October 22, 2014

VIA COURIER, EMAIL, RESS

Ms. Kirsten Walli
Board Secretary
Ontario Energy Board
2300 Yonge Street, 27th Floor
Toronto, ON
M4P 1E4

Dear Ms. Walli:

Re: EB-2011-0140: East-West Tie Line Designation
Monthly Report - October 22, 2014

Enclosed for filing is the monthly report for Upper Canada Transmission, Inc. ("NextBridge"), a copy of which was filed through RESS earlier today.

Yours truly,

(Original Signed)

Tania Persad
Senior Legal Counsel, Enbridge Gas Distribution Inc.

EB-2011-0140

ONTARIO ENERGY BOARD

IN THE MATTER OF sections 70 and 78 of the *Ontario Energy Board Act, 1998*;

AND IN THE MATTER OF a Board-initiated proceeding to designate an electricity transmitter to undertake development work for a new electricity transmission line between Northeast and Northwest Ontario: the East-West Tie Line.

UPPER CANADA TRANSMISSION, INC.
(d/b/a NextBridge Infrastructure)

Monthly Report

October 22, 2014

1. By the *Decision and Order* dated August 7, 2013 (Decision), the Ontario Energy Board (OEB or Board) decided that the designated transmitter for the development phase of the proposed East-West Tie Line (EWT Project) is NextBridge Infrastructure (NextBridge).

2. In accordance with Ordering Paragraph 2 (page 42) of the Decision and the Board's September 26, 2013 *Decision and Order regarding Reporting by Designated Transmitter*, NextBridge provides this monthly report. This report reflects the financial status of development work on the EWT Project through September 30, 2014. Other aspects of this report are current as of the close of business on the last business day prior to the filing date.

3. This report is organized as follows:

   (a) A summary report on overall EWT Project progress.

   (b) A cost summary providing details for each cost category included in NextBridge's Board approved development cost budget of: i) actual costs

to date; ii) percentage of budgeted costs spent to date; iii) updated budget forecast (if applicable); and iv) forecast variance. Reasons for any forecast variance and associated mitigating measures for negative forecast variances are also provided.

(c) A summary of the status of NextBridge's Board approved development milestones, indicating those that are complete and the status (i.e. on schedule, ahead of schedule or delay/potential delay) of those in progress. If any delay or potential delay in achievement of any of the milestones has been identified, the reasons for the delay, the magnitude and impact of the delay on the broader development schedule and cost, and mitigating steps that have been or will be taken, are reviewed.

(d) A summary of risks and issues that have arisen during development work, including discussion of potential impact of any such developments on schedule, cost or scope, and discussion of options for mitigating or eliminating the risk or issue. This section also provides an update on any previously identified risks or issues.

Overall Project Progress

4. Overall during this period, work towards all milestones continued to progress.

5. In respect of engineering work:

(a) detailed engineering design for the lattice tower structures is complete;

(b) prototype tower fabrication and testing has commenced and is expected to continue through November, 2014 for the family of lattice tower structures. Third party inspection services have been engaged with Bureau Veritas North America for the technical oversight and reporting on the fabrication and testing of the prototype towers; and

(c) geotechnical testing crews have mobilized and testing on initial locations is anticipated to start later this month. Additional geotechnical testing will be completed as authorized.

6. In respect of route selection, land/ROW acquisition and community/municipal consultation activities, discussions with landowners, permitting agencies and other stakeholders have continued.

(a) Activities within the community/municipal consultation area included:

(i) attended a meeting with the Northeastern Superior Mayors' Group on October 6, 2014;

(ii) attended a meeting with members of the Municipality of Wawa Council and key staff on October 6, 2014;

(iii) preparing an EWT Project update letter to be circulated to stakeholders; and

(iv) updated NextBridge.ca website with EWT Project updates and materials.

(b) Activities in respect of route selection and land/ROW acquisition included:

(i) continued engagement and outreach with landowners potentially directly affected for access to complete preliminary studies along the Reference Route and alternate routes still under consideration; and

(ii) continued response to landowner queries as received, including queries in connection with current routes under consideration, the Land Acquisition program, and the EWT Project in general.

