CCC Interrogatory #009

Interrogatory

Reference:
Exhibit A1, Tab 4, Schedule 1, Attachment 4, pp. 13, 22, 31-32, 49-50, 81

Question(s):

a) Please provide all of the internal audits with a yellow or red report rating as listed in Exhibit A1, Tab 4, Schedule 1, Attachment 4.

b) Please discuss the implications of certain fleet assets being acquired outside of the Fleet Management group. As part of the response, provide the total cost of the fleet assets procured outside of the Fleet Management group.

c) Please provide a brief summary and the costs of the following projects (broken out between capital and operations):

   i. Re-Imagine 1.0
   ii. RG Turbine Generator Overhaul

d) Please file the 24-15 DNNP Business Case and Release Quality estimate audit.

Response

a) Internal audits with a yellow or red report rating as listed in Ex. A1-4-1, Attachment 4 are provided in Chart 1.

Chart 1 - Yellow or Red Internal Audit Documents

Internal Audit Document Name	Attachment #
20-06 CIO Insider Threat Data Loss Prevention (ARC 2020 Q4)	Attachment 1 (confidential)
21-03 Business Case Summary (ARC 2021 Q4)	Attachment 2
21-04 Network Security, Threat & Vulnerability Management (ARC 2021 Q3)	Attachment 3 (confidential)
21-14 Fleet Management (ARC 2021 Q2)	Attachment 4
21-21 Right Work, Right Time, Right Value ("RWRTRV") - Station Productivity Initiative (ARC 2021 Q3)	Attachment 5
21-31 Shared Services Re-Imagine 1.0 (ARC 2021 Q4)	Attachment 6
22-03 Software Management (ARC 2022 Q1)	Attachment 7 (confidential)
22-08 Climate Change Strategy (ARC 2022 Q2)	Attachment 8
22-09 Pickering Inventory Management (ARC 2022 Q4)	Attachment 9
22-11 Market Renewal – Change Implementation (ARC 2022 Q2	Attachment 10
22-12 RG Turbine Generator Overhaul Program (ARC 2022 Q4)	Attachment 11 (confidential)
22-19 Indigenous Relations (ARC 2022 Q4)	Attachment 12 (confidential)
~~22-21 RWRTRV Station Productivity Initiative (ARC 2022 Q1~~	See Note 1
22-23 North American Electric Reliability Corporation (“NERC”) Reliability Standards Compliance – Renewable Generation (“RG”) (ARC 2022 Q4)	Attachment 13
23-02 IT Project Delivery (ARC 2023 Q2)	Attachment 14
23-04 Cyber Security Operations Centre (ARC 2023 Q4)	Attachment 15 (confidential)
23-06 Recruitment and Onboarding (ARC 2023 Q2)	Attachment 16 (confidential)
23-08 Nuclear Work Order Materials Management (ARC 2023 Q3)	Attachment 17
23-11 Asset Management & Maintenance Strategy (ARC 2023 Q2)	Attachment 18
23-15 Quality Management Program (ARC 2023 Q3)	Attachment 19
23-28 Market Renewal Program (ARC 2023 Q4)	Attachment 20
23-31 Third Party Risk Management (ARC 2023 Q4)	Attachment 21 (confidential)
24-01 Artificial Intelligence (“AI”) Governance (ARC 2024 Q1)	Attachment 22 (confidential)

24-08 Long Lead Material Procurement & Supplier Capacity Risk Mitigation (ARC 2024 Q2)	Attachment 23 (confidential)
24-11 Employees' Business Travel & Expenses (ARC 2024 Q3)	Attachment 24
24-13 Severe Weather Preparedness (ARC 2024 Q2	Attachment 25
24-14 Security Incident and Crisis Management (ARC 2024 Q4)	Attachment 26 (confidential)
25-09 Pension and Benefits Administration (ARC 2025 Q2)	Attachment 27

Note 1: In the course of responding to this interrogatory, OPG noted the 22-21 audit report was incorrectly identified in Ex. A1-04-01, Attachment 4. Audit 22-21 refers to the Board of Directors – 2021 Business Expenses audit report (February 14, 2022) with a green report rating and no findings. The RWRTRV audit is captured in the 21-21 audit report and is provided in Attachment 5.

b) For details regarding the cost and the potential implications of the one identified fleet asset being acquired outside of the Fleet Management group, refer to Finding 2 in Attachment 4. These assets remain subject to existing procurement policies and oversight and are tracked through the Preferred Fleet Vendor (PFV) system where applicable. All noted management actions have been completed.

c)

i. The total project costs (Total OPG) for Re-imagine 1.0 are outlined in Chart 2 below. The associated nuclear asset service fees included in the approved nuclear revenue requirements over the 2022-2026 period are shown in Ex. L-A1-Staff-013. There are no amounts for Re-Imagine 1.0 included in the proposed revenue requirements in this Application as the project was fully depreciated before 2027.

Chart 2 – Reimagine 1.0 Total Project Costs

	2019	2020	2021	Total
Capital	$12.2M	$5.3M	$0	$17.5
OM&A	Nil	Nil	Nil	Nil

ii. The "RG Turbine Generator Overhaul" audit as referenced in Ex. A1-4-1, Attachment 4, refers to a program consisting of multiple projects; it is not a singular project.

As described in Ex. F1-1-1, p. 5, overhaul projects involve significant OM&A maintenance activities to sustain reliable operations of the turbine-generator equipment and related systems. There is no capital spend associated with overhaul projects.

A summary of the costs associated with overhaul projects for 2022-2026 is provided in Ex. L-F1-SEC-156, Attachment 1. Forecast costs for overhaul projects for 2027 are provided in Ex. L-F1-AMPCO-092.

d) Refer to Ex. D2-Staff-131, Attachment 3.

ONTARIO POWER GENERATION

Internal Audit

CIO Insider Threat Data Loss Prevention Audit

December 17, 2020

Report Rating: [redacted]

Table of Contents

1.0 EXECUTIVE SUMMARY

1.1 Report Rating and Summary of Findings

Report Rating: [redacted]

No.	Finding	Risk Type	Risk Rating[1]		
			High	Moderate	Low
1	[redacted]	[redacted]	[redacted]		
2	[redacted]				
3	[redacted]				
4	[redacted]				
5	[redacted]				
6	[redacted]				
7	[redacted]				
Total					

1.2 Background

'Insider Threat' refers to the potential for an authorized person within the company to act in a manner, whether malicious or unintended, which causes damage to the organization. The person could be an employee, contractor, or someone affiliated with a third party with access to OPG facilities, systems or data. In a cyber security context, the action could range from malicious theft of sensitive data to unwittingly infecting the network with a computer virus.

With the increased number of employees working remotely due to the COVID-19 pandemic, there was an increased focus on insider threat as the company had expanded its capacity to enable employees to logon remotely through tools such as the Microsoft Application Launcher.

In recent years, the CIO organization has carried out a number of activities to further mitigate insider threat risks, including the following:

- An [redacted] as well as 'red team' and 'blue team' assessments[2];
- An industry benchmarking exercise carried out in February 2019 to assess the maturity of OPG's data loss protection activities;
- An exercise in Q2-Q3 2019 with the Enterprise Risk Management organization to help business owners identify and assess sensitive data and related controls; and
- Updating cyber security training content to include insider threat considerations.

The CIO organization was addressing some of the observations from these exercises, including the implementation of controls to further harden workstations and other endpoint devices to prevent data exfiltration.

[1] Please refer to Appendix B for risk rating definitions
[2] 'Red team' and 'blue team' assessments are tests of cyber security controls, respectively using active ('red') infiltration techniques to simulate attacks and passive ('blue') reviews of defensive capabilities.

This was a risk-based audit identified in Internal Audit's ("IA") 2020 Audit Plan. The audit was performed as information security risks had been identified as priority risks in OPG's enterprise risk profile, and the heightened focus of insider threat risks in the industry.

1.3 Objective & Scope

The objective of this audit was to assess the design and operating effectiveness of controls implemented as part of the CIO Cyber Security program to prevent unauthorized access to, and loss of, sensitive data. To achieve the audit objective, we reviewed processes and tested, on a sample basis, whether:

A. Asset management
• Cyber security assessments were conducted for assets introduced into the environment to determine vulnerability, and assets were hardened as appropriate; and • System and data assets were classified and prioritized based on data sensitivity.
B. Identity and access management
• Access was provisioned on a needs basis and revoked when no longer required; • Potentially conflicting access combinations were minimized and monitored; • Access to systems with sensitive data was logged and stored for a timeframe based on sensitivity, and interactive account activity was traceable to individuals; • Privileged and remote access was restricted through additional security; and • Access to systems and data via the Microsoft App Launcher was provided consistent with the controls expected for the applications accessible via that mechanism.
C. Cyber security awareness and training
• Mandatory user training covered data loss vectors (e.g. email exfiltration, removable media, unsecured file transfer, unapproved applications and malware), and was updated regularly to address emerging risk areas; and • Results of training evaluation exercises (e.g. simulated phishing attacks) were reviewed and actions taken where required.
D. Systems and data protection
• Sensitive systems and data were protected according to their classification, including storage, transmission, and destruction; • Common modes of data transmission that are prone to loss were limited for sensitive data, including printing and scanning, email transmission to non-OPG email addresses, storage on removable media devices, and electronic transmission over connections other than the corporate network (e.g. FTP or personal networks); and • Software programs were verified for integrity and security prior to end-user installation.
E. Detection of events
• Insider threat was considered when identifying risks in the IT Risk Register; • Access to systems with sensitive data was monitored for unusual activities, and the incident response process triggered as appropriate; • Periodic monitoring or reviews were conducted to assess protective measures' effectiveness, and identify cybersecurity events that may impact systems with sensitive data; and • Insider threat exercises were conducted periodically.
F. Fraud considerations
• No additional fraud risks identified.

Scope Period: The scope included activities between July 1, 2019 and June 30, 2020, and precursor activities.

As part of this audit, IA also reviewed and assessed the progress of actions taken to address observations from external assessments and benchmarking activities in November 2018 and February 2019.

Scope Exclusions: The following were not covered in this audit:

- [redacted]
- Activities within the responsibility of [redacted]
- [redacted]
- [redacted].

1.4 Conclusion

Overall the processes and controls over Insider Threat Data Loss Prevention ("DLP") [redacted]

Positive observations

- The CIO Cyber Security insider threat control framework is designed and implemented around the "Defense in Depth" concept, where a series of security mechanisms and controls are layered throughout the IT environment to protect sensitive information. This concept significantly mitigates the risk of operational impact from the failure of one control through the safeguards provided by other controls, including:
  - [redacted]
  - [redacted]
  - [redacted]
  - [redacted]
- The new Roadmap formulated by management addresses foundational aspects in a wide range of cyber security areas including DLP, Identity and Access Management, and third party risk management; and
- Cyber security initiatives to date appear to have established a reasonable framework to build further capabilities in DLP and other cyber security areas including designing secure systems, proactive risk management and supporting innovation across the organization.

Key Findings & Recommendations

- [redacted]

- A total of [redacted] phishing tests were conducted between July 2019 and June 2020, each covering all employees across the organization. The phishing test results included [redacted] individuals who failed the tests [redacted], and management indicated that [redacted] CIO management should develop targeted methods to address these failures, such as providing supervisors with reports on employees with repeat failures, and developing targeted remediation programs for these individuals;

- [redacted]

- [redacted]

- Writing data to removable storage media requires a security exemption, approved by CIO cyber security only where extenuating circumstances are demonstrated.
  - [redacted];
  - [redacted]
  - [redacted]

The findings noted in this report have been reviewed with management and they have committed to specific action plans. Management has already begun to address some of the audit findings, including drafting an escalation policy for employees who repeatedly fail OPG's phishing test program and completing the review of recommendations from the [redacted] assessment. Please refer to Section 2.0 for specific details of the above findings along with the associated risk impacts, audit recommendations and management action plans.

Opportunities for Improvement

- The CIO organization developed a number of governance documents identifying requirements for storing documents and data, such as [redacted]. However, requirements are not always clear for information and databases that are not part of Approved Information Management Systems ("AIMS"). CIO management should consider improving the clarity of these requirements including roles and responsibilities, and including definitions of terms such as "information" and "data";

- CIO management performs annual risk workshops at which values for impact and likelihood are identified for high level risk statements. CIO management should consider instead evaluating the impact and likelihood of risk using specific risk scenarios;

- The risks of [redacted] cyber security awareness training. CIO management should consider updating training material to include this risk; and

- [redacted]

2.0 DETAILED AUDIT FINDINGS

Internal Audit identified the following detailed findings and recommendations which have been risk rated based on the definitions outlined in Appendix B.

1. [redacted]

[redacted]

Employees are able to connect to the Corporate network remotely using Virtual Private Network ("VPN") software provided by OPG CIO. While the VPN software is available on OPG devices [redacted]

[redacted]

[redacted]

In mitigation, it is noted that access to [redacted] documents is limited to individuals who have gone through an additional access request process including training, and security screening (e.g. site access security clearance for Nuclear personnel). At the time of the audit, access was limited to [redacted] people.

Potential Causes & Impacts

Potential Cause:
Security assessments may not have been performed when the solutions were rolled out.

Potential Impact:
[redacted]

Recommendation

[redacted]

Management Response
CIO cyber security management will assess technical solutions for addressing this risk. The solutions need to be carefully assessed to minimize business impact. Target date for confirming the solution has been provided below. CIO will provide a completion date to IA once the solution has been finalized. [redacted]

2. [redacted]

Phishing is the fraudulent practice of sending emails purporting to be from reputable sources to induce individuals to reveal personal information, such as passwords and credit card numbers. Usually this is done by getting the email recipient to click a link or open an attachment that either asks the user for sensitive information, or installs a virus or malware on the user's computer.

Between July 2019 and June 2020, OPG CIO ran phishing tests [redacted] to educate users on the risks of such emails. As part of the test, a test email was sent to employees which was designed to appear legitimate. If a recipient clicked the link in the email or opened the attachment, they were alerted to the fact that they failed the test and were presented with educational information.

[redacted]

To mitigate the risk of operational impacts, additional controls are in place to prevent and detect malicious activity. These [redacted] In addition, management indicated that, when phishing emails are received, a large number of users report the email to the CIO in a timely manner. The reporting allows CIO staff to take actions to neutralize the phishing attack. For example, in one phishing exercise, management was able to demonstrate that over [redacted] users reported a phishing email, before the first failure was noted.

In addition, a benchmarking report by OPG's phishing test partner [redacted] shows that OPG's phishing test failure rate ("susceptibility rate") of [redacted] is better than other industry averages measured by [redacted]. See Appendix A for a graph of this comparison from the report.

Potential Causes & Impacts

Potential Cause:

[redacted]

Potential Impacts:

- [redacted]

[redacted].

Recommendation

CIO management should establish a policy to monitor phishing test results [redacted]

Management Action Plan

CIO cyber security management has drafted a policy [redacted] A plan for rollout of the new policy within OPG, including engagement with key stakeholders in the business, has also been finalized.

[redacted]

3. [redacted]

An industry benchmarking exercise was conducted in late 2018 by the external firm [redacted] to assess the maturity of [redacted]. The report from that exercise was provided to the CIO organization in February 2019 and included [redacted] observations across ten key domains: [redacted]

The exercise recommended that OPG establish a formalized [redacted] program and address the observations from the study, including areas where OPG [redacted]

[redacted]

Management had indicated that, while the recommendations [redacted]

Potential Cause & Impact

Potential Cause:

[redacted].

Potential Impacts:

[redacted]

Recommendation

CIO management should:

- Review the reports and confirm the observations that should be fixed;
- Prioritize initiatives to fix the issues;
- [redacted]

[redacted]

Management Response

Management has completed the review of the [redacted] and confirmed the initiatives that will be included in the Cyber Security Roadmap.

[redacted]

4. [redacted]

Based on the governing standards on Protecting OPG's Information and Intellectual Property (OPG-STD-0030), employees who have been provided electronic access to documents classified as [redacted].

IA reviewed the [redacted].

Potential Causes & Impacts

Potential Cause:

[redacted] The access review was in progress during the audit.

Potential Impact:

[redacted]

Recommendation

CIO management should:

- [redacted]
- [redacted]

Management Action Plan

CIO management [redacted].

[redacted]

[redacted]

[redacted]

5. [redacted]

[redacted]

Potential Causes & Impacts

Potential Cause:

[redacted]

Potential Impact:

[redacted]

Recommendation

CIO management should:

- [redacted]
- [redacted]
- [redacted]
- [redacted].

Management Response

CIO cyber security management will:

- [redacted]
- [redacted]

[redacted]

6. [redacted]

[redacted]

Potential Causes & Impacts

Potential Causes:

- [redacted]
- [redacted]

Potential Impact:

[redacted]

Recommendation

CIO management should:

- [redacted]
- [redacted].

Management Action Plan

CIO cyber security management will finalize [redacted]

[redacted]

7. [redacted]

The CIO organization developed a number of governance documents identifying requirements for storing documents and data such as encryption and access control procedures.

[redacted]

[redacted].

Potential Causes & Impacts

Potential Cause:

[redacted].

Potential Impact:

[redacted]

Recommendation

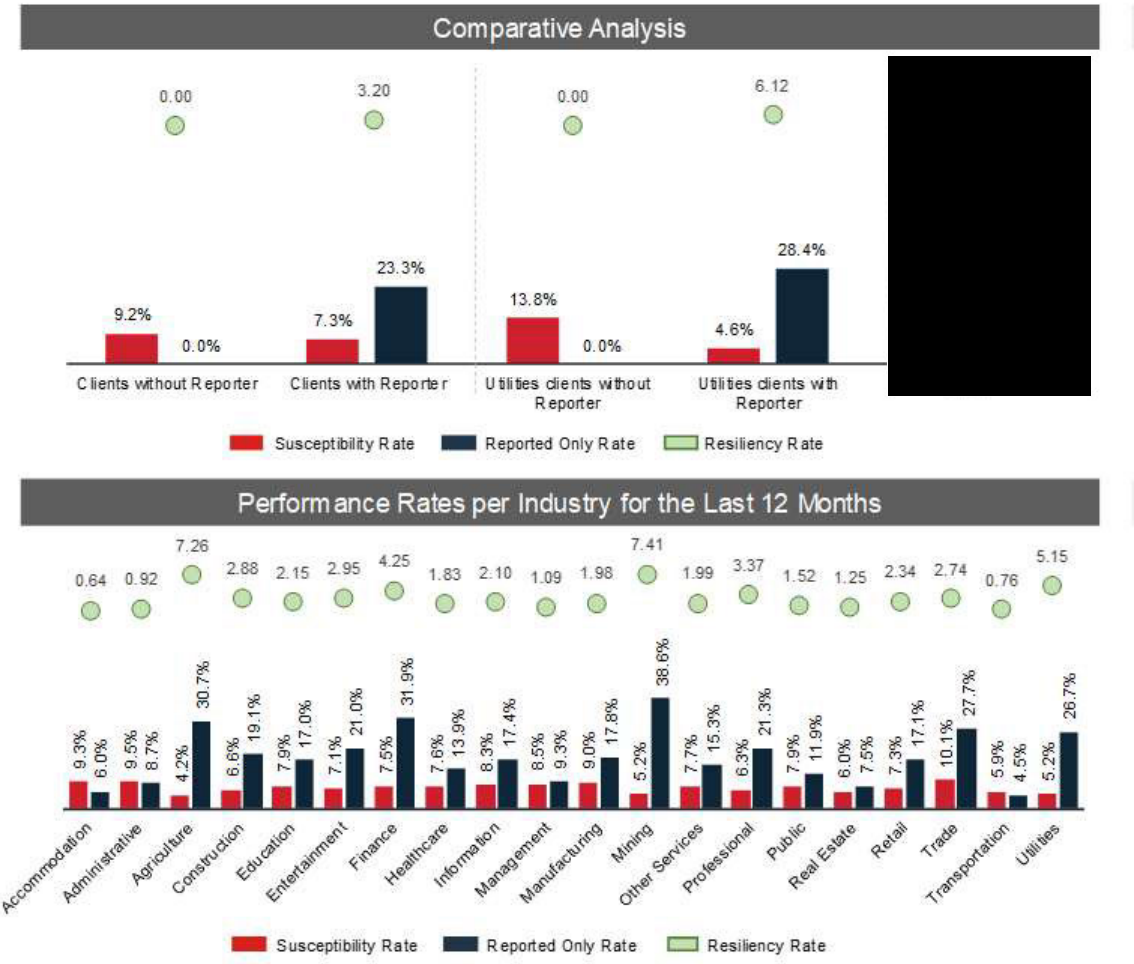
CIO management should prioritize and implement [redacted] initiative.

Management Action Plan

[redacted]

APPENDIX A – PHISHING BENCHMARKING STUDY ANALYSIS

Extract from the report of a benchmarking study provided by OPG's phishing test partner, [redacted]



Susceptibility Rate (Susceptible Recipients / Emails delivered)

This rate shows how many users were susceptible to the scenario versus the total number of emails delivered.

Reporter Rate (Users who reported only / Emails delivered)

This is the percentage of users that reported the email, without being susceptible to it, compared to the total number of users who received the email.

Resiliency Rate (Reported only rate / Susceptibility rate)

This is the percentage of users who reported the email, without being susceptible to it, compared to the percentage of users who fell susceptible.

APPENDIX B – RATING DEFINTIONS FOR AUDIT REPORTS

Finding: *Noted deficiency with potential impacts to the achievement of business unit/process area objectives, assessed using the following criteria:*

	High Risk	Moderate Risk	Low Risk
Safety & Social License	• Potential regulatory non-compliance. • Deficiencies that could result in: ○ Fatality, permanent disability, or lost time injury; ○ Data loss or unavailability of critical systems; ○ Security is compromised in sensitive / multiple areas; ○ Fraud / theft; or ○ Negative media coverage resulting in reputational damage	• Insufficient evidence to support regulatory compliance. • Deficiencies that could result in: ○ Minor injury with no lost time; ○ Temporary data loss or unavailability of non-critical systems; ○ Security is compromised; ○ Fraud / theft with some mitigating controls; or ○ Public escalating concerns to OPG Management or local media.	• Documentation improvements to support regulatory compliance. • Deficiencies that could result in incidents that do not require medical treatment. • Deficiencies that do not result in any media attention negatively impacting OPG's reputation.
Financial	• Potential loss or financial impact =>5% of the sample population's value, or the department's OM&A budget if the former is unavailable.	• Potential loss or financial impact >=2% and <5% of the sample population's value, or department's OM&A budget if the former is unavailable.	• Potential loss or financial impact <2% of the sample population's value, or department's OM&A budget if the former is unavailable.
Operational Excellence	• Governance non-compliance or lack of/inadequate controls that may impact achievement of business or project objectives. • Errors in or insufficient internal reporting that drives senior management decision making. • Test results where =>25% of the sample had deficiencies in the execution of a key control.	• Governance non-compliance or lack of/inadequate controls with alternate controls in place to mitigate the impact to business or project objectives. • Errors in or insufficient internal reporting that could affect management decision. • Test results where >=10% and <25% of the sample had deficiencies in the execution of a key control.	• Governance compliance with procedural concerns or documentation issues which could impact OPG's ability to demonstrate appropriate due diligence. • Errors in or insufficient internal reporting that has minimal decision making impact. • Test results where <10% of the sample had deficiencies in the execution of a key control.

Opportunity for improvement: *Observation with no risk impact that is provided to management for consideration to improve efficiency of processes and documentation (e.g. automation, duplication of activities).*

OVERALL REPORT RATING SCALE

An overall audit rating is assigned based on the number of observations identified for the audit and their assigned risk rating:

	Number of Findings			
Finding Risk Rating	**1**	**2**	**3 - 4**	**=> 5**
High	Requires Improvement	Not Effective	Not Effective	Not Effective
Moderate	Generally Effective	Generally Effective	Requires Improvement	Not Effective
Low	Effective	Effective	Generally Effective	Requires Improvement

APPENDIX C – PROCESS OWNER & DISTRIBUTION LIST

Distribution:

Chris Ginther
Chief Administrative Officer

Jason Wight
SVP Innovation and Chief Information Officer

[redacted]

cc:	Ken Hartwick	President & Chief Executive Officer
	John Mauti	SVP Finance and Chief Financial Officer
	Barbara Kerr	VP Controllership
	Kim Bosselle	Director CIO IT Projects
	Heather Young	Director CIO IT Portfolio Planning & Controls
	Adam Chiarandini	Director Enterprise Risk Management
	Janice Ding	Director Internal Audit
	Warren Hobbs	Director CIO Cyber Security
	Chris Woodcock	Director IT Services
	Nancy Woodward	Senior Manager IT Program

ONTARIO POWER GENERATION

Internal Audit

Business Case Summary

January 14, 2022

Report Rating: **Requires Improvement**

Table of Contents

1.0 EXECUTIVE SUMMARY

1.1 Report Rating and Summary of Findings

Report Rating: **Requires Improvement**

No.	Finding	Risk Type	Risk Rating[1]		
			High	Moderate	Low
1	Review and performance activities within BCSs were inconsistently executed.	Operational	X		
2	The Post Implementation Review ("PIR") Procedure had not been reviewed since 2010, and its requirements were not consistently applied.	Operational		X	
3	BCS guidance documents and rates used for project assessment were not periodically updated.	Operational			X
Total		**3**	**1**	**1**	**1**

1.2 Background

OPG established a business case approval process to ensure that a standard methodology is followed to document, evaluate and approve project proposals and associated expenditures across the organization. The Investment Management group within Finance has a suite of governance to define the business case requirements and provide stakeholders with guidance over the process. Core governance documents include OPG-STD-0076, *Developing and Documenting Business Cases*, as well as other associated forms and templates.

A Business Case Summary ("BCS") typically includes a recommendation for expenditure, a description of the underlying business needs, the estimated project cost and timing of cash flows, the project's net present value, an analysis of alternatives (considering scope, costs, schedule, benefits and risks) and a risk management plan. The BCS process is used for projects and investments. OPG's BCS template is intended to facilitate a holistic analysis of the proposed expenditure and is scalable depending on the project's complexity. The BCS also serves to support and illustrate prudent decision-making.

The organization executing the project, investment or initiative is responsible for preparing the BCS. A due diligence review is performed by Finance (either Investment Management or local Operations Controllership) and the appropriate governing body (as applicable, such as the Project Management Oversight Committee) before the BCS is submitted to the appropriate line management for final approval in accordance with OPG-STD-0017, *Organizational Authority Register* ("OAR"). Finance's review is intended to ensure compliance with governance, appropriateness and accuracy of the financial analysis, consideration of business implications and the impact on the business plan.

This audit was identified in Internal Audit's ("IA") 2021 Audit Plan, given the significant budget allocated to projects enterprise-wide on an annual basis.

[1] Please refer to Appendix B for risk rating definitions

1.3 Objective & Scope

The objective of this audit was to assess whether the processes and controls over the BCS process had been designed and operating effectively to ensure funding decisions were supported by business cases and appropriate due diligence and approvals. In order to achieve the audit objective, we reviewed the process and tested, on a sample basis, whether:

A. Governance
• Policies and procedures have been established to provide stakeholders with adequate guidance to prepare business cases; and • Approved templates were used to document business cases and support analysis.
B. Value proposition
• The business need and value proposition of the project has been documented; and • Alternatives were identified and analyzed to justify the preferred action where appropriate, (e.g. for value-enhancing projects or high cost/complexity projects), and rationale has been documented where no alternatives are considered.
C. BCS Approval
• BCS has been approved by the appropriate level of Finance and Line Management. Funds were not released until all required approvals had been obtained; • Finance and Line Management exercised appropriate levels of diligence before the approval of the BCS request; • Budgets were taken into consideration when evaluating and approving BCS; and • Material changes in scope and/or estimated costs (e.g. scope additions/removals) were approved prior to the release of additional funding.
D. Cost Estimates
• Cost estimates were comprehensive and adequately supported; • Cost estimates were split between OM&A and capital, consistent with applicable governance (e.g. FIN-STD-0030); • Financial evaluation and net present value analysis were prepared to support decision-making for applicable projects, and reasonable assumptions were applied in the analysis and were documented where material; and • Reasonable rates were used for project cost escalation and interest capitalization.
E. Risk Assessment
• A comprehensive risk assessment for the proposed project was completed and documented where appropriate.
F. Performance Monitoring
• Project goals (e.g. economic / efficiency targets, desired outcomes) were defined in the BCS and monitored for value realization subsequent to project's implementation; and • Performance was monitored to assess the quality of the BCS (e.g. PIR/PCR results).
G. Fraud Considerations
• No significant fraud risks were identified for inclusion within scope.
H. Opportunities for Improvement
• There were potential opportunities for cost recoveries and savings related to the efficiency of processes and documentation (e.g. automation, duplication of activities).

Scope Period: The scope included activities from January 1, 2020, to September 30, 2021, and precursor activities from prior periods where applicable.

1.4 Conclusion

Overall, IA noted that the design and operating effectiveness of the processes and controls over the BCS process (e.g. completeness of support documentation, appropriate approval, and completion of PIR activities) requires improvement. A summary of positive observations, key audit findings and recommendations is provided below.

Positive Observations

- Management is working on making the BCS process more efficient through automation by using a system called ePMX, which is expected to enhance oversight and improve consistency regarding documentation and workflow across business units;

- The correct BCS template were used across business units, thus providing consistency, and ensuring the same set of information is collected and reviewed for prospective projects; and

- Prior to the audit, Management had identified the resources needed to improve the coverage of BCS reviews on an ongoing basis. As at the date of this report, the team's resourcing strategy is being executed as part of the improvement.

Key Findings & Recommendations

- Review and performance activities that are required in the preparation of BCSs were inconsistently executed. IA identified exceptions covering different activities within the BCS preparation and review process, including instances of BCSs that were not accompanied with basis of estimate documentation, not being approved by individuals with sufficient authority, and superseding BCSs that were not accompanied with the justification for additional funding. In addition, instances of BCSs with some internal inconsistencies in financial information were identified. Management should continue to explore opportunities to incorporate automation in the BCS process, establishing appropriate workflow and approval rules/protocols based on the nature of the BCS, and reducing the number of manual inputs into areas of the BCS which provide duplicative information to ensure greater internal consistency. As at the time of this report, ePMX is active and Management is testing a new module within the ePMX system, which may be a solution in accordance with IA's recommendation; and

- The PIR Procedure (OPG-PROC-0056) had not been reviewed since 2010, and its requirements were not consistently followed by project teams. IA's review noted the appropriate types of PIR (simplified versus comprehensive) were not consistently performed, performance targets were not always measurable, and timing of PIRs did not always enable a full assessment of the project benefits. Management should establish the group responsible for reviewing and updating OPG-PROC-0056 on a periodic basis and explore automation opportunities concurrent with the automation of the BCS process to ensure greater consistency in PIR planning and execution.

The findings noted in this report have been reviewed with management and they have committed to specific action plans. Please refer to Section 2.0 for specific details of the above findings along with the associated risk impacts, audit recommendations and management action plans.

2.0 DETAILED AUDIT FINDINGS

Internal Audit identified the following detailed findings which have been risk rated based on the definitions outlined in Appendix B.

1. Review and performance activities within BCSs were inconsistently executed.	High

The *Developing and Documenting Business Cases* Standard (OPG-STD-0076) requires an identified approver from the Finance organization to assess the BCS for, among other criteria, project economics including the financial evaluation, business implications including the impact on the business plan, and reporting consistency. The development and documentation of business cases is applicable to all projects at OPG, irrespective of the magnitude of the project.

IA observed that the decentralized and largely manual nature of the BCS process led to inconsistent execution of required review and performance activities across various BCSs. IA sampled 41 BCSs across the organization from a total of 472 BCSs completed during the audit scope period. From the sample, the following observations were noted[2]:

a) Basis of estimate documentation supporting BCS proposal
An important consideration in reviewing a BCS for approval involves the project cost estimate, which forms the basis for project planning, decisions, value and performance. During the audit, IA noted five instances where the basis of estimate documentation was not available to support how project costs were determined and the estimate class (i.e. impacting the precision of the project cost estimate).

b) Approval limits and authorities
The OAR provides a framework of delegated authorities and position holders to whom authority is delegated. OPG-STD-0017 provides a listing of allowable dollar limits for the final approval of financial transactions for given position holders, with OAR elements 1.1 and 1.2 being applicable for any BCS covering Projects and Investments. In executing the testing of OAR approvals, IA noted the following:

- Two instances were identified where amounts were approved above the reviewer's OAR limits. In both instances, the reviewer had an approval limit of $1 million, but approved BCSs worth amounts of $4.1 million and $1.6 million, respectively;
- Four instances were identified where the BCSs were incorrectly listed as "in-budget" projects, as the projects had not been included in the approved business plans. In one of these instances, a Project Director with an OAR authority of $1M for "out-of-budget" BCSs approved a BCS for $3.1 million, while another minor (i.e. less than $100,000) BCS was approved by an individual who did not have OAR authority to approve out of budget projects;
- Five instances were identified where the Execution Authority approver was not within their authorization limit defined in OPG-STD-0076; and
- Three instances where gate approval was not obtained prior to the BCS OAR approval. An additional nine BCSs were identified where gate packages were not available to demonstrate that gate approval was obtained. Four of the nine instances were from the Renewable Generation ("RG") business unit, where gate packages were normally not prepared for the project initiation gate or projects with a small estimated overall cost (i.e. less than $2 million total project cost), per RG regional guidance;

[2] For all of the exceptions identified in categories a) through d), each project that each underlying BCS related to was less than $20 million in value.

c) Timeliness of BCS approval versus release of funds

OPG-STD-0076 notes that a BCS should be approved by the required OAR signatories prior to the release of funding from Finance. IA noted the following observations from the sample of BCS tested:

- Three instances were identified where evidence was not maintained to support that project funds were released only after BCS approval; and
- One instance was noted where the BCS was prepared subsequent to the release of funds.

d) Superseding BCS approvals

OPG-STD-0076 notes that a superseding BCS release is required where additional expenditures are being requested to complete the work previously approved in a Full Release BCS by more than 20% of the previously approved OAR amount, or where there is a material change in the scope of the project.

During the audit, IA found four instances of superseding BCSs in the IT Projects organization where a written variance explanation and justification for the additional funding was not included.

In addition to the exceptions above, five instances were identified where financial information included in the BCS tables (e.g. investment cash flow, summary of estimate) and the narrative in the BCS recommendation were inconsistent. Refer to Appendix A for the details of the noted inconsistencies.

Potential Cause & Impact

Potential Causes:

- The manual procedures to be executed during the BCS review process present a greater risk of human error, including in the sequencing of review activities and approvals occurring beyond individuals' assigned OAR limits;
- BCSs were reviewed by different organizations within Controllership, depending on the BUs that created the BCSs. Given the manual and decentralized nature of the review process, the depth of review could have been different amongst groups;
- Projects with a lower dollar value may not have been reviewed with the same rigour as higher value projects; and
- Changes in both personnel and the business units' organizational structures during the audit scope period may have led to a lack of consistent understanding of responsibilities in the BCS review process.

Potential Impact:

- There is a risk that business cases may be inappropriately approved, or approved in error, due to a variety of reasons:
  - BCS being approved without basis of estimate documentation to facilitate review;
  - BCS being approved by personnel without the requisite authority per OPG's OAR;
  - Funds being released prior to the BCS approval process being finalized; or
  - Project expenditures that exceed initial BCS approvals being approved without sufficient information outlining the business rationale for the additional expenditures.

Recommendation
Management should: • Continue with the current ePMX implementation as planned, including the use of ePMX system to store all supporting documentation related to the BCS approval process, automate work flow and approval processes and strengthen internal consistency of financial information within the BCS. In addition, management should explore opportunities to incorporate greater automation into the BCS process. • Establish a mechanism which guides Finance's review to ensure consistency amongst reviewers when undertaking a review.
Management Action Plan
1. A combined Gate Progression Form/Business Case Summary module is currently being tested within ePMX This module will ensure the following: • Life-to-date ("LTD") amounts are aligned to financial systems; • Automated workflow to link to and notify Finance to release funding, once the BCS is approved (and exploring feasibility of linking directly to funding release in a future module); and • Automated workflow to ensure the preparation and record-keeping of the Gate Progression Form, prior to BCS approval. Additional enhancements to the Digital BCS is planned to include the following: • Constraint to verify OAR Element against the approved Business Plan; • Constraints to ensure Costing tables totals are aligned; and • The requirement to include the basis of estimate to support the BCS. In addition, we will explore feasibility of using ePMX to address the in-budget vs. out-of-budget observation in a future module. Action Owner: Michael Wang, Manager, Project Controls Target Completion Date: September 30, 2022 2. Investment Management to provide a guidance roll-out for BCS Stakeholders/approvers to reinforce expectations on the following: • Finance's role in approving BCSs and guidance on best practices in reviewing; • OAR Signatory and Element identification; • Executive Authority Approval identification; and • Gate Progression Form requirements. Action Owner: Silvester Wong, Senior Manager, Investment Management Target Completion Date: September 30, 2022

2. The PIR Procedure had not been reviewed since 2010, and its requirements were not consistently applied.	**Moderate**

The *Post Implementation Review* procedure document (OPG-PROC-0056) covers the principles and processes to be followed and specifies responsibilities for completing PIRs of projects. While OPG-PROC-0056 has a three-year review cycle in accordance with OPG Governance requirements, it was last reviewed and updated in May 2010.

IA's review of 50 BCSs and PIRs noted inconsistencies in the adherence to the PIR procedure. IA observed the following:

Extent of PIR review
OPG-PROC-0056 states that a Comprehensive PIR ("CPIR") is required for projects which meet the criteria outlined in the procedure, while a Simplified PIR ("SPIR") is required for all other projects that are greater than $200,000 in total value. A CPIR is a more comprehensive assessment of the project (i.e. has greater independence and objectivity), and includes an assessment of the project execution, scope and resource management, and risk management practices, as well as a further review of the quality and effectiveness of the initial BCS. IA's review identified the following:

- Three ongoing projects were identified where management should have considered completing a CPIR at the end of the project instead of a SPIR as the value of the projects was greater than $25 million as recommended by OPG-PROC-0056. The estimated cost of the three projects ranged from $50 million to $165 million;
- A Project Closure Report ("PCR") is used to document relevant project closure information and approving the decision to close a project once completed. While OPG-PROC-0056 allows the use of a PCR in place of a SPIR for projects with straightforward deliverables, this process should be identified in the PIR plan within the BCS. IA identified two instances where a PCR was used instead of a SPIR, with the intent not documented in the BCS; and
- One instance was identified where the PIR plan was not established at the beginning of the project to identify the type of PIR to be performed, and the Key Performance Indicators ("KPIs") to be assessed at the end of the project.

Development of SMART KPIs
OPG-PROC-0056 notes that the measures used to develop the PIR plan for a particular project must be "SMART" measures (i.e. Specific, Measurable, Achievable, Realistic, Quantifiable and Timely"). Based on IA's review, the following observations were noted:

- Two instances were noted where the project's PIR Plan included a narrative describing the expected project benefits, but did not include measurable metrics to assess them;
- Four instances were identified where the KPIs listed in the project's PIR plan were not assessed when the PIR was performed at the end of the project; and
- Two instances were identified for longer-term projects (i.e. greater than 5 years in duration) where the PIR timelines that had been developed in the definition phase were too early to adequately evaluate the majority of the investment benefits.

Timeliness of PIR execution and timeframe for PIR assessment
OPG-PROC-0056 states that PIRs should be completed in a timely manner following the completion of a project. SPIRs should be completed no later than 6 months following project completion, while CPIRs should be completed within 12 months of project completion. IA identified eight instances where PIRs were not performed in accordance with these timeframes, with six exceeding a period of 12 months since the project in-service date.

Potential Cause & Impact

Potential Causes:

- The group responsible for maintaining the PIR Procedure during the 2010 revision (i.e. Corporate Investment Planning) no longer exists following organizational changes, and this responsibility may not have been subsequently assigned to another department;
- Greater focus may have been placed on reviewing other parts of the BCS rather than the PIR Plan, given the execution of the plan will only take place following the completion of the project; and
- PIR preparers and reviewers may not consistently refer to the PIR plan when performing the PIR.
- There were inconsistencies in the guidance related to the requirement to complete a CPIR i.e. use of “shall” and “may” in different sections of the Governance.

Potential Impact:

- A lack of review and update of the PIR Procedure may lead to new developments in the BCS process not being reflected in the procedure, or result in opportunities to critically assess the effectiveness and efficiency of the tasks in the procedure being forgone;
- Utilizing a SPIR process for more significant projects may result in review activities, such as an assessment of the success of project risk management activities and content of the BCS, not being subject to an arms-length review where deemed necessary;
- A lack of SMART baseline and target metrics may present challenges to objectively assess whether measurable benefits were achieved at the projects’ conclusion; and
- If PIRs are not performed in a timely manner, the benefits from the lessons learned exercise may be identified too late to be applied to other projects.

Recommendation

Management should:

- Define the group, including document owner and single-point-of-contact, that will be responsible for reviewing and maintaining the PIR Procedure in line with OPG Governance requirements;
- Provide OPG-PROC-0056 requirements training to individuals within Finance who have a role in reviewing and approving PIRs. The training and PIR guides should pay particular attention to providing examples of good PIR Plans and timelines as well as common SMART measures for “typical” OPG projects; and
- Consider developing rules within the digital BCS which would direct the project team down the CPIR route for applicable projects as part of the ePMX implementation noted in issue 1 above. Additionally, management should consider developing automatic reminders when PIR assessments are coming due to ensure timely completion.

Management Action Plan

The procedure will be reviewed and updated with an enhanced process. The roll out of the new procedure will include communication with key stakeholders regarding expectations.

Action Owner: Silvester Wong, Senior Manager, Investment Management

Target Completion Date: December 31, 2022

3. BCS guidance documents and rates used for project assessment were not periodically updated.	Low

Governance and guidance documents should be continuously reviewed and updated periodically to reflect best business practices and ensure consistency with other guidance documents.

IA's review of BCS guidance documents noted the following:

- The discount rate that BUs have been instructed to use to assess the economic benefits of regulated (7%) and non-regulated (9%) projects had not been formally reviewed and adjusted since 2013. While Management indicated that they informally reviewed these discount rates on a periodic basis and decided to maintain the rates to reflect a long term view, IA was not able to obtain evidence of the reviews performed; and

- Inconsistencies in the guidance on rates to be used for interest capitalization and escalation were noted between two documents within the Investment Planning Toolkit, which is a guidance toolkit for BCS preparers. Specifically, the BCS checklist specified the rates to be 5% for interest capitalization and 2% for escalation, while the spreadsheet provided as part of the toolkit included the rate of 4.33% for interest capitalization and a range of acceptable escalation rates.

  For 15 out of 25 BCSs sampled, IA noted project teams applied various interest capitalization rates ranging from 4.33% to 5% based on project specific factors such as project length. While Finance determined this practice to be reasonable, the toolkit did not include guidance on the situations where an interest capitalization rate can be adjusted to account for these factors.

Potential Cause & Impact

Potential Causes:

- The frequency and process to review important rates within BCS financial analyses (e.g. discount rates, interest capitalization rates, escalation rates) was not defined, and the organization previously responsible for reviewing the rate and updating guidance (i.e. Corporate Investment Planning) no longer exists following organization changes;
- Based on the established rates within the guidance, movements in rates may not have been considered to have a material impact on project economics; and
- The primary purpose of the BCS Checklist was intended to be a guide for those who are new to preparing BCSs; therefore, the document review may have occurred infrequently.

Potential Impact:

- Inappropriate rates may be used by project teams in assessing project economics, which could impact project assessment decisions; and
- As interest rates have generally reduced since 2013 (the date of the last update to the BCS guidance), the use of a lower discount rate would have increased a project's calculated Net Present Value. During the audit, IA did not identify any instances where a project's profitability was impacted as a result of using an outdated discount rate.

Recommendation
Management should: • Define the group, including the document owner and single-point-of-contact, that will be responsible for reviewing economic rate guidance on a periodic basis; and • Define the review period for assessing any significant updates to economic rates. This should also consider incorporating external factors into the review cycle (e.g. significant increases in interest rates).
Management Action Plan
Management plans to formalize the review process and update the BCS Toolkit to remove any perceived inconsistencies. Action Owner: Silvester Wong, Senior Manager, Investment Management Target Completion Date: September 30, 2022

APPENDIX A – INTERNAL INCONSISTENCIES WITHIN BCS DOCUMENTS

The samples below were noted as having inconsistencies of financial amounts within the BCS document.

Project	Business Unit	Project Value $'000	Comments
1	Nuclear	159,280	While the total project cost shown in the investment cashflow table and the summary of estimates table was the same, the split of the total cost between the LTD expenditure and 2020 expenditure columns was different. The investment cashflow table had an LTD expenditure amount of $46,023K and the 2020 total cost as $31,411K, while the summary of estimate table shows an LTD expenditure amount of $57,005K and the 2020 total cost as $20,430K.
2	Renewable Generation	3,832	The commentary within the BCS indicated a current release being sought of $3,598K, while the investment cashflow table indicated a current release being sought of $3,704K. It is noted that the final amount being released was $3,598K.
3	Real Estate	2,931	While the total project cost shown in the investment cashflow table and the summary of estimates table was the same, the split of the total cost between the 2021 and 2022 expenditure columns was different. The investment cashflow table indicated the 2021 total project cost was $2,931K and the 2022 total cost as nil, while the summary of estimate table showed the 2021 total cost as $2,845K and the 2022 total cost as $86K.
4	Real Estate	2,030	While the commentary within the BCS indicated that the total project cost of $2,030K did not include any contingency amount, the summary of estimate table indicated a contingency amount of $342K. In addition, the total project cost amounts within the table did not cross and down-add properly.
5	Renewable Generation	60	While the commentary within the BCS indicated that the release included a contingency amount of $6K, the summary of estimates table showed the contingency amount as nil.

APPENDIX B – RATING DEFINITIONS FOR AUDIT REPORTS

Finding: *Noted deficiency with potential impacts to the achievement of business unit/process area objectives, assessed using the following criteria:*

	High Risk	Moderate Risk	Low Risk
Safety & Social License	• Potential regulatory non-compliance. • Deficiencies that could result in: o Fatality, permanent disability, or lost time injury; o Data loss or unavailability of critical systems; o Security is compromised in sensitive / multiple areas; o Fraud / theft; or o Negative media coverage resulting in reputational damage.	• Insufficient evidence to support regulatory compliance. • Deficiencies that could result in: o Minor injury with no lost time; o Temporary data loss or unavailability of non-critical systems; o Security is compromised; o Fraud / theft with some mitigating controls; or o Public escalating concerns to OPG Management or local media.	• Documentation improvements to support regulatory compliance. • Deficiencies that could result in incidents that do not require medical treatment. • Deficiencies that do not result in any media attention negatively impacting OPG's reputation.
Financial	• Potential loss or financial impact =>5% of the sample population's value, or the department's OM&A budget if the former is unavailable.	• Potential loss or financial impact >=2% and <5% of the sample population's value, or department's OM&A budget if the former is unavailable.	• Potential loss or financial impact <2% of the sample population's value, or department's OM&A budget if the former is unavailable.
Operational Excellence	• Governance non-compliance or lack of/inadequate controls that may impact achievement of business or project objectives. • Errors in or insufficient internal reporting that drives senior management decision making. • Test results where =>25% of the sample had deficiencies in the execution of a key control.	• Governance non-compliance or lack of/inadequate controls with alternate controls in place to mitigate the impact to business or project objectives. • Errors in or insufficient internal reporting that could affect management decision. • Test results where >=10% and <25% of the sample had deficiencies in the execution of a key control.	• Governance compliance with procedural concerns or documentation issues which could impact OPG's ability to demonstrate appropriate due diligence. • Errors in or insufficient internal reporting that has minimal decision making impact. • Test results where <10% of the sample had deficiencies in the execution of a key control.

