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**15 Implementation and Risk Management Plan for Preferred Development Plan**

**15.0 Chapter Overview**

The Preferred Development Plan was created to serve the growing electricity demand in Manitoba and to take advantage of new export sale opportunities, including the 250 MW MP sale, the 125 MW NSP sale, the 100 MW WPS sale and the potential 300 MW WPS sale.

As described in *Chapter 2 – Manitoba Hydro’s Preferred Development Plan Facilities*, the Preferred Development Plan includes four main components:

- 695 megawatt (MW) Keeyask Project with a November, 2019 in-service date (ISD)
- 1,485 MW Conawapa Project with a May, 2026 ISD (the ISD is subject to revision)
- 185 MW North-South Transmission Upgrade Project, with an ISD to coincide with Conawapa
- 750 MW/500 kV Manitoba – Minnesota Transmission Project with a June, 2020 ISD.

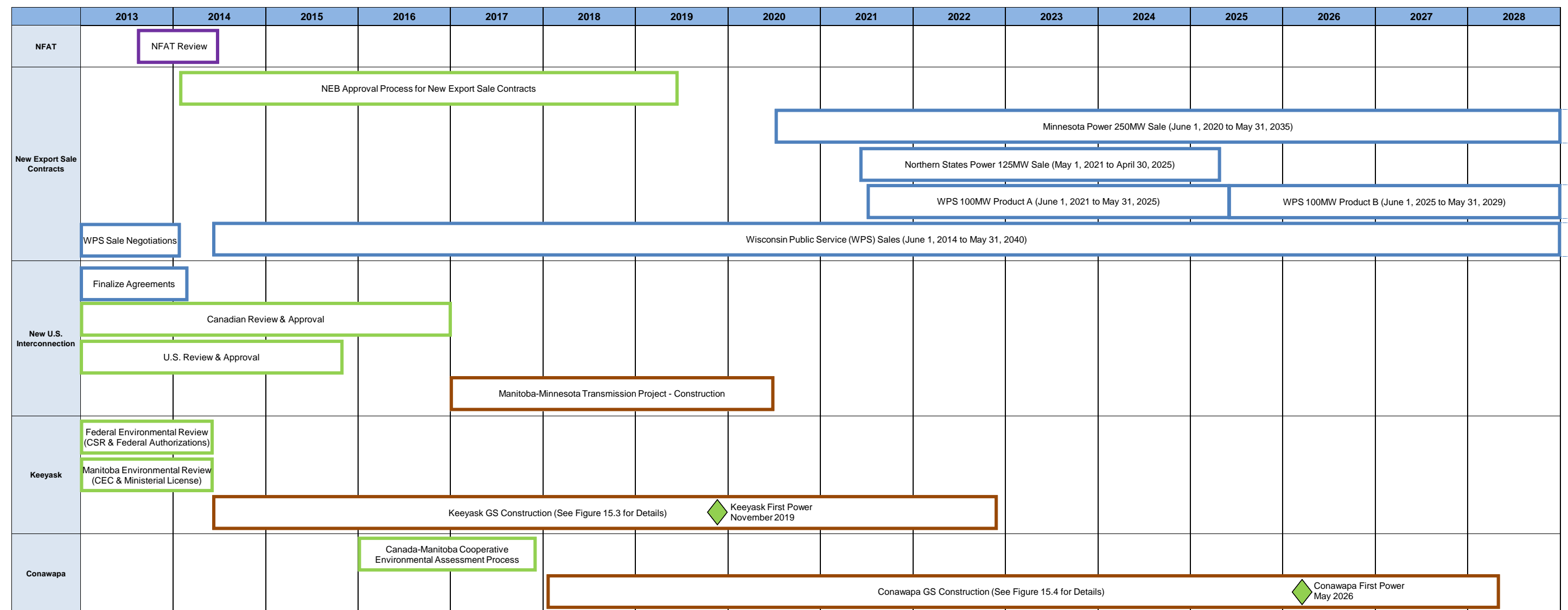
This chapter explains how Manitoba Hydro intends to implement the Preferred Development Plan and manage the associated risks. Implementation includes the finalization of all required agreements, including the export sale contracts; submission of regulatory applications and participation in regulatory review processes; and project delivery.

Figure 15.1 shows a schedule of the main activities and key dates related to implementation of the Preferred Development Plan that are discussed in this chapter.

- 1 The schedule represents the period from 2013-2028, inclusive. Please note that some of
- 2 the sale agreements extend beyond 2028.

1

Figure 15.1 MANITOBA HYDRO IMPLEMENTATION SCHEDULE – PREFERRED DEVELOPMENT PLAN



2

## 15.1 Pathways Associated with the Preferred Development Plan

**Chapter 14 – Conclusions**, Section 14.2 presents five distinct pathways for new resource development currently being considered by Manitoba Hydro. Each pathway is based on a specific commitment decision to be made regarding the next new resource and represents a range of alternative development plans that could unfold thereafter.

**Chapter 14 – Conclusions** concluded that Manitoba Hydro should proceed with the Preferred Development Plan and its associated pathways.

The immediate commitments in June 2014 are:

- start construction of Keeyask G.S. for a 2019 ISD
- proceed with the 250 MW export agreements with Minnesota Power(MP)
- proceed with the 100 MW export agreement with Wisconsin Public Service (WPS)
- proceed with the 750 MW/500 kV U.S. interconnection subject to regulatory approvals
- proceed with the 300 MW export agreements with WPS subject to satisfactory conclusion of negotiations currently underway.

As both Pathways 4 and 5 are based on developing Keeyask G.S. for an ISD of 2019 in conjunction with a new 750 MW U.S. interconnection, they will be the focus of this chapter.

Figure 15.2 illustrates Pathways 4 and 5 and shows the development plans that are represented by these pathways. The majority of the development plan analysis throughout this submission utilizes resource in-service dates based on the 2012 load forecast; however, Figure 15.2 is based on the 2013 Load Forecast resource in-service dates.

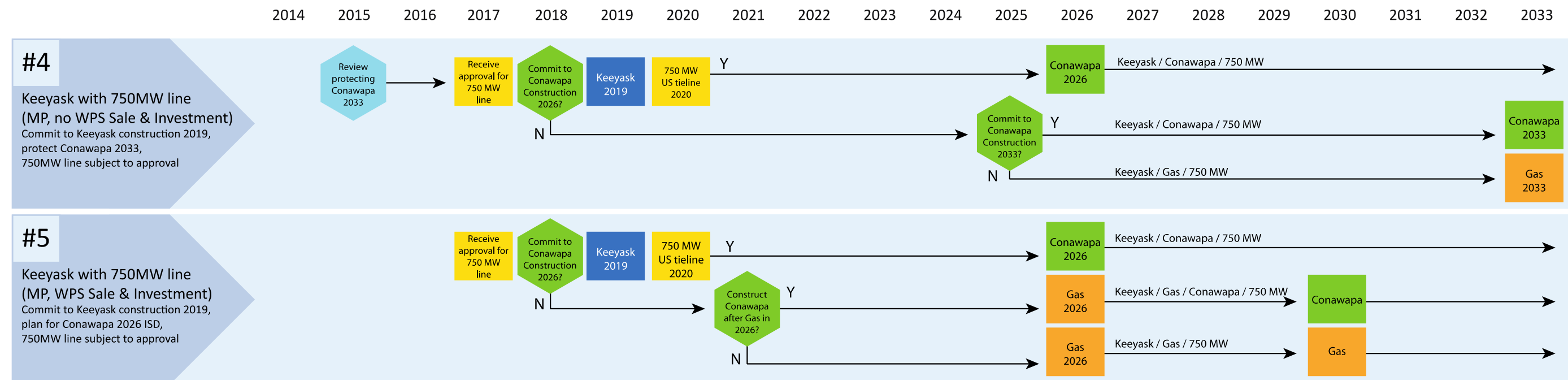
1  
2 Both Pathways 4 and 5 include Conawapa G.S. and have flexibility as to its ISD. Manitoba  
3 Hydro will continue to evaluate the Conawapa Project through the annual Power  
4 Resource Plan and otherwise as required. Should conditions not be favourable to  
5 constructing Conawapa for a 2026 ISD, a decision could be made as late as 2018 to defer  
6 its ISD or displace Conawapa with other resources such as gas. Displacing Conawapa G.S.  
7 by an alternate resource would reduce some of the benefits associated with the plan as  
8 described in this report, but this would be offset by a corresponding reduction in  
9 downside risk.

10  
11 There is a risk the 750 MW interconnection may not receive regulatory approval;  
12 however, this risk can also be mitigated because the Conawapa G.S. construction  
13 commitment in 2018 falls one year after the scheduled approval date for the  
14 interconnection. Conawapa G.S. could therefore be deferred or cancelled should the  
15 interconnection approval be delayed or denied.

16  
17 With all required approvals in place, construction can begin on the Keeyask Project  
18 without having received the final approval for the interconnection. In the event that the  
19 interconnection does not proceed and the 250 MW MP Power Sale Agreement (PSA) is  
20 cancelled, Keeyask G.S. is still the logical choice for a new resource option to meet  
21 Manitoba's growing electricity needs. With sufficient notice, the Keeyask G.S.  
22 construction timeline could be adjusted to correspond to a later ISD if conditions so  
23 indicate, likely around 2023, and the value of all Keeyask G.S. efforts and expenditures  
24 would still be retained.

1

**Figure 15.2** PATHWAYS ASSOCIATED WITH THE PREFERRED DEVELOPMENT PLAN (PATHWAYS 4 AND 5)



2



## **15.2 New Long-Term Export Contract Agreements**

Manitoba Hydro sale commitments that are contingent upon construction of the Preferred Development Plan are at risk of not commencing if the new generation and transmission projects are not completed. Refer to ***Table 6.4 - Long Term Export Commitments Contingent Upon New Hydro Development*** which summarizes the new long-term export contract agreements that are contingent on new hydro development and the new U.S. interconnection: agreements with Minnesota Power, Northern States Power and Wisconsin Public Service. A summary of the major terms and conditions for these contracts is contained in ***Appendix 6.1 - Summary of Terms and Conditions of Export Contracts***.

### **15.2.1 Long-Term Export Contracts Associated with the Preferred Development Plan**

The 250 MW MP sale and the MP Energy Exchange have been signed by both parties and are dependant on the construction of Keeyask generating station (G.S). The Keeyask G.S. ISD of November 2019 in the Preferred Development Plan is a function of the export contracts start dates of June 2020. In addition, MP and Manitoba Hydro have agreed to construct a new transmission interconnection through the 250 MW MP sale.

