

Appendix C

Executive Summary of the Provincial Corporate Base Map Content & Standards Review report by Sierra

STANDARD OPERATING PROCEDURE

MINISTRY OF SUSTAINABLE RESOURCE MANAGEMENT

Final

Report to

Ministry of Sustainable Resource Management

Provincial Corporate Base Map

Content & Standards Review

Version 1.0 – September 15th, 2001

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MINISTRY OF SUSTAINABLE RESOURCE MANAGEMENT

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Executive Summary

Previous initiatives sponsored by the former Land Use Coordination Office (now part of the Ministry of Sustainable Resource Management) indicated that there is a need for a Province Corporate Base Map. Sierra Systems and RLS Consulting Ltd. were contracted to explore base map content and standards (phase 1) and governance (phase 2) of a Provincial Corporate Base Map.

A series of stakeholders' workshops were conducted in July 2001 to identify user requirements, concerns and issues. For phase 1, the findings of these workshops were reviewed and analyzed by Sierra Systems, resulting in the following recommendations:

- Recognize base map information as a **Mission Critical** corporate asset of the BC Government, and manage it in accordance with good information resource management (IRM) principles.
- Establish a formal base map update program that includes updates from source data providers (i.e. contractors, resource managers, regions, districts and other programs.), and ensures the corporate base map database meets user requirements and is sustainable.
- Establish custodianship and clear lines of responsibility for base map information to ensure it continues to meet the needs of the province and other users.
- Establish an effective governance model for the management and funding of base map information
- Establish formal data exchange agreements, procedures and standards that facilitate on-going update of the corporate base map database from source data providers
- Establish a mechanism for notifying clients of base map updates.
- Update Transportation and Cadastre features on an on-going basis (at least annually). Other corporate base map features should be updated on a 5 year cycle, or as available from source providers
- Establish and maintain common corporate standards for base map information, including:
 - Geo-reference framework information (geodetic control)
 - Base map content and feature definitions
 - Positional accuracy
 - Topology rules (point, line and polygon)
 - Metadata and attribute linkage
 - Ortho-imagery products (photographic and satellite based)
 - Convert TRIM base map data from the current line-string / file based system to an integrated, seamless (province-wide) **Feature Based** corporate base map database

Establish and maintain both transportation and hydrographic feature network databases as integral components of the corporate base map information. These network databases should include a standardized attribute linkage model that can be used by all stakeholders

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- Undertake a review of the current hydrographic feature atlas (TRIM Watershed Atlas) with stakeholders to:
 - Identify shortfalls, issues and concerns
 - Clarify Roles and Responsibilities
 - Recommend changes to content, update procedures and standards to meet users needs
 - Establish an effective intra/internet based system for the on-going management of the corporate base map database, including tools for:
 - Edit/Update, QA/QC
 - On-line access
 - On-line reporting and analysis services

The findings and recommendations for Phase 2 of this project are detailed in a separate document entitled “Provincial Corporate Base Map Governance”, by RLS & Associates Consulting Inc.

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Introduction

This report documents the findings and recommendations of Phase 1 of the Corporate Base Map Review project. This project is the third in a series of projects commissioned by the former Land Use Coordination Office (LUCO) of the Province of BC - now part of the Ministry of Sustainable Resource Management (MSRM). Phase 1 of the project deals with Corporate Base Map Content and Standards. Phase 2 deals with Corporate Base Map Governance issues. The results of Phase 2 are included in a separate report by RLS & Associates, entitled "Provincial Corporate Base Map Governance"

Background

The former Land Use Coordination Office's (LUCO) mandate was to improve corporate direction and coordination of all inter-ministry strategic land-use planning initiatives including the provision of information and knowledge to these processes. The Assistant Deputy Ministers' Land Use and Coastal Committee directed LUCO to develop a corporate plan for critical government-wide land and resource inventory requirements, based on the business of government, and analyze the extent to which these needs are being met. This plan is referred to as the Provincial Land and Resources Corporate Inventory Plan. In order to develop this plan, LUCO launched two initiatives in 2000. LUCO contracted the services of Sierra Systems Group Inc (Sierra Systems) and RLS & Associates Consulting Inc. (RLS) to investigate and provide recommendations on these two initiatives.

The first initiative was to assess and improve the "blueprint" for Provincial Government Resource Inventory Programs. This involved an initial project (Current Assessment & Environmental Scan) to assess the scope and operation of provincial government inventory programs and to undertake an environmental scan of current and future business drivers and trends. Following this initial investigation, a subsequent project (Resource Inventory Data & Information Organizational Alternatives) was undertaken to explore alternative models and to propose more fundamental changes for the programs.

The second initiative involved a review of Provincial Government Legal Encumbrance Programs. This initiative was carried out in two phases. Phase 1 provided a "Current Assessment / Business Review" of all Provincial Government ministries involved in land-related or legal encumbrance programs effecting BC Crown lands. Phase 2, entitled "Future Directions / Corporate Priorities", provided an assessment of three alternative solutions to address the common problems identified in the first phase, and recommendations on fundamental changes for the legal encumbrance programs.

Reason For This Project

Both the Provincial Resource Inventory and Legal Encumbrances initiatives identified the need for a Provincial Corporate Base Map to be used to geo-reference the Resource Inventory and Legal Encumbrance Information. In fact, one of the recommendations from Phase 2 of the Legal Encumbrance Review was that: *"The government should undertake a business review of base mapping to define the key elements of a corporate base map and to determine appropriate governance of the program"*.

This project was carried out in response to this recommendation.

Project Objectives

This project is being undertaken in two phases.

The objectives for Phase 1 are:

- Identify the common key elements of a corporate base map (framework data).
- Provide recommendations on possible changes to base map content and standards.

The objectives for Phase 2 are:

- Review current governance issues regarding the management of Corporate Base Map data with GDBC and other parties.
- Provide recommendations on possible changes to the current governance model.

Document Scope

This document is focused on addressing Phase 1 objectives only. Phase 2 objectives are being addressed by a RLS & Associates in a separate report.

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The scope of this document includes:

- Identifying the key elements of a corporate base map that will meet the current and future business requirements of the Provincial Governments' Resource Inventory, Legal Encumbrance (Registry) and related Programs, and other key stakeholders and users outside the Provincial Government.
- Providing recommendations on possible changes to the base mapping content and standards that will ensure the corporate base map is current and accurate, and can be relied upon to meet the business requirements of the key stakeholder groups.

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Corporate Base Map Requirements Workshop

Approach

Four workshops were held over a two-week period during mid-July, 2001. The workshop participants included stakeholder representatives from land registry programs, land inventory programs and end-users. Follow up interviews were also carried out with several key stakeholder representatives unable to attend the workshops. Three additional interviews were held to include stakeholders unable to attend the scheduled workshops.

Representation included:

- 7 Ministries representatives (22 program areas)
- 3 Crown corporations organizations representatives
- 3 Private sector organizations representatives
- 3 Federal Government representatives
- 1 Local Government representative

A complete list of stakeholders consulted during this phase of the project is contained in appendix "F". The workshops and interviews were used to identify core base map requirements for each of the represented business areas.

During each workshop, each participant was asked for feedback on:

- Base map products currently being used in their business area
- Base map features needed for their business area
- The importance of accuracy / map scale, GIS readiness, metadata and currency, of base map data for their business area

Lastly, the participants were asked to identify issues and concerns, and any recommendations they wished to make. The participants on their review of the workshop minutes provided some additional requirement information. Several representatives that were unable to attend a workshop were interviewed separately regarding their base map requirements.

Information gathered at the workshops and interviews has been summarized and synthesized in this document, along with recommendations and suggestions for next steps.

Findings & Observations

User Community

The workshops and interviews conducted confirmed that there is a broad user community for provincial base map information.

Business areas represented included:

- Resource & Land Management (Inventory, Registry etc.)
- Infrastructure Management (Transportation, Utilities, Local Government etc.)
- Civic Information & Services (Emergency services, Local Government etc.)

Identified Base Map Requirements

Base Map Types

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Workshop participants were initially asked to list the base map products currently used to satisfy the needs of their business processes. The types of map products used to support the business processes varied and usually were confined to the specific needs of the individual organization.

Land registry owners (e.g., forest tenure) tended to have the most additional specific map type requirements (e.g., archaeological).

