

# Topographic Data Update Study

## Final Report – Executive Summary



*By AltaLIS Ltd. for the SDW/AltaLIS Joint Venture*



## 1 Executive Summary

# Topographic Data Update Study

### PREAMBLE

This document is the ‘Executive Summary’ section from a study conducted by AltaLIS Ltd from December 1999 to September 2000. The key objective of the study was to determine the viability of updating topographic spatial data in Alberta. The studies’ activities were based on objectives outlined in a ‘Statement of Work – Ver. 3.2’ from November 1999.

The primary effort and emphasis by AltaLIS was on the determination of a viable business case considering the technical, operational, and economic feasibility of updating Alberta’s Topographic Basemap Datasets.

#### **Audience**

This document assumes that Spatial Data Warehouse (SDW), as represented by the AltaLIS/SDW Joint Venture Management Committee (JVMC), is the client organization to receive and consider the recommendations of this study. All current and potential users of digital topographic datasets are the assumed stakeholders in the study.

#### **Acknowledgements**

AltaLIS wishes to acknowledge the contributions of the 100-plus experts interviewed, the over 200 clients surveyed, and the many meetings with SDW participant staff and industry vendors. The provincial government staff of the Alberta Environment department was especially helpful and supportive.

### EXECUTIVE SUMMARY

Enhancement of Alberta’s topographic data collection, mapping & redistribution systems represents a key business opportunity for the AltaLIS-SDW joint venture. Commissioned by the joint venture in December 1999, the primary objective for AltaLIS Ltd was to:

*“Conduct a Topographic data study with the goal of generating a high level plan and funding model outlining the feasibility of updating the topographic data. Present the study to the Joint Venture Management Committee (JVMC) and to Spatial Data Warehouse (SDW) by September 30, 2000”.*

The topographic digital datasets are one of the anchor products within AltaLIS-SDW JV’s spatial data product line. Updating the currency of the topographic dataset, re-engineering its update processes, and developing new distribution channels and mechanisms will potentially unleash a higher potential value.



The complete topographic dataset product line is currently licensed to the AltaLIS-SDW JV for exclusive distribution to client users in Alberta. The product line includes:

- 1:20,000 Topographic Dataset (2684 files – 5 Feature Classes)
- Digital Elevation Model (3-D surface model of 2,684 files)
- 1:20,000 City/Town Digital Base (125 urban municipalities)
- 1:50,000 Topographic Dataset (654 files)
- Small Scale Topographic Dataset comprising:
  - 1:250,000 Digital Base (50 files)
  - 1:1,000,000 Digital Base
  - 1:2,000,000 Digital Base

### 1.1 Market research

Market research was carried out during the study to gain a better understanding of the size, character, growth and trends in the demand for digital topographic data. A market survey conducted by Banister Research and Consulting Inc., collected opinions from a representative sample of 204 of AltaLIS’s current and potential clients.

#### Alberta Topographic Data Market

			actual	actual	F o r e c a
Year-end			1998-	1999-	2000-
			1999	2000	base
TOPO					
Est.	total potential topo	<i>high</i>	\$3,453,0	\$3,836,6	\$ 4,262,9
Market Size		<i>mid</i>	\$1,776,8	\$1,974,2	\$ 2,193,6
Sales	AltaLIS			\$ 856,77	\$ 780,84
	%		41%	43%	36%
TOPO VIEW-					
Est.	total potential	<i>mid</i>	\$1,374,7	\$1,527,4	\$ 1,697,2
Market Size	AltaLIS				\$ 46,97
Sales	%				3%
TOPO	total potential	<i>mid</i>	\$4,406,2	\$4,895,8	\$ 5,439,7
Est.	AltaLIS	<i>total sales (not net revenue)</i>			\$ -
Market Size	%				0%
Sales					

From the Banister survey and other studies and analysis, Alberta’s topographic data market size is currently estimated to be \$3.9 million annually (vector & viewing data) plus \$5.4 million per year in orthophoto sales. Comparing AltaLIS actual sales for 12 months ending March 31, 2000 to the total estimated market shows we had 43% of Alberta topographic vector market sales (\$0.857 million of \$1.97 million in 1999-00).