The 125 MW NSP sale has been signed and is contingent on new hydro development. The start date for this sale is May 2021.

There are three agreements with WPS, of which two are signed agreements that are contingent on development of the Keeyask G.S. These signed agreements start in June 2021 and June 2025.

The third WPS agreement for up to 300 MW remains under negotiation. In the event that no agreement is reached with WPS, Manitoba Hydro will continue to pursue export sales

1 with other utilities. A Conawapa G.S. ISD of May 2026 is based on serving the 300 MW  
2 WPS sale.

3  
4 An interconnection with a transfer capability larger than 250 MW is required to  
5 accommodate new sales to MP and WPS (beyond 100 MW). In the event that the 300  
6 MW sale to WPS does not materialize, a 250 MW transmission interconnection would be  
7 sufficient to meet the 250 MW Minnesota Power sale, although MP and Manitoba Hydro  
8 prefer a 750 MW interconnection as explained in **Chapter 14 – Conclusions**. The 100 MW  
9 WPS and 125 MW NSP sales will utilize existing transmission service and are not  
10 dependant on a new interconnection.

#### 12 **15.2.2 Managing Export Contract Risk**

13 Manitoba Hydro's export sales associated with the Preferred Development Plan involve  
14 physical delivery risks and financial risks from a multitude of factors such as delays in  
15 placing the new generation and/or transmission facilities in service, increases and  
16 decreases in the domestic load forecast, water supply variability, facility outages,  
17 customer creditworthiness, etc. Manitoba Hydro manages these physical and financial  
18 risks through a variety of means, including specific long-term export contract provisions,  
19 transmission access, and customized market products.

##### 21 **15.2.2.1 Long-Term Export Contract Provisions**

22 Manitoba Hydro enters long-term export contracts for the sale of capacity, dependable  
23 energy and opportunity energy in excess of the requirements for domestic customers.  
24 These export sales can be dependant on the construction of interconnecting transmission  
25 facilities. Export sales provide financial benefits to Manitoba Hydro, but also involve  
26 additional risks related to the physical delivery and the financial obligations associated  
27 with these sales. Manitoba Hydro's long-term export contracts contain numerous

1 provisions that are designed to mitigate the risks associated with these contracts. The  
2 following sections describe these provisions.

#### 3 4 **Market Access**

5 A common provision contained in Manitoba Hydro's export contracts that improves  
6 market access for sales is the right to use the firm transmission service that is not being  
7 utilized for the sale of must-take energy under the contract. This right to use the firm  
8 transmission service allows Manitoba Hydro to maximize the value of additional energy  
9 that may be available from time to time, avoiding the risks of non-firm transmission  
10 service—which is frequently not available or subject to interruption, preventing the  
11 corporation from maximizing additional opportunities.

#### 12 13 **Curtailments and Curtailment Priority Criteria**

14 Manitoba Hydro's service to domestic customers is protected under the curtailment  
15 provision incorporated into export sales agreements. Manitoba Hydro can curtail energy  
16 deliveries to the export customer without penalty if there is a physical problem on the  
17 Manitoba Hydro generation or transmission system that prevents continued deliveries. If  
18 a curtailment event does occur, then Manitoba Hydro is entitled to curtail energy  
19 deliveries according to a curtailment priority stack. Manitoba domestic load is at the  
20 highest priority, which means all export contracts would be curtailed before affecting  
21 Manitoba Hydro's domestic load in Manitoba.

#### 22 **Alternative Supply**

23 Manitoba Hydro's service to domestic customers and export sales obligations are  
24 protected under the alternative supply provision. Manitoba Hydro has the right to meet  
25 contracted energy obligations from more than its own generating stations. Flexibility to  
26 meet contracted energy obligations from energy markets (i.e. Midwest Independent  
27 System Operator, Inc. (MISO)) and third-party purchases allows Manitoba Hydro to meet

1 its sale obligations at lowest cost and during circumstances when all Manitoba Hydro  
2 generating resources are needed to serve domestic load in Manitoba.

#### 4 **Adverse Water Conditions**

5 Manitoba Hydro's service to domestic customers is protected under the adverse water  
6 conditions provision. Manitoba Hydro utilizes adverse water provisions in long-term  
7 export contracts to reduce the volume of contracted energy to be delivered if Manitoba  
8 Hydro anticipates conditions where it cannot meet its energy supply obligations from its  
9 own generating resources. These adverse water provisions provide the corporation with  
10 physical and financial protection in event of drought conditions.

#### 12 **Creditworthiness**

13 Financial risks related to Manitoba Hydro's export sales are mitigated by the  
14 creditworthiness provision. Manitoba Hydro's export contracts are executed with  
15 bilateral customers who are financially strong and creditworthy based on the financial  
16 metrics, investment grade credit ratings, and the regulatory support that the customers  
17 receive from their respective regulatory commission to ensure their continued financial  
18 integrity. However, if a customer's creditworthiness becomes unsatisfactory to Manitoba  
19 Hydro at any point during the term of the sale, Manitoba Hydro's export contracts  
20 contain provisions that allow Manitoba Hydro to request performance assurance from  
21 the customer. The performance assurance is typically in the form of a letter of credit  
22 issued by an investment-grade bank and can be drawn upon by Manitoba Hydro to  
23 ensure collection on any amounts owing under the export contract.

#### 25 **Conditions and Options**

26 Flexibility is needed to address the uncertainties associated with the timing of regulatory  
27 approvals and permitting for large generation and transmission facilities. Export contracts  
28 that depend on new generation or transmission facilities contain conditions and options

that allow for a potential delay in the start of the sale or the termination of the sale. In the case of the 250 MW MP sale and the 100 MW WPS sale, there are provisions for up to two years delay in the start of the contracts if regulatory approvals are delayed. It is anticipated that the 300 MW WPS sale will have the same regulatory delay provision.

#### **Conditions Precedent**

Conditions precedent ensure that Manitoba Hydro's obligations under export sale contracts do not take effect unless specific key conditions are met. These include receipt of all needed approvals and authorizations (i.e. Orders in Council, licences, permits and National Energy Board authorization) for the contracts by specified dates.

Conditions precedent in favour of Manitoba Hydro can also protect Manitoba Hydro should financial or economic circumstances materially change.

#### **15.2.3 Transmission Rights**

Manitoba Hydro currently has the rights to 1,850 MW of export and 750 MW of import capacity to and from MISO. In addition, the 500 kilovolt (kV) Great Northern Transmission Line (GNTL) is expected to provide an additional 750 MW of firm import and export capacity, bringing total capabilities to 2,600 MW export and 1,500 MW import. These transmission rights will be used to market all energy produced by Manitoba Hydro's generating resources in excess of Manitoba domestic load and to purchase energy when needed to meet Manitoba Hydro's domestic and export commitments. Manitoba Hydro's ability to sell and/or purchase energy from the MISO market using existing and future firm transmission service gives Manitoba Hydro the flexibility to export and/or import electricity to address any over- or under-supply or reliability risks associated with the Preferred Development Plan.

#### 15.2.4 Market Products

Manitoba Hydro's participation in the MISO market provides an opportunity to utilize various market related products to manage the physical and financial risks associated with the Preferred Development Plan and the associated export contracts. Market-related products that can be utilized to manage these physical and financial risks include the day-ahead and real-time markets (to sell or purchase energy), financial transmission rights (to manage congestion cost risks), and financial swaps.

Manitoba Hydro's participation in the MISO market has provided an opportunity to develop and/or utilize a number of unique customized market products. These products include:

- Module E<sup>1</sup> - use limited capacity (capacity sales with a daily four-hour energy offer obligation that recognizes that hydraulic generation facilities can have limited water supplies)
- Module B<sup>2</sup> energy sales (utilized by Manitoba Hydro for surplus energy sales)
- system participation sales
- seasonal diversity agreements.

Manitoba Hydro will continue to utilize these products to manage the capacity and energy associated with the Preferred Development Plan.

---

<sup>1</sup> Module E is a product of the MISO Tariff that provides mandatory requirements to be met by the transmission provider, load serving entity and other market participants to ensure a load-serving entity has sufficient access to deliverable, reliable and adequate capacity resources to meet its anticipated peak demand requirements plus an appropriate reserve margin.

<sup>2</sup> Module B is a product of the MISO Tariff that provides details on a host of transmission-related issues, including the types of service (Network and Point-to Point), procedures and rules for requesting transmission service, and the treatment of grandfathered transmission service.

### **15.3 New U.S. Transmission Interconnection Project**

As introduced in *Chapter 2- Manitoba Hydro's Preferred Development Plan Facilities*, the proposed new transmission interconnection is an international transmission line with two distinct components – the Manitoba-Minnesota Transmission Project (MMTP) in Manitoba (a 500 kV/750 MW transmission line between Dorsey and U.S. border) and the GNTL in Minnesota (Manitoba Hydro would contribute financially to the U.S. component of the interconnection to be built by MP). The interconnection would have an incremental transfer capability of 750 MW for both exports from and imports into Manitoba. For a more detailed description of the interconnection projects, refer to *Chapter 6 – The Window of Opportunity*, section 6.5.3.

Actual transmission line routing in Manitoba will be the subject of subsequent environmental and technical studies which started in May 2013. No preliminary routes or corridors have been identified for the MMTP.

#### **15.3.1 Related Agreements**

There are several agreements being developed in relation to the construction of the new transmission interconnection. A Memorandum of Understanding (MOU) was entered into between Manitoba Hydro and MP on January 25, 2013 for the purpose of outlining a framework for further discussions between Manitoba Hydro and MP regarding:

- the general line route and arrangement for a 500-kV interconnection and
- an agreement to work towards both a term sheet relating to the development of the 500-kV interconnection and a cost sharing agreement for development expenses.

A Cost Sharing Agreement between Manitoba Hydro and MP was subsequently signed on March 31, 2013. In order to realize the target ISD of the GNTL, MP has incurred

development expenses in advance of having executed a MISO Facilities Construction Agreement. Manitoba Hydro has committed to funding a portion of planning and engineering expenses as outlined in **Chapter 6 – The Window of Opportunity**, Section 6.5.3.3.

In addition, the following agreements are under development in relation to the construction of the new transmission interconnection:

- MISO Facilities Construction Agreement
- Manitoba Hydro Facilities Construction Agreement
- Transmission Service and Generator Interconnection Agreements
- Letter of Intent and Term Sheet (providing a framework for agreements required to proceed through the construction phase of the interconnection project)
- Project Development Agreement, scheduled for completion February 28, 2014.

For more details pertaining to these agreements, refer to **Chapter 6 – The Window of Opportunity**, section 6.5.3.

