Appendix 9.2

Risk Analysis

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1.1. Scope of the 2025 IRP Risk Assessment

The scope of the 2025 IRP risk assessment was to identify and assess key risks related to the short list of five potential development plans. The results of the risk assessment are used along with other analysis to select a recommended development plan from the short listed potential development plans. The risk assessment focuses on the 10-year time horizon out to 2035. The assessment considers the risks of proceeding with a potential development plan. The assessment evaluates differences in plans based on resource-related risks, such as implementation challenges, and their resilience to overall system risks.

Manitoba Hydro's Enterprise Risk Management (ERM) Framework, as show in Figure A9.2.1, guides the risk assessment of potential development plans. The assessment will also identify risk mitigations to be considered for the eventual recommended development plan so that they can be further detailed through subsequent project planning to be effectively managed, monitored, and reported on across the enterprise.

Figure 9.2.1 - Manitoba Hydro's Enterprise Risk Management Program Framework

1.2. Risk Assessment Process

The risk assessment process begins by identifying the key risks and their drivers for the short list of five potential development plans. Each driver is then scored based on its likelihood and impact using the risk assessment matrix contained within the ERM Framework. The highest scoring driver, in consideration of the interrelationship between drivers, informs a consensus score for the key risk. The following sections detail: likelihood, impact, and the calibration of these components for the 2025 IRP risk assessment.

1.2.1. Risk Assessment Matrix

The ERM framework has established enterprise risk categories, likelihood ratings, and impact severity definitions as detailed in the Risk Assessment Matrix (RAM). This matrix has been scaled to meet the needs of the IRP as shown in Figure 9.2.2.

Legend:

VERY HIGH Critical, requires immediate attention.	**HIGH** Closely monitor and address. Additional mitigations may be required to decrease the risk.	**MEDIUM** Monitor, risk management activities in place.	**LOW** No additional action required at this time as the risk is under control and is not subject to significant change.

Likelihood	Likelihood of occurrence	Risk Level				
5 - Almost Certain	Almost certain to occur in the next 10 years (>90%)	MEDIUM	HIGH	HIGH	VERY HIGH	VERY HIGH
4 - Likely	More likely to occur than not in the next 10 years (60-90%)	LOW	MEDIUM	HIGH	HIGH	VERY HIGH
3 - Possible	As likely to occur as not in the next 10 years (40-60%)	LOW	MEDIUM	MEDIUM	HIGH	HIGH
2 - Unlikely	Unlikely to occur in the next 10 years (10-40%)	LOW	LOW	MEDIUM	MEDIUM	HIGH
1 - Remote	Extremely unlikely or may occur only in exceptional circumstances in the next 10 years (<10%)	LOW	LOW	LOW	LOW	MEDIUM

Impact Category	Severity 1 - Insignificant	Severity 2 - Minor	Severity 3 - Moderate	Severity 4 - Major	Severity 5 - Severe
HEALTH & SAFETY (S)	No injury	Minor injury (no lost time)	Injury requiring medical attention or lost time, or increase in number of injuries	Critical Injury, significant number of injuries, key functions unavailable	Fatality or permanent disability, key functions unavailable or multiple serious injuries
LEGAL, REGULATORY COMPLIANCE AND ENVIRONMENT (L)	Non-compliance, insignificant impact	Non-compliance, some concern	Non-compliance, additional response and involvement	Non-compliance, legal action	Non-compliance, operational suspension, legal action
REPUTATION (R)	Insignificant impact	Local media/minor impact to Interested Parties	Provincial media/moderate impact to Interested Parties	Provincial media/major impact to Interested Parties	National media coverage/severe Interested Parties impact
OPERATIONS (O)	Insignificant disruption	Operations impact contained	Some operational effects and performance impacts	Major reduction in operational effectiveness/ performance metrics	Inability to deliver core services and/or products
FINANCIAL (F)	The information has not been provided in this appendix as public disclosure would result in the release of information considered to be confidential and commercially sensitive.				
DEPENDABLE ENERGY SHORTFALL	The information has not been provided in this appendix as public disclosure would result in the release of information considered to be confidential and commercially sensitive.				

Impact - Unmet Capacity (MW) due to Risk (Relative to 2024 ELF) / Number of years of shortfall	
<=1	The information has not been provided in this appendix as public disclosure would result in the release of information considered to be confidential and commercially sensitive.
>1, <=2	
>2, <=3	
>3, <=5	
>5	

Figure 9.2.2 - Manitoba Hydro's ERM Framework Risk Assessment Matrix (RAM)

1.3. Key Risks

The resultant Key Risks from the assessment process are summarized in Table 9.2.1 below, including examples of the drivers of each risk.