Opportunity for improvement: *Observation with no risk impact that is provided to management for consideration to improve efficiency of processes and documentation (e.g. automation, duplication of activities).*

OVERALL REPORT RATING SCALE

An overall audit rating is assigned based on the number of observations identified for the audit and their assigned risk rating:

	Number of Findings			
Finding Risk Rating	**1**	**2**	**3 - 4**	**=> 5**
High	Requires Improvement	Not Effective	Not Effective	Not Effective
Moderate	Generally Effective	Generally Effective	Requires Improvement	Not Effective
Low	Effective	Effective	Generally Effective	Requires Improvement

APPENDIX C – PROCESS OWNER & DISTRIBUTION LIST

Distribution:

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Senior Vice President, Finance and Chief Financial Officer

Alec Cheng
Vice President, Chief Controller and Accounting Officer

cc:	Ken Hartwick	President and Chief Executive Officer
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	Adam Chiarandini	Director, Enterprise Risk Management
	Janice Ding	Director, Internal Audit
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	Bryan Shaddock	Director, Controllership
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	Angelo Pavia	Senior Manager, Investment Management
	Silvester Wong	Senior Manager, Investment Management
	Nellia Kamwendo	Manager, Internal Audit
	Michael Wang	Manager, Project Controls

ONTARIO POWER GENERATION

Internal Audit

Network Security, Threat & Vulnerability Management Audit

Date: September 27, 2021

Report Rating: [redacted]

Table of Contents

1.0 EXECUTIVE SUMMARY

1.1 Report Rating and Summary of Findings

Report Rating: [redacted]

No.	Finding	Risk Type	Risk Rating[1]		
			High	Moderate	Low
1	[redacted]	[redacted]	[redacted]		
2	[redacted]				
3	[redacted]				
Total					

1.2 Background

OPG's information systems are potential targets for constantly evolving network security related attacks performed by parties motivated by varied interests. Such attacks can cause disruptions in operations, destruction / damage to infrastructure, systems or data, unauthorized access to systems and data, possible loss of privileged information and reputational damage. The growing frequency of cyber security attacks in general, and the high profile of OPG in the sector, significantly increases the risk of a successful attack if mitigating controls are not in place.

OPG had recognized risks associated with network security and had developed processes and controls in [redacted].

[redacted] Threat and Vulnerability Management Procedure (IT-PROC-0002). Strategies to respond to and recover from cyber security incidents were documented in the Cyber Security Incident Response Guide (OPG-GUID-08161-0002).

This was a risk-based audit identified in Internal Audit's ("IA") 2021 Audit Plan and was performed as information security risks were identified as priority risks in OPG's enterprise risk profile.

[1] Please refer to Appendix A for risk rating definitions

1.3 Objective & Scope

The objective of this audit was to assess the design and operating effectiveness of controls over securing the OPG Corporate network and devices, and the management of threats and vulnerabilities. To achieve the audit objective, we reviewed processes and tested, on a sample basis, whether:

A. Network device security
• An inventory of network devices was maintained and periodically updated; • Network devices were maintained in a secure configuration; • Network devices were placed in secure locations (e.g., locked cabinets or wiring closets); • Logical access to network devices was restricted to a limited number of authorized individuals; and • Changes to network devices were authorized, managed, and documented.
B. Event monitoring and response
• Tools and systems were in place to monitor cyber security events on key network devices; • Monitoring tool rules were configured to identify potential security issues for investigation; and • Cyber security incidents were resolved within the defined timeline based on the incident's priority.
C. Vulnerability management
• The network was periodically scanned for vulnerabilities; and • Vulnerabilities and threats brought to OPG's attention by NHSS were assessed and remediation was prioritized based on risk, and tracked to closure with risk treatment plans, or documented as accepted risks.
D. Fraud considerations
• No additional fraud risks identified.
E. Opportunities for improvement
• There were potential opportunities for cost recoveries and savings related to efficiency of processes and documentation (e.g., automation, duplication of activities).

Scope Period: The scope included activities between January 1, 2020, and March 31, 2021.

Scope Exclusions:

[redacted]

[redacted]

[redacted]

1.4 Conclusion

[redacted].

Audit findings, along with positive observations, are summarized below.

Positive Observations

- CIO management had proactively identified a number of challenges associated with the programs established to manage network security, threats and vulnerabilities, and had initiated actions to remediate these items. These included:
  - [redacted];
  - [redacted]
  - [redacted]

Key Findings & Recommendations

- [redacted]
- [redacted]

The findings noted in this report have been reviewed with management and they have committed to specific action plans. Please refer to Section 2.0 for specific details of the above findings along with the associated risk impact, audit recommendations and management action plans.

Opportunities for Improvement

- [redacted] CIO should update the procedure document to clarify required actions.

2.0 DETAILED AUDIT FINDINGS

Internal Audit identified the following detailed findings which have been risk rated based on the definitions outlined in Appendix A.

1. [redacted]

[redacted]

Potential Causes & Impacts

Potential Causes:

- [redacted]
- [redacted]
- [redacted]

Potential Impacts:

- [redacted]
- [redacted]
- [redacted]
- [redacted].

Recommendations

CIO management should:

1. [redacted];
2. [redacted]
3. [redacted].

Management Action Plan

[redacted]

CIO management will:

1. [redacted];
2. [redacted]
3. [redacted]
4. [redacted]
5. [redacted].

[redacted]

2. [redacted]

Maintenance of an asset inventory is a foundational component of many cyber security controls. It provides a baseline of the environment where controls need to be applied, as well as being a reference point for corrective actions following an incident or vulnerability identification. Controls related to cyber security where implementation is hindered by an inaccurate or incomplete asset database include physical access restrictions, patch management and incident management.

[redacted]

[redacted]

[redacted]

- [redacted]

- [redacted]

  [redacted]

  It is noted that the CIO organization employs additional security controls [redacted]

Potential Causes & Impacts

Potential Causes:

- [redacted]
- [redacted].

Potential Impacts:

- [redacted]
- [redacted]
- [redacted]

Recommendation

CIO IT Services management should:

1. [redacted]
2. [redacted]
3. [redacted]
4. [redacted]

Management Action Plan

Prior to issuance of the report CIO IT Services management has:

1. [redacted];
2. [redacted]
3. [redacted];
4. [redacted]
5. [redacted].

[redacted]

3. [redacted]

Penetration tests are detailed manual examinations to detect, and attempt to exploit, weaknesses in the network environment. Findings from penetration tests should be dispositioned in a timely manner to ensure that identified key weaknesses are remediated quickly, and the disposition should be formally documented. [redacted]

[redacted]

[redacted]

[redacted]

Potential Cause & Impact

Potential Cause:

[redacted]

Potential Impact:

[redacted]

Recommendation

CIO management should document the [redacted].

Management Action Plan

CIO management will:

1. [redacted]
2. [redacted].

[redacted]

APPENDIX A – RATING DEFINITIONS FOR AUDIT REPORTS

Finding: *Noted deficiency with potential impacts to the achievement of business unit/process area objectives, assessed using the following criteria:*

	High Risk	Moderate Risk	Low Risk
Safety & Social License	• Potential regulatory non-compliance. • Deficiencies that could result in: ○ Fatality, permanent disability, or lost time injury; ○ Data loss or unavailability of critical systems; ○ Security is compromised in sensitive / multiple areas; ○ Fraud / theft; or ○ Negative media coverage resulting in reputational damage.	• Insufficient evidence to support regulatory compliance. • Deficiencies that could result in: ○ Minor injury with no lost time; ○ Temporary data loss or unavailability of non-critical systems; ○ Security is compromised; ○ Fraud / theft with some mitigating controls; or ○ Public escalating concerns to OPG Management or local media.	• Documentation improvements to support regulatory compliance. • Deficiencies that could result in incidents that do not require medical treatment. • Deficiencies that do not result in any media attention negatively impacting OPG's reputation.
Financial	• Potential loss or financial impact =>5% of the sample population's value, or the department's OM&A budget if the former is unavailable.	• Potential loss or financial impact >=2% and <5% of the sample population's value, or department's OM&A budget if the former is unavailable.	• Potential loss or financial impact <2% of the sample population's value, or department's OM&A budget if the former is unavailable.
Operational Excellence	• Governance non-compliance or lack of/inadequate controls that may impact achievement of business or project objectives. • Errors in or insufficient internal reporting that drives senior management decision making. • Test results where =>25% of the sample had deficiencies in the execution of a key control.	• Governance non-compliance or lack of/inadequate controls with alternate controls in place to mitigate the impact to business or project objectives. • Errors in or insufficient internal reporting that could affect management decision. • Test results where >=10% and <25% of the sample had deficiencies in the execution of a key control.	• Governance compliance with procedural concerns or documentation issues which could impact OPG's ability to demonstrate appropriate due diligence. • Errors in or insufficient internal reporting that has minimal decision making impact. • Test results where <10% of the sample had deficiencies in the execution of a key control.

Opportunity for improvement: *Observation with no risk impact that is provided to management for consideration to improve efficiency of processes and documentation (e.g. automation, duplication of activities).*

OVERALL REPORT RATING SCALE

An overall audit rating is assigned based on the number of observations identified for the audit and their assigned risk rating:

	Number of Findings			
Finding Risk Rating	**1**	**2**	**3 - 4**	**=> 5**
High	Requires Improvement	Not Effective	Not Effective	Not Effective
Moderate	Generally Effective	Generally Effective	Requires Improvement	Not Effective
Low	Effective	Effective	Generally Effective	Requires Improvement

APPENDIX B – PROCESS OWNER & DISTRIBUTION LIST

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	Heather Young	Director IT Portfolio Planning & Controls
	Aleem Juma	Senior Manager Internal Audit
	Nancy Woodward	Senior Manager IT Program
	Vidu Mishra	Section Head Information Systems

ONTARIO POWER GENERATION

Internal Audit

Fleet Management

June 30, 2021

Report Rating: **Requires Improvement**

Table of Contents

1.0 EXECUTIVE SUMMARY

1.1 Report Rating and Summary of Findings

Report Rating: **Requires Improvement**

No.	Finding	Risk Type	Risk Rating[1]		
			High	Moderate	Low
1	Business Unit ("BU") Managers did not always fulfill their responsibilities to secure, maintain and monitor usage of fleet assets.	Operational	X		
2	Lease-versus-buy analysis was not performed as required, and some fleet assets were not acquired through the Fleet Management group.	Operational		X	
3	BU Managers were not informed when employees used the OPG Motor Pool (Enterprise CarShare).	Operational		X	
4	Fleet assets' utilization was not monitored and some assets were underutilized.	Operational		X	
5	Some employees used premium fuel for fleet assets although not required, resulting in higher costs to OPG.	Operational			X
Total		**5**	**1**	**3**	**1**

1.2 Background

The Supply Chain Fleet Management Services ("FMS") team maintains the process requirements used to manage OPG's transport and work equipment, and the administration of employer-provided vehicles. The fleet program includes cars, light trucks, non-standard vehicles (e.g. heavy trucks, trailers, snowmobiles, boats), and leased plant equipment. The assets could be license plated that operate on public roads, or non-license plated (i.e. assets that operate within the confines of a generating station).

Based on Supply Chain's Q4-2020 fleet overview, OPG fleet consisted of 1,230 (Q4-2019: 1,232) separately identifiable assets. Total expenditures for the fleet program was $12.8 million in 2020, covering costs including fuel, maintenance and repairs, and depreciation.

The Supply Chain FMS team establishes the fleet program requirements, provides overall program oversight, and serves as the primary interface for the supplier Automotive Resources International ("ARI"). BU staff is expected to comply with the fleet management program, including securing the asset, maintenance, usage logging, licensing and usage of the fleet cards. Fleet cards are issued with each new vehicle for purchasing fuel and maintenance, which allows for the recording and tracking of expenditures. The program is governed by the Fleet Management Procedure (OPG-PROC-0162).

This audit was identified in Internal Audit's ("IA") 2021 Audit Plan, as a follow-up engagement to the 2018 Fleet Vehicle Management advisory review, and due to the increased risks of non-compliance to the fleet management program as the responsibility to manage fleet assets is widely distributed across the company.

[1] Please refer to Appendix B for risk rating definitions

1.3 Objective & Scope

The objective of this audit was to assess the design and operating effectiveness of key controls to ensure fleet assets were acquired based on business needs and properly maintained, fuel cards were used for their intended purposes (e.g. fuel and maintenance), and value-for-money was achieved (e.g. proper utilization, disposal). In order to achieve the audit objective, we reviewed the process and tested, on a sample basis, whether:

A. Governance and Contract Management
• Governance structure for the fleet management program, and business unit roles and responsibilities, are clearly defined and communicated to stakeholders; and • The fleet program supplier (ARI) complies with the terms of the contract with OPG, and recoveries are sought from the vendor where needed (e.g. volume rebates).
B. Order Processing
• Proper approvals are obtained for fleet requests; • Analysis is performed to determine whether assets should be leased or purchased; • Fleet requests are fulfilled taking into consideration the need to redeploy under-utilized assets and the goal to use electric vehicles where feasible; and • Fleet asset inventory is tracked to facilitate monitoring and analysis (e.g. fleet age, odometer readings, fuel usage, maintenance).
C. Usage Logging and Maintenance
• Vehicle keys are placed in secured locked location; • Vehicle usages are logged, log books are reviewed, and odometer readings are recorded; • De minimis personal use of fleet vehicles are tracked and reported for taxation purposes; • The fleet is maintained based on prescribed frequency and recoveries from warranty are sought where applicable; • Fleet assets are registered, licensed, and insured where needed; and • Assets with low usage or no longer required are identified and assessed prior to redeployment or disposal.
D. Fuel and Motor Pool Usage
• Fleet cards and shop cards are used only for their intended purpose to purchase fuel for OPG fleet assets only and pay for maintenance; • Unusual fuel usage (e.g. volume of fuel purchased greater than tank capacity) is identified and followed-up; and • OPG Motor Pool (Enterprise Carshare) is used by employees to fulfill short-term business requirements.
E. Fraud Considerations
• Fleet assets are used for personal purposes and the usage is not consistent with the fleet management program (e.g. use of fleet card to purchase fuel for personal use).
F. Opportunities for Improvement
• There are potential opportunities for cost recoveries and savings related to efficiency of processes and documentation (e.g. automation, duplication of activities).

Scope Period: The scope included activities from January 1, 2019 to December 31, 2020, and precursor activities from prior periods.

1.4 Conclusion

Overall, IA noted the Fleet Management program requires improvement. The program is largely decentralized, with BU managers having responsibility for ordering, maintenance, and identifying surplus assets. Achieving consistency on the application of Fleet Management practices across BUs is a challenge, as Fleet Management controls are manual and BU Managers have competing priorities and are in different geographical locations. Some of the observations noted in this audit are similar to those identified in the 2018 Advisory review, particularly regarding controls performed by BU Managers around ARI exception report reviews, vehicle key security management, and log book reviews, including verification of periodic maintenance of vehicles.

Lease-versus-buy analyses were not performed as currently required by OPG governance to assess the cost effectiveness of potentially purchasing fleet assets. As a result, 204 of the 205 fleet assets acquired during the audit scope period were leased by default. The OPG CarShare program allows employees to rent vehicles on a short term basis. However, the CarShare program does not currently inform supervisors of such usage, and the rental charges are paid by OPG without any review.

A summary of the key findings and positive observations are included below:

<u>Positive Observations</u>

- Supply Chain and BU Management are working towards electrification of the OPG fleet. IA noted that 18% of the 86 vehicles acquired in 2020 were electric, compared to 13% in 2019. The increase use of electric vehicles results in lower carbon emissions, and is a step towards meeting OPG's commitment to convert its fleet of corporate vehicles, where technically feasible, to electric by 2030; and

- The Radioactive Materials Transport ("RMT") Division has installed and utilizes telematics on approximately 15 trucks and 35 trailers since the fall of 2020. Through devices installed on the vehicles, data is captured about the vehicle's location, engine codes, driver behaviour events such as acceleration, cornering, harsh breaking, and seatbelt usage. The system will also provide RMT drivers with the mandated Electronic Log Devices that is to be implemented by mid-June 2021. The Trailers use Solar Asset Trackers as they can track location without being attached to a power device. Supervisors will analyze data and training delivered to drivers in an effort to continuously improve driving habits.

<u>Key Findings & Recommendations</u>

- BU Managers did not always fulfill their responsibilities to secure, maintain and monitor the usage of fleet assets. IA noted that BU Managers did not always review log books to monitor fleet vehicle usage, review ARI exception reports for unusual fuel transactions, place vehicle keys in a secured locked location, and maintain vehicles annually as required through OPG's governance. IA also found two instances where wheels were not re-torqued within 100km after wheel replacement. Given BU Managers experience turnover, FMS should introduce an annual Computer Based Training ("CBT") requirement on the Fleet Management Procedures, to clarify BU Manager responsibilities in the Fleet Management program. The CBT should be offered through MyPower Learning, and taken by fleet asset custodians (e.g. BU Managers) on an annual basis;

- Lease-versus-buy analyses were not performed as required by OPG governance prior to the acquisition of fleet assets, to determine whether it would be more cost effective to purchase fleet assets instead of lease. 204 of the 205 fleet assets acquired through FMS in 2019 and 2020 were leased by default without such analysis being undertaken. Management should update governance to clearly specify management's expectations around lease-versus-buy analysis (e.g. applicable only to a subset of fleet assets), and define the types of assets that would require the analysis (e.g. vehicles over certain dollar thresholds, or non-standard assets such as scissors lifts, pump trucks etc.);

- The OPG MotorPool (also known as the CarShare program) was not setup to notify supervisors when employees rented a vehicle through this program, and invoices for the rental are processed centrally by Supply Chain. Therefore, unauthorized usage of the CarShare vehicles is unlikely to be detected. Management should work with the CarShare vendor to develop a process to make supervisors aware whenever a vehicle is rented through this program; and

- The utilization of fleet assets was not monitored, and a number of fleet assets appeared to be underutilized. By not monitoring the utilization of fleet assets, there is a risk of incurring costs on additional fleet assets and lost opportunities to redeploy fleet assets to other departments in need. Management should identify and communicate fleet utilization information to BU Managers for investigation and follow-up.

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The findings noted in this report have been reviewed with management and they have committed to specific action plans. Please refer to Section 2.0 for specific details of the above findings along with the associated risk impacts, audit recommendations and management action plans.

Opportunity for Improvement

Each vehicle is assigned an ARI fuel card to facilitate monitoring of the vehicle's fuel usage. Based on responses from employees, it was noted that cards are also used to purchase fuel for other OPG equipment such as compressors, lawnmowers, jerry cans etc. This practice made it difficult to assess the fuel efficiency of each vehicle, and identify potential misappropriations of fuel. Management should consider enforcing the need for employees to use the card only for the specific vehicle, and assign separate cards to purchase fuel for other equipment.

2.0 DETAILED AUDIT FINDINGS

Internal Audit identified the following detailed findings, which have been risk rated based on the definitions outlined in Appendix B.

1. Business Unit Managers did not always fulfill their responsibilities to secure, maintain and monitor usage of fleet assets.	**High**

Fleet Management Procedure (OPG-PROC-0162) outlines the responsibilities for BU Managers and operators and include the following:

- Supply Chain Facilities Management ("FM") must sign-off prior to new equipment being ordered, to ensure that FM will assume the maintenance burden for these assets;
- Vehicle users must sign the Employer-Provided Vehicle Agreement (OPG-FORM-0181), to confirm the employee's understanding of their responsibilities for the fleet vehicle;
- Vehicle keys are to be held in a secured locked location;
- BU Managers are to review the fleet log books quarterly;
- Vehicles must be inspected at least annually by a mechanic and the Vehicle Inspection and Maintenance Report (OPG-FORM-0186) must be prepared; and
- Vehicle's wheel lug nuts should re-torqued 100km after wheel installation.

IA sampled 15 new fleet asset orders and interviewed 10 BU Managers from Nuclear, RGPM, and corporate groups. The review identified that:

- 6 of 7 Nuclear vehicle orders sampled did not have evidence of Facilities Management ("FM") sign off before orders were placed;

- 6 of 15 vehicles sampled did not have the signed Employer-Provided Vehicle Agreement (OPG-FORM-0181);

- 3 of 10 locations sampled did not place their keys in a secure location. Vehicle keys for those locations were hung on wall boards, instead of being secured in locked boxes;

- 4 of 10 Managers interviewed were not aware of the requirement to review log books quarterly, thus the log books for their business units were not reviewed;

- 2 of 15 transactions sampled did not have a completed OPG-FORM-0186, and IA was not able to determine that annual inspections were performed for those vehicles.

  For 10 of these 15 transactions, evidence was produced showing that annual inspection was completed by providing Garage Management System ("GMS") records and/or AS7 work orders, although the annual inspection form (OPG-FORM-0186) was not completed;

- 2 of the 15 log books reviewed indicated that wheels were not re-torqued within 100km after wheel installation. Instead, they were re-torqued after 720km and 426km; and

- None of the 10 Managers interviewed were able to demonstrate that ARI exception reports (e.g. identifying unusual fuel usage) were reviewed.

Potential Cause & Impact

Potential Causes:

- Managers were not fully aware of the governance procedures and expectations due to competing priorities. As the Managers are geographically dispersed, it is difficult to ensure the Managers have adopted fleet management practices in a consistent manner;
- Keys were hung on wall boards, as Managers believe the facilities (e.g. hydroelectric stations) are secure, and additional security measures are not required. However, not all employees with access to the facilities are authorized to use fleet assets;
- Management had placed reliance on vehicle operators that they will do the right thing; and
- Users may have torqued the wheels and did not remember to record it in the log books on a timely basis.

Potential Impacts:

- Not maintaining vehicles in a timely manner can lead to increased costs and employee/public safety risks. If an accident occurs because of a wheel becoming detached from a vehicle, this could also have a negative impact on OPG's reputation;
- Irregular usage of fleet assets could be undetected as log books are not reviewed;
- Keys left in open areas may result in vehicles being stolen, or used by unauthorized employees for personal purposes; and
- Misuse of assets including using fuel cards for personal vehicles may be undetected as usage reports and key metrics were not reviewed.

Recommendation

Management should remind BU Managers that they should:

- Review the log books quarterly to ensure periodic maintenance occurs, and ensure wheels are re-torqued as required;
- Keep keys locked in secured lockboxes; and
- Conduct periodic reviews of ARI reports to detect anomalies with signoffs, and document the last review date in the log book.

In addition, the Fleet Management Procedure should be streamlined to reduce administrative burden for BU Managers. For example, the annual Vehicle and Maintenance Report (OPG-FORM-0186) could be eliminated, as BUs typically record the vehicle maintenance history in GMS or AS7. The expectation around fleet vehicle key security could also be updated, where keys are considered secured when they are placed inside a controlled access OPG facility regardless of storage method.

Management Action Plan

Supply Chain will work with Human Resources to implement a CBT course around the Fleet Management Procedure (OPG-PROC-0162) in MyPower Learning, and require BU Managers and fleet asset owners to complete the training annually.

In addition, Management will also review the Fleet Management Procedure to identify opportunities to reduce administrative burden for both Supply Chain and BU Managers.

Owner: Keren Morehead, Senior Manager Supply Chain
Target Completion Date: January 15, 2022

2. Lease versus buy analysis was not performed as required, and some fleet assets were not acquired through the Fleet Management group.	**Moderate**

The Fleet Management Procedure (OPG-PROC-0162) section 1.2 states that the determination whether to lease or buy an asset will be based on an analysis by Fleet Management Services. In addition, section 1.1.1(c)(2) requires fleet assets to be acquired through Supply Chain either by the FMS or Procurement Specialists. For assets purchased through the Procurement Specialists, BU Managers are to notify the FMS of the purchase, so that ARI inventory records can be updated.

IA's review of the fleet assets procured between January 2019 to December 2020 noted the following:

- A lease-versus-buy analysis was not performed prior to asset acquisition. Of the 205 assets procured within the sample period, leasing was the default option with 204 assets leased without any analysis to support cost effectiveness. The capital cost of the vehicles leased within the sample period ranged from $27,000 to $370,000, with the combined capital expenditure cost of $9.9 million; and

- A utility vehicle costing $21,269 was purchased by a BU Manager from a third party vendor using a Purchase Card ("P-Card"); the transaction included a trade-in of an OPG fleet asset valued at $7,000. As the purchase was not channeled through a Supply Chain Procurement Specialists or FMS, the asset traded-in was still included in the ARI inventory as "active" and the new asset was not added to the inventory.

Potential Cause & Impact

Potential Causes:
- Lease-versus-buy analysis is time consuming taking into consideration many factors (e.g. interest rates, tax implications, residual value), and is only performed by FMS upon request from BUs;
- Assets were leased as this is the typical path to acquire assets, and BUs did not have the capital budgets to purchase assets; and
- BU Manager paid for the asset using P-Card, as the individual was not aware of the requirement to acquire fleet assets through Supply Chain.

Potential Impacts:
- Potential cost savings may have been missed, as certain fleet assets may have been more cost effective to be purchased rather than leased; and
- Purchasing fleet assets outside of the established process could lead to inaccurate fleet inventory, and lack of oversight resulting in improper maintenance, insurance, and registration for the asset.

Recommendation

Management should:
- Update governance to clearly specify management's expectations around lease-versus-buy analysis (e.g. applicable only to a subset of fleet assets), and define the types of assets that would require the analysis (e.g. vehicles over certain dollar thresholds or non-standard assets such as scissors lifts, pump trucks etc.);
- Ensure that all BU requests for fleet assets are routed through Finance and all BU Managers are aware of this expectation;
- Coordinate with Finance and perform lease-versus-buy analysis for orders that are considered to require the analysis; and
- Include in the Fleet Management reminders/training (as discussed in observation #1), the procedural, documentation, and communication requirements for new vehicles purchased by the BU.

Management Action Plan
Supply Chain Management will ensure that: • Fleet Management governance is updated to clarify the expectation to prepare lease-versus-buy analysis. In particular, the analysis is required for certain types of assets (e.g. non-standard assets), but not others such as passenger vehicles; • FMS and Procurement Specialists require BU Managers to produce the lease-versus-buy analysis for applicable assets (e.g. non-standard assets), before the asset can be leased or purchased; and • Guidance to BU Managers will be reinforced, annually through the Fleet Management CBT, on the expectation to prepare lease-versus-buy analysis for non-standard assets, and the need to inform FMS when assets were purchased through the Procurement Specialists so that fleet inventory can be updated. Owner: Keren Morehead, Senior Manager Supply Chain Target Completion Date: September 30, 2021

3. Business Unit Managers were not informed when employees used the OPG Motor Pool (Enterprise CarShare).	**Moderate**

In October 2020, the Enterprise CarShare ("CarShare") program replaced the previously dedicated Ministry of Transportation ("MTO") Ontario Public Sector Motor Pool program that was available to OPG employees for business usage. Vehicles reserved through the CarShare program should be used for work-related short-term travel needs.

IA noted that supervisors were not informed when employees rented cars through the CarShare program, nor are supervisors required to approve expenses associated with the CarShare usage. CarShare invoices are processed centrally by Supply Chain, and are automatically paid through the purchase order and invoice matching process. The total value of the purchase order issued for the CarShare program is $2.5 million, with $54,000 spent since the program inception in October 2020; the low usage was likely due to COVID-19 travel restrictions.

Through the review of CarShare invoices, IA noticed four instances where an employee retained a rented vehicle over several weekends, even though the individual did not work the weekends and there was no work time charged in the time recording system (MyTime). For example:

- The employee took out a vehicle on Sunday, November 1, 2020, and returned the car on Monday, November 9, 2020, although the employee was not working on November 7 nor November 8; and

- Another instance where a car was taken out on Friday, November 20, 2020, and returned on Friday, November 27, 2020, although the employee was not working on November 21 nor November 22.

Through discussions, the employee's Supervisor indicated that he was not informed by the CarShare program that the employee had rented a car and kept it over the weekend. The Supervisor also mentioned that while the employee did not work those weekends, it might have been more convenient for the employee to retain the vehicle over the weekends instead of returning it on Friday and picking up another vehicle on Monday.

Potential Cause & Impact

Potential Cause:
The CarShare program is not setup to notify supervisors when employees rented cars through the program.

Potential Impact:
Although there is no additional rental costs for personal use of the CarShare program since OPG pays a monthly rate, there will still be an increase in OPG's operating costs (e.g. increased fuel usage, additional liability in the event of an accident from personal use). Without notification, there is also an increased risk of employees using OPG assets for personal use.

Recommendation

Management should:
- Investigate options which would result in Supervisors being notified when cars are rented;
- Reinforce with users that the intent of the program is for vehicles to be used for short term business needs, and therefore weekend reservations must be business related; and
- Disseminate CarShare usage reports to supervisors for review.

Management Action Plan
1. Subsequent to the audit fieldwork, Supply Chain Management worked with Enterprise CarShare to require users to acknowledge, in the CarShare program website, the terms of the program (e.g. non-business usage of vehicles is not allowed) before users can make vehicle rentals. Owner: Keren Morehead, Senior Manager Supply Chain Target Completion Date: Complete 2. Supply Chain Management will also work with Enterprise CarShare to develop a process to inform employees' supervisors whenever a motor pool vehicle is used. This could be through automation where emails are sent to the employee's supervisor when a motor pool vehicle is checked-out and returned. If automation is not practical, FMS will investigate other avenues to ensure employees' supervisors are informed of the motor pool usage, which could include charging the usage costs directly to the employee's credit card, and/or forward the Enterprise monthly consolidated invoices to the employees' supervisors for information. Owner: Keren Morehead, Senior Manager Supply Chain Target Completion Date: December 30, 2021

4. Fleet assets' utilization was not monitored and some assets were underutilized.	Moderate

As a best practice, business units should monitor the utilization of the fleet assets, and return underutilized assets to Supply Chain for redeployment or disposal.

Based on a review of a usage report obtained from ARI, IA noted Business Units had vehicles with low utilization, which were not sold or redeployed.

There were 25 vehicles included in the ARI report that were classified as low utilization, with no recent fuel and/or maintenance activities. The vehicles included full size pickups, sport utility vehicles, vans, compact pickups, and full size cars. A summary of the vehicles is provided in Appendix A.

Potential Cause & Impact

Potential Causes:

- Although utilization data is available, the information is not reviewed and analyzed as existing practices did not require BU Managers to monitor utilization and provide justification on why underutilized vehicles should be kept.
- Record keeping inaccuracies may exist where some vehicles that appeared underutilized may have been sold or disposed, but not updated in ARI records.

Potential Impacts:

- Idle assets that can be used in another location may go unnoticed, potentially resulting in additional assets being acquired without critically assessing redeployment of existing assets;
- Under-utilized vehicles may also pose a safety risk if not properly maintained before the next use; and
- Business units may be better served by realizing the cash value from the under-utilized vehicles.

Recommendation

Management should:

- Define criteria for identifying underutilized vehicles; and
- On an annual basis perform a fleet wide assessment, and circulate the results to the Controllership and Senior Business Unit management so they are aware of the underutilized assets and take appropriate follow up actions (e.g. assessment on continued retention of vehicle, update ARI records where there are inaccuracies, and ensuring vehicle is properly serviced before next use, etc.)

Management Action Plan

FMS will publish metrics, by business unit, identifying under utilized assets and share these metrics with the Controllership and Business Unit Leaders annually to facilitate their oversight.

Owner: Keren Morehead, Senior Manager Supply Chain
Target Completion Date: September 30, 2021

5. Some employees used premium fuel for fleet assets although not required, resulting in higher costs to OPG.	**Low**

All assets under the OPG fleet program use regular unleaded fuel and employees are expected to use this fuel grade when refueling the fleet assets.

IA noted that not all employees refuel their vehicles with regular fuel, as some employees opted instead for premium fuel. An ARI fuel report covering the period January 2019 to December 2020 revealed that employees spent approximately $95,000 in 2019 and $72,000 in 2020 for premium fuel purchases for fleet assets. The reduction in premium fuel purchases in 2020 may have been caused by travel constraints due to COVID-19 related restrictions.

Based on data from Statistics Canada, the cost of premium fuel is on average 20% higher than regular unleaded. Therefore, the use of premium fuel instead of regular translated into an increased cost of approximately $28,000 for the period reviewed (i.e. 2019 & 2020).

Potential Cause & Impact

Potential Causes:
BU Management and fleet asset operators may not be aware of the expectation to use regular unleaded fuel for fleet assets, as OPG-PROC-0162 is silent on the expectation.

Potential Impact:
This use of premium fuel resulted in higher fuel costs for OPG.

Recommendation

Management should update OPG-PROC-0162 to clarify the expectation that regular unleaded fuel should be used for fleet assets, and publish metrics to identify usage of premium fuel to facilitate Management oversight.

Management Action Plan

FMS will update OPG-PROC-0162 to clarify that regular unleaded should be used for fleet assets.

In addition, metrics will be published to identify premium fuel usage, and FMS will share these metrics with the Controllership and Business Unit Leaders every six months to facilitate their oversight.

Owner: Keren Morehead, Senior Manager Supply Chain
Target Completion Date: November 30, 2021

APPENDIX A – VEHICLES WITH NO RECENT FUEL AND / OR MAINTENANCE ACTIVITIES

Below is the list of 25 vehicles that, according to ARI records, do not have recent fuel and/or maintenance activities:

Vehicle Number	Model Year	Make	Model	Last serviced	Last Fuel Transaction
917001	2009	STERLING	ACTERRA	Jan 2009	Dec 2008
960963	2009	STERLING	ACTERRA	Feb 2010	Nov 2011
950843	2015	AUTOCAR	XSPOTTER	Jan 2015	No Transactions in ARI
862288	2014	RAM	1500	Feb 2016	Oct 2015
862320	2015	RAM	1500	Feb 2016	No Transactions in ARI
862329	2016	RAM	1500	Feb 2016	No Transactions in ARI
893431	2010	DODGE	RAM PICKUP	Mar 2016	Apr 2018
845022	2014	DODGE	JOURNEY	Dec 2017	Dec 2017
854311	2009	CHEVROLET	TAHOE	Dec 2017	Feb 2018
887456	2012	DODGE	GRAND CARAVAN	May 2018	Jul 2018
865492	2007	DODGE	RAM PICKUP	Dec 2018	Oct 2018
894286	2008	DODGE	RAM PICKUP	Sep 2019	Sep 2015
894331	2015	RAM	2500	Sep 2019	No Transactions in ARI
110001	2017	AUTOCAR	XSPOTTER	Oct 2019	Dec 2018
883130	2007	CHEVROLET	EXPRESS	Oct 2019	Jun 2019
865993	2009	DODGE	RAM PICKUP	Dec 2019	Aug 2015
845247	2009	DODGE	CHARGER	Jan 2020	Aug 2019
887367	2005	DODGE	GRAND CARAVAN	Jan 2020	Oct 2019
865471	2005	DODGE	DAKOTA	Jan 2020	Apr 2021
862361	2017	RAM	1500	May 2021	Aug 2019
862459	2020	FORD	F-150	No Transactions in ARI	No Transactions in ARI
862458	2020	FORD	F-150	No Transactions in ARI	No Transactions in ARI
894337	2019	RAM	2500	No Transactions in ARI	No Transactions in ARI
887093	2020	CHRYSLER	PACIFICA	No Transactions in ARI	No Transactions in ARI
840031	2020	HYUNDAI	KONA EV	No Transactions in ARI	No Transactions in ARI

APPENDIX B – RATING DEFINITIONS FOR AUDIT REPORTS

Finding: *Noted deficiency with potential impacts to the achievement of business unit/process area objectives, assessed using the following criteria:*

	High Risk	Moderate Risk	Low Risk
Safety & Social License	• Potential regulatory non-compliance. • Deficiencies that could result in: ○ Fatality, permanent disability, or lost time injury; ○ Data loss or unavailability of critical systems; ○ Security is compromised in sensitive / multiple areas; ○ Fraud / theft; or ○ Negative media coverage resulting in reputational damage.	• Insufficient evidence to support regulatory compliance. • Deficiencies that could result in: ○ Minor injury with no lost time; ○ Temporary data loss or unavailability of non-critical systems; ○ Security is compromised; ○ Fraud / theft with some mitigating controls; or ○ Public escalating concerns to OPG Management or local media.	• Documentation improvements to support regulatory compliance. • Deficiencies that could result in incidents that do not require medical treatment. • Deficiencies that do not result in any media attention negatively impacting OPG's reputation.
Financial	• Potential loss or financial impact =>5% of the sample population's value, or the department's OM&A budget if the former is unavailable.	• Potential loss or financial impact >=2% and <5% of the sample population's value, or department's OM&A budget if the former is unavailable.	• Potential loss or financial impact <2% of the sample population's value, or department's OM&A budget if the former is unavailable.
Operational Excellence	• Governance non-compliance or lack of/inadequate controls that may impact achievement of business or project objectives. • Errors in or insufficient internal reporting that drives senior management decision making. • Test results where =>25% of the sample had deficiencies in the execution of a key control.	• Governance non-compliance or lack of/inadequate controls with alternate controls in place to mitigate the impact to business or project objectives. • Errors in or insufficient internal reporting that could affect management decision. • Test results where >=10% and <25% of the sample had deficiencies in the execution of a key control.	• Governance compliance with procedural concerns or documentation issues which could impact OPG's ability to demonstrate appropriate due diligence. • Errors in or insufficient internal reporting that has minimal decision making impact. • Test results where <10% of the sample had deficiencies in the execution of a key control.

Opportunity for improvement: *Observation with no risk impact that is provided to management for consideration to improve efficiency of processes and documentation (e.g. automation, duplication of activities).*

OVERALL REPORT RATING SCALE

An overall audit rating is assigned based on the number of observations identified for the audit and their assigned risk rating:

	Number of Findings			
Finding Risk Rating	**1**	**2**	**3 - 4**	**=> 5**
High	Requires Improvement	Not Effective	Not Effective	Not Effective
Moderate	Generally Effective	Generally Effective	Requires Improvement	Not Effective
Low	Effective	Effective	Generally Effective	Requires Improvement

APPENDIX C – PROCESS OWNER & DISTRIBUTION LIST

Distribution:

Chris Ginther
Chief Administrative Officer

Karen Fritz
Chief Supply Officer

cc:	Nicolle Butcher	SVP Renewable Generation & Power Marketing
	Jon Franke	SVP Pickering
	Steve Gregoris	SVP Darlington
	Mark Knutson	Chief Enterprise Engineering & Chief Nuclear Engineer
	Robert De Bartolo	VP Supply Chain Materials
	Scott Burns	VP Security & Emergency Services
	Connie Hergert	VP Real Estate
	Jason Van Wart	VP Nuclear Waste & Commercial Services
	Adam Chiarandini	Director Enterprise Risk Management
	Janice Ding	Director Internal Audit
	Keren Morehead	Senior Manager Supply Chain
	Joseph Ng	Senior Manager Internal Audit
	Paul Anderson	Manager Internal Audit

ONTARIO POWER GENERATION

Internal Audit

Right Work, Right Time, Right Value – Station Productivity Initiative

October 7, 2021

Report Rating: **Requires Improvement**

Table of Contents

1.0 EXECUTIVE SUMMARY

1.1 Report Rating and Summary of Findings

Report Rating: **Requires Improvement**

No.	Finding	Risk Type	Risk Rating[1]		
			High	Moderate	Low
1	Key Performance Indicator ("KPI") reduction targets outlined in the Right Work, Right Time, Right Value ("RWRTRV") Charter were aspirational, and no progressive criteria was established to assess results.	Operational	X		
2	Formal close-out of completed sub-initiatives was not performed and documented.	Operational		X	
3	Some KPIs outlined in the Charter were not consistently reported to the Nuclear Executive Committee ("NEC") as the overall initiative progressed.	Operational			X
4	Initiative-wide risks documented in the Charter were not formally tracked and dispositioned within the initiative risk register.	Operational			X
Total		**4**	**1**	**1**	**2**

1.2 Background

Ontario Power Generation implements nuclear fleet initiatives ("NFI") with an objective of increasing productivity and efficiency and reducing costs across the nuclear stations. The "Right Work, Right Time, Right Value" ("RWRTRV") Station Productivity initiative was established to optimize cost and efficiencies in the execution of maintenance programs to support the safe and reliable operation of the nuclear stations. The expected benefits of the RWRTRV initiative were to increase station productivity by 25%, contributing to the overall target of reducing maintenance costs by approximately $30 million on an annual basis by 2021.

The RWRTRV initiative focused on implementing associated culture/behavioural changes to optimize equipment reliability through the efficient utilization of maintenance resources. The initiative originally included 11 sub-initiatives but as the project progressed they were combined into six sub-initiatives within the Station Productivity category:

- Working Efficiently – Increase Productive Time;
- Work Authorization Process Improvement (Work Approval Process);
- Work Protection Improvements;
- Enhancing Fix It Now (FIN) Team: FIN Resources;
- Assessing Optimization – Assessing Productivity; and
- Assessing Optimization – Technology Innovation.

The RWRTRV Focus Area Team ("FAT") was originally established to support and oversee the implementation of this initiative across Nuclear, and to ensure that its sub-initiatives were aligned with the Nuclear Business Plan commitments. Due to a restructuring of the Nuclear Fleet Strategy and Improvement ("NFSIP") organization during the latter part of 2020, the FAT disbanded, with sub-initiative work groups being assigned the responsibility for meeting their targets with monitoring and reporting support from the Contract-Senior Advisor, the Maintenance peer team, and respective representatives

[1] Please refer to Appendix C for risk rating definitions

at the Station Excellence Meetings (e.g. Operations Managers, Senior Vice Presidents, Work Management Director).

This audit was identified in Internal Audit's ("IA") 2021 Audit Plan given the significance of this initiative in driving efficiencies in the maintenance program with multiple stakeholder involvement across the nuclear organization and impact to work programs in the station.

1.3 Objective & Scope

The objective of this audit was to assess whether the goals and expected benefits of the RWRTRV initiative have been achieved and were providing value to OPG.

In order to achieve the audit objective, we reviewed the processes and tested, on a sample basis, whether:

A. Planning & Execution

- Planning included identifying key drivers and stakeholders, and setting clear objectives;
- Risks and issues for the initiative were assessed and managed;
- Significant changes to the initiative and sub-initiatives' scope and schedules were reviewed, approved through a formal change management process, and were formally communicated to Senior Leadership (e.g. Executive Sponsors);
- Work progress on sub-initiatives was monitored and updated to accurately reflect the status of deliverables, activities and interdependences;
- A post implementation review indicating whether the objectives were achieved was performed for completed sub-initiatives; and
- Funds and budget allocation to the overall RWRTRV Station Productivity initiative (and sub-initiatives as applicable) were tracked, appropriately managed, and transparently monitored.

B. Reporting & Monitoring

- Key performance monitoring:
  - Supported the initiative goal and anticipated benefits;
  - Measured results and tracked the completion of sub-initiatives; and
  - Included accurate and complete reporting.
- The status of sub-initiatives was communicated and monitored for effectiveness throughout execution/implementation;
- Sub-initiatives close-out were reviewed and approved based on:
  - Achievement of goals that were supported by results attributable to the initiative; and
  - Stakeholder's acceptance or acknowledgement at close-out, including the opportunity for continued application in station operations;
- Key operations and station environment were not adversely impacted by changes; and
- Existing open sub-initiatives were transferred / transitioned to appropriate owners to ensure accountabilities were preserved and continued progress was made towards completion.

C. Fraud Considerations

- There was intentional misreporting of initiative status for the funds originally allocated to the RWRTRV Station Productivity initiative.

D. Opportunities for Improvement

- There were potential opportunities for cost recoveries and savings related to efficiency of processes and documentation (e.g. automation, duplication of activities).

Scope Period: The scope included activities from March 29, 2019 to August 30, 2021. Precursor activities from prior periods were included as relevant.

Scope Exclusions: The Value Based Maintenance program was not in scope for the audit due to duplicate coverage by other oversight groups.

1.4 Conclusion

Overall, IA found that the RWRTRV Station Productivity Initiative requires improvement. While the Initiative has resulted in some cost reductions for maintenance activities, the initiative requires improvement in order to meet the goals and objectives established at the onset. A summary of positive observations, key audit findings and recommendations, and further opportunities for improvement is provided below.

Positive Observations

- Station maintenance activities are in a better position than prior to the start of the RWRTRV initiative. For example, measured improvements in maintenance efficiencies between 2018 and 2020 indicate cumulative savings of approximately $43 million, based on the $/Task metric. Key contributors to this improvement included the realignment of maintenance crews, shifting key maintenance crews to days based schedules, enhancing the size and capabilities of the FIN teams, improving maintenance resource utilization through schedule loading and minor maintenance / FIN work processes, and introducing remote work authorization capabilities; and

- The Maintenance Efficiency Power BI reporting application has improved Maintenance Managers' business acumen by providing a unique and near real-time perspective on work performed and cost of labor. The Power BI module is on OPG's intranet for all staff across the organization to review. Power BI shows maintenance efficiency trends by reporting year-to-date ("YTD") $/Task and YTD Tasks/FTE. These measures can be further filtered by station (i.e. Darlington or Pickering), reporting centre, by work crew, and by the amount of overtime hours and dollars. The different views provide helpful information to Management, and are discussed at station meetings throughout the year.

Key Findings & Recommendations

- The expected KPI benefits of increasing station productivity by 25% have not been achieved to date, and the performance as at the date of this report suggests that full achievement by the end of the year is unlikely. While Management has indicated that the 25% target was aspirational in nature, IA noted that progressive criteria had not been established in the Charter to indicate more realistic levels of success for the initiative. Management should critically assess the productivity savings achieved when closing out the initiative, and if a decision is made to continue with certain aspects of the initiative, consider re-evaluating the measures of success and establishing targets based on experience of the initiative to date; and

- No formal close-out summaries were performed for four completed sub-initiatives. Initiative close-outs provide a timely evaluation of the quantitative and qualitative benefits realized, and document whether all objectives were achieved, capability enhancements, monitoring and sustaining plans, and any outstanding actions and activities and their owners. Management should perform the close-out within six months of declaring the sub-initiatives complete (or as soon as practical) to document and record the information to ensure it is not lost due to staff turnover or passage of time.

The findings noted in this report has been reviewed with management, and they have committed to specific action plans. Please refer to Section 2.0 for specific details of the above findings, along with the associated risk impact, audit recommendations and management action plan.

Opportunity for Improvement

Terms of Reference (“ToR”) provide guidance, ensures all team members involved are in agreement with shared expectations, requirements, and provides clear ownership for the initiative (and sub-initiatives). A draft ToR was developed for the RWRTRV Station Productivity Initiative that included the objectives of the initiative and sub-initiatives, accountabilities and the staff members responsible for completing each sub-initiative; however it was not formally signed-off. IA recommends as a best practice that ToR be signed-off by all stakeholders prior to starting any future nuclear initiatives for alignment and the requirement be included in guides or governance for staff to reference.

2.0 DETAILED AUDIT FINDINGS

Internal Audit identified the following detailed findings which have been risk rated based on the definitions outlined in Appendix A.

1. KPI reduction targets outlined in the RWRTRV Charter were aspirational, and no progressive criteria was established to assess results.	**High**

The overall NFI objective was to increase productivity and efficiency, and reduce costs across the nuclear stations. The initiative was also brought about to optimize cost and efficiencies in the execution of maintenance programs to support the safe and reliable operation of the stations. The expected benefits of the RWRTRV initiative as outlined in the RWRTRV Charter was to increase station productivity by 25% as measured by $/Task and Tasks/FTE, to contribute to reductions in the overall maintenance costs of approximately $30 million on an annual basis by 2021.

Performance Measurement

A review of two KPIs as at September 10, 2021 tracked on the Power BI 'Maintenance Efficiency system' identified that progress has been made towards productivity improvement with 'Core Maintenance Cost Efficiency' at 3.1%, but there was a slight negative improvement with 'Core Maintenance Productivity' at (0.8)%. Despite the Maintenance Cost Efficiency gain, it does not appear that the progress will reach the 25% improvement goal by the end of 2021 (see chart below).

Tracking of the 25% Improvement Goal

KPI	Baseline 2017	Success Target 2021	Year-To-Date Sept 10 2021 (WW36)	Variance From Target Goal
The Core Maintenance Cost Efficiency (% improvement)	$2,377/Task	$1,783/Task 25% Improvement	*$2,303*/Task 3.1% Improvement	$550/Task 3.1%-25% = (21.9%)
The Core Maintenance Productivity (% improvement)	1.32 Tasks/FTE	1.65 Tasks/FTE 25% Improvement	1.31 Tasks/FTE (0.8)% Improvement	0.34 Tasks/FTE (0.8)%-25% = (25.8%)

Although the $/Task metric indicates cost reductions per task have been achieved during the initiative, no documented analysis has been performed to determine how these reductions materialized (e.g. allocating staff to perform other tasks; less overtime required; not requiring as many contract workers). In addition, a documented assessment of the Charter was not performed to outline and record how the RWRTRV initiative would directly contribute to the expected savings of $30 million per year.