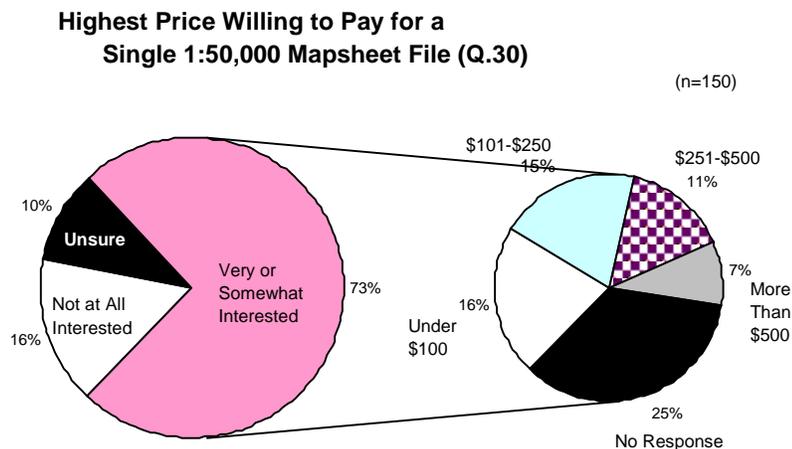


The ideal topographic product clients' need, as determined by our market survey research, is summarized as follows:

- Large scale vector mapping of GIS-ready quality;
- Horizontal feature accuracies of less than 10m for hydrography and facility themes; & less than 3 metres for transportation, access, and geo-administration boundaries;
- Vertical elevation data accuracies of less than 4 metres;
- Data interchange formats available in DXF/DWG, SHP/E00, and DGN;
- Features update cycles of:
  - Less than 2 years for pipelines, facilities, roads, trails and cutlines;
  - Less than 4 years for other topographic features except DEM, railways, hydrography and vegetation cover in which clients could tolerate less frequent updates for.
- Orthophoto mapping with pixels of under 2m resolution;

The average client uses topographic data as a background reference map for other user-relevant overlay information. Clients may occasionally make more advanced use of the base data for planning or project management purposes.

In our market survey and focus group, clients indicated some price sensitivity to any new product release of updated topographic data (as shown in the following figure).

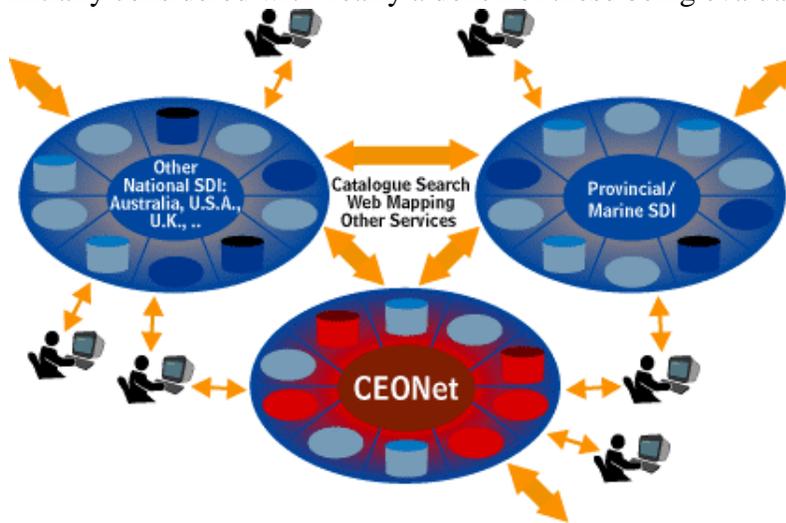




## 1.2 Technical research

Technical research in this study was used in the context of identifying alternative methods to viably meet client needs identified. Technical research was not conducted to create the best spatial data tools, but to investigate the application of the best tools available for data update, management and distribution.

Various spatial data models were reviewed and considered for their merits in Alberta's mapping industry. The concept of exchanging updated geographic data via distributed server network technology was investigated. The concept of integrating secondary data sources from third party datasets was investigated for cost and technical merit. Over 30 third party data sources were initially considered with nearly a dozen of these being evaluated in more detail.



Primary technical research by AltaLIS researchers included personal interviews by phone or in person with over 100 experts, stakeholders, and users of topographic data (note: this is over and above the 204 primary marketing research survey respondents contacted by phone during the Banister survey).

Two independent geomatic consultants were subcontracted to report on topographic update

methods in more detail and their reports have been considered.