Wherever possible, the risk assessments were based on quantitative analyses and references. For example, evaluating price risk impacts based on historic price volatility on net revenues to assess financial impacts and using recent forced outage statistics to quantify the impact of increased forced outages.

Table 9.2.1 - Summary Results of Key Risks

	Description and examples of Drivers
Risk Execution	Risk to Manitoba Hydro's ability to implement the development plan, such as availability of internal resources, regulatory approvals, and the design, manufacturing, supply, installation and commissioning of the resources.
HVDC Failure	Exposure to major prolonged HVDC outages relative to planned modernization, and the ability and timing of system restoration.
Economic	Higher resource costs, higher or lower export prices, higher natural gas costs for generation, drought costs, and other economic considerations.
Demand	Electricity and gas demand (higher or lower than 2024 Electric Load Forecast).
Regulation	Changes to Acts and/or regulations impacting customer demand, costs influencing operation of resources such as carbon pricing, or flexibility of operations due to operating licences.
Resource Effective Capacity	Uncertainty in resource performance and capacity characteristics due to level of resource maturity and/or presence in Hydro's system. This includes performance assumptions of technologies such as battery storage, additional energy efficiency beyond legislated requirements, Demand Response, and large volumes of wind.
Long-term Generation & Distribution Reliability	Availability/dependability of existing generation and delivery systems to meet customer demand. This includes the ability to complete maintenance, upgrades, and renewals of existing system components to avoid equipment outages and service interruptions.
Energy Sovereignty	Potential threats or vulnerabilities to the ongoing reliable supply of electricity or natural gas from jurisdictions outside of Manitoba or Canada's control.
Performance of Energy Efficiency	Ability to achieve the levels and timing of demand response and energy efficiency described in the potential development plans.
Extreme Weather	Exposure to risks caused by extreme weather, such as impact of extreme cold on natural gas supply for heating and to fuel combustion turbines.
Reputation	Negative impact on Manitoba Hydro's reputation as a low greenhouse gas (GHG) emitting producer and supplier of electricity.
T&D Execution and Capex	Capital and resource constraints that can force deferral of distribution system capacity projects and in some situations lead to delays in customer connections to meet load growth until upgrades can be completed.

1.4. Summary of Risk Assessment Findings

The scoring of key risks involved a review of each risk driver's impact and likelihood score by the risk team. Interdependencies among risk drivers were also evaluated qualitatively to understand the potential cumulative impact if multiple risks were realized concurrently. Final risk scores for each key risk were determined through a consensus-based approach, incorporating the highest individual driver score and the influence of interdependencies.

A comparative summary table (Table 9.2.2) highlights key differences in risk exposure across the various short listed potential development plans and provides a summary of the risk assessment findings for the short list of potential development plans.

Table A9.2.2 - Summary of Risk Assessment

Potential Development Plan (PDP)

Risk	PDP - P3	PDP - P5a	PDP - P5	PDP - P5b	PDP - P7
Execution	20	20	20	20	20
HVDC Failure	16	16	16	20	20
Economic	16	16	16	16	20
Demand	12	12	12	12	15
Regulation	12	12	12	16	16
Resource Effective Capacity	3	3	3	3	3
Long-term Gen. and Distribution Reliability	9	9	9	9	9
Sovereignty	1	1	1	2	2
Performance of Energy Efficiency	8	8	8	8	8
Extreme Weather	4	4	4	3	3
Reputation	12	12	12	12	9
T&D Execution and Capex	20	20	20	20	20

To facilitate further analysis and communication of results, a risk heat map was generated for each development plan, providing a visual representation of the likelihood and impact of key risks and scoring relative to other key risks for a particular potential development plan. This overall scoring and heat map is shown for each of the short list of five potential development plans below in Figures 9.2.3 through 9.2.7.

The assessment of potential development plans revealed that all plans carry some degree of risk, and none are fully robust against the most significant risk factors. However, plans with greater combustion turbine capacity — specifically P3, P5, and P5A — demonstrate lower exposure to major risks. These plans benefit from additional dispatchable capacity, which enhances system reliability and flexibility under certain conditions. In contrast, plans with limited combustion turbine capacity, such as P7, were found to be more vulnerable, primarily due to their reliance on accelerated additional energy efficiency programs with high implementation risk and less added capacity.