7. In respect of Aboriginal engagement, consultation and participation, activities included:

(a) ongoing engagement activities with the 18 identified First Nation and Métis communities;

(b) discussions with Ministry of Economic Development, Employment and Infrastructure in relation to support for consultation activities;

(c) attendance at community meetings with Red Rock Indian Band on September 19, 2014 and Pays Plat First Nation on September 20, 2014; and

(d) continued discussions on ways Aboriginal communities can commercially participate in the EWT Project, as outlined in the Aboriginal Participation Plan (Schedule C) submitted as part of the EWT Project January 22, 2014 Monthly Report.

8. In respect of environmental assessment activities, work included:

   (a) continued consultation with the Ministry of the Environment and Climate Change (MECC), Ministry of Tourism, Culture and Sport, and Ministry of Natural Resources and Forestry (MNRF) in support of the environmental assessment (EA);

   (b) obtaining letter of authority from MNRF for a portion of the geotechnical drilling work;

   (c) finalizing preliminary alternatives assessment for routing as support for EA;

   (d) data interpretation of natural environment and socioeconomic data for the EA; and

   (e) drafting the EA.

9. Additional general updates for the reporting period include:

   (a) On September 30, 2014 NextBridge received a copy of a letter sent from the Ontario Power Authority (OPA) to the Board (the OPA September 30 Letter). A copy of the OPA September 30 Letter is attached at Schedule A. NextBridge is currently assessing the nature and extent of potential scope, schedule, reporting and cost implications that may arise as a result of the OPA September 30 Letter.

   (b) Don Thompson, Enbridge Transmission Holdings, Inc.'s representative on the NextBridge Board of Directors has been replaced by Lino Luison. Mr. Luison, VP, Green Power, Transmission and Emerging Technology at Enbridge Inc., was originally on NextBridge's Board of Directors and his biographical summary was included in NextBridge's Application for Designation at Appendix A3.

   (c) NextBridge completed its review of the draft Customer Impact Assessment (CIA) received from Hydro One Networks Inc. (HONI) on September 19, 2014 and had no comments. NextBridge is now waiting for the final CIA from HONI. The final System Impact Assessment is anticipated to be received from the Independent Electricity System Operator on or before November 21, 2014.

   (d) NextBridge continues its efforts to consult with the six route First Nations communities. Progress continues to be steady but slow as economic participation activities have been given priority by those communities.

(e) The issuance of a Request for Proposals related to general contracting services has been delayed while NextBridge completes its assessment of potential scope and schedule implications resulting from the OPA September 30 Letter.

Cost Summary

10. Table 1, below, details for each cost category included in NextBridge's Board approved development cost budget: i) actual costs to date; ii) percentage of budgeted costs spent to date; iii) updated budget forecast (if applicable); and iv) forecast variance.

Table 1: Budgeted Costs Status

	PROJECT TO DATE		TOTAL PROJECT ESTIMATE			
Cost Category Budgeted	**Actual[1]**	**% of total budget**	**Forecast**	**Budget[2]**	**Variance $**	**Variance %**
Engineering, Design and Procurement Activity	$4,567,483	43.3%	$10,553,292	$10,553,292	-	0%
Permitting and Licensing	60,327	127.5%	121,031	47,320	(73,711)	(155.8)%
Environmental and Regulatory Approvals	2,666,920	74.2%	3,592,680	3,592,680	-	0%
Land Rights (Acquisitions or options)	1,388,855	69.8%	1,991,000	1,991,000	-	0%
First Nation and Métis Consultation	956,214	55.5%	1,724,000	1,724,000	-	0%
Other Consultation	702,245	141.6%	1,022,554	496,001	(526,553)	(106.2)%
Regulatory (legal support, rate case and LTC filings)	751,164	76.3%	1,165,000	985,000	(180,000)	(18.3)%
Interconnection Studies	70,273	39.3%	100,000	179,000	79,000	44.1%
Project Management	1,296,981	99.8%	1,672,015	1,300,000	(372,015)	(28.6)%
Contingency (Engineering, Design and Procurement)	-	0%	456,429	1,529,708	1,073,279	70.1%
Total	**$12,460,462**	**55.6%**	**$22,398,001**	**$22,398,001**	**-**	**0%**