### **15.3.2 Reviews and Approvals**

The new 750 MW U.S. interconnection is subject to regulatory review in both Canada and the U.S. With each regulatory hurdle, there is a risk that approval may not be granted. Without a new U.S. interconnection, neither the 250 MW MP sale nor the proposed 300 MW WPS sale would proceed.



1   **Canadian Approvals**

2   On the Canadian side, federal permitting is required from the National Energy Board for  
3   the MMTP interconnection project. Permitting is anticipated to be received by December  
4   2016.

5  
6   *The Manitoba Hydro Act* requires the corporation obtain approval of the Lieutenant-  
7   Governor in Council in order to develop new power generation stations. By Order In  
8   Council 00128/2013 dated April 17, 2013, the Government of Manitoba directed the PUB  
9   to conduct an Needs For and Alternatives To (NFAT) review and provide a report outlining  
10   its recommendations. The Government of Manitoba will make its determination as to  
11   what orders will be issued following consideration of the report.

12  
13   The MMTP will require an environmental assessment and review under *The Environment*  
14   *Act*. At the conclusion of that process, the Minister of Conservation and Water  
15   Stewardship will determine if a licence will be issued. The assessment and review process,  
16   including the Minister's decision, is expected to be completed by June 2016.

17  
18   **U.S. Approvals**

19   The major permits required on the U.S. side of the border are a Certificate of Need and a  
20   Route Permit—both granted by the Minnesota Public Utilities Commission—and are  
21   anticipated to be received by October 2015. Other required approvals include a  
22   Presidential Permit from the United States Department of Energy and a Wetland Permit  
23   from the U.S. Army Corps of Engineers. During the certification phase, additional state  
24   and federal approvals are also required.

**15.3.3 Project Delivery — MMTP**

The ISD of the new 750 MW interconnection is planned to coincide with the start of the 250 MW MP export sale beginning June 1, 2020. The engineering phase of this project will begin in 2015 and continue to the end of the project. Construction is scheduled to occur from 2017 to 2020, subject to all of the required agreements and regulatory approvals discussed earlier.

During the engineering and construction phase of this project, project risks will be identified in a project risk registry. This registry, which is an industry best practice, will serve as a project management tool to aid in managing the construction and decision making and in ensuring that the overall project remains within schedule and budget.

Manitoba Hydro will have to begin Keeyask G.S. construction before it receives National Energy Board approvals (for the export sales and the MMTP interconnection) or a *Manitoba Environment Act* licence for the MMTP. Manitoba Hydro expects to receive transmission interconnection approvals from the NEB by the spring of 2016. Complete applications to the NEB are expected to include evidence that environmental approvals have been received to construct Keeyask G.S.

Under the 250 MW MP sale and the 100 MW WPS sale, Manitoba Hydro assumes Keeyask G.S. construction schedule risk on the date when Manitoba Hydro starts constructing the Keeyask cofferdam. The 125 MW NSP sale provides Manitoba Hydro with the option of not proceeding with the PSA up to 2018 should circumstances warrant. The agreements protect Manitoba Hydro from uncontrollable events during this construction period via the force majeure provisions, with the exception of Manitoba Hydro labour strikes. If Keeyask G.S. construction schedule is delayed, Manitoba Hydro would, if necessary, be required to purchase energy/capacity from the market to fulfill its contractual obligations

to MP, WPS and NSP. If the transmission interconnection construction schedule is delayed, Manitoba Hydro has the option, but not obligation, to fulfill the MP sale through existing transmission service.

#### **15.4 Keeyask and Conawapa Generation Projects**

This section discusses two categories of risks: those risks associated with Manitoba Hydro's agreements to engage Cree Nations in the planning and development of the Keeyask and Conawapa Projects; and those risks associated with gaining regulatory approval for the projects.

##### **15.4.1 Agreements for Aboriginal Participation**

Under existing agreements stemming from the settlement for adverse effects of the Churchill River Diversion and Lake Winnipeg Regulation projects, Manitoba Hydro is obligated to achieve adverse effects agreements with Tataskweyak Cree Nation (TCN), War Lake First Nation (WLFN), York Factory First Nation (YFFN); and Fox Lake Cree Nation (FLCN). Agreements may be arbitrated if negotiations are not successful.

There is no similar legal requirement to achieve benefit-sharing agreements. Nevertheless, Manitoba Hydro was at the forefront of such agreements in Canada when it began negotiations for the Wuskwatim and Keeyask Projects, and it views benefit-sharing as a foundational element to the successful development of its next major hydroelectric generation project on the Nelson River, Conawapa G.S.

There are risks associated in the process to develop an agreement, and there are risks once an agreement is reached. The following sections discuss the risks associated with the Keeyask and Conawapa Projects.

**15.4.1.1 Keeyask Hydropower Limited Partnership**

Manitoba Hydro and the four Keeyask Cree Nations (KCNs) – TCN and WLFN, working together as the Cree Nation Partners; YFFN; and FLCN – have ratified the Joint Keeyask Development Agreement (JKDA) under which the Keeyask Hydropower Limited Partnership was established. In the agreement the KCNs and Manitoba Hydro have explicitly committed their support to the project.

The process of negotiating the agreement, and the agreement itself, address potential risks. In this regard, Manitoba Hydro shared financial projections with the KCNs while the JKDA was being negotiated. These included many different assumptions, resulting in low, medium and high estimates. The KCNs are thus aware there is a wide range of potential returns from their investments, and that the Keeyask financial results modelled during negotiations used the forecasting information available at that time. Manitoba Hydro has continued to keep the KCNs informed of the Keeyask Project economics.

The economic circumstances of Hydro's major projects have changed during the past several years, due in part to lower energy prices. Manitoba Hydro and Nisichawayasihk Cree Nation, its partner in Wuskwatim, G.S. are currently negotiating amendments to the Wuskwatim Development Agreement to deal with this issue.

Manitoba Hydro believes adjustments it has made to its development plans for Keeyask, G.S. in part through learnings from the Wuskwatim Project, will assist in managing risks related to project costs, revenues and schedule. The JKDA includes two investment options, common and preferred. The availability of these two options provides each of the KCNs with an investment choice depending upon their risk tolerance.

1 For more discussion about risks associated with this partnership model, see **Appendix**  
2 **15.1 - Keeyask Aboriginal Partnership Business Risks.**

#### 4 **15.4.1.2 Conawapa Project Agreements**

5 Manitoba Hydro and the five Cree Nations on or in the vicinity of the lower Nelson River  
6 (FLCN, YFFN, TCN, WLFN and Shamattawa First Nation) have protocols to discuss benefit  
7 agreements related to the Conawapa Project. These processes are ongoing.

8  
9 It is expected that without adverse effects and benefit-sharing agreements, and the  
10 corresponding support of the local First Nations, there could be significant challenges to  
11 achieving the required licences and approvals for Conawapa G.S.

#### 13 **15.4.2 Reviews and Approvals**

14 The federal and provincial governments each have regulatory regimes that must be  
15 satisfied before the major projects in the Preferred Development Plan can be  
16 constructed. Each jurisdiction has foundational legislation for its environmental reviews:  
17 the *Canadian Environmental Assessment Act* and *National Energy Board Act* for federal  
18 authorizations and *The Environment Act* and *The Water Power Act* for provincial  
19 authorizations. Without successful conclusions under these Acts, the Keeyask Project,  
20 Conawapa Project, North-South Transmission Upgrade and, as noted in Section 15.3.2,  
21 the Manitoba-Minnesota Transmission Project, will not be developed.

22 The potential listing of Lake Sturgeon under the *Species at Risk Act (SARA)* also poses a  
23 significant regulatory risk. *SARA* could impose restrictions on the potential development  
24 (and operations) of the Keeyask and Conawapa Projects.

1 The following sections discuss the risks associated with *The Environment Act* (Manitoba),  
2 *Canadian Environmental Assessment Act*, and *SARA*.

#### 4 **15.4.2.1 The Environment Act (Manitoba)**

5 The Keeyask Generation and Transmission projects are currently being reviewed under  
6 *The Environment Act*. The Minister has asked the Clean Environment Commission (CEC) to  
7 hold hearings and provide recommendations regarding the generation project. The  
8 Minister will determine if a licence should be issued and, if so, what conditions should  
9 apply. Appeals of the Minister's decision are made to the Lieutenant-Governor in Council.  
10 The Director of Environmental Assessment and Licensing will determine if a license will be  
11 issued for the transmission project; appeals of the Director's decision are made to the  
12 Minister.

13  
14 To manage the licensing risk, Manitoba Hydro and its Cree Nation partners, through the  
15 Keeyask Hydropower Limited Partnership, have undertaken a thorough environmental  
16 impact assessment using technical sciences and Aboriginal traditional knowledge. As  
17 recorded in ***Chapter 2 – Manitoba Hydro's Preferred Development Plan Facilities***,  
18 potential adverse effects have been identified and then avoided, reduced or mitigated;  
19 and potential benefits have been enhanced.

20  
21 Manitoba Hydro also undertook a complete environmental assessment of the Keeyask  
22 Transmission Project, a process which included engagement with the local Cree Nations.  
23 Manitoba Hydro has a long, successful record of planning, assessing and licensing  
24 transmission projects.

25  
26 Before the Province issues licences, it will also consult with First Nations and Métis  
27 people. The four KCNs have adverse effects agreements which they acknowledge address

1 impacts to the exercise of their Treaty and Aboriginal rights. The Province has initiated  
2 consultations with the KCNs and other aboriginal communities.

3  
4 The CEC, in its report on the Bipole III Project, proposed as a non-licensing  
5 recommendation that “Manitoba Hydro, in cooperation with the Manitoba Government,  
6 conduct a Regional Cumulative Effects Assessment for all Manitoba Hydro projects and  
7 associated infrastructure in the Nelson River sub-watershed” before any additional  
8 projects after Bipole III are licensed. If the Government of Manitoba were to adopt this  
9 recommendation and require such an assessment be carried out prior to licensing the  
10 Keeyask Generating Project, a delay could ensue.

11  
12 It should be noted that the Keeyask Environmental Impact Statement (EIS) was filed in  
13 July 2012. Consistent with the EIS Guidelines issued by environmental regulators, the  
14 environmental impact statement includes a cumulative effects assessment, and, where  
15 appropriate, takes a regional perspective to assess cumulative effects on specific Valued  
16 Environmental Components. The ultimate decision whether the CEC’s recommendation  
17 be adopted rests with the same party with approval power for the Keeyask Project, i.e.  
18 the Government of Manitoba. While adoption of the CEC recommendation is a risk to the  
19 Keeyask Project, it is not a third-party risk that is outside the control or consciousness of  
20 the decision maker, the Manitoba Government.