Discussions with management have indicated that the 25% improvement target documented in the Charter was aspirational in nature. IA noted that progressive criteria had not been established in the Charter to mark advancing levels of success for the initiative (e.g. setting threshold, target and stretch goals, similar to those utilized in the formation of station scorecards). Also, there was no re-forecasting or re-evaluation throughout the initiative to adjust the target due to actual experience to date and consideration for unforeseen factors (e.g. the impact of the COVID-19 pandemic on maintenance activities).

Reported Metrics

In addition to the setting of aspirational targets, there are inherent weaknesses with the calculation of $/Task. This KPI is calculated by taking the total weekly dollars paid to maintenance staff directly involved with performing maintenance work from the MyTime system, divided by the total number of maintenance tasks completed as recorded in the Passport system. A potential downside for the $/Task KPI is that the metric worsens if more complex tasks take longer to complete. The measure can also

be manipulated if tasks were to be separated into smaller tasks, which would have the impact of increasing the overall number of completed maintenance tasks and improve the KPI – although there was no indication of this from IA's testing. Consideration should be taken to include other KPIs as a measure for Station Productivity (e.g. hours per task) that will measure the number of hours spent on completing tasks every week.

Potential Causes & Impact

Potential Causes:

- Initial measures of success established at the commencement of the RWRTRV initiative were aspirational rather than realistic targets, with no progressive criteria being established to recognize varying levels of achievement;
- The organization restructure in late 2020 disbanded the larger part of the FAT, potentially resulting in a lack of clarity around ownership of the initiative and focus during the transition; and
- In response to the COVID-19 pandemic, progress on target goals was delayed, as the company pivoted operational focus to pandemic response.

Potential Impacts:

- The reliance on aspirational targets for performance measurement may make it difficult for management to critically assess performance during the initiative period, and presents challenges for assessing initiative success and the development of corrective action plans; and
- Management may be unable to determine the source of productivity and efficiency gains and omissions through the focus on $/Task and Task/FTE metrics.

Recommendation

1. In the close-out report, include an assessment of target achievement and how the RWRTRV initiative contributed to the initial goal of reducing maintenance costs on an annual basis, and whether management considers the NFI to have provided value to OPG. The final report should be presented to senior leadership and key stakeholder groups (e.g. at a Site Excellence Meeting);

2. Critically reassess whether there are further sustainable gains which may be realized during the project, and focus measures on what KPIs are most relevant for measuring maintenance productivity (e.g. transitioning to an hours/task KPI, which would be a more objective determinant of productivity gains); and

3. If management determines that there is further value to be obtained either by continuing the initiative or commencing a new initiative, establish phased levels of SMART (i.e. specific, measurable, achievable, realistic and timely) goals to measure success against. This may be implemented similar to the threshold/target/stretch levels as established in the station scorecard.

Management Action Plan

Management will continue to work with site Maintenance managers to further review, develop, and document initiatives which will continue to improve/sustain Maintenance Efficiencies. Part of this review will include the determination of future Maintenance measures and targets. Any revised measure and targets will be included in the 2022 Power BI reporting platform.

Owner: Dave Guernsey, Director Central-led Functional Area Manager (CFAM) Maintenance
Target Completion Date: March 15, 2022

2. Formal close-out of completed sub-initiatives was not performed and documented. **Moderate**

The RWRTRV initiative charter defined the vision, goals, objectives, and detailed design for each initiative. OPG organizations should implement leading project management practices for initiatives, which includes identifying and documenting objectives and performance metrics in the planning phase as well as measuring, reporting, and evaluating outcomes in the execution and close-out phases. The NFI guide (N-GUID-08100-10001) also states that quantifiable benefits should be measured for initiatives, and that the completion of an initiative close-out (including sub-initiatives) is required including a summary, assessment of benefits realized, capability enhancements, monitoring and sustaining plans and any outstanding actions / activities within six months of declaring the initiative complete. Completing a timely close out is good practice to reduce the risk of losing organizational information on what was achieved and loss of knowledge from staff turnover.

IA reviewed documentation for RWRTRV's four sub-initiatives that were completed, and noted that a formal close-out had not been performed to determine whether the sub-initiatives either achieved or were trending towards achieving the objectives stated in the Charter. The four sub-initiatives and their completion dates were as follows:

Details	Completion Date
Enhancing Fix It Now (FIN) Team: FIN Resources	Q4 2019
Resource Strategy: Crew Strategy Changes	Q4 2019
Assessing Optimization: Assessing Productivity	PN – Q4 2019 DN – Q3 2020
Assessing Optimization: Technology Innovation	Q4 2020

Potential Cause & Impact

Potential Causes:

Management may have been unaware of the requirement to perform close-out evaluations for sub-initiatives.

Potential Impact:

Knowledge on the progress and results of the sub-initiatives may be lost or forgotten between completion of the sub-initiative and the overall initiative, particularly if there is staff turnover. This may further result in management and other stakeholders not being able to fully assess results in a timely and accurate manner.

Recommendation

1. Given the current status of the overall RWRTRV initiative as nearing completion, consideration of sub-initiatives should be contemplated in the final close-out report. In future similar initiatives, Management should perform a timely formal close-out of all completed sub-initiatives to determine if they were successful and trending towards achieving the overall RWRTRV initiative (i.e. within six months of completing a sub-initiative).

2. Management should evaluate the Nuclear Fleet Initiatives Guide to determine if it should be updated and used for future organizational initiatives, and appoint an appropriate owner of the document.

Management Action Plan
CFAM Management will prepare a close-out report of the completed initiatives and sub-initiatives before year-end. The report will evaluate if the RWRTRV met the objectives; initiatives have been completed and tasks that can be reviewed further; and what went well and opportunities to improve. The report will be presented at a senior leadership meeting (e.g. Site Excellence Meeting). Owner: Dave Guernsey, Director CFAM Maintenance Target Completion Date: January 31, 2022

3. Some KPIs outlined in the Charter were not consistently reported to the NEC as the overall initiative progressed.	**Low**

There were seven KPIs / Success Measures that were documented in the original Project Charter from 2019, and two others were added in 2021. Collectively, the KPIs were measures of activities and successes that would help achieve the overall RWRTRV initiative goals.

IA reviewed five NEC reports from 2019 and 2020, and noted that there was inconsistent reporting of RWRTRV's KPIs. IA also noted a lack of documentation to support the rationale for discontinuing the measurement and reporting of some KPIs, and the impact of the KPIs on the overall initiative. The Charter was not updated to reflect the changes, and additionally there were two new KPIs that were reported to the NEC as part of the RWRTRV initiative. These new KPIs were not consistent additions to the initiative's reporting.

Potential Cause & Impact

Potential Causes:

As the initiative progressed, the FAT decided that five of the original KPIs in the Charter were not necessarily a good representation of activities that drove station productivity in considering the goals of the RWRTRV initiative. Management has stated that senior Nuclear leadership was aware of these changes, and were involved in overseeing the work and measurement focus of the RWRTRV initiative throughout its progress.

Potential Impact:

A lack of documentation detailing the rationale for changes with the RWRTRV initiative's KPIs and targets may result in confusion and/or misalignment when reporting progress to senior management.

Recommendation

As part of the close-out report, management should reconcile current achievements and progress against the KPIs which were tracked against to assess the initiative's success. The rationale for KPIs that were dropped from the initiative's Charter should be documented as part of the close-out, and results reported to Senior Leadership and other applicable stakeholders.

Management Action Plan

Management will, as part of the close-out report, include a summary of the current achievements and progress against the KPI's and where deemed appropriate, document the rationale for dropping KPIs from the original Charter, and report the results to Senior Leadership and other applicable stakeholders.

Owner: Dave Guernsey, Director CFAM Maintenance
Target Completion Date: January 31, 2022

4. Initiative-wide risks documented in the Charter were not formally tracked and dispositioned within the initiative risk register.	**Low**

A risk log maintained on the RWRTRV team site records the identified risks, analysis of their severity, and remediation management action to be taken. IA confirmed that an Excel risk log was created and maintained for the RWRTRV sub-initiatives. The risk log did not include the six initiative-wide risks noted from the Charter that could impact the successful completion of the initiative. Two risks had been classified as high risk, and involved obtaining the support of stakeholders, senior management and the participation of staff. Two medium-rated risks related to senior leadership facilitation and the availability of engineering resources (this risk was attached to the Value Based Maintenance component of the RWRTRV initiative that was later spun-off), and the remaining two risks were identified as low. Management was aware throughout the project that success would require the support of senior management and staff, but these risks were not included in the risk log and re-evaluated throughout the initiative.

IA discussed the six risks with the Senior Advisor of the RWRTRV initiative, who noted that the risks were relevant at the outset of the initiative as outlined in the Charter and that the sub-initiative work groups were aware of them despite not being formally tracked in the risk register. The risks of staff participation and support were managed and addressed as work progressed, and they were not considered to have materialized in a way that significantly impacted the overall initiative.

Potential Cause & Impact

Potential Causes:

Management felt that the risks were appropriately managed through regular communication with stakeholders, senior management and staff, and that it was not necessary to include the risks in the log.

Potential Impact:

Inconsistent documentation, such as risks identified in the Charter and not formally recorded on the risk register, reduces the ability of OPG to demonstrate that risks were being appropriately managed, as well as the status of mitigation efforts to reduce the likelihood or impact of identified risks being realized.

Recommendation

The risks from the Charter should be formally tracked in a risk register and retained in a central repository (e.g. ePMX system or Sharepoint) so that the initiative work groups can demonstrate that due diligence was performed around risk management, including updating for management actions taken in response to identified risks and subsequent impact on risk assessment. Risks should also be updated within the register if they were fully dispositioned by management and closed.

Management Action Plan

Management will include the risks from the Charter for the RWRTRV initiative and monitor and respond to these risks if they impact the objectives of the successful completion of this project. The requirement to capture Charter risks in a risk log and where they should be recorded (e.g. ePMX or Sharepoint) will be included in governance and/or guides for future projects.

Owner: Dave Guernsey, Director CFAM Maintenance
Target Completion Date: January 31, 2022

APPENDIX A – RATING DEFINITIONS FOR AUDIT REPORTS

Finding: *Noted deficiency with potential impacts to the achievement of business unit/process area objectives, assessed using the following criteria:*

	High Risk	Moderate Risk	Low Risk
Safety & Social License	• Potential regulatory non-compliance. • Deficiencies that could result in: ○ Fatality, permanent disability, or lost time injury; ○ Data loss or unavailability of critical systems; ○ Security is compromised in sensitive / multiple areas; ○ Fraud / theft; or ○ Negative media coverage resulting in reputational damage.	• Insufficient evidence to support regulatory compliance. • Deficiencies that could result in: ○ Minor injury with no lost time; ○ Temporary data loss or unavailability of non-critical systems; ○ Security is compromised; ○ Fraud / theft with some mitigating controls; or ○ Public escalating concerns to OPG Management or local media.	• Documentation improvements to support regulatory compliance. • Deficiencies that could result in incidents that do not require medical treatment. • Deficiencies that do not result in any media attention negatively impacting OPG's reputation.
Financial	• Potential loss or financial impact =>5% of the sample population's value, or the department's OM&A budget if the former is unavailable.	• Potential loss or financial impact >=2% and <5% of the sample population's value, or department's OM&A budget if the former is unavailable.	• Potential loss or financial impact <2% of the sample population's value, or department's OM&A budget if the former is unavailable.
Operational Excellence	• Governance non-compliance or lack of/inadequate controls that may impact achievement of business or project objectives. • Errors in or insufficient internal reporting that drives senior management decision making. • Test results where =>25% of the sample had deficiencies in the execution of a key control.	• Governance non-compliance or lack of/inadequate controls with alternate controls in place to mitigate the impact to business or project objectives. • Errors in or insufficient internal reporting that could affect management decision. • Test results where >=10% and <25% of the sample had deficiencies in the execution of a key control.	• Governance compliance with procedural concerns or documentation issues which could impact OPG's ability to demonstrate appropriate due diligence. • Errors in or insufficient internal reporting that has minimal decision making impact. • Test results where <10% of the sample had deficiencies in the execution of a key control.

Opportunity for improvement: *Observation with no risk impact that is provided to management for consideration to improve efficiency of processes and documentation (e.g. automation, duplication of activities).*

OVERALL REPORT RATING SCALE

An overall audit rating is assigned based on the number of observations identified for the audit and their assigned risk rating:

	Number of Findings			
Finding Risk Rating	**1**	**2**	**3 - 4**	**=> 5**
High	Requires Improvement	Not Effective	Not Effective	Not Effective
Moderate	Generally Effective	Generally Effective	Requires Improvement	Not Effective
Low	Effective	Effective	Generally Effective	Requires Improvement

APPENDIX B – PROCESS OWNER & DISTRIBUTION LIST

Distribution:

Sean Granville
Chief Operations Officer and Chief Nuclear Officer

Jane Travers
VP Integrated Fleet Management

Zar Khansaheb
VP Generation Strategy and Innovation

cc:

Ken Hartwick	President & Chief Executive Officer
Jon Franke	SVP, Pickering
Steve Gregoris	SVP, Darlington
John Mauti	SVP, Finance & Chief Financial Officer
Alec Cheng	Vice President, Chief Controller & Accounting Officer
Adam Chiarandini	Director, Enterprise Risk Management
Janice Ding	Director, Internal Audit
Dave Guernsey	Director CFAM Maintenance
Emile Ramnarine	Director, Nuclear Oversight
Anthony Ling	Senior Manager, Internal Audit
Thomas Kelly	Manager, Internal Audit
Omar Laidlaw	Manager, Internal Audit
Vitangelo Cafagna	Contract – Senior Advisor

ONTARIO POWER GENERATION

Internal Audit

Shared Services Re-Imagine 1.0

January 6, 2022

Report Rating: **Not Effective**

Table of Contents

1.0 EXECUTIVE SUMMARY

1.1 Report Rating and Summary of Findings

Report Rating: **Not Effective**

No.	Finding	Risk Type	Risk Rating[1]		
			High	Moderate	Low
1	Some of the Re-Imagine 1.0 workstreams have either not fully met Line of Business requirements, and/or have not been adopted in business processes.	Operational	X		
2	Some Robotic Process Automations developed by the Re-Imagine 1.0 project are no longer in use, while others required enhancements after going into production.	Operational	X		
3	The Post Implementation Review ("PIR") was finalized late, and a change control form was not completed to update the PIR requirement.	Operational			X
Total		**3**	**2**	**-**	**1**

1.2 Background

OPG launched the Re-Imagine 1.0 program in 2018 with an objective to execute work differently, shift organizational culture, and become more agile as a company. Management completed the Re-Imagine 1.0 program in August 2020.

The Re-Imagine 1.0 program was designed to identify improvement opportunities that would make a significant and transformative change to the business through the review of OPG's end-to-end, cross-functional business processes in Shared Services, Finance and Supply Chain. The following four work streams were defined in the program:

- **Process Redesign and System Optimization** covered the elimination of work, standardization, and optimization of how employees used existing tools;
- **Robotic Process Automation ("RPA")** included deploying RPA for various Finance and Shared Service processes such as forecasting, inventory, correction journal preparation, intercompany and cost recovery billing;
- **Power BI Dashboard and Analytics Command Centre** provided integrated financial and operational data through dashboard reports and analytics using Power BI capabilities; and
- **Workflow and Self-service** covered the improvement of self-service capabilities for processes such as onboarding, offboarding, employee or vendor queries.

The total cost to execute the program was approximately $17.5 million, which included a project over-variance of $2.5 million approved in July 2020. The program was expected to yield savings of approximately 62 Full Time Equivalent ("FTE") positions.

The Re-Imagine 1.0 program was selected in Internal Audit's ("IA") Audit Plan due to the cost of the program and the productivity gains expected to be achieved.

[1] Please refer to Appendix B for risk rating definitions

1.3 Objective & Scope

The audit objective was to assess whether the Re-Imagine 1.0 program was properly closed out, benefits assessed, and overall results communicated to stakeholders.

To achieve the audit objective, we reviewed the process and tested, on a sample basis, whether:

A. Re-Imagine 1.0 Close Out
• Project closeout documentation was completed and approved by relevant stakeholders; • Acceptance criteria for Re-Imagine 1.0 initiatives were met, deliverables completed, and performance against target was measured; • Post Implementation Review ("PIR") and benefits assessment were conducted consistent with the approved PIR plan; • Lessons learned were identified and applied to the Re-Imagine 2.0 program; and • Results of the Re-Imagine 1.0 program were communicated to relevant stakeholders and Enterprise Leadership Team members.
B. Fraud Considerations
• No significant fraud risks were identified for inclusion within scope.
C. Opportunities for Improvement
• There are potential opportunities for cost recoveries and savings related to efficiency of processes and documentation (e.g. automation, duplication of activities).

Scope Period: The scope included activities from January 2019 to December 2020. Precursor activities from prior periods were included as relevant.

1.4 Conclusion

Overall, IA noted the activities undertaken to close-out, assess benefits, and communicate results of the Re-Imagine 1.0 project were not effective. A summary of positive observations and key audit findings and recommendations is provided below.

Positive Observations

- The Re-Imagine 1.0 program introduced a number of new applications that have contributed to OPG's efforts to streamline operations. Most notably, initiatives such as the MyRequest system within Human Resources and the Ariba Contract Management system within Supply Chain were found to be implemented and widely used by the business.

Key Findings & Recommendations

- IA noted that some of the Re-Imagine 1.0 workstreams either have not fully met Line of Business ("LOB") requirements, and/or have not been adopted in business processes. The final deliverable for three workstreams did not fully address the business requirements, one system developed through Re-Imagine 1.0 was not being used by the business, and change control documentation for one additional workstream was not prepared to remove the workstream's scope from the project.

  For workstreams where solutions did not meet all business requirements, Management should perform a Lessons Learned exercise to review the solutions implemented, identify high-level requirements that were not addressed, and assess whether future projects or base-support is required for the unresolved requirements. For workstreams where developed solutions are not being incorporated into business processes, line management should oversee appropriate change management to enable the realization of expected benefits; and

- Some RPAs developed by the Re-Imagine 1.0 project are no longer in use, while others required enhancements after going into production. A number of sampled RPAs deployed through the project were no longer in use primarily due to unmet business needs, inaccurate results generated, or from the impact of system changes subsequent to implementation. For future IT projects looking to implement emerging technologies such as Artificial Intelligence ("AI"), Management should ensure that business units are aware of the need to sustain the tools being developed, and that sufficient ongoing support is available to enable business units to sustain them.

The findings noted in this report have been reviewed with management and they have committed to specific action plans. Please refer to Section 2.0 for specific details of the above findings along with the associated risk impact, audit recommendations and management action plans.

2.0 DETAILED AUDIT FINDINGS

Internal Audit identified the following detailed findings which have been risk rated based on the definitions outlined in Appendix A.

1. Some of the Re-Imagine 1.0 workstreams have either not fully met Line of Business ("LOB") requirements, and/or have not been adopted in business processes.	**High**

The User Acceptance Testing ("UAT") Report is a required deliverable for IT projects per the *IT Project Management Guideline* (OPG-GUID-08120-0002). The UAT Report confirms and documents that the final project deliverables meet the agreed, predetermined requirements identified in the Business Requirements Document ("BRD"). The Project Sponsor's approval of the UAT indicates that project activities are essentially complete.

IA reviewed the systems implemented for a sample of six workstreams, and noted exceptions for five of the workstreams. Specifically, the final deliverable for three of the workstreams did not fully address business requirements. For one other workstream, although the system was implemented, the business had yet to utilize it for the intended purpose. In one other workstream, the system was not implemented as that scope was discontinued.

Details of IA's observations include the following:

- **'Supply Chain ("SC") Guided Buying'** - The project implemented system features for Guided Buying, although only a simplified catalog of items were introduced (e.g. office supplies, document shredding). Through the Roadmap to Excellence initiative, SC will be introducing additional services (e.g. Professional and non-consulting services) to be made available through guided buying. IA was unable to assess whether the business requirements for Guided Buying were fully addressed by the project, as neither the BRD nor the UAT documents were retained within Documentum;
- **'Supply Chain Lifecycle and Performance Monitoring'** - System features for Performance Monitoring (e.g. vendor scorecards) were implemented. However, the features for vendor master control (e.g. lifecycle management) were placed on-hold, due to challenges with system integration and a lack of business resources to support implementation efforts. Change control documentation was not prepared to remove the lifecycle management scope from the project;
- **'HR Service Desk'** - The project implemented the MyRequest system, which was in active use. However, IA noted that not all of the requirements identified in the BRD had been addressed by the project. Of the 147 requirements identified in the BRD, 81 (55%) were in pending, partially complete, or out-of-scope status. 44 of the 81 unresolved requirements were previously assessed by the business unit as "critical" requirements, another 26 assessed as "important", and the remaining 11 assessed as "optional";
- **'Finance Legal Consolidation'** - The project implemented the legal consolidation solution for the External Reporting Group; however, the team had yet to use the system for consolidation reporting purposes. IA noted that although an email was received from a Finance Senior Manager confirming UAT completion except for cash flow statement functionality, a formal UAT report was not prepared to confirm that the solution fully met the business requirements; and
- **'Finance Transaction Correction'** - This workstream was cancelled, as after BRD development, the Finance organization decided to not to pursue the solution because it would not provide the value expected. The discontinuation of work for this workstream was discussed in the January 2020 Steering Committee meeting; however, formal change control documentation was not created to remove the workstream from the scope of Re-Imagine 1.0 and it was incorrectly reported in the Project Closure Report ("PCR") as complete.

Potential Cause & Impact

Potential Causes:

- Being a new type of project to the organization, Re-Imagine 1.0 may have been attempting to accomplish more projects than feasible within the budget and schedule constraints, potentially resulting in not all business requirements being addressed;
- Issues that were not identified or anticipated during the planning phase of the project (e.g. data quality issues impacting the creation of a reliable system interface) may have presented challenges to the project in fully addressing the original business requirements; and
- The success of the project was dependent on the cooperation of and support from BU resources to implement business process changes to accommodate the new systems. Competing priorities and resource constraints within the BUs may have resulted in the implemented systems either not fully meeting the intended objectives, or not being fully adopted by the BU.

Potential Impact:

- Unanticipated challenges encountered by the Re-Imagine 1.0 project may have contributed to the project costs being over the originally determined budget; and
- The solutions implemented may not address all of the requirements identified by the BUs, which could challenge the business' ability to achieve intended cost reductions without introducing additional projects to fully utilize system features.

Recommendation

- For workstreams where delivered solutions did not entirely meet the BRD requirements, Management should perform a Lessons Learned ("LL") exercise to review the solutions implemented, identify the high-level requirements that were not addressed, and assess whether future projects or base-support is required for the unresolved requirements; and
- For workstreams that have not incorporated the accepted solution into current business processes (i.e. the Finance Legal Consolidation workstream), Line Management should oversee appropriate change management practices to enable the realization of the anticipated benefits.

Management Action Plan

1. For workstreams where delivered solutions did not entirely meet the BRD requirements, Management will engage the business groups to perform a LL exercise. As part of the LL, Management will:
   - Review the solutions that Re-Imagine 1.0 delivered (e.g. whether they continue to meet business needs);
   - Identify the high-level requirements that were not addressed through the project and determine whether they are still needed by the business units, and
   - Assess whether additional work is required to resolve the requirements that were not addressed by Re-Imagine 1.0, so they could be considered for future base-support and/or inclusion in the project portfolio for prioritization.

   Owner: Jesse Migliaro, Director Transformation Program
   Target Completion Date: August 31, 2022

2. For the Finance Legal Consolidation workstream, Management is in the process of getting BPC Consolidation operational by entering historical financial results into the system, and resolving differences between the system output and the official results manually prepared.

   Management will define a plan to adopt BPC Consolidation, including defined milestones for the following activities:

   - Entering 2021 financial results into BPC consolidation;
   - Performing parallel run for several quarters (with BPC consolidation and manual consolidation being performed concurrently);
   - Resolving differences from the parallel run; and
   - Go-live.

   Owner: Chessa Jope, Director External Reporting & Accounting Policy
   Target Completion Date: April 15, 2022

2. Some RPAs developed by the Re-Imagine 1.0 project are no longer in use, while others required enhancements after going into production.	**High**

RPA involves the introduction of software robots (or 'bots') that are programmed to simulate routine, repetitive human activity, such as clicking buttons and copying files, typically found in manual business processes. Replacing these actions by robots can increase process efficiency and overall productivity.

As identified in the PIR reports of the Robotics Process Automation and Enterprise Robotics Automation projects, 36 bots were implemented as part of the RPA workstream. IA selected a sample of 10 RPAs, and through discussions with the line of business RPA owners, noted the following observations:

- Four instances were identified in which the robot was not in use as of the date of this report. Specifically:
    - The 'Talent Attraction – Offer Letters' robot was never put into production as the complexity of data source hindered the bot's proper operation;
    - The 'Settlements Process' robot did not meet business needs and was unstable (e.g. RPA was slow and often timed-out), thus it has not been in use since 2019;
    - The 'Training Record Processing – Manual ITR & PEL' bot was put into production but taken out of service due to interface changes from the SmartForm application implementation. As at October 2021, the business group was addressing the changes while also considering other simpler and more sustainable alternatives; and
    - The 'PO processing' robot was reported to have contributed significantly to the clearing of open Purchase Orders ("PO") and Material Requests ("MR") in 2019, but was taken offline as the bot had occasionally closed POs and MRs in error. The bot has since been replaced by a Visual Basic and Excel-based tool named Service Dashboard which is more compatible with current system and provides enhanced analytics;
- The 'ICOFR Audit' robot used by HR Pay Support Services to detect unauthorized employee master data changes was not adequately designed, since it did not consistently detect all unauthorized changes to master data. As a result, the activities performed by the robot had to be manually re-performed in 2019 (i.e. a manual review of all master data changes to detect any unauthorized changes had to be done). The robot was abandoned, and a new robot subsequently built, which required additional expense and time from the business unit to help develop and test; and
- Five other bots ('Oncore', 'Onboarding', 'Business Expenses', 'Posting PO Notes to SWCMT' and 'Integrity Reports') remain in use and have been found to contribute to business process improvements. However, business units had to plan for and undertake sustainment activities to ensure the robots effectively meet business needs after being put into production.

Potential Cause & Impact

Potential Causes:

- Testing conducted by business units before the bots were placed into production may have been insufficient to anticipate certain issues. This would have led to errors only being detected while the bots were in active use (e.g. bots were closing POs in error, failing to detect unauthorized changes to employee master data);
- Inadequate support provided by the IT Services Provider and/or business unit to ensure the RPAs are updated to account for source-system and process changes.

Potential Impact:

- The resources assigned to the development of RPAs may not have consistently yielded their expected return; and
- There may be further disruption to standard business operations, as business resources have to re-perform work that was thought to be accurately processed by the robot.

Recommendation

Through the lessons learned from the Re-Imagine 1.0 RPA deployment, the Re-Imagine 2.0 Project Team should ensure that, for emerging technologies (e.g. AI tools) to be implemented:

- Checklists and documentation be provided to business unit management to inform them of the steady state support requirements;
- Ongoing support be available to help the business sustain the tools in their daily activities and troubleshoot unforeseen issues.

Management Action Plan

1. For new AI and RPA tools are deployed into production, checklists and documentation will be provided to business unit management to inform them of the steady-state support requirements for the tools (e.g. tools need to be continually updated to incorporate new scenarios, CIO support contacts).

   Owner: Daniel Lau, Senior Manager Digital Innovation & Strategy
   Target Completion Date: May 31, 2022

2. IT Services will ensure that ongoing support is available to enable business units to sustain the tools and troubleshoot unforeseen issues.

   Owner: Chris Woodcock, Director IT Services
   Target Completion Date: May 31, 2022

3. The PIR was finalized late, and a change control form was not completed to update the PIR requirement.	**Low**

The PIR Procedure (OPG-PROC-0056) indicates that a Comprehensive PIR ("CPIR") should be performed for projects that are strategic in nature and/or when requested by the Project Sponsor.

The PIR Plan in the full release BCS for Re-Imagine 1.0 noted that a CPIR was to be completed, as indicated by the Project Sponsor at the time, who was the Chief Information Officer.

In reviewing the PIR completed for Re-Imagine 1.0, IA noted the following:

- A Simplified PIR ("SPIR") was completed in place of a CPIR. As a result, the PIR performed for Re-Imagine 1.0 focused only on the targeted headcount reduction as a relevant metric, and did not include an evaluation of other measures, including an assessment of project management activities such as scope management and lessons learned on the investment. In addition, the project did not benefit from having an independent team to undertake the PIR for the project as required for a CPIR.

  The Re-Imagine 1.0 Project Management team indicated that the requirement for a CPIR was included in error, as it was intended that only a SPIR was to be prepared. This could not be validated by the original Project Sponsor, as they are no longer employed by OPG. A project change control form was not prepared to revise the PIR plan; and

- In accordance with OPG-PROC-0056, a SPIR is required to be completed no later than six months following the completion of a project (i.e. by February 2021 for Re-Imagine 1.0). IA noted that the PIR was finalized and approved by the new Project Sponsor in October 2021, 15 months following the Project Completion Report ("PCR") being completed.

Potential Cause & Impact

Potential Causes:

- With the actual spend for the Re-Imagine 1.0 project ($17.5 million) being below the dollar threshold recommended for a CPIR ($25 million), together with the change in Project Sponsor, the project team might not have been aware that a CPIR was requested in the PIR plan;
- A change control document to revise the PIR plan may not have been prepared as the error was discovered after the project closed; and
- Stakeholders in the completion of the PIR had competing priorities, potentially resulting in the completion of the PIR taking a lower priority and ultimately being completed later than the required timelines in OPG-PROC-0056.

Potential Impact:

- Lessons learned on the Re-Imagine 1.0 investment were not required as part of a SPIR, to inform management decisions when investing on other projects within OPG. While the project team did capture various lessons learned from Re-Imagine 1.0 for consideration when planning Re-Imagine 2.0, with the delay in completing the SPIR, there is a greater risk of not capturing all lessons learned accurately in a timely manner.

Recommendation

Given the project is closed and a SPIR has been completed, no action is required from the project's perspective.

The PIR Procedure (OPG-PROC-0056) training / reminders should be provided to stakeholders involved in the PIR process.

Management Action Plan
The PIR procedure will be reviewed and updated with an enhanced process. The roll out of the new procedure will include communication with key stakeholders regarding expectations. Action Owner: Garry Lam, Senior Manager, Portfolio Management Target Completion Date: September 30, 2022

APPENDIX A – RATING DEFINITIONS FOR AUDIT REPORTS

Finding: *Noted deficiency with potential impacts to the achievement of business unit/process area objectives, assessed using the following criteria:*

	High Risk	Moderate Risk	Low Risk
Safety & Social License	• Potential regulatory non-compliance. • Deficiencies that could result in: ○ Fatality, permanent disability, or lost time injury; ○ Data loss or unavailability of critical systems; ○ Security is compromised in sensitive / multiple areas; ○ Fraud / theft; or ○ Negative media coverage resulting in reputational damage.	• Insufficient evidence to support regulatory compliance. • Deficiencies that could result in: ○ Minor injury with no lost time; ○ Temporary data loss or unavailability of non-critical systems; ○ Security is compromised; ○ Fraud / theft with some mitigating controls; or ○ Public escalating concerns to OPG Management or local media.	• Documentation improvements to support regulatory compliance. • Deficiencies that could result in incidents that do not require medical treatment. • Deficiencies that do not result in any media attention negatively impacting OPG's reputation.
Financial	• Potential loss or financial impact =>5% of the sample population's value, or the department's OM&A budget if the former is unavailable.	• Potential loss or financial impact >=2% and <5% of the sample population's value, or department's OM&A budget if the former is unavailable.	• Potential loss or financial impact <2% of the sample population's value, or department's OM&A budget if the former is unavailable.
Operational Excellence	• Governance non-compliance or lack of/inadequate controls that may impact achievement of business or project objectives. • Errors in or insufficient internal reporting that drives senior management decision making. • Test results where =>25% of the sample had deficiencies in the execution of a key control.	• Governance non-compliance or lack of/inadequate controls with alternate controls in place to mitigate the impact to business or project objectives. • Errors in or insufficient internal reporting that could affect management decision. • Test results where >=10% and <25% of the sample had deficiencies in the execution of a key control.	• Governance compliance with procedural concerns or documentation issues which could impact OPG's ability to demonstrate appropriate due diligence. • Errors in or insufficient internal reporting that has minimal decision making impact. • Test results where <10% of the sample had deficiencies in the execution of a key control.

Opportunity for improvement: *Observation with no risk impact that is provided to management for consideration to improve efficiency of processes and documentation (e.g. automation, duplication of activities).*

OVERALL REPORT RATING SCALE

An overall audit rating is assigned based on the number of observations identified for the audit and their assigned risk rating:

	Number of Findings			
Finding Risk Rating	**1**	**2**	**3 - 4**	**=> 5**
High	Requires Improvement	Not Effective	Not Effective	Not Effective
Moderate	Generally Effective	Generally Effective	Requires Improvement	Not Effective
Low	Effective	Effective	Generally Effective	Requires Improvement

APPENDIX B – PROCESS OWNER & DISTRIBUTION LIST

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	Joseph Ng	Senior Manager, Internal Audit
	Nancy Woodward	Senior Manager, IT Program
	Giselle Contaste	Manager, Internal Audit
	Nellia Kamwendo	Manager, Internal Audit

ONTARIO POWER GENERATION

Internal Audit

Software Management

Date: April 20, 2022

Report Rating: [redacted]

Table of Contents

1.0 EXECUTIVE SUMMARY

1.1 Report Rating and Summary of Findings

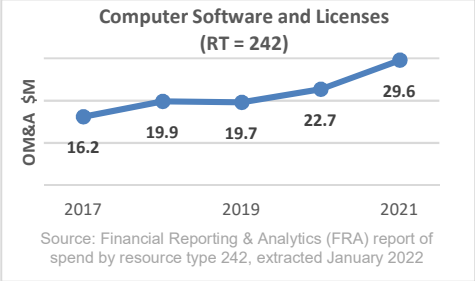
Report Rating: [redacted]

No.	Finding	Risk Type	Risk Rating[1]		
			High	Moderate	Low
1	[redacted]	[redacted]	[redacted]		
2	[redacted]				
3	Some software management process activities were not documented.				
Total					

1.2 Background

OPG uses many externally developed and licensed software packages to support business and operational requirements. Most are provided and supported through renewable software license agreements which govern the rules for fair use, while overall ownership and intellectual property rights for the source code is retained by the developer and distributor. Other types include perpetual license agreements and licenses through membership of organizations such as Electric Power Research Institute ("EPRI") and CANDU Owners' Group ("COG").

Over $29 million was spent in 2021 on "Computer Software and Licenses" which has been trending upward since 2017. Approximately 95% were incurred by the Chief Information Officer ("CIO") organization to support OPG operational software requirements. Other business groups with spend in this area are Renewable Generation (2.4%) and Nuclear (1.6%).



Source: Financial Reporting & Analytics (FRA) report of spend by resource type 242, extracted January 2022

Major software vendors periodically conduct software license audits to identify instances of non-compliance, which can result in financial penalties being imposed. A recent survey indicates these audits are increasing in frequency to combat software piracy and fines also provide an extra source of income for vendors[2]. Changes to vendor license agreement terms can increase the risk of non-compliance if business users are not updated. Some vendors may incorporate different software licensing technologies into products, such as central validation, which reduces the risk of non-compliance. IA is not aware of any OPG software-related fines in recent years.

Changes to business processes and software needs may result in unused or under-utilized software that OPG continues to pay for. The increase in cloud computing options including Software-as-a-Service ("SaaS") makes compliance with software licensing requirements more challenging, as user groups can enter into agreements for online software outside of the standard IT procurement process.

This was a risk-based audit identified in Internal Audit's ("IA") 2022 Audit Plan, due to the increasing usage of a variety of software products throughout the business.

[1] Please refer to Appendix A for risk rating definitions
[2] Which software publishers are currently auditing?", itassetmanagement.net, 2021

1.3 Objective & Scope

The objective of this audit was to assess whether the design and operating effectiveness of controls and processes in place to ensure OPG's compliance with contractual commitments for licensed software and optimization of licensing costs.

In order to achieve the audit objective, we reviewed the process and tested, on a sample basis, whether:

A. Control Environment and Risk Management
• There were clear policies and procedures in place to identify the roles, responsibilities and key objectives for software license management; • Key software vendors had designated contract managers assigned within OPG who were responsible for re-approving the licensing expenses, managing software demand and applying the required updates to the terms and conditions of the agreement; and • Key risks related to software licensing (including compliance and cost) were periodically monitored.
B. Software License Compliance
• Compliance with contractual commitments (whether by named users, installations, number of processor units, etc.) was monitored by management including vendor software auditing; • License renewals were processed timely; • Data used in license monitoring and auditing was verified to be accurate and complete; • Exceptions identified in external licensing audits were reviewed and validated by management; • Non-compliant software usage and installation on OPG devices (including laptops, desktops, servers and mobile devices) was prevented, detected, removed and investigated as necessary; • Contracts assigned to management license agreements for the business units were available and kept current; • Approvals to renew and pay for license agreements followed the requirements established in the Organizational Authority Register ("OAR"); and • PCard purchases were monitored for exceptions and reported to management.
C. Software License Cost Optimization
• Opportunities for software consolidation, optimization, reduction and/or elimination were pursued by CIO with the license holders in the business units; • Purchasing of software licenses (in terms of concurrent users, CPUs, subscriptions to online services including cloud applications, etc.) was limited to business need; and • Software spending through major distributors (e.g. Softchoice) was monitored and supported by favorable contract terms (e.g. rebates).
D. Fraud Considerations
• Intentional circumvention of established controls by employees to procure, install or use unlicensed software.
E. Opportunities for Improvement
• Potential opportunities for cost recoveries and savings related to efficiency of processes and documentation (e.g. automation, duplication of activities).

The scope included activities from January 1, 2021 to January 31, 2022 and included both software procured through CIO and software procured directly by business units.

1.4 Conclusion

Overall, the processes and controls over software management and software compliance require improvement. Evidence of consistent operation of some activities was not retained, and some processes were not well-documented. A summary of positive observations, key audit findings and recommendations, and opportunities for improvement is provided below.

Positive Observations

- The CIO IT Services tracked license renewal dates in the CIO IT Asset/Contract Tracking SharePoint System and periodically reviewed using Look-ahead Reports to manage the upcoming license renewals;
- The Microsoft System Center Configuration Manager was used to remove specific software to recover unused licenses automatically; and
- A relationship with a preferred software reseller, SoftChoice, had been established to facilitate cost savings with volume licensing for certain standard software purchases.

Findings & Recommendations

- [redacted]
- [redacted]
- Some software management process activities were not documented to facilitate consistency in execution. CIO management should document software management process activities that are to be defined per the Software Asset Management Plan.

The findings noted in this report have been reviewed with management, and they have committed to specific action plans. Please refer to Section 2.0 for specific details of the above finding along with the associated risk impacts, audit recommendations and management action plans.

Opportunities for Improvement

- The CIO risk management process used a “top-down” risk identification approach, covering residual risks from an organizational perspective, which did not include operational risks such as software license monitoring. CIO management may consider including a “bottom-up” approach to identify, evaluate, assign ownership and track operational risks.
- [redacted]

2.0 DETAILED AUDIT FINDINGS

Internal Audit identified the following detailed findings, which have been risk rated based on the definitions outlined in Appendix A.

1. [redacted]

[redacted]

Potential Cause & Impact

Potential Cause:

[redacted]

Potential Impact:

[redacted]

Recommendation

[redacted]

[3] Refer to Finding 2 for further details on impact for the License Gap Risk Report.

Management Action Plan

[redacted]

2. [redacted]

[redacted]

Potential Causes & Impact

Potential Causes:

- [redacted]
- [redacted];
- [redacted];
- [redacted]
- [redacted].

Potential Impact

[redacted]

Recommendation

[redacted]

Management Action Plan

[redacted]:

- [redacted];
- [redacted]
- [redacted].

[redacted]

3. Some software management process activities were not documented. [redacted]

The Information Management Program (OPG-PROG-0001) sets out requirements to create and maintain documentation over roles and accountabilities. Documentation is critical to quality and process control, and facilitates consistent and effective software management activities as well as knowledge-sharing within the CIO team.

[redacted].

Meeting materials, minutes and action logs are maintained for BSC meetings; however, the following are some of the active processes executed within CIO IT Services management where no documentation was available to describe the activities:

- [redacted]
- [redacted];
- [redacted]
- [redacted]

Management have commenced the establishment of program documentation through the issuance of a Strategic Asset Management Program document on March 11, 2022, with further development of asset management process documentation for software, hardware, IT contracts and IT projects to follow.

Potential Cause & Impact

Potential Cause:

Documenting activities related to software compliance monitoring was not prioritized.

Potential Impact:

Software license compliance related activities may not be executed consistently, particularly in the event of turnover in personnel.

Recommendation

CIO management should document the following processes:

- Review of monthly license compliance reports and follow up on discrepancies identified;
- Management of the PoE mailbox and provision of PoE entitlement detail to NHSS;
- Review of Look-ahead Report to monitor upcoming license renewals; and
- Use of Microsoft System Center Configuration Manager to remove specific software to recover unused licenses.

For process documents outside the OPG governance document hierarchy, documents should include the expected review period and version record to ensure these documents remain up to date and the correct version is used to carry out process activities.

Management Action Plan
CIO Management will issue a comprehensive Software Asset Management Plan (“AMP”), with Corporate and LOB adherence in mind. The Software AMP will describe: • Process for managing and renewing software licenses; • Requirements for Business Continuity per application; • Mechanism to observe/measure/report on software license compliance; and • Process for determining software asset value [redacted]

APPENDIX A – RATING DEFINITIONS FOR AUDIT REPORTS

Finding: *Noted deficiency with potential impacts to the achievement of business unit/process area objectives, assessed using the following criteria:*

	High Risk	Moderate Risk	Low Risk
Safety & Social License	• Potential regulatory non-compliance. • Deficiencies that could result in: ○ Fatality, permanent disability, or lost time injury; ○ Data loss or unavailability of critical systems; ○ Security is compromised in sensitive / multiple areas; ○ Fraud / theft; or ○ Negative media coverage resulting in reputational damage.	• Insufficient evidence to support regulatory compliance. • Deficiencies that could result in: ○ Minor injury with no lost time; ○ Temporary data loss or unavailability of non-critical systems; ○ Security is compromised; ○ Fraud / theft with some mitigating controls; or ○ Public escalating concerns to OPG Management or local media.	• Documentation improvements to support regulatory compliance. • Deficiencies that could result in incidents that do not require medical treatment. • Deficiencies that do not result in any media attention negatively impacting OPG's reputation.
Financial	• Potential loss or financial impact =>5% of the sample population's value, or the department's OM&A budget if the former is unavailable.	• Potential loss or financial impact >=2% and <5% of the sample population's value, or department's OM&A budget if the former is unavailable.	• Potential loss or financial impact <2% of the sample population's value, or department's OM&A budget if the former is unavailable.
Operational Excellence	• Governance non-compliance or lack of/inadequate controls that may impact achievement of business or project objectives. • Errors in or insufficient internal reporting that drives senior management decision making. • Test results where =>25% of the sample had deficiencies in the execution of a key control.	• Governance non-compliance or lack of/inadequate controls with alternate controls in place to mitigate the impact to business or project objectives. • Errors in or insufficient internal reporting that could affect management decision. • Test results where >=10% and <25% of the sample had deficiencies in the execution of a key control.	• Governance compliance with procedural concerns or documentation issues which could impact OPG's ability to demonstrate appropriate due diligence. • Errors in or insufficient internal reporting that has minimal decision making impact. • Test results where <10% of the sample had deficiencies in the execution of a key control.

Opportunity for improvement: *Observation with no risk impact that is provided to management for consideration to improve efficiency of processes and documentation (e.g. automation, duplication of activities).*

OVERALL REPORT RATING SCALE

An overall audit rating is assigned based on the number of observations identified for the audit and their assigned risk rating:

	Number of Findings			
Finding Risk Rating	**1**	**2**	**3 - 4**	**=> 5**
High	Requires Improvement	Not Effective	Not Effective	Not Effective
Moderate	Generally Effective	Generally Effective	Requires Improvement	Not Effective
Low	Effective	Effective	Generally Effective	Requires Improvement

APPENDIX B – PROCESS OWNER & DISTRIBUTION LIST

Distribution:

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	Nancy Woodward	Senior Manager, IT Program
	Arun Navaratnasingam	Manager, Internal Audit

ONTARIO POWER GENERATION

Internal Audit

Climate Change Strategy

July 28, 2022

Report Rating: **Requires Improvement**

Table of Contents

1.0 EXECUTIVE SUMMARY

1.1 Report Rating and Summary of Findings

Report Rating: **Requires Improvement**

No.	Finding	Risk Type	Risk Rating[1]		
			High	Moderate	Low
1	An overarching process was not in place to track progress towards net-zero by 2040.	Operational		X	
2	Action owners did not consistently provide detailed updates in Asset Suite to enable tracking and reporting.	Operational		X	
3	Business units did not always assess potential investments for climate change risks and adaptation opportunities, and risk assessment information entered into the C55 system was not always complete and accurate.	Operational		X	
4	Plans for the implementation of certain recommendations by the Task Force on Climate-related Financial Disclosures ("TCFD") were yet to be developed.	Operational			X
Total		**4**	**-**	**3**	**1**

1.2 Background

Climate change is an important issue impacting Ontario and OPG. The company has set targets to be a net-zero carbon company by 2040, and to support Ontario's goal of a net-zero carbon economy by 2050. In November 2020, OPG launched a Climate Change Plan ("CCP") to document and establish plans to meet its targets, which includes actions to mitigate and also adapt to climate change risks, and initiatives to innovate and lead others to manage climate change. As a leader, OPG established the CCP in advance of a legislative or policy framework based on best available information, and may need to review its plans as further guidance becomes available.

Under the direction of the Climate Change Steering Committee, the Climate Plan Working Group ("CPWG") ensures alignment on the progression of CCP actions, including providing a forum for sharing updates and requests for management support. The Climate Change Adaptation Working Committee's ("CCAWC") original mandate was to execute the enterprise roadmap for the coordination of adaptation activities. Adaptation activities were formerly led by the Enterprise Risk Management organization, and were transitioned to Environment, Health and Safety ("EH&S") in 2021, who are in the process of revising the adaptation strategic priorities for the business. Climate change activities are guided by the *Management of Climate Change* Standard (OPG-STD-0172) and *Adapting to Climate Risk* Standard (OPG-STD-0143).

As part of the annual business planning process, Business Units ("BUs") are required to identify projects and initiatives that facilitate OPG's climate change mitigation and adaptation efforts. In 2017, the Task Force on Climate-related Financial Disclosures ("TCFD") recommended that organizations develop climate-related financial risk disclosures that are measurable and relevant to stakeholders. OPG is currently reporting on most of the metrics included in the TCFD's recommendations in the quarterly Management Discussion and Analysis ("MD&A"). In the summer of 2022, OPG plans to introduce an Environmental, Social and Governance ("ESG") Report, where climate change performance will also be included.

[1] Please refer to Appendix B for risk rating definitions.

This was a risk-based audit identified in Internal Audit's ("IA") 2022 Audit Plan, selected given the importance of OPG's Climate Change Plan to the company's ESG performance.