Although organizations use a range of base map products to satisfy various business needs, the MSRM TRIM, CDMS and Imagery (Ortho-photo and Satellite) had by far the highest usage:

The extent to which stakeholders use these products is:

- 95% incorporate TRIM
- 75% use CDMS/CLRS.
- 75% use Ortho-photo maps in some capacity. – (e.g., Imagery used for roads location verification, coastline identification, etc.).

This usage and a general consensus from workshop participants indicates that there are three types of base maps in regular use and required by the user community

- Topographic Base Map including; planimetry, toponomy, contours and DEM
- Ortho – Image Base Map including aerial photography and satellite imagery
- Cadastre Base Map including primary and secondary survey, and administrative boundaries

A summary of stakeholder usage of the primary base map products is contained in the appendices.

Topographic Base Map Features

Using federal framework data and TRIM feature categories as a reference, workshop participants were asked to identify the need for individual features based on their business requirements.

Responses were varied and included specific features such as cycling routes and ditches. Analyzing the responses however, indicates that the underlying requirements of all participants could be focused on four topographic feature categories

- Transportation features including; Roads, Railways and trails.
- Hydrographic features including; Rivers, Streams, Lakes and wetlands
- Hypsographic features including; Contour and Digital Elevation model
- Utility features including Transmission lines, Pipelines and other Manmade features.

These categories represent the features that are in regular use and required by the user community as critical to their business processes.

Transportation

The extent to which stakeholders required transportation-related features included:

- 95% required highways and public roads, private roads, resource roads, and railways

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- More than 75% were interested in trails data
- Approximately 50% interested in ferry route data
- Level of interest in other transportation network data was limited (e.g., confined to individual business area).
- BC Hydro, E-Comm, and the Provincial Emergency Program had the widest range of data needs for transportation features. The other organizations represented had a more narrow range of needs (e.g., LTO is concerned with legal boundaries only).

Hydrography

The extent to which stakeholders required hydrography-related features included:

- 95% require rivers/streams, lakes/reservoirs, and coastline data
- 75% require wetlands/marsh data
- 65% require glaciers / snow pack data
- 65% require flood plain data
- Utility, CRD and Environment Canada had the widest range of data needs

Elevations

The extent to which stakeholders required elevation-related features included:

- 90% require contours
- 70% require DEM
- 40% require Watershed / HOL
- 20-30% require spot heights, water elevation, bathometric contours

Utilities

The extent to which stakeholders required utilities-related features included:

- 90+% require transmission lines
- 70% require telecom
- 50+% require cable
- 30% require water/sewer
- Pipelines were of interest primarily to land encumbrance managers (e.g., Crown Lands, Mineral Titles, Forest tenures)

Structures

The extent to which stakeholders required man-made structure features included:

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- Majority (60-80%) required major structures; e.g., bridges, airports, dams, tunnels and large buildings
- Majority (50-70%) require seismic lines, mines, water wells, oil & gas, flumes & canals
- 30% require road barriers (decommissioned roads)
- Level of interest in other structures data was limited (e.g., Archaeological sites of interest only to land encumbrance managers)

Geodetic Control Features

Geodetic control was included in the feature types survey conducted in the workshops.

Although other participants agreed that geodetic control was valuable, participants representing registry and tenure administration programs in particular identified geodetic control as an integral component of a provincial base map to:

- Provide a geographic framework for a provincial base map
- Provide a foundation for the Active Control Network (ACN) used for capture and update of base map features using new GPS methods.

Identified Base Map Standards

Workshop Participants were asked to provide requirements and comment on Scale & Accuracy, Data Currency, GIS Readiness and Meta data.

Again the responses were varied and indicated that each topic had broad definition among the represented groups.

Scale & Accuracy

Most participants equated map scale with accuracy. It is important to note that workshop discussions on accuracy included positional accuracy and accuracy of content.

Scale

Participants were asked to identify the map scale(s) that are necessary to their business processes. Several participants indicated that in some cases requirements for map scale are defined through regulation and not by preference.

It was determined from the response that the 1:20,000 map scale was the most widely used scale among the represented groups and that the 1:20,000 map scale provides the most practical scale for resource and tenure administration with satisfactory accuracy.

Participant comments included:

- Each scale (requirement) applies to a particular use.
- 1:20,000 is the optimal scale

Positional Accuracy

Participants were asked to identify required data accuracy and comment on the data accuracy of available products currently being used to satisfy their business needs.

The general consensus from the group indicated that of all the available provincial government spatial data, TRIM topographic data and the Ortho-Image base maps generally met the positional accuracy requirements for each users business needs.

The group was equally concerned with relative accuracy versus absolute accuracy. The general consensus indicates that relative accuracy is required for cadastre, administrative and hydro graphic features while absolute accuracy is required for roads and utility features.

Several concerns were raised over the accuracy of TRIM when compared to provincial cadastre and other provincial data sets. This concern was primarily one of relative accuracy of one data set to another.

Participant comments included:

- Ground truthing required to validate streams

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- Relative accuracy between TRIM and cadastre
- Accuracy not a big deal as long as we reference the right piece of land. Relative accuracy is key.
- Absolute accuracy on roads and harvest blocks
- Forest Practices branch requires 10m accuracy for roads and 20m accuracy for vegetation

Content Accuracy

Participants representing hydrographic and wildlife management business areas identified the issue of content accuracy, particularly as it relates to currently available stream network. Comments from this user group noted that while feature density was part of the problem the main concern was to assure that the correct streams were being captured relative to the end user requirements and that these streams were being classified correctly.

Data Currency (Update Frequency)

Participants were asked to comment and identify their requirement for currency of base map data.

The general consensus of the group indicated that currency is an important aspect of a base map product. Current data is key to all represented groups who rely on base map data in analysis for business decisions.

Many different viewpoints were expressed on the issue of currency. The different business areas represented each had specific needs in terms of how the base map should be updated and the frequency of updates for specific features important to their business process.

In particular, participants noted that there needs to be appropriate representation from the user community to effect base mapping decisions and mechanisms in place for user updates and corrections to be posted to the provincial base map to avoid duplication of effort on both sides.

The comments gathered can be summarized into three major concerns, namely update immediacy, update cycle and update priority.

Update Immediacy

Most participants believe that the currency of base map data should be almost immediate.

While it is recognized that spatial data updates are generally resource intensive participants indicated that it was acceptable to have a lag time (short) for spatial updates however, attribute updates and Meta data should be available immediately, particularly for cadastre.

In addition participants noted that a mechanism for notifying base map clients of updates should be incorporated into any proposed base map management system

Update Cycle

In general participants indicated that the update cycle for base map data could be categorized into three feature-based cycles:

- 1 to 2 years
- Cadastre (ideally updated from source when created).
- Transportation (ideally updated from source when created)
 - 5 years
- Hydrography
- Utilities
- Imagery (Ortho-photos & satellite)
- Other Manmade and Natural Features

Actual statistics from the workshop indicate the same relative update frequency for Transportation and Cadastre however, discussion favored Cadastre as the most important feature for annual updates.

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Update Priority

While each area represented had particular needs when update priority was considered the general consensus indicated that cadastre, administrative boundaries, and roads had the highest priority concern among users for update. There was also a requirement identified to update hydrography to provide consistent (standard classification) coverage, Province-wide.

GIS Readiness

Participants were asked to identify their requirement for GIS ready data. This includes topologically valid data (level 3 topology) with spatial to attribute linkages.

90 % of the group identified GIS ready base map data as an immediate requirement for their business processes and indicated that roads and cadastre are the highest priority features for GIS readiness.

Participant comments included:

- The issue: either the source can clean up or the user will clean over and over
- Require associated attributes for cadastre – primarily PID
- New watershed atlas has topological problems – Hydro has been correcting these for themselves

Meta data

Participants were asked to identify their requirement for base map Meta data.

The general consensus of the group indicated that Meta data is an essential component of any base map product.

While this requirement was seen as an important component for a base map, the emphasis on the requirement for meta data was strongest from users performing analysis with the base map data. The requirement for Meta data was identified by content and type.

Meta Data Content

Most users were interested in Meta data content that described the origin of the data including:

- Who collected it
- How it was collected
- To what standard it was collected
- When it was updated

Versioning and version control was also identified as key Meta data components.

Meta Data Type

Most users indicated that both file Meta data and feature meta data are essential meta data types for base map data.