21 The Conawapa Project, as well as the North-South Transmission System Upgrade and the  
22 Manitoba-Minnesota Transmission Projects, are still under study and no applications have  
23 been filed for regulatory review.

1    **15.4.2.2       Canadian Environmental Assessment Act**

2    The Canadian Environmental Assessment Agency is leading the development and  
3    production of a Comprehensive Study Report (CSR) of the Keeyask Generation Project. If  
4    the CSR determines the project will not cause a significant adverse effect, the Minister of  
5    Environment may inform federal departments with regulatory functions to issue  
6    authorizations for the project. If the CSR determines Keeyask G.S. will cause a significant  
7    adverse effect, the Minister may inform departments to issue authorizations only if the  
8    federal Governor-in-Council concludes the adverse effect is justified in this circumstance.

9  
10   As noted previously, Manitoba Hydro and its Cree Nation partners, through the Keeyask  
11   Hydropower Limited Partnership, have undertaken a thorough environmental impact  
12   assessment using technical sciences and Aboriginal traditional knowledge. As explained in  
13   ***Chapter 2 – Manitoba Hydro's Preferred Development Plan Facilities***, potential adverse  
14   effects have been identified and then avoided, reduced or mitigated; and potential  
15   benefits have been enhanced. As such, Manitoba Hydro does not believe the project will  
16   cause a significant adverse effect. However, should the CSR arrive at that conclusion, the  
17   many socio-economic benefits (e.g., reductions in greenhouse gases; increases in Lake  
18   Sturgeon populations; training and employment for northern Aboriginal workers; Cree  
19   Nation business opportunities; capacity building and profits for the Keeyask Cree Nations;  
20   and clean renewable energy for Manitobans and export markets) may lead to a  
21   conclusion that the adverse effect is justified in the circumstance.

22   As with the provincial process, the federal government must also conduct Aboriginal  
23   consultations in accordance with section 35 of the Constitution.

24  
25   The Conawapa Project will also require federal authorizations. This project is still under  
26   study and applications have not been filed for regulatory review.



1    **15.4.2.3        Species at Risk Act**

2    As discussed in Section 10.6.5, the federal government is considering whether to list Lake  
3    Sturgeon in the Nelson River as endangered under the SARA. Manitoba Hydro is  
4    proactively engaging in discussions with both provincial and federal regulators on its Lake  
5    Sturgeon stewardship plans. Activities include coordinating with the Manitoba  
6    Department of Conservation and Water Stewardship (Fisheries Branch) to ensure that  
7    stewardship activities are consistent with the provincial Lake Sturgeon Management  
8    Strategy. Manitoba Hydro is also communicating with staff from DFO to keep them  
9    informed about its approach to Lake Sturgeon stewardship, current activities, progress  
10   and outcomes. Manitoba Hydro's commitment and approach to Lake Sturgeon  
11   stewardship, with examples of stewardship activities, are explained in detail in **Appendix**  
12   **2.1 - Lake Sturgeon: Mitigation and Enhancement.**

13  
14   If Lake Sturgeon were to be listed under SARA, provisions would be implemented to  
15   protect individual fish and critical habitat. Fisheries and Oceans Canada (DFO) would  
16   develop a Recovery Strategy for Lake Sturgeon, followed by an Action Plan setting out the  
17   activities that would have to be undertaken to prevent harm to Lake Sturgeon and  
18   protect their habitat. If Manitoba Hydro (and, in the case of Keeyask, the partnership)  
19   wished to proceed with the Keeyask and/or Conawapa Projects, federal permits would  
20   have to be secured under the SARA in order to build and operate any new hydroelectric  
21   generating stations on the waterways where Lake Sturgeon were listed as endangered.  
22   The Keeyask and Conawapa Projects could be delayed or possibly cancelled if Lake  
23   Sturgeon are listed under SARA.

24  
25   The federal decision may not occur until after June 2014, when construction on Keeyask is  
26   schedule to begin. If this were to occur, Manitoba Hydro would evaluate the situation at

the time, including the likelihood of a future listing under SARA, and the costs and risks of delaying construction versus proceeding with construction.

#### **15.5 Generating Station Project Delivery**

This section outlines the methodology Manitoba Hydro follows in selecting a delivery model and contract packaging for a project and outlines how this has been done on the Keeyask Project. Additionally, the section provides an overview of Manitoba Hydro's key project management plans/processes used to successfully deliver major generation projects.

As detailed Stage V Engineering<sup>3</sup> on Conawapa G.S. has not yet begun, a formal project delivery strategy has not yet been established. Manitoba Hydro will continue to monitor the attractiveness of Conawapa's 2026 ISD. The EIS will be needed to be filed in 2015 and construction will need to begin in 2018 to meet the 2026 ISD. At any point, Manitoba Hydro may decide to defer the Conawapa G.S. ISD based on the evolution of conditions including export sale agreements, domestic energy requirements and other factors. Based on this approach, a decision on project delivery strategy for Conawapa G.S. is not anticipated until the project has progressed to Stage V—anticipated to occur around 2016, based on a 2026 ISD.

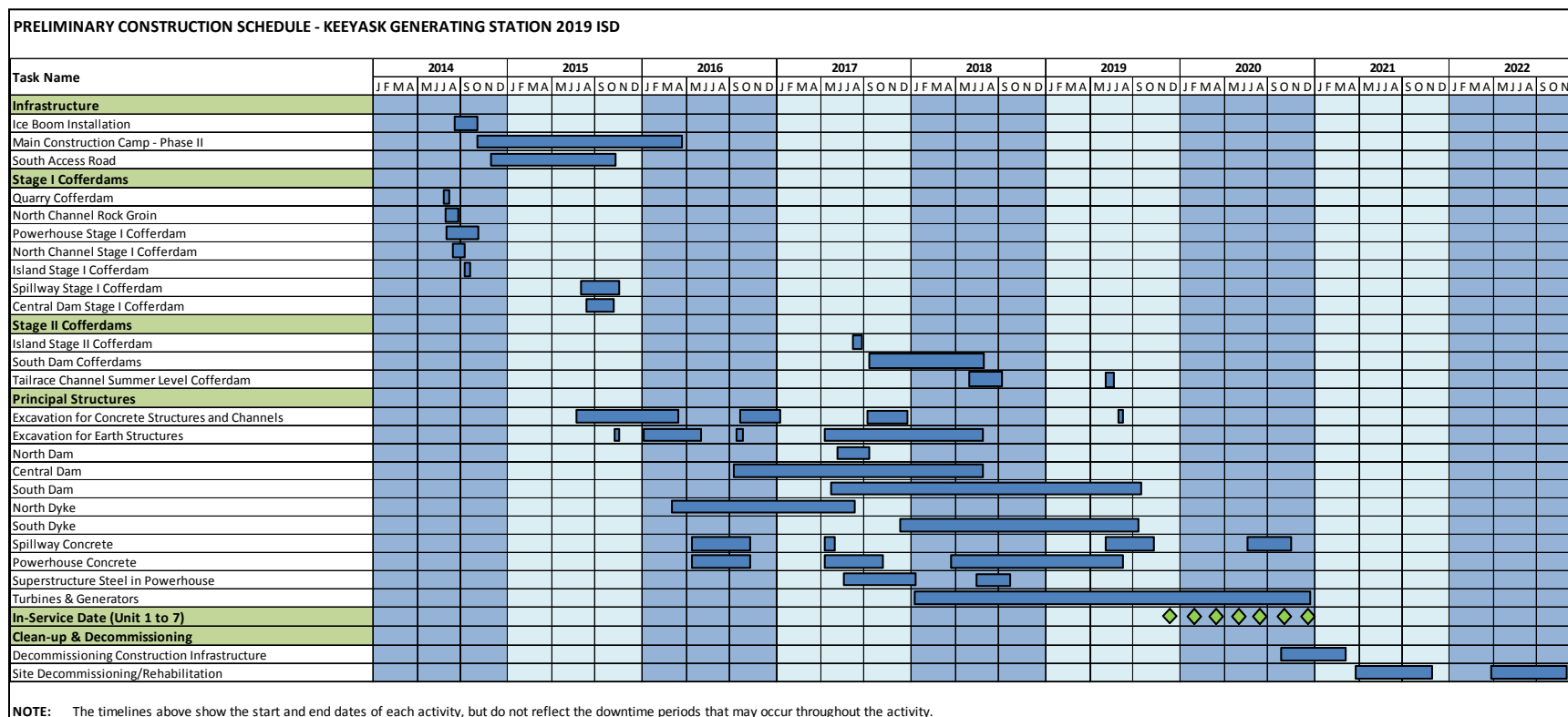
Constructions schedules for Keeyask G.S. 2019 ISD and Conawapa G.S. 2026 ISD are shown in Figures 15.3 and 15.4, respectively:

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<sup>3</sup> Refer to Appendix 7.2 Resource Options Report for a detailed explanation of Manitoba Hydro's project development stages.

