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January 16, 2018

Mr. D. Christle  
Secretary and Executive Director  
Public Utilities Board  
400-330 Portage Avenue  
Winnipeg, Manitoba R3C 0C4

Dear Mr. Christle:

**RE: MANITOBA HYDRO 2017/18 & 2018/19 GENERAL RATE APPLICATION ("GRA") – REBUTTAL EVIDENCE ON THE MGF REPORT**

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Please find attached Manitoba Hydro's Rebuttal Evidence with respect to the written evidence of MGF Project Services Inc., on their report titled *Manitoba Hydro Capital Expenditure Review for the Keeyask Hydroelectric Dam, the Bipole III, Manitoba-Minnesota, and GNTL Transmission Lines*.

Manitoba Hydro is enclosing, for the public record, copies of its Rebuttal Evidence with confidential information redacted and with redaction codes inserted thereon. Manitoba Hydro is also enclosing copies (on blue paper) of its Rebuttal Evidence with redactions removed, which copies Manitoba Hydro requests be received and held in confidence pursuant to Rule 13 of The Public Utilities Board Rules of Practice and Procedure.

If you have any questions or comments with respect to this submission, please contact the writer at 204-360-3946 or Odette Fernandes at 204-360-3633.

Yours truly,

**MANITOBA HYDRO LEGAL SERVICES DIVISION**

Per:



**PATRICIA J. RAMAGE**

Barrister & Solicitor

cc:

All Registered Interveners  
Odette Fernandes, Manitoba Hydro  
Bob Peters, Board Counsel  
Dayna Steinfeld, PUB Counsel

**MANITOBA HYDRO PUBLIC UTILITIES BOARD**

**IN THE MATTER OF *The Crown Corporation Public Review and Accountability Act***

**AND IN THE MATTER OF Manitoba Hydro's 2017/18 & 2018/19 General Rate Application**

**REBUTTAL EVIDENCE OF MANITOBA HYDRO**

**WITH RESPECT TO THE WRITTEN EVIDENCE OF:**

MGF Project Services Inc., Independent Expert Consultant for the Public Utilities Board, on the Manitoba Hydro Capital Expenditure Review for the Keeyask Hydroelectric Dam, the Bipole III, Manitoba-Minnesota, and GNTL Transmission Lines



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1 In its 2017/18 & 2018/19 General Rate Application (“Application”) filed on May 12, 2017,  
2 Manitoba Hydro provided a brief description of its Bipole III Reliability Project (“Bipole III”), its  
3 Keeyask Generating Station Project (“Keeyask”), and the U.S. Tie-Line Project made up of the  
4 Manitoba-Minnesota Transmission Project in Manitoba (“MMTP”) and the Great Northern  
5 Transmission Line in Minnesota (“GNTL”). Included in those descriptions were the budget  
6 estimates in place as at that time, and the projected In-Service Dates for each as of May, 2017.  
7 The Application also made reference to the review of those projects by the Boston Consulting  
8 Group.

9

10 On December 8, 2017, Manitoba Hydro was provided with a copy of the Report from MGF  
11 Project Services Inc. (“MGF”), an entity retained by The Public Utilities Board of Manitoba  
12 (“PUB”) to review Manitoba Hydro’s capital expenditure program in relation to the above  
13 projects and to provide its opinion on Manitoba Hydro’s updated costs for each. Manitoba  
14 Hydro has had the opportunity to review that report, to put forward its Information Requests,  
15 and to review the answers provided by MGF on or about January 5, 2018, to all of the  
16 Information Requests it received.

17

18 In order to provide background and context to the remarks made in the Report of MGF, and to  
19 fully respond to the opinions expressed therein, Manitoba Hydro has prepared separate  
20 rebuttal for each of Bipole III, Keeyask and MMTP. It was not felt necessary to provide rebuttal  
21 on GNTL and the Manitoba-Saskatchewan Transmission Project.

1 **1. KEYYASK GENERATING STATION PROJECT**

2  
3 The Keeyask Generating Station is a 7 unit 695-megawatt hydroelectric generating station  
4 situated at Gull Rapids on the lower Nelson River in northern Manitoba. Keeyask will be the  
5 fourth largest generating station in Manitoba and the sixth generating station located on  
6 the Nelson River. The Keeyask Project is owned by a partnership between Manitoba Hydro  
7 and four Manitoba First Nations, known as the Keeyask Hydropower Limited Partnership  
8 (“KHL P”). Manitoba Hydro has been tasked with the responsibility of managing the  
9 construction of the Keeyask Project and the operation of the facility when it enters into  
10 service on behalf of the KHL P. Construction of the Keeyask Project consists of the  
11 construction of the generating station as well as construction of supporting infrastructure  
12 and the Keeyask Transmission Project which will transport the power produced at Keeyask  
13 onto the Manitoba Hydro system when the generating station enters into service.

14  
15 MGF was retained on Keeyask to review and explain the increases in cost estimates and  
16 capital cost increases, as well as project cost overruns. It was to determine and assess the  
17 reasonableness of the updated forecast and to identify aspects of the updated cost  
18 estimate and schedule that are at risk. It was also to recommend risk mitigation strategies  
19 and, further, to review and make recommendations with respect to Manitoba Hydro’s:

- 20  
21 • practices on its pre-construction design and engineering work;  
22 • its methodologies for costing, for tendering and contracting, for management of  
23 construction, contractors and construction risk management, and for scheduling;  
24 • its choice of contract types;  
25 • geotechnical analysis; and  
26 • the governance structure.

27  
28 Manitoba Hydro staff received dozens of requests for information and data, and staff was  
29 fully transparent in sharing more than 1,900 documents including contracts, cost estimates,  
30 schedules and various other project management documents.

31  
32 Key Manitoba Hydro project staff had more than two dozen meetings by phone and in  
33 person with MGF representatives and hundreds of emails were exchanged between the  
34 parties over the course of the review. MGF also met with senior staff from the General Civil  
35 Contractor BBE Hydro Constructors Ltd (“BBE”), and the project design engineer (“Hatch”).  
36 MGF personnel attended the Keeyask site on three separate site visits.

1  
2 In MGF's *Report for Manitoba-Hydro Capital Expenditure Review for The Keeyask*  
3 *Hydroelectric Dam, The Bipole III, Manitoba-Minnesota and GNTL Transmission Line* report  
4 dated December 8, 2017 ("MGF's Report or the Report"), MGF and their sub-consultant  
5 Kohn Crippen Berger ("KCB"), provide a number of observations, findings,  
6 recommendations and conclusions related to Keeyask. Manitoba Hydro has grouped a  
7 majority of these items into three major themes which Manitoba Hydro will comment on in  
8 the subsequent sections of this rebuttal. The three major areas which Manitoba Hydro will  
9 address are as follows:

- 10  
11 1) The contract model selected for the General Civil Contract ("GCC");  
12 2) The people and the competency of the people managing the construction of the Keeyask  
13 Project; and  
14 3) MGF's findings related to the forecasted cost and schedule of the Keeyask Project.

15  
16 **The key responses to those three major areas (detailed more fully below) are:**

17  
18 **1) The contract model selected for the General Civil Contract;**

- 19 • The GCC is being managed under a target price contract where the contractor is  
20 reimbursed for actual costs. The contractor is incentivized to perform and minimize  
21 cost and schedule as their profit and General Administration and Overhead are at  
22 risk if they exceed their target price. The contractor is also subject to liquidated  
23 damages for delays to the project schedule.
- 24 • The decision to proceed under the cost reimbursable target price contract model  
25 was made in 2012/2013 and was part of a larger Project Delivery Strategy for the  
26 Keeyask Project. This decision was informed by lessons learned on the recently  
27 completed Wuskwatim Generating Station Project and prevailing market conditions  
28 at the time.
- 29 • The North American major capital project market around the time of the GCC  
30 procurement was extremely competitive. Contract models that transferred  
31 additional risk to the contractor including fixed price and unit price would have been  
32 cost prohibitive as contractors were not willing to accept additional risk in a  
33 competitive environment.
- 34 • An extensive 24 month, three phase procurement process was undertaken to select  
35 a General Civil Contractor. BBE was the selected contractor as they were  
36 determined to be the best value contractor based on the evaluated criteria.
- 37

1       **2) The people and the competency of the people managing the construction of the**  
2       **Keeyask Project.**

- 3           • The Manitoba Hydro team delivering the Keeyask Project is comprised of project  
4           management and construction management professionals with experience in  
5           managing some of the largest construction projects in Manitoba over the past  
6           decade.
- 7           • Manitoba Hydro has contracted BBE as the GCC to serve as Construction Manager  
8           for General Civil scope of work. Manitoba Hydro taking over the role of Construction  
9           Manager as implied by MGF throughout their report would expose Manitoba Hydro  
10          to additional risk and claims from the contractor.
- 11          • From the start of construction, Manitoba Hydro has continually attempted to  
12          undertake actions to progress the work while not crossing the line of explicitly  
13          directing the means and methods of the contractor. Crossing this line will expose  
14          Manitoba Hydro to interference claims from the contractor and increase the level of  
15          risk assumed by Manitoba Hydro.

16  
17       **3) MGF's findings related to the forecasted cost and schedule of the Keeyask Project.**

- 18           • MGF does not provide data to support its conclusion that the expected cost of  
19           Keeyask will be \$9.5 B to \$10.5 B. Manitoba Hydro and the PUB submitted  
20           Information Requests to MGF requesting the details underpinning these  
21           calculations; however, MGF failed to provide the requested backup.
- 22           • Without the backup to substantiate MGF's claims, Manitoba Hydro reviewed the  
23           data in an attempt to understand how MGF arrived at their conclusions. From the  
24           information available, it is Manitoba Hydro's opinion that MGF has likely overstated  
25           the range of potential costs as they incorrectly applied General Administration and  
26           Overhead and indirect costs to their estimated cost overruns.
- 27           • MGF's forecasting methods are overly simplistic and do not consider the efforts  
28           undertaken by Manitoba Hydro and BBE to reduce cost and schedule outcomes.

29  
30       **1.1. The General Civil Contract, Contracting Strategy, and Selection of the**  
31       **Contractor.**

32  
33       **GCC Contracting Strategy:**

34       **MGF Report:**

35       **Section 1 - Executive Summary, page 1**

36       **Scope Item 5: Finding # 1 page 50; Finding # 5 and 6 page 56; Finding # 12 page 62**



1           **Scope Item 9: Finding #10 page 80**

2           **Section 8 – Conclusion, page 161**

3  
4           **KCB Report:**

5           **Section 5 page 33 – 35**

6           **Section 7 Pages 39 -40**

7  
8           Recognizing that the GCC was the largest and most important contract on Keeyask, in  
9           2012 Manitoba Hydro developed and executed a detailed project delivery strategy  
10           which included a procurement strategy for the General Civil Contractor. The project  
11           delivery strategy was provided to Knight Piésold (“KP”) (the independent expert  
12           consultant retained by the PUB) during the Need for and Alternatives To (“NFAT”)  
13           review in 2014 and more recently to MGF in July 2017 during the current review of the  
14           Keeyask Project. On Executive Summary page II of IV of Knight Piésold Independent  
15           Expert Consultant Report Rev.1 dated January 23, 2014, in reference to construction  
16           management, schedule and contracting plans, KP stated that:

17  
18                   *“The overall approach follows well documented internal standards developed by*  
19                   *Hydro’s NGCD. The contracting method varies by project component but the*  
20                   *principal civil works contracting strategy is an Early Contractor Involvement (ECI)*  
21                   *Project Delivery Strategy. Overall the project delivery strategy has been to*  
22                   *transfer risk away from Contractors and to Hydro in order to better understand*  
23                   *and share the risks and obtain a better contract price as a result.”*

24  
25           Manitoba Hydro’s selection of a contracting strategy was informed by a number of  
26           factors including, but not limited to, the following:

- 27  
28           • Market conditions that influence the availability of major contractors willing to bid  
29           on the work;
- 30           • Allocation of risk to the party best suited to manage the project’s most significant  
31           risks;
- 32           • The project schedule;
- 33           • Completeness of engineering at the time of tender;
- 34           • Lessons learned from past projects including Wuskwatim and Pointe du Bois; and

- 1           • Internal expertise and resource availability. Manitoba Hydro evaluated its internal  
2 expertise, resource availability and corporate structure as part of its analysis of an  
3 appropriate contracting strategy. It was recognized that although Manitoba Hydro  
4 had significant and expert resources required to function as the overall project and  
5 site manager, it lacked the experience necessary to manage the day-to-day  
6 activities typically performed by the general civil contractor. To perform this role  
7 would require significant changes and the addition of considerable construction and  
8 support staff to Manitoba Hydro’s organization.

9  
10       KCB states:

11  
12                   *“While we were not part of the process that selected the contracting model, we*  
13 *surmise that MH either had success with this model elsewhere, or there were*  
14 *significant reasons to push the project into construction quickly relying on the*  
15 *early contractor involvement, the expectations of a quality design from Hatch*  
16 *and an experienced contractor with a realistic target price to make the project a*  
17 *success.” (Page 39)*

18  
19       KCB is correct in its assumption that Manitoba Hydro was applying lessons learned from  
20 previous major capital projects that it had managed, including the recently completed  
21 Wuskwatim Generating Station and Pointe du Bois Spillway Replacement Project. It is  
22 not accurate in its assumption that the contract was impacted by any desire or need to  
23 push the project into construction quickly.

24  
25       The lessons learned by Manitoba Hydro that led to its selection of the cost  
26 reimbursable target price contract for the GCC are explained below. Lessons learned  
27 from past projects were also previously discussed at a high level during the NFAT in  
28 2014 hearings as well as during the 2015/16 and 2016/17 General Rate Application  
29 (Manitoba Hydro Exhibit #104 – Undertaking #44).

30  
31                   *“Manitoba Hydro originally tendered the General Civil Contract for the*  
32 *Wuskwatim Generating Station in 2007 as a unit price contract using the design,*  
33 *bid, build model. This resulted in receiving only one bid from the market with a*  
34 *price nearly double the Engineer’s Estimate and well beyond the expected value*

1            *of the work. After suffering schedule delay because of the lack of reasonable*  
2            *bids, the work was re-tendered and four competitive proposals were received*  
3            *with a cost-reimbursable, target price contract awarded to the successful*  
4            *proponent in November 2008.*

5  
6            *Based on the Wuskwatim Project experience, Manitoba Hydro also chose to*  
7            *include the river management, rock excavation, and electrical/mechanical scope*  
8            *into the Keeyask GCC to reduce the interface risk between contractors otherwise*  
9            *held by Manitoba Hydro. The rock excavation and electrical/mechanical work*  
10           *were packaged as separate contracts on the Wuskwatim Project leading to many*  
11           *challenges in interface management between the various contractors. On*  
12           *Keeyask, this work is bundled together within the GCC's scope.*

13  
14           *At the time when Manitoba Hydro was developing the contracting strategy for*  
15           *the GCC, potash was increasing in demand, oil prices were more than*  
16           *\$100/barrel and any available forecasts anticipated continued price increases.*  
17           *As a result, there was a boom in the major capital project market in North*  
18           *America, particularly in the energy industry including the Northern Alberta*  
19           *oilfields as well as many oil and natural gas projects within the Bakken Formation*  
20           *underlying portions of Saskatchewan, Montana and North Dakota and the*  
21           *Muskrat Falls project in Labrador, which resulted in increased competition for*  
22           *skilled labour (See for example*  
23           <http://publications.gov.sk.ca/documents/310/81353-2014-MPI.pdf>*).* *In this 'hot'*  
24           *construction market, many of the major contractors had already committed*  
25           *experienced personnel and resources to the other projects and were not as*  
26           *hungry for opportunity. In this type of economic environment, Manitoba Hydro's*  
27           *experience was that contractors were also not as willing to accept risk in a job*  
28           *and their pricing reflects this reality. Economic conditions were similar for the*  
29           *procurement phase of Keeyask as they were for procurement during Wuskwatim*  
30           *when the original General Civil Contract was unsuccessfully tendered as a unit*  
31           *priced contract and then re-tendered competitively as a cost reimbursable target*  
32           *priced contract.*

33

1            *Labour productivity (amount of hours per unit of work) has been one of, if not the*  
2            *largest risk for contractors since the early 2000's across Canada, particularly in*  
3            *remote, fly-in fly-out operations such as Keeyask. As was learned on Wuskwatim,*  
4            *this caused contractors to avoid or submit extremely high bids for any contract*  
5            *that transferred this risk to them (such as fixed cost or unit price contracts). For*  
6            *Canadian hydro, the absence of large scale projects from 1990 to the mid-2000's*  
7            *magnified the productivity issue creating a skilled labour shortage across the*  
8            *country and a shortage of qualified supervision. Manitoba Hydro was well aware*  
9            *that many contractors were wary to provide competitive estimates for hydro*  
10           *work."*

11  
12           In 2012, Manitoba Hydro selected a cost-reimbursable target price model with Early  
13           Contractor Involvement ("ECI") that balances project risk between two parties. If the  
14           contractor completes the work under the target price, they earn profit plus a share of  
15           the savings. However, if the contractor exceeds the target price, they forfeit a  
16           substantial portion of their profit for every dollar of overrun, up to the value of their  
17           total profit amount. A contractor will not go bankrupt on the job, but they are at risk of  
18           not earning any profit if they exceed the target price by a certain threshold. No return  
19           (i.e. profit) on a 5+ year investment of resources by a major contractor is not what  
20           shareholders want to see and thus the contractor is incentivized and motivated to  
21           perform.