11. Additional Permitting and Licensing costs associated with identification and acquisition of approvals, permits, and licenses for the EWT Project was originally

[1] "Actual" refers to actual costs plus estimated accruals.
[2] This total refers to the Development Phase budgeted amount as approved by the Board in file EB-2011-0140 Phase 2 Decision and Order dated August 7, 2013.

captured in the EWT Project September 22, 2014 Monthly Report as part of the Project Management forecast. Upon review of the classification of similar prior costs, it was determined that a portion of this increase was more appropriately categorized as part of Permitting and Licensing as shown above.

12. Table 2, below, details costs to date not included in NextBridge's Board approved development cost budget. This table includes two categories of cost expressly excluded from the development cost budget filed by NextBridge: First Nation and Métis land acquisition costs and First Nation and Métis participation costs (see NextBridge Response to Interrogatory 26 to all applicants, attachment 1).

13. The "Other" category on Table 2 records unbudgeted costs that are, to date, for the most part related to the Notice of Appeal filed by Pic River in the Ontario Divisional Court in respect of the Decision.

Table 2: Unbudgeted Costs

Cost Category	Current month project to date Actual[3]	Prior month project to date Actual[3]
Not Budgeted		
First Nation and Métis Land Acquisition	$ 8,142	$ 7,332
First Nation and Métis Participation	1,136,293	1,028,338
Other Costs Not included in Budgeted Categories	230,610	224,610
Carrying Cost	39,126	34,766
Taxes and Duties	-	-
Total Not Budgeted	**$ 1,414,171**	**$ 1,295,046**

Development Milestone Summary

14. Table 3, below, provides a summary of the status of NextBridge's Board approved development milestones, indicating those that are complete and the status of those in progress (i.e. on schedule, ahead of schedule or delay/potential delay).

15. For each of the Board approved milestones, Table 3 provides:

    (a) The Board approved milestone date.

    (b) The status of those milestones due within 3 months of the reporting date.

    (c) A "revised forecast date" if applicable, indicating NextBridge's current forecast of the date for completion of the relevant milestone if the current forecast differs from the Board approved date.

16. NextBridge has focused, for the purposes of this reporting, on the status of those milestones due within 3 months of the reporting date in order to highlight the development activities in respect of which efforts are primarily focused, and which are of most immediate relevance to project progress and status.

[3] "Actual" refers to actual costs plus estimated accruals.

17. NextBridge does review its development schedule on a monthly basis, in conjunction with preparation of these monthly reports, and should an issue or risk regarding a milestone that is scheduled beyond 3 months from the reporting date be identified, NextBridge will nonetheless report on that issue or risk, and include an appropriate status indication and revised forecast date in Table 3.

Table 3: Milestone Progress and Status

Engineering Milestones

	Milestone	Board Approved Date	Status	Revised Forecast Date
1	Initiate engineering	13 Sep 2013	Completed	
2	Sign contract for engineering	31 Oct 2013	Completed	
3	Finalize design criteria for conductor and structure	31 Jan 2014	Completed	
4	Complete conductor optimization study	7 Mar 2014	Completed	
5	File request for a System Impact Assessment (SIA) with the IESO	12 Mar 2014	Completed	
6	Status report on progress toward finalization of structure choice	31 Mar 2014	Completed	
7	Obtain senior management approval of the structure configuration proposal	1 July 2014	Completed	
8	Complete aerial surveys	14 Oct 2014	Completed	
9	Receive final SIA from the IESO	21 Nov 2014	On Schedule	

Route Selection, Land/ROW Acquisition and Community/Municipal Consultation Milestones

	Milestone	Board Approved Date	Status	Revised Forecast Date
10	Prepare list of landowners along the ROW	10 Oct 2013	Completed	
11	Complete design of Landowner, Community and Municipal Consultation Plan	1 Nov 2013	Completed	
12	Commence negotiations or discussions with all landowners and permitting agencies	25 Nov 2013	Completed	May 30, 2014 as per EWT Project April 22, 2014 Monthly Report
13	Finalize proposed route and obtain senior management approval	1 Jul 2014	Completed	