1

**Figure 15.3 KEYEASK 2019 ISD PRELIMINARY CONSTRUCTION SCHEDULE**

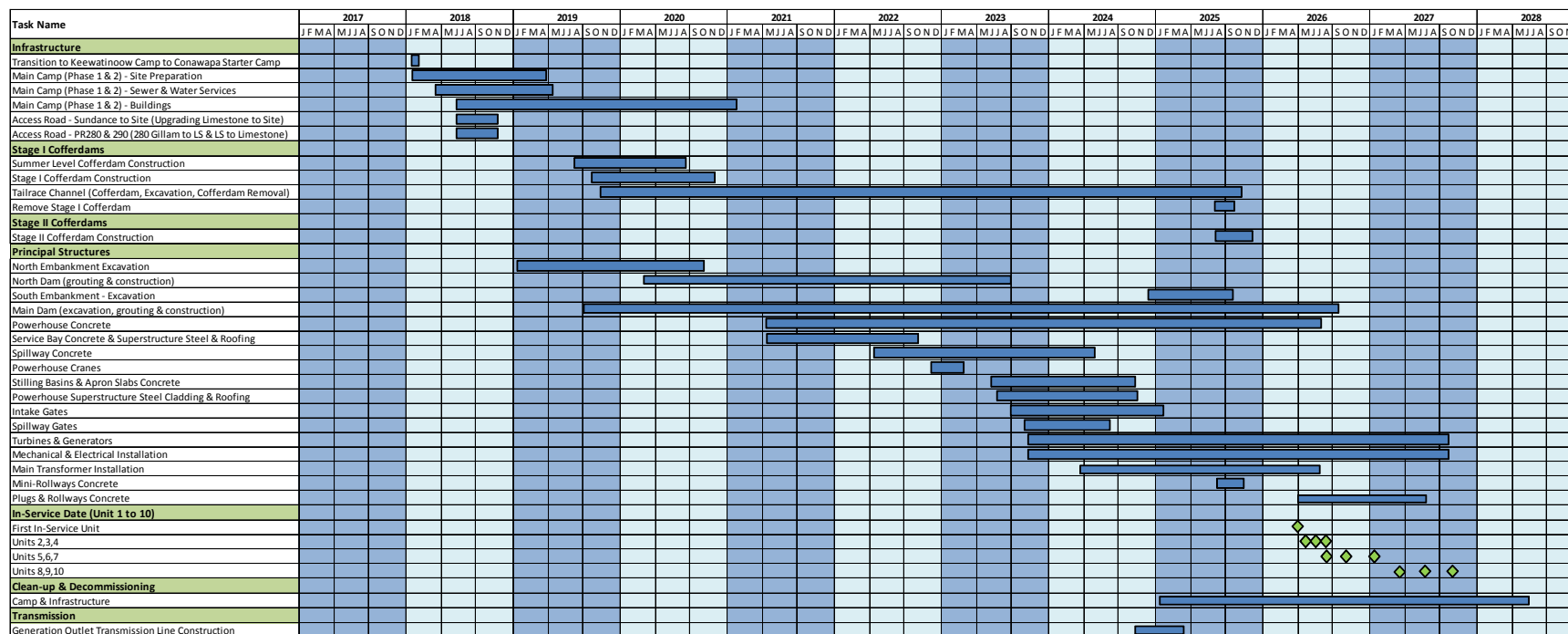


2

1

**Figure 15.4 CONAWAPA 2026 ISD PRELIMINARY CONSTRUCTION SCHEDULE**

PRELIMINARY CONSTRUCTION SCHEDULE - CONAWAPA GENERATING STATION 2026 ISD



2

**NOTE:** The timelines above show the start and end dates of each activity, but do not reflect the downtime periods that may occur throughout the activity.

### 15.5.1 Selection of Project Delivery Strategy

A project delivery strategy refers to the model or approach that will be followed to execute a project. As such, the project delivery strategy is a critical factor in successful project implementation. Selection of a project delivery strategy is based on numerous factors that include the project objectives, its key success factors and project risks. Project delivery strategies typically considered for the construction of major hydroelectric generating stations include the following:

- **Design Bid Build (DBB)** – A staged contracting approach whereby Manitoba Hydro as the owner contracts the design and then competitively tenders the work to a contractor who constructs the work.
- **Construction Management (CM)** – The owner contracts the design and, in parallel, contracts a Construction Manager who may act as the owner’s agent in managing the construction, or is considered “at risk” and assumes the majority risk by guaranteeing the schedule and budget, and who contracts all of the trades to construct the work. In either case the Construction Manager provides essential design input from the beginning of the detailed design phase.
- **Design Build (DB) or Engineer Procure Construct (EPC)** – The owner contracts a single entity that is responsible for both the design and construction of the work. This entity holds the majority of risks related to both design and construction. However, this type of risk allocation is reflected in the entity’s pricing of the work.
- **Integrated Project Delivery (IPD)** – The owner contracts a designer to carry out detailed design and, in parallel, contracts a contractor to provide early contractor input to the detailed design. The owner creates a multi-party contract (or teaming agreement) between the owner, designer, and contractor to undertake the collaborative approach to the design with an opportunity to award the construction phase to the contractor (the term “Integrated Design-Build” was used for the Pointe du Bois Spillway Replacement Project). This model provides a

1 more collaborative structure than a typical Design Build, which allows for more  
2 equitable risk allocation.

- 3 • **Alliance** – The owner contracts the designer and contractor under a single unifying  
4 teaming or partnership agreement to execute all phases of the project. Project risk  
5 and opportunities are shared equitably and project management decisions are  
6 made by the alliance. All parties share in the financial stake success or failure of  
7 the project (i.e. share in the cost overrun or underrun from the budgeted  
8 amount).

### 9 10 **Contract Packaging**

11 As a result of the broad type of work (i.e. civil, mechanical, electrical) required in the  
12 construction of a hydroelectric generating station, work is generally divided into defined  
13 contract packages. The contract must properly allocate the risk to the contractor and fit  
14 with other contracts within the project delivery system. Additional considerations in the  
15 development of the contract packaging include contractor capabilities, general  
16 construction market conditions and the ability to meet obligations to project partners.

17 Typical major contract packages include:

- 18 • General Civil Contract
- 19 • Turbines and Generators Contract
- 20 • Electrical and Mechanical Contract
- 21 • Construction Camp Contract
- 22 • Camp Operation and Services Contracts and
- 23 • Stage V Detailed Design Contract.

**15.5.2 Keeyask Project Delivery Strategy and Contract Packaging**

The Keeyask Project delivery strategy will employ a hybrid Design Bid Build model utilizing Integrated Project Delivery and Engineer Procure Construct approaches that best suit certain portions of the project. This delivery model is structured as follows:

- Manitoba Hydro acts as the Project Manager and Construction Manager responsible for the overall project costs, schedule and quality. Manitoba Hydro holds separate contracts with each contractor and has overall responsibility for interface management.
- A single project designer is responsible for the majority of the project design. This design team is lead by Hatch and includes SNC Lavalin and KGS. Internal Manitoba Hydro resources provide design and define performance specifications for some of the specialized EPC contracts.
- An Engineer, Procure, Construct model has been selected for the turbine and generators contract, with the contractor being responsible for design, manufacturing and installation. The performance specification is defined by Manitoba Hydro's design team. In addition, this model will be utilized for the spillway gates, intake gates, cranes, and majority of the electrical equipment contracts.
- An integrated design build approach with a target price model will be implemented for the General Civil Contract, which is described further in the section that follows.

**Keeyask General Civil Contract (GCC)**

The GCC will be the largest contract on the Project and is made up of a range of work packages including excavation, cofferdam construction, river management, dams, dykes, and electrical and mechanical works, as well as construction of the powerhouse and spillway structures. Design Build, Design Bid Build and Integrated Design Build project

1 delivery methods were considered for the delivery of the Keeyask GCC. Other project  
2 delivery methods including turnkey options were not considered as they remove  
3 Manitoba Hydro from the project execution phase, jeopardizing both budget and quality  
4 goals. Prior to selecting a delivery strategy for the project, critical success factors were  
5 identified including safety and environment considerations; ability to meet approved  
6 budget and in-service dates; maximizing opportunities for KCN partners where capacity  
7 exists; developing project and construction management expertise within Manitoba  
8 Hydro; and obtaining early constructability input to maximize value to the project. Project  
9 delivery methods were ranked against one another based on these critical success  
10 factors.

11  
12 The GCC for the Keeyask Generation Project will be executed using an Integrated Design  
13 Build or Early Contractor involvement process. In this model, the designer carries out the  
14 detailed design and the contractor provides constructability input as the design is  
15 developed. Involving the contractor early in the detailed design phase helps to ensure  
16 that the contractor's extensive construction knowledge is incorporated into the design  
17 and the opportunity for cost savings in the form of value engineering is increased. Since  
18 the contractor is involved in the process nearly two years before major GCC construction  
19 begins, they have the opportunity to refine the schedule, secure the necessary labour and  
20 form alliances with Manitoba suppliers and sub-contractors. Once construction starts, it is  
21 likely that claims will be minimized and costly disputes avoided because the contractor  
22 will have all available information and an opportunity to provide input into the final  
23 design.

24  
25 To help reduce scheduling risk and potential interface issues, a number of contracts will  
26 be bundled with the GCC, including the Electrical and Mechanical contract, excavation,  
27 cofferdams and draft tube forms. The reduction of interface risk was a lesson learned  
28 from the Wuskwatim project, which had several different contracts. Other construction



1 contracts for the Keeyask G.S., such as the turbines and generations, will be executed by  
2 the Design Build method.

3 Selection of the contractor is based on target prices submitted through a Request for  
4 Proposal process and assessment of the best value offered to Manitoba Hydro.  
5 Determining best value includes consideration of the contractor's ability to reduce risks to  
6 the schedule and increase the possibility of early in-service dates, as these outcomes have  
7 substantial financial benefits.

#### 8 **Project Management Roles and Responsibilities in Keeyask Delivery Strategy**

9 Manitoba Hydro acts as the Project Manager and Construction Manager responsible for  
10 the overall project cost, schedule and quality. Manitoba Hydro holds separate contracts  
11 with each contractor and has overall responsibility for interface management.  
12 Additionally, Manitoba Hydro holds project responsibility over environmental,  
13 stakeholder and partnership issues. The contractors are responsible for managing their  
14 specific scope of work and the Stage V Design consultant is responsible for the majority of  
15 engineering and design for the project. The respective responsibilities are outlined further  
16 in Figure 15.5 below.

1

Figure 15.5

PROJECT MANAGEMENT RESPONSIBILITIES

**Project Management Responsibilities**

**OWNER – MANITOBA HYDRO:**

- The Owner provides the overall direction and governance on the project.
- The Project Owner has responsibility for overall performance of the project. Specific areas of project responsibility include: financial, regulatory, environmental, stakeholder management, partnership, etc.

**DESIGNER ENGINEER – HATCH:**

- The project Designer is a 3<sup>rd</sup> party Engineer firm hired by the Owner (Manitoba Hydro) who is responsible for the majority of the project design
- The Design Engineer also plays a support role during construction

**CONTRACTORS AND VENDORS:**

- Contractors and Vendors carry out the actual construction and supply of equipment
- Each Contractor manages their own work with overall coordination between Contractor managed by the Owner
- Includes GCC, T & G Contractor, etc.