22  
23           A fixed price model was considered but would have necessitated a contractor bidding  
24           higher to factor in risks over which they have no control (e.g. geological conditions,  
25           interest rates, commodity price escalations over the duration of the work, labour skill  
26           and availability, etc.). This would have raised the initial cost of the project and limited  
27           the number of parties interested in proposing on Keeyask, thus driving up the project  
28           cost.

29  
30           Another reason the target price model was chosen was because it allowed for an  
31           opportunity to leverage ECI. As the final design engineering was not yet complete,  
32           there was an opportunity to engage a contractor early to help influence the design  
33           from a constructability standpoint. Engaging a contractor earlier also allowed the

1 contractor more lead time to establish project process and work plans, understand the  
2 labour agreement and understand the local labour and supplier market.

3  
4 Manitoba Hydro also had experience with the target price model having recently  
5 completed Wuskwatim in 2012 (\$1.4B) and Point du Bois in 2014 (\$0.6B).

6  
7 KPMG, a consultant experienced in the management of major capital projects, was  
8 engaged by Manitoba Hydro in May 2016 to undertake an independent review of the  
9 current status of Keeyask. KPMG subsequently provided advice on the development  
10 and implementation of a Recovery Plan for Keeyask and has provided project  
11 management support since that time for the Manitoba Hydro project delivery team.  
12 Manitoba Hydro requested KPMG to provide commentary on the following three  
13 topics:

- 14  
15 1. Provide commentary on the contract model and any incentives included.  
16 2. Define Manitoba Hydro's role in the GCC contract. Define the role of the Contractor  
17 and comment on Manitoba Hydro's ability to manage the Contractor in this role.  
18 3. Provide commentary on Manitoba Hydro acting as the builder and taking on a  
19 Construction Management role.

20  
21 KPMG's response to these items is attached as Keeyask – Appendix A. In terms of  
22 contract type, KPMG's response indicates the incentives used in this contract have  
23 been used in other cost reimbursable contracts as well as other forms of contracts. The  
24 incentives align the owner's and contractor's interests and help to mitigate the  
25 exposure the owner has to poor performance by the contractor.

26  
27 **General Civil Contract Procurement:**

28  
29 ***MGF Report – Scope Item 5: Finding #12, page 62***

30 ***KCB Report – Section 5: page 33***

31  
32 Manitoba Hydro undertook an extensive three phase procurement process for the GCC  
33 beginning in 2012. This included a six month market-sounding exercise where 21 major  
34 international contractors were contacted to determine their level of interest in the

1           Keeyask Project. This process served as a marketing effort to generate interest for  
2           Keeyask in the marketplace with the intent of maximizing the number of capable  
3           contractors responding to the Request for Pre-Qualification to obtain competitive  
4           pricing. This process also served to inform Manitoba Hydro on the factors that were of  
5           interest to the potential contractors. Feedback on contracting models was also  
6           solicited from these organizations. Many of these experienced companies indicated  
7           they would not bid on a project the size and remoteness of Keeyask on a fixed price  
8           model due to the risks involved.

9  
10          The second phase of procurement was the prequalification phase. Seven contractors  
11          submitted proposals in response to Manitoba Hydro's call for submissions. The  
12          contractor submissions were evaluated on 17 different criteria including demonstrated  
13          experience in remote, arctic heavy civil construction projects with an emphasis on  
14          concrete, earthworks and river management. Other factors that were considered in  
15          the evaluation included schedule, risk mitigation and safety. Four contractors that  
16          Manitoba Hydro believed were capable of building the work were pre-qualified and  
17          were provided the opportunity to bid on the Keeyask General Civil Works Contract in a  
18          competitive, cost-based evaluation.

19  
20          The proposal stage was the third and final step in the procurement process. Manitoba  
21          Hydro engaged a third party ("Chant Construction") to provide their estimated price for  
22          the work as an additional pricing comparator (in addition to Manitoba Hydro's  
23          Engineer's Estimate). The pricing proposed by Chant Construction was generally in line  
24          with the Engineer's Estimate and was within the range of bids received from the four  
25          Proponents. A summary of the pricing information from the GCC proposals was  
26          provided in confidence to MGF as part of their review, and to the PUB and its  
27          independent expert KP during the NFAT hearings as exhibit NFAT CSI Manitoba Hydro-  
28          3.

29  
30          As part of the evaluation of the contractors' proposals, Manitoba Hydro evaluated the  
31          initial target price proposed by the contractors based upon a number of pre-defined  
32          factors that were valued by Manitoba Hydro including potential schedule  
33          advancements, size of workforce against available camp capacity, and quantity change  
34          sensitivities to ensure that the contractor who provided the best value was selected.

1 The bids were also compared against one another and against the estimate provided by  
2 Chant Construction for reasonableness. After nearly a two year procurement process  
3 to conduct the market sounding, prequalify capable proponents and evaluate proposals  
4 to select the best value for Manitoba Hydro, the General Civil Works Contract was  
5 awarded to BBE, a limited partnership between Bechtel Canada Co., Barnard  
6 Construction of Canada Ltd. and EllisDon Civil Ltd. in March 2014.

7  
8 Throughout its report, MGF is critical of the form of contract selected for the GCC. On  
9 page 80, MGF states:

10  
11 *“The GCC Contract strategy of adopting a cost reimbursable commercial*  
12 *arrangement for this project was flawed from the outset, with a predictable*  
13 *outcome, i.e. it promotes and rewards inefficient work and doesn’t encourage*  
14 *efficient work.”*

15  
16 MGF fails to identify and understand the factors that led to Manitoba Hydro proceeding  
17 with the selected form of contract for the GCC. MGF’s comment also does not address  
18 the target price aspect of the contract that puts the contractor’s profit and General  
19 Administration & Overhead (“GA&O”) at risk. The opportunity for profit and  
20 maintaining the GA&O incentivizes the contractor to attempt to meet or beat its target  
21 price. Manitoba Hydro provided MGF with the procurement documents for the GCC,  
22 evaluation matrix and criteria, related recommendations and presentations to the  
23 Manitoba Hydro Electric Board, the awarded contract with BBE and all seven amending  
24 agreements. These documents provide the rationale for selecting BBE as the GCC and  
25 clearly articulate the incentives that are intended to motivate contractor performance.

26  
27 The Keeyask Project standards and procedures referenced on pages 50 – 53 of the MGF  
28 report were used to support the development of the contracting strategy and  
29 throughout the procurement process for the GCC. On page 53 of the report, MGF  
30 states that *“the standards, procedures and processes supporting Contracting Strategy,*  
31 *Contractor Prequalification, Individual Contract Plans and Tender, Evaluate, Negotiate*  
32 *and Award are sufficient and well documented.”*

1 The contracting strategy, the GCC contract documents and a summary of proposal was  
2 reviewed with KP as part of the NFAT process. KP did not raise any significant concerns  
3 with the contracting strategy at the time of their review and the benefits and risks of  
4 the contract model were understood and communicated during the NFAT hearings.

5  
6 It is not clear to Manitoba Hydro whether MGF and KCB were aware of the information  
7 provided to the PUB during the NFAT, or of the NFAT conclusions. As seen below,  
8 Manitoba Hydro addressed the contracting strategy with the PUB's independent expert  
9 in the NFAT process and the PUB's decision reflects that this, along with the risks, were  
10 discussed and reviewed.

11  
12 On page 132 of the PUB's final NFAT report dated June 20, 2014, section 7.6.0  
13 Conclusions of the Panel, the PUB stated the following regarding the Keeyask Project:

14  
15 *"The actual construction cost of Keeyask will increase beyond Manitoba Hydro's*  
16 *currently projected capital cost of \$6.5 billion. Budgeting at least for Manitoba*  
17 *Hydro's "high" estimate of \$7.2 billion would be prudent. This conclusion is not*  
18 *reached as a result of the history of past capital cost increases. The Panel accepts*  
19 *Manitoba Hydro's argument that the past is not necessarily a predictor of the*  
20 *future. Rather, the Panel bases its conclusion on its review of the Keeyask general*  
21 *civil contract, which is a cost-reimbursable contract that leaves a significant*  
22 *portion of cost risk with Manitoba Hydro. It would be a fallacy to assume that the*  
23 *contract provides anywhere near the same level of cost certainty as a fixed-price*  
24 *contract, which would be more expensive. This is not a criticism of the Keeyask*  
25 *general civil contract or Manitoba Hydro's approach to contracting. The Panel is*  
26 *satisfied that Manitoba Hydro's approach to developing and negotiating the*  
27 *contract, as well as its approach to managing risk, has been appropriate to date.*  
28 *Rather, it reflects the general nature of a large infrastructure project with*  
29 *inherent risks that can be mitigated, but not avoided."*

30  
31 **1.2. The People and the Competency of the People Managing the Construction of the**  
32 **Keeyask Project**  
33

34 **MGF Report: Section 1 – Executive Summary, page 1**



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On page 1 of MGF’s report, MGF states that:

*“There is an opportunity for Manitoba Hydro to implement contract management improvements, take ownership for the GCC and drive the GCC contractor to higher levels of predictable performance, to accelerate project schedule and to lower the likely forecast cost at completion”.*

MGF goes on to say that:

*“Manitoba Hydro staff are competent and professional but they are not a construction manager with the experience and skills to direct the GCC. As such, its project management and control effectiveness is low.”*

MGF makes these assertions without describing the skills and experience of Manitoba’s senior team managing Keeyask, the roles and responsibilities under the General Civil Works contract, or even the actions that Manitoba Hydro has taken to improve outcomes from this contract. As MGF has failed to address these points in its report, the following section describes Keeyask’s governance structure, an assessment of skills and experience of Manitoba Hydro’s senior project team from a third party and a description of some of the key actions Manitoba Hydro has taken to enhance performance.

**Governance:**

Manitoba Hydro is experienced in the execution of major capital projects having delivered some of the largest capital projects in Manitoba over the last 10+ years.

In early 2016, Manitoba Hydro established the Major Projects Executive Committee (“MPEC”) which is chaired by Manitoba Hydro’s President & CEO and consists of five Vice Presidents who have accountability over the areas of the company responsible for the execution of major capital projects. MPEC is an executive management forum that provides oversight, direction and executive/strategic decision making with respect to major capital projects (i.e. Keeyask, Bipole III, MMTP and the GNTL Project in Minnesota). MPEC meets every two weeks or as required.

The Manitoba Hydro executive team is ultimately accountable to the Manitoba Hydro-Electric Board (“MHEB”). Periodically (and conforming to the corporate approval

1 authority levels), major project decisions are reviewed and approved by the MHEB. The  
2 Keeyask Project team also provides project update reports and presentations to the  
3 MHEB on a regular basis. Site visits by both the Manitoba Hydro executive team and  
4 MHEB members have taken place.

5  
6 As Keeyask Project is owned by the KHLF, there are additional accountabilities beyond  
7 the Manitoba Hydro organization structure. The Keeyask Project team is also  
8 accountable to the KHLF Board that is comprised of representatives from each of the  
9 four Keeyask Cree Nation (“KCN”) Partner Communities and Manitoba Hydro. The KHLF  
10 Board is chaired by the Manitoba Hydro Vice President of Generation and Wholesale.  
11 The Keeyask Project team provides monthly update reports to the KHLF, as well as  
12 makes quarterly update presentations at the Board meetings.

13  
14 The Keeyask Project team is comprised of project management and construction  
15 professionals with significant experience in the execution of major capital projects. As  
16 stated, Manitoba Hydro requested that KPMG review and comment on the experience  
17 of Manitoba Hydro’s senior leadership team responsible for delivering Keeyask, and  
18 those comments are also found in Keeyask – Appendix A.

19  
20 **Management of the General Civil Contract:**

21  
22 ***MGF Report: Section 1: Executive Summary – page 1.***

23  
24 On page 1 of their report, MGF states that Manitoba Hydro’s “*project management and*  
25 *control effectiveness is low*”. MGF does not recognize the efforts of the Manitoba Hydro  
26 team in helping to manage the GCC.

27  
28 Manitoba Hydro has been pushing, and will continue to aggressively push, the General  
29 Civil Contractor to perform. To be successful, this will require that Manitoba Hydro and  
30 BBE work together. After the award of the GCC in March 2014, work commenced on  
31 July 16, 2014 following receipt of all required regulatory approvals. Work by the GCC for  
32 the remainder of 2014 and all of 2015 was focused on establishing infrastructure  
33 including temporary buildings, haul roads, rock quarries as well as temporary river  
34 management structures (cofferdams) to control the flow of the Nelson River. These  
35 cofferdams allowed for the areas to be dewatered and rock excavated to allow for the  
36 construction of the permanent structures. In early January 2016, work on the North

1 Dyke commenced representing the milestone of the first permanent earthworks on the  
2 project.

3  
4 At the beginning of the 2016 construction season, the project was generally on track  
5 and the project team was forecasting that the control budget and schedule of \$6.5B and  
6 November 2019 unit 1 ISD (established during the NFAT hearings) would be achieved.

7  
8 Manitoba Hydro reported to the PUB on March 2016 that the project was on schedule  
9 and on budget. Manitoba continued to actively monitor the progress of the GCC through  
10 the beginning of the construction season as it has throughout the project. Concrete  
11 work on the principle structures (Spillway, Intake, Powerhouse, Service Bay and Tailrace)  
12 began in early May 2016.

13  
14 **2016 Issues:**

15 In early June 2016, approximately 6 weeks into concrete activities it was evident that  
16 the contractor's actual volume of concrete completed to date was significantly less than  
17 the contractor's plan. On June 19, 2016, Manitoba Hydro formally requested that the  
18 Contractor develop a recovery plan to increase their manpower ramp-up and concrete  
19 production in order to bring their production back in line with the 2016 plan. Manitoba  
20 Hydro staff continued to monitor the progress carefully during this time.

21  
22 By July 2016, it was apparent that that the initial recovery efforts by the contractor were  
23 not going to be impactful enough to recover to the original plan. As well, both the GCC  
24 and Manitoba Hydro were becoming aware that the work could not be built as it was  
25 originally planned. As work continued to progress, the need for a new execution plan  
26 crystallized and required the team to understand the issues and problems and address  
27 them going forward. This led to the Recovery Plan described below.

28  
29 By the end of the 2016 construction season, concrete placement was at 41% complete  
30 of the original plan for the year while earthworks were at 65% complete of the original  
31 plan. The concrete plan was to complete nearly 200,000 cubic metres of the 360,000  
32 cubic metres required for Keeyask in the first year, while only 77,000 cubic metres were  
33 completed in the first year of concrete (2016). The production rates accomplished  
34 during the first concrete construction season saw the project schedule rapidly change  
35 from having a potential 6-month advancement opportunity at the start of the year shift  
36 to a potential of up to 2+ year delay by the end of the year. At this time it was also  
37 apparent that the \$304M Labour Management Reserve in the \$6.5B control budget to

1 help offset productivity risk would not be sufficient. The large variance between actual  
2 and planned production also resulted in the Contractor having no opportunity to earn  
3 profit for the remainder of the project under the existing contract structure. This was  
4 already making for disengagement and the risk of worsening performance could occur  
5 for the remainder of the project if not addressed.

6  
7 **Recovery Plan:**

8 Manitoba Hydro could not wait until the end of the 2016 construction season to begin  
9 to address the issues and plot a new path forward. Manitoba Hydro, with the assistance  
10 of industry experts KPMG, developed a Recovery Plan in September 2016 that covered  
11 both short and long term issues. The Recovery Plan incorporated a number of key  
12 features required to address the trajectory of the Project in order to achieve successful  
13 completion. The Recovery Plan needed to improve production and remove  
14 inefficiencies, and included:

- 15
- 16 • The development of a plan for the continuation of concrete through the winter  
17 months (previously not included in the original schedule);
  - 18 • Identification of root causes of performance issues;
  - 19 • Engagement of senior leadership, Executive Sponsors and CEOs;
  - 20 • Development of refined processes, systems and tool based upon the findings of the  
21 root cause analysis;
  - 22 • Implementation of a change management program to enable a culture shift within  
23 the project team;
  - 24 • Initialization of activities to reforecast the cost and schedule for the project;
  - 25 • Analysis of the Contractor's claims; and
  - 26 • Supplementing of the commercial expertise of the Manitoba Hydro team.
- 27

28 Manitoba Hydro and BBE assessed the underlying causes of the challenges experienced  
29 to date. The main contributing factors to the underperformance included:

- 30
- 31 • Unachievable labor productivity rates in the current market which were contained  
32 within the contractor's bid;
  - 33 • Slower than planned progress in ramping-up the on-site labour force in preparation  
34 for the concrete works beginning in 2016. This ramp up required a doubling of the  
35 labour force of roughly 1,000 workers to 2,000 workers in a period of roughly three  
36 months.

- 1           • Geotechnical and geological conditions different than anticipated based upon the  
2           extensive pre-construction geotechnical testing, resulting in additional effort to “get  
3           off the rock” to allow for construction of the concrete and earthworks structures off  
4           of the bedrock.