Aboriginal Engagement, Consultation and Participation Milestones

	Milestone	Board Approved Date	Status	Revised Forecast Date
14	Send introductory correspondence to aboriginal communities	30 Aug 2013	Completed	
15	Initial meeting with Ministry of Energy regarding the MOU for delegation	15 Sept 2013	Completed	
16	Complete initial/introductory contact with all aboriginal communities identified by the Ministry of Energy	30 Sept 2013	Completed	
17	Sign MOU with Ministry of Energy regarding the delegation	5 Nov 2013	Completed	
18	Complete design of First Nations and Métis Participation Plan with community input	2 Jan 2014	Completed	
19	Complete design of First Nations and Métis Consultation Plan with community input	2 Jan 2014	Completed	

Environmental Assessment (Provincial) Milestones

	Milestone	Board Approved Date	Status	Revised Forecast Date
20	Consult with environmental agencies (Ministry of Environment, Ministry of Natural Resources, Parks Canada and Ontario Parks)	10 Oct 2013	Completed	
21	Issue notice of draft Terms of Reference (ToR) available for review	16 Jan 2014	Completed	
22	File Environmental Assessment ToR	28 Feb 2014	Completed	
23	Initiate wildlife, aquatics and early season vegetation assessments	1 May 2014	Completed	May 20, 2014 - as per EWT Project April 22, 2014 Monthly Report
24	Approval of Environmental Assessment ToR	3 Jul 2014	Completed	August 28, 2014
25	Complete Environmental Assessment Consultation Report	27 Jan 2015	Potential Delay	To be determined
26	Submit Environmental Assessment to Ministry of Environment	27 Jan 2015	Potential Delay	To be determined

Leave to Construct Milestone

	Milestone	Board Approved Date	Status	Revised Forecast Date
27	Submit Leave to Construct (LTC) application	28 Jan 2015	Potential Delay	To be determined

18. In respect of the milestone achieved during this reporting period:

    (a) **Milestone 8: Complete aerial surveys**. Attached at Schedule B is a copy of the KBM Resources Group 2013/14 Aerial Acquisition of LiDAR and High-resolution Imagery Report dated October 6, 2014 as proof of completion of this milestone in relation to the routes currently under review.

19. All milestone activity coming due within the next 3 months remains on schedule. NextBridge is currently evaluating the nature and extent of the potential scope, schedule, reporting and cost implications that may arise as a result of the OPA September 30 Letter.

Issues/Risks/Mitigation Summary

20. This section of NextBridge's monthly report provides a summary of risks and issues that have arisen during development work, including discussion on potential impact of any such developments on schedule, cost or scope, and of options for mitigating or eliminating the risk or issue.

21. As referenced in subparagraph 9(a) above, NextBridge is currently evaluating the nature and extent of the potential scope, schedule, reporting and cost implications that may arise as a result of the OPA September 30 Letter.

Attachments to NextBridge Monthly Report

Schedule A

Letter from Ontario Power Authority to Ontario Energy Board dated September 30, 2014

ONTARIO POWER AUTHORITY

120 Adelaide Street West
Suite 1600
Toronto, Ontario M5H 1T1

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www.powerauthority.on.ca

COURIER AND E:MAIL

September 30, 2014

Ms. Rosemarie Leclair
Chair and Chief Executive Officer
Ontario Energy Board
2300 Yonge Street, 27th Floor
Toronto ON M4P 1E4

Dear Ms. Leclair:

Re: East-West Tie Expansion Project – Development Schedule
Ontario Energy Board File No. EB-2011-0140

I am writing to provide an update on the East-West Tie expansion project. The OPA believes that there is merit in extending the current in-service date of 2018 in order to allow for additional time to develop the East-West Tie Expansion project, with a focused aim of reducing its cost. The OPA believes that allowing for this additional time will not impact the overall benefits of the project or impact reliability, as mining and other infrastructure developments have been progressing at a slower than expected pace in Northwestern Ontario ("the Northwest"). The IESO, in its latest 18-Month Outlook, confirms that at current demand levels the Northwest can be reliably supplied with existing infrastructure.