Planning to the 2025 IRP build-out target provides resilience against most reliability-related risks affecting the supply-demand balance. The risk assessment identified several major risks where meaningful differences between plans emerged, including execution, HVDC failure, economic, demand, regulation, and reputation. On balance, P3, P5 and P5A were found to be less exposed to these risks, while P7 was the most vulnerable when assessed through the ERM Framework.

Key Risk	Likelihood	Impact	Risk Score
Execution	4	5	20
HVDC	4	4	16
Economic	4	4	16
Demand	3	4	12
Regulation	4	3	12
Resource Effective Capacity	3	1	3
Long-term Gen. and Distribution Reliability	3	3	9
Sovereignty	1	1	1
Performance of Energy Efficiency	4	2	8
Extreme Weather	1	4	4
Reputation	4	3	12
T&D Execution and Capex	5	4	20

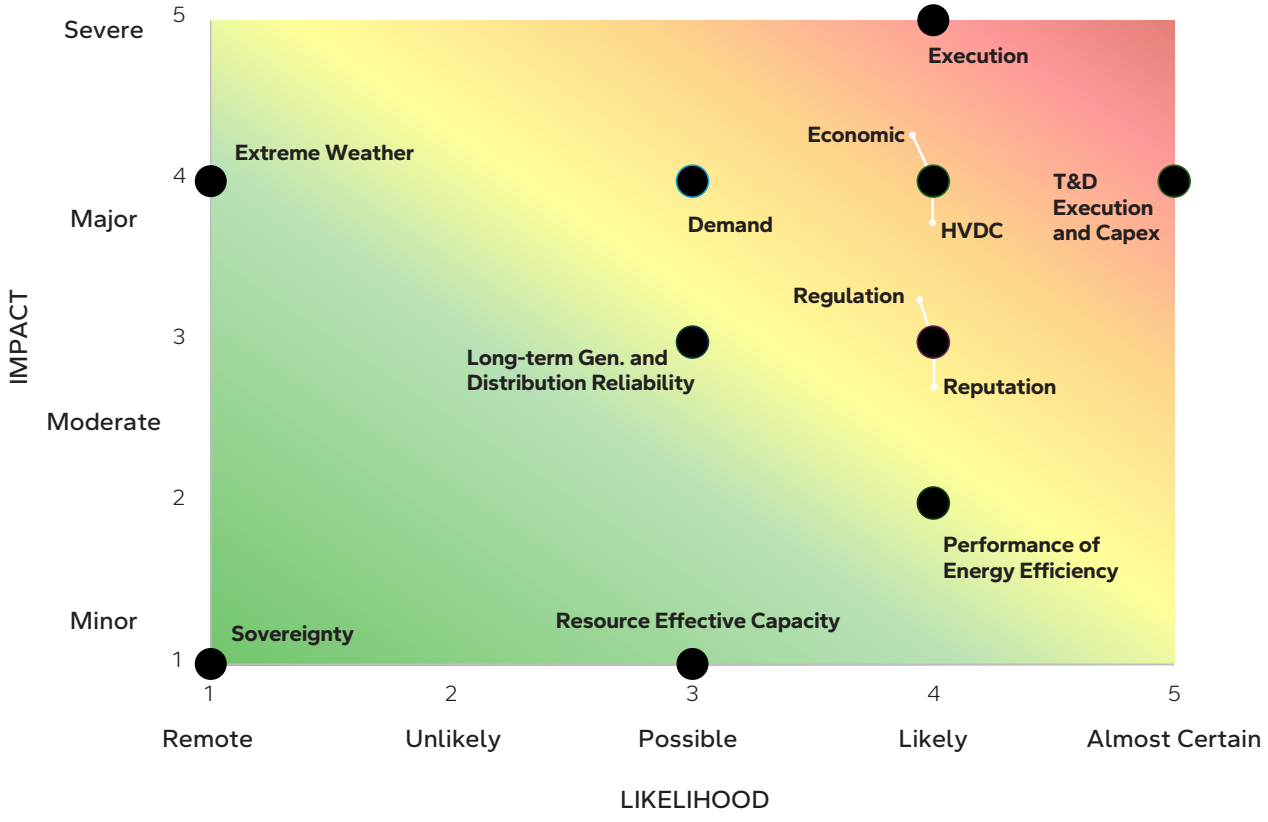

Figure 9.2.3 - Potential Development Plan P3 overall risk scoring and heat map

Key Risk	Likelihood	Impact	Risk Score
Execution	4	5	20
HVDC	4	4	16
Economic	4	4	16
Demand	3	4	12
Regulation	4	3	12
Resource Effective Capacity	3	1	3
Long-term Gen. and Distribution Reliability	3	3	9
Sovereignty	1	1	1
Performance of Energy Efficiency	4	2	8
Extreme Weather	1	4	4
Reputation	3	4	12
T&D Execution and Capex	5	4	20