5  
6           As part of the Recovery Plan, Manitoba Hydro, leveraging support from third party  
7           experts, including KPMG (Recovery Plan support), Revay (claims valuation and  
8           management), Borden Ladner Gervais LLP (legal support) and Validation Estimating  
9           (contingency development) undertook a thorough process to evaluate alternatives for,  
10          and impacts, to the GCC. The review demonstrated that the best course of action was  
11          to amend the existing contract with BBE, specifically to lower the overall cost and  
12          schedule risk for Manitoba Hydro and permit BBE an opportunity to re-establish a  
13          reasonable profit level. All other alternatives introduced significant additional risks to  
14          the Project as well as guaranteed impacts to cost and schedule that were greater than  
15          the selected alternative of amending the contract with BBE.

16  
17          **General Civil Works Contract Amendment:**

18          In early 2017, Manitoba Hydro and BBE were able to achieve the mutual agreement that  
19          was required to amend the contract. The negotiation required ‘gives and takes’ from  
20          both parties and the outcome was a contract that lowered the overall cost and schedule  
21          risk for Manitoba Hydro and allowed the Contractor an opportunity to re-establish a  
22          reasonable profit level if they are able to perform relative to their revised target price.  
23          This aligned the interests of both parties to deliver a “Best for Project” approach.

24  
25          The details of the amendment to the contract are formalized in Amending Agreement  
26          #7 between Manitoba Hydro and BBE. Amending Agreement #7, in addition to all  
27          previous versions of the agreement between Manitoba Hydro and BBE were provided to  
28          MGF in support of their review. The key features of the amendment include:

- 29  
30          • Cost and schedule incentives providing motivation for BBE to earn profit by  
31          delivering the work to Manitoba Hydro with minimum cost and best schedule;  
32          • Outstanding contractor claims were reconciled;  
33          • GA&O mark-up was capped at target price;  
34          • Narrowed ability for future claims;  
35          • New liquidated damages provisions were established for late delivery;  
36          • Productivity rates in line with 2016 actual performance used to inform the estimate  
37          of remaining costs on this contract.

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Both MGF (MGF Report page 80) and KCB (KCB Report page 34-35) are critical of the contract model for the GCC. In Keeyask-Appendix A, KPMG describes the original and the amended contract for the GCC. KPMG describes the challenges inherent in attempting to renegotiate a contract in a non-competitive environment on page 2 of their submission:

*“The amended contract continues to be a Target Price Cost Reimbursable contract, fundamentally the same as the original contract. The ability to transfer additional risk, such as geotechnical, hydrology, labour, extreme weather, and northern logistics to BBE by changing the contract to a Unit Rate or Lump Sum contract, would have required directly negotiating a new form of contract with BBE in a non-competitive environment or descope/terminating BBE and going back to the market for a Unit Rate contract. It was expected that in a non-competitive environment and given BBE’s performance in 2016, the costs of transferring this risk to BBE would have been prohibitive and/or not achievable.”*

**New Control Budget and Schedule Established:**

With the General Civil Works Contract amended, further efforts were required to re-establish a new control budget and schedule for Keeyask. Manitoba Hydro reviewed the impact of the delay, along with known trends for the impacted work packages. The outcome of the review process was a revised control budget of \$8.7B with a P50 contingency and a first unit in service date (“ISD”) of August 2021. The revised control budget and schedule was formally approved by the MHEB in February 2017. The following table from PUB/MH MFR-122 highlights the major changes between the control budget established at the NFAT in 2014 and the revised control budget:

1 **Figure 1.0**

Keyask Budget Summary (in Billions \$)				
Item #	Item	Previously Approved Budget (2014\$)	Current Approved Budget(2016\$)	Variance
1.1	Generating Station	4.046	5.948	1.902
1.2	Generation Outlet Transmission (GOT)	0.164	0.202	0.038
1.3	Escalation @ CPI	0.244	0.249	0.005
1.4	Interest (including Interest on Equity)	1.343	1.749	0.406
1.5	Contingency	0.307	0.578	0.271
1.6	Labour Management Reserve	0.304	0.000	-0.304
1.7	Escalation Management Reserve	0.088	0.000	-0.088
1.8	<b>Total</b>	<b>6.496 B</b>	<b>8.726</b>	<b>2.230</b>
1.9	First in-service Date	Nov-2019	Aug-2021	21 months.

2  
3  
4 **2017 Performance:**

5 The 2017 construction season saw improved performance over the 2016 season with  
 6 approximately 12% more concrete placed in 2017. This improvement is significant as  
 7 the work done in 2017 was more complex, specifically, most of the placements in 2017  
 8 were generally smaller, required more formwork and were greater complexity pours  
 9 (such as draft tubes) and concrete at height (head blocks and piers).

10  
11 For the earthworks, productivity rates improved by 15% and the total of material placed  
 12 in permanent structures in 2017 was 1.03 M cubic metres, an improvement of roughly  
 13 90%.

14  
15 Contributing factors that influenced performance in 2017 included:

- 16  
17
- 18 • Improved contractor leadership/management and their ability to plan and manage the work;
  - 19 • More complex and better developed sequencing of concrete work and interfaces with earthworks;
  - 20 • Learning curve to perform “first” work on the concrete in the Intake, Powerhouse and Service Bay;
  - 21 • Challenges with the craft labour including maximizing work time at the work front.
- 22  
23

1  
2 Despite the improvements over 2016 described above, the target quantities for  
3 concrete and earthworks were not fully achieved. By the end of the 2017 construction  
4 season, while the Contractor had achieved considerably more concrete and earthworks  
5 volume than the previous year, concrete was approximately 20% less than planned and  
6 earthworks was 25% less than planned. Despite these shortfalls in volume, the key  
7 milestones for the year were achieved allowing the Keeyask project to remain on  
8 schedule. Achieving the following major milestones in 2017 ensures that the project will  
9 be delivered within the shortest duration schedule possible and protect the opportunity  
10 for schedule advancement of the unit 1 ISD:

- 11
- 12 • Completion of the Spillway concrete and handoff of the Spillway to the Gates,  
13 Guides and Hoists Contractor (Canmec) on November 15, 2017 (on schedule);
  - 14 • Installation of the Powerhouse Cranes in the Service Bay in November (on schedule);
  - 15 • Enclosure of Powerhouse Units 1 and Service Bay completed by December 31, 2017  
16 (on schedule);
  - 17 • Enclosure of Powerhouse Units 2-3 by February 2018 is on track to allow for the  
18 start of turbine and generator work;
  - 19 • Significant progress on earth structures (dams and dyke) such that Keeyask is on  
20 track to divert the river through the Spillway in July/August 2018
- 21

22 As a consequence of the above milestones being met the project is still on track to be  
23 completed on or below the revised budget with the first turbine coming in service in or  
24 before August 2021.

25

26 **Management of the GCC:**

27

28 ***MGF Report – Section 1: Executive Summary, page 1***

29

30 It was suggested by MGF on page 1 of their report that *“There is an opportunity for*  
31 *Manitoba Hydro to implement contract management improvements, take ownership for*  
32 *the GCC and drive the GCC contractor to higher levels of predictable performance, to*  
33 *accelerate project schedule and to lower the likely forecast cost at completion”*. This  
34 statement appears to suggest that MGF is recommending that Manitoba Hydro should  
35 take over the role of Construction Manager from BBE. MGF goes on to soften this  
36 recommendation in MH/MGF I-2j and state that *“the recommendation is not for*



1 *Manitoba Hydro to become the construction manager and replace BBE, but for*  
2 *Manitoba Hydro to exert more control and hold BBE accountable for its performance.”*

3  
4 Manitoba Hydro is not a general contractor, nor does it have on hand the necessary  
5 personnel to manage and build Keeyask as the general contractor. If it were to  
6 undertake some or all of this task as recommended by MGF, it would have to retain  
7 significantly more staff with sufficient experience and expertise to take on the work  
8 without any delays. Such personnel are not readily available and, as outlined in more  
9 detail in Appendix A, there would be risk to the schedule because of the time it would  
10 take to find the personnel, to give them time to get up to speed on the project, and to  
11 develop a team to surround themselves with whom they would have confidence. As  
12 stated by experts KPMG and Hatch, this would simply introduce more risk to the project  
13 at this stage.

14  
15 Hatch has been involved in Keeyask as the detailed design engineer and as an  
16 organization, has considerable experience in the delivery of major capital projects.  
17 Hatch was asked to provide commentary around expanding Manitoba Hydro’s role with  
18 the GCC, as recommended by MGF. Hatch’s response can be found in Keeyask -  
19 Appendix B, and like the response from KPMG, Hatch did not recommend such action.

20  
21 According to Hatch (page 3 of Keeyask - Appendix B), Manitoba Hydro taking a greater  
22 role in the construction is of equal or greater risk to the project than the status quo.  
23 Hiring a Construction Management team to manage the construction on behalf of  
24 Manitoba Hydro would also carry risk until proven. Some of the risks identified in the  
25 Hatch review that informed their opinion include:

- 26  
27
- 28 • Lack of availability of qualified professionals required to staff an entire team;
  - 29 • Time to recruit, hire and mobilize a team;
  - 30 • The new team would have a steep learning curve which would add risk to the  
31 successful execution of the project;
  - 32 • Manitoba Hydro would lose leverage within the BBE contract.

33 BBE was hired by Manitoba Hydro as the Construction Manager to complete the  
34 General Civil Works scope. Keeyask – Appendix A provided by KPMG defines Manitoba  
35 Hydro’s role in the GCC contract and provides commentary on the expected implications  
36 of Manitoba Hydro acting, instead, as the builder and taking on a Construction  
37 Management role, rather than acting in its capacity as owner.

1  
2 MGF states on page 1 that Manitoba Hydro is “*not a construction manager with the*  
3 *experience and skills to direct the GCC*”. However it fails to address the activities  
4 Manitoba Hydro has undertaken to progress the work, without crossing the line of  
5 explicitly directing the means and methods of the Contractor, and without exposing  
6 Manitoba Hydro to interference claims. If Manitoba Hydro did step into the role of  
7 Construction Manager, it would be likely that the Contractor could claim for their entire  
8 performance bonus(es) regardless of the final cost and in-service date of the project.  
9 This would also inhibit ownership/accountability of the Contractor to perform.

10  
11 KPMG was asked to provide commentary on Manitoba Hydro acting as the builder and  
12 taking on the Construction Management role. KPMG has indicated that they are  
13 unaware of any Canadian public sector owner with the skill-set required to directly  
14 manage a multi-billion dollar construction project (Keeyask – Appendix A).

15  
16 In an attempt to better understand MGF’s perspective, Manitoba Hydro requested  
17 additional information related to this conclusion in MH/MGF I–2. Specifically, Manitoba  
18 Hydro was interested in understanding if other owners/utilities have successfully taken  
19 ownership in the middle of a major capital project and the outcomes of those  
20 interventions. Manitoba Hydro was also interested in the Corporation’s exposure to  
21 risks arising from undertaking such a change however MGF did not provide a response  
22 to MH/MGF I–2 that provided an answer to these questions. Manitoba Hydro posed  
23 this question to KPMG and requested their professional assessment. This information  
24 can be found in Keeyask – Appendix A. Hatch also provided commentary on the  
25 potential liabilities associated with taking over the role of Construction Manager in  
26 Keeyask - Appendix B.

27  
28 Throughout 2017, Manitoba Hydro has increased the pressure on the Contractor to  
29 perform, and to have its workers become more productive. Some of these areas  
30 include:

- 31  
32
- 33 • Contractor’s management of the trades;
  - 34 • Travel logistics for the contractor’s workforce;
  - 35 • Site wide respectful workplace campaign;
  - 36 • Contractor’s revised organizational structure and increased supervision capacity and  
experience;

- 1           • The development of an effective monitoring and control system to provide daily  
2           feedback to contractor workforce;  
3           • Combining and streamlining BBE's and Manitoba Hydro's quality control and  
4           assurance teams and processes;  
5           • Establishment of single mission and team ethics for the Manitoba Hydro and BBE  
6           teams.

7  
8           Manitoba Hydro has also been leading efforts to gain efficiencies, improve  
9           methods/processes and achieve cost and schedule savings. A few examples of key  
10          initiatives where Manitoba Hydro spearheaded efforts that led to significant cost and/or  
11          schedule benefits:

- 12          • The decision to procure a new draft tube formwork system to utilize on the  
13          remaining 5 units. This decision shortened the schedule to install the bottom  
14          portion of the draft tube and improved cost performance.  
15          • The decision to utilize column extenders in the Powerhouse and Intake allowed for  
16          structural steel to be installed at lower elevations. This provided an opportunity to  
17          enclose the Powerhouse and Service Bay earlier. A schedule savings of over 1 year  
18          resulted.  
19          • Advancement of the south dyke in 2018 and supporting design changes. This will  
20          allow for additional quantities to be placed during the winter 2018 and reduce risk  
21          to the project schedule.

22  
23          **2018 Plan:**

24          In 2018, a 10% increase in performance by the GCC is required to meet control budget  
25          (\$8.7B) and achieve IDS's for the units that are in advance of the control schedule of  
26          August 2021. This also assumes that no significant risks materialize with other contracts  
27          or risks that could impact the critical path. Manitoba Hydro is confident that this rate of  
28          improvement is attainable as the year-over-year improvement between 2016 and 2017  
29          was similar. In addition, much of the remaining concrete work in 2018 is similar to the  
30          work completed over the previous year and lessons learned over the last year and the  
31          inherent repeatability of seven nearly identical units is expected to improve  
32          productivity. Manitoba Hydro and BBE are currently working on their planning for 2018.  
33          Some of the key initiatives in 2018 include:

- 34  
35          • 2018 winter work (placement of additional concrete over the 2018 winter months);  
36          • Building a high performance culture at site;

- Cold eyes review;
- Manitoba Hydro and BBE leads identifying efficiencies and improvement;
- Improved management of indirects;
- Productivity studies and planning.

**Third Party Reviews and Involvement:**

Continuous improvement is ingrained in the culture of the Keeyask team but can always be improved. Prior to, and during the construction of Keeyask, external experts have been engaged to support and, in some cases, augment the skills of the existing project team. The project recognizes that the decision to manage the project using a team with strong internal expertise and knowledge brings both benefits and risks. To reduce the risk of an internal-only perspective, external expertise from across the utility and construction industries was retained and reviews were completed in the areas noted below. In addition, a handful of experts/consultants are used on a regular basis to support the project. Key reviews and supports external to Hydro alone include:

**Figure 1.1**

Third Party	Scope	Date
KPMG	KPMG was engaged due to their industry expertise in the areas of project management and contract administration to assess the health of the Keeyask Project. KPMG has since been regularly involved in helping to augment Manitoba Hydro’s project management expertise.	2016 - current
Boston Consulting Group	In spring 2016, the Manitoba Hydro Electric Board retained Boston Consulting Group (BCG) to among other things, undertake a review of the Keeyask Project. The report of BCG’s findings was released in September 2016.	2016
BBE/MH Cold Eyes Review	BBE & MH jointly carried out a review of BBE’s operations on April 25 – 28, 2016. Teams consisted of 3 individuals from Bechtel and 3 individuals from MH (2 of which are Hydro-X and 1 construction management expert consultant). The purpose was to review BBE’s operations and to ensure readiness of site project team for the upcoming first season of concrete.	2016
KPMG	In early 2016, KPMG carried out an independent review of the catering contract and the Keeyask Project Safety Management Plan. The purpose of the catering review was to ensure quality of service is sustained and to develop strategies to provide this level of service at the least cost. The purpose of the safety review was to ensure the Keeyask Project Safety Management Plan was	2016

	focused on the right things to achieve our safety goals with all contractors.	
Hatch	Quality Management support for Hatch’s quality lead from the Mississauga office supports the project through the preparation of key Quality Program documents and the review of quality initiatives for the project. This support is especially strategic at this time given work underway to reset BBE’s focus on its strategy for meeting quality requirements for the GCC.	2015 - current
Nalcor and BC Hydro	On-going informal dialog is taking place with Nalcor’s Lower Churchill Project team and BC Hydro’s Site C team to exchange ideas and lessons learned. Muskrat Falls is about one year ahead of the Keeyask schedule and their 824 MW project is similar to Keeyask’s scope.	2015 - current
Validation Estimating	John Hollman of Validation Estimating is retained for assistance in the development of the project control budget, contingency pool, and management reserves. The risk profile for the project is reviewed at regular intervals in comparison to projects of similar size and complexity.	2012 - current
Hatch	A panel of Hatch senior engineers/managers from outside the Keeyask Project was retained to conduct a “cold eyes” review of the management of the engineering in an effort to identify gaps in the scope and quality of the engineering design, and ability to deliver the required product.	2014/2015
Knight Piésold	Knight Piésold (KP), the independent expert consultant retained by the PUB during the NFAT process in 2013/2014 reviewed project processes, the estimate, and contingency, KP was generally satisfied with these practices and methodologies stating that they were consistent with industry best practices.	2013/2014

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**1.3. MGF’s Findings Related to the Forecasted Cost and Schedule of the Keeyask Project**

***MGF Report: Scope Item 5 – Finding #13, pages 63 – 64***

In its report, MGF states that the expected cost of Keeyask will be \$9.5 B to \$10.5 B (MGF report page 63 & 64). However, MGF did not provide or substantiate how it arrived at these values. Manitoba Hydro (MH/MGF I-26), as well as the PUB (PUB/MGF–14), requested a breakdown of how MGF arrived at these values. MGF provided the following in response (MH/MGF I-26a):

1  
2           *“MGF used MH’s spent to date and cost to go figures, on top of these MGF*  
3           *applied additional costs for items such as earthwork productivity; concrete*  
4           *productivity; additional scaffold & crane costs; additional indirect costs; etc.*

5  
6           *In addition, MGF applied interest and escalation in line with MH’s percentage.*

7  
8           *Finally, MGF applied a 10% contingency to take into account project risk and*  
9           *uncertainty.”*

10  
11           Manitoba Hydro has attempted to understand how MGF came to their expected cost of  
12           Keeyask of \$9.5 B to \$10.5 B. Manitoba Hydro does not know exactly how MGF  
13           developed the values as they have failed to provide the requested supporting  
14           information (MH/MGF I-26).