### 1.3 Topographic Data Update Cost Comparisons

The final eleven topographic update alternatives assessed were from among the very best methods and data sources available in AltaLIS’s opinion. Not all update source organizations made it to this final stage if they did not meet pre-qualifying criteria of:

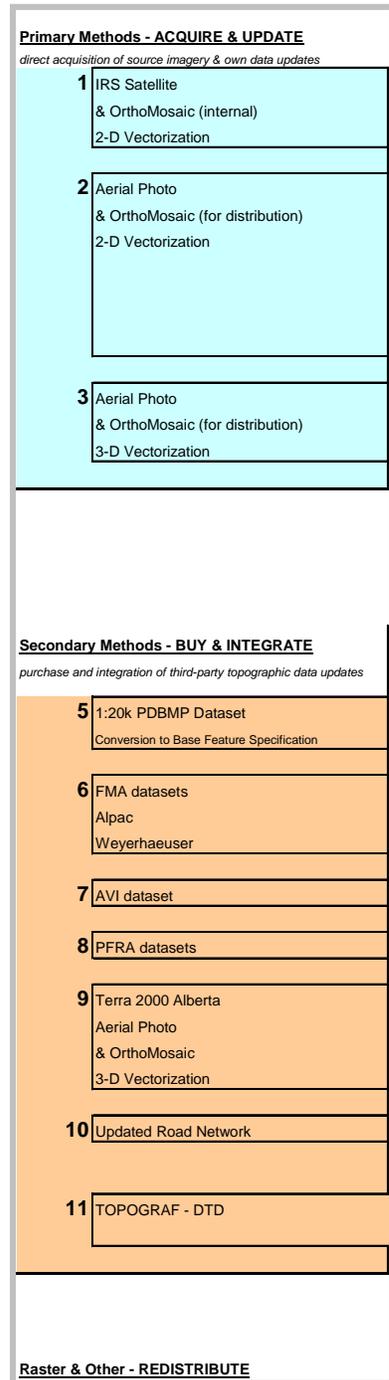
1. data coverage of at least 30% of Alberta for a single or organization group;
2. significant base mapping expertise in data collection and compilation; and,
3. a favorable partnership or distribution agreement is attainable

Like most complex issues, there is no one correct answer or entirely objective comparison, but AltaLIS believes a more informed choice can be made from a thorough investigation of alternatives.

Three basic topographic data update strategies are proposed, and all alternative update methods fall into one of them:

- 1) **Acquire and Update** - that is where the update source data is acquired directly by AltaLIS, and all production of topographic vector update information is directly administered. In all cases extensive use of industry vendors means AltaLIS takes on the role of production management and assumes the risk for the project’s success.
- 2) **Buy and Integrate** - this group of alternate solutions means a third party owns the source data for update and that any updated topographic products are bought and re-integrated to a common standard (RDD-Base Features has been chosen to be the common topo data standard for comparison purposes) from this source.
- 3) **Redistribute**- recognizes that there are some non-vector topographic product alternatives such as digital elevation models and orthomosaics that could be redistributed. These products are meant to take advantage of AltaLIS’s marketing and distribution strengths by extending our topographic product line without owning the data.

The update methods making it to the final cost analysis are summarized in the diagram to the right.