1.3 Objective & Scope

The objective of this audit was to assess the design and operating effectiveness of processes and controls in place to enable OPG to achieve the commitments outlined in the company's CCP, and to assess the company's readiness for potential future reporting obligations in accordance with Canadian securities regulations. To achieve the audit objective, we reviewed the process and tested, on a sample basis, whether:

A. Governance
• OPG's climate change strategy and plan aligned with the company's strategic priorities, and included an accountability framework assigning roles and responsibilities; • Relevant stakeholders were engaged to implement a systematic approach to climate change efforts, and a communication strategy developed to ensure the messaging to these stakeholders supported OPG's social licence imperative; • Required financial, human & operational resources had been identified to support CCP efforts; and • Relevant climate science and data was maintained in the climate resilience toolkit.
B. Climate Change Actions (e.g., Mitigate, Adapt, Innovate, and Lead)
• The actions identified in the CCP to be completed by 2025 were being progressed and tracked to their timely completion; • Climate change actions to be completed beyond 2025 were identified, measurable, & progressed; • Mitigation and adaption projects and initiatives identified in the Business Plans ("BPs") were costed, monitored and executed; • Climate change vulnerabilities were identified and risk treatment activities were developed and documented; • Projects were assessed for climate vulnerabilities and potential opportunities to increase resilience; • Climate change-related performance metrics in executive compensation arrangements were appropriately aligned to OPG's climate strategy; and • Greenhouse gas ("GHG") emissions were being monitored in support of making OPG a "net-zero" carbon company by 2040.
C. Reporting
• The status of planned actions to address climate change were reported in order to assess their progress and effectiveness; • Risks and performance metrics (e.g. GHG emissions) were accurately prepared and reported; • CCP reporting to the Board was aligned with the progress of climate change actions and other internal / external reports; • Climate change data was available to facilitate ESG reporting, and emerging and/or best practices reporting requirements (e.g. the proposed National Instrument 51-107); and • TCFD recommendations were being implemented as appropriate.
D. Fraud Considerations
• GHG emissions may be intentionally reported incorrectly.
E. Opportunities for Improvement
• There were potential opportunities for cost recoveries and savings related to efficiency of processes and documentation (e.g. automation, duplication of activities).

Scope Period: The scope included activities from January 1, 2021 to May 31, 2022 and precursor activities from prior periods as relevant.

1.4 Conclusion

Overall, the processes and controls in place to enable OPG to achieve the commitments outlined in the company's CCP require improvement. A summary of positive observations, key audit findings and recommendations, and opportunities for improvement is provided below.

Positive Observations

- Data on carbon emissions from OPG's operations ("scope 1"), required to be reported per Federal and Provincial regulatory requirements, were accurately captured. IA also noted a robust review process and oversight to confirm the accuracy of the emissions information;

- There was an established communication plan to support the CCP roll-out, which included multiple streams of communication aimed at internal and external stakeholders. Modes of communication included webinars, internal webpage, meetings, presentations and several forms of social media; and

- The Model Development & Analytics team collaborated with EH&S to develop a "net-zero mixer" model, which calculates the expected GHG emissions in Ontario under various energy demand and supply mix scenarios, based on the degree of electrification (e.g., in the transportation sector) and projected installed generation capacity by type (e.g. Nuclear, Gas-fired) in future periods. The model should help OPG in developing the pathway towards the goals stated in the CCP.

Key Findings & Recommendations

- Management has yet to establish an overarching process to track progress towards net-zero by 2040. The initiatives and the costs needed to support net-zero were not yet defined, and any gaps that may exist to achieve net-zero, after implementation of the initiatives, were not yet determined. Recognizing the significant uncertainties that exist around the success of currently identified initiatives and future organizational, societal and regulatory developments, IA recommends that management establishes a roadmap to track progress to net-zero, including key indicators of success for identified initiatives and quantification of estimated costs of achieving net-zero;

- CCP action owners did not consistently provide detailed updates in Asset Suite to enable tracking and reporting. In addition, a process to report on overall progress of detailed actions towards the CCP goals had not been implemented. IA recommends that, where applicable, management ensures that CCP actions are measurable, CCP action status updates are provided in sufficient detail to demonstrate progress towards completion, and a process is established to enable periodic communication on the status of actions on a program-wide basis to key stakeholders; and

- Business units did not always assess potential investments for climate change risks and adaptation opportunities, and risk assessment information entered into the Copperleaf 55 ("C55") system was not always complete and accurate. IA recommends that additional training be provided to subject matter experts and investment owners on the requirements outlined in governance on when and how to perform climate risk assessments, and that the enterprise-wide adaptation strategy currently under development is finalized and implemented within the business to support the identification of climate change adaptation and resiliency benefits in investment opportunities.

The findings noted in this report have been reviewed with management and they have committed to specific action plans. Please refer to Section 2.0 for specific details of the above findings along with the associated risk impact, audit recommendations and management action plans.

Opportunities for Improvement

- Expectations for organizations to incorporate corporate ESG measures into executive compensation arrangements, including those related to an organization's climate change related performance, are becoming increasingly prominent among various stakeholder groups[2]. The measure developed by Management for inclusion in the company's 2022-24 Medium Term Incentive Plan ("MTIP"), as approved by OPG's Board of Directors in February 2022, is based on the timeliness of placing certain execution-phase projects with stated climate change benefits in service in accordance with OPG's capitalization policy.

  As the incorporation of ESG measures into executive compensation arrangements become more mature across the industry, IA recommends that OPG continues to monitor developments in best practices, and incorporate into future executive compensation arrangements as appropriate;

- In reviewing the incorporation of CCP actions within Asset Suite, IA noted that none of the 25 CCP actions due to be completed by 2040 and 2050 are currently being tracked in Asset Suite. IA recommends that CCP actions due in 2040 and 2050 are assessed for any potential activities due to be scheduled in shorter time intervals, and document these constituent activities within Asset Suite with defined milestones and assigned owners as appropriate;

- The climate change resilience toolkit provided information on climate change adaptation which was beneficial to project owners as they assessed whether projects required a climate change assessment and would impact climate resilience. However, there was no defined minimum frequency to update the toolkit information to ensure the information is current. IA recommends that intervals for assessing whether the data in the toolkit is up to date are defined and implemented accordingly; and

- OPG-STD-0172 Section 2.1 outlines that Management roles and accountabilities are identified in section 3.0 of the Standard as well as the CCP, although the CCP did not include this information. IA recommends that Management should update the Standard to remove references that Management roles and accountabilities are cited in the CCP.

[2] Principle 6 – Incentivization in *"How to Set Up Effective Climate Governance on Corporate Boards Guiding principles and questions"*, World Economic Forum, 2019

2.0 DETAILED AUDIT FINDINGS

Internal Audit identified the following detailed findings which have been risk rated based on the definitions outlined in Appendix B.

1. An overarching process was not in place to track progress towards net-zero by 2040.	Moderate

OPG targets to become a net-zero carbon company by 2040. The proposed method for calculating net-zero was defined in OPG's CCP, and includes the aggregation of direct and indirect carbon emissions from OPG generating stations and purchased energy, reduced by emissions eliminated through carbon removal solutions and purchase of offset credits from third parties. The ongoing work to define net-zero and establish legislative/regulatory frameworks at both the provincial and federal levels create uncertainty for OPG's climate change program.

The expected reduction in carbon emissions through major strategic initiatives, including Small Modular Nuclear ("SMR") development, transportation electrification, hydroelectric generation investment, and the purchase of offset credits, were quantified and disclosed in the CCP. The plan provided different scenarios that may be pursued in relation to the initiatives.

IA noted that while management is tracking the planned volume of greenhouse gas ("GHG") emissions expected from OPG generating stations up to 2040, and is aware of emissions reductions from its planned projects, an overarching process to enable continued tracking of the contribution of identified initiatives towards net-zero by 2040 was not in place. Such a process may have the following benefits:

- A more comprehensive and transparent identification of expected initiatives and their contribution to reducing GHG emissions. This would include recognizing management's best estimate and key assumptions required to recognize this estimate, while acknowledging the risks and uncertainties associated with achieving this estimate, and formation of risk mitigation plans and actions where appropriate;

- Identification of potential gaps to achieving net zero where current planned identified initiatives are not expected to fully offset GHG emissions. Identifying any such gaps would enable OPG to take better informed actions and aim efforts at other initiatives, where viable;

- Enable the ability to reforecast OPG's trajectory to net zero in a more timely manner to take account of new information; and

- Provide OPG's Executive Leadership Team ("ELT") with more information to monitor OPG's current forecast position, challenges and uncertainties in a more defined manner.

While management has developed scenarios of GHG emissions that could be avoided from developments in the generation mix in the Ontario market (e.g., the deployment and use of SMRs in place of thermal generation), the modelling developed thus far estimates the emissions position of the province as opposed to that of the company, including contributing actions and emissions from all market participants. In order to track the company's progress to net-zero, the modelling would require to be tailored to identify OPG's contribution to the energy mix, and be supplemented with estimated emissions savings from the climate actions identified by management that are not directly linked to the company's generation.

Potential Cause & Impact

Potential Causes:

- The forecasting of the impact of actions in mitigating projected emissions has been hindered by the significant levels of uncertainty in both the execution and evolution of both identified initiatives and current industry issues which are not within OPG's control, such as:
  - the output-based pricing system ("OBPS"), and the role of emitting generation (i.e., natural gas) to support the development of non-emitting resources like SMRs and renewables;
  - the carbon offset system, which is not currently in place in Ontario and is uncertain in both the construct of the market and the pricing of potential offsets (management is in the process of preparing a high-level offset cost analysis); and
  - limitations in carbon capture technology, which remains in its early stages; and
- Competing priorities in executing other aspects of the climate change program may have resulted in less importance being placed on such tracking, given the longer-term nature of CCP objectives.

Potential Impact:

- If a projected roadmap to net-zero is not developed, the effectiveness of planned initiatives and emissions status may be unknown or difficult to track. This could result in gaps requiring either more than planned purchase of energy credits to achieve net-zero, or additional initiatives to reduce carbon emissions; and
- OPG may not be able to identify and manage key risks associated with executing some of its "known" initiatives at a sufficiently detailed level.

Recommendation

Management should:

- Refine its process to enable tracking the contribution of relevant initiatives towards net-zero, incorporating projected emissions and forecast reductions from identified initiatives;
- Quantify the estimated costs associated with any revised plans or initiatives. This includes updating and expanding the offset cost analysis currently under development; and
- Communicate to the ELT on a prescribed frequency on the current forecast of tracking to net zero.

Management Action Plan

Management will:

- Update OPG's net zero forecast to track the contribution of key initiatives, including projected emissions and reductions. This will be completed every two years, or on an ad hoc basis when any significant changes to expected emissions, key initiatives or major regulatory developments (e.g., finalization of the federal Clean Electricity Standard) occur;
- Quantify and update the estimated costs of purchasing offsets for OPG's net zero planning scenarios, as the regulated and voluntary offset market gain certainty. This will include updating and expanding the offset cost analysis currently under development; and
- Communicate the information above to the ELT in accordance with the frequency above (i.e. every two years or on an event-driven basis as appropriate).

Action Owner: John Beauchamp, Director, Environment, Health & Safety

Target Completion Date: June 15, 2023

2. Action owners did not consistently provide detailed updates in Asset Suite to enable tracking and reporting.	**Moderate**

OPG's *Management of Climate Change* standard (OPG-STD-0172) indicates that CCP actions associated with 2025, 2040 and 2050 timelines are to be tracked in Asset Suite. The standard further requires that OPG reports progress on CCP activities to the Board through various channels, including semi-annual reporting with support from the senior-level Climate Steering Committee, the CPWG, and other departments.

OPG's CCP was launched in November 2020 and outlined climate actions, including some aspirational overarching actions. Actions may be added and removed in accordance with line of business priorities and evolutions in climate change initiatives. The Asset Suite system is used to track ownership, progress, and status of CCP actions, and Action Owners are expected to update the action status on all identified actions on a semi-annual basis at minimum. As of the date of this report, there have been two updates since the inception of the CCP (i.e. August 2021 and May 2022).

IA's review identified the following observations on the process to track CCP actions in Asset Suite:

- A process to provide an aggregated summary of overall progress of relevant detailed actions towards the CCP goals had not been implemented;
- Of the 68 identified climate actions due by 2025 or 2026 that were tracked in Asset Suite:
  - Status updates provided for nine actions did not include specific details to enable management to assess the progress made. For example, some action owners documented items were "in-progress, on target", with no additional information provided on actual progress on the actions to date. IA also noted that the owners for another nine actions did not provide an update for at least one cycle;
  - Milestones were not defined for 23 actions that were due in 2025 and 2026, to enable Management to periodically monitor and track progress against plan to facilitate consistent reporting and review of the status of actions;
  - Thirteen actions had their due dates revised from December 2025 to December 2026, one year after the originally planned timeline. Justification was not provided on the reasons for the deferral except in one instance;
  - Ten actions were documented as high-level objectives, and did not have specific actions associated with them; and
  - Three actions were closed without documentation to support the basis on which they were closed. Three additional actions had closure notes; however, the actions were not closed in the system.

Potential Cause & Impact

Potential Causes:

- Certain action owners (e.g., owners involved in the development of small modular reactors) report status of their initiatives through alternate channels (e.g., directly to line management or the Board of Directors), and may have overlooked documenting detailed updates in the Asset Suite system;
- Lack of developed program level view as a result of potential over-reliance on action owners executing assigned actions within their area of accountability;
- Some climate actions were not developed using the SMART (Specific, Measurable, Achievable, Reasonable, Time bound) criteria; and
- Some actions may have been deferred due to competing priorities (e.g., the company's response to the COVID-19 pandemic).

Potential Impact:

- Stakeholders may not be aware of the progress of climate change actions, as the status of actions reported in Asset Suite were not always accurate and complete;
- Certain climate actions may not measurable, achievable and time bound, as they were not developed using SMART principles; and
- By not tracking the status of actions in the aggregate, overall program action health versus expected timelines may be difficult to determine and required corrective actions may not be taken.

Recommendation

Management should establish a process to manage CCP actions, and:

1. Develop a SMART guide to support lines of business to ensure that pertinent climate change actions are specific, measurable, and timely. Deliverables and milestones on a prescribed frequency should be defined for SMART actions;
2. Ensure that the CPWG tracks the status updates provided by action owners and that progress towards completion is being demonstrated;
3. Incorporate an aggregate summary of climate change action status in the annual CCP status update to key stakeholders; and
4. Document closure notes in Asset Suite for all closed actions.

Management Action Plan

Management will:

1. Develop a SMART guide to support lines of business to ensure that pertinent climate change actions are specific, measurable, and timely. Annual deliverables and milestones will be defined, where applicable, by line management;
2. Refine the process to ensure that status updates are provided by action owners on a bi-annual frequency within Asset Suite;
3. Incorporate an aggregate summary of climate change action status in the annual CCP status update to key stakeholders; and
4. Document closure notes in Asset Suite, confirming that closed actions are, in fact, complete. This guidance will be included in SMART guide referenced in recommendation #1.

Action Owner: Barbara Medeiros, Senior Manager, Environment, Health & Safety

Target Completion Date: March 15, 2023

3. Business units did not always assess potential investments for climate change risks and adaptation opportunities, and risk assessment information entered into the C55 system was not always complete and accurate.	**Moderate**

The *Adapting to Climate Risk* Standard (OPG-STD-0143) requires BU investment owners to identify and flag in the C55 system whether climate change and climate resilience risks and opportunities are considered for potential investments during the investment planning phase. In their BP presentations, BUs are required to provide a summary of investments and projects that were flagged for climate assessment and the potential to increase climate resilience.

The climate assessment and climate resiliency flag completion requirement within C55 was introduced for new investment opportunities only at present, and has not yet been applied to assess existing OPG assets for risks and mitigating actions. IA reviewed potential investments that BUs identified in the C55 system and the annual business planning presentations, and noted the following:

- Climate adaptation flags were added to the system in September 2021. From this date, there were a total of 648 investments added into the C55 system. Of those 648 investments, 297 (46%) investment owners did not complete the flag indicating whether a climate change assessment was needed. Of the 297 investment owners who did not complete this flag, 228 also did not complete a flag to indicate whether the investment would improve climate resilience or mitigate transition risks;

- With formal assessments of climate resiliency for existing assets still to be undertaken, it was noted that only a small proportion of investment opportunities entered into C55 since the implementation of adaptation flags (i.e. less than 5%) were noted as having a climate resiliency benefit;

- Climate change information / flags entered into C55 by BU investment owners were sometimes incomplete or inaccurate. For example:

  - Three projects included in the MTIP scorecard metric as supporting climate change adaptation efforts did not have climate change or climate resilience assessments as required in C55;

  - Of a sample of 13 projects, four were flagged as not requiring a climate assessment despite having identified transition risks. In further discussions, the respective BU investment owners indicated that the projects had been incorrectly flagged to have a resilience impact; and

  - Four projects documented in BP presentations as having climate adaptation benefits were either flagged in C55 as not requiring a climate change assessment, or was not flagged in C55.

- For investment programs identified in BP presentations as contributing to climate resilience, it was not always clear how such projects increased climate resiliency. For example, programs such as Market Renewal for Energy Markets and Pickering Wi-Fi Powerhouse were identified as increasing climate resilience through changing climate parameters; however, the program elements noted as providing the benefit did not align with climate resilience contributions identified in OPG-STD-0143.

Potential Cause & Impact

Potential Causes:

- BU investment owners may not have been familiar with the requirement to complete a climate change assessment for potential investments and document the assessment completion in C55;
- Historically, when assessing potential investments to progress to projects, evaluation criteria has been based on commonly established principles (e.g., economic justifications or assessments of component reliability based on operational experience). Results of the climate assessment and climate resiliency flags were not previously considered in the process. As the climate adaptation flags were implemented in September 2021, management is still implementing processes to utilize climate data in investment decision making;
- There was no central oversight performed to review the completeness and accuracy of climate change assessment information entered into C55; and,
- As at the date of this report, EH&S were in the process of revising the adaptation strategy outlining the climate change adaptation priorities for the business. As a result, the previously formed Climate Change Adaptation Working Committee that had been responsible to provide centralized risk management and climate science expertise to support business decisions, had not met since July 2021, which may have impeded the ability to integrate climate change adaptation considerations into investment decisions.

Potential Impact:

- Climate change risks and resiliency opportunities may not be given sufficient consideration during investment decision making, nor during project design and execution. This could result in missed opportunities or project costs due to climate-related risks and opportunities not being assessed.

Recommendation

Management should:

- Provide additional training to subject matter experts and investment owners on the requirements outlined in governance around when and how to perform climate risk assessments, and consider embedding this information within the C55 system for ease of reference;
- Finalize and implement the revised enterprise-wide adaptation strategy within the business. The strategy should consider the identification of the climate adaptation impact as part of the formal assessment criteria when critiquing investments; and
- Assess whether processes within C55 can be developed to further facilitate climate change-related considerations within the investment management process. This should include:
  - Monitoring tools to enable assessments of the reasonableness of information documented in C55;
  - Embedding automated linkages of identified climate-related investments to BP presentations;
  - Control checks to ensure the list of potential investments and the climate change flags in C55 are complete and accurate.

Management Action Plan

Management will:

- Provide additional training to subject matter experts and investment owners on the requirements outlined in governance around when and how to perform climate risk assessments;
- Finalize and implement the revised enterprise-wide adaptation strategy within the business; and
- Assess the need for and develop processes within C55, where necessary, to further facilitate climate change-related considerations within the investment management process.

Action Owner: John Beauchamp, Director, Environment, Health & Safety

Target Completion Date: September 30, 2023

4. Plans for the implementation of certain TCFD recommendations were yet to be developed.	**Low**

The Task Force on Climate-related Financial Disclosures ("TCFD") of the Financial Stability Board ("FSB") is an organization that developed various voluntary recommended disclosures that organizations may adopt to report on the impact an organization has on the global climate. OPG-STD-0172 states that OPG is committed to implementing the eleven TCFD recommendations, which are summarized in Appendix A. OPG's support for the disclosure principles outlined by the TCFD is also articulated in the company's annual MD&A.

On the three TCFD recommendations yet to be implemented by OPG as of the date of this report, IA observed the following:

Scenario Analysis
The scenario analysis undertaken to date by OPG has focused on broader qualitative societal and economic impacts as a result of climate change to help inform the Company's overall strategic direction, rather than a detailed assessment of the resilience of OPG's business to the potential impacts of climate change. As of the date of this report, OPG has not yet assessed or disclosed the potential impact on the company's business under different climate scenarios (e.g., quantifying and disclosing the estimated impact to OPG's business of specified climate change scenarios, such as an average temperature increase of 2°C in the regions that OPG operates).

In response to some of the challenges identified in developing scenario analysis, management has engaged with key external stakeholders involved in the development of new securities regulations. In particular, issues around the consistency of judgments made by reporting issuers has been raised to critique the comparability of scenario analysis as a valuable disclosure for stakeholders. Management's correspondence also identified challenges regarding the definition of the number of scenarios to be developed, the time-horizon applicable to each scenario, and the frequency of updating certain factors, including key drivers and scenarios themselves.

GHG Emissions
Emissions figures reported in the MD&A include direct GHG emissions from OPG operations ("scope 1"), and indirect emissions from the generation of purchased electricity, steam, heating and cooling consumed by OPG ("scope 2"). TCFD recommends emissions reporting covering scopes 1 and 2 and, if appropriate, Scope 3[3].

At present, scope 2 emissions are captured and disclosed for a number of sources, while emissions from leased facilities (including the associated consumption of electricity at those facilities) are being analyzed for treatment. In addition, the identification and reporting of scope 3 emissions has been challenging for industry at large. In response, Management has commenced a project led by Supply Chain aimed at identifying scope 3 emissions from suppliers.

Climate Related Performance Targets
Although certain targets on current climate performance had been established within the company, these have not been disclosed publicly as yet. Performance metrics to manage longer-term climate-related risks and opportunities were yet to be defined.

[3] Scope 3 emissions are GHGs that are generated across the value chain not included in scope 1 and 2. Scope 3 emissions can include transportation, distribution, purchased goods and services.

Potential Cause & Impact

Potential Causes:

- As the TCFD recommendations are voluntary and adoption within industry of the three remaining recommendations is not common but is expected to increase, these evolving areas may require greater judgment and diligence in their execution;
- As scenario analysis is dependent on a number of variables impacting different areas of the business, the business group responsible to develop scenario analysis for the purposes of meeting the TCFD recommendation had not been determined;
- There are various challenges common to industry more broadly on identification and quantification of scope 3 emissions to ensure confidence on the completeness and accuracy of such sources; and
- Climate related performance targets were yet to be defined, as the technologies and projects required to achieve net-zero are being identified.

Potential Impact:

- OPG may not fully meet its voluntary commitment to ultimately implement TCFD recommendations, which has been identified as a core element of OPG-STD-0172.

Recommendation

Acknowledging the initiatives underway by Management in monitoring regulatory developments and determining sources and data to quantify scope 3 emissions, IA recommends that Management:

- Define target completion timelines for the implementation of the remaining TCFD recommendations, to use as a basis for continued progress on these initiatives;
- Determine the responsible party within OPG for forming scenario analysis, and ensure the analysis is performed with appropriately documented assumptions, risks and uncertainties in forming the estimated impact, in a timeframe considered appropriate for the business; and
- Define climate-related performance targets that align with the company's climate targets and/or goals, as appropriate.

Management Action Plan

Besides the initiatives currently being worked as articulated above, Management will:

- Define target completion milestones for the implementation of the remaining TCFD recommendations;
- Determine the responsible party within OPG for forming scenario analysis; and
- Define climate-related performance targets that align with the company's climate targets and/or goals.

Action Owner: Carlton Mathias, Vice President, Law, ESG and Corporate Secretary

Target Completion Date: July 15, 2023

APPENDIX A – TCFD RECOMMENDATIONS AND RECOMMENDED DISCLOSURES

A summary of the recommendations and supporting recommended disclosures contained within the TCFD's June 2017 report[4] is provided below.

Recommendations	Supporting Recommended Disclosures
Governance Disclose the organization's governance around climate-related risks and opportunities.	Describe the Board's oversight of climate-related risks and opportunities.
	Describe management's role in assessing and managing climate-related risks and opportunities.
Strategy Disclose the actual and potential impacts of climate-related risks and opportunities on the organization's businesses, strategy, and financial planning where such information is material.	Describe the climate-related risks and opportunities the organization has identified over the short, medium, and long-term.
	Describe the impact of climate-related risks and opportunities on the organization's businesses, strategy, and financial planning.
	Describe the resilience of the organization's strategy, taking into consideration different climate-related scenarios, including a 2°C or lower scenario.
Risk Management Disclose how the organization identified, assesses, and manages climate-related risks.	Describe the organization's processes for identifying and assessing climate-related risks.
	Describe the organization's processes for managing climate-related risks.
	Describe how processes for identifying, assessing, and managing climate-related risks are integrated into the organization's overall risk management.
Metrics and Targets Disclose the metrics and targets used to assess and manage relevant climate-related risks and opportunities where such information is material.	Disclose the metrics used by the organization to assess climate-related risks and opportunities in line with its strategy and risk management process.
	Disclose Scope 1, Scope 2, and, if appropriate, Scope 3 GHG emissions, and the related risks.
	Describe the targets used by the organization to manage climate-related risks and opportunities and performance against targets.

[4] Recommendations of the Task Force on Climate-related Financial Disclosures, June 2017

APPENDIX B – RATING DEFINITIONS FOR AUDIT REPORTS

Finding: *Noted deficiency with potential impacts to the achievement of business unit/process area objectives, assessed using the following criteria:*

	High Risk	Moderate Risk	Low Risk
Safety & Social License	• Potential regulatory non-compliance. • Deficiencies that could result in: ○ Fatality, permanent disability, or lost time injury; ○ Data loss or unavailability of critical systems; ○ Security is compromised in sensitive / multiple areas; ○ Fraud / theft; or ○ Negative media coverage resulting in reputational damage.	• Insufficient evidence to support regulatory compliance. • Deficiencies that could result in: ○ Minor injury with no lost time; ○ Temporary data loss or unavailability of non-critical systems; ○ Security is compromised; ○ Fraud / theft with some mitigating controls; or ○ Public escalating concerns to OPG Management or local media.	• Documentation improvements to support regulatory compliance. • Deficiencies that could result in incidents that do not require medical treatment. • Deficiencies that do not result in any media attention negatively impacting OPG's reputation.
Financial	• Potential loss or financial impact =>5% of the sample population's value, or the department's OM&A budget if the former is unavailable.	• Potential loss or financial impact >=2% and <5% of the sample population's value, or department's OM&A budget if the former is unavailable.	• Potential loss or financial impact <2% of the sample population's value, or department's OM&A budget if the former is unavailable.
Operational Excellence	• Governance non-compliance or lack of/inadequate controls that may impact achievement of business or project objectives. • Errors in or insufficient internal reporting that drives senior management decision making. • Test results where =>25% of the sample had deficiencies in the execution of a key control.	• Governance non-compliance or lack of/inadequate controls with alternate controls in place to mitigate the impact to business or project objectives. • Errors in or insufficient internal reporting that could affect management decision. • Test results where >=10% and <25% of the sample had deficiencies in the execution of a key control.	• Governance compliance with procedural concerns or documentation issues which could impact OPG's ability to demonstrate appropriate due diligence. • Errors in or insufficient internal reporting that has minimal decision-making impact. • Test results where <10% of the sample had deficiencies in the execution of a key control.

Opportunity for improvement: *Observation with no risk impact that is provided to management for consideration to improve efficiency of processes and documentation (e.g., automation, duplication of activities).*

OVERALL REPORT RATING SCALE

An overall audit rating is assigned based on the number of observations identified for the audit and their assigned risk rating:

	Number of Findings			
Finding Risk Rating	**1**	**2**	**3 - 4**	**=> 5**
High	Requires Improvement	Not Effective	Not Effective	Not Effective
Moderate	Generally Effective	Generally Effective	Requires Improvement	Not Effective
Low	Effective	Effective	Generally Effective	Requires Improvement

APPENDIX C – PROCESS OWNER & DISTRIBUTION LIST

Distribution:

Mel Hogg
Chief Administrative Officer

Aaron Del Pino
Vice-President, Environment, Health & Safety

cc:	Ken Hartwick	President & Chief Executive Officer
	Aida Cipolla	Chief Financial Officer & Senior Vice President, Finance
	Alec Cheng	Vice President, Chief Controller & Accounting Officer
	Carlton Mathias	Vice President, Law, ESG & Corporate Secretary
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	Kurt Kornelsen	Senior Manager, Water Resources
	Barbara Medeiros	Senior Manager, Environment, Health & Safety
	Joseph Ng	Senior Manager, Internal Audit
	Michellee Reid	Manager, Internal Audit
	Tammy Wong	Senior Environmental Specialist

ONTARIO POWER GENERATION

Internal Audit

Pickering Inventory Management

February 28, 2023

Report Rating: **Requires Improvement**

Table of Contents

1.0 EXECUTIVE SUMMARY

1.1 Report Rating and Summary of Findings

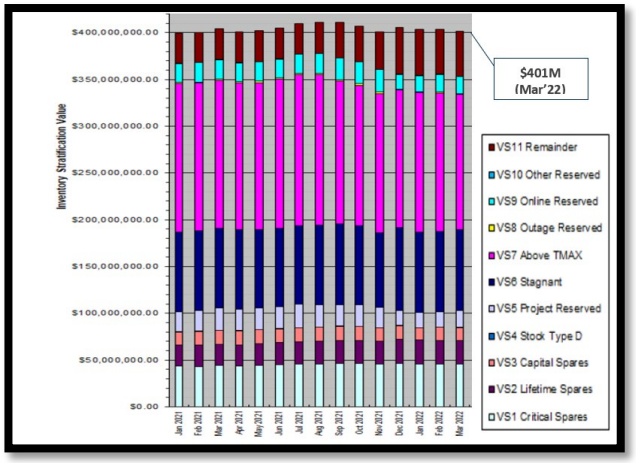
Report Rating: **Requires Improvement**

No.	Finding	Risk Type	Risk Rating[1]		
			High	Moderate	Low
1	Inadequate schedule, contingency planning, resources, and organizational change management led to delays in High Impact Team (HIT) initiatives.	Operational		X	
2	The authority to make decisions at various levels within the HIT initiative was not defined, and reporting to oversight bodies was not consistent.	Operational		X	
3	Project teams did not frequently use “Shop at OPG” to utilize PNGS stranded inventory.	Operational		X	
4	The OAR did not contemplate an approval authority process for sequenced enterprise-level write-off initiatives.	Operational		X	
Total		**4**	**-**	**4**	**-**

1.2 Background

Pending regulatory approval from the Canadian Nuclear Safety Commission, the Pickering Nuclear Generating Station ("PNGS") is anticipated to end commercial operations in 2026. While the Province of Ontario has recently directed OPG to conduct a study to assess the feasibility of redeveloping PNGS to enable operation beyond 2026, the overall planning for the station's End of Commercial Operations (“PECO”) had started, which includes planning for the station's excess inventory.

In the past five years, on average, PNGS procured $82.5 million worth of inventory per year while issuing $71.3 million, resulting in inventory levels that exceed current and forecast demand plans to PECO. As of March 31, 2022, PNGS inventory amounted to $401 million, with approximately 65% ($260 million) of that inventory being either stagnant or above the target maximum (“TMAX”) stock quantity. Refer to the figure below.



[1] Please refer to Appendix A for risk rating definitions

In Q1 2022, a High Impact Team ("HIT") was formed, with an overall objective of managing the materials demand and supply imbalance to reduce PNGS inventory ahead of PECO. The HIT included cross-functional members from Supply Chain, Engineering, Maintenance, Work Management, Fuel Handling, Nuclear Fleet Work Management and Finance.

PNGS Stranded Inventory Risk is an entry in the Business Risk Register with a high residual risk rating. As a result, management initiated several risk treatment activities to mitigate the risk, including a "Shop at OPG" initiative, where workers and vendors where applicable are encouraged to use existing inventory instead of purchasing new items.

This was a risk-based audit identified in Internal Audit's ("IA") 2022 Audit Plan, selected given the significant value of inventory at PNGS and the strategic importance of the activities underway in mitigating the inventory growth.

1.3 Objective & Scope

The objective of this audit was to assess whether: (1) the initiatives planned by Management will help PNGS reduce inventory; and (2) the initiatives and activities to mitigate the PNGS stranded inventory risk are progressing toward the stated goals.

To achieve the audit objective, IA reviewed the process and tested, on a sample basis, whether:

A. Governance
• A governance model was in place to oversee the HIT and track solution implementation; • Business processes and governance documentation were updated to proactively manage material request decisions to eliminate over-ordering; • An inventory review board was established with accountability to ensure ongoing focus on inventory management; and • Charters were developed for the chosen solutions and owners were engaged for the initiatives consistent with best practice.
B. HIT Initiative Progression
The HIT achieved its objectives including: • Plans were developed and actions taken to realize the benefits of solutions that have high impact and/or require low effort (e.g. “quick wins” and “gems”); • A surplus criteria/process was established for cross-functional reviews with signoffs to expedite decisions for reducing stagnant inventory; • Asset Suite (“AS9”) was updated to autocancel material requests for rejected work orders, and was synced with Outage Management System (“OMS”) to detect work orders rejected from OMS scope and remove outage from AS9 shutdown number; • All existing work orders to PNGS end-of-life were assessed to confirm remaining actual demand; • Inventory tied to old demand was freed up to drive up consumption, and open purchase orders for items above TMAX are cancelled/adjusted; and • A team was established to conduct a deep dive of all inventory and review re-order points and TMAX. Strategies are being identified to consume existing inventory and equivalency opportunities to avoid over-ordering.

C. Risk Management and Reporting
• Business Unit stranded inventory risk mitigating activities were progressing (e.g., "Shop at OPG"); • Risks to achieving the HIT initiatives were identified, routinely reviewed, and mitigating actions are taken; and • The progress of HIT initiatives was monitored, and results were reported to the sponsors and other relevant stakeholders as needed.
D. Fraud Considerations
• Intentional misstatement of the HIT initiatives' achievements to report better results than actual benefits achieved.
E. Opportunities for Improvement
• There were potential opportunities for savings related to efficiency of processes and documentation (e.g. automation, duplication of activities, etc.).

Scope Period: The scope included activities from November 1, 2021 to October 31, 2022, and included precursor activities from prior periods.

1.4 Conclusion

Overall, the planned initiatives and actions to mitigate the PNGS stranded inventory risk require improvement. A summary of positive observations, key audit findings and opportunities for improvement are provided below.

Positive Observations

- The HIT had representation from multiple cross-functional teams, which increased creativity and innovation on the approach to address the stranded inventory issue due to the different skill sets, experience, and unique perspectives of the broad and diverse team, and

- Re-order points and TMAX reductions of approximately $44.2 million were implemented, and more than 13,000 out of 19,000 work orders were placed on hold to avoid false demand signals and unnecessary procurement.

Key Findings & Recommendations

- The delays in HIT initiatives and $7 million shortfall in PNGS year-end inventory balance were brought about by inadequate planning for resources, schedule, contingency and impacts of other organizational initiatives (e.g., AS9 upgrade, PNGS Vacuum Building Outage). Management should review, manage, monitor and document initiatives that will continue to improve PNGS' inventory reduction efforts including the re-evaluation of timelines for the HIT initiatives and the assessment of resource requirements. The role of the third-party consultant should also be reassessed to help the HIT accomplish their objectives;

- The authority to review and approve changes, cancellations, and deemed completion of initiatives was not defined, although working level reviews had occurred including review by the Vice President, Supply Chain (HIT Sustaining Sponsor). Additionally, reporting to oversight bodies did not occur at the defined frequency and information reported was sometimes inconsistent between reports. Management should assess reasonableness of existing governance and update as necessary, including defining what initiatives are considered significant;

- Project teams were not using Pickering's stranded inventory (i.e., "Shop at OPG" was not pursued) to increase the consumption of existing equivalent inventory before purchasing materials from external vendors. Management should reassess "Shop at OPG" and include guiding principles, training and enhanced reporting that would lead to and support its use across the business; and

- The Organizational Authority Register ("OAR") did not provide guidance and approval authority requirements for sequenced enterprise-level write-off initiatives, which led to inventory written-off exceeding the amounts delegated to the approving authority. Management should amend the OAR to include guidance and approval expectations for specific strategic initiatives, including the development of approval plans.

The findings noted in this report have been reviewed with management, and they have committed to specific action plans. Please refer to Section 2.0 for specific details of the above findings, and the associated risk impact, audit recommendations and management action plans.

Opportunities for Improvement

- Instances were noted where some PNGS inventory written-off in 2022 was subsequently re-ordered, and other instances where some written-off items may have been used at the Darlington Nuclear GS ("DNGS"). While Management indicated this is a known risk and was discussed with the HIT Steering Committee, Management may consider developing a report to identify demand after items are written off but not shipped, so the surplused items can be held back. Management may also consider simplifying the process for inter-station transfers (e.g., by lowering the dollar threshold specified within governance for station transfers), so that more inventory can be redeployed to other stations; and

- The *Catalogue Information: Create, Maintain and Replenish* procedure (N-PROC-MM-0008) states that the Supply Chain Senior Manager is responsible to manually cancel open Material Requests ("MRs") for cancelled work order tasks (also known as the "CXCL/REQ" process). This activity had not been performed during the period, as the value of associated MRs was less than $100,000 between November 2021 to October 2022. Management may consider assessing whether this review is valuable, and update N-PROC-MM-0008 to remove this expectation if it is not considered an important activity.

2.0 DETAILED AUDIT FINDINGS

IA identified the following detailed findings which have been risk rated based on the definitions outlined in Appendix A.

1. Inadequate schedule, contingency planning, resources, and organizational change management led to delays in HIT initiatives.	Moderate

The 2022 year-end gross inventory target (i.e., exclusive of provisions) for PNGS was $333 million, representing a year-over-year inventory reduction of $55 million. The HIT team had planned to achieve the reduction through a combination of write-offs ($45 million) and increased inventory usage ($75 million), and fewer purchases ($65 million), resulting in a net consumption of $10 million. Additionally, the HIT had planned to complete 17 initiatives by the end of August 2022 to assist in meeting the inventory target.

As of year-end 2022, PNGS year-end inventory was $340 million, missing the target inventory by $7 million due to materials purchases being higher than planned ($2 million) and inventory usage being lower than planned ($5 million).

A third-party consultant was engaged to design and establish program governance, manage the HIT program dependencies and capacity requirements, support program plan completion to mitigate key risks/dependencies and right-size the resourcing model, drive project milestones completion, and provide daily oversight of the program.

The following observations were noted:

- While the third-party consultant was engaged with a key scope on program management and governance according to the engagement Statement of Work, inquiries of Management indicated that the HIT ultimately elected to manage the scope as an initiative, with a group of tasks and due dates;
- Timelines for the initiatives were set, without due consideration given to capacity constraints on assigned resources, given they were expected to continue to perform their day-to-day tasks;
- Impacts brought about by the Vacuum Building Outage (“VBO”) and AS9 upgrade projects were not identified and sufficiently mitigated timely, as the impact of VBO was only identified in the risk register in September 2022, when the VBO was about to start on October 6th;
- Although a high-level Gantt chart listed the planned and start dates for all initiatives at the planning phase, it was not supported by a schedule identifying milestones, key tasks, effort required, duration, and resource assignment; and
- The HIT activities were also impacted by a lack of dedicated and/or available resources. For example, at the time of the audit, Initiative Owners were yet to be identified for two of the initiatives expected to be completed by year-end 2022.

Status of Initiatives

Of the 17 initiatives scheduled to be completed by August 2022, 10 remained open at year-end 2022 mainly due to resource challenges, as staff were addressing issues around the AS9 upgrade project and supporting the VBO.

The contributions from the delayed initiatives may have helped the HIT achieve the year-end inventory target as follows:

- Initiatives to reduce materials purchases such as auto-cancelling material requests tied to stale work orders and aligning outage management system coding with AS9 would have eliminated false demand signals, leading to purchasing more items than used; and
- Initiatives to increase inventory usage such as including inventory metrics into the station "top 50" metrics package and updating governance may have driven the appropriate behaviors, demonstrating active monitoring of inventory metrics as being impactful to the station's performance.

Initiative Targets/Performance Indicators & Reporting

It was noted that many of the initiatives did not have measurable targets or performance indicators. The reporting of initiative progress was also not always accurate or up to date. Specifically, 3 of the 17 initiatives were past the revised due dates but were still being reported as on track.

Potential Cause & Impact

Potential Causes:

- Unlike for projects, there is no central OPG governance to provide guidance for best practices in managing initiatives;
- In the absence of central governance, the HIT could have benefited from scaled project management methodologies and techniques (e.g., identification of resource constraints and interdependencies);
- The third-party consultant may have lacked the requisite authority to enforce program discipline;
- Progress on initiatives was manually tracked in Excel, thus being more susceptible to human error; and
- Employee behaviour can be difficult to change, where more materials are ordered than necessary "just-in-case" they are needed for timely project completion.

Potential Impact:

- Inventory reduction targets for future years could be missed if delayed initiatives continue, resulting in potential excess costs either through additional write-offs or unneeded purchases.

Recommendation

While also considering that the feasibility of Pickering Refurbishment is occurring throughout 2023, Management should review, manage, monitor and document initiatives that will continue to improve PNGS' inventory reduction efforts, as follows:

- Re-evaluate the timelines of the HIT initiatives and assess resource requirements for the short term to ensure that the HIT initiatives can get back on track;
- Assess the adoption of project management practices and scheduling applications (e.g.MS Projects) to manage the HIT initiatives; and
- Reassess the role of the third-party consultant to enable the HIT to accomplish their objectives.

Management Action Plans

Management will:

1. Re-evaluate the timelines of the inventory initiatives and assess resource requirements for the short term to ensure that the initiatives can get back on track.

   Action Owners: Jennifer Lafferty, Purchasing (for Supply Chain-owned initiatives); Nahil Rahman, Director, Work Management (for Station-owned initiatives)

   Target Completion Date: March 30, 2023

2. Assess the adoption of project management practices and scheduling applications (e.g., MS Projects) to manage the inventory initiatives.

   Action Owner: Nahil Rahman, Director, Work Management

   Target Completion Date: March 30, 2023

3. Reassess the role of the third-party consultant to enable the HIT to accomplish their objectives.

   Action Owner: Nahil Rahman, Director, Work Management

   Target Completion Date: March 30, 2023

2. The authority to make decisions at various levels within the HIT initiative was not defined, and reporting to oversight bodies was not consistent.	**Moderate**

A 'Program Governance Framework' was developed and presented by the third-party consultant engaged by OPG, which provided proposed HIT governance principles, including review and approval of significant initiative changes and program decisions and initiative deliverables by the Executive Sponsors and Sustaining Sponsors, respectively. It also defined the metrics to be reported and the frequency of reporting to the Inventory Review Board ("IRB"), Steering Committee ("SteerCo"), and ELT. The IRB is responsible for program management and support while the SteerCo, and the ELT are responsible for providing program guidance. The proposed framework was not finalized and established.

Changes and closures to initiatives were found to not be consistently reviewed with the Executive and Sustaining Sponsors, and reporting to the IRB, SteerCo, and ELT did not consistently occur at the suggested frequency, as outlined below:

- **Not all initiative tasks were actioned before initiatives were closed without the review and approval by Executive or Sustaining Sponsors.** For the identified initiatives, while they were actively managed by HIT Initiative Owners prior to closure, the following was noted:
    - *Reduce / Eliminate $13 million demand over TMAX:* The team reviewed $9 million of the $13 million worth of demand over TMAX, cancelled $0.6 million of demand, and concluded the initiative completed as they indicated the effort to review the remaining $4 million to be not cost effective. The remaining task to develop a report for ongoing monitoring of demand over TMAX was also not completed;
    - *Improve Supply Chain engagement at key review boards:* HIT was to capture data, from HIT inception to PECO, on realized inventory cost avoidance. However, this initiative was reported as completed, although there had been no realized financial benefit reported in the Supply Chain value improvement tool; and
    - *Review Material Requests ("MR") with need date pre-2022:* Two tasks within the initiatives were closed, although partial results were achieved. For example, in the review of $27 million of project MRs with need date pre-2022, management cancelled $7 million (25%) of the $27 million of MRs, with the balance ($20 million) left open, although they continued to have a need date pre-2022.

Inquiries of Management indicated that the oversight provided at the Band E (i.e. Sustaining Sponsor) level was considered sufficient for initiative changes and closures that were made. The proposed framework noted that the Executive Sponsors had this decision-making authority, consistent with their accountability to "review and approve program decisions", however, it was too broad in that it did not identify the type of decisions requiring oversight by the Executive Sponsor vs. Sustaining Sponsor. In addition, evidence of approval by the Sustaining Sponsor to close the initiative without actioning all the associated tasks was not available.

- **Changes to initiatives were not reviewed and approved by Executive Sponsors, despite the proposed framework indicated that "significant initiative changes" would require their review.** Specifically, initiatives were added (i.e., D14 – Accelerate demand and seek opportunities to install high-cost inventory), timelines were revised (i.e., to initiative I01), and initiatives were further bifurcated (i.e., PG1 – Define Standard Surplusing Criteria for 2022) without any review or approval. Discussions with management indicated that approval was not sought as they did not consider them to be significant changes.

- **Materials Requested Not Issued (MRNI) is a key metric that tracks all inventory that is requested but never issued to the requesting organizations, which is a key reason for inventory growth.** IA noted that it was not reported to the IRB as required by the Governance Framework.

Potential Cause & Impact

Potential Causes:

- Management did not recognize the need to finalize and establish a final governance framework as it was not deemed necessary to provide formal rules and practices by which the HIT ensures accountability and transparency in how the overall initiative is run;
- The HIT was not intended to be managed as a program or project and thus did not provide guidance on change management as it related to the initiatives, including the definition of significant changes;
- There is no existing governance providing guidance for initiatives in instances where initiative owners opt not to follow the PMO governance;
- The IRB, SteerCo, and ELT meetings may not have been held at the prescribed frequency due to competing priorities, including the VBO; and
- The MRNI metric was already tracked on an enterprise-wide basis, thus the HIT team viewed it as redundant to report as part of the HIT Initiative for PNGS specifically, even though this is an important metric at the PNGS level given the significant risk of stranded inventory.

Potential Impacts:

- Lack of application of best practices in good governance may impede inventory management from achieving its objectives;
- Modifying or closing initiatives without appropriate review and approval may result in the initiatives not achieving the intended benefits especially in cases where the expected benefits and objectives are not defined before the commencement of the initiative, and Senior Leadership (e.g. Senior Work Management Team) may not have the opportunity to engage in the decision-making process and provide oversight and support to delivery teams as necessary; and
- Although informal discussions were held with ELT, SteerCo, and IRB members outside of the formal governance meetings, they may not be made fully aware of the progress and challenges encountered by the HIT to enable timely oversight and direct corrective actions as necessary, as those meetings were not held at the prescribed frequency and presentations included inconsistent information.

Recommendation

Management should:

- Assess reasonableness of the proposed HIT Program Governance Framework and update and formalize accordingly, i.e., review and approval expectations around initiative changes, cancellation, and completion, frequency of reporting to oversight bodies, and reporting of relevant metrics; and
- Define what initiative changes are considered significant and the type of decisions that requires the SteerCo’s review and potential challenge.

Management Action Plan
Management will: 1. Assess reasonableness of the HIT Program Governance Framework and update and formalize accordingly, i.e., review and approval expectations around initiative changes, cancellation, and completion, frequency of reporting to oversight bodies, and reporting of relevant metrics. Action Owner: Nahil Rahman, Director, Work Management Target Completion Date: March 30, 2023 2. Define what initiative changes are considered significant and the type of decisions that requires the SteerCo's review and potential challenge. Action Owner: Nahil Rahman, Director, Work Management Target Completion Date: March 30, 2023

3. Project teams did not frequently use "Shop at OPG" to utilize PNGS stranded inventory.	**Moderate**

Pickering Stranded Inventory is an entry in the business unit risk register with a high-rated residual risk and includes risk treatment activities such as internal utilization of existing inventory, also known as "Shop at OPG". The initiative seeks to replicate the benefits realized in 2019, where it was claimed that the Darlington Refurbishment Project avoided $10 million in external purchases by leveraging PNGS' stagnant inventory.

On review of the risk treatment activities, it was noted that other Generating Stations ("GSs") were not implementing the "Shop at OPG" initiative. As part of the "Shop at OPG" process, project personnel are to send material requests to the "Shop at OPG" team within Supply Chain to assess whether existing or equivalent inventory is in stock before a project procures from external sources. It was noted that no requests were sent to the "Shop at OPG" team between the period November 2021 to October 2022 to assess whether the existing inventory was available to support projects.

The HIT had planned to reinvigorate the "Shop at OPG" program through new initiatives to increase the consumption of existing equivalent inventory before procurement (P10 and I05 initiatives). However, discussions with Management indicated that the timeline to kick off those initiatives was delayed to 2023 as they wanted to advance other HIT initiatives that was expected to produce greater benefit.

Potential Cause & Impact

Potential Causes:

- Governance requirements did not exist mandating project teams to utilize "Shop at OPG";
- There may be significantly greater effort required to identify and confirm the availability of required CAT IDs (or appropriate equivalents) when compared with placing orders with external vendors;
- Shop at OPG was not managed under the HIT program;
- Lack of Supply Chain resources to promote "Shop at OPG" and help project teams identify equivalent items similar to CAT-IDs the projects required; and
- There was a lack of incentive for project teams to use "Shop at OPG" as it will consume time from the project schedule, and project teams would still be expected to pay "Shop at OPG" for the inventory items utilized.