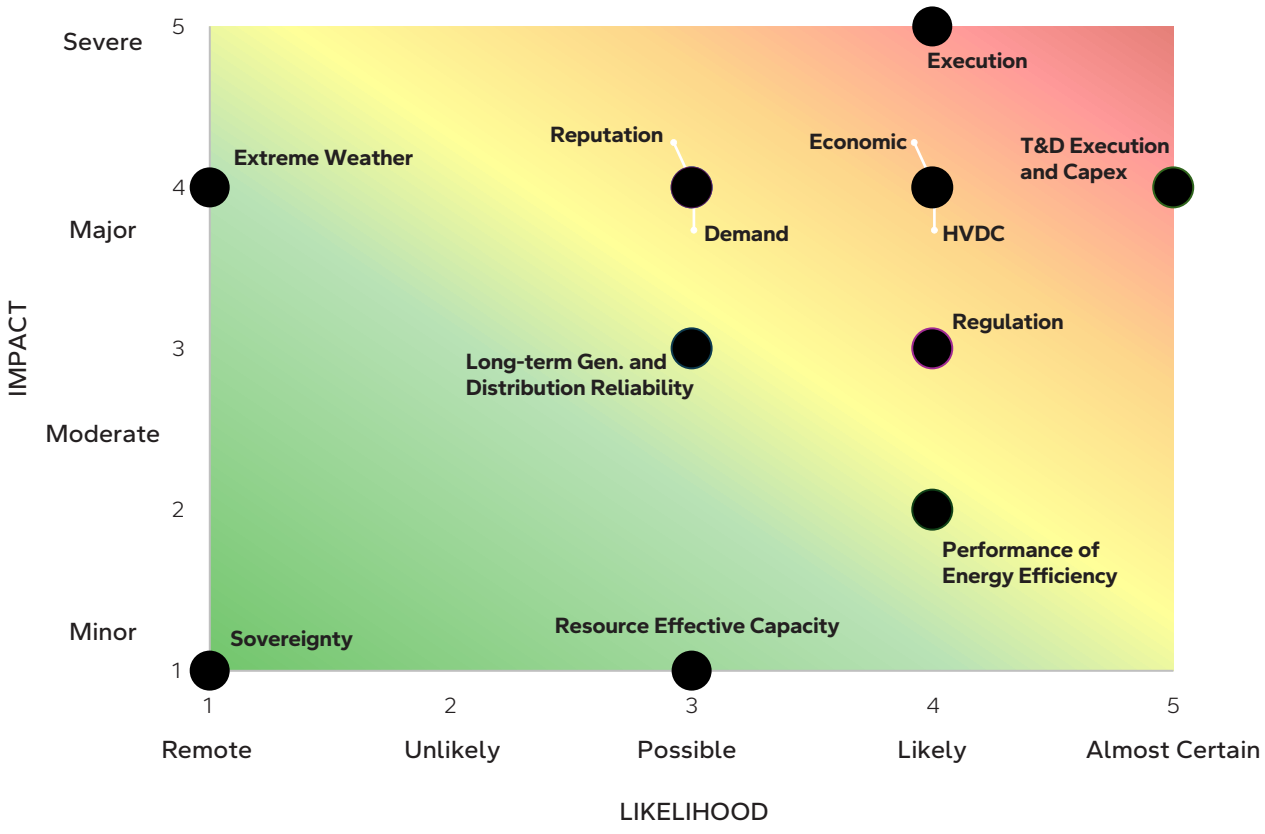

Figure 9.2.4 – Potential Development Plan P5A overall risk scoring and heat map.