Examples of File Meta Data:

- Data type
- Map projection (storage)
- Version

Examples of Feature Meta Data:

- Data source
- Method of capture
- Accuracy standard
- Date Captured

Custodianship

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A very clear theme of custodianship and responsibility was generated when workshop participants were asked to identify issues and concerns and provide recommendations regarding the current state of base map availability and any future direction that may be taken.

Workshop participants all acknowledged that GDBC (BMGS) is the custodian of the provincial topographic and ortho-image base map products and expressed an expectation of what the custodial responsibilities should provide. The expectation has been distilled into three main categories:

1. Development and enforcement of data standards
2. Update frequency & maintenance of the data
3. Ease of access

Data Standards

Participant comments included:

- Base map standards need to be set, maintained and enforced for all users. Province-wide data standards are needed that enhance the integration of both spatial and attribute data.
- Stream network consistency and standards between TRIM I and TRIM II is an issue
- Access to good clean data is essential to the business process. For example, any data can be integrated into a base map. Concern is around the reliability and usability of that data.

Update & Maintenance

Participant comments included:

- Currency of the data can be managed separately for individual features. It also follows that currency of the data can be managed separately for the attribute and spatial component of a single feature
- A mechanism should be established for prioritizing base map updates.

Access

Participant comments included:

- A common (standardized, user-friendly) data portal for access to all-provincial government spatial data would be of benefit. Provincial base map data should be easy to access and available to all potential users. Access to good, clean GIS ready data is essential to the business process. Common meta data search capabilities of provincial spatial holdings would be of benefit.
- TRIM purchasing procedures (current) are cumbersome and not user friendly.

Recommendations

From the preceding findings and observations, Sierra systems has developed the following recommendations:

Base Mapping Program

- Recognize base map information as a **Mission Critical** corporate asset of the BC Government, and manage it in accordance with good information resource management (IRM) principles.
- Establish a formal base map update program that includes updates from source data providers (i.e. contractors, resource managers, regions, districts and other programs.), and ensures the corporate base map database meets user requirements and is sustainable.

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- Establish custodianship and clear lines of responsibility for base map information to ensure it continues to meet the needs of the province and other users.
- Establish an effective governance model for the management and funding of base map information
- Establish formal data exchange agreements, procedures and standards that facilitate on-going update of the corporate base map database from source data providers
- Establish a mechanism for notifying clients of base map updates.

Base Mapping Standards

- Update Transportation and Cadastre features on an on-going basis (at least annually). Other corporate base map features should be updated on a 5 year cycle, or as available from source providers
- Establish and maintain common corporate standards for base map information, including:
 - Geo-reference framework information (geodetic control)
 - Base map content and feature definitions
 - Positional accuracy
 - Topology rules (point, line and polygon)
 - Metadata and attribute linkage
 - Ortho-imagery products (photographic and satellite based)
 - Convert TRIM base map data from the current line-string / file based system to an integrated, seamless (province-wide) **Feature Based** corporate base map database
 - Establish and maintain both transportation and hydrographic feature network databases as integral components of the corporate base map information. These network databases should include a standardized attribute linkage model that can be used by all stakeholders.
 - Undertake a review of the current hydrographic feature atlas (TRIM Watershed Atlas) with stakeholders to:
 - Identify shortfalls, issues and concerns
 - Clarify roles and responsibilities
 - Recommend changes to content, update procedures and standards to meet users needs

Base Map Management & Accessibility

- Establish an effective intra/internet based system for the on-going management of the corporate base map database, including tools for:
 - Edit/Update, QA/QC
 - On-line access
 - On-line reporting and analysis services

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Appendix A. Summary of Workshop Participants Issues and Concerns

Economic Issues/Concerns

- What are the financial arrangements for obtaining base map data? Who's funding base maps? Concern with costing and data availability (in Crown Lands, they are looking at integrated model for registry - user fees, funding, available product, and cost effective in terms of acquisition).
- (Forests perspective) Need to get money together to finish base in TRIM II, set standards and then maintain them. Need to identify private sector money that can be used for base map funding. Communication is key.
- Production cost of ortho-photo is minimal – requesting agencies should consider the small extra cost at the same time.
- Cost recovery by municipalities and alike seriously restricts availability and use of data (CHR perspective).
- Scope of data set acquisition (e.g., number of map sheets that are purchased) is an issue due to the individual mapsheet costs.
- The ongoing cost of the road network data is an issue. Provincial ownership of GIS road network data (or similar) and integration of that data into a Provincial Corporate Base Map would act to lower business cost of all end users.

General Business Process Issues/Concerns

- User Community represents the general business needs of government. There is a need to ensure proper representation from the user community in base mapping decisions. Are both private and public organizations adequately contributing to the solution.
- When a business area detects the need for new data, how will it be decided whether this new data is to be considered corporate data? How do we integrate the new data, and/or connect it to the existing base? What responsibility does the collecting agency have?
- MSRM believes that a “corporate digital atlas” and not just a base map is required.
- Long-term survivability/sustainability of data is an issue (i.e., after TRIM II completed). How is TRIM II to be kept current, and who will be responsible for doing it?
- How will base data duplication within government be stopped. There is no use in having the base unless everyone uses it (strong governance is required to enforce usage of Base standards). E.g., existing non-TRIM hydrography collected by Water Management Branch is an issue – GDDB does not want this data if it does not meet TRIM standard – therefore it is not available to others.
- Mechanisms for user updates and corrections to be effectively posted to the source data set to prevent the duplication of effort by the user community when errors are detected or updates are made.

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- Access to good, clean GIS ready data is essential to the business process. For example, Any data can be integrated into base map. Concern is around the reliability and usability of that data.
- Environment Canada will enhance substandard data or creates home brew data sets when reliable data is unavailable or cost prohibitive. Required data is acquired at the cheapest source that ultimately provides substandard data (as data massaging or “value added” activities by third party vendors ultimately degrade the original source data).
- Like any data, GIS spatial/attribute data must be FOI-able.
- Parks can be created or changed by OIC but the changes are not reflected in the provinces map products in a timely manner.
- Permanent and Experimental plots are not mapped because they do not have protected status. Permanent and Experimental plots require protected status.
- Ortho-photos (CANFOR) should not be part of the base map. How will the inventory of ortho-photo’s be kept up to date?
- TRIM purchasing procedures are cumbersome and not user friendly (BCH perspective) – BC Online issue.
- No corporate definition of ‘GIS ready’.
- Integration of multiple data sources to a single positional accuracy – Assurance that all positional accuracy of all features falls within an acceptable standard.
- The challenge in developing a corporate base map will be overcoming the system development viewpoint of the base map. Emphasis must be placed on the users need for flexibility and awareness of the base map product.
- Timeless / Seamless base map – A base map must not only be seamless, it must be timeless. Data comes from multiple sources over time and there is a need to create a snapshot of the data at a specific point in time.
- There are no currently available provincial products that address linear networking. MOTH believes that a corporate base map should include linear referencing tied to their linear referencing model.
- Substantive Meta data and attributes should be available for all base map features to provide for query by geographic area, attribute or layer.
- Multiple data custodians managing the content and meta data of specific base map layers is the only way to ensure currency of a complete provincial base map.
- Corporate base Map must be available to all agencies

Specific Data Quality Issues/Concerns

- Single (base map) source and standards are required (some data duplicated between TRIM and Vegetation inventory) when business opportunity arises – e.g., to bring (Forest) vegetation inventory up to TRIM standard.
- There are issues around tenures that cross map sheets (TRIM I crosses TRIM II..... GDBC is trying to integrate both standards (different from one to the other) and mapsheets together – difference of many years between datasets). Essential to have a good, homogeneous base.

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- Density of existing stream network is an issue. Stream network consistency and standards between TRIM I and TRIM II is an issue
- There is no custodian for Soils or Terrain Stability. The data is poor and unorganized. There is no accounting for what has actually been done and where the (soils) information resides. The problem was compounded by the fact that digital standards were being developed at the same time as the data was being collected.
- Topological integrity issues in TRIM and TWA data (elevation errors). Some data comes from groups with standards and some with minimal standards the translation and massaging of data causes operation problems during integration for business use
- Gross errors in TRIM toponomy have forced forest resource inventory to duplicate the effort to achieve accuracy.
- “The relative accuracy between TRIM and Cadastre data is a concern.”
- Mineral Tenure data is not GIS ready
- A rigid custodial standard in regards to scale, accuracy and topology is not practical. The provincial standard needs to be open to different levels of accuracy and levels of completeness.