2  
3

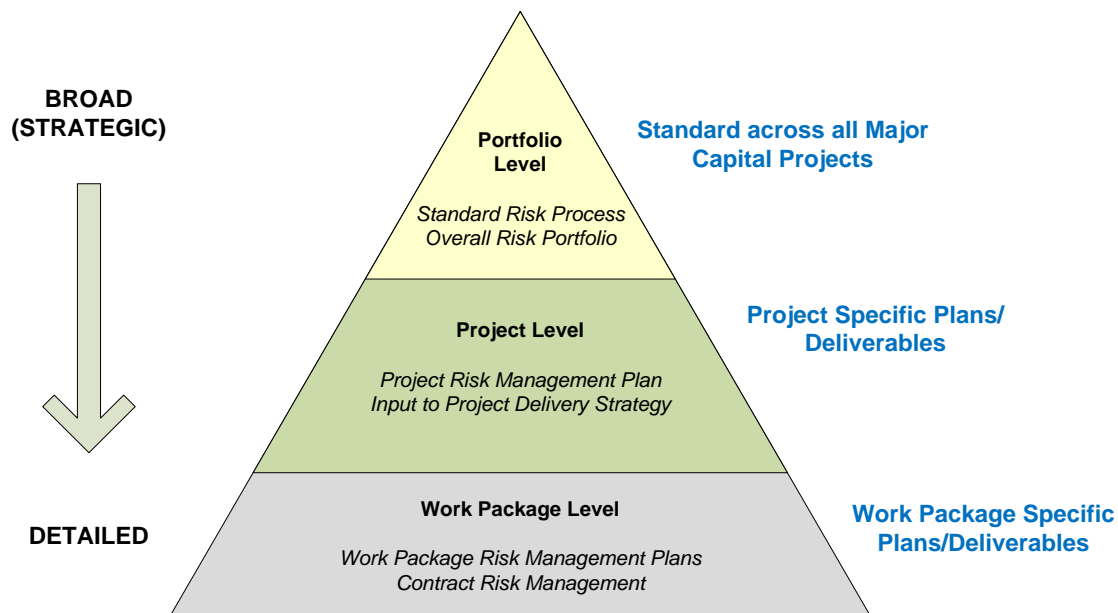
## **15.6 Project Management and Control for Generation Projects**

The following sections outline key project management plans/processes that enable successful project implementation.

### **15.6.1 Risk Management**

Effective risk management is a critical aspect of Manitoba Hydro's project management practices and is necessary to ensure the required project objectives are achieved. The risk management process implemented on capital projects considers three levels of risk: i) portfolio, ii) project, and iii) work package. Risk management is driven from the portfolio level. Project-level risk documents are developed based on the portfolio-level documents and likewise work package-level risk documents are developed based on both portfolio and project-level documents. A top-down approach ensures approaches followed on portfolio-level risk documents are applied to all detailed risk documents, and strategies for risk management are driven down into the development of the detailed documents/plans (see Figure 15.6).

**Figure 15.6 STAGES OF RISK MANAGEMENT PROCESS**



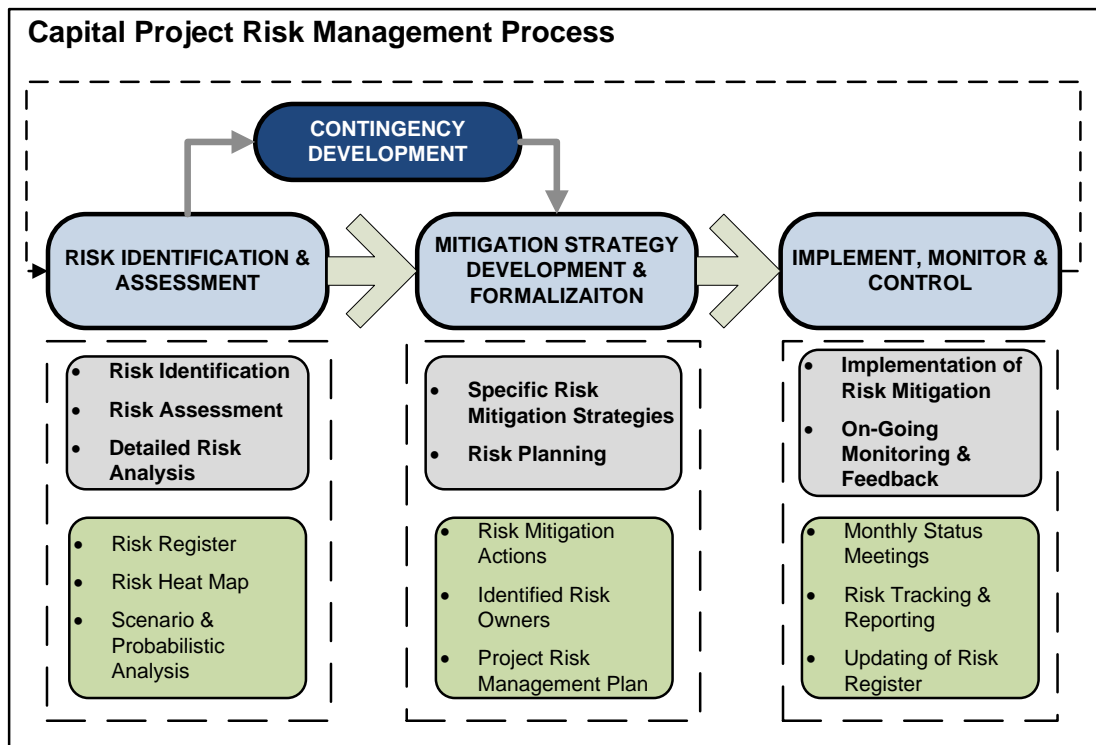
1    **Risk Management through Project Progression**

2    Risk management is an iterative process and occurs frequently from early design through  
3    completion of construction. The end of Stage IV Engineering or the beginning of Stage V  
4    Engineering are the typical points for implementing the first detailed risk management  
5    activities. At this stage of project development the desired output of the risk  
6    management process is a detailed, actionable risk management plan for the entire  
7    project. As the project progresses through Stage V Engineering, risk management  
8    activities become specific to the project's work packages (contracts). These activities are  
9    described in more detail below.

10  
11    **Project Risk Management Process**

12    The basic project risk management process applied to Keeyask G.S. and Conawapa G.S.  
13    follows recognized project management best practices. The process includes risk  
14    identification, quantification, mitigation planning, mitigation, implementation, and  
15    monitoring and tracking. This process is shown below and described in the sections that  
16    follow:

**Figure 15.7 CAPITAL PROJECT RISK MANAGEMENT PROCESS**



### **Risk Assessment**

Risk assessment is the process of identifying risk items that influence/drive uncertainty on the project; these risk items are captured in a project risk register, a living document that acts as the repository for all identified project risks throughout the life of the project. The impact and probability for each risk event is scored, allowing identified risks to be prioritized based on a risk score (impact x probability) to help focus risk management activities on the most critical items.

### **Detailed Risk Analysis**

Detailed risk analysis involves developing a quantitative assessment of each risk's impact and probability. The key output of this stage is a detailed profile of each risk event in order to facilitate development of a detailed risk mitigation strategy. Actions taken during

1 this stage include activities such as development of schedule “what if” scenarios,  
2 probabilistic (Monte-Carlo) analysis and constructability reviews.

#### 4 **Risk Mitigation Development**

5 Risk mitigation strategies are developed specific to each identified risk. Mitigation  
6 strategies include: acceptance, elimination, mitigation or transfer. Selection of the  
7 appropriate strategy will depend on numerous factors and is assessed on a risk-by-risk  
8 basis.

#### 10 **Risk Tracking**

11 Risk tracking involves establishing metrics that allow the project team to assess the level  
12 of success of risk mitigation actions. Information from this step feeds back into the risk  
13 management process for future analyses.

#### 15 **Contingency Development**

16 Contingency development is a subset of risk mitigation and is both a part of the risk  
17 management process and the cost estimate development process. Methodologies used  
18 to determine contingency are described further as part of the description of Manitoba  
19 Hydro’s cost estimating methodology described in ***Appendix 2.4 – Developing the***  
20 ***Keeyask and Conawapa Capital Cost Estimates.***

#### 22 **15.6.2 Key Lessons Learned from Wuskwatim**

23 Manitoba Hydro undertook “lessons learned” reviews during the pre-construction and  
24 construction phases of Wuskwatim and has applied these lessons to the Keeyask and  
25 Conawapa planning and cost estimating processes as a key additional risk management  
26 step. Specific actions taken from these lessons learned in the pre-construction phase are:

- 27 • development of a comprehensive master pre-construction schedule

- early inputs from and engagement with stakeholders (regulators and affected communities) to ensure the project scope is well defined, understood and agreed to by all parties and
- more engineering and environmental information developed earlier in the planning process to support partnership and regulatory work.

Specific actions taken from these lessons learned in the construction phase are:

- moving supporting infrastructure design and construction activities (such as those for access roads and camps) out of the generation project and into separate earlier projects. This allows for increased benefits to First Nations and reduces construction delay risks associated with infrastructure work
- ensuring the construction camp provides craft workers with remote-site living conditions of the highest quality that are on par with other remote major project sites across Canada
- consideration of new approaches to contract frameworks (e.g., “target price” contracts) to improve alignment with prevailing market conditions, attract contractor interest, and provide incentives for contractor performance
- early input from contractors to maximize opportunities for optimization of design cost-effectiveness and constructability. Also, to allow for development of a detailed labour plan for the project
- work packaging and contract scoping optimized to mitigate schedule and contract risks. Specifically, eliminating interfaces between the General Civil Contractor and the Electrical and Mechanical Contractor.

### **15.6.3 Risk Management on Keeyask and Conawapa**

Risks to the Keeyask and Conawapa Projects will be managed following the previously described capital project risk management process. The general categories of risk that

each project is exposed to and that must be managed during the pre-construction and construction phases are as follows:

- Regulatory: Includes risks related to regulatory approvals, SARA, on-going environmental protection, etc.
- Stakeholder: Includes risks related to negotiated agreements, stakeholder engagement, etc.
- Execution: Includes risks related to procurement, design, construction and installation
- Safety: Includes risks related to ensuring safe operations during construction
- Labour: Risks related to attraction and retention of labour and overall productivity of labour
- Cost Escalation: Risk related to adverse changes in the marketplace resulting in increased cost escalation.

A number of risk mitigation measures have already been implemented for Keeyask and Conawapa Projects to address the above risks. The following are some of the key actions being taken on the Keeyask Project:

- Early Contractor Involvement: The General Civil Contractor will be brought on nearly two years before major GCC construction is scheduled to begin. The primary advantage of such an approach is that it allows the GCC to incorporate constructability into the project design and optimize the project construction schedule to mitigate construction risks. Additionally, it allows the GCC to work with Manitoba Hydro in addressing labour attraction, retention and productivity risks.
- Contract Packaging: The work on the Keeyask Project has been packaged to minimize contractor interfaces that could affect project schedule. The most notable instance of this is the inclusion of the Electrical & Mechanical work in the



General Civil Contract, which, as noted, was a key lesson learned from Wuskwatim.