Key Risk	Likelihood	Impact	Risk Score
Execution	4	5	20
HVDC	4	4	16
Economic	4	4	16
Demand	3	4	12
Regulation	4	3	12
Resource Effective Capacity	3	1	3
Long-term Gen. and Distribution Reliability	3	3	9
Sovereignty	1	1	1
Performance of Energy Efficiency	4	2	8
Extreme Weather	1	4	4
Reputation	4	3	12
T&D Execution and Capex	5	4	20

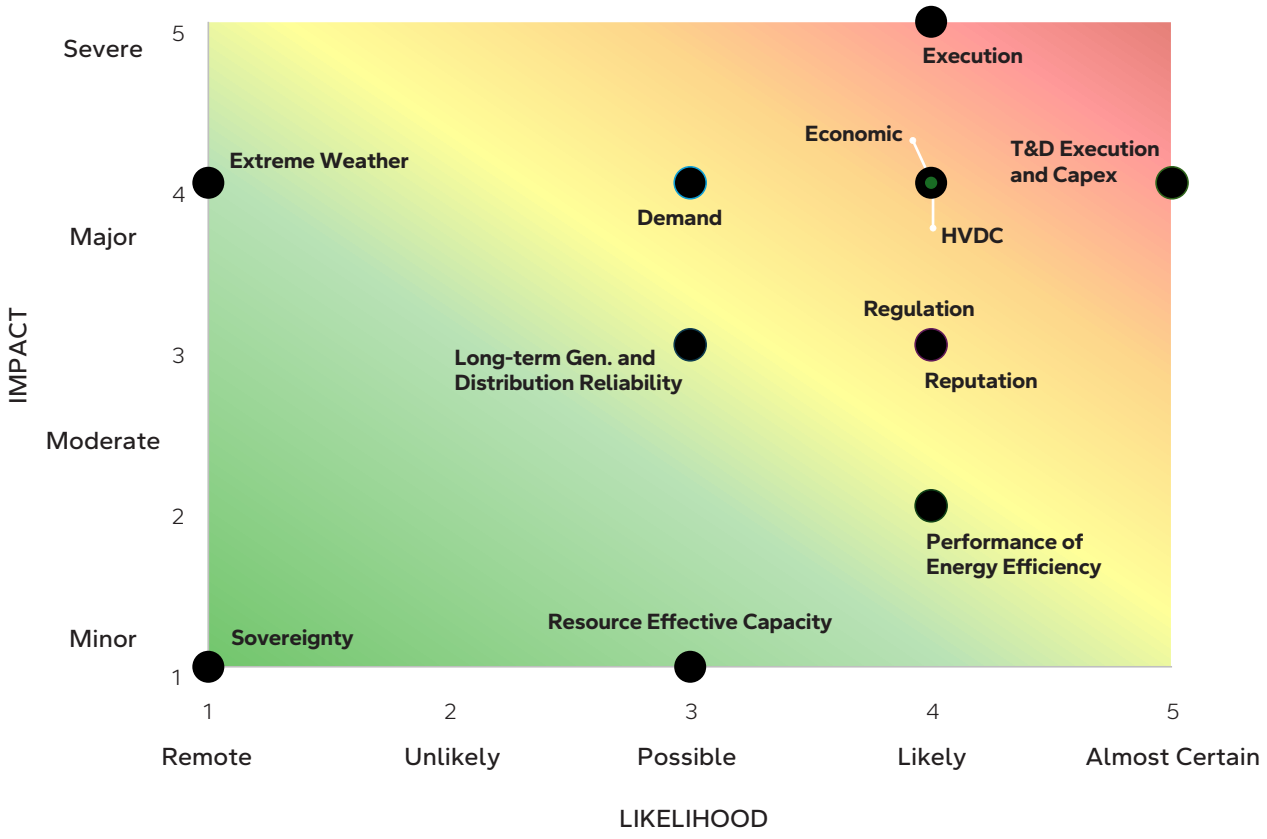

Figure 9.2.5 - Potential Development Plan P5 overall risk scoring and heat map.