The current schedule for the East-West Tie expansion project has Upper Canada Transmission Inc. (OA NextBridge Infrastructure), the designated transmitter, applying for Board Leave to Construct ("LTC") approval in early 2015 in order to meet an in-service date of 2018. NextBridge Infrastructure ("NextBridge") has been pursuing a compressed development schedule in order to meet this accelerated in-service date.

Extending the 2018 in-service date requirement would provide additional time for developing the East-West Tie Expansion project, with a focused aim of reducing its cost. Some of the areas where costs could be reduced include: pursuing a shorter line routing option; optimizing equipment and system design, including staging of station facilities; and having a less compressed schedule for the development and implementation of the project.

With regard to line routing, NextBridge was advised in February 2014 by the federal government that a route through Pukaskwa National Park, adjacent to the existing East-West Tie line, would not be considered. As a result, NextBridge has been focusing on developing a longer, alternate route around the park. In addition to being more costly due to the added distance, this route could require the creation of a new linear corridor. On July 9th, The

Honourable Bob Chiarelli, Ontario Minister of Energy, wrote to The Honourable Leona Aglukkaq, Federal Minister of the Environment, requesting that the federal government reconsider its position to avoid adding significant incremental costs to ratepayers. If a decision by the federal government allows consideration of the route through the park, the OPA understands that NextBridge would need additional time to gather data on that route in order to complete its Environmental Assessment ("EA"). The OPA believes that there is value to Ontario ratepayers in pursuing this route, which has the potential for cost savings and lower environmental impact.

Extending the timeframe for development work could also allow the LTC and EA approvals to be sought sequentially, rather than in parallel. If feasible, this could reduce the risk that the outcome of the EA process could change the assumptions on which an LTC decision is based.

In the last few years, the OPA has updated its forecasts as indicators of mining development have changed. In 2013, based on several mines and other loads reaching important milestones, the OPA published a higher forecast for the Northwest than it had previously (See *Updated Assessment of the Rationale for the East-West Tie Expansion* filed under EB-2011-0140 on October 8, 2013). In 2014, based on the most recent available information, the OPA revised its forecast downwards in recognition that the pace of mining and other infrastructure developments in the Northwest had slowed (See *Assessment of the Rationale for the East-West Tie Expansion - Second Update Report* filed under EB-2011-0140 on May 5, 2014). Since May, there has been no indication that this slowing trend will change in the next while. Given the current forecast outlook, the OPA believes that a delay of up to two years in the in-service date would not adversely impact reliability in the Northwest. Should demand ramp up more quickly than planned, the OPA is aware of a number of short-term options, from responses to its recent Request for Information, that it could procure to bridge any gaps that may develop. The OPA will continue to monitor developments in the Northwest and adjust its plans accordingly.

The OPA continues to support the East-West Tie as the long-term alternative to supply the Northwest and maintains that development work should continue. The OPA recognizes that due to the nature of the loads in the Northwest, demand growth can develop quickly and in large blocks. Continuing with development work will allow the East-West Tie expansion project to come into service quickly should the pace of demand growth change. To this end, the OPA is prepared to continue to support NextBridge in its development activities. In addition, the OPA supports the initiation of development work on the Northwest Bulk Transmission line, another Northwest priority project identified in the 2013 Long-Term Energy Plan. The Northwest Bulk Transmission line would supply demand growth in the West of Thunder Bay and North of Dryden areas. Due to the long lead time required for new transmission line projects, proceeding with development work on both of these projects will allow for scoping of these transmission alternatives, and shorter lead times if the projects are to proceed.

On October 2, the OPA is hosting a full-day meeting with stakeholders in Northwest Ontario to discuss electricity planning including demand, supply and transmission developments and forecasts. As part of this meeting, the OPA will update stakeholders on the status of the East-West Tie project. A similar electricity planning meeting will be held with First Nation and Métis representatives, including an update on the East-West Tie project. The OPA will also

continue to communicate with stakeholders and communities in the Northwest, and to monitor load growth and developments that may impact the need for the East-West Tie project.