- Regulatory and Stakeholder Engagement: Manitoba Hydro is actively engaged with key regulatory bodies and project stakeholders to manage the pre-construction process. This engagement is intended to help ensure the project can move forward and all groups benefit from construction of the project.
- Sufficient Project Contingency Fund: Contingency is the primary financial measure applied in managing project risks. Carrying a sufficient project contingency ensures funds have been planned for and are available to address the uncertainties that exist in the construction of a hydroelectric generating station.

#### **15.6.3.1 Application of Labour and Escalation Reserves in Managing Risk**

The additional requirement of management reserve funds was identified as required to properly address both labour and cost escalation risks, based on current market conditions and labour restrictions. The use of these reserves and mitigation of the associated risks are discussed below.

##### **Labour Reserve**

As outlined, the potential impact of labour availability and productivity issues is anticipated to exceed what is included in the P50 contingency in the Base Estimate. This issue is largely due to the restrictions that could be placed on the projects' ability to address the current and expected state of the Canadian construction labour market.

The labour risk has been calculated based on a series of correlated and cumulative impacts that together act as a single major event. As a result, it is difficult to say what portion of this risk would apply at different probabilities. The use of a labour risk is similar

1 to a scope change in which, if that scope change occurred, the associated cost would be  
2 added to the estimate.

3 A number of steps are being taken by Manitoba Hydro to mitigate labour risk and the  
4 need to draw from the labour reserve. Key steps that have been or are being taken  
5 related to the Keeyask Project are as follows:

- 6 • *High-Quality Construction Camp:* The camp currently in construction for the  
7 Keeyask Project has seen a significant increase in the level of quality compared to  
8 the camp that was in place at the Wuskwatim project. Feedback to-date from both  
9 contractor and union groups on camp quality has been very positive.
- 10 • *Changes to Isolation Leaves and Travel Costs in the Burntwood Nelson*  
11 *Agreement*<sup>4</sup>: The isolation-leave provisions in the BNA have been successfully  
12 changed from five weeks in and one week out for craft workers to three weeks in  
13 and one week out. This change aligns the projects more closely with other remote  
14 projects across Canada, improving the ability to attract and retain labour.
- 15 • *Stakeholder Engagement:* Discussions are being held with both the Construction  
16 Labour Relations Association of Manitoba (group representing the contractors)  
17 and the Allied Hydro Council (group representing the unions) to collaborate on  
18 identifying opportunities to address craft labour supply concerns on the projects.
- 19 • *Early Contractor Involvement:* As already outlined, the General Civil Contractor will  
20 have the time to take critical steps to improve the recruitment of labour on the  
21 project.

---

<sup>4</sup> The Burntwood Nelson Agreement (BNA) is a no-strike, no-lockout collective bargaining agreement which applies to major northern Manitoba Hydro projects. The BNA defines items such as hiring preferences, wage rates, overtime provisions etc. for “on the tools” (or “craft”) workers. Supervisory employees (e.g. superintendents, engineers, management) are not included under the BNA.

- 1 • *Labour Strategy Development:* In addition to the items above, Manitoba Hydro  
2 continues to develop a strategy related to improving labour attraction and  
3 retention as well as labour productivity. This strategy considers both short- and  
4 medium-term actions to be taken. In developing this strategy, Manitoba Hydro is  
5 working with owner groups across Canada to learn what has been successful in  
6 those provinces.

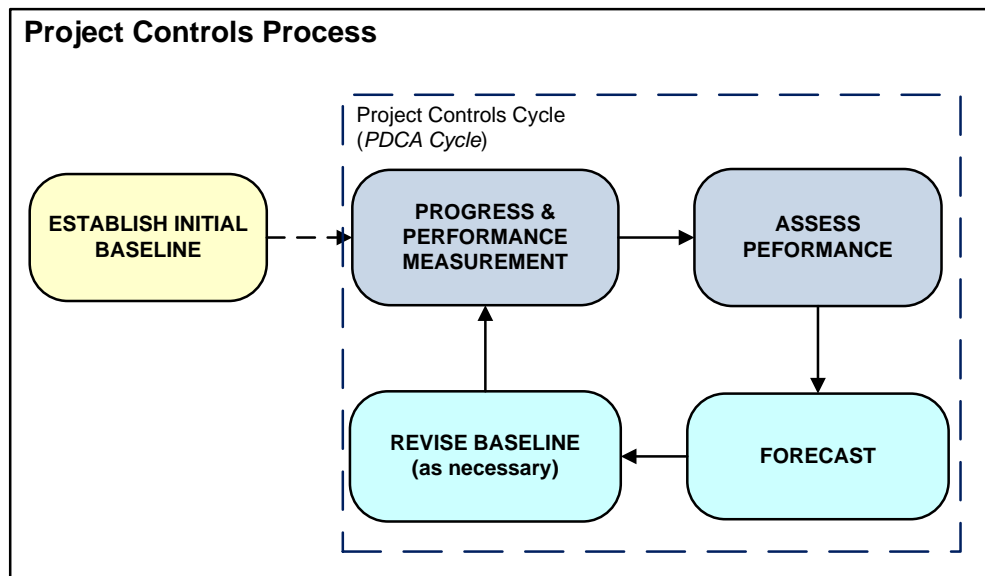
#### 7 **15.6.4 Project Controls**

8 One of the critical roles of Manitoba Hydro's project management team is the monitoring  
9 and control of project scope, schedule and budget on the Keeyask and Conawapa Projects  
10 through a project controls process. As such, the purpose of the project controls process is  
11 to provide timely and accurate information and forecasts that allow project scope to be  
12 managed to the approved budget and schedule.

13  
14 The project controls process applied on the Keeyask and Conawapa Projects is based on  
15 the Plan-Do-Check-Act cycle, which is a well recognized continuous improvement  
16 management model. The project controls process is intended to answer the questions  
17 below and is outlined further in the figure that follows:

- 18 • How does actual performance compare to planned (baseline) performance?  
19 • What is the forecast for future performance based on performance to-date?  
20 • What are the areas requiring action to bring actual performance in-line with  
21 expected performance?  
22 • What are the results of any corrective actions taken?

**Figure 15.8 PROJECT CONTROLS PROCESS**



The general principles of the above process are as follows:

- The approved project scope, schedule and budget together form the baseline for performance measurement and control.
- Monitoring and control activities occur on all costs items, with the greatest degree of focus on large dollar or high-risks portions of the work (e.g., the General Civil Contract).
- Monitoring and control is the responsibility of the Project Manager and all work package leads on the projects. Project controls staff support the Project Manager and his/her team by helping facilitate the controls process.
- Outputs from the project controls process support both the contingency management and change management processes.

Specific to the Keeyask General Civil Contract, the target price provided by the contractor will include a detailed breakdown of the cost to execute the work (e.g. labour, equipment

and material costs, overhead, profit, etc.) for each component of the work. This cost structure will be used to manage changes to the target price as the project progresses.

#### **Change Management**

Project changes are managed closely on the Keeyask and Conawpa Projectss following established change management processes. Processes for managing change are needed to ensure approved changes are clearly communicated and managed in a consistent manner. The scope of the change management process covers from the design phase through the close of construction. Specific items covered under the change management process include:

- Identification of potential changes
- Assessment of the need for the identified change
- Assessment of budget impact of the change, including the impact on project contingency
- Assessment of the impact of the change to the baseline schedule
- Process to approve changes
- Mechanisms to execute approved changes
- Documentation of the executed change.

The change management process ensures someone is identified to execute the required change, all documents are updated appropriately to account for the change, and the change itself is documented appropriately.

The approval level for a project change follows a hierarchical structure and is dependent on the size of the change. As the cost and schedule impact of a change increases, the approval level required increases. Significant changes will require the approval of the Manitoba Hydroelectric Board.

**Other Management Processes**

There are a number of other management processes that are being implemented on the Keeyask and Conawapa Projects. These additional management processes include:

- Quality Management – The quality management process is in place to manage quality at all levels in the project to ensure all deliverables meet or exceed requirements. Quality management applies continuous improvement practices to all project work to minimize the risk of not meeting requirements. Quality management involves planning, doing, checking, and acting to improve both project and product quality. Quality management is generally divided into three key activities: quality planning, quality control and quality assurance.
- Health and Safety Management – The health and safety management plan ensures that all actions undertaken as part of the project are done so in a safe manner. More specifically, the plan outlines how contractor safety plans will interact with Manitoba Hydro's safe work procedures and processes. It is expected that every contractor will operate safely and participate in ensuring overall safety throughout the project work.
- Human Resource Management – The human resources management process manages the overall staffing needs required for construction including: Manitoba Hydro internal project staff, Manitoba Hydro support services (e.g. legal, purchasing, etc.), external consultants and contractor workforce.
- Communications Management – The communications management plan outlines the methods for ensuring all stakeholders and project team members remain informed of the progress of the work. Requirements for information distribution and reporting performance are found within the project communication plan.
- Document Management – The document management plan is in place to identify the appropriate classification and storage location of drawings and documents associated with the project.

1    **15.7    Summary of Risk Mitigation Actions**

2    The following table summarizes the risk mitigation actions that have either already been  
3    implemented by Manitoba Hydro or will be implemented once the projects are  
4    committed. These include risks and mitigation actions described in this chapter, as well as  
5    other chapters in the NFAT submission. The content is grouped using the same key risk  
6    factors as presented in ***Chapter 10 – Economic Uncertainty Analysis – Probabilistic***  
7    ***Analysis and Sensitivities,***  
8    Table 10.15 Economic Evaluation - Uncertainty Matrix.