Key Risk	Likelihood	Impact	Risk Score
Execution	4	5	20
HVDC	4	5	20
Economic	4	4	16
Demand	3	4	12
Regulation	4	4	16
Resource Effective Capacity	3	1	3
Long-term Gen. and Distribution Reliability	3	3	9
Sovereignty	1	2	2
Performance of Energy Efficiency	4	2	8
Extreme Weather	1	3	3
Reputation	3	4	12
T&D Execution and Capex	5	4	20

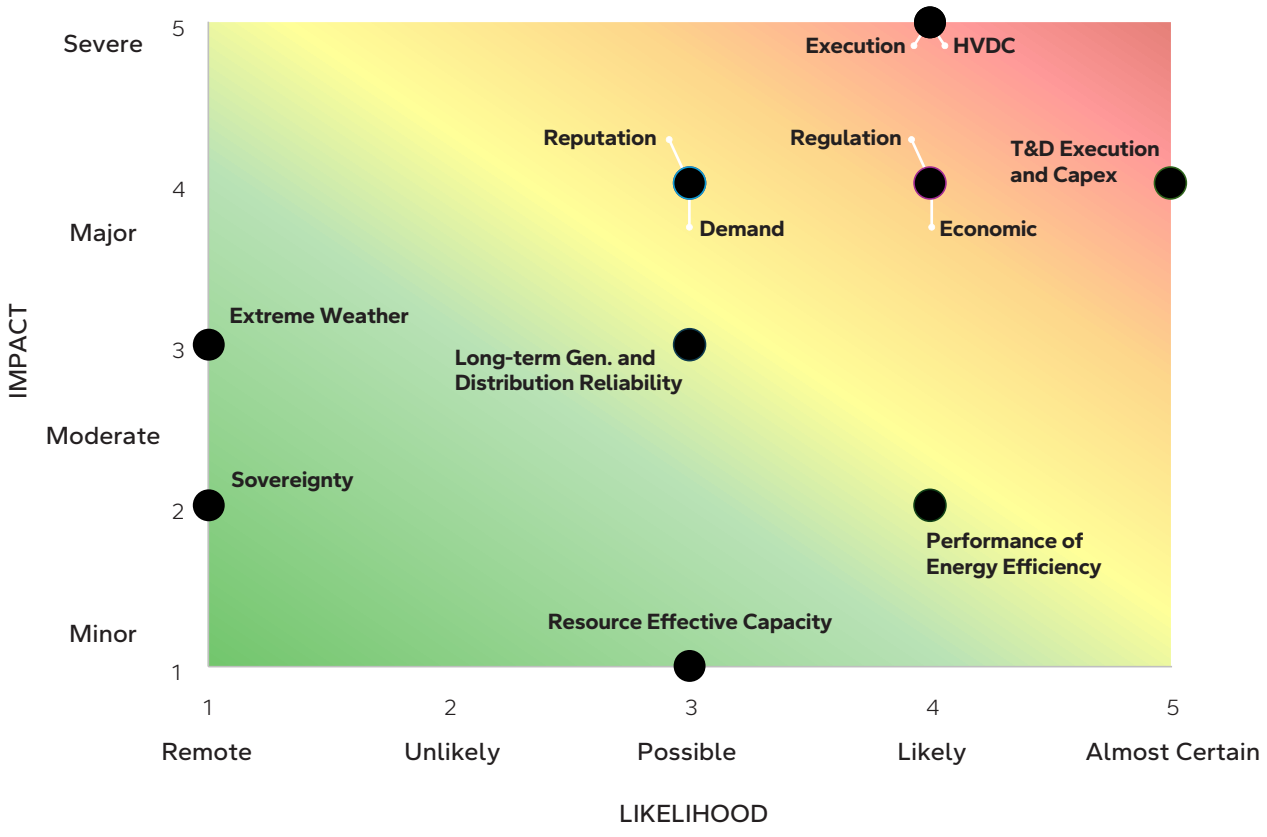

Figure 9.2.6 - Potential Development Plan P5B overall risk scoring and heat map.

Key Risk	Likelihood	Impact	Risk Score
Execution	4	5	20
HVDC	4	5	20
Economic	4	5	20
Demand	3	5	15
Regulation	4	4	16
Resource Effective Capacity	3	1	3
Long-term Gen. and Distribution Reliability	3	3	9
Sovereignty	1	2	2
Performance of Energy Efficiency	4	2	8
Extreme Weather	1	3	3
Reputation	3	3	9
T&D Execution and Capex	5	4	20