15  
16           Manitoba Hydro notes that the range of values identified by MGF happen to align with  
17           the potential range of outcomes identified in Manitoba Hydro’s own analysis done  
18           when the Keeyask project budget was revised early in 2017. At that time, the potential  
19           cost of the project with P90 contingency was identified to be \$9.6 B which roughly  
20           aligns with the lower end of MGF’s range. The sum of a potential management reserve  
21           budget to cover severe event risk (that would result in a one-year delay and costs  
22           between \$500M to \$800M) added to the potential P90 budget would closely align with  
23           the \$10.5B upper end of the range identified by MGF.

24  
25           In early 2017, when Manitoba Hydro revised the control budget, the Keeyask Project  
26           budget with P50 contingency was selected. This established the \$8.7B control budget  
27           to ensure Manitoba Hydro was proceeding with the lowest cost execution for the  
28           project. Other alternatives were considered at the time; however considering the level  
29           of completeness of the project (roughly halfway through with many key risks still  
30           remaining) the P50 contingency balances the potential costs from the remaining risks  
31           and provides a challenge to the execution team. This approach drives the lowest cost  
32           delivery and the most efficient outcome.

33

1 The following is a summary of items that MGF states will result in additional costs to  
 2 the Project:

3  
 4 **Figure 1.2**

MGF Scope #	MGF Finding #	MGF Report Page	Description of Finding	MGF Order of Magnitude Estimate
5	9	60	Increased use of overtime and double time	██████
5	10	61	BBE indirect costs	██████
9	3	74	Earthworks productivity	██████
9	5	76	Scaffold and crane costs	██████
9	7	78	Concrete productivity direct costs	██████
9	7	78	Concrete productivity indirect costs	██████
<b>Total</b>				<b>\$678M</b>

1a

5  
 6  
 7 In the MGF report, the sum of the estimated value of the Findings that MGF states will  
 8 result in an increase to the cost of Keeyask of approximately \$678 M. By applying the  
 9 methodology described by MGF in their response to MH/MGF I-26a, it could be  
 10 assumed that applying interest, escalation and a 10% contingency to the \$678 M and  
 11 adding the value to the \$8.7B control budget would arrive within MGF’s expected cost  
 12 of \$9.5 B to \$10.5 B. For most of their Findings, MGF included a factor for GA&O and  
 13 Indirect Costs. GA&O and Indirect Costs as they relate to the GCC are described below:

14  
 15 **General Administration & Overhead** - GA&O is intended to cover support to the  
 16 project from the Contractor’s home offices including but not limited to expenses  
 17 such as Human Resource Management, Corporate Procurement, and I.T.  
 18 support.

19  
 20 **Indirect Costs** – Costs that are required to support the direct work at site  
 21 including temporary buildings, small tools, and worker transportation expenses.

22  
 23 It is Manitoba Hydro’s opinion that these “order of magnitude” costs are overstated in  
 24 the MGF report and result in an inflated forecasted cost for the following reasons:

1  
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**1) MGF has incorrectly applied the GA&O mark-up percentage to potential cost increases.**

As part of Amending Agreement #7, GA&O has been capped at the target price to disincentive the Contractor for exceeding the revised target price established in AA#7. This also encourages the Contractor to complete the work at the lowest cost. It appears that MGF did not account for this GA&O cap in their values, but rather applied the full amount on all of the forecasted increased costs disregarding the cap. This results in an over-estimate of at least \$26 M.

**2) MGF has overstated their forecasted indirect costs for BBE by simply extrapolating the current spend.**

***MGF Report: Scope Item 5, Finding #10, page 61***

On page 61 of their report, MGF provided a forecasted value for an increase to the indirect costs. It appears to Manitoba Hydro that MGF used the overall physical percent complete from the Bill of Quantities for their estimate and assumed that the indirect costs from the BBE Cost Report will continue similarly for the remainder of the work (i.e. they extrapolated these values for the remainder of the contract on a straight line basis).

The forecasting method used by MGF is overly simplistic and flawed as it does not consider upfront costs that will not occur again in the future such as temporary buildings, and roads (i.e. fixed indirect costs) and progress on areas of the work that may incur more (or less) indirect costs than others. The values also do not consider the efforts that Manitoba Hydro is undertaking with BBE to manage BBE's indirect costs. Managing BBE's indirect costs is a key area of focus for Manitoba Hydro in 2018. Manitoba Hydro hired an Indirects Lead with over 19 years of related experience in project controls, project management and accounting in the major capital project environment to help manage BBE's indirect costs. These factors are



1 considered in Manitoba Hydro's forecasting methodology. However, they do not  
2 appear to be considered in MGF's cost estimate, as they should.

3  
4 In addition to the specific forecasted indirect cost value presented on page 61 of its  
5 report, in other findings including: Scope Item 9: Finding 3, page 74; Scope Item 9:  
6 Finding 5, page 76; Scope Item 9: Finding 7, page 78, MGF has added a factor for  
7 indirect costs calculated by dividing the total direct costs by total indirect costs.  
8 This suggests that MGF double counted indirect costs by identifying indirect costs  
9 related to earthworks productivity, concrete productivity, and scaffolding/crane  
10 costs beyond the values MGF provided on page 61 of its report in the calculated  
11 "BBE Indirect Costs" value.

12  
13 Manitoba Hydro is of the opinion that utilizing this indirect to direct cost ratio for  
14 potential cost increases is inappropriate as this ratio includes both **variable indirect**  
15 **costs** such as maintenance costs, transportation costs for workers, additional  
16 supervision, and consumables/small tools, as well as **fixed indirect costs** such as  
17 installation of temporary buildings and roads. These fixed indirect costs would not  
18 be impacted by changes in direct work. For example, if concrete productivity is  
19 worse than expected and additional labour hours are required (i.e. direct work);  
20 costs that were originally incurred to build the carpentry shop (**i.e. fixed indirect**  
21 **cost**) would not be incurred again. It appears as though MGF has failed to account  
22 for this reality in its report, resulting in an overestimate of future costs.

23  
24 Manitoba Hydro has conducted a line by line analysis of the cost accounts to  
25 determine which indirects could be affected by direct work and has concluded that  
26 a lower ratio is more appropriate. However, the nature of the direct work in  
27 question is important. For example, if concrete productivity would cause the project  
28 to be extended, it is likely that most indirects would be impacted and therefore a  
29 ratio on the higher end of Manitoba Hydro's range would provide a reasonable  
30 estimate of the associated indirect costs. In contrast, if the craft-to-foreman ratio  
31 were to change, it would not impact as many indirect cost accounts and the ratio of  
32 indirects could be significantly lower. In its analysis, MGF failed to recognize that  
33 the relevant indirect costs need to be considered when estimating the cost impact

1 associated with a potential increase to direct costs rather than using a broad ratio  
2 of total indirect to direct budgets.

3  
4 **The following are additional miscellaneous points that Manitoba Hydro would like to**  
5 **rebut that fall outside the 3 main areas addressed:**

6  
7 **1) Selection of the Contractor:**

8  
9 ***Scope Item 5, Finding #12, page 62***

10  
11 On page 62 of their report, MGF states that they “*were advised by Manitoba Hydro that*  
12 *Bechtel were self-performing Contractor’s on Limestone and this predicated their*  
13 *decision to appoint BBE*”. Manitoba Hydro provided MGF with the documentation  
14 related to the procurement of the GCC including the RFPQ and evaluation criteria.  
15 Manitoba Hydro did not select BBE, a limited partnership that included Bechtel, strictly  
16 on the basis of Bechtel’s Limestone experience as it is implied in the MGF report. In  
17 addition to considering the work self-performed by Bechtel, the pre-qualification  
18 process described above also considered the experience with self-performed work by  
19 both Barnard and Ellis Don. It is the combination of experience and knowledge across  
20 all three partner companies that informed the decision to select BBE as one of the four  
21 contractors that would ultimately compete on a cost basis for the work during the final  
22 phase of the three-phase competitive tendering process.

23  
24 A strength of the joint venture was that each partner would lead different areas, but  
25 would still share overall responsibility. The division was as follows: Bechtel for concrete  
26 structures, Barnard for earthworks, and Ellis Don for their infrastructure work and  
27 knowledge of the Canadian labour marketplace. Each proponent offered key personnel  
28 that had experience in all of these areas.

29  
30 **2) Earthworks Embankment Fill Measurement**

31  
32 ***Scope Item 9, Finding 2, and page 73***

1 On page 73 of their report, MGF describes a site visit to Keeyask on November 9 and  
2 10, 2017 where the two MGF staff who attended the site visit performed a survey of  
3 the earthworks to compare to the value reported by BBE. From this assessment, MGF  
4 concluded that the embankment fill claimed by BBE is approximately 10% higher than  
5 the quantity assessed by MGF.

6  
7 During this site visit, MGF representatives spent approximately 12 hours in the field  
8 which included safety orientations, a site tour, and meetings with Manitoba Hydro  
9 staff, in addition to their time surveying quantities. In MH/MGF I-28, Manitoba Hydro  
10 requested that MGF describe the methodology used to calculate this value. MGF  
11 provided the following description of the methodology they employed:

12  
13 *“Average end area method was used to calculate the volume. Heights of existing*  
14 *embankment and remaining fill heights were determined by referencing the*  
15 *existing known elevation point at concrete structures, survey stakes and speaking*  
16 *with MH site personnel. Survey profiles of existing embankment and center line*  
17 *profiles provided to MGF staff on site by MH were also used in the calculation of*  
18 *the volumes.”*

19  
20 Manitoba Hydro was present during this survey and reports that the review was  
21 rudimentary and involved measuring the structures with no equipment but a borrowed  
22 measuring tape and 100 metre chain. While these methods are appropriate for checks  
23 to determine approximate quantities, they are not as reliable as the detailed  
24 methodology employed by Manitoba Hydro numbering thousands of checks on BBE’s  
25 performance over the course of the last three and a half years, described below.

26  
27 In their report, MGF did not refer to the actual methods used by Manitoba Hydro and  
28 BBE to measure quantities for the earth structures on the Keeyask site. In addition to  
29 the Manitoba Hydro earthworks inspectors that monitor performance of the  
30 Contractor, Manitoba Hydro has a survey crew of seven full time staff dedicated to  
31 earthworks with at least four staff on site at all times (2 on day shift, 2 on night shift).  
32 BBE also employs an earthworks survey crew of 12 staff with at least 8 staff on site at  
33 all times (4 day shift, 4 night shifts). There are additional surveyors from both  
34 organizations dedicated to the concrete structures as well (e.g. Powerhouse and

1 Spillway). Manitoba Hydro and BBE earthworks surveyors take independent  
2 measurements before, during and after the placement of material on each earth  
3 structure. Both crews use a combination of Trimble GPS and total station survey  
4 equipment to measure quantities. The survey data is used to develop detailed 3D  
5 models using AutoCAD 3-D for modeling and calculating quantities. These models are  
6 updated weekly and quantity runs by both Manitoba Hydro and BBE are generated to  
7 report on weekly production. Typically, the difference between the survey data  
8 captured by Manitoba Hydro and BBE surveyors is between 3-5% and is reconciled  
9 regularly. Manitoba Hydro and BBE meet to review these numbers and agree upon the  
10 final installed quantities.

11  
12 On page 73 of their report, MGF recommends that Manitoba Hydro performs “spot  
13 checks” on the quantities claimed by BBE to ensure the quantity progress being relied  
14 upon for scheduling is accurate. Manitoba Hydro and BBE are continuously measuring  
15 quantities via their respective survey teams. As an example of the degree of rigor with  
16 respect to the survey process, on a portion of the Central Dam, 104,820 survey points  
17 were collected for the foundation (bedrock and back slopes) and 127,729 survey points  
18 were collected for the fill (including dental concrete). This methodology is superior to  
19 spot checks because data is gathered continuously at every stage of construction to  
20 ensure quantity measurements are accurate. The suggestion that the methods  
21 employed by the MGF employees on the two-day site visit are superior to the methods  
22 employed by Manitoba Hydro’s constant and continuous surveillance of the work site  
23 are nothing short of ridiculous.

### 24 25 **3) Issues with methodology employed on Keeyask**

#### 26 27 ***Scope Item 9, Finding 10, and page 81***

28  
29 On page 80 and 81 of their report, MGF provides a picture of earthworks from summer  
30 2016 from a Manitoba Hydro report and has overlaid a number of notations. In  
31 addition to this picture, MGF states that:

32  
33 *“The application of incorrect machinery and work methods causes delay and*  
34 *additional cost. The following picture depicts an example where both Schedule*

1                    *and Cost are pushed out in favour of the Contractor and at the expense of the*  
2                    *Client.*

3  
4                    *While the above is an example, the poor productivity achieved on site reflects*  
5                    *poor Supervision and Management by the Contractor. If Manitoba Hydro wants*  
6                    *to reduce cost and schedule overruns they should have a more hands on*  
7                    *approach.”*

8  
9                    The date stamp on the photo is July 28, 2016, approximately 1 year prior to MGF first  
10                    attending the Keeyask site. In MH/MGF I-32a, MGF has confirmed that their notations  
11                    are based on the photo and personal experience, and therefore, not as a result of  
12                    directly observing the work taking place or speaking to Manitoba Hydro staff at the  
13                    Keeyask site who were involved in the specific work depicted in the photo.

14  
15                    In MH/MGF I-32e, MGF states that a technical specification does not necessarily need  
16                    to be followed in instances where there are opportunities to improve productivity and  
17                    cost. MGF goes on to say a test program may be implemented.

18  
19                    The scope of work depicted in the photo occurred on the North Dyke and when the  
20                    excavation occurred in this area, four distinct areas of saturated clay material were  
21                    discovered requiring additional excavation. The resulting excavation of the localized  
22                    area was 1-2 metres lower than the surrounding areas and susceptible to ground water  
23                    infiltration. In this case, BBE attempted to follow the Technical Specification but found  
24                    it challenging due to the prevailing ground conditions. The Manitoba Hydro Earthworks  
25                    and Excavations Resident Engineer and the BBE earthworks team worked together to  
26                    engage in a test program which was successful in keeping the work moving. In the case  
27                    of the photo on page 81 of MGF’s report, MGF has taken a situation with limited  
28                    context, without speaking to Manitoba Hydro to understand the situation, and applied  
29                    the finding in an attempt to substantiate an unfounded conclusion.

30  
31                    **4) Extended Overtime:**

32  
33                    ***Scope Item 9, Finding #8, page 79***

1 On page 79 of its report, MGF states that, upon reviewing BBE's progress payments  
2 from May and June 2017, there were 73 instances of individuals working over 16 hours  
3 in a day during that 2 month period. MGF goes on to state that these extended hours  
4 will not be as productive as straight time hours and will result in diminishing output for  
5 every hour worked, in addition to raising concerns about potential personnel safety.  
6 Manitoba Hydro reviewed these 73 instances and found that a majority of the records  
7 were either supervisory staff or craft workers performing concrete-related work. In  
8 most cases, when a concrete placement is started, it needs to be taken to conclusion to  
9 avoid a cold joint (which is a potential water pathway through the concrete structure).  
10 During larger concrete placements, additional overtime is periodically warranted  
11 meaning that some of these cases where individuals were required to work extended  
12 hours were justified. However, safety was not sacrificed as supervisors were on hand  
13 to ensure the work was performed safely and in accordance with the established  
14 procedures.

15  
16 To put these 73 instances of individuals working over 16 hours in a day into  
17 perspective, in May and June 2017 there were a total of 61 days worked. Considering  
18 that BBE had an onsite workforce on average of approximately 1,500 individuals, this  
19 would result in more than 90,000 days worked by the contractor's workers. These 73  
20 instances account for less than 0.08% of the total days worked by the contractor's  
21 workforce during that 2 month period, and are the exception rather than the rule.

22  
23 Manitoba Hydro reviewed the May and June 2017 progress payments and found that  
24 the average hours worked by the entire field workforce is approximately 10.7 hours per  
25 day and 10.5 hours per day for the field workforce for all of 2017. This average does  
26 exceed the standard onsite working day of 10 hours. Manitoba Hydro agrees that  
27 extended overtime could impact worker productivity and could have cost implications.  
28 As such, it will continue to work with the contractors in 2018 to more effectively  
29 manage overtime. These changes will help to minimize the need for additional  
30 overtime and is expected to increase productivity.

31  
32 Manitoba Hydro also prides itself on its safety record and works diligently in this  
33 regard. From project commencement to November 30, 2017, there have been  
34 approximately 15 million person hours worked on the project and only 22 lost time

1 incidents averaging slightly over 6 lost time days per incident. In addition, BBE has  
2 gone more than 14 months (over five million person hours worked) without a lost time  
3 incident. This safety record is impressive given the size and remoteness of the project,  
4 but Manitoba Hydro and BBE will continue to focus on eliminating safety incidents until  
5 the goal of “zero hurts” is reached.