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Appendix B. Summary of Workshop Participant Recommendations

General Recommendations

- Users would like the opportunity to provide more feedback (especially organizations outside government) in base map development process. This is consistent with GDBC goal (of having users drive further base map direction).
- Base map definition should be limited to common spatial map features only.
- Specify a custodian of each Base Map feature (which will hopefully reduce data duplication across stakeholders).
- Base Map standards need to be set, maintained and enforced for all users. Province-wide data standards are needed that enhance the integration of both spatial and attribute data components.
- A common base map should exist as a “virtual base” to complement the business specific data of government and the private sector.
- Data standards developed at the corporate level should consider most users’ needs prior to developing the map product.
- Most (all?) base map features should be GIS ready.
- Currency of the data can be managed separately for individual features. It also follows that currency of the data can be managed separately for the attribute and spatial component of a single feature.
- Stakeholders (users) should be notified immediately when new data becomes available (either metadata and/or spatial features).
- A mechanism should be established for prioritizing base map updates.
- Cadastre, Transportation and Hydrography were identified as key components of the corporate base map. The Cadastre Fabric (Crown and Private lands) was identified as a key component of the corporate base map.
- Improved integration of the data and GIS with business applications.
- A common (standardized, user-friendly) data portal for access to all provincial government spatial data would be of benefit. Provincial base map data should be easy to access and available to all potential users. Access to good, clean GIS ready data is essential to the business process. Common meta data search capabilities of provincial spatial data holdings would be of benefit.
- There is a need to establish a corporate base map definition.
- Establish a Data Registry to make the data discoverable.
- Develop a base map model that can be expanded or adapted easily and cheaply
- Any base map initiative must have a user awareness component.

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- The provincial base map must be timeless and seamless driven by a major meta data component

Data-Specific Recommendations

- Satellite imagery must be high resolution (20 meter min.) to be useful.
- Must finish TRIM II.
- Jurisdictional differences (from one part of the province to the other) can and should be reflected in a base map
- Linkages are required between the Forest Atlas and the Forest Tenures Administration System (FTAS).
- Incorporate smart toponomy into TRIM.
- Enhance coastline definition.
- Permanent and Experimental plots require protected status.
- Single source and standards are required for openings (some data duplicated between TRIM and Vegetation inventory) – e.g. there is a business opportunity to bring Vegetation inventory up to TRIM standard.
- Ortho-photos should not be part of the base map (CANFOR).
- There is a need to create a representational base map product on an ortho-photo base (Forests Vegetative Inventory perspective).
- Incorporate the GISI (or similar) road network into the Provincial Corporate Base Map

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Appendix C. Base Map Products Currently Used Survey

Organization	Department/Program	Map Product Type and Usage (X = Used)																										
		TRIM	Mof FC1 / Veg	MSRM CDMS/CLRS	Orthophoto	Satellite Imagery	Federal NTS Topo	BTM	Generalized Version	CAD	TWA (Watershed Atlas)	LUCO	Road Atlas (GIS)	street atlas	NDII	data	TRIM (Watershed Atlas)	NTS 1:31,680	Archaeological	Mineral Tenure	Petroleum	CHS	Multi Beam	LIDAR	TEMS/PEMS	Multi Spectral	TCN (Trans Cntrline Network)	Transport Canada Road Base
BC Hydro	Geographic Information Business Services	X	X	X	X	X	X			X	X	X																
CANFOR		X	X	X	X	X	X															X						
Capital Regional District		X	X	X	X	X	X					X																
E-Comm		X	X									X																
Environment Canada	Applications & Services	X	X		X	X	X	X			X				X													
Federal Department of Fisheries and Oceans	Canadian Hydrographic Service	X			X		X														X	X	X					
Insurance Corp. of BC	Crime Crash & Contravention	X										X																
McElhanney Surveys Ltd.																												
Min. of Attorney General	Land Titles Branch																											
Min. of Energy & Mines	Geological Survey Branch	X				X	X																					
Min. of Energy & Mines	Mineral Titles Branch	X	X			X	X		X									X										
Min. of Energy & Mines	Petroleum Lands Branch	X					X																					
Min. of Forests	Forest Practices Branch	X	X	X	X	X	X																	X	X			
Min. of Forests	Forest Protection Branch	X	X		X	X	X																					
Min. of Transportation		X		X	X	X	X					X																
Min. of Public Safety and Solicitor General	Provincial Emergency Program	X		X	X		X					X	X															
Min. of Sust. Res. Mgmt.	Corporate and Client Services																											
Min. of Sust. Res. Mgmt.	Crown Lands Branch	X	X	X	X	X									X	X												
Min. of Sust. Res. Mgmt.	Fisheries	X	X	X	X	X	X														X							
Min. of Sust. Res. Mgmt.	Forest Tenures	X	X	X	X	X	X								X	X	X	X	X	X								
Min. of Sust. Res. Mgmt.	GDBC	X			X	X	X																					
Min. of Sust. Res. Mgmt.	Information Provision Branch	X	X	X	X	X	X	X			X	X	X															
Min. of Sust. Res. Mgmt.	Mineral Titles Branch	X		X	X		X		X								X	X	X	X	X							
Min. of Sust. Res. Mgmt.	Resource Inventory Branch (Veg)	X	X	X	X	X	X																					
Min. of Sust. Res. Mgmt.	Resource Inventory Branch (Water)	X		X	X	X	X														X							
Min. of Sust. Res. Mgmt.	Resource Inventory Branch (Wildlife)	X	X	X	X	X	X														X			X				
Min. of Sust. Res. Mgmt.	Vancouver Region	X	X	X	X	X	X																					
Min. of Sust. Res. Mgmt.	Water Management Branch	X		X	X	X	X		X																			
Min. of W/L/A Protection	Fisheries Branch	X	X		X		X	X	X																			
Natural Rrcs Canada	Geological Survey	X	X		X	X	X														X	X	X		X			X
Timberline		X	X	X	X	X					X																	

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Appendix D. Base Map Features Survey Matrix

Organization	Department/Program	Transportation																	
		Highways and Public Private Roads	ReSource roads	Non-Tenured Roads	Tenured Roads	Decommissioned Roads	Railways	Ferry Routes	Trails	Skid Trails	Streets and Alleys	Cycle Routes	Mass Transit Infrastructure	Waterways	Air routes	Air Strips	Park Roads	First Nation Roads	Commercial Shipping /Cruise Ship Lanes
BC Hydro	Geographic Info Business	X	X	X				X	X	X	X	X	X	X	X				
CANFOR		X	X	X				X	X	X	X	X							
Capital Regional District		X	X	X				X	X	X	X	X							
E-Comm		X	X	X				X	X	X	X	X	X			X			
Environment Canada	Applications & Services	X	X	X				X	X	X					X	X			X
Dep't of Fisheries & Oceans	Canadian Hydrographic	X	X					X	X		X								X
Insurance Corp. of BC	Crime Crash & Contravention	X	X	X				X	X	X	X	X	X						
McElhanney Surveys Ltd.		X	X	X				X	X										
Min. of Attorney General	Land Titles Branch																		
Min. of Energy & Mines	Geological Survey Branch	X	X	X				X		X	X								
Min. of Energy & Mines	Mineral Titles Branch	X	X	X				X	X	X									
Min. of Energy & Mines	Petroleum Lands Branch	X	X	X				X	X	X									
Min. of Forests	Forest Practices Branch	X	X	X				X		X									
Min. of Forests	Forest Protection Branch	X	X	X				X		X	X								
Min. of Transportation		X	X	X				X	X	X	X	X	X	X	X	X	X	X	
Min. of PS & Solicitor General	Provincial Emergency Program	X	X	X				X	X	X	X	X			X				X
Min. of Sust. Res. Mgmt.	Corporate and Client Services	X	X	X				X		X									
Min. of Sust. Res. Mgmt.	Crown Lands Branch	X	X	X				X	X	X						X			
Min. of Sust. Res. Mgmt.	Fisheries Branch	X	X	X						X									
Min. of Sust. Res. Mgmt.	Forest Tenures	X	X	X	X	X	X	X		X						X			
Min. of Sust. Res. Mgmt.	GDBC	X	X	X				X											
Min. of Sust. Res. Mgmt.	Information Provision Branch	X	X	X				X	X	X					X	X			
Min. of Sust. Res. Mgmt.	Mineral Titles Branch	X	X	X				X	X	X						X			
Min. of Sust. Res. Mgmt.	Resource Inventory (Vegetation)	X	X	X				X	X	X	X								
Min. of Sust. Res. Mgmt.	Resource Inventory (Water)	X	X	X				X		X									
Min. of Sust. Res. Mgmt.	Resource Inventory (Wildlife)	X	X	X				X	X	X	X								
Min. of Sust. Res. Mgmt.	Vancouver Region	X	X	X				X	X										
Min. of Sust. Res. Mgmt.	Water Management Branch	X	X	X				X	X										
Min. of W/L/A Protection	Fisheries Branch	X	X	X				X	X										
Natural Resources Canada	Geological Survey Canada	X	X	X				X	X	X									
Timberline		X	X	X				X	X	X									