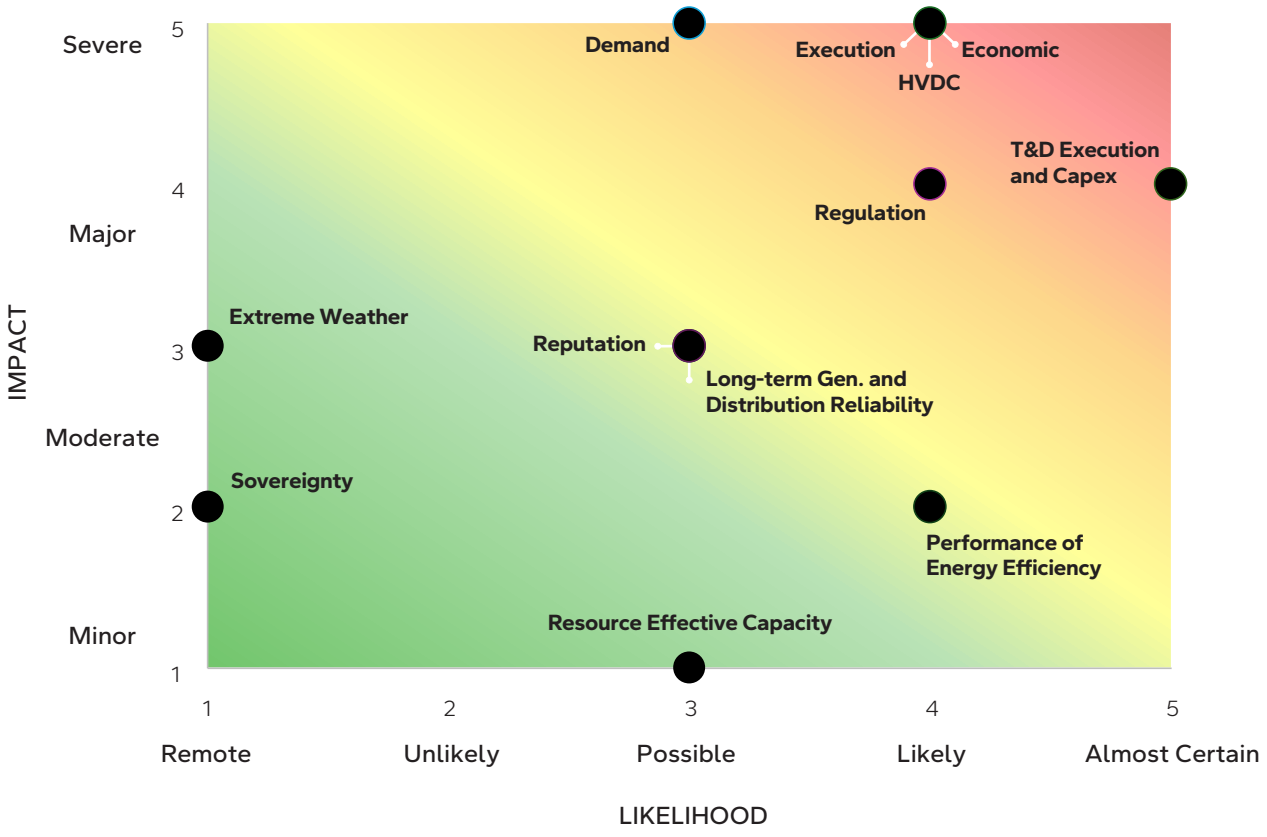

Figure 9.2.7 - Potential Development Plan P7 overall risk scoring and heat map.

1.4.1. Discussion of Risks Common to All Plans

Among the key risks assessed for the shortlisted potential development plans, four risks were found to have similar drivers and outcomes across all plans. These risks — resource effective capacity, long-term generation and distribution reliability, performance of energy efficiency, and transmission & distribution execution and capital expenditure — do not exhibit material differences between plans and therefore did not influence the recommendation process.

These risks are broad, organization-wide challenges that affect Manitoba Hydro regardless of which development plan is chosen. For example, uncertainty around how reliably new resources will perform — such as how much wind generation can be counted on during peak demand — is a shared risk across all plans. Since each plan includes similar amounts of wind, this risk does not significantly differentiate them. Likewise, long-term reliability issues with existing generation and distribution systems are tied to current infrastructure, not new resources for a given development plan. Other risks, like the success of the Efficiency Plan Projection or the execution of transmission and distribution upgrades, also apply across the board and do not vary meaningfully between plans. Because these risks are similar across the assessed plans, they were not used to differentiate between options or to guide the selection of a recommended plan. Any recommended plan will not change the risk tolerance or mitigation strategies for these risks, which will continue to be addressed through enterprise-wide planning and operational mitigations.

To summarize why these risks were similar across the shortlisted potential development plans:

Resource Effective Capacity

A reduction to the accredited capacity of added wind, battery, selectable energy efficiency, and demand response was assessed where, although plans differed in the quantity of some of these resources, the impact assessment across plans was similar and not enough to differentiate between plans.