6  
7 **5) Inconsistencies in Estimate Documentation:**

8  
9 ***Scope Item 3, Finding #2, page 36***

10  
11 MGF reviewed Manitoba Hydro’s estimate documentation on Keeyask and stated the  
12 following on page 36 of their report:

13  
14 *“CEF 2016 Estimate Sheets were provided in the Basis of Estimate appendices as*  
15 *supporting details to the cost estimate, however, the values included within these*  
16 *estimate sheets did not align with the values carried in the actual estimate. In the*  
17 *2014 Capital Project Justification Addendum, Basis of Estimate variances occur*  
18 *because of SAP’s use of a more accurate treatment of overhead. It was also*  
19 *noted through conversations that these variances are the result of updated*  
20 *labour rates themselves which are to be applied throughout the next fiscal year.*  
21 *Rates current at the time the CEF 2016 Estimate Sheets were generated, and then*  
22 *adjusted prior to being carried in the final estimate. This was not specified within*  
23 *the 2017 Capital Project Justification Addendum, Basis of Estimate and the*  
24 *reconciled estimate sheets that were provided in 2014 were also neither provided*  
25 *nor developed for the 2017 Estimate. This made one-for-one reconciliations*  
26 *difficult to perform.”*

27  
28 Manitoba Hydro has calculated the approximate “discrepancy” between the estimate  
29 sheets (item 1.0 below) and the Capital Expenditure Forecast (“CEF”) 2016 Plan in SAP  
30 (item 2.0 below) referred to on page 36 of MGF’s report. The total variance (item 3.0  
31 below) is under \$500K on a total value of almost \$3.5B resulting in a difference of  
32 0.013%.

33

1 To understand this statement, in MH/MGF I-13, Manitoba Hydro requested that MGF  
2 provide the specific networks which are misaligned along with the dollar value and  
3 what percentage of the CEF2016 estimate the value of the total misalignment  
4 represents. MGF did not provide this detail in their response to MH/MGF I-13.  
5 Manitoba Hydro reviewed the total budget values found in the available CEF2016  
6 estimate sheets and compared to the values in SAP, and focused on networks valued  
7 over \$1M. The outcome of the analysis is listed below:

8  
9 **Figure 1.3**

Item	Description	Value
1.0	CEF2016 estimate sheets	\$3,488,545,769
2.0	CEF2016 Plan in SAP	\$3,489,007,738
<b>3.0</b>	<b>Variance</b>	<b>\$461,969</b>
<b>4.0</b>	<b>% difference</b>	<b>0.013%.</b>

10  
11 As part of the estimating process that feeds into Manitoba Hydro's CEF, the Work  
12 Package Leads on the Keeyask Project who are responsible for managing the scope,  
13 schedule and budget for their respective work packages, complete estimate  
14 spreadsheets where they estimate the costs of managing their scope of work (i.e. work  
15 packages). As part of this exercise, the Work Package Leads estimate the level of effort  
16 (labour hours) in managing their work package. These hours are multiplied against a  
17 labour rate that is extracted from SAP, the corporation's cost management system  
18 (item 1.0 above). After a verification process, the estimated hours from the Work  
19 Package Leads are then loaded into SAP to form the CEF Plan in SAP (item 2.0 above).  
20 In some cases it may take 1-3 months for this process to be completed. Some of the  
21 labour rates that were taken from SAP and included in the estimate spreadsheets may  
22 change slightly from the time they are extracted for the spreadsheet and the labour  
23 hours are uploaded to SAP. The labour rate in SAP multiplied by the labour hours  
24 provided by the Work Package Leads is the value that becomes part of the CEF plan  
25 (item 2.0 above). The labour rates carried in SAP trump the labour rates in the  
26 spreadsheets. The labour hours captured in the spreadsheet by the Work Package  
27 Leads (and subsequently uploaded into SAP) is the key deliverable. The labour rate in  
28 the spreadsheet that may have changed in SAP since it was originally extracted is not



1 updated on the spreadsheet (because the labour hours have already been entered into  
2 SAP to form the Plan).

3  
4 While there is technically a minor difference in the values referenced above, MGF has  
5 failed to recognize if this difference is a material one. Manitoba Hydro is alert to any  
6 changes which might impact the estimates and monitors these factors. In the context  
7 of the budget the issue raised by MGF does not materially impact the estimates.

8  
9 **6) Cash and Trade Discounts**

10  
11 ***Scope item #5, Finding #8 – Keeyask Cash and Trade Discounts (page 59 and 60)***

12  
13 MGF reviewed progress payments for BBE for the months of October 2016 and June  
14 2017 and noted that trade discounts were “negligible” and no cash (prompt payment)  
15 discounts were identified. MGF goes on to recommend that all contractors negotiate  
16 trade discounts with their subcontractors and suppliers.

17  
18 In MGF’s observations and findings, MGF implies that BBE could achieve 10% savings  
19 from their suppliers and pass this savings on to Manitoba Hydro. When considering  
20 BBE’s total purchases for the entire Keeyask project, MGF believes this equates to a  
21 potential savings of approximately \$115.8 million for Manitoba Hydro.

22  
23 Manitoba Hydro provided MGF with a copy of the General Civil Works Contract with  
24 BBE. In the contract, Section 7.8 Process of Selection of Subcontractors outlines the  
25 process that BBE is required to follow for the award of major subcontracts (includes  
26 contracts for both subcontractors performing work under BBE and suppliers of  
27 equipment/material). BBE is required to solicit three competitive bids for every  
28 contract valued over \$500,000. The contract also provides Manitoba Hydro the ability  
29 to review and sign off on procurement over \$500,000. If the contractor does not follow  
30 this procedure and subcontracts work without receiving the required approval from  
31 Manitoba Hydro, the work is not eligible for reimbursement under the contract.  
32 Therefore it is in the contractor’s best interest to follow the terms of the contract. BBE  
33 has operationalized this section in the contract as a Desktop Procedure for

1 Subcontractor Selection Process. Manitoba Hydro provided MGF this document on  
2 October 7, 2017.

3  
4 In MGF's conclusion regarding cash and trade discounts, MGF fails to mention how BBE  
5 can realistically achieve this 10% savings from their suppliers and if this is even possible  
6 under the existing agreements BBE has with their suppliers and subcontractors. Since  
7 BBE is required to competitively tender work valued over \$500,000, the vendor  
8 selected should already provide the lowest cost or best value proposal. Manitoba  
9 Hydro reviews these tenders to ensure that this philosophy is maintained. Manitoba  
10 Hydro is skeptical that a further 10% savings as implied by MGF could be achieved as  
11 the major subcontracts are already competitively tendered by BBE.

## 12 13 **7) Hatch Schedule**

### 14 15 ***Scope Item #4, Finding #2 – Hatch Schedule (page 41)***

16  
17 MGF reviewed the schedule for the detailed design engineer Hatch and concluded that  
18 while the schedule is well-developed, many activities are behind schedule.

19  
20 Manitoba Hydro and MGF had a number of discussions regarding the engineering  
21 schedule and the status of engineering deliverables. During these discussions,  
22 Manitoba Hydro described that during the time of Amending Agreement #7 with BBE,  
23 the decision was made to manage engineering deliverables based on Construction  
24 Work Packages (the pieces of work to be undertaken by the GCC) rather than on the  
25 specific engineering deliverables that were incorporated into Hatch's baseline schedule  
26 (i.e. on a drawing by drawing basis). This ensures that the contractor has all the  
27 drawings they require to build a specific piece of work (such as a Powerhouse Unit 1  
28 base slab) with the required lead time to plan and procure materials.

29  
30 Since neither Manitoba Hydro, Hatch nor BBE are no longer managing their respective  
31 work to Hatch's baseline schedule, efforts have not been expended to update the  
32 Hatch baseline schedule.

33

1 On page 33 of MGF's report (Scope Item #2, Finding #1), MGF confirms that on October  
2 23, 2017, in a video conference with senior representatives from BBE, BBE advised MGF  
3 that construction had not been delayed on account of the issue of Issued for  
4 Construction drawings. This informed MGF's conclusion that "*The production of Issued  
5 for Construction drawings has not impacted BBE's progress*".  
6

#### 7 **8) BBE Schedule – Negative Float**

##### 8 9 ***Scope Item #4, Finding #3 - Keeyask – BBE Schedule: Negative Float (page 42)***

10  
11 In reviewing BBE's schedule, MGF identified a number of activities in BBE's schedule  
12 that have negative float. MGF concludes that until these deficiencies are reviewed and  
13 corrected, Manitoba Hydro cannot have confidence in BBE's schedule. Manitoba Hydro  
14 was aware of the presence of negative float in BBE's schedule and its significance and  
15 has been working with BBE over the last few weeks to develop a valid recovery  
16 schedule. This recovery schedule recovers the delays in BBE's baseline schedule and  
17 eliminates negative float. This recovery schedule was submitted to Manitoba Hydro in  
18 2017.  
19

#### 20 **9) BBE Forecast at Completion Date**

##### 21 22 ***Scope Item #4, Finding #6 – BBE Forecast at Completion Date (page 44)***

23  
24 MGF reviewed Manitoba Hydro's schedules and methodologies and believe the first  
25 unit ISD will be approximately 3 months later while the last unit will be 4 months late.  
26 MGF goes on to context this finding stating that no mitigation strategies or schedule  
27 recovery options have been added to this forecast. In MH/MGF I-19F, MGF confirms  
28 that the forecasted delay could be reduced using schedule mitigation activities and  
29 successful improvements at site. Some of these mitigation activities are referenced  
30 previously in this report.  
31

32 On page 78, MGF indicates that actual average concrete productivity is likely to worsen,  
33 as there are more complicated pours to come and three more winter seasons to work  
34 through. Manitoba Hydro expects that concrete productivity to improve. A majority of

1           the progress to date on the Powerhouse structure has been on units 1, 2 and 3. There  
2           has been a learning curve for the contractor and the craft labour who are building the  
3           work on these first three units. Given that a generating station is comprised of seven  
4           nearly identical units, it is expected that performance on the remaining units will be  
5           improved. It should be noted that on page 78, MGF states that the expected cost  
6           increase due to lower than planned productivity on the concrete structures is  
7           approximately \$136.5 M. In MH/MGF I-30c, MGF indicates that they have not included  
8           factors such as improvements due to repeatability into their estimated costs. It could  
9           also be assumed that this factor was also not considered in the finding related to  
10          schedule.

1 **2. Bipole III Transmission Reliability Project**

2  
3 The Bipole III Transmission Reliability Project, currently under construction, is a high-voltage  
4 direct-current (“HVDC”) transmission project that will enhance the reliability and increase  
5 capacity of Manitoba’s electricity supply. More than 70 percent of electricity generated in  
6 Manitoba is delivered to customers on the two existing HVDC transmission lines (Bipole I  
7 and Bipole II). These lines run alongside each other for much of their route and end at the  
8 same point in southern Manitoba at the Dorsey Converter Station. Due to their proximity to  
9 each other and the single terminus point for both lines, damage to Bipole I and II or Dorsey  
10 Converter Station could mean Manitoba Hydro cannot carry enough electricity to meet its  
11 customers’ demand. Bipole III will add 2,000 megawatts to Manitoba Hydro’s HVDC  
12 transmission capacity.

13  
14 MGF was retained by the PUB on Bipole III to review and explain the increases in cost  
15 estimates and capital cost increases, as well as project cost overruns. It was to determine  
16 and assess the reasonableness of its updated forecast and to identify aspects of the  
17 updated cost estimate and schedule that are at risk. It was also to recommend risk  
18 mitigation strategies and, further, to review Manitoba Hydro’s:

- 19
- practices on its pre-construction design and engineering work; and
  - its methodologies for costing, for tendering and contracting, for management of  
20 construction, contractors and construction risk management, and for scheduling.
- 21

22  
23 MGF’s evidence was that Bipole III Transmission Line is generally well organized and  
24 managed efficiently. It stated that it was on schedule and had used contracting strategies  
25 that were commercially astute, allocating risk appropriately. It also stated that Manitoba  
26 Hydro was managing a key risk, cause by poor performance of a contractor. MGF, in its  
27 Executive Summary on page 1 of its report, have highlighted that the HVDC Converter  
28 Stations “are well managed by Manitoba Hydro and the potential for cost over-runs is low.”

29  
30 Manitoba Hydro generally agrees with the MGF findings related to the Bipole III Project.  
31 Manitoba Hydro continues to manage the project appropriately, and maintain and affirm  
32 that Bipole III will be in service by the end of July 2018. This will be achieved within the  
33 approved \$5.04 billion control budget.

1 Manitoba Hydro agrees with MGF that there remains risk to completing Bipole III on time.  
2 Specific risks related to Transmission Line contractor Rokstad’s performance have been  
3 highlighted. As noted in the MGF report, Manitoba Hydro is managing this risk by de-  
4 scoping work from Rokstad and awarding it to another contractor. Manitoba Hydro was in  
5 the process of taking the action independently from this review. However, as noted on page  
6 112 of MGF’s report, the contingency amount for the Transmission Line will be sufficient to  
7 address this mitigation action and remaining risks on the work.

8  
9 Despite Manitoba Hydro’s general agreement with MGF’s findings on Bipole III, there  
10 remain some areas within MGF’s report that Manitoba Hydro disagrees with, and some  
11 areas in which it would like to provide clarifying information. There are also a number of  
12 instances where MGF has misunderstood the information provided, or drew an incorrect  
13 assumption that Manitoba Hydro would like to clarify on the record. In some of these  
14 instances, MGF was provided clarifications by Manitoba Hydro prior to the report being  
15 completed. However, it did not incorporate those into its final report.

## 16 **2.1. Additional information to provide some clarity on the MGF report.**

17  
18  
19 There are a number of items on which Manitoba Hydro would like to provide some  
20 additional information to provide some clarity on the MGF report.

### 21 **Scope Item 10, Finding 2, page 84**

22 MGF recommends that “the Manitoba Hydro Estimating Team prepare the overall  
23 estimate with input from each department.” Manitoba Hydro can advise that approach  
24 to managing the estimate update process through the Estimating Team was in place  
25 prior to the MGF review. The Estimating Team coordinates all inputs from contributing  
26 areas/Departments. The Estimating Team also conducts reconciliations and  
27 confirmation of values for items input and updated within SAP.

### 28 **Scope Item 15, Finding 2, page 99**

29  
30 On page 99 of its report MGF concludes that the 2014 pre-construction Basis of  
31 Estimate was extremely well done, however recommends further improvements in the  
32 supporting backup documentation to align costs captured within the SAP accounting  
33 software used by Manitoba Hydro and the project Work Breakdown Structure.  
34

1  
2 A Basis of Estimate document details the scope of the project on which the estimate is  
3 developed, the estimating methodologies applied and key assumptions upon which the  
4 estimate is based. As noted by MGF, the 2014 Basis of Estimate document was  
5 extremely well done. Part of the Basis of Estimate is to document project costs entered  
6 directly into Manitoba Hydro's SAP accounting system. These costs would include  
7 internal labour hour estimates, expense estimates and similar internal costs. In contrast  
8 to MGF's recommendations, Manitoba Hydro considers the backup documentation  
9 included within the Basis of Estimate document associated with these costs to be  
10 aligned with the Work Breakdown Structure and considers the level of documentation  
11 of these costs included within the Basis of Estimate document to be sufficient.  
12

13 **Scope Item 17, Findings 5 and 6, page 105**

14 MGF has correctly identified that Rokstad Power's work remains one of the critical risks  
15 to the on-time completion of the Bipole III Project. Manitoba Hydro would like to clarify  
16 the following regarding this scope item:

- 17
- 18 • The report notes an end date of April 21, 2018 for Rokstad's work. In IR MH/MGF I  
19 – 44 MGF clarified that the activity considered the end date "Final Record and As  
20 Built Submissions" is in fact a trailing /post-construction activity and does not  
21 correspond directly with the completion of construction work. Construction work  
22 will be completed in March 2018.
  - 23 • MGF correctly states on page 106 of its report that "A recovery plan has been  
24 developed and submitted by Rokstad Power Company to Manitoba Hydro, but has  
25 not been approved at this time." Manitoba Hydro continues to work with Rokstad  
26 to develop a sufficient recovery plan for their remaining scope and Rokstad's  
27 progress will be closely monitored to determine whether any further actions are  
28 required. .
  - 29 • Manitoba Hydro agrees with MGF that removal of scope from Rokstad and  
30 placement of this work with another contractor does not guarantee the project will  
31 finish on schedule. However, Manitoba Hydro can advise that the new contractor  
32 has mobilized and has begun construction on this removed scope. The new  
33 contractor has committed to a schedule that will ensure on-time completion of the  
34 transmission line and they are currently on-track to this schedule. As such, this risk  
is substantially mitigated.

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**Scope Item 20, Finding 3, Page 117**

MGF recommends that Manitoba Hydro properly record costs associated with placing the removed scope with another contractor and record the extra over costs it has incurred in having the new contractor in place. Manitoba Hydro agrees with MGF and is in the process of recording these costs appropriately and taking the appropriate steps contractually to recover any additional costs from Rokstad that are associated with the scope removal and Rokstad’s lack of performance.