Potential Impact:

- Existing inventory on hand may not be utilized, potentially resulting in higher costs to the organization.

Recommendations

Management should:

- Reassess whether “Shop at OPG” remains an initiative that would yield tangible benefits in managing the PNGS stranded inventory risk, particularly in light of the potential for PNGS redevelopment;
- If “Shop at OPG” continues to be considered an initiative to be pursued, provide guiding principles leading to greater use in certain scenarios (e.g., when an item is in inventory, or when there are similar items in inventory that may be used with minimal design modification without adverse impacts to work programs);
- Complete the “CAT-ID Equivalency” initiative (i.e., I05 and PG10) to develop process, expectations, and barriers to ensure that when parts are ordered, existing inventory is being explored first; and
- Provide communications across the enterprise to create awareness, supplemented with enhanced reporting that is communicated across the business to demonstrate awareness of how much “Shop at OPG” is being used.

Management Action Plan

Management will:

1. Reassess whether “Shop at OPG” remains an initiative that would yield tangible benefits in managing the PNGS stranded inventory risk, particularly in light of the potential for PNGS redevelopment.

Action Owner: Jennifer Lafferty, Director, Purchasing
Target Completion Date: June 15, 2023

2. Provide guiding principles leading to greater use in certain scenarios (e.g., when an item is in inventory, or when there are similar items in inventory that may be used with minimal design modification without adverse impacts to work programs). This is contingent on the decision to continue “Shop at OPG” as an initiative to be pursued.

Action Owner: Jennifer Lafferty, Director, Purchasing
Target Completion Date: June 15, 2023

3. Complete the “CAT-ID Equivalency” initiative (i.e. I05 and PG10) to develop process, expectations, and barriers to ensure that when parts are ordered, existing inventory is being explored first.

Action Owner: Zahin Rahman, Manager, Engineering
Target Completion Date: June 15, 2023

4. Provide communications across the enterprise to create awareness, supplemented with enhanced reporting that is communicated across the business to demonstrate awareness of how much “Shop at OPG” is being used.

Action Owner: Jennifer Lafferty, Director, Purchasing
Target Completion Date: June 30, 2023

4. The OAR did not contemplate an approval authority process for sequenced enterprise-level write-off initiatives. **Moderate**

The *Organizational Authority Register ("OAR")* Standard (OPG-STD-0017) states that position holders should comply with authority limits and exercise delegated authority up to the specified dollar limit. Section 1.1.2 of the standard also states that OAR approval of transactions should be based on the total financial commitment and tied to proper work bundling.

While the inventory write-offs were a part of the HIT's mandate, the OAR approval of the PNGS inventory surplus declaration had not been based on the total financial commitment. As a separately identified initiative with a communicated target within the business plan, write-offs associated with the PNGS inventory surplus should be viewed in aggregate to ensure appropriate oversight of the write-offs is considered for the initiatives in total. The following was noted on the process to write off PNGS inventory in 2022:

a) The OAR did not contemplate the approval process for one-time enterprise-level write-offs, such as the planned write-offs of PNGS stranded inventory. As write-offs were performed on a number of different dates as the HIT progressed its activities, a strict interpretation of the OAR would have led the HIT to have had to seek approval multiple times from OPG's Board of Directors;

b) While the planned write-off for 2022 was $45 million, two memoranda defining the inventory surplus criteria were used as OAR approvals to write off inventory valued at $62.9 million, including the bringing forward of write-off activities previously planned for 2023. The memos were approved by individuals with delegated authority limits of $1 million according to OAR element 1.7.

c) An approver with OAR authority of $1 million per transaction signed multiple surplus declaration forms, each less than $1 million, on the same day. Due to the numerous forms approved, the total daily financial commitment from the surplus declarations ranged from $1.9 million to $13.2 million. The table below summarizes the details;

Declaration Form Date	Authority Limit	# of Forms Signed	Value of Surplus
January 3, 2022	$1 million	18	$9.2 million
February 9, 2022		9	$5.6 million
March 17, 2022		19	$11.0 million
April 19, 2022		3	$1.9 million
October 19, 2022		19	$13.2 million
November 4, 2022		17	$13.0 million

d) An OAR approver or a finance controller did not sign three surplus declaration forms totaling $2.0 million. Instead, the forms referenced the memorandum mentioned in point (b) above as the signoff and approval of declaring the inventory surplus.

Potential Cause & Impact

Potential Causes:

- The write-offs were part of an approved initiative in the business plan, and were considered routine business transactions; and
- Supply Chain practices do not consider situations where there are multiple surplus transactions to be processed daily, resulting in an OAR violation (section 1.1.2) when the value of the daily transactions is aggregated.

Potential Impacts:

- The existing OAR approval requirements would have necessitated the HIT to bring forward routine surplus declarations to the ELT and Board of Directors for approval, inefficiently tying up resources' time; and
- Without clarity on the approval authority process for sequenced enterprise-level write-off initiatives, Management may be unable to demonstrate that due diligence at the appropriate level, commensurate to the amount and nature of the write-offs, was applied.

Recommendation

Management should:

- Amend the OAR to include guidance and approval expectations on specific strategic initiatives that would otherwise require Board approval (e.g., similar to the PNGS stagnant inventory write-off); and
- Develop a plan to ensure that future writeoffs being conducted as part of the HIT initiative are in accordance with the amended OAR and appropriate approvals are obtained.

Management Action Plan

Management will:

1. Amend the OAR to include guidance and approval expectations on specific strategic initiatives that would otherwise require Board approval, while still maintaining the control principles embedded within the OAR.

   Action Owner: Bryan Shaddock, Director, Accounting
   Target Completion Date: September 30, 2023

2. Develop a plan to ensure that future writeoffs being conducted as part of inventory management are in accordance with the amended OAR and appropriate approvals are obtained.

   Action Owner: Michael Stoter, Senior Manager, Supply Chain
   Target Completion Date: March 31, 2023

APPENDIX A – RATING DEFINITIONS FOR AUDIT REPORTS

Finding: *Noted deficiency with potential impacts to the achievement of business unit/process area objectives, assessed using the following criteria:*

	High Risk	Moderate Risk	Low Risk
Safety & Social License	• Potential regulatory non-compliance. • Deficiencies that could result in: o Fatality, permanent disability, or lost time injury; o Data loss or unavailability of critical systems; o Security is compromised in sensitive / multiple areas; o Fraud / theft; or o Negative media coverage resulting in reputational damage.	• Insufficient evidence to support regulatory compliance. • Deficiencies that could result in: o Minor injury with no lost time; o Temporary data loss or unavailability of non-critical systems; o Security is compromised; o Fraud / theft with some mitigating controls; or o Public escalating concerns to OPG Management or local media.	• Documentation improvements to support regulatory compliance. • Deficiencies that could result in incidents that do not require medical treatment. • Deficiencies that do not result in any media attention negatively impacting OPG's reputation.
Financial	• Potential loss or financial impact =>5% of the sample population's value, or the department's OM&A budget if the former is unavailable.	• Potential loss or financial impact >=2% and <5% of the sample population's value, or department's OM&A budget if the former is unavailable.	• Potential loss or financial impact <2% of the sample population's value, or department's OM&A budget if the former is unavailable.
Operational Excellence	• Governance non-compliance or lack of/inadequate controls that may impact achievement of business or project objectives. • Errors in or insufficient internal reporting that drives senior management decision making. • Test results where =>25% of the sample had deficiencies in the execution of a key control.	• Governance non-compliance or lack of/inadequate controls with alternate controls in place to mitigate the impact to business or project objectives. • Errors in or insufficient internal reporting that could affect management decision. • Test results where >=10% and <25% of the sample had deficiencies in the execution of a key control.	• Governance compliance with procedural concerns or documentation issues which could impact OPG's ability to demonstrate appropriate due diligence. • Errors in or insufficient internal reporting that has minimal decision making impact. • Test results where <10% of the sample had deficiencies in the execution of a key control.

Opportunity for improvement: *Observation with no risk impact that is provided to management for consideration to improve efficiency of processes and documentation (e.g. automation, duplication of activities).*

OVERALL REPORT RATING SCALE

An overall audit rating is assigned based on the number of observations identified for the audit and their assigned risk rating:

	Number of Findings			
Finding Risk Rating	**1**	**2**	**3 - 4**	**=> 5**
High	Requires Improvement	Not Effective	Not Effective	Not Effective
Moderate	Generally Effective	Generally Effective	Requires Improvement	Not Effective
Low	Effective	Effective	Generally Effective	Requires Improvement

APPENDIX B – PROCESS OWNER & DISTRIBUTION LIST

Distribution:

Mel Hogg
Chief Administrative & Ethics Officer

Steve Gregoris
Chief Nuclear Officer

Karen Fritz
Chief Supply Officer

Jon Franke
Senior Vice President, Pickering

Paul Ross
Vice President, Supply Chain

cc:	Ken Hartwick	President & Chief Executive Officer
	Nicolle Butcher	Chief Operations Officer
	Aida Cipolla	Chief Financial Officer & Senior Vice President, Finance
	Alec Cheng	Vice President, Chief Controller & Accounting Officer
	Maha Tam	Vice President, Controllership
	Emily Tarle	Deputy Site Vice President, Pickering
	Adam Chiarandini	Director, Enterprise Risk Management
	Mohamed El Defrawy	Director, Controllership Nuclear
	Jennifer Lafferty	Director, Purchasing
	Nahil Rahman	Director, Work Management
	Emile Ramnarine	Director, Nuclear Oversight
	Bryan Shaddock	Director, Accounting
	Judy Tan	Director, Internal Audit
	Joseph Ng	Senior Manager, Internal Audit
	Michael Stoter	Senior Manager, Supply Chain
	Nellia Kamwendo	Manager, Internal Audit

ONTARIO POWER GENERATION

Internal Audit

22-11 Market Renewal – Change Implementation

July 18, 2022

Report Rating: **Not Effective**

Table of Contents

1.0 EXECUTIVE SUMMARY

1.1 Report Rating and Summary of Findings

Report Rating: **Not Effective**

No.	Finding	Risk Type	Risk Rating[1]		
			High	Moderate	Low
1	An integrated resource loaded schedule was not in place to identify interdependencies, critical path, and schedule baselines;	Operational	X		
2	Key project activities including market renewal impact assessment and requirements gathering were not completed timely per the milestones defined in the Business Case Summary ("BCS") and Steering Committee ("SC") presentations;	Operational	X		
3	Project performance measures were not defined, progress against milestones was not reported, and not all SC members were included in SC meetings; and	Operational		X	
4	A Project Management Plan ("PMP"), including the gating strategy and risk management plan, was not developed.	Operational		X	
Total		**4**	**2**	**2**	**–**

1.2 Background

In 2016, the Independent Electricity System Operator ("IESO") initiated its Market Renewal Program (the "IESO MRP") to improve the current market design and how electricity is supplied, scheduled and priced in the Ontario market. At the time of the audit, the IESO MRP go-live date was scheduled for Q4 2023, with sandbox testing beginning in Q4 2022. The IESO MRP's key initiatives will lead to a fundamental redesign of Ontario's electricity market and include:

1. A single schedule market with location-specific energy market pricing;
2. A financially binding day ahead market to procure the majority of Ontario's electricity needs a day in advance; and
3. An enhanced real-time unit commitment engine for commitment decision making in the pre-dispatch timeframe.

Market Renewal will introduce changes in how participants operate in the market, and will require substantial updates and changes to processes and systems to ensure OPG is commercially ready to participate. The Market Affairs & Development team completed an impact analysis of the IESO MRP's high level design, and established cross-functional teams to address initiatives in the following areas:

- Understand market design impact and advocate for OPG in IESO stakeholder engagement activities;
- Gather requirements and upgrade / redevelop technical systems and tools;
- Ensure commercial readiness including changes to existing business processes, market / operational strategy, and training; and
- Implement high-level strategic improvements not required for market renewal.

[1] Please refer to Appendix A for risk rating definitions

This was a risk-based audit identified in Internal Audit's ("IA") 2022 Audit Plan, and was selected given the impact of Market Renewal to OPG's ability to participate in the market, market offer strategy, business processes, and technical systems and tools.

1.3 Objective & Scope

The objective of this audit was to assess the design and operating effectiveness of controls and processes to support the change management and implementation of the Market Renewal Program (the "MRP").

To achieve the audit objective, we reviewed the process and tested, on a sample basis, whether:

A. Planning and Change Management
• An overall strategy and structure was established, approved and communicated to key stakeholders to provide a framework for implementation of the MRP, including the Chief Information Office ("CIO") supported initiatives; • Project management activities were appropriate for the scale and complexity of the project; • Initiatives were clearly defined and communicated to stakeholders, including mandate, scope, key deliverables, and roles and responsibilities; • Project and initiative schedules were established and aligned, including identification of key milestones, interdependencies and accountabilities; • The schedule was aligned to meet the IESO timelines for sandbox testing and the go-live date; • Resource estimates and requirements were well defined and reflected in the current schedule to ensure teams were adequately structured; and • Appropriate stakeholders and subject matter experts were engaged in a timely manner.
B. Program Execution
• Known market renewal impacts to OPG business and processes were identified, assessed and communicated to stakeholders; • Market participant provided inputs for the IESO's MRP (i.e. reference level submissions) were accurate and supported, reviewed, submitted on time, and approved by the IESO; • OPG was actively involved in providing stakeholder input into the market rule and market manual amendments; • System and tool updates were prioritized based on the established Minimum Viable Product criteria; and • Business requirements for systems and tools requiring update were defined or being defined.
C. Monitoring and Reporting
• The Steering Committees comprised an appropriate representation of senior leaders across stakeholder groups; • The Program Execution Team provided accurate and timely program updates to the Steering Committees to facilitate oversight and monitoring, including all costs for the Market Renewal initiatives; • Commercial readiness metrics were defined, tracked and accurately reported to measure OPG's preparedness for the renewed market; • Performance against the baseline schedule was tracked and monitored to identify and report delays and bottlenecks; • Actual project costs were measured against the approved budget to identify and report over/under spending; and • Project risks were identified and assessed, and mitigation plans were developed and implemented.

D. Opportunities for Improvement
• There are potential opportunities for improvement related to efficiency of processes and documentation.

Scope Period: The scope included activities from January 1, 2021 to April 30, 2022, and included precursor activities from prior periods as relevant.

Scope Exclusion: The audit scope specifically excluded Market Renewal activities of Atura Power ("Atura"), as these are managed separately by Atura management.

1.4 Conclusion

Overall, IA noted that the controls and processes are currently not effective to support the change management and implementation required to meet the changes presented by the IESO MRP. While recognizing some dependencies and impact on OPG's MRP project as a result of IESO delays, changes and strategic considerations related to the negotiation of MRP features, a summary of positive observations, key audit findings and recommendations, and opportunities for improvement is provided below.

Positive Observations

- The Market Affairs & Development team has actively participated in the IESO stakeholder engagement process, providing feedback on the design and implementation of the MRP, and advocating for design level changes that would maintain OPG's operational flexibility; and

- The Energy Markets and CIO organizations have established a program to work collaboratively to update applications identified as "hybrid tools" to meet Market Renewal requirements, while aligning with CIO standards such as cyber security and software architecture requirements. This program will include shared responsibilities between Energy Markets and CIO for system development and continuous application support. An agile project management approach will be applied to support this initiative and ensure continuous integration.

Findings & Recommendations

- An integrated resource loaded schedule was not in place to identify interdependencies, critical path, and schedule baselines. This impacted the ability to prioritize and resource activities, engage resources, identify the impacts of delays or shifting priorities, and communicate the overall project progress. As of the date of this report, Management was in the process of developing an overall schedule, and should continue to complete this deliverable to facilitate overall project management. Resources required to support the MRP completion should be identified and their availability confirmed;

- Project activities were not tracking on schedule or completed in a timely manner. IA noted delays in completing the detailed design impact analysis, Business Requirement Documents ("BRDs"), and initial reference level submissions. Management should complete the outstanding key activities;

- Project reporting did not include performance measures or progress against milestones, and limited metrics were included in Steering Committee updates. The Program Execution Team was still in the process of developing key milestones, budget and schedule metrics, and commercial readiness metrics required per the MRP Umbrella Charter. Management should define the relevant metrics and begin reporting them to enable trending analysis; and

- For the Umbrella MRP, Market Affairs & Development management was not always following the Enterprise Project Management Office's ("EPMO's") Project Management governance, as documentation such as the PMP and some associated key project controls, including the gating framework and risk management plan, were not in place. Management should review the EPMO Scalable Project Delivery Model, and implement the appropriate level of project management activities.

The findings noted in this report have been reviewed with management and they have committed to specific action plans. Please refer to Section 2.0 for specific details of the above findings along with the associated risk impacts, audit recommendations and management action plans.

Opportunity for Improvement

While Market Affairs & Development management has participated in the IESO stakeholder engagement process for proposed market rules and manuals, inputs to this process were not consistently provided by the IESO established due dates. Of the five submissions tested, IA identified two instances of late submissions, and in response, the IESO requested OPG to provide timely advance notice in the future if extensions were required. Market participants are not required to submit comments but it presents an opportunity to provide input on proposed changes prior to market rules and manuals being imposed on market participants. While the IESO has accepted all of OPG's submissions to date, they are not obligated to consider them when received past the communicated deadlines. Management should ensure OPG's internal review timelines align with the IESO's due dates for future submissions, or request extensions in a timely manner.

2.0 DETAILED AUDIT FINDINGS

Internal Audit identified the following detailed findings which have been risk rated based on the definitions outlined in Appendix A.

1. An integrated resource loaded schedule was not in place to identify interdependencies, critical path, and schedule baselines.	**High**

A project schedule is a main planning tool in project management used to understand and communicate the status and interrelationships / dependencies among project activities and deliverables. The schedule is critical to properly strategize, plan / prepare for project work, address resource requirements, and develop corrective actions as required.

IA observed that the Umbrella MRP did not have a consolidated schedule that captured key initiative milestones and interdependencies, and resource requirements for each of the components within the MRP, although one was being developed during the audit in May 2022. While each initiative may have had its own timeline and discrete deliverables, those initiative-level plans were independent of other project activities, creating challenges in project management including the following areas:

a) Prioritizing activities and identifying the effects of delays on interdependent activities

An aggregate control schedule covering the full project scope and lifecycle remains under development at the time of this report. This led to interdependencies between the various MRP activities not being identified, and the project's critical path was not determined, as required by the *Project Schedule Management Manual* (OPG-MAN-00120-0014, sections 2.21 and 2.28). As a result, the impact of delays or shifting priorities could not be readily assessed (e.g. the reassignment of resources previously engaged to work on one deliverable to complete a different deliverable that was behind schedule). Given the initiatives are being executed concurrently, and there are competing activities, both within the project and for daily operations requiring the same resources, it is important to ensure a robust schedule is established to identify interdependences so that activities can be prioritized on prerequisite tasks, to avoid impact to downstream deliverables.

b) Ensuring activities are properly resourced and time commitment requirements are transparent

Resourcing was identified as a key risk early in this project due to limited Subject Matter Expert ("SME") availability and the potential for attrition. An overall resource loaded schedule defining the resource estimates and requirements had not yet been established for the Umbrella MRP, although one was in place for the IT deliverables (including CIO supported, line of business ("LOB") supported and hybrid (i.e. CIO and LOB supported) tools) , which comprised approximately 80% of the MRP budget. In place of a resource loaded schedule, Energy Markets management held regular meetings to discuss and manage project resourcing, taking the form of verbal discussions on overall MRP progress and expected resource requirements for the program as a whole. Many resources supporting the MRP have base roles (i.e. continue to have accountabilities outside of the MRP), and the lack of a resource loaded schedule may have contributed to bottlenecks in progressing initiatives such as reference level submissions and BRD reviews and approvals for technical systems and tools.

c) Assessing overall project status against baseline

A baseline schedule to facilitate performance reporting had not yet been established, as required by the *Project Schedule Management Manual* (sections 2.2.16 and 2.2.17). As a result, the existing project status reporting only provided a timeline for activities, making it difficult to determine progress against the original plan.

Potential Cause & Impact

Potential Causes:

- The Umbrella MRP is classified as a level C project based on project cost and initial assumptions on complexity, and therefore a resource loaded schedule was only recommended rather than required, per the *Project Schedule Management Manual*; and
- The importance of a consolidated project schedule may not have been recognized in the project planning phase, and a Cost & Schedule Analyst was not assigned to assist with the creation of a resource loaded schedule identifying interdependencies and the project critical path.

Potential Impact:

- A lack of detailed planning to identify critical path activities and interdependencies of key Umbrella MRP deliverables may:
  - Affect the ability to properly strategize, plan / prepare for project work, and address resource requirements, which results in a reactive approach to project management; and
  - Impact the timely completion of the project by the IESO's planned go-live date of Q4 2023;
- The project team may be unable to properly determine and communicate project status and schedule efficiency; and
- Business resources may not be allocated the appropriate amount of time to participate.

Recommendation

Management should establish an overall project schedule that captures key milestones / interim deliverables, interdependencies, critical path, and resource requirements for the Umbrella MRP. The schedule would serve as a baseline, and progress against that baseline should be monitored to identify and report delays. The schedule should be used as a basis for managing stakeholder expectations, and communicated for awareness of the extent and timing of resource requirements.

Management Action Plan

Management will:

- Finalize and share with key stakeholders a combined schedule that includes key deliverables, milestones, interdependencies, overall critical path, and resource requirements for the Umbrella MRP; and
- Develop the project baseline and key milestones, and begin reporting on progress against them to the MR Integration SC.

Action Owner: Lynn Wizniak, Senior Manager Market Affairs

Target Completion Date: January 15, 2023

2. Key project activities including market renewal impact assessment and requirements gathering were not completed timely per the milestones defined in the Business Case Summary ("BCS") and Steering Committee ("SC") presentations.	**High**

The milestones for completing key MRP deliverables, including detailed design impact analysis, business requirements gathering, tools and systems design, and market power mitigation reference level negotiations were communicated in various documents from the MRP team. This included a high level project roadmap issued in March 2021, the definition phase BCS for the Umbrella MRP prepared in October 2021, and Steering Committee meeting presentations in February 2022.

During audit testing in May 2022, IA observed that various milestones defined in the above documents had not been met. The table below identifies some of the milestones established and the status as of May 2022:

	Target Completion Date ("TCD")		
Milestone	**Roadmap (March 2021)**	**BCS (October 2021) / SC Presentation (February 2022)**	**Status (May 2022)**
a) Detailed design impact analysis	April 2021	November 2021[a]	In progress during audit testing in May 2022. Report subsequently issued in June 2022.
b) Business requirements gathering	August 2021	March 2022[b]	In progress - 13 of 18 BRDs completed, one subsequently completed in June 2022. TCD revised to August 2022.
c) Tools and systems design	March 2022	June 2022[b]	In progress - 2 of 15 SRDs completed. TCD revised to November 2022 for CIO and hybrid tools.
d) Reference level negotiations	July 2022	December 2022[a]	In progress - 11 of 37 submitted; overall TCD revised to May 2023.

[a] Reported in the definition phase BCS for the Umbrella MRP prepared in October 2021.
[b] Reported in the February 2022 MR Integration SC meeting, includes CIO stream systems and tools.

The list below provides further information on the status of the milestones identified above:

a) Detailed design impact analysis

The IESO issued its MRP Detailed Level Design Report in January 2021. The project team had planned to analyze the IESO report and prepare a detailed impact assessment to provide OPG stakeholders (e.g. the Business Planning, Generation Revenue Planning, and Regulatory Affairs teams) details on the areas of risk and focus.

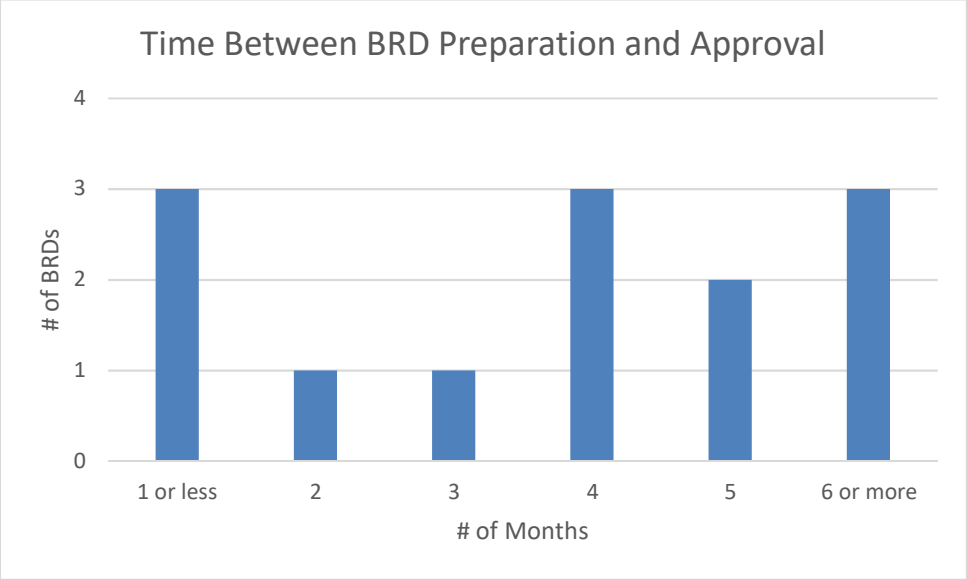
Although the BCS identified the detailed design impact analysis target completion date of November 2021, the document was being finalized during audit testing in May 2022. Management subsequently issued the document in June 2022.

b) BRDs for systems and tools

The target completion date for the 18 BRDs required for the MRP was March 2022, according to the BCS. As of the date of this report, four of the 18 BRDs remain outstanding, which Management has rescheduled for higher priority deliverables. One of those BRDs (the Running Cost Calculator, used to support Lennox and Atikokan offers/bids), was prepared over five months ago, but was awaiting review and approval.

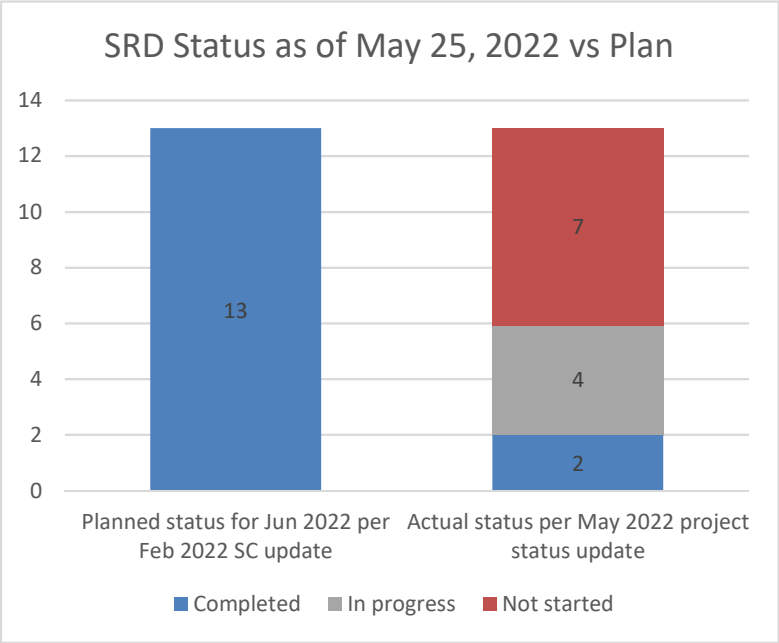
Tool	Revised Completion Date to Prepare BRD	Revised TCD to Approve BRD
Lepton Strategic	6/14/2022	7/22/2022
Lepton Non-Quick Start	5/24/2022	7/27/2022
RIV24 (MR)	(TCD) 7/25/2022	8/31/2022
Running Cost Calculator	12/7/2021	7/15/2022

For the BRDs that had been completed, IA noted significant delays between the time that BRD drafts were available for review and final approval, which subsequently led to a negative impact on the System Requirements Documents ("SRD") development. The chart below illustrates that most BRDs took 4-6 months for approval (versus the original estimate for BRD review sessions of approximately 2-3 weeks), mainly due to competing MRP priorities:



c) SRDs for systems and tools

The SRDs and associated system design activities for 13 of the 15 major tools were to be completed by June 2022 per the February 2022 presentation to the MR Integration SC. As of May 2022, only two SRDs had been completed and four were in progress, with seven not yet started. As a result, system design activities had yet to begin for the tools with incomplete SRDs. The chart below illustrates the status of SRDs as compared to plan:



d) Reference level negotiations for hydroelectric and thermal facilities

The IESO requires reference levels to be established for each dispatchable resource prior to Market Renewal go-live. Market participants must provide the financial reference levels (e.g. energy offers), opportunity costs, non-financial reference levels (e.g. energy ramp rates) and reference quantities (e.g. minimum head-based capability), or accept / register a default value. In 2021, OPG established the timeline for hydroelectric facilities, with the reference level submissions for Nuclear and Solar facilities being submitted and approved by the IESO in 2022.

Based on this initial timeline, 24 reference level workbooks were to have been submitted by May 2022, and the remaining 13 to be completed by the end of 2022 consistent with the BCS milestone. During audit testing, IA noted that 11 of the 24 reference level documents due by May 2022 have been submitted to the IESO, with three of the 11 documents approved by the IESO, and another one partially approved. OPG has since made two requests to the IESO to amend the timeline for the remaining 26 submissions, including the partially approved submission, with the latest from the end of 2022 to May 2023, and the IESO has agreed to the extensions.

The MRP team had also requested submission date extensions for individual facilities or groups of facilities (e.g. batched submissions). IA noted that in two instances the request was made after the submission deadline had passed.

Potential Cause & Impact

Potential Causes:

- Resourcing challenges, including:
  - SMEs were involved in multiple MRP initiatives and/or were supporting the MRP on a part-time basis, in addition to their regular base assignment duties, and their time may not have been properly budgeted / prioritized without a resource-loaded schedule;
  - MRP resources re-prioritized work to address emerging issues; and
  - Turnover of personnel may have led to deliverables not being completed as initially planned;
- The complexity in determining financial reference level calculations and inputs, and the subsequent time required for this exercise, may have been underestimated; and
- The MRP team has been working with the IESO and other stakeholders (e.g. the Ontario Waterpower Association) to clarify the opportunity cost calculation methodology, contributing to the delay in finalizing reference level submissions.

Potential Impact:

- The delays in completing initial activities may have a cascading impact on OPG's readiness for market renewal and/or project scope; and
- OPG may need to accept default reference levels if negotiations are not completed with the IESO by Market Renewal go-live, which may impact operating strategies.

Recommendation

Management should:

- Complete the remaining BRDs and SRDs subject to IESO dependencies;
- Develop the plan for reference level submissions, including identification of resource and time requirements (see finding 1 for further details);
- Communicate the plan to key stakeholders and obtain commitment to the established timelines; and
- Assess the risks and/or impact of the delays on downstream activities / deliverables, and develop recovery / contingency plans, as appropriate.

Management Action Plan

In addition to the management action plan articulated in response to finding 1, Management will document the approach and plan to completing and submitting the remaining SRDs and reference level submissions, as appropriate, and communicate it to stakeholders.

As of the audit report date, Management has:

- Developed and communicated a schedule for completing review and approval of the remaining BRDs, including identification of the resource requirements; and
- Issued the detailed design impact analysis document on June 14, 2022 and communicated to stakeholders.

Action Owner: Lynn Wizniak, Senior Manager Market Affairs

Target Completion Date: January 15, 2023

3. Project performance measures were not defined, progress against milestones was not reported, and not all SC members were included in SC meetings.	**Moderate**

The MR Integration SC was established to provide executive oversight and includes the following objectives per the Terms of Reference and MRP Umbrella Charter: (1) Overseeing the coordination of collaborative strategies across Corporate Business Development & Strategy, Renewable Generation and Regulatory Affairs, (2) Providing guidance pertaining to regulatory issues, and (3) Monitoring program performance metrics with an aim for continuous improvement.

In reviewing the monthly updates provided to the MR Umbrella Program Senior Leadership Team, IA noted the following:

a) Performance measurements were not yet finalized;

The MRP Umbrella Charter identified program performance metrics to include the conventional budget and schedule metrics (i.e. Cost Performance Index ("CPI") and Schedule Performance Index ("SPI")), as well as commercial readiness metrics.

As of May 2022, Management was still in the process of defining metrics to assess performance, and socializing the key milestones, which will be used to measure progress in ensuring MRP readiness. The CPI and SPI metrics were not yet reported for the Umbrella MRP, although required by the project charter. IA noted the CPI cost based metric may not be meaningful for the MRP, as most staffing resources were funded by base business and did not charge time to the project (e.g. MRP budget was not linked to deliverables to enable meaningful determination of CPI). The only metrics reported, actual spend to date versus total aggregate project budget and current release, and a sliding scale indicator of the progress for reference level negotiations, provided limited information on the project performance. IA noted the CIO workstream had started reporting CPI and SPI in 2022.

b) Delays and changes in the target completion date for project deliverables were not communicated; and

The Umbrella MRP defined a high level project roadmap with key milestones in March 2021, and the milestones were revised when the definition phase BCS was prepared in October 2021. IA noted the revisions in key milestone dates were not reported to the MR Integration SC. Additionally, actual progress against the latest defined milestones had not been reported (see finding 2 for further details).

c) Progress on tools and systems were not included in the SC reporting.

The SC has oversight responsibilities for the entire MRP, including the associated IT activities which comprised approximately 80% of the MRP budget. IA noted that the status of the IT program, which was a significant component of the MRP, was not reported to the MR Integration SC, although certain members receive an update on the progress of the IT program through their membership on the IT Steering Committee.

In addition to the communications on project performance as noted above, IA also noted that not all SC members as identified in the MRP Umbrella Charter had been invited to certain MR Integration SC meetings. Per discussion with the MRP team, due to the progress of the MRP at that time, attendance of all SC members had not been considered necessary based on the subject matter being discussed.

Potential Cause & Impact

Potential Causes:

- Competing project priorities resulting in project management activities, including the development and reporting of performance metrics, not being prioritized;
- Performance metrics, while driven by Project Management governance requirements may not have been appropriately defined in the Charter (e.g. the use of CPI as a performance metric is less relevant for the Umbrella MRP, where resources do not charge time to the project); and
- A separate steering committee existed for the IT program following CIO Projects governance, and the MR Integration SC may have relied on this oversight function.

Potential Impact:

- Delays in key project milestones may not be transparent to stakeholders and the MR Integration SC, if baseline schedules, milestones and metrics are not defined to facilitate performance reporting and milestone revisions are not evident, which may result in corrective actions not being taken;
- Given the significance of the IT project within the overall MRP program, the MR Integration SC's ability to oversee and assess the progress of the overall MRP program may be challenging if they are not provided with timely information on the IT MRP's progress; and
- Key stakeholder input and oversight may not be provided if SC members are not invited to the SC meetings.

Recommendation

Management should:

- Assess the needs of the MR Integration SC, and consider whether additional information (e.g. overall progress on IT activities) is required;
- Complete the performance metrics definition activities, and report to the MR Integration SC the overall project status against defined milestones and performance metrics; and
- Ensure that all SC members are invited to each MR Integration SC meeting and quorum be established, regardless of the subject matter to be discussed in the meeting.

Management Action Plan

Management will:

1. Revise dashboard to show progress on integrated schedule towards defined milestones. Complete definition of performance metrics. Report at monthly MRP Status Update meetings and MR Integration SC meetings.
2. Provide additional information related to the tools and system progress (i.e. IT program) to the MR Integration SC meeting to facilitate its objective to review initiatives associated with Market Renewal and provide feedback / direction; and
3. Ensure that all SC members are invited to future MR Integration SC meetings and quorum be established.

Action Owner: Lynn Wizniak, Senior Manager Market Affairs

Target Completion Date: January 15, 2023

4. A PMP, including the gating strategy and risk management plan, was not developed.	**Moderate**

The OPG *Project Management Standard* (OPG-STD-0148) requires all projects to develop a Project Charter and PMP, which would include the gating strategy and risk management plan. As of the date of this report, the Umbrella MRP is in the definition phase (i.e. a phase subsequent to the identification, initiation and development phases). In reviewing the project documentation, IA noted that the Project Charter and PMP, which were expected to have been developed in the earlier phases, were not completed timely or yet to be finalized. Specifically:

- The MRP Umbrella Charter, which is required to be finalized during the initiation phase per the *Project Integration Manual* (OPG-MAN-00120-00010) section 2.21, was not developed until the definition phase of the project. It was presented in April 2020, distributed for review in March 2021, and not finalized until December 2021. As a result, the charter was not included as an input into the Gate 1 approval decision (December 2020 for the IT MRP project) since it was not yet available. Additionally, IA noted the charter did not include all the required components, including the project level, gating strategy, commitments and considerations, funding / cost, and project boundaries; and

- The PMP was still being developed as of audit fieldwork for the Umbrella MRP, although the *Project Integration Manual* section 2.3.1 requires the PMP to be completed during the development phase. Therefore, the approach for managing the execution of the project, measuring and controlling progress, monitoring performance and managing change had not yet been established, as well as the following:

  a) Gating strategy

  The *Project Phase-Gate Management Manual* (OPG-MAN-00120-0019) section 3.1 requires a gating strategy to be established at the onset of the project and no later than the point at which the business case is approved. The strategy identifies in advance when gates will occur in the project schedule, and the deliverables to be completed for each gate.

  IA noted that a gating strategy had not been defined for the Umbrella MRP, including the activities / deliverables required to be completed and approved for each gate approval. Although the Umbrella MRP had received Gate 2 funding, there was no documentation to support the project had completed the deliverables required to pass Gate 2 (e.g. the existence of the PMP and a detailed schedule).

  b) Risk management plan

  The *Project Risk Management Manual* (OPG-MAN-00120-0015) sections 2.1.1 and 2.2.4 requires a risk management plan to be developed and assessed periodically, and a risk register to be used to record all identified risks. IA noted that the Umbrella MRP had yet to develop a risk management plan, and a formalized risk register in ePMX did not exist, although project risks were discussed at monthly status meetings. Risk response strategies were not defined, and risk owners were not identified to ensure risk responses were appropriate; risks have also not been assessed on a quantitative basis. IA noted the existing risk inventory did not include all identified risks impacting the project.

Beginning in March 2022, the EPMO was engaged to assist with performing cost and forecast analysis for the project. Management anticipates this arrangement will help standardize the analysis and align it with the EPMO methodology, as well as facilitate monthly budget variance discussions.

Potential Cause & Impact
Potential Causes: • Management was not familiar with the EPMO governance requirements, and may not have felt that the implementation of project management controls was necessary; • Insufficient or inadequate resources were allocated to focus on the MRP project management activities during the planning phase; and • EPMO resources had been included in the Umbrella MRP team to support project management controls implementation, but were limited to assisting with cost and forecast analysis. Potential Impact: • The project may not be effectively managed if key project elements (e.g. gating strategy and risk management plan) are not addressed, which may impact the overall performance and achievement of objectives and deliverables; and • Risks may not be appropriately mitigated and managed if accountability is not assigned to risk owners and response plans are not prepared.
Recommendation
Management should complete the PMP, as well as establish and implement the gating strategy and risk management plan. Management should assess whether additional resources with appropriate subject matter expertise in the area of project management are required.
Management Action Plan
With the assistance of the EPMO, management will develop a PMP with the appropriate amount of rigour applied as required by OPG-MAN-00120-00010, including a gating strategy and risk management plan for review, approval and implementation. As of the audit report date, Management has input the program risks into the ePMX tool, including risk assessment and response plans. Risks will be periodically reviewed to assess ongoing effectiveness of mitigation efforts. Action Owner: Lynn Wizniak, Senior Manager Market Affairs Target Completion Date: January 15, 2023

APPENDIX A – RATING DEFINITIONS FOR AUDIT REPORTS

Finding: *Noted deficiency with potential impacts to the achievement of business unit/process area objectives, assessed using the following criteria:*

	High Risk	Moderate Risk	Low Risk
Safety & Social License	• Potential regulatory non-compliance. • Deficiencies that could result in: ○ Fatality, permanent disability, or lost time injury; ○ Data loss or unavailability of critical systems; ○ Security is compromised in sensitive / multiple areas; ○ Fraud / theft; or ○ Negative media coverage resulting in reputational damage.	• Insufficient evidence to support regulatory compliance. • Deficiencies that could result in: ○ Minor injury with no lost time; ○ Temporary data loss or unavailability of non-critical systems; ○ Security is compromised; ○ Fraud / theft with some mitigating controls; or ○ Public escalating concerns to OPG Management or local media.	• Documentation improvements to support regulatory compliance. • Deficiencies that could result in incidents that do not require medical treatment. • Deficiencies that do not result in any media attention negatively impacting OPG's reputation.
Financial	• Potential loss or financial impact =>5% of the sample population's value, or the department's OM&A budget if the former is unavailable.	• Potential loss or financial impact >=2% and <5% of the sample population's value, or department's OM&A budget if the former is unavailable.	• Potential loss or financial impact <2% of the sample population's value, or department's OM&A budget if the former is unavailable.
Operational Excellence	• Governance non-compliance or lack of/inadequate controls that may impact achievement of business or project objectives. • Errors in or insufficient internal reporting that drives senior management decision making. • Test results where =>25% of the sample had deficiencies in the execution of a key control.	• Governance non-compliance or lack of/inadequate controls with alternate controls in place to mitigate the impact to business or project objectives. • Errors in or insufficient internal reporting that could affect management decision. • Test results where >=10% and <25% of the sample had deficiencies in the execution of a key control.	• Governance compliance with procedural concerns or documentation issues which could impact OPG's ability to demonstrate appropriate due diligence. • Errors in or insufficient internal reporting that has minimal decision making impact. • Test results where <10% of the sample had deficiencies in the execution of a key control.

Opportunity for improvement: *Observation with no risk impact that is provided to management for consideration to improve efficiency of processes and documentation (e.g. automation, duplication of activities).*

OVERALL REPORT RATING SCALE

An overall audit rating is assigned based on the number of observations identified for the audit and their assigned risk rating:

	Number of Findings			
Finding Risk Rating	**1**	**2**	**3 - 4**	**=> 5**
High	Requires Improvement	Not Effective	Not Effective	Not Effective
Moderate	Generally Effective	Generally Effective	Requires Improvement	Not Effective
Low	Effective	Effective	Generally Effective	Requires Improvement

APPENDIX B – PROCESS OWNER & DISTRIBUTION LIST

Distribution:

Nicolle Butcher
Chief Operations Officer

Kim Lauritsen
Vice President, Energy Markets

cc:	Ken Hartwick	President & Chief Executive Officer
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	Kathy Lau	Manager, Internal Audit
	Nuno De Matos	Senior Project Manager Consultant
	Abhay Lakhanpal	Senior IT Leader/Advisor
	Daisy Wu	Senior Market Affairs Advisor

ONTARIO POWER GENERATION

Internal Audit

Renewable Generation Turbine Generator Overhaul Program

February 28, 2023

Report Rating: **Requires Improvement**

Table of Contents

1.0 EXECUTIVE SUMMARY

1.1 Report Rating and Summary of Findings

Report Rating: **Requires Improvement**

No.	Finding	Risk Type	Risk Rating[1]		
			High	Moderate	Low
1	Sampled TG overhaul projects did not consistently adhere to OPG's project management framework, contributing to adverse project performance.	Operational	X		
2	The Asset Investment Planning and Management ("AIPM") software tool is not being fully utilized to support TG overhaul investment optimization and document decision making rationale.	Operational			X
3	A formal change management plan that includes the transition to the Equipment Health Monitoring and Reporting process has not been completed to drive full implementation.	Operational			X
4	Three recommendations from the TG Overhaul Strategic Initiative have not been implemented, and actions have not been formally recorded in an approved tracking system for monitoring and closeout.	Operational			X
Total		**4**	**1**	**-**	**3**

1.2 Background

Renewable Generation ("RG") Operations is responsible for operating and maintaining a diverse fleet of hydroelectric generating facilities and the associated infrastructure for water conveyance across the province of Ontario. The hydroelectric assets have installed capacity of approximately 7,590 MW, and account for the majority of RG's generation portfolio. RG continuously invests in its hydroelectric fleet and plans to spend approximately $2.5 billion on 174 overhauls over the next 22 years, many of which will be Turbine Generator ("TG") overhaul projects.

TG overhauls are typically performed on an approximate 25-year frequency and are often completed with other related capital projects such as runner replacement, rotor field pole or stator rewind projects when the schedule for these investments align with the 25-year overhaul lifecycle. Overhaul and runner, rotor and stator capital investments are often programmed together given the longer required planning duration and effective sequencing in execution to make efficient use of outage time. TG overhauls typically require full disassembly of the unit, requiring substantial space within the powerhouse to execute.

Historically, each RG region (Western, Eastern, and Niagara Operations) used different methods to plan and execute overhaul projects, which were managed regionally. RG now aims to establish more consistency in the approach to performing TG overhauls across the fleet. An initiative to develop an RG TG Overhaul Strategy was conducted in 2019-2020, with a vision to develop a best-in-class TG Overhaul Program that is consistently applied across the fleet to aid execution of overhaul projects, and to identify common opportunities and efficiencies. Currently, governance for a formal TG Overhaul Program is being developed while overhaul projects are being planned and executed in accordance with RG's Business Plan and OPG's project management framework.

[1] Please refer to Appendix A for risk rating definitions

This was a risk-based audit identified in Internal Audit's ("IA") 2022 Audit Plan, selected given the criticality of ensuring the continued useful life of hydroelectric plants to OPG's generation capacity, and climate change and strategic goals.

1.3 Objective & Scope

The objective of the audit was to assess whether the processes and controls related to the TG Overhaul Program and key project management activities were designed and operating effectively to ensure the successful delivery of TG overhaul projects on time, on budget, and with quality.

In order to achieve the audit objective, IA reviewed the processes and tested, on a sample basis, whether:

A. Integrated Asset Management & Engineering Assessments
• The governance framework for the TG Overhaul Program has been established, including interfaces with the RG Equipment Reliability, Design Management, and Strategic Asset Management Programs as applicable; • The TG Overhaul Program is supported by RG Asset Management processes that integrate technical and economic assessments to produce investment options; • The TG Overhaul Program incorporates measurable benefits and efficiencies from common strategies across the fleet, while providing the regions with support and flexibility to implement regional solutions; and • Recommendations from the TG Overhaul Strategic Initiative have been implemented by each RG region in order to effectively support TG overhaul projects.
B. Project Estimating and Scheduling
• RG annually prepares a Business Plan, which includes Project Listing of TG overhaul projects to be executed based on decision-making criteria and documented inputs; • A critical component strategy for TG overhaul projects is in place enabling the identification and procurement of long-lead components, which is incorporated into the overall planning at the portfolio and project level; and • Oversight of the TG overhaul project portfolio is in place with reporting of progress, challenges, and identification and reporting on results of corrective action and/or mitigation plans.
C. TG Overhaul Project Planning & Management
• Project management standards, activities, and processes are aligned to OPG's project management framework based on the size and complexity of the project; • Scope of work has been developed and managed to ensure that the project includes all the work required, to meet project objectives; • Gate deliverables are established, and gate decision forum aligns with gate definition requirements, gate strategy and provides information on business rationale, project planning and performance; • Scope is adequately planned and is aligned to the project Work Breakdown Structure ("WBS"), schedule, resources and budget; • Contractor and OPG's schedules are established and aligned – including identification of critical path, precursor activities, milestones, interdependencies and accountabilities; • Cost estimates align with project management governance and the project WBS; • Appropriate oversight of cost/budget, including forecasting, are implemented; • Scope, schedule and cost changes are tracked, approved and managed effectively; • Progress on projects is reported, including measuring Key Performance Indicators ("KPIs"); and • Project risks and issues are regularly assessed and reviewed, and mitigation plans are implemented and contingency amounts are developed based on risks.

D. Fraud Considerations
Vendors or OPG staff may provide inaccurate cost and schedule performance reporting to intentionally misrepresent actual results or progress.
E. Opportunities for improvement
Potential opportunities for cost management and savings related to efficiency of processes were tracked and documented (e.g. automation, duplication of activities, etc.).

Scope Period: The scope included activities from January 1, 2021 to November 30, 2022, and precursor activities from prior periods where appropriate.