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Organization	Department/Program	Hydrography											Elevations					Utilities						
		Rivers & Streams	Lakes & Reservoirs	Coastline	Glaciers & Snow Pack	Flood Plain	Rapid & Falls	Inter Tidal Zone	Sand Bars	Islands	Acquifers	Water Intake	Ditches	Wetlands (Marsh/Swamp)	Contours	DEM & Breaklines	Spot Heights	Bathometric Contours	Water Elevation	Watershed / HOL	Transmission Line	Telecom	Cable	Water / Sewer
BC Hydro	Geographic Info Business	X	X	X		X	X	X	X	X			X	X	X			X	X	X	X	X	X	
CANFOR		X	X	X	X	X					X	X	X	X	X			X	X	X	X	X		
Capital Regional District		X	X	X		X	X	X		X			X	X	X		X		X	X	X	X	X	
E-Comm		X	X	X	X	X	X						X	X	X					X	X		X	
Environment Canada	Applications & Services	X	X	X	X	X		X	X	X			X	X	X		X		X	X	X		X	
Dep't of Fisheries & Oceans	Canadian Hydrographic	X	X	X							X		X	X		X				X	X	X		
Insurance Corp. of BC	Crime Crash & Contravention	X	X	X	X					X														
McElhanney Surveys Ltd.		X	X	X	X	X															X			
Min. of Attorney General	Land Titles Branch																							
Min. of Energy & Mines	Geological Survey Branch	X	X	X	X	X							X	X	X	X			X	X		X		
Min. of Energy & Mines	Mineral Titles Branch	X	X	X	X									X						X	X	X		
Min. of Energy & Mines	Petroleum Lands Branch	X	X											X						X				
Min. of Forests	Forest Practices Branch	X	X	X	X	X					X	X	X	X	X	X		X	X	X	X	X		
Min. of Forests	Forest Protection Branch	X	X	X	X								X	X	X	X		X		X	X	X		
Min. of Transportation		X	X	X	X	X		X	X	X			X	X	X	X	X	X	X	X	X	X	X	X
Min. of PS & Solicitor General	Provincial Emergency Program	X	X	X	X	X	X	X					X	X						X	X	X	X	
Min. of Sust. Res. Mgmt.	Corporate and Client Services																							
Min. of Sust. Res. Mgmt.	Crown Lands Branch	X	X	X									X	X	X	X				X	X		X	
Min. of Sust. Res. Mgmt.	Fisheries Branch	X	X	X	X	X							X	X	X	X		X	X		X	X		
Min. of Sust. Res. Mgmt.	Forest Tenures	X	X	X	X	X							X	X	X	X				X	X	X		X
Min. of Sust. Res. Mgmt.	GDBC																							
Min. of Sust. Res. Mgmt.	Information Provision Branch	X	X	X	X	X	X	X					X	X	X		X		X	X	X	X	X	
Min. of Sust. Res. Mgmt.	Mineral Titles Branch	X	X	X	X								X	X		X				X	X			X
Min. of Sust. Res. Mgmt.	Resource Inventory (Vegetation)	X	X	X	X	X							X	X	X				X	X	X	X		
Min. of Sust. Res. Mgmt.	Resource Inventory (Water)	X	X	X	X	X					X	X	X	X	X		X	X	X	X	X	X		
Min. of Sust. Res. Mgmt.	Resource Inventory (Wildlife)	X	X	X	X	X						X	X	X	X		X	X	X	X	X	X		
Min. of Sust. Res. Mgmt.	Vancouver Region	X	X	X	X			X						X	X				X	X	X	X	X	
Min. of Sust. Res. Mgmt.	Water Management Branch	X	X	X		X								X	X				X	X				
Min. of W/L/A Protection	Fisheries Branch	X	X	X		X	X	X					X	X	X		X		X	X	X	X	X	
Natural Resources Canada	Geological Survey Canada	X	X	X	X	X						X	X	X	X	X		X	X	X		X		
Timberline		X	X	X	X	X	X						X	X	X		X		X	X	X	X	X	

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Organization	Department/Program	Imagery		Map Grid							Cadastral							Other																
		Orthophoto	Satellite	1:20000	1:50000	1:250000	1:500000	1:31680	1:5000	1:10000	Borden Grid	Military Grid	Custom	Primary Survey	Secondary Survey	Mile Post & other surveys	Surveys of subsurface	R.O.W. Surveys	Land Act Tenures	Forest Tenures	Geodetic Control	ACS Repeaters	Geographic Names	Geomorphologic Features (e.g., Eskers)	Toponymy	Photo Centers	Linear Reference	GPS Visibility Polygons	Mud/Land Slide	Commercial Names	Karst Topography			
BC Hydro	Geographic Info Business	X	X	X	X	X							X	X				X	X	X	X	X												
CANFOR		X		X									X	X																	X			
Capital Regional District		X	X	X	X	X							X	X						X	X	X	X											
E-Comm		X	X	X	X								X	X								X												
Environment Canada	Applications & Services	X	X	X	X	X							X	X				X	X	X	X	X												
Dep't of Fisheries & Oceans	Canadian Hydrographic	X		X	X	X														X														
Insurance Corp. of BC	Crime Crash & Contravention																					X									X			
McElhanney Surveys Ltd.		X	X	X	X	X	X													X														
Min. of Attorney General	Land Titles Branch			X	X	X	X						X	X																				
Min. of Energy & Mines	Geological Survey Branch	X	X	X	X	X																			X									
Min. of Energy & Mines	Mineral Titles Branch			X	X	X	X						X	X																				
Min. of Energy & Mines	Petroleum Lands Branch	X	X																															
Min. of Forests	Forest Practices Branch	X	X	X									X	X											X							X		
Min. of Forests	Forest Protection Branch	X	X	X	X	X						X	X	X																				
Min. of Transportation		X	X	X	X	X	X	X	X				X	X			X	X	X	X	X	X	X			X	X	X						
Min. of PS & Solicitor General	Provincial Emergency Program	X										X	X	X								X	X											
Min. of Sust. Res. Mgmt.	Corporate and Client Services																																	
Min. of Sust. Res. Mgmt.	Crown Lands Branch	X	X	X	X	X							X	X	X	X	X																	
Min. of Sust. Res. Mgmt.	Fisheries Branch	X	X	X	X	X							X	X											X									
Min. of Sust. Res. Mgmt.	Forest Tenures	X	X	X	X	X	X						X	X	X	X	X			X				X										
Min. of Sust. Res. Mgmt.	GDBC																																	
Min. of Sust. Res. Mgmt.	Information Provision Branch	X	X	X	X	X				X			X	X								X	X											
Min. of Sust. Res. Mgmt.	Mineral Titles Branch	X		X	X	X							X	X	X	X	X			X				X										
Min. of Sust. Res. Mgmt.	Resource Inventory (Vegetation)	X	X	X									X	X											X								X	
Min. of Sust. Res. Mgmt.	Resource Inventory (Water)	X		X	X	X							X	X																				
Min. of Sust. Res. Mgmt.	Resource Inventory (Wildlife)	X	X	X	X	X	X						X												X									X
Min. of Sust. Res. Mgmt.	Vancouver Region	X	X	X	X								X	X			X	X	X		X													
Min. of Sust. Res. Mgmt.	Water Management Branch			X	X	X							X	X						X														
Min. of W/L/A Protection	Fisheries Branch			X	X																	X												
Natural Resources Canada	Geological Survey Canada	X	X	X	X	X	X						X	X						X	X	X	X										X	
Timberline		X	X	X	X	X				X			X	X						X	X	X	X											