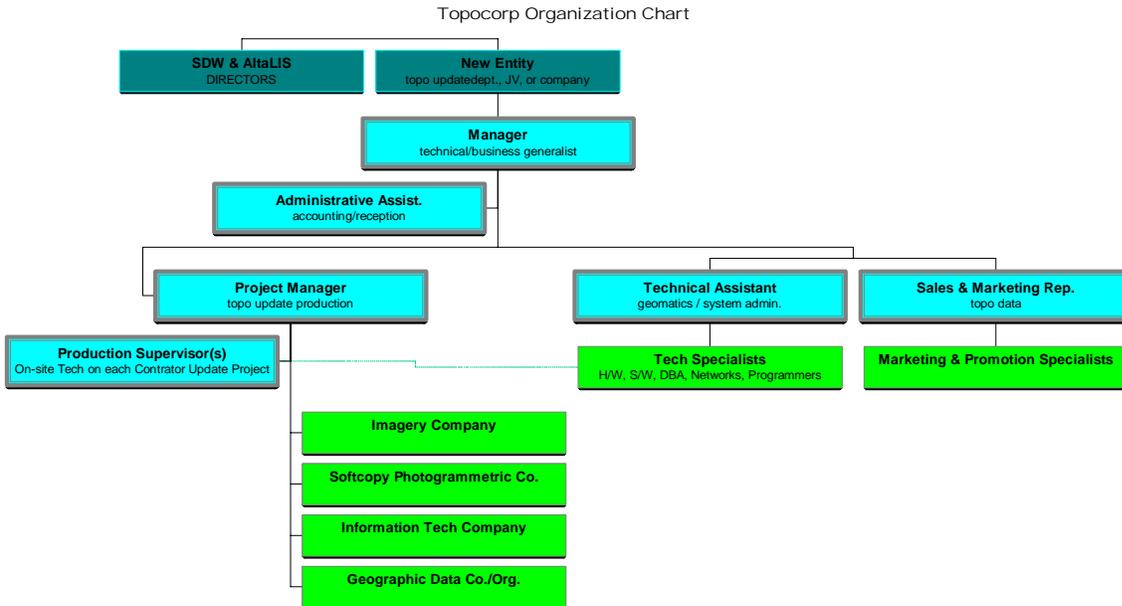


## 1.4 Operations and Production by Topocorp

The proposed operation of a business entity designed to produce updated topographic data is dubbed “Topocorp”. Topocorp is the code name of a new entity that could be a division or department of a related company, or be a new company onto itself. The organization’s ownership is not the focal point here, but the process & resource needs are. The requirements of the new Topocorp entity may exist in AltaLIS already, but this is not assumed here.

ID	Task Name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1	<b>1 TOPOGRAPHIC DATA UPDATES - PROJECT MGMT</b>																					
2	1.1 Topo Feature Priority Selection																					
7	1.2 Obtain business commitments																					
14	1.3 Select update method																					
31	1.6 RFP tendering process																					
36	1.8 Acquire Update Data																					
57	1.9 Topo Feature Mapping - Primary Methods																					
62	1.10 Integrate Secondary Data to Standard Topo Spec																					
69	1.11 Topo Feature classification Field Truthing																					
79	<b>2 OPERATIONS</b>																					

Topocorp’s organization structure and resource needs will be built from the ground up, as an independent entity whose first mission is to create updated topographic data and second purpose is to distribute and market this data. **Topocorp’s** organization chart below shows a requirement for 6 roles (turquoise boxes) equating to 4 full time equivalents (FTE). Topocorp reports to SDW and makes extensive use of industry (green boxes) suppliers, contractors and vendors.





## 1.5 Financial Analysis

Potential sales of updated topographic products are compared to the costs of various alternatives in product update methods. The subsequent net cash flows have been analyzed and five of these options are presented as distinct business cases.

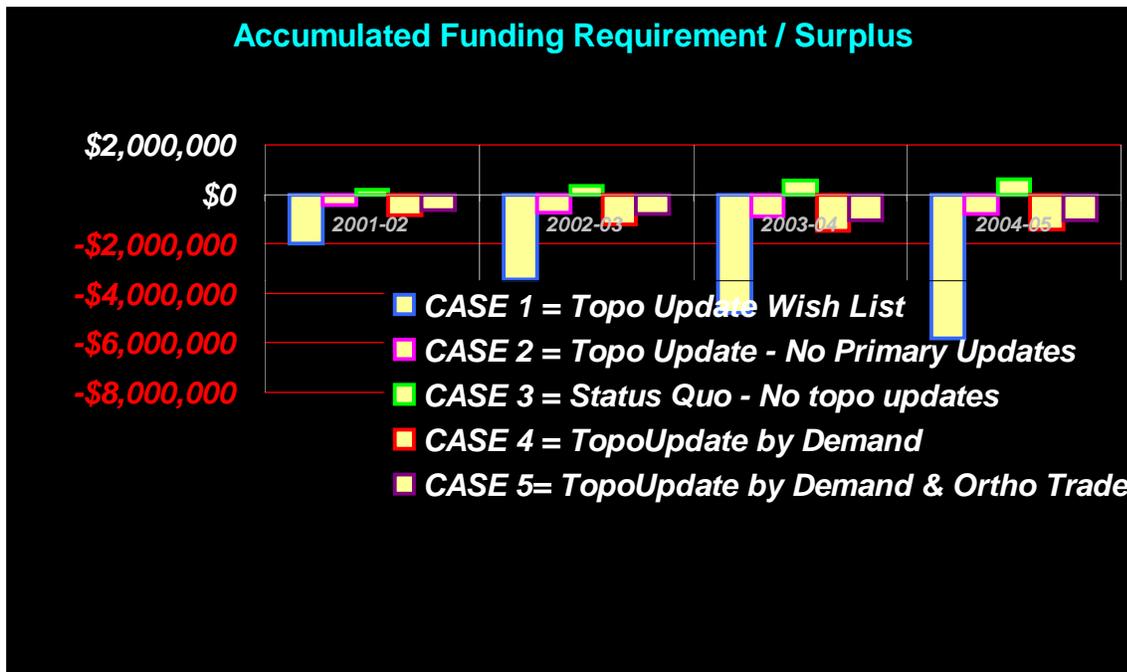
Our five-year sales forecasts for updated topographic data plus other related product lines, generally fall short of the costs required to create them. Of the best cases presented it will take more than five years to reach the breakeven point. In general the relatively small Alberta market size, combined with the prices the marketplace will bear for purchasing topographic data, do not yet reflect the short-term costs of its production.