Given the potential benefits of extending development work and the current slower pace of mining development in the Northwest, the OPA recommends that work to focus on reducing the overall cost of the project be accommodated, including consideration of paralleling the existing route through Pukaskwa National Park, and that accordingly, the development schedule for the East-West Tie expansion be extended to work toward a 2020 in-service date. The OPA continues to support the East-West Tie as the long-term alternative to supply the Northwest.

Sincerely,

Colin Andersen
Chief Executive Officer

cc:

Eric S. Gleason, *President of Upper Canada Transmission, Inc. the sole general partner of NextBridge Infrastructure, LP*

Carmine Marcello, *President and Chief Executive Officer, Hydro One*

Bruce Campbell, *President and Chief Executive Officer, IESO*

Attachments to NextBridge Monthly Report

Schedule B

Milestone 8: Complete Aerial Surveys – proof of completion

KBM Resources Group 2013/14 Aerial Acquisition of LiDAR and High-resolution Imagery Report, October 6, 2014

2013/14 Aerial Acquisition of LiDAR and High-resolution Imagery

10/6/2014

Ontario East-West Tie Line

Prepared for:
Nextbridge Infrastructure

On behalf of:
KBM Resources Group
349 Mooney Ave.
Thunder Bay, ON P7B 5L5

KBM Contact:
Shawn Mizon-Principle, Aerial Survey and Geomatics
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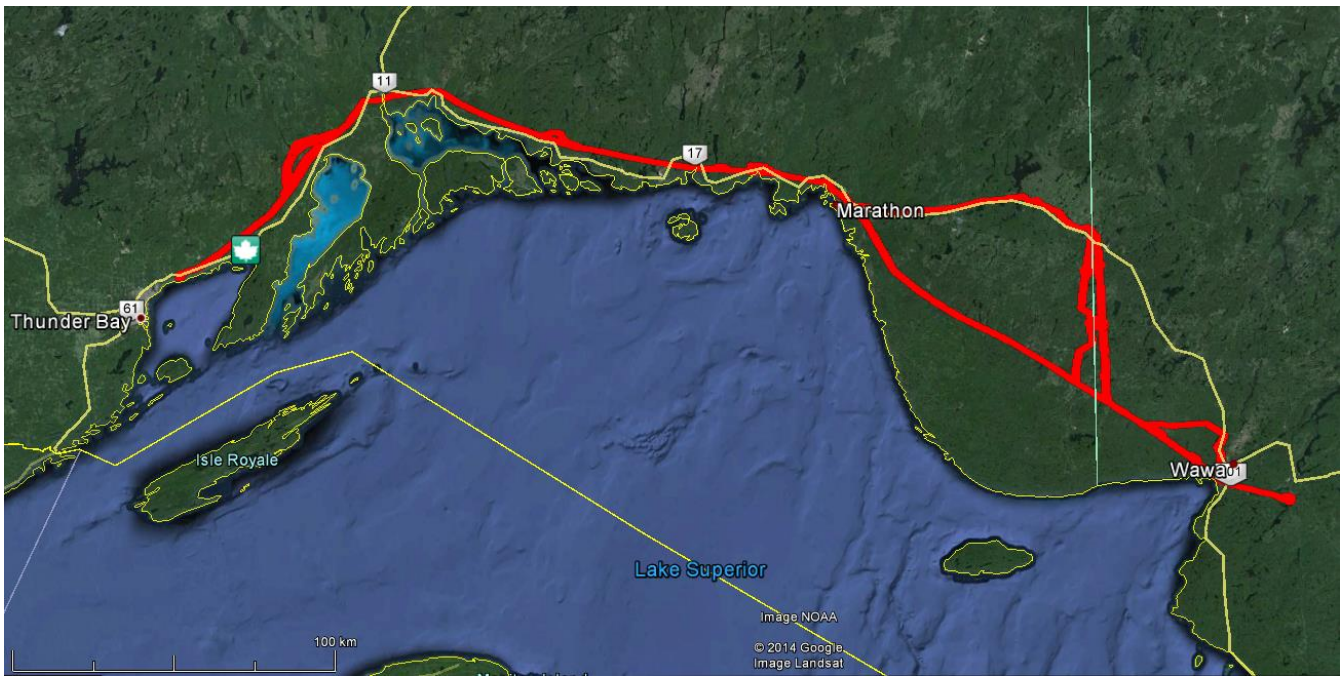