1.4 Conclusion

Overall, the processes and controls related to the TG Overhaul Program were found to require improvement. A summary of positive observations, key audit findings and recommendations, and further opportunities for improvement is provided below.

Positive Observations

- To support overhaul work, RG has been working with Supply Chain to develop strategic partnerships and expand its list of specialized engineering and manufacturing vendor partners in the design and replacement of turbine and generator components;

- Technical and economic tools that form the basis of RG's asset management and overhaul planning have been redesigned, including a value framework and engineering and risk assessment processes under the RG Equipment Reliability program; and

- The new Equipment Health Monitoring and Reporting process ("System Health") is being implemented to facilitate and standardize the continual assessment of RG facilities' equipment condition. During the last year, System Health has been rolled out to five hydroelectric facilities, with more to follow.

Key Finding & Recommendations

- Within the sampled TG overhaul projects, there were instances where the projects did not adhere to key elements within OPG's project management framework, which impacted performance for those projects. Additionally, a formal framework for the RG TG Overhaul Program has not been established. RG management, with enhanced presence and support by the Enterprise Project Management Office ("EPMO"), should ensure that key project management processes are implemented across planned and in progress TG overhaul projects. The EPMO should work with RG Operations to ensure timely and updated monthly project reports reflect actual results for users to assess performance across the fleet, and RG management should finalize and rollout the RG TG Overhaul Program framework.

The findings noted in this report have been reviewed with management who have committed to specific action plans. Please refer to Section 2.0 for specific details of the above findings along with the associated risk impact, audit recommendations and management action plans.

Opportunities for Improvement

RG-PROG-MA-0005 *Overhaul Strategy* (DRAFT) section 1.13 states that Equivalent Forced Outage Rate ("EFOR") should be measured for each unit post overhaul, in order to assess whether the overhaul has had its desired effect on reliability. EFOR reporting as it relates to TG overhauls shall not include outages that are a result of an issue outside of the turbine and generator equipment. As such, $EFOR_{TG}$ (for turbine and generators only) is to be measured on all overhauled units over time, and the data should be stored in a central database. IA noted that $EFOR_{TG}$ has not yet been implemented for units with recent TG overhauls. Given the significant planned investment in TG overhauls by RG in the future, the implementation, measurement, reporting and trending of $EFOR_{TG}$ is recommended as soon as is practical.

2.0 DETAILED AUDIT FINDINGS

IA identified the following detailed findings which have been risk rated based on the definitions outlined in Appendix A.

1. Sampled TG overhaul projects did not consistently adhere to OPG's project management framework, contributing to adverse project performance.	**High**

OPG's project management framework is based on industry standards and includes leading practices. All organizational groups are expected to adopt this framework when planning and executing projects, including TG overhaul projects. The required level of adherence and adoption of required controls are a function of the project's scope, risk, complexity, duration, cost, and project execution strategy.

In order to assess the management and performance of TG overhauls, a sample of eight in-progress or completed TG overhaul projects across RG's operational regions was selected, ranging from project level 'B' to level 'D' according to OPG's Scalable Project Delivery Model. OPG's project management governance modules were being rolled out across the RG fleet commencing in December 2019. As a result, the sampled TG overhaul projects were in various stages of adopting the enterprise-wide project management framework given the projects represented in-progress or completed work at the time of audit fieldwork.

Of the eight sampled projects, five were reporting unfavourable Cost Performance Index ("CPI") (ranging from 0.41 to 0.92), with one project reporting a CPI of 1.66. These same six projects were reporting unfavourable Schedule Performance Index ("SPI") (ranging from 0.09 to 0.78), as at November 2022.

In analyzing the sampled projects in detail, the following details were noted:

<u>Project Planning</u>
Two of the eight sampled TG overhaul projects did not have their Project Management Plan ("PMP") finalized, and cost and schedule baselines were not always documented in the PMP. In some instances, cost and schedule baselines were noted on the PMP as being in the appendices, however there were no appendices in the PMP.

<u>Contingency Management</u>
OPG-MAN-00120-0015 *Project Risk Management* requires that a quantitative risk analysis be performed on A, B and C level projects that may require contingency funding. The two methods of analysis are:

- Monte Carlo/Program Evaluation and Review Technique ("PERT") Risk Modelling, performed on project levels A and B by the Project Management Office ("PMO") Risk Management Subject Matter Expert ("SME"); and
- Expected Monetary Value ("EMV"), performed on level C projects by the project team.

In developing the contingency estimates for the TG overhaul projects, neither of the required quantitative risk analysis methods above were utilized for four of the eight sampled projects. Instead, a 'percentage of estimate' approach was used in determining contingency, where the percentage usually varied between [redacted] of budgeted cost based on the perceived needs of the project. From discussions with management, it is unclear whether a specific implementation date for using quantitative risk analysis methods was firmly established for RG Operations.

Change Management

OPG-MAN-00120-0016 *Project Integrated Change Control* requires that all material directed changes to project scope, cost or schedule baselines be performed through the integrated change control process in accordance with the Scalable Project Delivery Model. All change requests should be initiated within the Ecosys change module via a Change Control Form ("CCF"). A change log should be maintained documenting all changes that occur on the project and their status. For project levels A, B, and C, the change log is to be maintained electronically.

Five of the seven sampled level B – C TG overhaul projects did not document individual project changes within EcoSys. It was noted that three of these projects raised a CCF to document changes in schedule baseline, to support a superseding Business Case Summary ("BCS") or a Project Over Variance Approval ("POVA"). Changes to contract deliverables were documented using Project Change Directives ("PCDs"), however the management and impact of those changes were not documented.

Lessons Learned

Six of the eight sampled TG overhaul projects were not actively documenting lessons learned within the EBX system as they progressed through planning and execution. It was noted that the rollout of EBX to RG occurred in June 2022.

Additionally, evidence to formally validate that previous lessons learned were reviewed as part of project planning was only available for two of the eight sampled TG overhaul projects. Project managers for two separate TG overhaul projects confirmed that a review of lessons learned was completed for their projects, however the outcome and activities coming out of those reviews were not documented.

Project Performance and Reporting

All projects are to document project performance using monthly project performance reports, with requirements (including the use of standardized templates) scaled to the project level. Project performance analysis and variance explanations should be completed with quality and confirmed by the project manager. Explanations should identify the description of the variance, and its cause and impact on project objectives (e.g., scope, cost and schedule), and include corrective actions and timelines for recovery.

In reviewing the November 2022 monthly pulse report for the sampled TG overhaul projects, the following was noted:

- Three did not have updated information in ePMX and Ecosys tools due to ongoing data accuracy issues, which had some impact on CPI and SPI calculated results; and
- Of the six projects that were reporting unfavorable variances, only two included explanations which outlined the cause and impact of the variances as well as the recovery efforts that were being pursued.

RG TG Overhaul Program Framework

Although various TG overhauls have been completed by RG Operations for many years, an overarching framework had not been established to define aspects of an RG TG Overhaul Program, specifically the purpose, objective, governance structure, roles and responsibilities, definitions, and interfaces. A draft overhaul strategy program document, aimed at providing guidance to RG overhaul teams on leading practices and tools, is in progress but has not been finalized.

In reviewing the draft overhaul strategy program document, the following was noted:

- A governance structure had not yet been determined, and there is no firm date for the completion and rollout of the document as part of governance;
- There are some references to processes that are being phased out, such as Plant Condition Assessments ("PCAs"); and
- There is no common/formal definition of an 'overhaul' within RG and among stakeholders.

Potential Causes and Impact

Potential Cause:

- Competing priorities and lack of resources may have contributed to staged implementation of OPG's project management framework to RG's operational regions. As a result, RG project managers are still familiarizing themselves with all elements of the framework;
- A firm implementation date was not established for use of quantitative risk analysis for contingency management, which impacted their use on legacy TG overhaul projects; and
- Historically, each RG region has used different methods to plan and execute TG overhaul type projects without the development of formal definitions and criteria.

Potential Impacts:

- Parties accountable for oversight may not have accurate, complete and up-to-date information to allow them to appropriately assess the progress of TG overhaul projects;
- The demonstration of sufficient due diligence may be questioned in the absence of a finalized and fully updated PMP;
- A lack of consideration of previously documented knowledge and learnings may cause projects to inadequately plan to prevent a repeat of past mistakes, miss opportunities for improvement and prevent projects from achieving the best possible outcomes;
- Using non-risk-based contingency calculation models may expose the TG overhaul project to unanticipated cost overruns;
- There may be limited insight/record-keeping into the changes that have affected the project cost baseline to confirm that the impact of changes to scope, schedule and/or cost and business justification for the changes are understood, documented, and accepted; and
- Lack of a common overhaul framework may result in knowledge gaps in the event of staff turnover and inconsistent execution that may impede the achievement of TG Overhaul Program objectives in the long run.

Recommendations

- Management, with enhanced presence and support by the EPMO, should ensure that key project management processes are fully implemented across planned and in-progress TG overhaul projects in accordance with applicable governance, which may improve outcomes and the achievement of objectives;
- Given the data issues impacting lagging CPI and SPI metrics, the EPMO should work with RG Operations to ensure timely and updated monthly project reports reflect actual results for users to assess performance across the fleet; and
- Management should finalize and rollout the RG TG Overhaul Program document with the following key elements – purpose and objectives, common definition for overhaul, a governance hierarchy, and requirement for performance metrics and reporting.

Management Action Plan
1. Management will perform a self-assessment on active TG overhaul projects against key project management governance, identify the gaps, and develop and implement an action plan to close those gaps. Action Owner: Amanda Griener, Manager, Project Controls Target Completion Date: October 31, 2023 2. Management will overhaul CPI/SPI metrics reviewed monthly at the RG portfolio, and an action log will be included to capture discussions and corrective actions to address unfavourable trends. Action Owner: Amanda Griener, Manager, Project Controls Target Completion Date: March 31, 2023 3. Management will finalize and roll out the RG TG Overhaul Program framework document. Action Owner: Brian Dietrich, Director Asset & Project Management, Western Region Target Completion Date: May 31, 2023

2. The AIPM software tool is not being fully utilized to support TG overhaul investment optimization and document decision making rationale.	**Low**

Following development by Integrated Fleet Management on behalf of Enterprise Operations, RG has implemented an AIPM software tool, Copperleaf 55 ("C55"), under Project #ICICO014 "Enterprise Asset Management Tool". C55 supports best practices in asset management that embodies the key principles of ISO 55000 to optimize investment decisions.

Two aspects were identified where C55 was being underutilized in the TG overhaul program:

Optimization Functionality

During project execution, stakeholders in RG were provided with C55 training and demonstrations. While the C55 tool is currently being used as a repository of data for capturing information on investments and their valuation, it was noted that the optimization functionality is not being leveraged by users for overhauls. Interviews with regional stakeholders indicated that they had provided feedback on the issues that they have encountered in applying the C55 VF, with the results not being aligned to their knowledge of the condition and importance of the assets (e.g., in some instances the investments produced a negative VF from C55).

Retaining investment selection rationale

To ensure sound investment decisions, Regional Programming evaluates investments relative to the operating environment and both short and long-term organizational goals. Potential investments are first identified from PCAs and Engineering Risk Assessment Program ("ERAP") inputs, and are recorded in the Work Program Catalog (which was migrated to the C55 software tool in Q1 2022). Potential investments for inclusion in the business plan are evaluated in each RG region and prioritized on the basis of defined criteria including technical condition, risk, value, and regional factors such as resource availability, materials delivery time, and installation requirements. The result of this iterative process is a prioritized 'Project List' submitted to Finance for the RG Business Plan, that is scheduled based on available funding and resources.

Decision-making with regards to investment selection and prioritization is a mature process involving meetings with stakeholders across RG regions, as well as review by Senior Leadership. However, it was noted that investment decisions and rationale for not selecting specific components, stations or projects (i.e., those that do not make it on the prioritized 'Project List' are not documented). Since C55's investment optimization functionality is currently not being utilized, an investment prioritization output is not generated and therefore RG's current outcome of TG overhaul project selection as part of the business planning process cannot be matched with optimized investment recommendations from C55.

Potential Cause & Impact

Potential Causes:

- C55's value framework algorithm may not have been designed for RG TG overhaul/refurbishment investments; and
- Despite rollout efforts and initial training, C55 is still a new tool where users are building knowledge and experience in functionality related to investment optimization for RG TG overhauls.

Potential Impact:

- Underutilization of the C55 tool may result in inconsistent approaches to investment evaluation by the RG regions, inability to measure and compare performance using uniform asset management performance metrics, and inability to fully achieve the intended benefits of OPG's investment in an AIPM tool.

Recommendation
Management should: • Review the calculation methodology of the VF utilized by C55 for valuing TG overhaul investments and make adjustments to address the noted issues, while taking account of experience with the use of C55 by other business units; and • Fully utilize C55 to produce optimized investment recommendations for TG overhauls that align with project selections for business planning. Until an optimized investment output is produced by C55, management should document the rationale behind TG overhaul investment selections and other key business decisions as part of business planning.
Management Action Plan
Management will review the calculation methodology of the VF utilized by C55 for valuing TG overhaul investments and make adjustments to address the noted issues, while taking account of experience with the use of C55 by other business units. Action Owner: Trevor Carneiro, Senior Manager Strategic Initiative Target Completion Date: June 29, 2023 Management will finalize and roll out the RG TG overhaul program framework document, which will include a process for documenting the rationale for TG overhaul investment selections in an approved information management system. Action Owner: Brian Dietrich, Director Asset & Project Management, Western Region Target Completion Date: May 31, 2023

3. A formal change management plan that includes the transition to the Equipment Health Monitoring and Reporting process has not been completed to drive full implementation.	**Low**

TG overhauls are planned as part of RG's business planning cycle, and are prioritized based on assessments of plant condition, engineering risk assessment, and economic and other factors. Currently, RG is in the process of a shift in engineering assessment methodology from Plant Condition Assessments ("PCAs") to the new Health Monitoring and Reporting ("System Health") process in order to enhance the overall monitoring of system integrity and plant condition across the fleet. RG-PROG-MA-0004 *Equipment Reliability* issued in September 2021 replaces the former PCA and Engineering Risk Assessment programs.

OPG-STD-0140 *Managing Change* provides requirements for managing changes resulting from projects or initiatives. This is to ensure that changes are thoroughly planned and implemented, and that the lasting intended benefits of change are achieved. Among other requirements, the standard requires documenting a formal change management plan.

A draft change management plan was created in January 2021 and updated in January 2022 for the development and implementation of the RG Equipment Reliability Tool, which includes the transition to the new System Health process, however it has not been fully completed or formalized. Specifically, the draft plan does not include tasks past September 2022 and is lacking an updated implementation timetable and post monitoring activities. Discussions with management indicated that due to the complexity of the transition, challenges in implementing new processes across multiple facilities and limited resources, the full implementation of the System Health process across RG is expected to take more time.

Potential Cause and Impact

Potential Causes:

- Turnover of key resources during the development of the new System Health process may have contributed to delays in completing the change management plan; and
- The level of implementation effort across the RG fleet, such as ongoing work modifying and validating new software tools (Engage software modules) and baselining system health information for the Hydroelectric fleet within the Engage software tool, may have been underestimated when being planned.

Potential Impacts:

Lack of a formal, complete, and approved change management plan for a major initiative departs from leading practices as articulated in change management governance, and may expose the initiative to inefficiencies and increase the risk of a protracted implementation period costing more time and resources.

Recommendation

Management should complete and issue a formal change management plan in accordance with OPG-STD-0140 for the System Health process.

Management Action Plan

Management will prepare and issue a Change Management Plan for the transition to enhanced Equipment Reliability tools and processes to support timely risk-based decision making.

Action Owner: Chad Plant, Senior Manager Performance Engineering

Target Completion Date: April 28, 2023

4. Three recommendations from the TG Overhaul Strategic Initiative have not been implemented, and actions have not been formally recorded in an approved tracking system for monitoring and closeout.	**Low**

Due to the planned increase in TG Overhaul project work in RG's business plan, an initiative to assess and develop an RG TG Overhaul Strategy began in February 2019. The intent of the strategy was to consider both internal and external factors such as Original Equipment Manufacturer ("OEM") resource limitations/capacity, trades' availability, and internal resourcing demands. A report on the results of the initiative (RG-REP-41100-0001) was completed in June 2020 and it outlined recommendations developed by the five established working groups.

It was noted that three of the seven recommendations related to performing benchmarking, 'capturing tools and templates' in the RG Managed System, and developing and implementing an RG Approved Supplier Program, have not yet been implemented, formally tracked and actioned. Although some recommendations had been implemented and others are in progress, the recommendations from the initiative, in general, were not converted into traceable management actions with assigned owners and target completion dates for monitoring and formal closeout.

Potential Cause and Impact

Potential Cause

A formal process to record, monitor, and track actions associated with the TG Overhaul Strategic Initiative was not developed as part of the initiative closeout. As a result, resources required to implement all recommendations may not have been identified to ensure completion of all actions.

Potential Impact

If formal action items are not developed, tracked and monitored with assigned owners or delegated to responsible parties, the actions may not be completed in a timely manner, and objectives of the initiative may not be achieved.

Recommendation

Management should document all actions associated with the TG Overhaul Strategic Initiative in a managed system, which would facilitate the assignment of action owners as well as formal tracking and closeout of all recommendations and actions including the three outstanding recommendations.

Management Action Plan

Management will document all actions associated with the TG Overhaul Strategic Initiative in a managed system, which would facilitate the assignment of action owners as well as formal tracking and closeout of all recommendations and actions including the three outstanding recommendations.

Action Owner: John McCaig, Director Asset & Project Management, Integration Strategy

Target Completion Date: December 29, 2023

APPENDIX A – RATING DEFINITIONS FOR AUDIT REPORTS

Finding: *Noted deficiency with potential impacts to the achievement of business unit/process area objectives, assessed using the following criteria:*

	High Risk	Moderate Risk	Low Risk
Safety & Social License	• Potential regulatory non-compliance. • Deficiencies that could result in: ○ Fatality, permanent disability, or lost time injury; ○ Data loss or unavailability of critical systems; ○ Security is compromised in sensitive / multiple areas; ○ Fraud / theft; or ○ Negative media coverage resulting in reputational damage.	• Insufficient evidence to support regulatory compliance. • Deficiencies that could result in: ○ Minor injury with no lost time; ○ Temporary data loss or unavailability of non-critical systems; ○ Security is compromised; ○ Fraud / theft with some mitigating controls; or ○ Public escalating concerns to OPG Management or local media.	• Documentation improvements to support regulatory compliance. • Deficiencies that could result in incidents that do not require medical treatment. • Deficiencies that do not result in any media attention negatively impacting OPG's reputation.
Financial	• Potential loss or financial impact =>5% of the sample population's value, or the department's OM&A budget if the former is unavailable.	• Potential loss or financial impact >=2% and <5% of the sample population's value, or department's OM&A budget if the former is unavailable.	• Potential loss or financial impact <2% of the sample population's value, or department's OM&A budget if the former is unavailable.
Operational Excellence	• Governance non-compliance or lack of/inadequate controls that may impact achievement of business or project objectives. • Errors in or insufficient internal reporting that drives senior management decision making. • Test results where =>25% of the sample had deficiencies in the execution of a key control.	• Governance non-compliance or lack of/inadequate controls with alternate controls in place to mitigate the impact to business or project objectives. • Errors in or insufficient internal reporting that could affect management decision. • Test results where >=10% and <25% of the sample had deficiencies in the execution of a key control.	• Governance compliance with procedural concerns or documentation issues which could impact OPG's ability to demonstrate appropriate due diligence. • Errors in or insufficient internal reporting that has minimal decision making impact. • Test results where <10% of the sample had deficiencies in the execution of a key control.

Opportunity for improvement: *Observation with no risk impact that is provided to management for consideration to improve efficiency of processes and documentation (e.g. automation, duplication of activities).*

OVERALL REPORT RATING SCALE

An overall audit rating is assigned based on the number of observations identified for the audit and their assigned risk rating:

	Number of Findings			
Finding Risk Rating	**1**	**2**	**3 - 4**	**=> 5**
High	Requires Improvement	Not Effective	Not Effective	Not Effective
Moderate	Generally Effective	Generally Effective	Requires Improvement	Not Effective
Low	Effective	Effective	Generally Effective	Requires Improvement

APPENDIX B – PROCESS OWNER & DISTRIBUTION LIST

Distribution:

Nicolle Butcher
Chief Operations Officer

Paul Seguin
Senior Vice President, Renewable Generation

cc:

Ken Hartwick	President & Chief Executive Officer
Aida Cipolla	Chief Financial Officer & Senior Vice President, Finance
Mark Knutson	Chief Enterprise Engineering & Chief Nuclear Engineer
Riedewaan Bakardien	Senior Vice President, Integrated Fleet Management
John Hefford	Vice President, Regional Operations, Western Region
Zar Khansaheb	Vice President, Fleet Performance
Nicholas Pender	Vice President, Regional Operations, Niagara Operations
Bruce Robertson	Vice President, Regional Operations, Eastern Region
David Rogalski	Vice President, Central Engineering
Adam Chiarandini	Director, Enterprise Risk Management
Brad Bacvar	Director, Asset & Project Management, Northeast Region
Brian Dietrich	Director, Asset & Project Management, Western Region
Scott Gagnon	Director, Asset & Project Management, Southeast Region
Jenny Hawco	Director, Plant Reliability
Nimun Jahangir	Director, Plant Reliability
Kent Keeler	Director, Asset & Project Management, Niagara Operations
John McCaig	Director, Asset & Project Management, Integration Strategy
Judy Tan	Director, Internal Audit
Trevor Carneiro	Senior Manager, Strategic Initiatives
Anthony Ling	Senior Manager, Internal Audit
Chad Plant	Senior Manager, Performance Engineering
Michellee Reid	Manager, Internal Audit

ONTARIO POWER GENERATION

Internal Audit

Indigenous Relations

February 13, 2023

Report Rating: **Requires Improvement**

Table of Contents

1.0 EXECUTIVE SUMMARY

1.1 Report Rating and Summary of Findings

Report Rating: **Requires Improvement**

No.	Finding	Risk Type	Risk Rating[1]		
			High	Moderate	Low
1	Evidence to support Financial Settlement Agreements ("FSA"s) and fulfilment of related obligations was not always available.	Operational	X		
2	Governance does not contain guidance on the preparation of Indigenous Engagement Plans ("IEPs").	Operational		X	
3	Monthly status reports on Indigenous procurement contained inaccuracies.	Operational			X
4	The interpretation and execution of one RAP target were inconsistent with a plausible interpretation of the wording in the RAP.	Operational			X
Total		**4**	**1**	**1**	**2**

1.2 Background

Ontario Power Generation ("OPG") facilities across Ontario are located on the treaty and traditional territories of Indigenous people. OPG is committed to fostering positive and mutually beneficial relationships with Indigenous people and communities across Ontario.

In 1992, OPG developed a formal framework to assess and resolve historic grievances, largely related to the flooding of First Nation reserve lands. Over the past three decades, OPG has reached and delivered on Final Settlement Agreements ("FSA"s), including extending formal apologies, with 21 First Nations communities.

As part of OPG's commitment to partnering with Indigenous communities, a number of projects, advisory councils and grants have been developed in collaboration with Indigenous partners. This includes four generating station construction projects, the establishment of OPG's Indigenous Opportunities Network, extension of community grants, and creation of advisory councils on key OPG projects such as Small Modular Reactors ("SMRs").

In October 2021, OPG published its first Reconciliation Action Plan ("RAP") as a roadmap for how OPG plans to partner with Indigenous communities, businesses and organizations to advance reconciliation. The RAP is aligned with the Truth and Reconciliation Commission of Canada's Calls to Action #92, which calls for corporate Canada to create a better future by applying a reconciliation framework to business activities.

This is a risk-based audit identified in Internal Audit's ("IA") 2022 Audit Plan, selected given the strategic importance of the RAP, the significance of engagement of Indigenous communities to OPG's growth prospects, and the resolution of past grievances to the company's operational and social license performance.

[1] Please refer to Appendix A for risk rating definitions

1.3 Objective & Scope

The objective of this audit was to assess the design and operating effectiveness of controls and processes in place to ensure OPG's compliance with the obligations set out in the settlement agreements, and enable OPG to achieve the commitments outlined in the company's RAP.

To achieve the audit objective, IA reviewed the process and tested, on a sample basis, whether:

A. Past Grievances
• Memoranda of Understanding ("MOUs") were signed by Indigenous community representatives, as well as an OPG Director or Officer; • MOUs contained a work plan, including a timeline and budget; and • Final Settlement Agreements ("FSAs") were only signed off following an approved Business Case Summary for the work plan and Indigenous community referendum.
B. Settlement Obligations
• Settlement obligations were tracked to ensure that payments and actions were completed on a timely basis and in accordance with the terms of the settlement agreements; and • Periodic reports were provided to the Enterprise Leadership Team on the status of past grievances and settlement obligations.
C. Reconciliation Action Plan ("RAP")
• A governance framework had been established to support achievement of RAP goals; • Formal leadership and working groups had been established and provided oversight of, and drove progress aligned to, RAP actions; • RAP actions targeted for completion to date had been completed or otherwise extended as appropriate; and • Measures to report progress against RAP actions not yet completed were tracked and calculated appropriately, including the progress towards $1 billion in economic impact by 2031.
D. OPG Business Initiatives
• IEPs had been developed for key OPG growth initiatives and articulated Indigenous community positions clearly; • Community engagement plans for key OPG growth initiatives had owners assigned for accountability.
E. Fraud Risks
• Intentional erroneous reporting on the status of OPG's obligations under the settlement agreements; • Preferential selection of certain vendors for personal gain; and • Pressure to meet RAP targets results in reduced integrity in the procurement process.
F. Opportunities for Improvement
• There are potential opportunities for cost management and savings related to efficiency of processes and documentation (e.g. automation, duplication of activities, etc.).

Scope Period: The scope included activities from January 1, 2021 to September 30, 2022, and relevant precursor activities from prior periods where appropriate.

1.4 Conclusion

Overall, IA noted the processes and controls established to ensure OPG's compliance with the obligations set out in the FSAs and to enable OPG to achieve the commitments outlined in the company's RAP require improvement. A summary of positive observations, key audit findings and recommendations, and opportunities for improvement is provided below.

Positive Observations

- The Indigenous Relations ("IR") department has continued to collaborate with plant groups and the communities in which the groups are located to help improve OPG's relationship with those communities. The IR staff demonstrated a high level of engagement and motivation towards ensuring the achievement of OPG's objectives, especially as they relate to Indigenous engagement.

- The IR department has proactively sought to address the planned increase in enterprise-wide projects requiring further Indigenous engagement, including the Darlington New Nuclear Project ("DNNP") and the potential for development of hydroelectric facilities in Northern Ontario, as reflected in the establishment of additional positions within the group. This has also been reflected in the establishment of a Vice President role, recognizing the importance of Indigenous engagement to OPG's social licence.

Key Findings & Recommendations

- Documentation was not consistently maintained to support the FSAs between OPG and Indigenous communities or the completion of the related obligations. In addition, the tool currently used to track FSAs is incomplete and contains some inaccuracies. Coupled with high staff turnover, the lack of adequate documentation and tracking has led to a lack of clarity around OPG's outstanding financial and non-financial FSA obligations. Confusion around whether obligations have been met could adversely impact OPG relationships with Indigenous communities, putting planned strategic initiatives at risk. Management should review and update the tool and their process for document management to achieve the appropriate clarity.

- Indigenous relations governance does not include guidance on the preparation of IEPs, which are important to ensure OPG works with Indigenous communities in a consistent and respectful way, and to ensure OPG fulfils the Crown's Duty to Consult with the communities occupying lands on which OPG operates. Failure to consult could result in adverse actions by communities delaying project operations.

The findings noted in this report have been reviewed with management and they have committed to specific action plans. Please refer to Section 2.0 for specific details of the above findings along with the associated risk impact, audit recommendations and management action plans.

Opportunities for Improvement

- An outstanding non-financial obligation in one settlement agreement was for OPG to provide a formal apology to the Wahnapitae Indigenous community by February 2013, shortly after the execution of the agreement. Discussions with Management indicated that the action had been delayed for a number of reasons, including resourcing constraints within the community, competing priorities with the management of other Indigenous relationship matters, and the impact of the COVID-19 pandemic on the community. Given the recent correspondence with the Wahnapitae community, Management should consider prioritizing the fulfilment of this obligation as soon as possible.

- The *Indigenous Relations Manual* has not been updated since May 2020, and therefore does not reflect changes in OPG's organizational structure since that date. For example, the positions of President of Nuclear and President of Renewable Generation are cited in the Manual, with neither position existing as of the date of this report. Management should update governance documents to reflect the current organizational structure.

2.0 DETAILED AUDIT FINDINGS

Internal Audit identified the following detailed findings which have been risk rated based on the definitions outlined in Appendix A.

1. Evidence to support Final Settlement Agreements and fulfilment of related obligations was not always available.	High

Since 1993, OPG has executed 21 FSAs with Indigenous communities. These FSAs contain both financial and non-financial commitments made by OPG to the communities. As per OPG-MAN-08410.1-0001 *Indigenous Relations Manual* ("the Manual"), the IR team is responsible for maintaining documentation that supports both the execution and the monitoring of OPG's compliance with the FSAs, including the processing of related payments. The Manual requires that FSAs are supported by approved Business Case Summaries ("BCS"). Management maintained an Excel tracker to monitor OPG's fulfilment of all FSA obligations as they become due.

Through discussions with Management and review of the FSAs, it was demonstrated that OPG's obligations were generally being met. However, through review of the FSAs, IA observed the following items in relation to the control environment with respect to the tracking and monitoring of OPG's performance against these obligations:

Financial commitments

- Six FSAs were noted as having ongoing payment obligations as of the date of this report. On review of the six FSAs, it was noted that supporting BCSs could not be located for three, dating between 1995 and 2011 and ranging from [redacted] to [redacted] in total obligations;
- From a sample of 19 FSA-related payments across five FSAs, evidence was not available confirming four of the payments had occurred. All of these payments were non-recurring in nature, and had anticipated payment dates prior to 2014; and
- From a sample of six FSAs, two obligations relating to flooding permits and lease payments totalling approximately [redacted] were unable to be paid due to challenges in obtaining Indian Act permits from the federal government. While the inability to secure such permits prevented the payment of such obligations, the respective amounts had not been accrued as expenses in the relevant periods.

Non-financial obligations

It was noted that the tracker maintained by IR did not include all non-financial obligations within the FSAs. While obligations relating to communication were listed separately, only 14 of the 21 FSAs were represented, and details had not been updated since 2020. IA confirmed that there was at least one FSA with non-financial obligations that were not included. Of the 14 FSAs listed in the file, various non-financial obligations such as issuance of a formal apology, installations of and repairs to various grounds, and engagement of communities in future business development were not included in the tracker.

Monitoring activities

The tracker maintained by IR was also found to be incomplete and contained inaccuracies. Specifically:

- In the financial obligation tracker, two of the 21 FSAs were not included, and only the worksheet summarizing 2022 payments was being updated;
- Seven of the 103 pre-2022 payment obligations, including lump sum payments, professional fees, and negotiation fees, were missing from the financial obligations tracker or inaccurately recorded;
- For two of the six active FSAs, lease obligations remained active and were being accrued, but the tracker indicated that lease obligations were completed; and
- Lease obligations where terms had not yet been negotiated and finalized were not being tracked.

Potential Cause & Impact

Potential Causes:

- The variety of changes in the business since the inception of FSAs may have created difficulties in locating payment evidence. Such changes included accounting systems updates, changes in names or references of some of the Indigenous communities and assignment of multiple vendor codes to individual communities;
- Loss of historical knowledge of past FSA activity due to turnover of staff in the role responsible for FSA-monitoring since the inception of FSAs;
- Competing priorities due to the volume of activities managed by the IR team, leading to matters such as supporting Indigenous engagement and consultation processes, managing relationship issues, and responding to internal requests being prioritized over longer-term administrative departmental needs; and
- In reviewing the need for period-end accruals, there may have been a lack of consideration given to outstanding financial obligations under the FSAs due to their non-standard nature.

Potential Impacts:

- There may be challenges in producing supporting documentation/evidence when requested by parties such as the Indigenous communities or other stakeholders;
- If all obligations are not being monitored, corrective action may not be taken in a timely manner, and may result in obligations not being met as they fall due;
- Missed / unmet obligations may negatively impact relationships with Indigenous groups and result in impacts to OPG's social licence; and
- There may be an understatement of expenses and associated liabilities in OPG's financial information.

Recommendations

Management should:

- Develop a process to improve knowledge retention and knowledge transfer around FSAs;
- Perform a review of all hard and soft copy FSA files currently in its possession, and develop a standardised system and methodology for retaining key documents;
- Establish a way to record the completion of both financial and non-financial obligations, and identify obligations that are still to be completed. This should include both obligations where the terms and amounts are known and where terms are yet to be finalised;
- Where payments, accruals and non-financial activities have been completed, develop a process to validate and retain supporting documentation;
- Ensure that there is a process to review and update the records as needed; and
- Perform an assessment of existing staff and responsibilities of the IR department to assess where there may be gaps.

Management Action Plans

Management will:

- Work with Finance to develop and document a process to track financial and non-financial FSA obligations, recording obligations met (e.g., payments, accruals, and non-financial obligations), and facilitate the retention and retrieval of related documents;
- Complete a Records Management Self-Assessment and identify the actions and resources needed to establish a consistent records management system for Indigenous Relations; and
- Perform an assessment of the IR team's resources and responsibilities to identify where there may be gaps and needs for additional support.

Action Owner: James Desmoulin, Senior Manager, Indigenous Relations
Target Completion Date: August 30, 2023

2. Governance does not contain guidance on the preparation of Indigenous Engagement Plans ("IEPs").	**Moderate**

OPG-MAN-08410.1-0001 R001 *Indigenous Relations Manual* S5.5 describes the background of and general procedures to comply with OPG's Crown-delegated Duty to Consult with Aboriginal groups resident on land subject to Aboriginal or Treaty Rights and on which OPG plans to develop projects. This Duty to Consult is paramount in project development where environmental assessments are undertaken and in seeking federal or provincial approvals or permits. As a result, legislation such as the Canadian Environmental Assessment Act and some regulators such as the Canadian Nuclear Safety Commission ("CNSC") encourage the preparation of Indigenous consultation / engagement plans. The CNSC, through REGDOC 3.2.2, mandates that a licensee submit an Indigenous engagement report as part of its license to construct application. OPG's approach to addressing this requirement includes the preparation of internal Indigenous Engagement Plans ("IEPs") for projects on land subject to Aboriginal or Treaty Rights.

From a population of 16 IEPs, IA reviewed six IEPs, three related to the Hydro Expansion initiative and three related to the DNNP, and noted that the owners of the plan (that is, the individual responsible for ensuring the implementation of the engagement activities) had not been identified, nor had a risk assessment of potential adverse impacts been performed to guide the extent of engagement needed.

The Darlington New Nuclear Project ("DNNP") team, established to develop SMRs, recently created a role with specific accountability for overall management of Indigenous engagement for DNNP. Subsequent to discussions with IA, this role was identified as the owner of the IEPs specific to DNNP. Indigenous engagement activities related to this project has progressed in accordance with the IEPs.

Potential Cause & Impact

Potential Causes:

- No documented guidelines were available on the preparation and expected content of IEPs, as the *Indigenous Relations Manual* was last revised in 2020 when a number of newer strategic initiatives had not been developed; and
- Knowledge sharing may have been inconsistently performed from areas of the business that have greater experience in working with Indigenous communities, to other areas where Indigenous engagement may be a comparatively newer concept.

Potential Impact:

A lack of consistently established IEPs may have a number of potential impacts, including:

- OPG's "Duty to Consult" obligations may be not be adequately met;
- A lack of a detailed plan with risk mitigation strategies may lead to a deterioration of relationships with Indigenous communities, resulting in increased reputational risk;
- Possible delays in project schedules if IEPs do not contain a comprehensive engagement plan; and
- Delayed approval of pending and future project permits by legislators and regulators.

Recommendation

Management should consider:

- Establishing guidelines on OPG's expectations around the preparation of IEPs, including but not limited to identifying instances where an IEP is required, the identification of the plan owner, the roles and responsibilities of key project staff, and a risk assessment of potential adverse impacts and associated risk management plan; and
- Including in the IEPs related to the DNNP, descriptions of the roles and responsibilities of key employees involved in Indigenous engagement related to the DNNP.

Management Action Plan
Management will establish guidelines on the preparation of IEPs, including but not limited to the identification of the plan owner, the roles and responsibility of key project staff, and a risk assessment of potential adverse impacts. Action Owner: Ian Jacobsen, Director, Indigenous Relations Target Completion Date: May 30, 2023 Management will include descriptions of the roles and responsibilities of key employees involved in Indigenous engagement in the IEPs related to the DNNP, given that project work has already commented in the DNNP while the Hydro Expansion project is still in its feasibility study phase. Action Owner: Peter Moore, Senior Manager, Projects (DNNP) Target Completion Date: March 31, 2023

3. Monthly status reports on Indigenous procurement contained inaccuracies.	Low

Maximizing business and procurement opportunities from Indigenous communities is a key pillar in the RAP, which also includes an action to increase procurement from Indigenous businesses, with a goal of achieving a minimum of 5% of total OPG spend per year by 2025. In 2022, Procurement from Indigenous Businesses was included as a key performance indicator ("KPI") in OPG's Corporate Balanced Scorecard as a first step in advancing towards the RAP action, with a target spend of $56 million for the year ended December 31, 2022.

Supply Chain prepared monthly status updates on the progress towards the KPI target to OPG's Senior Leadership Team. As at the end of October 2022, the update reported year-to-date ("YTD") Indigenous procurement of [redacted]. IA reviewed documentation in support of this reported value and noted that it was overstated by approximately [redacted], analysed as follows:

- Inclusion of transactions totaling approximately [redacted] with one vendor that was determined not to be Indigenous. This error was self-identified by Management in November 2022;
- Five instances were noted where procurement with Indigenous businesses was recognized in duplicate, predominantly where both the master service agreement ("MSA") and subsequent releases against that MSA were included. This resulted in an over-estimation in spend by approximately [redacted]; and
- One instance was noted where a terminated contract worth [redacted] was included in the total.

Potential Cause & Impacts

Potential Causes:

- Being a new KPI in 2022, the process of tracking Indigenous procurement is manual, and involves compiling data on Indigenous procurement to date from multiple systems, increasing the likelihood of human error; and
- Changes to procurements in prior periods are not reflected in the report, with only the most recent month was updated in the YTD figure for each monthly update. Prior months are not reviewed for changes in circumstances (e.g., amendments or cancellations in contracts).

Potential Impacts:

- Inaccurate reporting on performance against the corporate scorecard target and subsequent monitoring of progress against the RAP action.

Recommendations

Taking the lessons learned from the first year of monitoring Indigenous procurement, Management should aim to add improvements to the process, with a goal of eliminating manual errors, present the most up-to-date information and improve efficiency. Management should complete the current initiative to automate the Procurement monthly presentations using Indigenous award values directly from source data.

Management Action Plan
Management is developing and implementing an automated reporting system to present RAP awards and spend using PowerBI, pulling source data from Ariba rather than AS9. Specifically, the system will: • Pull award data automatically from Ariba into PowerBI to reduce risk of transcription error and include the most recent updates and amendments to purchase orders and contracts; • Pull vendor data from Ariba Vendor Master to ensure that vendors' Indigenous status have been thoroughly validated prior to inclusion in the report; and • For prime suppliers, pull Tier 2 awards through Ariba questionnaire functionality. Documentation from UAT testing will be maintained to support the accuracy of the reporting. Action Owner: Pavel Shcherbin, Senior Manager, Supply Chain Target Completion Date: March 31, 2023

4. The interpretation and execution of one RAP target were inconsistent with a plausible interpretation of the wording in the RAP.	**Low**

As part of the RAP, OPG aimed to enhance support for Indigenous initiatives, with a target of increasing amounts contributed to overall annual Indigenous investment program through the Corporate Citizenship Program ("CCP") by 10%. In the 2022 RAP Annual Report issued in November 2022, progress against this action was noted as being on track, noting that the CCP will meet the target of a 10% increase in Indigenous community investment in 2022.

CCP investments in Indigenous initiatives in 2022 totaled $419,000. It was noted that this amount was less than in 2021, where OPG invested larger amounts in Indigenous initiatives as part of the response to the COVID-19 pandemic.

Potential Cause & Impacts

Potential Causes:

- The detailed target benchmark was not clearly defined in the RAP, including consideration of the enhanced contributions previously made to Indigenous initiatives in response to the COVID-19 pandemic;
- The RAP target was ambiguous by not including the intended baseline budget benchmark of $350,000, therefore leading to a different interpretation; and
- Being a new initiative, the process for monitoring progress against the targeted spend was not mature, and because the baseline spend was not specified in the RAP, there was confusion about the specific value of the RAP commitment.

Potential Impacts:

- Reputational harm to OPG if external parties perceive that OPG's reporting on RAP progress is inaccurate; and
- Reduced impact of the RAP if internal or external parties perceive that RAP targets are not meaningful or being adhered to.

Recommendations

Management should:

- Ensure that future RAP targets provide a clear understanding of how to measure progress against the objective, and that related internal measures are aligned with the RAP target; and
- Consider whether the discrepancy in the published 2022 RAP Annual Report is material enough to require a revision for additional clarity.

Management Action Plan

Management will:

- Review RAP 2023 targets and work with the relevant responsibility centers to ensure that targets are measurable, to demonstrate that completion of the target will contribute to the overall goals of the five pillars of the RAP; and
- Determine if the published 2022 RAP needs to be revised for additional clarity.

Action Owner: Ian Jacobsen, Director, Indigenous Relations
Target Completion Date: April 30, 2023

APPENDIX A – RATING DEFINITIONS FOR AUDIT REPORTS

Finding: *Noted deficiency with potential impacts to the achievement of business unit/process area objectives, assessed using the following criteria:*

	High Risk	Moderate Risk	Low Risk
Safety & Social License	• Potential regulatory non-compliance. • Deficiencies that could result in: ○ Fatality, permanent disability, or lost time injury; ○ Data loss or unavailability of critical systems; ○ Security is compromised in sensitive / multiple areas; ○ Fraud / theft; or ○ Negative media coverage resulting in reputational damage.	• Insufficient evidence to support regulatory compliance. • Deficiencies that could result in: ○ Minor injury with no lost time; ○ Temporary data loss or unavailability of non-critical systems; ○ Security is compromised; ○ Fraud / theft with some mitigating controls; or ○ Public escalating concerns to OPG Management or local media.	• Documentation improvements to support regulatory compliance. • Deficiencies that could result in incidents that do not require medical treatment. • Deficiencies that do not result in any media attention negatively impacting OPG's reputation.
Financial	• Potential loss or financial impact =>5% of the sample population's value, or the department's OM&A budget if the former is unavailable.	• Potential loss or financial impact >=2% and <5% of the sample population's value, or department's OM&A budget if the former is unavailable.	• Potential loss or financial impact <2% of the sample population's value, or department's OM&A budget if the former is unavailable.
Operational Excellence	• Governance non-compliance or lack of/inadequate controls that may impact achievement of business or project objectives. • Errors in or insufficient internal reporting that drives senior management decision making. • Test results where =>25% of the sample had deficiencies in the execution of a key control.	• Governance non-compliance or lack of/inadequate controls with alternate controls in place to mitigate the impact to business or project objectives. • Errors in or insufficient internal reporting that could affect management decision. • Test results where >=10% and <25% of the sample had deficiencies in the execution of a key control.	• Governance compliance with procedural concerns or documentation issues which could impact OPG's ability to demonstrate appropriate due diligence. • Errors in or insufficient internal reporting that has minimal decision making impact. • Test results where <10% of the sample had deficiencies in the execution of a key control.

Opportunity for improvement: *Observation with no risk impact that is provided to management for consideration to improve efficiency of processes and documentation (e.g. automation, duplication of activities).*

OVERALL REPORT RATING SCALE

An overall audit rating is assigned based on the number of observations identified for the audit and their assigned risk rating:

	Number of Findings			
Finding Risk Rating	**1**	**2**	**3 - 4**	**=> 5**
High	Requires Improvement	Not Effective	Not Effective	Not Effective
Moderate	Generally Effective	Generally Effective	Requires Improvement	Not Effective
Low	Effective	Effective	Generally Effective	Requires Improvement

APPENDIX B – PROCESS OWNER & DISTRIBUTION LIST

Distribution:

Heather Ferguson
Senior Vice President, Business Development, Strategy & Corporate Affairs

Jennifer Tidmarsh
Vice President, Indigenous Relations & Partnerships

cc:	Ken Hartwick	President & Chief Executive Officer
	Aida Cipolla	Chief Financial Officer & Senior Vice President, Finance
	Alison Bradley	Director, Asset & Project Management
	Adam Chiarandini	Director, Enterprise Risk Management
	Michelle Folliott	Director, Ethics & Equity
	Ian Jacobsen	Director, Indigenous Relations
	Adam McClare	Director, Brand Management
	Roberta Reyns	Director, Recruitment & Onboarding
	Judy Tan	Director, Internal Audit
	James Desmoulin	Senior Manager, Indigenous Relations
	Christine John	Senior Manager, Indigenous Relations
	Aleem Juma	Senior Manager, Internal Audit
	Peter Moore	Senior Manager, Projects, DNNP
	Pavel Shcherbin	Senior Manager, Supply Chain
	Giselle Contaste	Manager, Internal Audit
	Shannon Yee	Manager, Internal Audit

ONTARIO POWER GENERATION

Internal Audit

North American Electric Reliability Corporation ("NERC") Reliability Standards – Renewable Generation Operations

February 28, 2023

Report Rating: **Requires Improvement**

Table of Contents

1.0 EXECUTIVE SUMMARY

1.1 Report Rating and Summary of Findings

Report Rating: **Requires Improvement**

No.	Finding	Risk Type	Risk Rating[1]		
			High	Moderate	Low
1	Issues were noted with supporting evidence used to demonstrate the completion of maintenance activities required by PRC-005-6.	Operational/ Social Licence	X		
2	Regional Program Execution Plans ("PEP") spreadsheets for PRC-005-6 lacked justification for extended maintenance intervals and were missing maintenance completion and next verification dates.	Operational/ Social Licence		X	
3	Insufficient evidence was available to validate Reported Facility Ratings under FAC-008-5.	Operational/ Social Licence		X	
Total		**3**	**1**	**2**	**-**

1.2 Background

The IESO Market Rules require market participants to comply with NERC Reliability Standards and Northeast Power Coordinating Council ("NPCC") Regional Standards, Directories and Criteria documents. Energy generation companies, such as OPG, must comply with IESO Market Rules as required by the company's electricity generation licence issued by the Ontario Energy Board ("OEB").

OPG's Internal Reliability Compliance Program ("IRCP") is designed to set out the methodology by which OPG achieves reliability compliance, based on a framework to determine and track ongoing reliability compliance through regular reporting, periodic self-assessments and audits.

This audit was executed following a request by Management, given the importance of following the IRCP and ensuring compliance with IESO Market Rules, a condition of OPG's electricity generation licence. Internal Audit ("IA") engaged a third-party consultant to perform an assessment of OPG's compliance over select NERC Reliability Standards based on NERC's Compliance Monitoring and Enforcement Manual and Auditor Handbook, which classifies findings into three categories:

- **Potential for Non-Compliance ("PNC")** - A determination that there is a possible failure to comply with a Reliability Standard or Requirement.
- **Areas of Concern ("AOC")** - A situation that, if not addressed, could develop into future non-compliance. Ineffective or nonexistent preventive, corrective, or detective actions may contribute to an area of concern.
- **Opportunities for Improvement ("OFI")** - Suggested improvements in the compliance program, control-related processes, procedures, or tools to enhance the reliability, security, or resiliency of the Bulk Electric System ("BES"). Opportunities for process improvements should be shared with the Registered Entity.

[1] Please refer to Appendix B for risk rating definitions

1.3 Objective & Scope

The objective of this audit was to assess OPG's compliance with a sample of certain NERC standards for the Renewable Generation ("RG") business unit. There are more than 30 applicable NERC Operations and Planning type standards (excluding 12 NERC Critical Infrastructure Protection standards) that apply to OPG. The standards that were in scope for this audit were:

1) PRC-005-6 *Protection System, Automatic Reclosing, and Sudden Pressure Relaying Maintenance*;
2) PRC-024-2 *Generator Frequency and Voltage Protecting Relay Settings*;
3) PRC-006-NPCC-2 *Automatic Underfrequency Load Shedding;*
4) FAC-008-5 *Facility Ratings*; and
5) MOD-032-1 *Data for Power System Modeling and Analysis*.