There is a finding on page 111 of the report regarding the Bipole III Project cost estimates for the Rokstad contract and a recommendation that the estimate be updated to reflect this change. Manitoba Hydro’s estimate has already been updated with these costs. All reductions to the contract budget are returned to the project control budget, Transmission Line Contingency, as part of ongoing change management on the project.

**2.2. Areas of the report that Manitoba disagrees with the conclusions drawn by MGF**

There are a few areas of the report that Manitoba disagrees with the conclusions drawn by MGF.

**Scope Item 18, Finding 1, page 108**

On page 111 of its report, when determining the reason for project cost overruns since the final pre-construction control budget, MGF concludes that “Many of the additional costs appear to be a result of a project that was perhaps not at a stage of readiness at the time of project approval in terms of permit approvals, design development, land acquisitions and execution planning (i.e. procurement cycle and delivery time, market underpinned costing based on a tested and firm strategy, etc.)” Manitoba Hydro does not agree with this assessment.

The project was at an appropriate stage of “readiness” to proceed recognizing that the environmental License had been received and a sufficient number of winter construction seasons were necessary to execute the work. Specifically, as the transmission line work proceeds sequentially from clearing, to anchors and



1 foundations, to tower erection and stringing, it was appropriate that clearing, work  
2 began immediately after the Licence was obtained and the tower erection and stringing  
3 contracts proceeded later. The project correctly identified uncertainty in the  
4 transmission line construction marketplace and carried both contingency and  
5 management reserve related to this. Events related to weather and material  
6 procurement that transpired were not an issue of “readiness”, but rather general and  
7 typical areas of uncertainty and specific contractor issues/challenges.

8  
9 **Scope Item 10, Finding 1, page 83**

10 MGF identified Manitoba Hydro as having internal labour costs budgeted beyond the  
11 project in-service date that are being incorrectly applied to capital expenditures as  
12 opposed to operating expenditures. Manitoba Hydro provided clarification and,  
13 through the IR process, MGF responded that it was their “..opinion these costs should  
14 not be part of a capital budget.” Manitoba Hydro disagrees with the treatment of all  
15 costs immediately after the ISD being classified as operating expenses (as opposed to  
16 capital). After the ISD, there are still significant construction activities to be completed;  
17 such as:

- 18 • completion of synchronous condensers 3 and 4 at Riel,
- 19 • demobilization and clean-up by Contractors at each construction site,
- 20 • decommissioning of the camp infrastructure at Keewatinohk, and
- 21 • deficiency clean-up and commercial contract close-out.

22  
23 All of these activities will require Manitoba Hydro labour after ISD that is directly  
24 attributable to capital construction costs associated with the asset. To ensure  
25 appropriate allocation of costs to capital or operating expenses, all project costs are  
26 carefully scrutinized by Manitoba Hydro accounting professionals to ensure that costs  
27 meet the criteria for capitalization as set out in International Financial Reporting  
28 Standards. When costs are deemed not to be eligible for capitalization, they are  
29 charged directly as an operating expense to the Corporation. Additionally, the  
30 allocation to capital or operating is considered in the annual external accounting audit  
31 that the Corporation undertakes as part of preparing its yearly financial statements.

32  
33 **Scope Item 13, Finding 3, page 95**

1 On page 97 of their report MGF states “The current value of contingency at a P75  
2 confidence level does not appear to be based on a current or updated Contingency  
3 review. As such, this would not take into consideration the events and updated risks  
4 that the project has been or may be exposed to. Manitoba Hydro’s corporate standard  
5 states that contingency is set at a P50 or 50% confidence level.” Manitoba Hydro  
6 disagrees with this statement. The current P75 contingency value for the Converter  
7 Stations was developed based on the 2014 risk and contingency assessment as the  
8 general risk profile of the project was unchanged. This approach does appropriately  
9 account for risks realized to-date.

10  
11 **Scope Item 19, Finding 3, page 112**

12 MGF further concluded on page 114 when reviewing the Bipole III transmission line  
13 that the current P80 confidence level does not appear to be based on a current or  
14 updated review. The current P80 contingency value for the Transmission Line was also  
15 developed based on the 2014 risk and contingency assessment as the general risk  
16 profile of the project was unchanged. This approach does appropriately account for  
17 risks realized to-date. It was also reviewed against the Risk Register at the time,  
18 contrary to MFG’s finding that it does “not appear to be based on current or updated  
19 review.” The Risk Register is a document used as a tool to track issues and address  
20 problems as they arise. It acts as a repository for all risks identified and includes  
21 additional information about each risk such as the nature of the risk, the owner of the  
22 risk, and mitigation measures.

23  
24 The decision to increase the P-value of the contingency for the Bipole III Project  
25 (transmission line and converter stations) in 2016 from a P50 to an overall P75  
26 contingency level on the project was based on a number of anticipated risks having  
27 been realized and the desire to have an increased confidence level in the Bipole III  
28 control budget recognizing that there was only 2 years remaining on the work before  
29 the project was brought into service. With construction work on the project now  
30 largely complete, the project has progressed to a point where budget risks are largely  
31 reduced and the primary risk relates to schedule. This is supported by MGF’s findings  
32 that the contingency on both the transmission line and converter stations are sufficient  
33 to complete the work on-budget.

1 It is the project management team's responsibility to recommend the appropriate P-  
2 level for contingency on a project. While this can be a P50 contingency, the project  
3 management team may alternatively recommend a different P-value (e.g. P75  
4 contingency) based on factors such as: realized risks, project status, remaining work-to-  
5 complete, and remaining risks. The recommended P-level of the contingency together  
6 with the project estimate is reviewed and approved at the Executive level.

7  
8 **2.3. Misinterpretations, errors and incorrect characterizations in the MGF findings.**  
9

10 MGF provided many of their findings to Manitoba Hydro in advance of issue the report  
11 as drafts and Manitoba Hydro advised MGF that, in its opinion, there were a number  
12 of misinterpretations, errors and incorrect characterizations in the findings.  
13

14 It also suggested corrections. However, based on the MGF responses obtained  
15 through the Information Requests process, MGF did not include any of these  
16 suggested corrections within its final report. As such, Manitoba Hydro will provide this  
17 information directly to the PUB through this Rebuttal.  
18

19 **Scope Item 10, Finding 3, page 86**

20 MGF has incorrectly stated a risk identified in the June 2017 Bipole III Converter  
21 Stations Project Controls Report was repeated/again identified in the September 2017  
22 Controls Report, although the wording in the report was in no way the same. The risk  
23 from the June 2017 report addressed both concerns related to the on-time  
24 completion of work by the Keewatinohk 230kV AC Switchyard contractor and the  
25 commissioning schedule for the Riel Converter Station Synchronous Condensers,  
26 whereas The risk from the September 2017 report identified concerns related to the  
27 overall complexity of interface work between the major contractors, potential delays  
28 to commissioning due to HVDC equipment damaged during installation, the risk of  
29 commissioning delays on the AC Switchyard and equipment delivery delays potentially  
30 impacting commissioning schedules.  
31

32 Based on MGF's interpretation that the identified risks were identical, they incorrectly  
33 concluded that Manitoba Hydro did not mitigate the risk originally identified in June  
34 2017. These two risk items were, in fact, different issues. Regarding the June 2017 risk,

1 Manitoba Hydro took specific actions, including taking-over the work in parts from the  
2 contractor to ensure the AC Switchyard work was completed and handed over to  
3 Manitoba Hydro in time to accommodate commissioning. Similarly, Manitoba Hydro  
4 has required the Riel Synchronous Condenser Contractor to review its commissioning  
5 plan and ensure it is achievable. The risks noted in the September 2017 report were  
6 addressed as follows:

7  
8 The “complexity of interfaces” risk relates to schedule risks on the overall interface  
9 work that is to be executed to “connect” or “link” the major components of work on  
10 the converter stations (for example linking the HVDC station to the Synchronous  
11 Condensers). Manitoba Hydro is actively managing and mitigating this risk through  
12 execution of its interface contracts and interface schedule management

13  
14 The damaged HVDC equipment identified as having the potential to impact  
15 commissioning, relates to damage that occurred to Converter Transformer turrets  
16 during installation. The Contractor has addressed this risk by obtaining replacement  
17 turrets. There will be no impact to schedule.

18  
19 The delays related to commissioning of the Keewatinohk AC Switchyard, related to  
20 new delays that had arisen in the completion of installation and finalization of  
21 equipment. These items were addressed and recovered by the contractor and the final  
22 handover of the switchyard to Manitoba Hydro for commissioning occurred on  
23 schedule.

24  
25 The risk related to delayed equipment delivery potentially impacting commissioning  
26 schedules, related primarily to remaining (minor) equipment deliveries on the HVDC  
27 contract and remaining equipment deliveries on the Riel Synchronous Condensers.  
28 These delays are both being actively managed and mitigated by the Contractors and  
29 both are not anticipated to have any impact to schedule and the in-service date of the  
30 project

31  
32 **Scope Item 11, Finding 3, page 90**

33 MGF has misinterpreted the application of mark-up on several of the lumps sum  
34 Variations reviewed. MGF have indicated that the contractor improperly applied mark-

1 up to lump sum Variation values already including mark-up (i.e. double application of  
2 mark-up). This double application of mark-up did not occur. The instances identified  
3 by MGF only included a single markup of 15% as part of the total lump sum pricing.  
4 This mark-up happens to be the same as prescribed for on Actual Cost Variations but  
5 was not additional application (or double counting) of mark-up. As such, in the  
6 identified Variation, the amount paid by Manitoba Hydro was equal to the agreed  
7 upon lump sum price included in the approved variation.  
8

9 **Scope Item 15, Finding 1, page 98**

10 MGF stated "CEF 16 carried a cost of [REDACTED]  
11 [REDACTED] Manitoba Hydro  
12 wishes to clarify that the entire Rokstad Contract budget has been adjusted for  
13 reduced scope (primarily foundations scope removed in N4) and updated unit rates  
14 once the contract was awarded in December 2016, which was post the finalization of  
15 CPJA 08a (2016). All reductions to the contract budget are returned to the project  
16 control budget, Transmission Line Contingency as part of the ongoing budget  
17 alignment process for changes.  
18

1a, 7a, 8a

19 **Scope Item 15, Finding 3, page 100**

20 MGF has incorrectly identified that the CEF2016 estimate failed to include costs for  
21 Distribution Line Crossings and the Transmission Line Construction Yard. These costs  
22 were included in the CEF2016 and current CPJA 08a approved control budget in the  
23 2016 estimate and summaries provided to MGF. Bipole III – Appendix A is a summary  
24 of an extensive spreadsheet that was provided to MGF with relevant items expanded  
25 that summarizes the approved budgets and that these items were in fact included in  
26 the control budget.  
27

28 **Scope Item 17, Finding 1, page 102**

29 MGF alleged that there were several missing attributes to the Bipole III Risk Register.  
30 These attributes are actually addressed in the Risk Register and have been missed by  
31 MGF. MH wishes to clarify that the Risk Register was originally developed through  
32 SharePoint and as such there is an identified creation date for each risk. However, in  
33 the spreadsheet output of the Risk Register provided to MGF a column outlining the  
34 creation date of each risk had not been included.

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**Scope Item 20, Finding 1, page 115**

On page 115 in its review of the Risk Register, MGF recommended that the Risk Register be updated to include the date the Register was last updated and the date the risk ID was last updated. In fact, the Risk Register is actively and properly managed and the Risk Register information suggested by MGF to be collected is already captured within the SharePoint document management and collaboration tool where the Risk Register is held and is updated regularly.

**Scope Item 17, Findings 2, 3 and 4, page 102**

On page 103 and 104 of its report, MGF states that the Variation Summary only records those variations that are “approved.” Manitoba Hydro does maintain variation log/summaries with all variations, and further reviews those for cost impact through the “Project Change Authorization” or PCA process, which is a document that authorizes and documents the use of contingency or return of contingency on the project budget and is key component of the change management process that Manitoba Hydro follows on Bipole III.

On page 102 of its report, MGF identifies Contract 031074 with Valard Construction as open, with a contingency remaining of [REDACTED]. This contract is shown as closed in the Contracts Listing. All un-used Purchase Order funds that were held in budget and/or in allocated contingency for the Order are returned to the project control budget, Transmission Line Contingency, as part of the ongoing budget alignment process for changes.

1a, 7a

While Manitoba Hydro generally agrees with the MGF findings related to Bipole III and agrees that construction of the project is tracking on budget and on schedule with all equipment installations nearing completion, and commissioning of the project underway, it did want the record to accurately reflect the facts above. Manitoba Hydro will continue to manage the project appropriately and is committed to meeting the scheduled ISD of July 2018 and completing within the \$5.04 billion control budget.

1 **3. MANITOBA-MINNESOTA TRANSMISSION PROJECT**

2  
3 The Manitoba-Minnesota Transmission Project consists of a 500 kV transmission line from  
4 the Winnipeg area to the U.S. border in southeastern Manitoba, as well as upgrades to  
5 three existing electrical stations in southern Manitoba. If the Project receives environmental  
6 licences and approvals from both the Provincial and Federal Governments, it will transport  
7 power to the United States to meet sales contracts, improve reliability of the transmission  
8 system, and bring electricity to Canada from the United States in emergencies.

9  
10 MGF was retained by the PUB on MMTP to review Manitoba Hydro's:

- 11 • practices on its pre-construction design and engineering work;
- 12 • its methodologies for costing, for tendering and contracting, for management of  
13 construction, contractors and construction risk management, and for scheduling; and
- 14 • capital cost estimates.

15  
16 MGF's review was generally favourable, indicating that MMTP was currently on schedule  
17 and that Manitoba Hydro's estimating methodology is consistent with industry standard.  
18 Manitoba Hydro does wish to respond to three areas contained within the MGF Report, as  
19 set out below.

20  
21 **3.1. Acumen Fuse**

22  
23 Acumen Fuse is a software tool used for reviewing the quality of schedules prepared in  
24 Primavera. Primavera is a scheduling tool that Manitoba Hydro uses to create project  
25 schedules.

26  
27 Project schedules are comprised of activities associated with the work involved to  
28 construct the project, such as designing towers, ordering materials, constructing  
29 foundations, etc.

30  
31 Manitoba Hydro links these activities together within Primavera using "schedule logic"  
32 to ensure that changes to durations and start dates are reflected in the schedule as the  
33 project progresses. An example of this "schedule logic" would be a link between a  
34 tower steel delivery activity and an installation of the tower steel activity. The tower



1 can't be installed until the material is delivered, thus these activities would be linked in  
2 the scheduled using finish to start "schedule logic".

3  
4 On the MMTP Manitoba Hydro also used Primavera to schedule the spending on the  
5 project. Activities in Primavera were also linked to the budget for the project and  
6 spending associated with activities was distributed from the start of the activity until  
7 the end of the activity. Using this technique Manitoba Hydro creates two types of  
8 activities, those that impact the duration of the project, and those that are solely used  
9 to record labour charges against the project, which Manitoba Hydro refers to as  
10 "Charging Activities". An example of this would be an activity used by our material  
11 procurement staff to record their time against while they answer questions about  
12 delivery dates, Manitoba Hydro would refer to this activity as a "Support" activity.

13  
14 In the case of the 500kV Transmission Line schedule MGF stated the following  
15 (Reference: On page 125 of the MGF report):

16  
17 *"Fuse Schedule Index: Is a single quality indicator resulting from a summary of*  
18 *detailed analysis. The Dorsey Stn: Manitoba – US 500kV baseline schedule scored*  
19 *42, giving it a 30% probability of success."*

20  
21 In addition, MGF responded the following with respect to Manitoba Hydro's information  
22 request pertaining to Acumen Fuse (In response to MH/MGF I-4 on page 13 and 11  
23 respectively):

24  
25 *"MGF agrees that activities within the schedules that are used for capturing*  
26 *internal labour expenses significantly reduce the Acumen Fuse score. MGF*  
27 *disagrees they would have no actual impact to the project schedule success."*

28  
29 In essence, MGF is stating that missing "schedule logic" is impacting the Acumen Fuse  
30 score which is reducing the project success rate.

31  
32 Manitoba Hydro is of the opinion that its scheduling methodologies are appropriate and  
33 accurate. Manitoba Hydro has successfully used these scheduling practices to deliver  
34 numerous transmission line projects in the past and have refined our scheduling  
35 practices and templates based on our experience on previous projects, most recently



1 the Bipole III, Lake Winnipeg East 115kV line, and two 138kV transmission lines built for  
2 Keeyask.

3  
4 Manitoba Hydro is of the opinion that Acumen Fuse has a number of limitations with  
5 regards to scoring the success rate of the project. These include:

- 6 • Acumen Fuse cannot recognize if “schedule logic” between activities is correct,  
7 for example if the activity to install the material was linked to start before the  
8 material delivery activity Acumen Fuse would not penalize the schedule rating.
- 9 • Acumen Fuse doesn’t recognize if there are missing activities.
- 10 • Acumen Fuse penalizes the project success rating for missing logic, even if the  
11 logic is associated with activities that are not influential in the project schedule.
- 12 • Acumen Fuse doesn’t measure the typical duration of a transmission line  
13 schedule in comparison to the time allotted by Manitoba Hydro.
- 14 • Acumen Fuse does not consider any other factors that contribute to project  
15 success beyond the quality of scheduling practices used to create the schedule.
- 16 • Acumen Fuse rates project success on schedule quality, and has no measure for  
17 a project team’s ability to execute a project, their past experience, or if the  
18 current schedule has activities in the correct sequence.