KBM'S RESOURCE MANAGEMENT PROFESSIONALS DELIVER PRACTICAL INNOVATION THROUGH INTEGRATED CONSULTING, TECHNICAL AND ON-THE-GROUND SERVICES. KBM DELIVERS WORLD CLASS PRODUCTS USING LEADING-EDGE IMAGING, LIDAR AND GEOMATICS SERVICES. BASED IN THUNDER BAY AND FOUNDED IN 1973, KBM BRINGS LOCAL KNOWLEDGE TO PROJECTS IN NORTHWESTERN ONTARIO AND ALSO HAS EXTENSIVE EXPERIENCE WORKING IN CENTRAL CANADA AND THE MIDWESTERN US.

PROJECT OVERVIEW

Between October 2013 and October 2014, KBM Resources Group collected LiDAR and digital imagery along the east-west tie line reference and alternate routes between Thunder Bay, ON and Wawa, ON. Initial acquisition occurred in fall of 2013 with follow up flights to extend and improve coverage taking place in spring and fall of 2014.

The purpose of this data collection was to provide detailed elevation models, planimetric features, and orthoimagery to support routing and design work for the proposed new transmission line.

TECHNOLOGY AND RESOURCES

KBM owns and operates a fixed-wing aircraft equipped with a Trimble Harrier 68i laser/camera system that was used for all missions on this project. General system specifications are provided below.

Aircraft

- Piper Seneca II

LiDAR

- Up to 400 kHz laser pulse rate with full waveform digitization
- Scan speed up to 200 Hz
- Absolute accuracy <15 cm vertical, <25cm horizontal (with suitable ground control)
- 45-60 degree field-of-view for efficient acquisition time
- High point density from fixed-wing platform
- Typical raw point density ranging from 1-10 pts/m in a single pass

Digital Mapping Camera

- 60 Megapixel, 3 channel (RGB) frame camera
- Average Ground Sample distance (GSD) up to 3 centimetres
- Fully calibrated lenses (report available on request)
- Fully integrated Forward Motion Compensation (FMC)

Survey GPS (Base Stations)

- Trimble R8-Model 3 Receivers

All aerial survey work on this project was completed by qualified KBM personnel.

ACQUISITION SUMMARY

Data quality is dependent on suitable conditions (rain, snow, fog, and cloud-free conditions). Exact survey dates were selected accordingly within consideration for timelines also a major factor. Abnormal weather conditions delayed fall 2013 acquisition notably and the final flight on November 19 occurred with small amount of snow on ground and ice crystals in the air. Re-flights were completed as necessary on parts of reference and alternate routes in spring 2014 where data quality was insufficient. A complete list of all missions is provided in Table 1.

Table 1: LiDAR Data acquisition dates and key survey parameters.

Date	Time (UTC)	Flying height (m agl)	PRF (kHz)	Season
28-OCT-2013	16:30 to 19:30	450	266	Fall 2013
29-OCT-2013	15:00 to 17:30	450	266	Fall 2013
05-NOV-2013	14:30 to 20:30	450	266	Fall 2013
19-NOV-2013	17:00 to 21:00	450	266	Fall 2013
27-MAY-2014	14:40 to 16:40	650	200	Spring 2014
28-MAY-2014	14:30 to 17:30	450	266	Spring 2014
28-MAY-2014	17:30 to 18:30	650	200	Spring 2014
05-JUN-2014	15:30 to 16:10	650	200	Spring 2014
05-JUN-2014	18:30 to 21:10	600	200	Spring 2014
08-SEP-2014	15:20 to 23:30	650	200	Fall 2014

METHODOLOGY

All survey work and project deliverable were processed based on the following geodetic parameters:

Horizontal Datum : NAD83(CSRS) epoch 1997.00
Vertical Datum : CGVD28
Projection : UTM Zone 16

Survey Control

Control points for the project were surveyed in and processed prior to acquisition using static GPS techniques. A separate survey report and a network adjustment report have been prepared. Due to difficult access many point were installed outside the target corridor and then tied in with additional flightlines during acquisition. Some points were installed via float plane with special permission granted by Pukaskwa National Park.