These five specific standards were identified following a risk-based assessment in coordination with the Regulatory Affairs Department.

In order to achieve the audit objective, IA reviewed the process and tested, on a sample basis, whether:

A. PRC-005-6
• A Protection System Maintenance Program ("PSMP") had been established that meets all applicable requirements to be followed by OPG plants for its applicable Protection Systems, Automatic Reclosing, and Sudden Pressure Relaying that are identified as Bulk Electric System ("BES") elements; • OPG plants had an adequate set of Plant Instructions for maintenance activities; • Maintenance activities were performed as defined by the PSMP within associated intervals; • Efforts to correct identified Unresolved Maintenance Issues were documented; • Equipment was tested and monitored to ensure compliance with reliability standards; and • Sufficient documentation, records, and other evidence was captured and maintained to demonstrate compliance with the standard.
B. PRC-024-2 and PRC-006-NPCC-2
• BES and Bulk Power System ("BPS") generator frequency protective relaying had been set to meet requirements; • Generator voltage protective relaying were set to not trip within the "no trip zone" identified in the standard; • Known regulatory or equipment limitations that prevent an applicable generating unit with generator frequency or voltage protective relays from meeting relay setting criteria had been documented; • Applicable generator protective relay trip settings were communicated to the Planning Coordinator or Transmission Planner upon receipt of written request within required timelines; • The underfrequency protection was set to operate as outlined in the standard; • Generator frequency protective relaying was set to trip as outlined in the standard, and in accordance with applicable law, good utility practice and all applicable reliability standards; and • Sufficient documentation and evidence was captured and maintained to demonstrate compliance with the standard.

C. FAC-008-5
• Documentation existed for determining the facility ratings of OPG's solely and jointly owned generator facilities; • OPG's Facility Rating Methodology was consistent with requirements and included the underlying assumptions, design criteria and methods used for determination; • Requested information (such as facility ratings and the identity of the most limiting equipment of the facilities) was provided to transmission owner(s) and to the IESO within required timelines upon request; and • Sufficient documentation and evidence was captured and maintained to demonstrate compliance.
D. MOD-032-1
• Steady-state, dynamics, and short circuit modeling data had been provided to the IESO in accordance with requirements and reporting procedures; • A comprehensive database was established that contains all generation facility data required for IESO registration; • Updated data, explanations, and technical rational was provided to the IESO upon request; and • Sufficient documentation and evidence was captured and maintained to demonstrate compliance.
E. Fraud Considerations
• No significant fraud risks were identified.
F. Opportunities for Improvement
• There were potential opportunities for cost savings related to efficiency of processes and documentation (e.g. automation, duplication of activities).

Scope Period: The scope included activities from September 1, 2019 to August 31, 2022, and relevant precursor activities from prior periods where appropriate.

Scope Limitations:
The audit scope was restricted to assessing compliance with the NERC standards identified above. The audit did not assess compliance with other NERC standards that OPG must comply with as a market participant and electricity generator.

1.4 Conclusion

Overall, some maintenance activities, evidence and associated documentation needed to demonstrate compliance were found to require improvement. A summary of positive observations and key audit findings and recommendations are provided below. Opportunities for improvement identified in the engagement have been separately communicated to Management.

<u>Positive Observation</u>

- IA noted that RG is in the process of implementing initiatives that will streamline and enhance records and how activities are conducted such as:
  - Moving towards 'online' PEPs across all regions that will be updated and accessible for users;
  - Standardization of PSMP related work forms vetted with specific required maintenance activities; and
  - Use of tablets loaded with standardized PSMP work forms for use by staff instead of manual 'offline' forms.

Key Findings & Recommendations

- Some issues were noted with supporting evidence used to demonstrate the completion of maintenance activities required by PRC-005-6. Management should progress ongoing initiatives that may address gaps in records and evidence such as implementation of “online” Program Execution Plans (“PEPs”) to improve consistency and apply application controls, and implement standardization of work forms for required maintenance activities. Management should also perform a self-assessment review on the accuracy and existence of audit evidence for the Protection System Components listed in RG regional PEPs, and take action to address any gaps in the work management process and supporting system documentation identified during the assessment;

- Regional PEP spreadsheets lacked justification for extended maintenance intervals, maintenance completion, and next verification dates. Management should progress efforts to transition towards online version of PEPs with application controls to mitigate data gaps, while addressing gaps with historical maintenance records. Regional PEPs should be reviewed to ensure the information is being presented in a consistent manner, extended maintenance intervals are justified with rationale and supporting documentation, and key dates related to maintenance activities are not missing; and

- Insufficient evidence was available to validate Reported Facility Ratings across many of the facilities. In addition, values were manually entered instead of being calculated as a formula in Facility Rating Spreadsheets (“FRS”), which resulted in the audit team not being able to verify the accuracy of the reported ratings. Management should develop a risk-based and prioritized plan to address the gaps in records and evidence to support values reported in the FRSs.

The findings noted in this report have been reviewed with Management and they have committed to specific action plans. Please refer to Section 2.0 for specific details of the above finding along with the associated risk impact, audit recommendations and management action plans.

2.0 DETAILED AUDIT FINDINGS

IA identified the following detailed findings which have been risk-rated based on the definitions outlined in Appendix B.

1. Issues were noted with supporting evidence used to demonstrate the completion of maintenance activities required by PRC-005-6.	**High**

Maintenance and testing activities are required to be performed on all Protection System components as identified in PRC-005-6 R3 - *Criteria for a Performance-Based Protection System Maintenance Program*. RG's methodology is documented in ENG-MAN-041 – *Protection System Asset Management and Maintenance Manual* and in the Internal Reliability Standard OPG-STD-0099 – PRC-005 – *Protection System Maintenance*, which establishes guidance for each of the regions and facilities to implement the required procedures and processes to implement a PSMP.

The required protection system Preventative Maintenance ("PM") activities are programmed into a Computerized Maintenance Management System ("CMMS"), which is the Asset Suite 9 ("AS9") tool – formerly Asset Suite 7 ("AS7"). Each operational region (Niagara, Northwest, Northeast, and Southeast Operations), and a few contracted facilities, maintains a PEP that contains Preventative Maintenance Identification ("PMID") numbers, equipment information, and maintenance frequencies, in addition to other pertinent information.

From an initial in-scope population of 153 OPG RG generating units across 33 generation facilities in the RG fleet that must comply with PRC-005, ten stations were judgmentally sampled to assess compliance with PRC-005-6 (see Appendix A for a listing of the sampled stations). In accordance with the NERC Electric Reliability Organization ("ERO") Sampling Handbook, the audit team utilized statistical sampling to identify a testing population for each generation facility's relays as identified in the regional PEP. This resulted in a total sample of 98 protection systems across the ten stations.

The following issues were identified based on a review of regional PEPs, supporting evidence provided by RG staff, additional data request responses, and following interviews with RG staff and compliance SMEs assessing whether the required maintenance activities were completed within the required NERC intervals cited in the regional PEPs:

1. Insufficient evidence was available to support the execution of a 5 year battery load capacity test at the DeCew 2 facility as noted on the PEP and dated February 2018;
2. No records existed to support the sampled annual battery tests for Otter Rapids, and both annual and quarterly battery tests for Abitibi Canyon;
3. Inability to verify various sampled regional PEPs for the 'Latest Completion Dates' for maintenance activities due to insufficient audit-quality documented evidence;
4. Some sampled PM / Work Order ("WO") packages did not have any supporting field evidence;
5. AS9 screen captures (i.e., 'predefined WO history' and 'Task Completion Process' screens) and instruction/work standards for testing procedures were provided as evidence of maintenance testing, which would not be deemed as sufficient quality evidence due to inadequate details; and
6. Some sampled supporting field evidence did not have dated/signed checklists.

Potential Cause & Impact

Potential Cause:

Completed dated field-testing documentation was not retained by regional Work Centres after closure of WOs due to a lack of training, including understanding of evidence requirements as defined by regulatory standards.

Potential Impact:

Insufficient supporting evidence demonstrating that required maintenance activities were completed within the required intervals cited in the regional PEPs, and a lack of maintenance activity occurrence, may result in a non-conformance to NERC standards and regulatory fines. Pervasive issues may also erode OPG's credibility and compliance history with regulators.

Recommendation

Management should:

1. Further investigate the identified incidents of possible non-compliance and conduct a self-assessment review on the accuracy and existence of audit evidence for the Protection System Components listed in RG regional PEPs across the fleet, and take action to address any gaps in the work management process and supporting system documentation identified during the assessment. Management should initiate MACD self reports as required once the assessments are completed; and

2. Progress initiatives that include, but are not limited to:

   - Implementation of "online" PEPs across all RG regions to improve consistency and mitigate missing information through application controls;
   - Resolving data gaps in AS7/AS9; and
   - Develop and implement standardization of the PSMP related Work Forms that are tailored to act as evidence and documentation for required maintenance activities.

Management Action Plan

1. Investigate the three representative samples noted within the PNC related to Otter Rapids, Abitibi Canyon, and DeCew 2 sites. Determine root causes and corrective actions necessary to prevent a recurrence, and initiate MACD self reports as required.

   Target Completion Date: April 14, 2023

2. Implement and issue RG IRCP procedure establishing a continuous improvement process, and complete a IRCP program fleet view dashboard/tool in alignment with the new procedure.

   Target Completion Date: September 30, 2023

3. Develop RG governance pertaining to PSMP/IRCP work forms, reporting and retention, and establishing a change control process and standardized approach.

   Target Completion Date: December 29, 2023

Action Owners:
Bruce Robertson, Vice President, Regional Operations Eastern Region; and
Shaun Hinds, Director, Plant Operations, Southeast Operations

2. Regional PEP spreadsheets for PRC-005-6 lacked justification for extended maintenance intervals and maintenance completion and next verification dates.	**Moderate**

The required protection system Preventative Maintenance activities are programmed into a CMMS (Computerized Maintenance Management System). Management uses AS9 as its CMMS (prior to July 2022, AS7 was used). The Asset Suite Preventative Maintenance activities use Preventative Maintenance ID (PMID) numbers, equipment numbers, model work orders, and frequencies to identify the protection system component and its required maintenance. The use of specified frequencies within Asset Suite establishes a time-based methodology to conduct maintenance activities that are required by regulation. As part of the migration from AS7 to AS9, Management continues to address implementation issues associated with the validation of historical maintenance records, e.g. completion dates and links to supporting documents.

In RG, each region (Niagara, Western, and Eastern Operations) maintains a regional PEP in Excel that contains the PMID numbers, equipment information and maintenance frequencies, Previous Three Completed Dates and Next Verification date. The regional PEPs are being maintained and utilized by regional compliance officer or SME as a tool for ensuring that the required regulatory maintenance activities are scheduled as required. Currently, Management is transitioning these PEPs to an 'online' version, that will allow the SMEs to drill down to the associated word orders.

In reviewing regional PEP spreadsheets, a number of issues were identified across all PEPs, including:

1. In instances where OPG utilized extended maintenance intervals, insufficient information or explanation was provided to justify the extension;

2. The '*Previous Three Completed Dates'* and '*Next Verification Date*' fields often contained no data, and notations that read '*No Data*' and '*AS7 Date in Past'*, as well as dates that were not in alignment with evidence provided by Management.

3. *Next Verification Date* was not being consistently calculated and lacked commentary explaining the basis for these entries, and at times the value, when present, exceeded governance intervals;

4. Documentation for the Maintenance / Testing requirements did not consistently align with the PRC-005-6 Table's *Component Attributes and Maintenance Activities* or OPG-STD-0099 *Appendix A*; and

5. There was a lack of maintenance interval entries for System Protection Components that were replaced during the audit period.

Potential Cause & Impact

Potential Cause:

Resource/time constraints due to competing priorities and work backlog, have resulted in incomplete and insufficient data within the regional PEP spreadsheets, which are currently performed manually.

Potential Impacts:

1. Differences in maintenance intervals may lead to a misinterpretation of the required maintenance activity and result in non-compliance; and

2. Lack of, and inconsistencies with, data within OPG's tools for tracking and managing PRC-005-6 maintenance activities, may impact OPG's ability to demonstrate compliance.

Recommendations

Management should:

1. Progress its ongoing efforts to transitioning the PEPs to an “online” version, and addressing implementation issues and data gaps associated with the validation of historical maintenance records.
2. Review the regional PEPs to ensure the information is being presented in a consistent manner and addresses the noted issues within the finding such as (but not limited to):
    - Aligning maintenance / testing requirements with PRC-005-6 or OPG governance, and justify extended maintenance intervals with rationale and supporting documentation;
    - Validating recorded dates (i.e. ‘Previous Three Completed Dates’, ‘Last Completed’ date, and ‘Next Verification date” with AS9 maintenance records;
    - Ensure commentary is included to describe any known issues with the presented information in the PEP; and
    - Include maintenance interval entries for System Protection Components that were replaced.

Management Action Plan

Refer to management action plan in Finding 1 above, specifically item #2.

Action Owner:

- Bruce Robertson, Vice President, Regional Operations Eastern Region; and
- Shaun Hinds, Director, Plant Operations Southeast Operations

Target Completion Date: September 30, 2023

3. Insufficient evidence was provided to validate Reported Facility Ratings under FAC-008-5.	**Moderate**

ENG-INS-009 *Equipment Ratings Methodology* outlines OPG's methodology for determining facility ratings which is based on Design Manuals, Original Equipment Manufacturers ("OEM") manuals, design drawings, engineering calculations, and commissioning reports. RG's current set of facility ratings are documented in FRSs, which are the BU's repository for equipment rating data and includes logic to establish the R1 and R2 facility ratings.

In accordance with the NERC ERO Sampling Handbook, a statistical sample of eight generation units across the RG fleet of 153 in-scope units was selected, reviewing a set of 11 equipment rating data points associated with each of the eight sampled units. Based on a review and analysis of evidence files provided by RG and discussion with management, it was determined that documented evidence (such as name plate rating and manufacturer's rating specifications) could not be provided within the timeline of the audit engagement for each of the 88 requested data points to fully validate the sampled Reported Facility Ratings.

The audit team also noted a discrepancy in the FRS from our test sample for a generating unit at a sampled facility. Further investigation indicated the listed High Voltage ("HV") limiting factor was entered as a value instead of calculated as a formula. The listed HV limiting factor for two other sampled units (from two different facilities), while reported correctly, were also entered as values.

Potential Cause & Impact

Potential Causes:

1) Resource/time constraints due to competing priorities and work backlog, have resulted in some instances of insufficient audit-quality documented evidence to support Facility Ratings; and
2) According to management, manual override was necessary in entering a value in the FRS instead of utilizing a calculated formula as accurate values could not be obtained easily from establishing a formula.

Potential Impacts:

1) Failure to provide sufficient valid documented equipment ratings may impact OPG's ability to demonstrate compliance with FAC-008-5.
2) 'Hard-coding' HV limiting factors instead of utilizing formulas may result in incorrect values if changes occur.

Recommendations

Management should develop a risk-based and prioritized plan to address the gaps in records and evidence to support values reported in the FRSs.

Management Action Plan

Management will develop a comprehensive plan to address the potentially missing ratings evidence and its use, which will involve:

Action Owner: David Rogalski, Vice President Central Engineering
Target Completion Date: September 29, 2023

APPENDIX A – LISTING OF SAMPLED REGIONAL FACILITIES

The following facilities were sampled during this audit.

No.	Facility	Number of Units
1	Abitibi Canyon Generating Station	5
2	Atikokan Generating Station	1
3	Barrett Chute Generating Station	4
4	Decew Falls 2 Generating Station	2
5	Des Joachims Generating Station	8
6	Lennox Generating Station	4
7	Otter Rapids Generating Station	4
8	R.H. Saunders Generating Station	16
9	Sir Adam Beck 2 Generating Station	16
10	Whitedog Falls Generating Station	3

APPENDIX B – RATING DEFINITIONS FOR AUDIT REPORTS

Finding: *Noted deficiency with potential impacts to the achievement of business unit/process area objectives, assessed using the following criteria:*

	High Risk	Moderate Risk	Low Risk
Safety & Social License	• Potential regulatory non-compliance. • Deficiencies that could result in: ○ Fatality, permanent disability, or lost time injury; ○ Data loss or unavailability of critical systems; ○ Security is compromised in sensitive / multiple areas; ○ Fraud / theft; or ○ Negative media coverage resulting in reputational damage.	• Insufficient evidence to support regulatory compliance. • Deficiencies that could result in: ○ Minor injury with no lost time; ○ Temporary data loss or unavailability of non-critical systems; ○ Security is compromised; ○ Fraud / theft with some mitigating controls; or ○ Public escalating concerns to OPG Management or local media.	• Documentation improvements to support regulatory compliance. • Deficiencies that could result in incidents that do not require medical treatment. • Deficiencies that do not result in any media attention negatively impacting OPG's reputation.
Financial	• Potential loss or financial impact =>5% of the sample population's value, or the department's OM&A budget if the former is unavailable.	• Potential loss or financial impact >=2% and <5% of the sample population's value, or department's OM&A budget if the former is unavailable.	• Potential loss or financial impact <2% of the sample population's value, or department's OM&A budget if the former is unavailable.
Operational Excellence	• Governance non-compliance or lack of/inadequate controls that may impact achievement of business or project objectives. • Errors in or insufficient internal reporting that drives senior management decision making. • Test results where =>25% of the sample had deficiencies in the execution of a key control.	• Governance non-compliance or lack of/inadequate controls with alternate controls in place to mitigate the impact to business or project objectives. • Errors in or insufficient internal reporting that could affect management decision. • Test results where >=10% and <25% of the sample had deficiencies in the execution of a key control.	• Governance compliance with procedural concerns or documentation issues which could impact OPG's ability to demonstrate appropriate due diligence. • Errors in or insufficient internal reporting that has minimal decision making impact. • Test results where <10% of the sample had deficiencies in the execution of a key control.

Opportunity for improvement: *Observation with no risk impact that is provided to management for consideration to improve efficiency of processes and documentation (e.g. automation, duplication of activities).*

OVERALL REPORT RATING SCALE

An overall audit rating is assigned based on the number of observations identified for the audit and their assigned risk rating:

	Number of Findings			
Finding Risk Rating	**1**	**2**	**3 - 4**	**=> 5**
High	Requires Improvement	Not Effective	Not Effective	Not Effective
Moderate	Generally Effective	Generally Effective	Requires Improvement	Not Effective
Low	Effective	Effective	Generally Effective	Requires Improvement

APPENDIX C – PROCESS OWNER & DISTRIBUTION LIST

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	Brad Bacvar	Director, Asset & Project Management Northeast Region
	Brian Dietrich	Director, Asset & Project Management Western Region
	Scott Gagnon	Director, Asset & Project Management Southeast Operations
	Shaun Hinds	Director, Plant Operations Southeast Operations
	Kent Keeler	Director, Asset & Project Management Niagara Operations
	Judy Tan	Director, Internal Audit
	Vladislav Urukov	Director, Reliability Compliance
	Anthony Ling	Senior Manager, Internal Audit
	David Kwan	Senior Manager, Reliability Compliance
	Jesse Rocca	Manager, Plant Technical Support
	Ken Tom	Section Manager, Southeast Operations

ONTARIO POWER GENERATION

Internal Audit

IT Project Delivery

July 12, 2023

Report Rating: **Requires Improvement**

1.0 BACKGROUND & OVERVIEW

IT project management controls are designed to mitigate risks associated with IT projects such as large-scale enterprise-wide system implementations. These controls are split across multiple areas such as Project Governance, Requirements, Risk Management, Organizational Change Management, and Performance Management, among others. Controls are designed to mitigate specific risks within each area.

OPG's IT Project Management Office is currently undergoing a review of project controls to improve alignment with the Enterprise Project Management Office as well as updating control considerations to include additional elements such as the Agile methodology[1].

Two key IT projects, implementations of MyTime and Asset Suite ("AS") 9 (to replace AS7), were delivered in August 2020 and July 2022, respectively. While proper oversight and go live approvals from all stakeholders were demonstrated on implementation, post-implementation usage identified that some business expectations were not met.

This was a risk-based audit identified in Internal Audit's ("IA") 2023 Audit Plan, selected given the significance of upcoming key IT projects to enable the achievement of OPG's strategic objectives and overall performance.

2.0 OBJECTIVE & SCOPE

The audit aimed to determine whether the program governance and project management methodologies used to deliver the two sampled projects were appropriate, as well as identify potential root causes of the unmet expectations of the business users. The scope included all activities conducted as part of the MyTime and AS9 projects, and also included certain related post-implementation activities.

3.0 CONCLUSION

Report Rating: **Requires Improvement**

Overall, IA noted that the processes and controls supporting the implementation of IT Projects require improvement. IT projects with a significant business process change were considered to be technology upgrades, leading to inconsistent business involvement and oversight. In addition, system performance and load balancing capabilities were not fully tested, and end users were not provided with adequate training to appropriately use the new systems on implementation.

[1] "Agile methodology" is defined as an approach to software development that uses iterative and incremental delivery of a working solution, with frequent customer feedback and adaptation.
[https://www.pmi.org/learning/library/agile-project-management-pmbok-waterfall-7042]

4.0 SUMMARY OF FINDINGS

No.	Finding Rating	Observation	Potential Impact	Management Action Plan
1	High	**IT projects that required significant business process change were treated as technology upgrades, leading to inconsistent business stakeholder involvement.** The AS9 Upgrade and the MyTime project were delivered as technology upgrades that were led by IT. These projects required significantly more business stakeholder involvement than reported in the lifecycle of the project. • The Projects did not have sufficient business representation in the executive steering committees. The AS9 project did not have sufficient finance and supply chain involvement throughout the project and the MyTime project did not involve sufficient HR stakeholders; • All business stakeholders were not involved in the AS9 requirements gathering process, even though this project led to several business process changes. User acceptance testing identified defects that were classified as missed requirements; and • Shared services stakeholders with detailed knowledge of the collective agreements used in the calculation of time accrued and employee payouts were not appropriately involved in the MyTime project.	The impacts of the insufficient involvement of business stakeholders included: • Challenges experienced during project build and test to include time reporting details from collective agreements in the MyTime implementation; • Defects identified during testing the new AS9 system that should be business requirements; and • Significant post go-live problems experienced, such as errors in procurement processing between AS9 and Ariba.	Projects go through an intake process. The project intake form and guidance for the intake process will be updated to reflect a decision point on whether a project would be led by business or IT. The following considerations will be taken: • Complexities of business processes involved; and • Number of business areas affected by the project Once a decision is made all project governance documentation will reflect the decision on a business-led versus an IT-led project. The Project Management Plan (PMP) template will be updated to reflect that the test strategy is acknowledged and reviewed by the business, and that the earliest possible time for business to test the solution is incorporated into the plan. **Action Owner**: Shallen Dam, Director, Customer Experience **Target Completion Date**: October 31, 2023

No.	Finding Rating	Observation	Potential Impact	Management Action Plan
2	Moderate	**Insufficient testing of non-functional requirements such as system performance led to performance issues following implementation.** The non-functional test strategies for both the AS9 and MyTime projects included performance and load balance tests as required elements. During the execution and test stages of these project, additional business requirements were identified which led to non-functional tests being deferred until after go-live. These tests were required to ensure that the systems being delivered had appropriate capacity to manage the required workload and users.	Insufficient testing of non-functional requirements led to performance and scalability issues, poor user experience and increased incidents and problems faced by the end users upon go-live.	The acceptance criteria for project go-live stated in the Project Management Plan (PMP) template and the Test Strategy guidance will be updated to reflect that non-functional testing is performed appropriately and timely. **Action Owner**: John Brewer, Senior Manager, CIO IT Projects **Target Completion Date**: December 29, 2023
3	Moderate	**Training did not incorporate a hands-on understanding of the new system and focused on online learning.** For the AS9 upgrade, there was no opportunity to perform hands on training by granting users' access to sandbox systems and to perform actual business scenarios during training. While completion of the self-learning modules and demos were tracked, the training team did not appropriately verify that personnel were job ready and had appropriate understanding of the system functionality to apply their knowledge in a real-world setting.	Insufficient training led to post go-live issues with the user adoption of the AS9 system. Users identified significant differences in the training material and system functionality leading to increased incidents related to system navigation upon go-live.	The Project Management Plan (PMP) template will be updated to reflect that the training strategy and plan will consider the appropriate training vehicle for the change such as hands on training. **Action Owner**: John Brewer, Senior Manager, CIO IT Projects **Target Completion Date**: December 29, 2023

APPENDIX A – FINDING RATING CRITERIA

Finding: *Noted deficiency with potential impacts to the achievement of business unit/process area objectives, assessed using the following criteria:*

	High Risk	Moderate Risk	Low Risk
Safety & Social License	• Potential regulatory non-compliance. • Deficiencies that could result in: o Fatality, permanent disability, or lost time injury; o Data loss or unavailability of critical systems; o Security is compromised in sensitive / multiple areas; o Fraud / theft; or o Negative media coverage resulting in reputational damage.	• Insufficient evidence to support regulatory compliance. • Deficiencies that could result in: o Minor injury with no lost time; o Temporary data loss or unavailability of non-critical systems; o Security is compromised; o Fraud / theft with some mitigating controls; or o Public escalating concerns to OPG Management or local media.	• Documentation improvements to support regulatory compliance. • Deficiencies that could result in incidents that do not require medical treatment. • Deficiencies that do not result in any media attention negatively impacting OPG's reputation.
Financial	• Potential loss or financial impact =>5% of the sample population's value, or the department's OM&A budget if the former is unavailable.	• Potential loss or financial impact >=2% and <5% of the sample population's value, or department's OM&A budget if the former is unavailable.	• Potential loss or financial impact <2% of the sample population's value, or department's OM&A budget if the former is unavailable.
Operational Excellence	• Governance non-compliance or lack of/inadequate controls that may impact achievement of business or project objectives. • Errors in or insufficient internal reporting that drives senior management decision making. • Test results where =>25% of the sample had deficiencies in the execution of a key control.	• Governance non-compliance or lack of/inadequate controls with alternate controls in place to mitigate the impact to business or project objectives. • Errors in or insufficient internal reporting that could affect management decision. • Test results where >=10% and <25% of the sample had deficiencies in the execution of a key control.	• Governance compliance with procedural concerns or documentation issues which could impact OPG's ability to demonstrate appropriate due diligence. • Errors in or insufficient internal reporting that has minimal decision making impact. • Test results where <10% of the sample had deficiencies in the execution of a key control.

OVERALL REPORT RATING SCALE

An overall audit rating is assigned based on the number of observations identified for the audit and their assigned risk rating:

	Number of Findings			
Finding Risk Rating	**1**	**2**	**3 - 4**	**=> 5**
High	Requires Improvement	Not Effective	Not Effective	Not Effective
Moderate	Generally Effective	Generally Effective	Requires Improvement	Not Effective
Low	Effective	Effective	Generally Effective	Requires Improvement

APPENDIX B – PROCESS OWNER & DISTRIBUTION LIST

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	Judy Tan	Director, Internal Audit
	John Brewer	Senior Manager, IT Projects
	Aleem Juma	Senior Manager Internal Audit

ONTARIO POWER GENERATION

Internal Audit

Cyber Security Operations Centre

February 22, 2024

Report Rating: [redacted]

1. BACKGROUND & OVERVIEW

In response to the heightened risk of cyber breaches to the organization, OPG Digital Technology & Services ("DT&S") Cyber Security team developed a cyber security road map to strengthen the company's cyber defences. A key part of the road map included enhancing OPG's detection, response, and recovery capabilities across the organization.

[redacted]

The establishment of the CSOC also supports regulatory compliance requirements including Canadian Standards Association ("CSA") N290.7-21 and North American Electric Reliability Corporation ("NERC") Critical Infrastructure Protection ("CIP") standards 005 and 007.

This was a risk-based engagement identified in Internal Audit's ("IA's") Audit Plan, selected given the enterprise-level risks related to cyber security.

2. OBJECTIVE & SCOPE

The objective of this audit was to evaluate the design and operating effectiveness of the processes and controls established in monitoring coverage, detection methodologies, response planning and escalation mechanisms, and incident reporting capabilities.

In addition to the audit, an independent benchmarking analysis of the design of OPG's CSOC against peers based on industry CSOC best practices was also performed. This analysis specifically reviewed the CSOC architecture, noting external connection, firewalls, security tools, critical assets and data types handled. The benchmarking assessment was based on best practices and standards as documented in National Institute of Standards and Technology (NIST) 800-53, Center for Internet Security (CIS) Controls v8, and NIST CSF v1.1 Frameworks.

The audit scope included activities from April 1, 2023 to October 31, 2023, and relevant precursor activities from prior periods where appropriate.

3. CONCLUSION

Report Rating: [redacted]

Overall, the design and operating effectiveness of the processes and controls established in monitoring coverage, detection methodologies, response planning and escalation mechanisms, and incident reporting capabilities [redacted]. Key observations identified during the engagement are summarized below:

No.	Finding	Risk Type	Risk Rating[1]		
			High	Moderate	Low
1	[redacted]	[redacted]	[redacted]		
2	[redacted]				
3	Some periodic operational reports were not received as required.				
Total					

4. SUMMARY OF POSITIVE OBSERVATIONS

- High quality documentation and flow diagrams are maintained by the CSOC for the management and communication of cybersecurity incidents. For example, the monthly operations report includes data on case priority, case resolution code, false positive rate, duplicate rate, and response times. It also includes threat and use case information. Each of these categories of information is presented using several charts and/or graphs to demonstrate trends for the month.

- Good industry practices were observed in documenting the threat environment and the ways to mitigate/respond to changes in the threat landscape, including a Threat Catalogue and Standard Operating Procedures that include a review process and alert rule optimization.

- In conjunction with the Threat Catalogue, the inclusion of a threat intelligence brief provides an in-depth analysis of threats, recommendations, and relevant indicators of compromise, improving Management's ability to effectively manage and evaluate possible cybersecurity incidents.

- A well-structured communications path and various communication tools, such as [redacted] have been established, ensuring that relevant stakeholders are kept informed during an evolving cyber security incident which aids in the identification and remediation of cybersecurity incidents.

[1] Please refer to Appendix A for risk rating definitions

5. SUMMARY OF FINDINGS

1. [redacted]		
Observation	**Potential Impact**	**Management Action Plans**
Schedule C of the CSOC contractual arrangement includes a number of operational performance metrics, [redacted]	[redacted]	[redacted]

2. [redacted]		
Observation	**Potential Impact**	**Management Action Plans**
Schedule D of the contractual arrangement requires that [redacted]	[redacted]	[redacted]

3. Some required periodic reports were not received from [redacted]		
Observation	**Potential Impact**	**Management Action Plans**
Per Schedule C, section [redacted] of the contractual arrangement, [redacted] is required to provide a Quarterly Operational Report within the first [redacted] business days of each quarter for the preceding quarter and a Monthly Operational Report within the first [redacted] business days of the following month, unless it is being provided in conjunction with the Quarterly Report. The Operational Reports include information such as service level performance and credits, spend under contract, operational issues, service personnel and logs for any open issues to be followed up on from the previous reporting period. During the audit, it was noted that only [redacted] monthly reports had been provided to OPG during the audit scope period. Additionally, each of these reports were submitted after the required [redacted] business days per the contract [redacted] business days respectively).	[redacted]	[redacted]

Advisory Recommendations – OPG Cyber Security

No.	Observation	Potential Impact	Recommendation
1	A robust training plan helps to ensure that people supporting cyber incident detection and response are fully trained and up to date with processes, technologies, and methods. Training plans should define which courses are mandatory and should include the required frequency. All training should be tracked and monitored. While a training plan is in place, the frequency of the required training was not defined, did not identify which courses were mandatory or how the training was being tracked and monitored. References: NIST 800-53 AT-2, AT-3, AT-6 CIS Controls v8 Control 14 NIST CSF v1.1 ID.SC, PR.AT	[redacted]	[redacted]
2	Up to date Cyber Security Operational Diagrams that are representative of the current live environment enable better visibility for the monitoring of network activities. Infrastructure diagrams play a crucial role in understanding and visualizing the organization's network architecture, systems, and interconnections, enabling better identification of dependencies, impact assessment of changes, and investigation of disruptions to specific components on the overall system. While a conceptual, generic plan was available, a detailed plan demonstrating the current live OPG environment was not available. This kind of documentation may include specific server details, ingress and egress points, connections, log file transfer mechanisms, etc. References: SP 800-53 Revision 5 PM7, RA9, SA15, SA17 NIST CSF v1.1 PR.AC CIS Controls v8 Control 12.4	[redacted]	[redacted]
3	Since the cyber security environment is highly dynamic and evolving rapidly, it is crucial to define minimum expectations for the cyber security skills required in the CSOC team for effective threat detection, response, and mitigation. [redacted] References: CIS Controls v8 Control 14.9	[redacted]	[redacted]

No.	Observation	Potential Impact	Recommendation
4	A CSOC and the supporting technology is made up of several components and tools. Each of these is enhanced by their respective vendors over time and the interaction between them changes. A periodic review of components and tools should be performed so that these updates and changes to interaction are planned for and proactively managed for continued effective operations. This review will also enable improvements to be identified and enhance the ability to detect and respond to cyber security incidents. [redacted] References: SP 800-53 Revision 5 AU-5, AU-6 CM-9 CIS Controls v8 Control IR-7, MA-2, MA-3 NIST CSF v1.1 RS.AN-1, DE.AE, DE.CM	[redacted]	[redacted]

APPENDIX A – RATING DEFINITIONS FOR AUDIT REPORTS

Finding: *Noted deficiency with potential impacts to the achievement of business unit/process area objectives, assessed using the following criteria:*

	High Risk	Moderate Risk	Low Risk
Safety & Social License	• Potential regulatory non-compliance. • Deficiencies that could result in: ○ Fatality, permanent disability, or lost time injury; ○ Data loss or unavailability of critical systems; ○ Security is compromised in sensitive / multiple areas; ○ Fraud / theft; or ○ Negative media coverage resulting in reputational damage.	• Insufficient evidence to support regulatory compliance. • Deficiencies that could result in: ○ Minor injury with no lost time; ○ Temporary data loss or unavailability of non-critical systems; ○ Security is compromised; ○ Fraud / theft with some mitigating controls; or ○ Public escalating concerns to OPG Management or local media.	• Documentation improvements to support regulatory compliance. • Deficiencies that could result in incidents that do not require medical treatment. • Deficiencies that do not result in any media attention negatively impacting OPG's reputation.
Financial	• Potential loss or financial impact =>5% of the sample population's value, or the department's OM&A budget if the former is unavailable.	• Potential loss or financial impact >=2% and <5% of the sample population's value, or department's OM&A budget if the former is unavailable.	• Potential loss or financial impact <2% of the sample population's value, or department's OM&A budget if the former is unavailable.
Operational Excellence	• Governance non-compliance or lack of/inadequate controls that may impact achievement of business or project objectives. • Errors in or insufficient internal reporting that drives senior management decision making. • Test results where =>25% of the sample had deficiencies in the execution of a key control.	• Governance non-compliance or lack of/inadequate controls with alternate controls in place to mitigate the impact to business or project objectives. • Errors in or insufficient internal reporting that could affect management decision. • Test results where >=10% and <25% of the sample had deficiencies in the execution of a key control.	• Governance compliance with procedural concerns or documentation issues which could impact OPG's ability to demonstrate appropriate due diligence. • Errors in or insufficient internal reporting that has minimal decision-making impact. • Test results where <10% of the sample had deficiencies in the execution of a key control.

Opportunity for improvement: *Observation with no risk impact that is provided to management for consideration to improve efficiency of processes and documentation (e.g. automation, duplication of activities).*

OVERALL REPORT RATING SCALE

An overall audit rating is assigned based on the number of observations identified for the audit and their assigned risk rating:

	Number of Findings			
Finding Risk Rating	**1**	**2**	**3 - 4**	**=> 5**
High	Requires Improvement	Not Effective	Not Effective	Not Effective
Moderate	Generally Effective	Generally Effective	Requires Improvement	Not Effective
Low	Effective	Effective	Generally Effective	Requires Improvement

APPENDIX B – PROCESS OWNER & DISTRIBUTION LIST

Distribution:

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	Aleem Juma	Senior Manager, Internal Audit
	Ethel Macasias	Senior Manager, IT Services

ONTARIO POWER GENERATION

Internal Audit

Recruitment & Onboarding

July 14, 2023

Report Rating: [redacted]

1.0 BACKGROUND & OVERVIEW

OPG is a labour-intensive organization, with over 10,000 employees on average during the year ended December 31, 2022[1]. In 2022, OPG completed over 3,500 hires across all programs, and along with its vendor partners, onboarded over 7,100 employees (including contractors). As OPG moves towards energy transition, net zero goals and new growth opportunities, recruiting and onboarding new talent in an efficient and effective manner will be critical to the success of the organization. The Recruitment & Onboarding ("R&O") group within the Human Resources department is responsible for centrally coordinating the process and engaging stakeholders including hiring managers, external recruiting agencies and other lines of business as appropriate.

Employment is contingent on obtaining a successful security clearance, processed and approved by OPG's Emergency Services & Training group, and can involve input from external parties [redacted] The level of clearance required is determined based on the location of the job and level of physical and informational access required. 12,000 clearances were processed in 2022, including those related to new employees, contractors, and repeat onboarding for short-term hires.

The process of obtaining the required access, tools and technology for successful candidates is largely decentralized. In addition to the recruiting business unit, the process includes:

- Plant Access Training – Facilitation of computer-based training, and basic radiation protection (Orange Badge) training where necessary;
- Chief Information Office ("CIO") IT Services – Fulfillment of IT hardware and software set-up, issuance and access requests;
- Shared Services – Issuance of position numbers and employee numbers and set up of candidate in OPG's HR data repository (SAP); and
- Radiation Data – Verification of employee personal information and processing of thermoluminescent dosimeter ("TLD") paperwork.

During the audit scope period, Management had commenced the development and implementation of various initiatives aimed at enhancing the efficiency and effectiveness of the recruitment and onboarding process. These initiatives included reporting to the Operations Leadership Team ("OLT") on hiring volumes relative to the enterprise staffing strategy, the development of an operational dashboard, and initiating the replacement of the SharePoint-based Onboarding Tool.

This was a risk-based audit identified in Internal Audit's (IA) 2023 Audit Plan, selected given the significance of recruitment and onboarding activities in light of labour market challenges and planned growth initiatives to the achievement of OPG's strategic objectives and overall performance.

2.0 OBJECTIVE & SCOPE

The objective of this audit was to assess the design and operating effectiveness of relevant processes and controls in place surrounding recruitment and onboarding of employees, covering the period from January 1, 2022 to February 28, 2023, and precursor activities from periods where appropriate.

[1] Not including employees at OPG subsidiaries, which were outside the scope of this audit.

3.0 CONCLUSION

Report Rating: [redacted]

Overall, IA noted that the processes and controls established to manage the recruitment and onboarding process [redacted]. Improvements can be made in relation to the consistent use of tools, oversight of operational performance, limitations in tools supporting security clearance, and rework in onboarding. Other observations included outdated governance, maintenance of documentation to support hiring decisions, security clearance processing methodology, and documentation of risks and associated mitigation plans.

4.0 SUMMARY OF POSITIVE OBSERVATIONS

- Management has demonstrated progress in developing Key Performance Indicator ("KPI") targets that are informed by OPG's business and competitors, and indicated that they have completed benchmarking activities in April 2023. Using the results of these benchmarking activities should help guide the future oversight model of the R&O process.

- Management has demonstrated a commitment to improving and streamlining the end-to-end recruitment process as evidenced through the creation of a working team focused on achieving better integration between all stakeholders and reducing time to fill.

- [redacted]

5.0 SUMMARY OF FINDINGS

No.	Finding Rating	Observation	Potential Impacts	Management Action Plan
1	Moderate	**Inadequate data entry and data validation controls led to challenges with operational oversight and performance monitoring.** MyPower and the Onboarding Centre ("OBC") tool are used to facilitate the R&O process and to provide data for operational reporting purposes. Both tools are intended to facilitate timely management, tracking and sequencing of R&O activities to enable an efficient onboarding for applicants and successful candidates. It was noted that MyPower and the OBC tool were not used consistently, resulting in incomplete, untimely, or inaccurate data that limited the ability to manage recruitment and onboarding activities and report accurately and effectively. Some issues identified include: • Certain standard labels are used to indicate the movement of candidates through the R&O process, and are also used for reporting purposes. Several instances were noted where non-standard labels had been applied, impacting the calculation of counts of individuals at various points of the process and the time spent on the components of the process. • There was incomplete and insufficient data to indicate the movement of candidates through the R&O process. Of 8,502 individuals listed in the OBC tool, 6,447 (76%) did not have job requisition IDs used to uniquely identify requisitions in the recruitment and onboarding systems which impacts the ability to accurately calculate time to fill; and • Delays in data entry and human error resulted in dates that were not always accurately reflected in the system leading to ambiguity on the actual handover date. In addition, milestone dates in the recruitment and onboarding process, which are needed to enable process oversight were not identified in Excel-based trackers used for augmented and contingent staff.	• Progression of candidates through the R&O process may be delayed as a result of inaccurate, missing, or untimely data; • Root causes for processing delays may not be identified and resolved due to unreliable data or delays in data entry; • Initiatives to improve processing times may not be effectively evaluated if baseline metrics rely on inaccurate and incomplete data; and • Operational metrics are calculated and reported using inaccurate and incomplete data.	Develop a change management plan to increase the likelihood of successful adoption of "Onboard" that will replace the OBC tool. The change management plan should identify and define activities that have been completed such as preliminary stakeholder meetings to define desired end-state activities that are in progress such as development of the tool and future planned activities such as user acceptance testing. **Action Owner:** Mia Kara, Senior Manager, Recruitment & Onboarding **Target Completion Date:** August 31, 2023 Develop an integrated implementation plan to support Employee Central, Service Now and HR Evolution that outlines the activities, milestones and deadlines for implementing the technology changes. **Action Owner**: Mia Kara, Senior Manager, Recruitment & Onboarding **Target Completion Date**: March 15, 2024 Implement updated user guides / procedures on the consistent use of MyPower and Onboard for all stakeholders for applicant tracking to support efficient processing, data integrity and R&O measurements and dashboards. Include a sustainment plan with regular review frequency and monitoring of data integrity. **Action Owner:** Mia Kara, Senior Manager, Recruitment & Onboarding **Target Completion Date:** September 15, 2023 Create Onboard reporting and data extraction for management oversight of the process and integrate into R&O Dashboard. **Action Owner:** Mia Kara, Senior Manager, Recruitment & Onboarding **Target Completion Date:** February 28, 2024 Update the onboarding process to transition the Security Clearance verification activity from Recruitment & Onboarding to Security to improve accuracy of verifications and reduce rejections and overprocessing. **Action Owner:** Dawn Card, Senior Manager, Recruitment & Onboarding **Target Completion Date:** Completed

No.	Finding Rating	Observation	Potential Impacts	Management Action Plan
2	Moderate	**KPIs to measure and guide the R&O and security clearance process were incomplete and lacked targets.** There have been developments during the audit scope period towards a formal reporting process to enable enhanced oversight in the R&O process; as at the date of the audit report, the formal reporting protocol for oversight had not been defined. Instead, some KPIs have been reported through various mechanisms: • Until Q3 2022, there was an absence of reporting on R&O operational performance; • In August 2022, a R&O strategy was published that outlined strategic objectives and associated measures. However, while specific measures were identified, specific targets were not included; • Beginning September 2022, a monthly Functional Area Summary (“FAS“) report was produced for internal oversight. This report included some metrics identified in the R&O strategy and provided updates on work programs in progress. While some of the metrics outlined in the R&O strategy were included, various other metrics were not. In addition, targets for the metrics were not communicated.	• Management may be unable to evaluate performance of R&O activities accurately and objectively, and determine whether the process is meeting the desired standards and objectives; • Management may not be able to identify and plan for trends in the R&O process (e.g., increasing or decreasing cycle time) on a timely basis; • Management may not be able to identify areas where resources should be allocated to maximize efficiency and effectiveness within the R&O process; and • Management may not easily assess the impact of intended process improvements and initiatives, and may miss other opportunities for improvement.	Create Recruitment and Onboarding reporting structure and sustainment model that includes defined roles and responsibilities with respect to calculation, collation, reporting, review, decision-making, frequency of reporting and approval of KPI-driven oversight. **Action Owner:** Roberta Reyns, Director, Recruitment and Onboarding **Target Completion Date:** January 30, 2024 Complete Phase 2 enhancements of the R&O Dashboards that include KPIs aligned to components of the R&O strategy, which will provide more detailed operational reporting for R&O managers and workers, Staffing Plan Owners, and leadership oversight. **Action Owner:** Roberta Reyns, Director, Recruitment and Onboarding **Target Completion Date:** January 30, 2024

No.	Finding Rating	Observation	Potential Impacts	Management Action Plan
3	Moderate	**Systems supporting the security clearance process are unable to generate processing timeline information.** [redacted] [redacted]	• Data to inform process operation oversight, management decisions, and improvement initiatives, including taking corrective action for deviations from expected timelines, is not available; • Potential delays on candidate start dates and downstream delays in the onboarding process; and • Potential loss of candidates due to delays in security clearance.	[redacted] Develop a change management plan to increase the likelihood of successful adoption of the new security clearance management system. **Action Owner**: Robyn Way, Senior Manager Contracts & Stakeholder Relations **Target Completion Date**: October 15, 2023 [redacted]

No.	Finding Rating	Observation	Potential Impacts	Management Action Plan
4	Moderate	**Re-work and some delays in the onboarding process occurred due to a high rejection rate of dosimeter request forms needed for access to OPG sites with the potential for radiation exposure.** Onboarding Coordinators are responsible for receiving dosimeter request forms for contractors, then passing them to the Health Physics Radiation Data Unit ("RDU") for processing. Of the 5,565 forms submitted between January 1, 2022 and February 28, 2023, 18% were rejected as they had not been completed correctly (e.g., approver dates preceding applicant signature dates).	• Rejections and repeat submissions resulted in re-work for Radiation Data and Onboarding team members; • Extended time between TLD form submission and TLD allocation may result in delays in employees executing their job responsibilities; and • Inefficient use of time for constrained resources in Onboarding and RAD Data groups.	Create digital RAD data forms (N-FORM-10019, N-FORM-82452, N-FORM-10692) to minimize errors and enhance accuracy and complete initiative to automate the request approval workflow. **Action Owner:** Ephraim Schwartz, Manager, Health Physics **Target Completion Date:** January 30, 2024

No.	Finding Rating	Observation	Potential Impacts	Management Action Plan
5	Low	**The People and Culture (P&C) Management System documentation requires updates to enable sufficient oversight and operational monitoring.** The *P&C Management System* (OPG-PROG-0040), which includes references to recruitment activities, defines how the business unit supports achievement of organizational objectives and demonstrates continuous improvement in business operations. While the governance document includes details on some oversight activities, it has not been updated since 2017 to reflect significant changes in the department and the wider organization including the following: • The document follows an outdated organizational structure resulting in the exclusion of certain components of the current HR organization. While the Talent & Business Change organization (previously responsible for Recruitment activities) is included, there is no consideration of the onboarding component of R&O's function; • The monitoring activities identified for the Talent & Business Change organization did not reflect any of the actions being undertaken by Management such as the development and monitoring of the R&O dashboard, nor presentations to leadership teams. Instead, the activities identified were limited to operational and non-compliance audits. Further, the inclusion of Internal Audit as the sole monitoring function for the organization does not appropriately reflect Internal Audit's role as a third line of defense in OPG's system of internal control. • There was limited discussion of the processes in place to improve on Talent & Business Change's program. The actions described were limited to reactions to audits and feedback from clients. There was no identification of the various improvement initiatives that R&O has underway.	Errors in governance may lead to a lack of understanding of how R&O oversight is conducted and how operations and performance are measured.	Complete the update of the management system governance documents to bring governance in line with current processes. The responsibilities of respective groups for onboarding activities should be defined in the updated governance. **Action Owner**: Sarah McDermott, Director, HR Strategy **Target Completion Date**: October 30, 2023

No.	Finding Rating	Observation	Potential Impacts	Management Action Plan
6	Low	**Documentation to support hiring decisions was not consistently maintained.** The Vacancy Retention Checklist indicates that hiring managers are responsible for retaining certain hiring documents, including completed “Interview Guide" forms and the candidate assessment summary and selection matrix, whilst HR is responsible for maintaining signed offer letters. It was noted that due in part to decentralization of parts of the recruitment process, some supporting documentation could not be located on request, including two signed offer letters.	Potential challenges in validating recruitment decisions or contractual agreements when required.	Review the documentation requirements within the recruitment process, and determine whether their retention is essential and update guidance to reflect any items removed. For those that are required, supporting information will be retained in software or tools that support the recruitment and onboarding process rather than in a separate site. **Action Owner**: Mia Kara, Senior Manager, Recruitment & Onboarding **Target Completion Date**: November 30, 2023
7	Low	[redacted]	• [redacted]	[redacted]

No.	Finding Rating	Observation	Potential Impacts	Management Action Plan
8	Low	**Risks in the R&O process were not documented, identified, tracked, and monitored.** Section 2.0 of *Enterprise Risk Management Reporting* (OPG-PROC-0094) requires all Business Units to identify, assess, treat, monitor, and report risks that may affect the achievement of objectives in OPG's Strategic Plan and annual business plan. Documentation of business unit risks also supports the organization by providing context to activities that are being completed, particularly when there is employee turnover in the department. While many of the risks specific to the R&O process were being actively mitigated, no documentation existed to clearly define the risks and associated mitigating activities. In addition, while enterprise risks are documented, tracked, and monitored through the central Enterprise Risk platform, Resolver, action owners for risk treatment plans associated with the Enterprise "Talent Attraction" risk were not included in Resolver, but were instead documented in a separate tracker maintained by HR.	• Risk-mitigating activities may be modified or removed, resulting in an adverse change to the overall risk profile; • Risk tracking metrics and indicators may not be defined and monitored; and • Groups or individuals who are impacted by Talent Attraction risk may not be aware of the status of risk treatment actions in place.	R&O Innovation team will perform a review of the end-to-end R&O process and in collaboration with R&O Management develop a risk register specific to R&O ensuring that it identifies risk owners, risk level, likelihood, risk treatment plans, and action owners. The frequency of review of the risks will also be defined. **Action Owner:** Mia Kara, Senior Manager, Recruitment and Onboarding **Target Completion Date:** May 30, 2024 Risk-related information, such as target completion dates and action owners, will be retained in Resolver. **Action Owner:** Mia Kara, Senior Manager, Recruitment & Onboarding **Target Completion Date:** May 30, 2024

APPENDIX A – FINDING RATING CRITERIA

Finding: *Noted deficiency with potential impacts to the achievement of business unit/process area objectives, assessed using the following criteria:*

	High Risk	Moderate Risk	Low Risk
Safety & Social License	• Potential regulatory non-compliance. • Deficiencies that could result in: o Fatality, permanent disability, or lost time injury; o Data loss or unavailability of critical systems; o Security is compromised in sensitive / multiple areas; o Fraud / theft; or o Negative media coverage resulting in reputational damage.	• Insufficient evidence to support regulatory compliance. • Deficiencies that could result in: o Minor injury with no lost time; o Temporary data loss or unavailability of non-critical systems; o Security is compromised; o Fraud / theft with some mitigating controls; or o Public escalating concerns to OPG Management or local media.	• Documentation improvements to support regulatory compliance. • Deficiencies that could result in incidents that do not require medical treatment. • Deficiencies that do not result in any media attention negatively impacting OPG's reputation.
Financial	• Potential loss or financial impact =>5% of the sample population's value, or the department's OM&A budget if the former is unavailable.	• Potential loss or financial impact >=2% and <5% of the sample population's value, or department's OM&A budget if the former is unavailable.	• Potential loss or financial impact <2% of the sample population's value, or department's OM&A budget if the former is unavailable.
Operational Excellence	• Governance non-compliance or lack of/inadequate controls that may impact achievement of business or project objectives. • Errors in or insufficient internal reporting that drives senior management decision making. • Test results where =>25% of the sample had deficiencies in the execution of a key control.	• Governance non-compliance or lack of/inadequate controls with alternate controls in place to mitigate the impact to business or project objectives. • Errors in or insufficient internal reporting that could affect management decision. • Test results where >=10% and <25% of the sample had deficiencies in the execution of a key control.	• Governance compliance with procedural concerns or documentation issues which could impact OPG's ability to demonstrate appropriate due diligence. • Errors in or insufficient internal reporting that has minimal decision making impact. • Test results where <10% of the sample had deficiencies in the execution of a key control.