19  
20 Manitoba Hydro is of the opinion that MGF has overstated the relevance of the Acumen  
21 Fuse score with respect to missing “schedule logic” and project success. In Manitoba  
22 Hydro’s opinion, the activities identified by MGF will not impact the schedule because of  
23 the nature of the activities with missing “schedule logic”. The majority of these activities  
24 are not used by Manitoba Hydro to control the start and finish dates of activities within  
25 the schedule and therefore don’t impact the duration of the project schedule. Instead  
26 they are used for accounting and reporting purposes only.

27  
28 For example a “Support” activity is scheduled during the procurement and construction  
29 of the transmission line, which is used by procurement staff to record their labour  
30 against the project while they provide support to design and construction staff, such as  
31 answering questions pertaining to material delivery. If this activity is late to start in the  
32 schedule it won’t prevent the procurement staff from answering questions and  
33 providing support and since it’s not linked to other activities it will have no impact on  
34 project duration or success. This is a standalone activity that spans a long duration of

1 work and its purpose is only to schedule the spending budget for the support work.  
2 Normally these activities are omitted by the Acumen Fuse analysis however a certain  
3 activity type needs to be assigned within the Primavera software for this to occur  
4 automatically, which was not done by Manitoba Hydro. Not assigning the activity type  
5 doesn't change the intent of these activities, it just lowers the result of the Acumen Fuse  
6 output, which is not a tool that Manitoba Hydro uses.

7  
8 Manitoba Hydro believes these activities are of little relevance to the project success  
9 because these activities are not used by Manitoba Hydro to control the duration of the  
10 project schedule. These activities do not influence start and finish dates of other  
11 activities in the schedule and whether or not they have started is irrelevant to when  
12 actual critical activities would start. Tangible events are more likely to have impacts on  
13 the project success, such as delivery delays or incremental weather, than missing  
14 "schedule logic" on activities used to record labour

15  
16 Acumen Fuse is a tool to help improve the quality of the project schedule but can't be  
17 used to evaluate the success rate of a project. While poor scheduling can have negative  
18 effects on the project outcome, scheduling errors which Acumen Fuse can't identify  
19 such as missing activities, overstated durations, and incorrect logic would have more  
20 substantial impacts than missing "schedule logic" on activities not used to control the  
21 project's duration. The Acumen Fuse tool can't take away from the experience of the  
22 project team and their ability to execute the project.

### 23 24 **3.2. Industry Standard Costs**

25  
26 MGF (Stanley) has compared the MMTP estimate for the Transmission Line portion of  
27 the project to a white paper prepared by the Western Electricity Coordinating Council  
28 ("WECC") and a report prepared by the Midcontinent Independent System Operator  
29 ("MISO") in which an "Industry Standard" cost per kilometer of transmission line was  
30 developed. MGF believes that Manitoba Hydro's estimate is lower than the industry  
31 standard and that Manitoba Hydro should revise its cost estimate.

32  
33 Through the information request process Manitoba Hydro questioned, whether or not  
34 the "industry standard" costs took into account the tower type used on each project

1 when developing the measure, to which MGF (Stanley) responded there was no  
2 significant impact on the costs based on tower type.

3  
4 More specifically, in response to MH/MGF IR I-47, MGF (Stanley) has stated:

5  
6 *“WECC and MISO data have indeterminate structure design. Calculated data*  
7 *projects included self-supporting lattice tower (1 project) and tubular steel*  
8 *structures (5 projects). None of the projects included guyed tangent lattice*  
9 *towers. It is worth noting that type of transmission structures does not have a*  
10 *significant impact on overall cost per mile for comparison purposes.”*

11  
12 Manitoba Hydro disagrees with this position as it previously stated in its Information  
13 Request Round 2 response in the Clean Environment Commission Hearing, Question  
14 #MWL-IR-89:

15  
16 *“based on an internal cost comparison for transmission structures in southern*  
17 *Manitoba, installed construction cost (not including line hardware) for a single*  
18 *tubular tower is approximately 70% of the installed cost for a single self*  
19 *supporting lattice tower. However, with the increased number of tubular*  
20 *structures required, the total cost of a tubular line is higher. Assuming 500m*  
21 *spans for lattice and 250m spans for tubular structures, a line constructed with*  
22 *tubular towers would increase the cost of the line by as much as 40%. This is*  
23 *based on 240 kV structure costs in southern Manitoba.”*

24  
25 The Western Electricity Coordinating Council (“WECC”) white paper on Capital Costs for  
26 Transmission and Substations developed by Black & Veatch in 2014 which Stanley  
27 Consultants has used in preparing the industry standard comparison states on page 2-4  
28 that there is a 1.5 multiplier for using tubular steel compared to lattice as shown in the  
29 figure below.

1 **Figure 3.0**

**2.2.3 Transmission Structure Type**

In 2012, Black & Veatch quantified the capital cost multipliers associated with each type of transmission support structure. Structure types included lattice towers and tubular steel.

Table 2-3 below shows the transmission structure type cost multipliers for all voltage classes. An additional voltage class was added for the 600 kV HVDC bi-pole alternative based on the 500 kV HVDC bi-pole multiplier. The 500 kV HVDC bi-pole multiplier was originally developed based on the relative costs of lattice structures and tubular steel at very high voltage.

**Table 2-3 Transmission Structure Type Cost Multipliers**

STRUCTURE	230 KV SINGLE	230 KV DOUBLE	345 KV SINGLE	345 KV DOUBLE	500 KV SINGLE	500 KV DOUBLE	500 KV HVDC BI-POLE	600 KV HVDC BI-POLE
Lattice	0.90	0.90	1.00	1.00	1.00	1.00	1.00	1.00
Tubular Steel	1.00	1.00	1.30	1.30	1.50	1.50	1.50	1.50

2  
3  
4  
5  
6  
7

This multiplier is used in the Transmission Calculation Methodology stated on page 2-8 of the WECC white paper.

**Figure 3.1**

**2.6 TRANSMISSION CALCULATION METHODOLOGY**

Multiplying the right of way acres per mile by the land cost per acre yields the total right of way cost per mile of transmission line. This value was added to the base transmission costs discussed in Sections 2.2, 2.3, and 2.4 to develop the total transmission line capital cost.

$$\text{Total Transmission Line Cost} = [((2014 \text{ Base Transmission Cost}) \times (\text{Conductor Multiplier}) \times (\text{Structure Multiplier}) \times (\text{Re-conductor Multiplier}) \times (\text{Terrain Multiplier}) + (\text{ROW Acres/Mile}) \times (\text{Land Cost/Acre})) \times (\# \text{ of Miles})]$$

8  
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17

It is clear from the equation that the WECC agrees with Manitoba Hydro’s assessment that the structure type does have an impact. In the equation above, the base costs would be multiplied by a factor of 1.5.

In summary, Manitoba Hydro is of the opinion that structure type does have an impact on the costs per kilometer, and that using tubular steel towers typically increases the project costs. This could explain why Manitoba Hydro’s estimates are lower than industry standard costs which seem to be determined mainly from tubular steel

1 projects as stated above in the response to MH/MGF IR I-47. Manitoba Hydro's current  
2 estimates are based off of recent construction bids that were provided for the Bipole III  
3 Project which Manitoba Hydro believes is the best source of comparison as it reflects  
4 current market conditions for 500kV towers in the Manitoba market place, compared  
5 to historical industry costs in differing market conditions. Manitoba Hydro is committed  
6 to keeping the costs of capital work as low as possible and is confident in its estimating  
7 process.

### 8 9 **3.3. Internal vs. External Design**

10  
11 MGF (Stanley) has stated that the project delivery model, with respect to internal  
12 compared to external designs have no significant impact on the overall cost per mile of  
13 transmission line.

14  
15 In response to MH/MGF IR I-47, page79 MGF (Stanley) states,

16  
17 *"WECC and MISO project delivery methods are indeterminate. Calculated data*  
18 *projects were design-build with mixture of internally designed (2 projects) and*  
19 *contracted design (4 projects).*

20  
21 *It is worth noting that internal vs. externally contracted design does not have a*  
22 *significant impact on overall cost per mile for comparison purposes."*

23  
24 Manitoba Hydro is of the opinion that its approach to tower design is appropriate and  
25 cost effective. It disagrees with MGF's position regarding the impact of internal or  
26 external design on project costs. While the labour costs associated with internal design  
27 and contracted design firms are negligible in terms of the overall project budget, the  
28 indirect benefits of the internal design approach are significant.

29  
30 The internal design approach protects Manitoba Hydro from design firms and material  
31 vendors "over designing" towers in order to protect themselves from risk, such that the  
32 costs of materials on the project could increase.

1 Manitoba Hydro's design approach is to design towers all the way to fabrication  
2 drawings, which prescribes to vendors exactly what is to be built. In addition, Manitoba  
3 Hydro arranges for tower testing which verifies the minimum amount of steel required  
4 on each tower and allows Manitoba Hydro to optimize its design and reduce costs.

5  
6 Manitoba Hydro generally agrees with the MGF findings related to the MMTP.  
7 Manitoba Hydro continues to manage the project appropriately and is committed to  
8 continuing efforts to secure the June 2020 ISD. MGF recommends that Manitoba Hydro  
9 should update the project estimate and include awarded contracted values instead of  
10 estimates whenever possible. Manitoba Hydro intends to do so at an appropriate time  
11 when those contract values become available.



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January 11, 2018

Dave Bowen, Keyask Project Director  
Manitoba Hydro  
360 Portage Ave  
Winnipeg, MB  
R3C 0G8

## **RE: Response to Manitoba Hydro's Questions**

KPMG was engaged by Manitoba Hydro ("MH") on May 2, 2016 to undertake an independent review of the current status of the Keyask Generating Station ("Project") and subsequently provide advice on the development and implementation of a Recovery Plan for the Project. The Recovery Plan was approved by the Manitoba Hydro Executive Board ("MHEB") in February 2017 and the implementation of the Recovery Plan has been the focus of the Project Team throughout 2017. In mid-December 2017, as part of MH's information gathering related to the Public Utility Board General Rate Application, MH requested KPMG to provide comments on the following matters:

1. Provide commentary on the contract model and any incentives included.
2. Define MH's role in the GCC contract. Define the role of the Contractor. Comment on MH's ability to manage the Contractor in this role.
3. Provide commentary on MH acting as the builder and taking on a Construction Management role.

In responding to the three matters in this letter, KPMG reviewed the documents provided by Manitoba Hydro as well as incorporated leading industry practices from both the Hydro industry and public sector projects greater than \$1 billion. The documents provided by MH were: Recovery Plan Strategy (undated), the Capital Project Healthcheck, Cost and Schedule Assessment (July 2016), monthly Manitoba Hydro Status Update and Step Change Incentive Profit reports, the amended Keyask Generating Station General Civil Works Contract #016203 (Feb 28, 2017), and weekly Issues Logs.

The response to Manitoba Hydro's questions was led by Gary Webster, National Lead for KPMG Global Infrastructure Advisory. Gary has more than 30 years of experience as a Professional Engineer specializing in the organization, procurement and implementation of large scale infrastructure projects.

Please note that this letter is subject to KPMG's engagement terms dated December 2015 with MH related to its work on the Keyask Project. This letter is provided to MH and based on the review of the documents provided by MH and KPMG experience with industry leading practices. KPMG does not accept any liability or responsibility to any third party who may use or place reliance on this letter.

### **Question 1: Provide commentary on the contract model and any incentives included**

MH awarded the General Civil Works Contract ("GCC") to a limited partnership between Bechtel Canada Co., Barnard Construction of Canada Ltd and Ellis Don Civil Ltd. ("BBE"), three recognized, experienced and well established companies. The contract was a Target Price contract, where payment to BBE was on a cost reimbursable basis with a gain share/pain share incentive formula. The gain share/pain share formula was introduced into the contract to incent BBE to deliver the Project under or on the target price.





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There was no early delivery incentives in the original contract but liquidated damages were included for late delivery.

As a cost reimbursable contract, the owner was responsible for all of BBE’s actual costs. However, with the inclusion of the incentives, it ensured that the contractor’s profit (and to a limited extent their general administration and overhead (“GA&O”)) was at risk based on their performance. The incentives used in this contract have been used in other cost reimbursable contracts as well as other forms of contracts. The incentives align the owner’s and contractor’s interests and help to mitigate the exposure the owner has to poor performance by the contractor.

The gain share/pain share formula was structured as follows:

- The gain share formula for cost savings was 80% for MH and 20% for BBE. If BBE delivered a project under the Adjusted Target Price (as defined in the contract), their profit increased from 1% by % of the additional savings. 1a
- The pain share formula, however, was more punitive to the contractor. If the costs went over the adjusted target price, BBE was responsible for 80% of the cost overruns and their % profit could erode to zero profit based on the amount of cost overrun. 1a

Additionally, once the actual costs exceeded the target price by 1.3 times, BBE would no longer receive their % GA&O. The objective of this cap on GA&O was to ensure that the contractor would not benefit from escalating project costs and removed the incentive for the contractor to increase project costs to improve their overall position. 1a

By fall of 2016, MH realized that BBE’s opportunity for profit would likely be eroded and that there were no longer any achievable incentives remaining in the original contract. The result was a mis-aligned relationship between MH and BBE where BBE could be motivated to regain their profit to the detriment of the Project. During this period, MH developed and implemented a Recovery Plan. As part of the Recovery Plan, MH addressed a number of root causes that led to cost and schedule overruns that were being incurred. They also negotiated an amended contract with BBE.

The amended contract continues to be a Target Price Cost Reimbursable contract, fundamentally the same as the original contract. The ability to transfer additional risk, such as geotechnical, hydrology, labour, extreme weather, and northern logistics to BBE by changing the contract to a Unit Rate or Lump Sum contract, would have required directly negotiating a new form of contract with BBE in a non-competitive environment or descope/terminating BBE and going back to the market for a Unit Rate contract. It was expected that in a non-competitive environment and given BBE’s performance in 2016, the costs of transferring this risk to BBE would have been prohibitive and/or not achievable. Additionally, in its Recovery Plan, MH analyzed the impact of terminating or descope BBE’s work. MH analysis shows that the additional delay to the project required for the re-procurement of this work along with additional risks associated with re-procurement, would have resulted in an additional increase to the Adjusted Project Budget.

The amended contract remains a Target Price Cost Reimbursable contract with limits on GA&O and performance incentives tied to achieving the target price. The amended contract was designed to achieve the following:





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- Reset the target price and schedule milestones;
- Improved gain share/pain share incentive formula. The new incentive program is now structured around cost, schedule and management performance;
- Limited BBE's right to claim for additional adjustments to the target price;
- Improved the relationship with BBE that allows for a more collaboration on site; and
- Allow MH, as they deem necessary, to alter the scope of BBE.

The amended contract now includes incentives for not only cost, but also schedule and management performance. The balance of the incentives is now [REDACTED] % of any cost savings that it may generate capped at [REDACTED] M and [REDACTED] M based on meeting schedule milestones. Cumulatively, BBE could earn up to [REDACTED] M profit for meeting all their cost, schedule and management targets, conversely they risk losing not only all their profit and GA&O expenses above the capped amount but an additional [REDACTED] M for poor project performance. The amended incentive pool was designed to further motivate BBE to perform and take day to day responsibility for the work it has been contracted for.

1a

It should be noted that in contract management, a high risk exists when cost performance incentives are entirely disconnected from schedule. Namely, a perverse incentive could exist for a contractor to forsake schedule in an effort to maintain a low cost position. To address this risk, the amended contract contains a deduction associated with very strong cost performance and very weak schedule performance. This incentive structure is designed to eliminate the incentive to ignore schedule performance in order to capitalize on cost incentives.

The amended contract also has a component where BBE can gain an additional [REDACTED] M (included in the [REDACTED] M referred to above) for improved management performance ("Step Change Incentive") based on their ability to better perform their construction management responsibilities. This includes improvements such as site leadership, planning and scheduling, reporting and better coordination with MH.

1a

Finally, the general administration and overhead ("GA&O") is [REDACTED]%. The provision of GA&O expenses, which are standard in the construction industry for any contractor, affords for cross-functional and project-wide resources to be accessed throughout the initiative and allows for ease and efficiency in administration without the need for micro-management. MH was able to cap the GA&O at the Final Target Price versus the original 1.3x the target price.

1a

MH has taken reasonable steps to renegotiate the contract. The amended contract addressed a number of concerns MH had with BBE and their performance. It includes multiple systems of financial incentives and disincentives to mitigate risks associated with cost reimbursable contracts. The contract amendments were designed to promote better alignment of BBE and MH objectives, and create a collaborative environment that allows MH to take on a more proactive management style with BBE.

**Question 2: Define MH's role in the GCC contract. Define the role of the Contractor. Comment on MH's ability to manage the Contractor in this role.**

**MH's Role in the GCC Contract.**

Manitoba Hydro's Role in the GCC Contract is to function as the overall Project and Site Construction Manager. As Project Manager, MH is responsible to ensure integration, alignment and quality of the



project as a whole. As Site Construction Manager, MH is responsible for the overall coordination and oversight of site work, while delegating the construction planning, management of labour and construction means and methods (along with other responsibilities) to the contractor. It should be noted that construction management is a term used which can cover a wide range of responsibilities and functions. From public sector owners' perspective, construction management is often the term used to oversee the construction of the project. Canadian public sector owners do have experience managing construction works; however, these works tend to be routine and relatively minor. KPMG is unaware of any Canadian public sector owner who would have the capabilities, systems and processes to allow for direct management of complex multi-billion construction projects.