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Organization	Department/Program	Administrative																													
		International Boundaries	Provincial Boundaries	Electoral Districts	Municipal Boundaries	DND Properties	First Nation Reserves	Crown Lands	Parks (Fed, Prov, Regional)	Ecological Reserve	Watershed/HOL	Land District	Mine Districts	Recreation Areas	Protected Areas	Muskwa-Kechimka	Regional Water District	Designated Placer Areas	Provincial Forest	TSA and TFL	Agricultural Res.	Planning (LRMP)	Special Management Zones	Land Titles	Forest Tenure	Forest District & Regional	Pulp Wood Area / Agreement	FDP	Incorporated Areas	SOI/Neg Treaty Land	BC Assessment Authority
BC Hydro	Geographic Info Business	X	X	X	X	X	X	X	X		X			X						X			X								X
CANFOR		X	X	X	X	X	X	X			X			X											X						
Capital Regional District		X	X	X	X	X	X	X			X			X							X			X							X
E-Comm		X	X	X	X	X	X	X			X																				
Environment Canada	Applications & Services	X	X	X	X	X	X	X			X			X							X			X							X
Dep't of Fisheries & Oceans	Canadian Hydrographic	X	X			X	X	X			X			X																	
Insurance Corp. of BC	Crime Crash & Contravention			X	X		X	X			X																				
McElhanney Surveys Ltd.																															
Min. of Attorney General	Land Titles Branch																														
Min. of Energy & Mines	Geological Survey Branch	X	X				X	X							X																
Min. of Energy & Mines	Mineral Titles Branch																														
Min. of Energy & Mines	Petroleum Lands Branch																														
Min. of Forests	Forest Practices Branch	X	X	X	X	X	X	X			X			X							X				X						
Min. of Forests	Forest Protection Branch	X	X		X	X	X	X			X			X							X				X	X					
Min. of Transportation		X	X	X	X	X	X	X			X			X							X								X	X	X
Min. of PS & Solicitor General	Provincial Emergency Program	X	X	X	X	X	X	X			X			X															X	X	
Min. of Sust. Res. Mgmt.	Corporate and Client Services																														
Min. of Sust. Res. Mgmt.	Crown Lands Branch	X	X	X	X	X	X	X			X		X	X	X	X	X	X	X		X										
Min. of Sust. Res. Mgmt.	Fisheries Branch	X	X		X	X	X	X						X							X				X						
Min. of Sust. Res. Mgmt.	Forest Tenures	X	X		X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Min. of Sust. Res. Mgmt.	GDBC																														
Min. of Sust. Res. Mgmt.	Information Provision Branch	X	X	X	X	X	X	X			X			X							X			X							X
Min. of Sust. Res. Mgmt.	Mineral Titles Branch	X	X		X	X	X	X		X	X	X	X	X	X	X	X	X	X				X	X							
Min. of Sust. Res. Mgmt.	Resource Inventory (Vegetation)	X	X	X	X	X	X	X						X							X				X						
Min. of Sust. Res. Mgmt.	Resource Inventory (Water)	X	X		X	X	X	X			X			X							X				X						
Min. of Sust. Res. Mgmt.	Resource Inventory (Wildlife)	X	X	X	X	X	X	X						X							X				X						
Min. of Sust. Res. Mgmt.	Vancouver Region	X	X		X	X	X	X			X			X							X										X
Min. of Sust. Res. Mgmt.	Water Management Branch																														
Min. of W/LA Protection	Fisheries Branch	X	X		X	X	X	X			X			X							X			X							X
Natural Resources Canada	Geological Survey Canada	X	X		X	X	X	X																							
Timberline		X	X		X	X	X	X						X							X										

Appendix E. Base Map Standards Survey

Scale and Accuracy

Organization / Department	Requirements/Comments
Min. of Energy & Mines - Petroleum Lands Branch	Using 1:20, 1:50 and 1:250 Sub meter petroleum grid defined through regulation 1:20 is the optimal scale
Min. of Energy & Mines - Mineral Titles Branch	Moving to 1:20,000 Currently using old ½ mile
McElhanney Surveys	Survey closure 1:2,500 – 1;5000 required by regulation
Min. of Attorney General - Land Titles Branch	LTO not concerned with scale
Min. of Sust. Res. Mgt – Crown Lands Branch	1: 20000 (reference base). With the spatial data it is scalable to whichever scale you require. CDMS compiled at 1:20 000 originally.
Min. of Sust. Res. Mgt – Mineral Titles Branch	1:20,000
Min. of Sust. Res. Mgt. – Forest Tenures	1:20000 (forest practices code).
Min. of Sust. Res. Mgt. – Water Management Branch	Accuracy not a big deal as long as we reference the right piece of land Relative accuracy is key (CAD in particular) Spatial accuracy is of lesser importance
Federal Department of Fisheries & Oceans – Canadian Hydrographic Survey	1:10k – 1:50k No common scale Accuracy relative to hydrographic features
Min. of Forests – Forest Practices Branch	1:20k +- 10 M for Roads +- 20 M for Vegetation cover
Min. of Energy & Mines – Geological Survey Branch	1:20k – 1:2 million Relative accuracy important
CANFOR	1:20k +- 10 M for Roads +- 20 M for Vegetation cover
Min. of Sust. Res. Mgt. – Resources Inventory (Vegetation)	1:20k +- 10 M for Roads +- 20 M for Vegetation cover
Min. of Sust. Res. Mgt. – Fisheries Branch	1:5k for streams 1:20k & 1:50k for Each scale applies to a particular use. TRIM II additions to streams are of little value with out ground truthing. Relative accuracy between streams and cadastre is important
Natural Resources Canada – Geological Survey Canada	1:20, 1:50, 1:250 relative accuracy important

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Organization / Department	Requirements/Comments
Min. of Sust. Res. Mgt. – Resources Inventory (Wildlife)	<p>1:30m for ecosystem overview</p> <p>1:2 m for ecosystem overview</p> <p>1:250k for wildlife capability/suitability strategic planning (Broad Ecosystem Inventory BEI)</p> <p>1:50k Landscape unit strategic planning</p> <p>1:20k Operational level mapping (Terrestrial Ecosystem, Sensitive Ecosystem and Predictive Ecosystem Mapping)</p> <p>1:20k Compilation of Terrestrial Ecosystem Mapping and Vegetation Resource Inventory</p> <p>(this is new and under development, biosphere mapping for a lack of a name for now)</p> <p>1:5 000 rarely produced. Reserved for small parks conservation assessments.</p> <p>+ - 10m for roads and water features</p> <p>We use 1:20 as our main base for endangered species</p>
Min. of Sust. Res. Mgt. – Resources Inventory (Water)	<p>1:5k in populated valley bottoms, 1:20k elsewhere</p> <p>+ - 10 M for Roads</p> <p>Accurate cadastre is essential</p>
BC Hydro	<p>¼ meter accuracy required for hydro corridors – capture by BCH</p> <p>Absolute accuracy is most important</p>
Min. of W/L/A Protection – Fisheries Branch	<p>Scales used – 1:5k, 1:20k and 1:50k</p> <p>Higher scale for generalized applications</p> <p>Relative Accuracy is important for all Streams, roads and habitat protected areas</p> <p>Main concern of consistency between existing map product</p> <p>Ground truthing required to validate streams</p>
E-Comm	<p>1:5K</p> <p>Absolute accuracy for roads</p> <p>Relative accuracy for streams</p>
Environment Canada	<p>1:5k – wildlife and urban areas</p> <p>1:20k - adequate for meteorological</p> <p>Relative accuracy is important</p>
Timberline / Inform	<p>1:20k</p> <p>1:5k if available</p> <p>Absolute accuracy on roads and harvest blocks</p>
Min. of Sust. Res. Mgt. – Vancouver Region	<p>1:20k</p> <p>1:5k if available</p> <p>Absolute accuracy on roads and harvest blocks</p>
Min. of Public Safety & Solicitor General – Provincial Emergency Program	<p>1:20k rural</p> <p>1:5k urban</p> <p>Relative accuracy is important</p>
Min. of Sust. Res. Mgt. – Information Provision Branch	<p>1:20k mostly</p> <p>1:5k and larger for survey plans</p> <p>Relative accuracy between TRIM and Cadastre.</p>