1 **Figure 15.9 SUMMARY OF MANITOBA HYDRO'S RISK MITIGATION ACTIONS FOR THE PREFERRED DEVELOPMENT PLAN**

Driver	Description	Potential Risk to Preferred Plan	Risk Mitigation Actions	
			Pre-commitment	Post-commitment (Planned)
Key Risk Factor - Energy Prices				
Electricity Price Forecast	Lower electricity prices than forecast	Lower export revenues	Utilize a consensus-based forecast of five independent consultants to produce high, expected and low forecasts  Negotiate term sheets and contract agreements prior to committing to hydro development	Conawapa development will continue to be re-assessed prior to project commitment in 2018
Natural Gas Price Forecast	Lower natural gas prices than forecast	Lower export revenues and lower thermal operating costs in the long run	Negotiate term sheets and contract agreements prior to committing to hydro development	Conawapa development will continue to be re-assessed prior to project commitment in 2018
MISO Load	Diminished sale opportunities in the export market (firm and opportunity)	Lower export revenues	Negotiate term sheets and contract agreements prior to committing to hydro development	Conawapa development will continue to be re-assessed prior to project commitment in 2018
Carbon Policy	Uncertainty towards implementation, timing and level of carbon pricing	Lower export revenues	Negotiate term sheets and contract agreements prior to committing to hydro development	Conawapa development will continue to be re-assessed prior to project commitment in 2018
Other U.S. Environmental Policies	Uncertainty towards implementing a series of proposed U.S. environmental policies, their stringency and overall impact. (MATS, ash lagoon, CO2 for new coal, CASPR, US RPS)	Lower export revenues	Negotiate term sheets and contract agreements prior to committing to hydro development	Conawapa development will continue to be re-assessed prior to project commitment in 2018

2



Driver	Description	Potential Risk to Preferred Plan	Risk Mitigation Actions	
			Pre-commitment	Post-commitment (Planned)
Key Risk Factor - Capital Cost or In-Service Date				
Keeyask and Conawapa	Labour escalation, labour shortages, low productivity rates and associated increased indirect costs.	Higher capital costs and potential for ISD delays	Labour and Escalation Management Reserve Fund created for budgeting purposes  High quality camp accommodations to aid in attracting workers, comparable to other northern remote Canadian project camps  Modifications to isolation leaves in the BNA  Early Contractor Involvement contractor for the General Civil Contract	Increased staff-to-craft ratios and turnarounds relative to Burntwood Nelson Agreement  Implementation of labour strategy
	Higher commodity prices, equipment and material costs (direct costs)	Higher capital costs	Escalation Management Reserve Fund created for budgeting purposes	Transfer of portion of commodity price risk to contractors through contract terms
	Delays incurred after start of construction	Higher capital costs, delay to ISD	Utilizing contracting strategies that involve contractors in the design phase and minimize Contractor interfaces	Input from General Civil Contractor to maximize constructability and optimize schedule
	Lack of competitive bidding on contracts	Higher capital costs, limited contractor availability, potential for schedule delays	Consulted with potential bidders for major contracts in the design phase to gauge interest (vendor development)  Contract packaging that aligns with prevailing market conditions, attracting contractor interest  Improved engineering process	Improved contract management process and coordination
	Contract estimate accuracy	Higher capital costs	Adjusted contract estimates based on Wuskwatim experience and prevailing market conditions	Effective management of contracts and project schedule

Driver	Description	Potential Risk to Preferred Plan	Risk Mitigation Actions	
			Pre-commitment	Post-commitment (Planned)
Thermal Generation	Commodity escalation, schedule overruns and environmental legislation	Higher capital costs	Thermal resources have been minimized in the Preferred Development Plan	
Transmission in Manitoba	Final routing, commodity escalation, schedule overruns and environmental legislation	Higher capital costs, lower export revenues if export sales cannot be served	<p>The approval process for the interconnection has been initiated and sale contracts provide for up to two year delay.</p> <p>Community consultations on the Keeyask Generator Outlet Transmission are completed and the licensing process is underway.</p> <p>Planning is underway for North-South Manitoba transmission; signed and proposed firm contracts can proceed without this infrastructure.</p>	Generation ISDs could be adjusted if transmission is delayed.
<b>Key Risk Factor - Economic Factors</b>				
Exchange Rate (CAD/USD)	Future exchange rates	Higher volumes of export sale revenues and U.S. denominated debt exposed to U.S. exchange rate risk	Manitoba Hydro maintains a natural hedge with U.S. dollar cash flows, including outflows from US denominated debt. The U.S. debt portfolio may occasionally be rebalanced in accordance with US dollar cash flows.	
Inflation Rates (U.S. & Cdn)	Future inflation rates	<p>Erosion of export revenues from long term contracted sales due to inflation.</p> <p>High upfront capital investment and commodity / labour cost increases subject to inflation</p>	<p>Price escalators are included in export contract terms and conditions.</p> <p>Construction contracts share escalation risk with the contractor by indexing the supply price of major commodity based materials (e.g. reinforcing steel, copper, cement etc.) to market indices and allowing for pre-purchase of materials to take advantage of lower market prices if and when they exist.</p> <p>Capital costs include an allowance for real escalation as described in Appendix 9.3, Section 2.1.3, Table 2.4.</p>	
Interest Rates	Future interest rates	Interest rates would affect capital cost and finance expense	Manitoba Hydro manages the aggregate level of interest risk rate within the debt portfolio arising from short-term debt, floating rate long-term debt, as well as the amount of long-term debt to be refinanced. When selecting terms for its new borrowing, Manitoba Hydro gives careful consideration to the debt maturity schedule and the total level of annual financing requirements.	

Driver	Description	Potential Risk to Preferred Plan	Risk Mitigation Actions	
			Pre-commitment	Post-commitment (Planned)
Specific Risk Factor - Drought				
Multi-year drought	Extended periods of low flows in the hydraulic system	Preferred Development Plan is not sufficient to meet load commitments	Under drought conditions, Manitoba Hydro has the contractual right to curtail firm export deliveries in order to serve Manitoba load first.  Retained earnings are being maintained to protect against the financial impact of potential droughts. Equity provides buffer to absorb adverse events so that compensating rate increases can be smoothed out over a period of time.	
Drought worse than drought of record used for system energy planning occurs	Extreme low flows for one season	Preferred Development Plan is not sufficient to meet load commitments		
Specific Risk Factor - Climate Change				
Long-Term Climate Change	Impact on precipitation and temperature	Lower export revenues or inability to meet load commitments	Monitoring potential impacts of climate change scenarios on NPV of Preferred Plan and All Gas plan.	Climate change will continue to be studied.  New interconnection capacity will provide enhanced ability to adapt to load changes.
Specific Risk Factor - Manitoba Load/ DSM				
Manitoba Load Growth	Potential for higher/lower than expected load	Potential impact to the need date for new resources	Manitoba Hydro’s NFAT analysis and pre-construction planning consider varying levels of load growth and the Preferred Development Plan provides the most flexibility to adapt to changing load (See Chapter 14)	Utilize imports or may need to build thermal as a short term solution.  Conawapa development will continue to be re-assessed prior to project commitment in 2018.  New interconnection capacity will provide enhanced ability to adapt to load changes.
	Also potential for large industrial load addition or subtraction	Higher load could require new thermal generation		
Manitoba DSM	Potential for higher/lower than expected load due to Future Power Smart programs and/or customer response	Lower load would increase surplus energy and capacity which in turn would increase export revenue potential and may defer in-service dates	Manitoba Hydro’s NFAT analysis and pre-construction planning consider varying levels of load growth and the Preferred Development Plan provides the most flexibility to adapt to changing load (See Chapter 14)  Engaged EnerNOC to work with Manitoba Hydro to assess the 20-year potentials of energy efficiency for electricity (See Appendix 4.3)	Continual review and pursuit of new program opportunities and current program effectiveness.  Conawapa development will continue to be re-assessed prior to project commitment in 2018.  New interconnection capacity will provide enhanced ability to adapt to load changes.
Driver	Description	Potential Risk to	Risk Mitigation Actions	

		Preferred Plan	Pre-commitment	Post-commitment (Planned)
Other Risk Factors				
Export Contract Terms	Final terms of WPS sale not determined  Other future firm contract terms subject to future contract negotiations	Lower export revenues	Firm export contracts signed prior to project commitment including provisions that exempt Manitoba Hydro in the case of regulatory delay or cancellation.  New, additional contracts are being pursued with both existing and new customers.  Ongoing efforts to maintain existing and establish new relationships to meet customer needs.	Conawapa development will continue to be re-assessed prior to project commitment in 2018.
New U.S. Transmission Interconnection Capacity and Ownership	Final design and capital allocation among proponents	Higher Manitoba Hydro capital cost contribution and higher ongoing operating costs	Minnesota Power is the proponent for the new U.S. portion of the interconnection and sales agreements are contingent on required approvals.  Conawapa development will continue to be re-assessed prior to project commitment in 2018.	
Market Access	Potential for legal or regulatory restrictions which would prevent Manitoba Hydro's surplus power from reaching the competitive marketplace free from unreasonable legal, regulatory, structural or tariff barriers	Lower export revenues	Ongoing efforts to maintain existing and establish new relationships to meet customer needs.  Pursuing large tie line to expand ability to serve new markets with firm transmission access.  Continue participation in MISO tariff task forces.  Ensure legal requirements are understood and Manitoba Hydro legal interests are represented in establishing tariffs.	

Driver	Description	Potential Risk to Preferred Plan	Risk Mitigation Actions	
			Pre-commitment	Post-commitment (Planned)
<i>Species at Risk Act (SARA)</i>	The federal government is considering listing Lake Sturgeon under SARA.	If Lake Sturgeon are listed, the projects could be delayed or cancelled; if the projects proceed, they will require permits	Manitoba Hydro is working with northern communities and resource managers to develop and implement programs to benefit Lake Sturgeon (Appendix 2.1); recent studies have indicated results from these programs, some of which go back two decades.	Manitoba Hydro will continue to work on Lake Sturgeon management and enhancement programs. For the Keeyask and Conawpa Projects, habitat will be enhanced to address the loss of existing sturgeon habitat, and stocking will be implemented to increase regional populations.
Legislation for Environmental Reviews	The federal and provincial legislation require public reviews of the potential environmental effects of the projects	If approval is not received, the project(s) cannot proceed	A thorough environmental assessment using “Western” science and Aboriginal traditional knowledge has been completed for the Keeyask Project and is underway for the Conawapa Project. During the process, many potential adverse effects are avoided and extensive mitigation measures address other potential adverse effects (section 2.1.3).	Once regulatory approval is received, monitoring will be undertaken to determine if predictions in the assessment are correct and, if not, to help inform the development of adaptive management measures. The Keeyask G.S. will be designed to enable it to be retrofitted should monitoring determine that a fish passage structure is required.
Aboriginal Participation and Support	Manitoba Hydro is seeking Aboriginal support for northern hydroelectric projects	If support is not forthcoming, the projects could face challenges in getting regulatory approval and in marketing product in the U.S.	Negotiate agreements with Cree Nations prior to start of construction. Benefit-sharing (i.e. the Joint Keeyask Development Agreement) and adverse effects agreements have been negotiated with the four Keeyask Cree Nations.  Process protocols have been established for negotiating Conawapa agreements (section 2.1.3.1).	While there are risks inherent to a business partnership, the Joint Keeyask Development Agreement incorporates a variety of terms intended to eliminate, mitigate, or provide mechanisms to deal with risks associated with developing the Keeyask Project as a partnership.
Socio-economic impacts to Gillam			Collaboration between Manitoba Hydro, Town of Gillam, Fox Lake Cree Nation, Northern Regional Health Authority, RCMP and others  Harmonized Gillam development	