In its role, Manitoba Hydro provides oversight and approval of BBE's activities by providing channels for controls, as well as strategic level issue and risk management. Their general duties would include:

- Overall responsibility to complete the planning, design and engineering and to oversee the construction and commissioning of the proposed Keyask Generating Station which includes the General Civil Works contract;
- Overall responsibility of the site and coordinating the interfaces with the various contractors and suppliers they enter into contracts with;
- Approving contract changes;
- Agreeing to the Contract Schedule, and all amendments thereto, in the course of BBE's performance;
- Providing oversight and surveillance audits of BBE's processes;
- Reviewing any potential changes to the overall work plan, that could alter the target price and/or construction schedule;
- Addressing stakeholder issues;
- Acquiring Project permits; and
- Providing access to the Site and timely payment to the contractor.

Ongoing monitoring and collaboration by MH continues to be essential. MH has retained an experienced construction management consortium to undertake the direct management of the construction works. If MH drives for more aggressive involvement in the direct construction management, MH could be potentially frustrating BBE in their execution of the work. This could result in a number of reactions from BBE including claims for lost profit if the project does not meet the performance requirements associated with the gain share/pain share incentives. Furthermore, it may also result in MH unintentionally taking on additional risk with respect to performance results that are currently under BBE's control that MH does not have the experience to manage.

### The Role of the Contractor

MH has a contract with BBE to manage the construction of the general civil works. As per their contract, BBE is obligated to construct and commission the GCC work. This would include providing the material, labor, construction planning and supervision expertise to construct an end product that meets the cost, schedule and specifications outlined in the contract. The general responsibilities of BBE include:

- Working with MH to deliver their work;
- Executing site safety processes and procedures as outlined in the project safety plan;



- Providing construction planning expertise and collaborating with MH (and other parties), throughout the design development phase (in particular reviewing constructability and completeness of detail of the design);
- Developing the contract budget and schedule;
- Procuring equipment, material and labour;
- Providing qualified management and supervision;
- Planning and supervising construction;
- Implementing quality control and assurance program and maintaining quality management records;
- Maintaining and meetings all permit and environmental requirements;
- Monitoring the costs and schedule; and
- Reporting on progress. This would include costs, productivity, down time, schedule, work plans, etc.

### MH's Ability to Manage the Contractor Based on the Contract

MH and the current Project team have experience managing large complex hydro projects and have completed Pointe du Bois and Wuskwatim (\$0.6B and \$1.4B respectively). The table below highlights the relative experience of each of the key leadership team members.

Name	Project Role	Experience
<b>Senior Management Team</b>		
Dave Bowen	Project Director	20 Years
Ryan Ward	Commercial Contracts Manager	19 Years
Barry Nazar	Site Construction Manager	32 Years
Jeff Strongman	Business Manager	24 Years
Tom Tonner	Engineer Manager	25 Years
<b>Senior Technical Team</b>		
Terry Armstrong	Construction Quality Engineer	27 Years
Dave Little	Site Support Manager	30 Years
Gene Piasta	Head of Project Controls	27 Years
Glen Schick	Head of Infrastructure	29 Years
Charles Wright	Structures Resident Engineer	25 Years
Guy Remillard	Mechanical/Electrical Resident Engineer	32 Years
Brian Beyak	Earthworks & Excavations Resident Engineer	26 Years



As summarized in the above table, the Senior Management Team has 120 years of combined experience managing and overseeing large complex projects.

Over the course of 2017, Manitoba Hydro has managed their internal responsibilities while managing BBE to meet their contractual obligations. MH has demonstrated they understand their role in administering the contract with BBE as well as the risk they have to manage associated with the contract.

MH has enhanced its internal systems and processes to manage the overall project since the commencement of the project. This included initiating a “Step Change Program” that focused on their own improvement as well as that of BBE. The Step Change program was designed to address the root causes identified in the Recovery Plan and implement the following improvements for MH and BBE respectively.

Manitoba Hydro:

- Organizational structure to reflect the stage of Project;
- Leadership accountability;
- Authority residing at the Site;
- Communications between the Site and Winnipeg offices;
- Project controls function;
- Risk management and project reporting; and
- Escalation of issues to senior leadership team.

BBE:

- Organizational structure to reflect the construction management activities required by BBE;
- Alignment with MH counterparts;
- Contract reporting;
- Management of indirect costs;
- Travel logistics;
- Collaborative working environment;
- Relationship with Allied Hydro Council;
- Construction planning; and
- Construction supervision personnel.

Based on the above, the current division of roles and responsibilities between MH and BBE is appropriate and the Project team has experience and qualifications to manage and oversee the GCC Target Price contract.

**Question 3: Provide commentary on MH acting as the builder and taking on construction management role**

As highlighted in Question 2, we are unaware of any Canadian public sector owner who would have the capabilities, systems and processes to allow for direct management of complex multi-billion dollar



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construction projects. The contractor brings a significant amount of skills to a project that an owner does not have. The following is a brief, non-exhaustive list of such skills:

- Construction labour recruitment and labour relations expertise;
- Corporate construction safety plan;
- Construction equipment corporate discounts;
- Extensive cost control system;
- Management, supervision and engineering personnel with construction experience;
- Access to labour; and
- Previous work experience in order to better plan and perform the work.

Some project owners do have the internal capabilities and experience to act as the builder and to take on a construction management role. Generally, this skillset is developed through experience with multiple projects and owners have gained experience in building and managing projects of scale which they regularly undertake. However, public sector owners do not perform large projects with sufficient frequency to have developed the internal skills to manage the additional complexity that are associated with multi-billion dollar projects.

MH has relied on general contractors to manage large projects in the recent past. The most recent hydro projects completed by MH are Limestone (\$1.43B and 1,350MW completed in 1990), Wuskwatim (\$1.37B and 211MW completed in 2012), and Pointe du Bois Spillway Replacement, (\$600M completed in 2016). MH has only completed these three projects since 1990 and all of these were executed using external general contractors. This would generally not be considered adequate experience for MH to be considered a low-risk builder or construction manager.

This letter is addressed to Manitoba Hydro and in response to MH's three matters. As noted on page 1, we will not accept any liability or responsibility to any other party to whom the letter may be shown or who may require a copy of the letter.

Yours Sincerely,

Gary Webster, P. Eng.  
Partner, National Lead Infrastructure Advisory  
KPMG Canada  
(604) 646-6367 | gwebster@kpmg.ca





Project Memo

H341433

January 15, 2018

TO: Dave Bowen

FROM: Alan O'Brien/Sylvain Laramée

cc: Ian Ainslie

## Manitoba Hydro Keeyask GS Engineering Consulting Services

### MGF Report on Keeyask

#### 1. Introduction

At the request of The Manitoba Public Utilities Board, MGF Project Services Inc have conducted an independent review of Manitoba Hydro's Capital Expenditures program. The conclusion of their finding presented in their report issued at the end of 2017 was inclusive of a certain number of recommendations especially with regard to the Keeyask Hydroelectric Dam.

Following their receiving of the said report, Manitoba Hydro has mandated Hatch to provide commentary regarding MGF's suggestion that Manitoba Hydro expand its role with the GCC. Alan O'Brien and Sylvain Laramée have reviewed MGF's report and subsequently prepared their joint response which follows their own personal bios.

#### 2. Bios

##### 2.1 Alan O'Brien

Alan is a seasoned project and business manager with more than forty (40) years of experience in Engineering design, project, business and commercial management. He has been involved in projects of various sizes in a variety of industries including Oil & Gas, Petrochemical, and Power (Hydro, Nuclear, Thermal and Wind). He has managed contracts both domestically and internationally.

He has worked for two major engineering Contractors (Amec/Agra and Hatch). In his capacity of Project Manager and/or Director, he has delivered projects using various execution models, such as EPCM, EPC, fixed fee, target price and cost reimbursable. As Global Director of Commercial Management he was responsible for overseeing the group that undertook commercial and implementation reviews on all major contracts. The experience gained over many years working both in the engineering office and at site has given him a broad exposure to different types of contract execution strategies and their advantages and disadvantages.

If you disagree with any information contained herein, please advise immediately.



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Alan is currently acting as Project Sponsor on a few Hatch projects. In this role, he works with the Project Manager and his/her team in an oversight role to provide ongoing review, guidance and support.

## 2.2 Sylvain Laramee

Sylvain is an experienced project professional with thirty-four (34) years' experience in project and construction management of major capital projects in the Mining and Energy sectors which have allowed him to develop a broad range of management skills that are uniquely adapted for project work. His experience, both on the EPCM and contractor's side, coupled with the diversified leadership roles (Engineering Manager, Area Manager and Construction Manager) held on major capital projects has provided him a unique perspective of innovative implementation strategies and successful project outcomes.

For the past decade, Sylvain has fulfilled the role of Managing Director, Construction Management, leading Hatch's global group of construction management professionals and taking responsibility for all domestic and international major capital project construction assignments. He has considerable experience in developing implementation strategies suited to specific project challenges including, project remoteness, complex logistics, lack of skilled labor, extreme weather conditions and security issues. During this period, he assembled and mentored a core group of competent construction professionals as well as developing and implementing construction tools and work processes targeted at addressing and overcoming the complexity of each of those projects.

## 3. Hatch commentary around expanding Manitoba Hydro's role with the GCC as suggested by MGF

MGF's recommendation at the end of their Executive Summary reads as follows: "The recovery of this project will require Manitoba Hydro taking a construction management, hands-on approach to design and implement a recovery plan and hold the GCC contractor to perform" (Page 3, Dec 8/17 MGF Report). There is no doubt that MH has the experience of similar major projects and could put together a team of construction managers as suggested. However, given that this was not the implementation strategy that was chosen initially to execute this project and given that MH does not have available the type of construction resources needed to take over the construction lead, one would question how viable it is to significantly change at this late stage the current approach and make MH the "Constructor". It would be our views that the proposed suggestion is of equal risk if not riskier than the status quo, as described below.

Interestingly, MGF when referring to the GCC contract points out that: "The largest single contributor to the budget increase is the sum to the original GCC on account of the Contractor's poor productivity and increased indirect costs as the GCC would take longer to perform" (Page 1, Dec 8/17 MGF Report). Unfortunately, their report fails to identify the reasons behind BBE's poor productivity performance. Hence it is unreasonable to make any recommendations for changes without the root causes being identified and solutions being proposed as well as those solutions and/or recommendations then being evaluated against the costs and risks inherent to their implementation. Naturally, MGF was unable to identify potential solutions to improve the productivity for the very same reasons.



The absence of a clear understanding of the said root causes makes it impossible to identify and implement the proper corrective measures. As an example, MGF suggest as a potential saving by modifying the ratio of craft to foreman from roughly 4:1 to 6:1. Should one of the problems be the quality of the supervision then this suggestion would in fact creates the opposite effect as there would be a further deterioration of the productivity.

Based on our experience, what MGF is suggesting, is of equal or greater risk than the status quo. Whilst MH would have the experience and capability to hire a competent CM team, such a team would carry a risk until proven. Hence to create this new CM team in the midst of this mega Project, is more likely to cause the overall Project to forecast to keep increasing because it introduces pitfalls and unknowns.

The risks associated with a major shift in the contracting strategy, especially for the single most important contract, include:

- It will remain a challenge to gather a team of construction professionals from the open market that will commit to the Project for the long haul knowing that the required caliber is typically under employment by the large constructions firms hence, and not readily available
- It will likely take several months to recruit, hire, onboard and mobilize such a team. And likely not in the optimal sequence.
- Clearly it will take some time for the new CM team with no previous working together experience, to understand the challenges, find the appropriate solutions, get efficient as a team and finally drive the performance improvement. Considering the complexity of this major Project, its remote location and its many work fronts, this team will undergo a steep learning curve regardless of their experience.
- In our experience in such drastic organizational changes, there is a fair chance of MH losing critical resources that are knowledgeable, and up to now, committed to the success of this Project.
- Until a new CM organization is in place, there would be transition period of high uncertainty that inevitably will prevent people from making decision and thus, some of the initiatives currently being developed to help driving the Project in the right direction could be lost.
- Should MH follow the recommendation, it will change the nature of BBE's contract, leaving the contractor the freedom to maximize their revenue under a de facto time and material with fee contract. MH leverage over BBE using the pain/gain sharing and liquidated damages would not be retained.
- Once BBE would become aware of MH plan to take over the management of their contract, it is doubtful that they will remain engaged in finding ways to drive productivity or find solutions to existing challenges.



- It cannot be ruled out that BBE could walk away from the Project considering that MH would be effectively breaking the terms of their current contract thus leaving MH with an even greater challenge to overcome.

Contrary to what MGF is stating in their report, and based on our limited knowledge of the contract between MH and BBE, we understand from MH that the GCC contract is a target price with contractor's fee at risk which includes schedule incentives and liquidated damages for late delivery. It is very difficult to imagine that MH would take over as the builder as this could result in a forfeiture of their contractual rights and a forfeiture of their leverage over the contractor to get their full attention and cooperation in addressing the seriousness of the situation. We're of the opinion that enforcing the contract to force the contractor to come to the table, put its best foot forward and make available their strengths and wherewithal will produce more upside than downside.

One interesting recommendation can be found in the report under Scope Item 9, Finding No. 1: Keyask – Structural Steel Progress which states: “MGF recommends that Manitoba Hydro work with BBE on a recovery plan to improve BBE's construction management, construction planning, coordination and supervision of construction work.” This in our views is the logical beginning of a solution that ought to be applied to the overall contract and is currently being pursued by Manitoba Hydro

We understand that Manitoba Hydro is actively involved with the contractor in addressing the situation and we can only encourage them to remain focused on the work at hands and continue to hold BBE accountable by working jointly with them in accomplishing the following:

- Re-assess the final forecast
- Understand the root causes behind the poor performance and identify ways to improve and/or execute the works differently
- Identify all the risks that could impact the final forecast and elaborate a mitigation plan for each one
- Find innovative ways to improve productivity using latest technology available on the market
- Develop an optimal execution schedule that could be used as a baseline moving forward
- Deliver a comprehensive recovery plan that can be easily monitored and audited on a regular basis

There is an advantage to developing a plan jointly and making sure in the process to understand the areas where the GCC contractor could try to take advantage at the end for claims. In short, by doing this, it allows MH to limit or eliminate the General Contractor's ability to make claims by removing the obstacles and ultimately leaving the GC with only the burden of performing. Even in circumstances where there may be a requirement to supplement temporarily the Owner's team with some ad hoc resources, we believe the benefits will by far outweigh the investment and bring the best value to the Project. As time is of the essence, such exercise must take place sooner rather than later and should not disrupt what is happening at site

In summary, the suggestion by MGF to make such a fundamental change at this stage is, in our opinion, a mistake which could lead to a serious disruption of the Project with a very high potential of adding both to the costs and the schedule.

Al O'Brien/ Sylvain Laramée

SL:wp  
Attachment(s)/Enclosure



### Bipole III Transmission Reliability Project

#### Attachment 1 – Response to Scope Item 15, Finding 3, page 100

		<b>BPIII 500kV Transmission Line</b>					
		CPJA7 / CPJA8 Comparison					
				(2016)	(2014)		
				CPJA8 Plan (\$)	CPJA7 Plan (\$)		
		ID	Activity ID	Cost Element/Work Centre	variance (\$)		
	2	21	P:04218	BPIII Eastern Route 500kV T/L-Sunk Cost			
	3	543	P:04221	BPIII Licensing & Env Assessment			
	6						
	7						
+		993	239224	<u>340 TransLine Materials Yard (Const/deve</u>			
+		1072	239224	<u>342 Trans Line Materials Yard (Operation</u>			
+		1906	239224	Bipole III Western Route T/L			
+		2188	251480	BPIII N1 Construction			
+		2475	251481	BPIII N2 Construction			
+		2733	251482	BPIII N3 Construction			
+		2992	251483	BPIII N4 Construction			
+		3223	251484	BPIII C2 Construction			
+		3490	251485	BPIII S1 Construction			
+		3769	251865	BPIII C1 Construction			
+		3918	253789	BPIII S2 Construction			
+		3938	255540	<u>Logistics contract - Intellwave</u>			
+		4090	P:10155	BPIII 500kV HVDC Transmission Line			
+		4437	P:14518	BPIII Transmission Line Property			
+		4965	P:18414	BPIII Communications System			
+		5014	P:18767	BPIII Electrical Effects Monitoring			
+		5190	P:20255	BPIII T-Line Vehicles (print w/ P10155)*			
+		5682	P:23622	<u>BPIII Distribution Relocation</u>			
+		5819	P:23817	BPIII Transmission Line Contingency			
+		5964	P:25205	BPIII Distribution Relocation N4			
+		6128	P:25508	BPIII Distribution Relocation C1			
+		6219	P:25509	BPIII Distribution Relocation C2			
+		6602	P:25510	BPIII Distribution Relocation S1			
+		7014	P:25511	BPIII Distribution Relocation S2			
	7015						
	7016	TOTAL FOR SELECTION			\$1,957,615,	\$1,655,370,	\$302,244,