The summary of our financial assessment of all business cases is shown in the table below. The charts that follow demonstrate the viability of each case in terms of net cash flow.

<b>Financial Summary by Business Case</b> (over 5 years at constant year 2000 CDN \$)				
<u>Case Scenario</u>	<u>five years</u>		<u>Maximum Level</u>	<u>Five Year</u>
	<u>Sales</u>	<u>Costs</u>	<u>of Financing</u>	<u>Rate of Return</u>
Case 1 Topo Update Wish List	\$7,294,798	\$12,716,175	-\$6,981,037	-10%
Case 2 Topo Update - No Primary Updates	\$5,662,095	\$6,034,863	-\$899,856	-1%
Case 3 Status Quo - No topo updates	\$3,030,000	\$2,132,448	\$0	8%
Case 4 Topo Update Wish List - Update by Demand	\$6,934,723	\$7,978,973	-\$1,452,233	-3%
Case 5 Topo Update Wish List - Update by Demand & Ortho Data Trade	\$6,102,471	\$6,737,971	-\$1,039,505	-2%
Note: Case 5 @ 10 year return =				1.0%

Assessing our options based strictly on the five year financial results of the five business cases presented leaves Topocorp with few options but to continue with the status quo. The status quo means Topocorp would not update nor improve the topographic base datasets and would continue distributing them until their product lifecycle is over. This case does however trend to a negative return after 5 years, as data sales no longer meet Topocorp operating expenses.

All other business case alternatives besides Case 3 show negative returns to the capital employed at five years. If investors were looking at a five-year horizon, Topocorp's investment dollar would be better employed in opportunities with more favorable return rates.



If Topocorp's owners or investors increase their planning horizons to 10 years, a positive return to capital is predicted for Case 2 and Case 5 of around 1% in real terms. As an investor's dollar can return much more than this in a near risk-less market security like Canadian T-Bills, the assumption of project risk for only a 1% return premium is a financially unsound decision.

### 1.5.1 Partner Cost Reduction Alternatives

It seems that another business case option needs to be found. One of these options could be to seek partners with parallel mapping projects who would consider an opportunity to reduce their mapping division costs. If Topocorp's owners/investors were currently spending over \$1 million total in the next 5 years to produce the same updated mapping products for internal use, then a cost share agreement would make some of these business cases financially sound while reducing (not eliminating) the mapping costs of the partner.

One of the 5 Topocorp business cases could thus be made positive with external partner funding based on the partner's:

- cost reduction objectives; and/or
- public policy objectives.

Topocorp investing partners could be private or government entities. They are more likely government organizations like LFS that could be interested in a 'mapping program cost reduction' alliance with Topocorp.

The funding of such a 'cost reduction alliance' between the GOA and Topocorp could come from many sources including:



1. redirection of a portion of GOA-AEP appropriation funding to Topocorp for update mapping activities (estimated at \$12 million per year);
2. redirection of only RDD's Base Features map update funding to Topocorp (estimated at \$1 million per year);
3. introduction of an additional user fee directed at those clients who instigate change in topographic features through resource and land development (estimated user fee revenues of up to \$1 million could be generated from increments in geophysical program application fees, land disposition applications, development permits, road permits, etc.).

All of the above public funding sources need exploration through government partnership negotiations. At the end of the day, any potential for a public – private partnership scenario will need GOA sponsorship. Topocorp can be a catalyst in developing funding & fee options, but would not be in a position to drive home any public policy initiative.

### 1.5.2 Partner Joint Ventures

Other topographic data update funding options exist within potential and existing stakeholders. Two considerations are:

- NRCan Geoconnections framework data funding is available for up to \$1 million on 50/50 cost share projects to support non-acquisition activities (i.e. net impact of \$0.5 million for topo translators, conversion, integration and data access proposals);
- SDW participant members currently fund topographic and cadastral mapping through participant agreements. SDW may consider an evolution of their ownership which could increase their participant membership and attach an annual member fee. The fees could support the required financing subsidy and be divided among more than just the current 6 members.

This concludes the 'Executive Summary' section of the study. The concepts and analysis presented in this section are an abridged format of the final report.