Data Processing

Data was processed using the following steps:

1) INS processing - The position and attitude of the LiDAR and camera sensors were determined using differential positioning using one or more base stations on the ground (using applanix POSPac MMS). These positions (sensor trajectory) were processed using multiple methods for checks and redundancy.
2) LiDAR calibration (using Trimble Inpho LPMaster)
    a. The attitude correction position were then combined with laser ranges and scan angles measured by the LiDAR scanner to generate a LiDAR point cloud in real world coordinates.

   b. Some of the surveyed control points were used to check or correct for relative offsets between flightlines. Overlapping flightlines were checked and corrected for any visible offsets.

3) LiDAR processing
   a. Using Merrick's MARS LiDAR processing suite and Terrascan the LiDAR point cloud was checked and cleaned for outliers. Ground points and other relevant features (vegetation, structures, etc. were then extracted using Terrascan's ground classification tool.
   b. Right of ways, existing transmission lines and other assets were then digitized using various point cloud processing suites (such as and including, Terrascan)
4) Image Processing
   a. Aerial Triangulation using exterior orientations from INS and ground control point to perform a bundle adjustment
   b. Orthocorrection using elevation model extracted from LiDAR
   c. Mosaicking and colour-balancing to produce seamless georeferenced orthoimagery.
5) PLS-CADD packaging
   a. All products (orthoimagery, elevation model, planimetric features) were combined in PLS BAK files for use in industry standard PLS-CADD software used by line design team.

DATA ACCURACY

LiDAR Accuracy

The following is a control report that compares final LiDAR deliverables with control point coordinates located within the corridor.

Table2: LiDAR control report summary comparing LiDAR derived elevation against surveyed control points

Point ID	Easting (m)	Northing (m)	Known Z (m)	LiDAR Z (m)	dZ (m)
1	683594.9	5306396	298.55	298.70	0.15
2	671739.5	5310010	303.03	302.88	0.15
3	661926.3	5312860	242.27	242.26	-0.01
6B	623577.6	5339219	418.86	418.92	0.05
7	616911.7	5343296	468.41	468.46	0.04
10	552048.9	5393396	215.21	215.28	0.07
11	547425.6	5398685	305.30	305.42	0.12
12B	536332.4	5403610	258.73	258.85	0.12
13B	527284.2	5405605	218.33	218.22	-0.11
14B	519690.5	5405964	202.47	202.42	-0.05
15B	505911.8	5406854	290.60	290.63	0.03
16	492573	5408405	301.01	301.11	0.10
17	474273.4	5411919	326.85	326.76	-0.09
18	460302.2	5414992	228.77	228.78	0.02
19	449603.8	5418783	250.46	250.44	-0.02
22	414486.7	5429427	209.58	209.59	0.01
23	402354.9	5427080	279.03	279.14	0.11
24	394143.9	5417585	233.46	233.62	0.16
26	380278.4	5401461	249.93	249.91	-0.02
27	373121.3	5392413	331.30	331.26	-0.04
28B	368326.9	5388778	329.89	329.83	-0.06
29	354524	5378451	313.84	313.99	0.15
30	345697	5373399	228.53	228.48	-0.05
A1	663407.4	5326817	325.84	325.82	-0.02
A5	622909.8	5354443	487.60	487.55	-0.05
A6	619598.1	5365212	472.72	472.66	-0.07
A7	620854.8	5375649	436.04	435.95	-0.08
A10	605940.6	5397482	350.27	350.22	-0.05
				Average dZ	***0.02***
				Average magnitude	***0.07***
				RMS	***0.09***

As per results in Table 2 the aerial survey were deemed to have met required accuracy specifications for this project.