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Organization / Department	Requirements/Comments
Capital Regional District	1:20 to 1:1k Absolute accuracy for cadastre and infrastructure
Insurance Corporation of British Columbia	No common scale Accuracy for road network features – Lat/Long to six decimal places Absolute accuracy required - Incidents are located by Lat/Long point locations Reference data should tie to the road network with an acceptable tolerance
Ministry of Forests Forests Protection Branch	1:20,000 Sequential Accuracy – Relative accuracy enhanced with metadata provides relative accuracy of one feature to another and ensures the feature follows sequentially along a linear path (example sign posts)
Ministry of Transportation	No minimum scale requirement - scale is dependant on data source Sequential Accuracy – Relative accuracy enhanced with metadata provides relative accuracy of one feature to another and ensures the feature follows sequentially along a linear path (example sign posts)

Currency

Organization / Department	Requirements/Comment
Petroleum Lands Branch	Currency is dependant on feature
Min. of Attorney General - Land Titles Branch	Currency is split between immediacy of attribute and currency of physical map features For CAD and ADM data. Attributes are more important It is more important for the attribute to be up to date Having a lag time (short) for spatial updates is not a bad thing
Land Titles Branch / Water Management Branch	Knowledge is required for identifying a change vs actual map updates To facilitate status activities etc. i.e If a new park is estab the actual map update could happen 6 months from the actual park creation
McElhanney Surveys	Agrees with previous comment Consider how data is submitted. Submitted data should be directly integrated into the Corporate base map
Min. of Sust. Res. Mgt – GDBC	Ideally the user should update the data but how do you let the client post a change?
Min. of Sust. Res. Mgt – Crown Lands Branch	Cadastre is # 1 priority, Administration Boundaries 2 nd and any geodetic control.
Min. of Sust. Res. Mgt – Mineral Titles Branch	Parks and everything related to them (protected areas, ecological reserves). Roads are less important.
Min. of Sust. Res. Mgt. – Forest Tenures	Mineral tenure, new surveys, roads, databases (TRIM Watershed ATLAS), Land Act (new parks), etc
Federal Department of Fisheries & Oceans – Canadian Hydrographic Survey	Currency Important - Yes for navigational hazards Update Cycle: <ul style="list-style-type: none"> 5 years for land features
Min. of Forests – Forest Practices Branch	Currency Important – Yes Update Cycle: <ul style="list-style-type: none"> 2 years for openings and roads

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Organization / Department	Requirements/Comment
	<ul style="list-style-type: none"> 5 years for parks
Min. of Energy & Mines – Geological Survey Branch	Currency Important – Yes Update Cycle: <ul style="list-style-type: none"> 2 years for transportation (access)
CANFOR	Currency Important – Yes Update Cycle: Annual cut block updates
Min. of Sust. Res. Mgt. – Resources Inventory (Vegetation)	Currency Important – Yes Update Cycle: <ul style="list-style-type: none"> 2 years for openings and roads 5 years for parks
Min. of Sust. Res. Mgt. – Fisheries Branch	Currency Important – Yes Update Cycle: Annual urban streams update
Natural Resources Canada – Geological Survey Canada	Currency important, update 2 years for roads
Min. of Sust. Res. Mgt. – Resources Inventory (Wildlife)	Currency important – Yes Update cycle – 5 years Ecosystem boundaries copied from base map features such as rivers, lakes and contours. We are updating information on our maps on a continual basis
Min. of Sust. Res. Mgt. – Resources Inventory (Water)	Update Cycle: <ul style="list-style-type: none"> 6 months for cadastre asap for administrative boundaries and water features 2 to 5 yrs for other planimetric information
BC Hydro	Currency important – roads hydrology 5 year update cycle on all base features
Min. of W/L/A Protection – Fisheries Branch	Currency important – roads hydrology Annual update cycle for resource inventory Update Cycle: <ul style="list-style-type: none"> 5 year for all other features
E-Comm	Currency important – roads Update Cycle: <ul style="list-style-type: none"> Quarterly update cycle for resource inventory
Environment Canada	Currency important – hydrology Update Cycle: <ul style="list-style-type: none"> 2 year for orthophoto and land use 5 years for all other features
Timberline / Inform	Currency important – harvest blocks Update Cycle: <ul style="list-style-type: none"> Annual for harvest blocks

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Organization / Department	Requirements/Comment
	<ul style="list-style-type: none"> • 2 year for roads and vegetation • 5 years for all other features
Min. of Sust. Res. Mgt. – Vancouver Region	Currency important – harvest blocks Update Cycle: <ul style="list-style-type: none"> • Annual for harvest blocks • New roads require immediate update • 5 years for all other features
Min. of Public Safety & Solicitor General – Provincial Emergency Program	Currency important – pipelines/ telecommunications Update Cycle: <ul style="list-style-type: none"> • New roads require immediate update • Annual for other transportation features • 5 years for all other features
Min. of Sust. Res. Mgt. – Information Provision Branch	Currency important – Administrative and Cadastral Update Cycle: <ul style="list-style-type: none"> • Annual for transportation features • 5 years for all other features
Capital Regional District	Currency important – Administrative and Cadastral Update Cycle <ul style="list-style-type: none"> • Annual for roads streets • Monthly for Cadastre
Insurance Corporation of British Columbia	Currency important – Yes <ul style="list-style-type: none"> • Minimum for month cycle for road network data (most GIS Road data currently updated quarterly) • For reference base map (TRIM) key structural features ideally require 2 year update cycle
Ministry of Forests Forests Practices Branch	Currency Important – Yes <ul style="list-style-type: none"> • Admin boundaries, cadastre, roads, structures and orthophotos
Ministry of Transportation	Currency Important – Yes

GIS Ready

Organization / Department	Requirements/Comments
Min. of Energy & Mines – Petroleum Lands Branch	Base information not used currently used in business, but should be GIS ready
Water Management Branch	Required Yes <ul style="list-style-type: none"> • The issue: either the source can clean up or the user will clean it over and over
Min. of Energy & Mines - Mineral Titles Branch	Required – Yes

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Min. of Attorney General - Land Titles Branch	LTO no requirements for GIS
McElhanney Surveys	Required – Yes
Min. of Sust. Res. Mgt – Crown Lands Branch	Important
Min. of Sust. Res. Mgt – Mineral Titles Branch	Important, although if used as backdrop, it wouldn't have to be GIS ready. Administration Boundaries would be a priority for topology. Cadastre is a close 2nd.
Min. of Sust. Res. Mgt. – Forest Tenures	Very important for topology to be correct, some info in backdrop may be used in georeferencing.
Canadian Hydrographic Survey	Required – Yes
Min. of Forests – Forest Practices Branch	Required – Yes
Min. of Energy & Mines - Geological Survey Branch	Required – Yes
CANFOR	Required – Yes
Min. of Sust. Res. Mgt. – Resources Inventory (Vegetation)	Required – Yes
Min. of Sust. Res. Mgt. – Fisheries Branch	Required – Yes
Natural Resources Canada – Geological Survey Canada	Required – Yes
Resources Inventory (Wildlife)	Required – Yes
Resources Inventory (Water)	Required – Yes
BC Hydro	<p>Required – Yes</p> <ul style="list-style-type: none"> • Roads, Hydrology, CAD and Land Use • New watershed atlas has topological problems – Hydro has been correcting these for themselves • TRIM has same problem • The data seems to meet the standard 90% it's the 10 % that causes all the problem • Attribute link to CAD