Long-term Generation and Distribution Reliability

Although the quantity of capacity additions varied across plans, the assessed impact of generation reliability is similar. This is because the build-out target sufficiently mitigated these risks, and the resolution of the impact analysis did not reveal material differences. Exposure to distribution reliability was also similar across plans due to comparable levels of distributed resources and the fact that distribution reliability is independent of overall system-level supply and demand.

Performance of Energy Efficiency

The impact of a 20% reduction in capacity benefits from Efficiency Manitoba's extended 3-year Efficiency Plan and a 30% reduction in capacity from additional energy efficiency options was assessed over the development plan horizon. All plans were rated as moderate for this risk, primarily because the build-out target sufficiently mitigates the impacts.

Transmission & Distribution Execution and Capex

While this is a significant risk that could hinder new load connections or service upgrades, it is largely independent of system-level resource plans. Minor differences in distributed energy resources or selectable energy efficiency across plans do not result in discernible differences in this risk.

1.4.2. Meaningful Differences and Distinguishing Factors

Risks where there are meaningful differences between plans include: execution, HVDC failure, economic, demand, regulation, and reputation.

Execution

Execution risk refers to Manitoba Hydro's ability to implement the development plan, including factors such as internal resource availability, regulatory approvals, and the design, manufacturing, supply, installation, and commissioning of resources. This risk was assessed for each resource type and for each shortlisted development plan.

Plans with a higher proportion of combustion turbines face greater exposure to delays in bringing these resources into service, potentially leading to supply shortfalls around 2030. In contrast, plans with a diverse mix of resources — such as plan P7 — are more vulnerable to delays due to limited internal capacity to manage multiple projects simultaneously, resulting in operational risks.

All plans include wind generation with initial service dates in 2029, which is considered highly susceptible to scheduling risks. Manitoba Hydro and the province may face criticism from proponents and Indigenous communities if wind project timelines are not met.

While no single factor led to a plan being rated as very high risk, all plans were assessed as such overall due to the cumulative impact of multiple execution risks.

HVDC Failure

Over the next 10 years, it is likely the availability of the HVDC transmission system will decline. This means it might not be able to consistently transmit power from the Lower Nelson River to southern Manitoba when it is needed most, particularly during periods of peak demand. As a result, there may not be enough capacity delivered to reliably meet all demand during peak periods. By 2035, the overall shortage of capacity is expected to be similar across different plans. However, the impact would be worse in the earlier years for development plans P5B and P7 which have less capacity during this period relative to other plans. Because of this higher risk, those two plans received very high-risk scores.

Economic

Economic risk is assessed based on several drivers: resource costs, export prices, natural gas prices, and drought financial impact. The biggest difference between plans is due to resource cost uncertainty. These costs are likely to rise beyond what was assumed in the IRP, and some plans are more affected than others depending on the mix of resources. Plan P7 has higher base costs and greater financial impact due to cost uncertainty, resulting in the very high-risk rating.

Demand

Demand risk considers drivers like electric vehicle charging, unanticipated growth in distributed energy resources, higher or lower electricity demand, and whether upstream gas supply can meet peak customer gas demand combined with requirements for combustion turbines. Most plans have similar risk levels, except for Plan P7, which shows slightly higher financial impact if demand is lower than expected.

Regulation

Regulatory risks are assessed based on factors like requirements for fuel switching for heating, carbon and emissions regulations, limits on natural gas generation, trade agreement impacts, and changes that could reduce the operating flexibility of hydroelectric facilities. Most of these risks are rated as low to medium. However, all plans face high risk from reduced flexibility of existing hydro generation. Plan P7 scored slightly higher due to having less available capacity in the middle years of the planning period.

Reputation

This risk relates to how environmentally friendly the potential development plan is perceived by the public, which can affect public trust in Manitoba Hydro and the province's reputation as a low greenhouse gas (GHG) emitting electricity provider. The main factor is public perception of the amount of natural gas combustion turbines installed, regardless of their operation time, actual contributions to Manitoba's GHG emissions or emission offsets. Even though new combustion turbines are expected to operate infrequently and thus emit relatively low quantities of GHG emissions, all plans except P7 were rated as high risk due to including 600 MW, or more, of combustion turbines. Plan P7 was designed to limit combustion turbine additions, so its risk was rated medium.