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Min. of W/L/A Protection – Fisheries Branch	Required – Yes <ul style="list-style-type: none"> Stream networks Analytical problems generated by attributes is a big issue New watershed atlas has topological problems – Hydro has been correcting these for themselves TRIM has same problem
E-Comm	Required – Yes <ul style="list-style-type: none"> Primarily Roads
Environment Canada	Required – Yes <ul style="list-style-type: none"> For Land Use, Hydrology and Roads
Timberline / Inform	Required – Yes <ul style="list-style-type: none"> For Vegetation, Roads and Streams Require associated attributes for Vegetation
Min. of Sust. Res. Mgt. – Vancouver Region	Required – Yes <ul style="list-style-type: none"> For Vegetation, Roads and Streams Require associated attributes for Vegetation
Min. of Public Safety & Solicitor General - Provincial Emergency Program	Required – Yes <ul style="list-style-type: none"> For Cadastre Require associated attributes for Cadastre (primarily PID)
Min. of Sust. Res. Mgt. – Information Provision Branch	Required – Yes <ul style="list-style-type: none"> For Cadastre Require associated attributes for Cadastre
Capital Regional District	Required – Yes <ul style="list-style-type: none"> For Cadastre, Roads, Land Use, Infrastructure and Zoning Require associated attributes for Cadastre
Insurance Corporation of British Columbia	Required – Yes <ul style="list-style-type: none"> GIS data is formatted in fully attribute Arc shape files as delivered from GDBC
Ministry of Forests Forests Protection Branch	Required – Yes <ul style="list-style-type: none"> Links to telephone numbers Links to place names / gazetteer
Ministry of Transportation	Required – Yes <ul style="list-style-type: none"> Linear topology and associated attributes links

Meta Data

Organization	Comment
Min. of Sust. Res. Mgt – Crown Lands Branch	Cadastre is # 1 priority, Administration Boundaries 2 nd and any geodetic control.
Min. of Sust. Res. Mgt – Mineral Titles Branch	Important.
Min. of Sust. Res. Mgt. – Forest	Yes, extremely useful and important in cases of Cadastre and tenure and the base. One group would explain data accuracy, the other how data was collected

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Tenures	(who/when/what standards it was collected under).
Federal Department of Fisheries & Oceans – Canadian Hydrographic Survey	Required Yes – Hydrographic feature metadata important
Min. of Forests – Forest Practices Branch	Required – Yes
Min. of Energy & Mines - Geological Survey Branch	Required – Yes To Determine: <ul style="list-style-type: none"> • Who collected it • To what standard or how was it collected • File metadata and feature metadata • When was it collected and updated
CANFOR	Required Yes To Determine: <ul style="list-style-type: none"> • Who collected it • To what standard or how was it collected • File metadata and feature metadata • When was it collected and updated
Min. of Sust. Res. Mgt. – Resources Inventory (Vegetation)	Required – Yes To Determine: <ul style="list-style-type: none"> • Who collected it • To what standard or how was it collected • File metadata and feature metadata • When was it collected and updated
Min. of Sust. Res. Mgt. – Fisheries Branch	Required - Yes – Aquatic features and roads To Determine: <ul style="list-style-type: none"> • Who collected it • To what standard or how was it collected • File metadata and feature metadata • When was it collected and updated
Natural Resources Canada – Geological Survey Canada	Required – Yes To Determine: <ul style="list-style-type: none"> • Who collected it • To what standard or how was it collected • File metadata and feature metadata • When was it collected and updated
Min. of Sust. Res. Mgt. – Resources Inventory (Wildlife)	Required - Yes –Contours, rivers, lakes, political boundaries (municipalities' etc.) To Determine: <ul style="list-style-type: none"> • File metadata and feature metadata • When was it collected and updated • How it was collected – line work transfer process etc.

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	<ul style="list-style-type: none"> To what standard was it collected
Min. of Sust. Res. Mgt. – Resources Inventory (Water)	<p>Required – Yes</p> <p>To Determine:</p> <ul style="list-style-type: none"> Who collected it To what standard or how was it collected File metadata and feature metadata When was it collected and updated
BC Hydro	<p>Required – Yes</p> <ul style="list-style-type: none"> TRIM II meta data is not sufficient
Min. of W/L/A Protection – Fisheries Branch	<p>Required – Yes</p> <ul style="list-style-type: none"> Source and QA (identify data standards and determine if they have been followed)
E-Comm	<p>Required – Yes</p> <ul style="list-style-type: none"> Source and QA (identify data standards and determine if they have been followed)
Environment Canada	<p>Required – Yes</p> <ul style="list-style-type: none"> Source and QA (identify data standards and determine if they have been followed)
Timberline / Inform	<p>Required – Yes</p> <p>To Determine:</p> <ul style="list-style-type: none"> Who collected it To what standard or how was it collected When was it collected and updated
Min. of Sust. Res. Mgt. – Vancouver Region	<p>Required – Yes</p> <p>To Determine:</p> <ul style="list-style-type: none"> Who collected it To what standard or how was it collected When was it collected and updated
Min. of Public Safety & Solicitor General - Provincial Emergency Program	<p>Required – Yes</p> <p>To Determine:</p> <ul style="list-style-type: none"> Who collected it Version (Version control) When was it collected and updated
Min. of Sust. Res. Mgt. – Information Provision Branch	<p>Required – Yes</p> <p>To Determine:</p> <ul style="list-style-type: none"> Who collected it Version (Version control) When was it collected and updated
Capital Regional District	<p>Required – Yes</p> <p>To Determine:</p> <ul style="list-style-type: none"> Who collected it Version (Version control)

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	<ul style="list-style-type: none">• To what standard or how was it collected• When was it collected and updated
Insurance Corporation of British Columbia	Required – Yes <ul style="list-style-type: none">• ICBC main meta data requirement is for enhanced meta data on attributes (data dictionary)
Ministry of Forests Forests Protection Branch	Required – Yes <ul style="list-style-type: none">• Date of photo• Date of last update
Ministry of Transportation	Required – Yes

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Appendix F. List of Workshop & Interview Participants

Organization	Department / Program	Name
BC Hydro		Larry Coghlan
Canadian Hydrographic Survey		Ann Woollard
CANFOR		Dave Harrison
Capital Regional District		Craig Mount
E-Comm		David Hamilton
Environment Canada	Applications & Services	Dawn Andrews
Environment Canada	Applications & Services	Judy Kwan
Insurance Corporation of British Columbia	Crash, Crime and Contravention	Richard Tench
LUCO		Evert Kenk
McElhanney Surveys Ltd.		O'Brian Blackall
Ministry of Attorney General	Land Titles Branch	Darcy Hammett
Ministry of Attorney General	Land Titles Branch	Ken Jacques
Ministry of Energy and Mines	Geological Survey Branch	Nick Massey
Ministry of Energy and Mines	Mineral Titles Branch	Denis Lieutard
Ministry of Energy and Mines	Petroleum Lands Branch	Chris Blaney
Ministry of Energy and Mines	Petroleum Lands Branch	Gerald German
Ministry of Forests	Forest Practices Branch	Brian Murphy
Ministry of Forests	Forest Protection Branch	Mike Winder
Ministry of Sustainable Resource Management	Corporate and Client Services Section.	Blair Matheson
Ministry of Sustainable Resource Management	Crown Land Registry Services	Chuck Salmon
Ministry of Sustainable Resource Management	Crown Lands Branch	Godfrey Archbold
Ministry of Sustainable Resource Management	Fisheries	Peter Lewis
Ministry of Sustainable Resource Management	Forest Tenures	Olga Kopriva
Ministry of Sustainable Resource Management	GDBC	Barry Carman
Ministry of Sustainable Resource Management	GDBC	Roger Balser
Ministry of Sustainable Resource Management	Information Provision Branch	Dugald Smith
Ministry of Sustainable Resource Management	Mineral Titles Branch	Jack Leedham
Ministry of Sustainable Resource Management	Mineral Titles Branch	Rosa Munzer
Ministry of Sustainable	Resources Inventory Branch	Fern Schultz

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Resource Management	(Water & Wildlife)	
Ministry of Sustainable Resource Management	Resources Inventory Branch (Vegetation)	Dave Gilbert
Ministry of Sustainable Resource Management	Sustainable Resource Development	Adam Dewey
Ministry of Sustainable Resource Management	Vancouver Region	Richard Bevan
Ministry of Sustainable Resource Management	Water Management Branch	Jim Mattison
Ministry of Sustainable Resource Management	Water Management Branch	Lynn Kriwoken
Ministry of Transportation	Information Management	John Coombs
Ministry of Attorney General	Land Titles Branch	Darcy Hammett
Ministry of Attorney General	Land Titles Branch	Ken Jacques
Ministry of Public Safety & Solicitor General	Provincial Emergency Program	Brad Judson
Ministry of Water, Air Lands and Parks	Fisheries Branch	Art Tautz
Natural Resources Canada	Geological Survey	Sandy Colvine
RLS & Associates Consulting		Lorne Seitz
Sierra Systems		Terry Tarle
Sierra Systems		Dave Philp
Sierra Systems		Stephen Molson
Timberline / Inform		Steve Lipscomb