OVERALL REPORT RATING SCALE

An overall audit rating is assigned based on the number of observations identified for the audit and their assigned risk rating:

	Number of Findings			
Finding Risk Rating	**1**	**2**	**3 - 4**	**=> 5**
High	Requires Improvement	Not Effective	Not Effective	Not Effective
Moderate	Generally Effective	Generally Effective	Requires Improvement	Not Effective
Low	Effective	Effective	Generally Effective	Requires Improvement

APPENDIX B – PROCESS OWNER & DISTRIBUTION LIST

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	Judy Tan	Director, Internal Audit
	Dawn Card	Senior Manager, Recruitment & Onboarding
	Aleem Juma	Senior Manager, Internal Audit
	Mia Kara	Senior Manager, Recruitment & Onboarding
	Robyn Way	Senior Manager, Contracts & Stakeholder Relations
	Ephraim Schwartz	Manager, Health Physics
	Shannon Yee	Manager, Internal Audit

ONTARIO POWER GENERATION

Internal Audit

Nuclear Work Order Materials Management

November 2, 2023

Report Rating: **Not Effective**

1. BACKGROUND & OVERVIEW

Maintenance programs across OPG require the efficient use of materials to ensure work activities are executed in a cost-effective, timely manner with quality. Materials for associated work orders ("WOs") are procured by Supply Chain, received at a warehouse, then prepared for collection by work groups. Uncollected materials are returned to inventory when WOs are completed, cancelled, or deferred. The costs associated with the packaging, transportation, and staging[1] of materials that are not consumed for WOs result in both overhead expenses and labour expenditure.

Since 2018, data indicates that there has been an upward trend in inventory levels at warehouse locations related to Nuclear Maintenance Programs. Management indicated that a potential driver behind this increase was the observation that certain materials requested for maintenance tasks were not being promptly collected or acted upon by the requisitioning group. Supply Chain Management had been monitoring this issue using the *Materials Requested Not Issued* ("MRNI") metric, which was reported in their Tier 1 Scorecard.

Collectively, MRNI and Returns (i.e., materials picked by work groups but eventually returned unused to the warehouse, available for future scheduled maintenance activities) were estimated to represent approximately 55% of total materials inventory issued and staged, with MRNI accounting for 40% and Returns for 15%. Management estimated that MRNI, Returns, and associated labour costs could amount to approximately $85 million by the end of 2023.

This was a risk-based audit identified in Internal Audit's ("IA") 2023 Audit Plan, selected due to the importance of the materials management process to OPG's Nuclear Maintenance Programs.

2. OBJECTIVE & SCOPE

The objective of this audit was to assess whether the processes and controls related to materials management are designed and operating effectively to reduce the risk of MRNI and the impact on resources in material movements.

The audit scope included activities from January 1, 2022, to June 30, 2023.

[1] Staging is the activity of consolidating material request items from work packages and work groups and placing materials in a holding area prior to delivery or issue to Work Groups.

3. CONCLUSION

Report Rating: **Not Effective**

Overall, the processes and controls established for work order materials management were found to be not effective. Processes had not been established to assess ordering practices resulting in inventory accumulation, and the causes and composition of MRNI and returns had not been identified to enable targeted corrective actions to be taken. In addition, governance and process documents lacked guidance and timelines for action on staged materials, and while Supply Chain continues to develop KPIs to strengthen the materials management program, delivery fulfilment metrics were not being reported on during the audit scope period.

4. SUMMARY OF POSITIVE OBSERVATIONS

- Management has demonstrated a commitment to improve and streamline the end-to-end supply chain process as evidenced through the “Supply Chain Planning and Warehouse Management Assessment” project, a collaboration with Microsoft that assessed existing supply chain processes and systems for improvement opportunities.

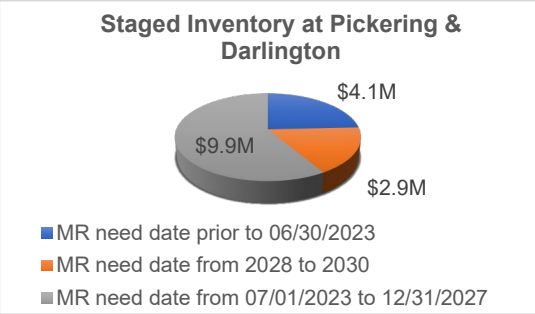
- Management has proactively identified opportunities to cancel demand and avoid unnecessary procurement, amounting to $18 million year-to-date in 2023. By reducing the Reorder Point (“ROP”) and Target Maximum Quantity (“TMAX”) levels, an estimated additional $25 million in procurement has been avoided year-to-date in 2023, along with avoided amounts of $44.2 million in 2022.

- Management has added the Net Inventory Balance (NIB) metric to the station’s Top 50 KPIs, which has allowed for greater visibility into actual inventory levels.

5. SUMMARY OF FINDINGS

1. Lessons learned, performed at the end of each outage or online work, do not review materials ordered versus used.		High
Observation	**Potential Impact**	**Management Action Plans**
N-PROC-MA-0013, *Planned Outage Management* specifies requirements for activities associated with preparation and execution of planned nuclear unit outages. N-PROC-MA-0022, *Integrated On-line Work Schedule,* defines the process and milestones for performing non-outage maintenance work. Both governance documents provide instructions for conducting post-outage/post-maintenance activities and capturing lessons learned, including specific requirements for lessons learned meetings. However, those requirements did not include reviewing estimated materials required against materials used to refine the assessing process, given costs related to materials procured but not used are retained in central inventory as opposed to being a cost of the work activities conducted. This has led to an aggregation of inventory across both Pickering and Darlington, in excess of inventory issued for both stations.	Work orders may use material requisitions that are greater than the actual material required, leading to over-ordering and unnecessary storage and handling costs incurred at an enterprise level.	Management will: Update relevant governance procedures to incorporate a review comparing materials requisitioned with materials consumed. This may include N-PROC-MA-0013, N-PROC-MA-0022, and templates used for lessons learned reviews, ensuring the retention of this requirement for an extended duration and that the outcomes will encompass the implementation of corrective actions. **Action Owner**: Shiva Habibi, Director, CFAM Maintenance **Target Completion Date:** April 30, 2024 Update NK38-MAN-09701-10005 to include the requirement to review whether materials ordered were appropriate. **Action Owner:** Ebraheem Waraich, Project Director, Nuclear Refurbishment **Target Completion Date:** January 31, 2024 Provide senior station oversight of MRNI reduction initiatives through the Senior Work Management monthly meetings. **Action Owners**: Nahil Rahman, Director Work Management (Pickering) / Shayn Ballagh, Vice President, Site Support (Darlington) **Target Completion Date:** January 31, 2024 Provide data on materials requisitioned and not consumed to work groups for evaluation. **Action Owner**: Alison Bradley, Director, Supply Chain Strategy & Supplier Relationship Management **Target Completion Date**: December 8, 2023

2. Causes and composition of MRNI and Returns have not been identified.		**High**
Observation	**Potential Impact**	**Management Action Plans**
The Supply Chain, Work Control and Work Management teams had been working together to analyze the root causes of MRNI and returns including origins and composition; however, that work has not yet been completed. The following limitations have added to the challenges in performing the analysis: • The current system does not have the functionality to prompt users to provide a rationale for not picking up or returning items, preventing subsequent tracking and monitoring; and • In order to assess the status of an order, and to enable Supply Chain staff to communicate with work groups, inventory must be traced back to the originating requisition. Following the Asset Suite 9 ("AS9") upgrade in July 2022, the system no longer linked inventory items to the original requisition. At the time of the audit, Management was actively collaborating with the AS9 IT team to resolve the system issue. During the audit, a temporary solution was developed, linking approximately 90% of items received back to originating MRs, before addressing the permanent linkage in AS9 at the conclusion of the audit.	Failure to promptly collect materials may result in storage space within warehouse staging areas being utilized, leading to limited storage availability and unnecessary effort in handling. System limitations may hinder Management's ability to identify and address root causes for returns and MRNI, thereby impeding the implementation of remediation actions. Without a link between inventory and the order MR, Management may not be able to trace the originator of parts received at warehouse locations, leading to an inability to fully analyze MRNI.	To date, Management has completed a partial analysis of the origins of MRNI and returns, identifying over-ordering by plant operations as one of the main sources. Management will develop an ongoing monitoring process to further assess and mitigate MRNI and returns. **Action Owner**: Teri Lilley, Director, Supply Chain Plant Operations **Target Completion Date:** March 31, 2024 Management will update supporting systems so that selected material requisition actions that are associated with MRNI and returns, require the user to indicate a reason for the action. **Action Owner**: Alison Bradley, Director, Supply Chain Strategy & Supplier Relationship Management **Target Completion Date:** March 31, 2024 Management has restored the permanent linkage between inventory and the originating MR within AS9. **Action Owner**: Alison Bradley, Director, Supply Chain Strategy & Supplier Relationship Management **Target Completion Date:** Completed

3. Governance and process documents lack clear instructions and timelines for action on staged materials.		Moderate
Observation	**Potential Impact**	**Management Action Plans**
N-PROC-MM-0042, *Nuclear Warehousing Core Duties* and N-GUID-08173-1008, *Nuclear Warehousing Core Duties Guideline* outline the processes for material picks, staging, issuing, and returns. Items are staged according to a "need date", which is specified when materials are ordered. In reviewing the governance documents, it was noted that procedures for the following processes were not included: • Collection or cancellation procedures or timelines for staged materials; and • Returning uncollected staged items back to the warehouse, including how often staged items should be reviewed, and the factors used for determining items to be unstaged. A review of staged inventory as of September 8, 2023 identified: • Inventory with a need date prior to June 30, 2023, which had not yet been collected; and • Inventory with a need date later than 2028  It was also noted that both stations had inventory that had been staged for over five years, some up to 20 years, totaling $2 million (12%). In addition, items in the staging area were not included in inventory cycle counts, leading to issues in inventory control. The staging area has not been included in inventory cycle counts, as it is considered as a transitory area where materials should be turned over in a short period of time. At least one Station Condition Record ("SCR") had indicated that items had gone missing from staging areas.	The lack of documented guidance for managing staged items may result in: • Holding items in staging for excessive periods of time, leading to increased storage and handling costs; • Inconsistent processes for managing inventory between locations; and • Inconsistent reporting of MRNI between locations, leading to ineffective decision making. An inability to identify missing inventory may result in overstatement of inventory and delayed work.	Management will conduct a review of the existing governance documents, including N-PROC-MM-0042 and N-GUID-08173-1008, and update these documents to include guidance for the management of staged inventory. **Action Owner** Teri Lilley, Director, Supply Chain Plant Operations **Target Completion Date:** January 31, 2024

4. "On Time Delivery" is not being tracked and monitored.		**Moderate**
Observation	**Potential Impact**	**Management Action Plans**
"On-time delivery" measures Supply Chain's delivery of orders within a specific timeline that incorporates vendor lead time and Supply Chain processing time. This metric had been monitored as a KPI by Supply Chain management prior to the beginning of 2022, but was discontinued due to the metric being skewed by unrealistic need dates being requested by work groups.	Material delivery timelines may slip due to the failure to monitor against Supply Chain's commitment to the business, leading to work delays, and inability to identify bottlenecks in the material supply chain. Station personnel may overorder material, due to real or perceived delays in obtaining items needed for maintenance and outage performance, combined with a very high outage time cost, leading to higher risk of excess inventory, and higher cost of storage and handling.	Management will establish "On-Time Delivery" as a KPI to track and monitor. This will involve designing a method to account for the impacts that have historically skewed the metric (e.g., unrealistic need dates from work groups), and incorporate tracking of vendor lead times to differentiate between different sources contributing to overall lead time. **Action Owner**: Alison Bradley, Director, Supply Chain Strategy & Supplier Relationship Management **Target Completion Date:** March 31, 2024

5. Key Performance Indicators related to MRNI and Returns reported in the Supply Chain Scorecard were inadvertently miscalculated. — **Low**

Observation	Potential Impact	Management Action Plans
MRNI and effort wasted in managing staged items were reported to Supply Chain Senior Management through monthly Supply Chain scorecards. MRNI is calculated by dividing the total number of lines of Staged Returns by the total number of lines of Material staged. The wasted effort is determined by multiplying the number of lines of staged returns by an estimate of time required to unstage, transport and place material in the warehouse. A sample of reporting for two months indicated that the values for MRNI% and wasted effort did not match the values reported, due to the use of incorrect filters when extracting the data for populating the scorecards. This resulted in MRNI being overstated, and wasted effort being understated, as noted in the table below.	Discrepancies in reported KPIs may impede management's ability to make informed decisions on taking corrective actions where required.	Management has rectified the error in the report and briefed staff on the issue for awareness. **Action Owner:** Alison Bradley, Director, Supply Chain Strategy & Supplier Relationship Management **Target Completion Date:** Completed Management will create a Station Condition Record ("SCR") to document the context and remediation activity performed. **Action Owner**: Alison Bradley, Director, Supply Chain Strategy & Supplier Relationship Management **Target Completion Date:** December 31, 2023

Metric	Month	Reported	Recalculated
MRNI (%)	February	56.2	32.4
	June	41.2	36.7
Wasted Effort	February	$356,000	$702,000
	June	$1.3 million	$1.6 million

6. Risks with respect to MRNI and Returns are not documented, identified, tracked and monitored.		**Low**
Observation	**Potential Impact**	**Management Action Plans**
Section 1.1.3 of *Nuclear Risk Management* (OPG-PROC-AS-0086) requires that any risk that has the potential to impact a BU objective outside established tolerance should be identified in that Business Unit's ("BU's") risk register. Risks should be identified in a risk register even when the probability or impact is unknown, the treatment plan is not yet formulated, or the risk owner is unclear. Once documented and identified, the risks can be monitored, and risk treatment plans can be developed. While some of the risks related to inventory were being actively tracked and mitigated in the Supply Chain BU risk register (e.g., the risk of stranded inventory at Pickering), risks related to MRNI and returns were not identified in the BU risk register and there was no formal documentation to clearly demonstrate that the risks are being identified, tracked, monitored and addressed through mitigating activities to acceptable risk tolerances.	Operational risks related to MRNI may materialize without a formal strategy to mitigate, avoid, transfer, or accept them, due to the risk not being formally documented, leading to work delays, financial loss, and reduced ability to make effective management decisions.	Management will update the existing "stranded inventory" risk to reflect the impact on the risk from MRNI and returns, and document mitigating activity, related to MRNI and returns, in the remediation plan for that risk. **Action Owner**: Jennifer Lafferty, Director, Purchasing **Target Completion Date:** December 31, 2023

APPENDIX A – RATING DEFINITIONS FOR AUDIT REPORTS

Finding: *Noted deficiency with potential impacts to the achievement of business unit/process area objectives, assessed using the following criteria:*

	High Risk	Moderate Risk	Low Risk
Safety & Social License	• Potential regulatory non-compliance. • Deficiencies that could result in: ○ Fatality, permanent disability, or lost time injury; ○ Data loss or unavailability of critical systems; ○ Security is compromised in sensitive / multiple areas; ○ Fraud / theft; or ○ Negative media coverage resulting in reputational damage.	• Insufficient evidence to support regulatory compliance. • Deficiencies that could result in: ○ Minor injury with no lost time; ○ Temporary data loss or unavailability of non-critical systems; ○ Security is compromised; ○ Fraud / theft with some mitigating controls; or ○ Public escalating concerns to OPG Management or local media.	• Documentation improvements to support regulatory compliance. • Deficiencies that could result in incidents that do not require medical treatment. • Deficiencies that do not result in any media attention negatively impacting OPG's reputation.
Financial	• Potential loss or financial impact =>5% of the sample population's value, or the department's OM&A budget if the former is unavailable.	• Potential loss or financial impact >=2% and <5% of the sample population's value, or department's OM&A budget if the former is unavailable.	• Potential loss or financial impact <2% of the sample population's value, or department's OM&A budget if the former is unavailable.
Operational Excellence	• Governance non-compliance or lack of/inadequate controls that may impact achievement of business or project objectives. • Errors in or insufficient internal reporting that drives senior management decision making. • Test results where =>25% of the sample had deficiencies in the execution of a key control.	• Governance non-compliance or lack of/inadequate controls with alternate controls in place to mitigate the impact to business or project objectives. • Errors in or insufficient internal reporting that could affect management decision. • Test results where >=10% and <25% of the sample had deficiencies in the execution of a key control.	• Governance compliance with procedural concerns or documentation issues which could impact OPG's ability to demonstrate appropriate due diligence. • Errors in or insufficient internal reporting that has minimal decision making impact. • Test results where <10% of the sample had deficiencies in the execution of a key control.

Opportunity for improvement: *Observation with no risk impact that is provided to management for consideration to improve efficiency of processes and documentation (e.g. automation, duplication of activities).*

OVERALL REPORT RATING SCALE

An overall audit rating is assigned based on the number of observations identified for the audit and their assigned risk rating:

	Number of Findings			
Finding Risk Rating	**1**	**2**	**3 - 4**	**=> 5**
High	Requires Improvement	Not Effective	Not Effective	Not Effective
Moderate	Generally Effective	Generally Effective	Requires Improvement	Not Effective
Low	Effective	Effective	Generally Effective	Requires Improvement

APPENDIX B – PROCESS OWNER & DISTRIBUTION LIST

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	Paul Ross	Vice President, Supply Chain
	Ricky Aroda	Director, Design Engineering, Pickering
	Alison Bradley	Director, Supply Chain Strategy & Supplier Relationship Management
	Adam Chiarandini	Director, Enterprise Risk Management
	Shawn David	Manager, Plant Maintenance, Pickering
	Shiva Habibi	Director, CFAM Maintenance
	Jennifer Lafferty	Director, Purchasing
	Teri Lilley	Director, Supply Chain Plant Operations
	Nahil Rahman	Director, Work Management, Pickering
	Emile Ramnarine	Director, Nuclear Oversight
	Andrew Robertson	Manager, Plant Maintenance, Nuclear Refurbishment
	David Rogalski	Director, Design Engineering, Darlington
	Judy Tan	Director, Internal Audit
	Ebraheem Waraich	Project Director, Nuclear Refurbishment
	James Willson	Manager, Plant Maintenance, Darlington
	Aleem Juma	Senior Manager, Internal Audit
	Greta Deda	Manager, Internal Audit

ONTARIO POWER GENERATION

Internal Audit

Asset Management and Maintenance Strategy

July 26, 2023

Report Rating: **Requires Improvement**

1.0 BACKGROUND & OVERVIEW

Ontario Power Generation Inc. ("OPG") operates and maintains a diverse fleet of generating facilities and the associated infrastructure across the province of Ontario. Historically, OPG's Renewable Generation ("RG") and Nuclear lines of business had separate Asset Management programs that covered aging management, equipment reliability, investment planning, and work maintenance. While continuing the path to asset management excellence, OPG has adopted life cycle asset management as the approach to managing assets, in line with the foundation and principles of the International Organization for Standardization's ("ISO") 55000 series of standards for Asset Management. As a result, in March 2023, OPG established the Strategic Asset Management Program ("SAMP") as an enterprise-wide program across all business units. The SAMP utilizes a systematic approach to manage asset investments, both individually and in portfolios, with a view to optimize cost and performance and realize the maximum amount of asset value within given constraints.

A key element of the SAMP is the maintenance strategy – which includes established engineering programs, condition monitoring activities, and surveillances – that is periodically evaluated for effectiveness. Maintenance (i.e., work planning) includes the performance of activities to prevent, repair or replace malfunctioning structures, systems, and components to re-establish conformance with industry requirements. There is an established maintenance plan for every major asset type, where production-related maintenance encompassing regulatory requirements is the priority.

This audit was a risk-based engagement in Internal Audit's ("IA's") 2023 Audit Plan, and was selected given the potential safety, generation, and financial impacts if OPG's generating assets and systems are not operating effectively.

2.0 OBJECTIVE & SCOPE

The objective of this audit was to assess whether the processes and controls to ensure that investment and maintenance decisions regarding generating assets were made and carried out in a timely and optimized manner to promote reliability, viability and sustainability, and that these processes and controls were designed and operating effectively. The scope included activities from January 1, 2022 to April 30, 2023 and precursor activities from prior periods where appropriate.

3.0 CONCLUSION

Report Rating: **Requires Improvement**

Overall, IA noted that the processes and controls established to ensure that investment and maintenance decisions regarding generating assets were made and carried out in a timely and optimized manner require improvement. RG should formally develop a plan to monitor and manage the preventative maintenance ("PM") work order task ("WOT") backlog across the fleet, the Asset Management team should establish key performance indicators for the Asset Management Program to drive performance, and project controls and key deliverables consistent with OPG's project management framework should be developed for the Continuous On-Line Monitoring ("COLM") Technology Implementation project.

4.0 SUMMARY OF POSITIVE OBSERVATIONS

- The Monitoring & Diagnostic ("M&D") Centre for OPG is collaborating with industry partners such as the Department of Energy National Laboratories in the United States, the CANDU Owners Group ("COG") in Canada, and the Electric Power Research Institute ("EPRI") to explore new evolutions in M&D centres, which has prognostic capabilities to predict the remaining useful life of components and feed data into the timing of investment decisions within Asset Management.

- The Asset Management Team implemented the Enterprise SAMP to outline key elements of OPG's Asset Management Program, and to provide guidance on how technical and economic assessments are integrated into managed processes to ensure that asset investments are optimized. It was noted that the SAMP is in alignment with ISO 55000, and will provide valuable guidance to all BUs including the Chief Information Office's portfolio of assets, Real Estate Facilities, RG Facilities, and Nuclear Facilities, including the Advance Inspection Maintenance ("AIM") and Nuclear Sustainability Services ("NSS") groups.

5.0 SUMMARY OF FINDINGS

No.	Finding Rating	Observation	Potential Impact	Management Action Plan
1	High	**There is no formally documented plan to reduce WOT backlogs for RG, including key performance indicator ("KPI") targets and timelines.** RG-PROC-MA-0002 *Work Management - Assess, Plan and Schedule Work* requires maintenance backlogs for all priority levels to be managed and accepted by the Work Centre Manager or delegate. While WOT backlogs are reported and tracked by individual hydroelectric stations, there is no formally documented plan across RG to manage and reduce the station backlogs, including KPI targets and timelines. As of the date of this report, it was noted that there were over 17,000 WOTs in backlog.	The lack of a documented preventative maintenance backlog plan may lead to increases in backlog and/ or no significant reduction over time, which may indicate a less effective maintenance program that contributes to system health and equipment reliability issues. These issues could result in equipment outages and negative operational and financial impacts.	Management will: • Revise work management governance to include direction/expectations for monitoring and management of WOT backlog on an ongoing basis. • Include a WOT Backlog Reduction measure as a KPI within RG's performance metrics and reporting. **Action Owner:** Alain Levesque, Senior Manager RG Programs **Target Completion Date:** October 31, 2023
2	Moderate	**KPIs have not been implemented for the Asset Management Program.** Although OPG-PROG-0045 *Enterprise Strategic Asset Management Program* requires metrics to be developed to track performance, the Asset Management team has not implemented nor reported on performance metrics specific to the Asset Management Program to senior leadership. Additionally, key success factors which drive the development of KPIs were not formally documented.	Key stakeholders and decision makers may not be fully aware of the status of the Asset Management Program to inform the monitoring and oversight of stations and systems in a timely manner, which may lead to declining performance.	Management will identify and use the key success factors impacting asset management to develop and implement appropriate KPIs to improve the asset management function at OPG and performance reporting to senior leadership. **Action Owner:** Trevor Carneiro, Senior Manager Strategic Initiatives **Target Completion Date:** January 15, 2024

No.	Finding Rating	Observation	Potential Impact	Management Action Plan
3	Moderate	**Changes to RG's COLM Technology Implementation project did not follow the change management process, and the project was missing key project management controls.** In 2018, RG established the COLM project to install sensors on equipment at hydroelectric stations. The project is currently in the execution phase, with a target installation completion date of 2024. The project aims to enhance the existing health monitoring program, and was classified as a Level B project due to the assessed complexity of the project and its intended coverage being deployed across the RG fleet. It was noted that there were various scope reductions compared to the originally approved business case summary ("BCS") that were not processed via OPG's established change management process. There was also no Project Management Plan ("PMP"), scope document, or schedule in the P6 system tool and cost baselines, and the project does not have a central oversight plan to coordinate and oversee the installation of sensors by hydroelectric operations teams through a number of 'sub' projects and other execution strategies.	The project may not be delivered on time, on budget, and with expected quality due to the lack of project management controls during execution, which may result in the project not meeting its intended objective to obtain sensor data to inform equipment reliability and system health monitoring.	Management will: • Perform a detailed assessment of the current project status against the governance requirements and to develop a recovery plan that addresses the specific individual gaps, which will include alignment with the BCS and development of a Project Management Plan and revised cost and schedule baselines. **Action Owner:** Ivan Dimitrov, Director Engineering Services **Target Completion Date:** October 15, 2023 • Implement the recovery action plan developed above. **Action Owner:** Ivan Dimitrov, Director Engineering Services **Target Completion Date:** January 15, 2024
4	Low	**Value Based Maintenance ("VBM") principles have not been formally documented in maintenance governance for Nuclear and RG.** In 2017, Nuclear established the 'VBM Initiative', with an aim of improving equipment reliability and maintenance efficiency. The VBM Initiative contributed to the reduction of maintenance costs and resource demand by optimizing maintenance frequency and by equipment failure cost avoidance. While RG maintenance activities were not covered by the VBM Initiative, shifts towards condition based maintenance ("CBM") had commenced, providing real time data on equipment condition. When reviewing Nuclear and RG maintenance programs and procedures, it was noted that VBM principles underlying Nuclear's VBM Initiative have not been formally incorporated into governance, including for RG. While existing governance provides guidance on cost considerations, it does not reference VBM or outline the key steps to integrate VBM into maintenance processes, which include cost-benefit analysis, cost monitoring, or documenting the rationale behind decisions made in managing PM.	The lack of a documented requirement within governance and maintenance processes in Nuclear and RG may result in a loss of effort and sustainability over VBM activities that are currently being performed, resulting in a potential loss of realized economic benefit to OPG.	Nuclear Management will update N-PROC-MA-0020 *Predefined Process and the Preventative Maintenance Review Board's Term of Reference* to outline the key steps to integrate VBM in the maintenance process. **Action Owner:** Melissa Damiani, Manager Maintenance Programs **Target Completion Date:** October 31, 2023 RG Management will update RG-PROG-MA-0003 *Work Management Program* to specifically include cost and value considerations (e.g., cost-effectiveness, cost monitoring, rationalization of PM program changes) in the ongoing implementation of the program. **Action Owner:** Alain Levesque, Senior Manager, RG Programs **Target Completion Date:** September 30, 2023

No.	Finding Rating	Observation	Potential Impact	Management Action Plan
5	Low	**Some maintenance work order ("WO") priority levels were not accurately assigned by RG Work Centres.** RG-PROC-MA-0002 *Work Management - Assess, Plan And Schedule Work* requires each planned WO to include a type, description, objective, and other attributes and details to support an assigned priority level. There are five levels, with priority 1 being most critical and priority 5 being the least. It was noted that of the nine priority 1 WOs in RG from January 2023 to April 2023, six were incorrectly assigned a priority 1 level when, instead, they should have been priority 2. This was validated with accountable Work Centre Maintenance and Production Managers at four hydro stations by reviewing supporting details. Priority 1 WOs must be addressed immediately, whereas all other priority levels have a risk-graded response timeline requirement.	Incorrect designation of a higher WO priority may result in inefficiencies where non-critical work is completed ahead of critical work.	Management will implement a reporting process for monitoring and oversight of WOTs, with a focus on P1, to ensure ongoing appropriate prioritization. **Action Owner:** Alain Levesque, Senior Manager, RG Programs **Target Completion Date:** September 30, 2023

APPENDIX A - FINDING RATING CRITERIA

Finding: *Noted deficiency with potential impacts to the achievement of business unit/process area objectives, assessed using the following criteria:*

	High Risk	Moderate Risk	Low Risk
Safety & Social License	• Potential regulatory non-compliance. • Deficiencies that could result in: ○ Fatality, permanent disability, or lost time injury; ○ Data loss or unavailability of critical systems; ○ Security is compromised in sensitive / multiple areas; ○ Fraud / theft; or ○ Negative media coverage resulting in reputational damage.	• Insufficient evidence to support regulatory compliance. • Deficiencies that could result in: ○ Minor injury with no lost time; ○ Temporary data loss or unavailability of non-critical systems; ○ Security is compromised; ○ Fraud / theft with some mitigating controls; or ○ Public escalating concerns to OPG Management or local media.	• Documentation improvements to support regulatory compliance. • Deficiencies that could result in incidents that do not require medical treatment. • Deficiencies that do not result in any media attention negatively impacting OPG's reputation.
Financial	• Potential loss or financial impact =>5% of the sample population's value, or the department's OM&A budget if the former is unavailable.	• Potential loss or financial impact >=2% and <5% of the sample population's value, or department's OM&A budget if the former is unavailable.	• Potential loss or financial impact <2% of the sample population's value, or department's OM&A budget if the former is unavailable.
Operational Excellence	• Governance non-compliance or lack of/inadequate controls that may impact achievement of business or project objectives. • Errors in or insufficient internal reporting that drives senior management decision making. • Test results where =>25% of the sample had deficiencies in the execution of a key control.	• Governance non-compliance or lack of/inadequate controls with alternate controls in place to mitigate the impact to business or project objectives. • Errors in or insufficient internal reporting that could affect management decision. • Test results where >=10% and <25% of the sample had deficiencies in the execution of a key control.	• Governance compliance with procedural concerns or documentation issues which could impact OPG's ability to demonstrate appropriate due diligence. • Errors in or insufficient internal reporting that has minimal decision making impact. • Test results where <10% of the sample had deficiencies in the execution of a key control.

Opportunity for improvement: *Observation with no risk impact that is provided to management for consideration to improve efficiency of processes and documentation (e.g. automation, duplication of activities).*

OVERALL REPORT RATING SCALE

An overall audit rating is assigned based on the number of observations identified for the audit and their assigned risk rating:

	Number of Findings			
Finding Risk Rating	**1**	**2**	**3 - 4**	**=> 5**
High	Requires Improvement	Not Effective	Not Effective	Not Effective
Moderate	Generally Effective	Generally Effective	Requires Improvement	Not Effective
Low	Effective	Effective	Generally Effective	Requires Improvement

APPENDIX B – PROCESS OWNER & DISTRIBUTION LIST

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	Barbara Kerr	Director, Generation Strategy & Innovation
	John McCaig	Director, RG Programs & Strategy
	Brian Mori	Director, Plant Reliability Creative Intelligence & Innovation
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ONTARIO POWER GENERATION

Internal Audit

Quality Management Program

November 2, 2023

Report Rating: **Requires Improvement**

1. BACKGROUND & OVERVIEW

OPG's Construction Centre of Excellence ("CCoE") provides innovative safety and quality solutions for mega construction projects. The Quality Management ("QM") program was originally established to provide additional strategic oversight for work executed by Engineering, Procurement and Construction ("EPC") vendors under their QM program for the Darlington Refurbishment Project ("DRP"), and is now also expected to be applied to the Darlington New Nuclear Project ("DNNP").

QM is a vital element in project management as it ensures that all aspects of nuclear safety, ranging from design to operations, are managed to established quality standards. It also provides another layer of monitoring by conducting secondary checks, targeting areas where failure could potentially result in adverse consequences for the project.

The QM team takes a systematic look at various aspects of program windows and project bundles in order to review identified risks, proactively identify quality gaps, and add a level of assurance that minimizes the chance of emergent threats to Restart Control Hold Points ("RCHP") and Regulatory Hold Points ("RHP"). RCHP and RHP are checkpoints that require review and verification by regulators and other key stakeholders before project work progresses further along the schedule. Information gathered from quality surveillance activities is used to raise corrective actions for identified issues, and as operational experience ("OPEX") learnings for future work. The process used to support quality management efforts is called the Systematic Approach to Window Level Project Oversight ("SAWLPO"), which uses an assessment process to target quality surveillance activities based on the associated risk to the appropriate program windows / project bundles.

The QM Program audit was a risk-based audit identified in Internal Audit's ("IA") 2023 Audit Plan, selected given the importance of quality management to ensuring that mega construction projects are delivered with the required quality to be fit for purpose.

2. OBJECTIVE & SCOPE

The objective of this audit was to assess the design and operating effectiveness of processes and controls within the QM program over the DRP that support the achievement of quality management performance objectives and measures, and project outcomes as a whole.

The scope included activities from January 1, 2022 to July 31, 2023 and precursor activities from prior periods where appropriate.

3. CONCLUSION

Report Rating: **Requires Improvement**

Overall, the design and operating effectiveness of processes and controls within the QM program over DRP require improvement. There was a lack of effectiveness reviews conducted on self-assessments ("SAs"), which identify trends and possible corrective actions to support continuous improvement on a programmatic level. Quality trends reported by the QM team were not always reassessed for escalation, and severity levels for surveillance observations did not consistently met the stated criteria based on formally recorded documentation. Additionally, program window start and end dates could not be validated to ensure adequate planning of surveillance activities within required timelines.

As DNNP is currently in the development phase, the quality management plan is in its early stages, and will be updated as the project matures.

4. SUMMARY OF POSITIVE OBSERVATIONS

- Recognizing the importance of quality excellence in construction and aiming to continuously improve, the QM group established a Vendor Quality Council ("VQC") in April 2023. The objectives of the VQC aim to gain better visibility on trending quality events, and to create greater transparency within the vendor community by no longer considering quality events in isolation to a single vendor;

- The QM group conducts weekly internal review meetings of surveillance observations, which involve assessments of related risk impacts and follow up actions by OPG and vendors. In addition, observations, quality events, and other deviations from vendor quality programs are communicated and escalated to vendors to ensure appropriate follow-up and action;

- The QM group publishes monthly and quarterly reports to project stakeholders, as well as to senior leadership on quality management activities performed. The reports include a wide cross section of information including the number significant quality events and their rating (from poor to excellent), performance metrics by unit / project bundle / vendor, and trends and opportunities. The quarterly reports also include a summary of surveillance observations by severity level, status of oversight plans and reports, procurement oversight being conducted, self-assessments planned and completed, and details of other in-progress initiatives; and

- The QM group has demonstrated aspects of continuous improvement by consolidating their Oversight Plan and Oversight Report into one document, reducing duplication of effort while continuing to provide stakeholders with relevant details of the surveillance activity conducted.

5. SUMMARY OF FINDINGS

1. Effectiveness reviews of self-assessments were not executed in line with governance.		**Moderate**
Observation	**Potential Impact**	**Management Action Plans**
OPG-GUID-01940-0001 *OPG Quality Surveillance Guide* states that programmatic areas and processes may be identified for review at the discretion of the QM Senior Manager based on identified trends and risks. When performed, the review should be conducted in accordance with N-PROC-RA-0097 *Self Assessment and Benchmarking Procedure.* The QM group conducted two snapshot self assessments ("SAs") in 2022. Snapshot SAs may be used for early detection of gaps with work, and for quickly determining whether process or program weaknesses exist that may require actions for improvement or further evaluation. Based on a review of the two snapshot SAs, it was noted that there was no evidence to demonstrate that the Management sponsor had completed a quality review of the SA to ensure that it met expectations and that expected outcomes were achieved. In addition, a periodic review of the effectiveness of the SA and benchmarking program had not been performed, which is the responsibility of the Performance Improvement group. There were also some inconsistencies and omissions on one of the snapshot SAs, as the conclusion and expected benefits/results were not fully in line with the governance procedure, with no recommendations or executive summary being documented.	The absence of quality reviews and periodic effectiveness reviews may result in an inability to adequately identify relevant weaknesses in vendor quality programs.	Management will: • Prepare a Self Assessment Plan for the CCoE Division and add an assessment for the QM group; and • Create prompts in AS9 to ensure divisional self-assessments are not missed going forward. **Action Owner:** Donna Flewell, Senior Performance Officer **Target Completion Date:** April 30, 2024

2. The severity levels of some observations created to capture negative trends were not elevated as required by governance, and medium level observations were closed without raising a Station Condition Report or Correction Action Report.		**Moderate**
Observation	**Potential Impact**	**Management Action Plans**
OPG-GUID-01940-0001 defines the criteria for surveillance observation severity levels (classified as high, medium, and low) and the basis for their closure. For identified trends in quality events, the guide also requires the creation of a higher severity observation to capture the information. *Trends* During the audit, six instances were identified where trends were reported within monthly reports or identified by vendors, but there was no indication that the observations created to capture these trends had elevated severity level ratings. In total, 11 observations were raised for trends within the audit scope period; seven were rated as low, while four were rated as medium; *Classification of quality events* A review of the population of observations (127 classified as medium severity and 1,734 classified as low severity, with no observations classified as high severity) noted the following: • The closure notes for some observations did not include a basis for closure in line with the quality surveillance guide. Specifically, medium level observations should be closed if a Station Condition Report ("SCR") or corrective action report ("CAR") are raised. A review of closed medium level observations found that 27 of 121 records (22%) did not indicate whether an SCR or CAR was raised. Instead, the observation was communicated to the vendor for follow up, which is the requirement for low rated observations; and • The type of information documented in the Quality Management Master Observation Repository ("MOR") did not always allow for an adequate assessment of whether observation severity levels were rated in line with the criteria in OPG-GUID-01940-0001. The documented information for 14 medium and 78 low observations did not match the stated criteria within governance. While governance permits management to exercise discretion in determining severity levels for observations that would otherwise be assessed as a high severity event (i.e., allowing for additional information such as the completion of vendor corrective actions and root cause analysis), the basis for exercising discretion in these instances was not formally documented. Management indicated that discretion is also exercised in practice for observations assessed as medium and low severity.	• A failure to elevate severity levels resulting from negative trend patterns may result in a lack of focus on repeating quality issues, resulting in insufficient corrective action and resolution to address the issues; • High and medium level observations may not be tracked and monitored to ensure proper actioning and close out by vendors in the absence of SCR or CAR reporting; and • A lack of sufficient detail to support assigned severity levels outside of established criteria may result in observations not receiving the level of scrutiny and corrective action required, resulting in unaddressed quality issues.	Management will reassess current and outstanding trends and elevate the observations with higher severity levels as appropriate. Follow up actions for these observations will be documented, if needed, and dispositioned. **Action Owner:** Shahid Chishty, Section Manager, Quality Management **Target Completion Date:** April 29, 2024 Management will update governance to: • Require that details of observations include criteria, cause, and impact so that there is sufficient and transparent information to demonstrate how severity levels were assigned and meet the established criteria; • Establish a process to address situations where discretion is exercised in assigning a severity rating or closing an observation, and treat such discretion as exceptions to the normal course process within the QM program; and • Require review and approval of documented exceptions where discretion is exercised. **Action Owner:** Shahid Chishty, Section Manager, Quality Management **Target Completion Date:** April 29, 2024

3. Accurate information on the start and end dates for program windows was not consistently available, presenting challenges in assessing adherence to timelines established within governance for the preparation of oversight plans and reports.		**Moderate**
Observation	**Potential Impact**	**Management Action Plans**
OPG-GUID-01940-0001 indicates that oversight plans should be completed at least 30 days before the program window start date, and oversight reports should be completed within 60 days of window end date, to ensure adequacy of planning and availability of appropriate staff to oversee all critical tasks. For the annual plan, the P6 schedule was utilized to plan surveillance timeframes. In most cases, the program window start and end dates noted in the QM annual plan were not reflective of the actual start and end dates due to program window changes as a result of the working schedule being ahead of the P6 planned schedule. To mitigate the impacts of changes to schedule on the overall QM plan, frequent engagement with the project execution team occurred to ensure that surveillance was still conducted on relevant windows. A sample of 10 project windows noted that for nine of the sampled program windows, the earliest observation noted in the oversight report pre-dated the completion date of the oversight plan, indicating that oversight work was being performed prior to the completion of the oversight plan. Management indicated that the actual program window start and end dates were captured as supplementary notes within the QM annual plan, however this information was only documented for one of the 10 sampled oversight reports. With respect to the issuance of oversight reports, while the lack of documented window dates presented challenges in validating the timely completion of reporting, it was observed that all sampled reports were consistently finalized within 45 days of the final noted observation from the executed surveillance work.	Lack of accurate and documented information on changes to program windows may inhibit management's ability to plan surveillance activities with adequate preparation and resourcing in order to execute with quality, placing greater dependence on less formal interactions with the project team to ensure surveillance activities are planned and executed accordingly.	Management will: • Revise the QM planning process, including the development of key tools (i.e., Annual Plan) and deliverables (observation reports) to track and record program window date changes (i.e., to the T10 schedule), and the potential impact on surveillance resourcing and scheduling; and • Revisit timing requirements for planning and preparation to ensure execution of activities are adaptive to schedule changes. **Action Owner:** Shahid Chishty, Section Manager, Quality Management **Target Completion Date:** April 29, 2024

4. The Annual Plan was not consistently updated with rationale to explain the non-selection of certain program windows for surveillance.		**Low**
Observation	**Potential Impact**	**Management Action Plans**
The QM team documents the rationale for non-selection of program windows for surveillance in its Annual Plan (an Excel based document). Some documented reasons included reference to activities that do not warrant a review of quality, such as non-EPC activities and 'segment 0' activities, which are preliminary readiness activities. It was noted that of the 165 program windows with start dates during the audit scope period, 102 were not selected for surveillance. Of these 102 program windows, 34 did not have an accompanying rationale for their non-selection. Management indicated that all windows without comments met the criteria for non-selection and that due to competing priorities, the plan had not been fully updated with the rationale for non-selection. Management further noted that windows that require oversight are reviewed during weekly meetings to ensure none are missed.	Absence of documented rationale for the non-selection of program windows for surveillance does not provide: • Assurance of the reasonableness of their omission (i.e., that some windows that should have been assessed were not); and • Documentation to support knowledge retention (e.g., in the event of staff turnover).	Management will: • Revise governance to require a rationale to be provided for program windows that are not selected for surveillance activities; and • Include functionality in the Annual Plan spreadsheet to require mandatory documentation of the rationale for non-selection. **Action Owner:** Shahid Chishty, Section Manager, Quality Management **Target Completion Date:** June 28, 2024

5. QM plans and reports were not consistently communicated to relevant stakeholders.		**Low**
Observation	**Potential Impact**	**Management Action Plans**
OPG-GUID-01940-0001 states that: • Oversight plans should be communicated to at least one project stakeholder; • Oversight reports should be communicated to the Project Manager and/or other project stakeholders; • Results of program and process reviews should be communicated to the project, vendor and program owner; and • Observations from surveillances and assessments should be monitored for trends and communicated to the project, stakeholders, and vendors. In the following instances, it was noted that communication of the relevant report/document was not provided to key stakeholders as required: • Nine of 10 sampled oversight plans and related reports; • One horizontal assessment; and • Two QM quarterly reports.	Stakeholders may not: • Be able to assess the relevance of the plan to the work being done; • Be aware of quality issues related to their work; and • Be informed of lessons learned on a timely basis to implement/apply to ongoing windows.	Management will: • For QM quarterly reports, develop and provide targeted communication that will allow senior leadership a succinct view of the status of QM's activities; • For horizontal assessments, provide results to relevant stakeholders through a review check. The review will also ensure that evidence of communication is retained in a central repository; and • Revise guide requirements for communication of oversight plans and reports as this information is available to stakeholders because it is published on the QM site. Management will recommunicate the availability of this information to project stakeholders. **Action Owner:** Shahid Chishty, Section Manager, Quality Management **Target Completion Date:** June 29, 2024

APPENDIX A – RATING DEFINITIONS FOR AUDIT REPORTS

Finding: *Noted deficiency with potential impacts to the achievement of business unit/process area objectives, assessed using the following criteria:*

	High Risk	Moderate Risk	Low Risk
Safety & Social License	• Potential regulatory non-compliance. • Deficiencies that could result in: o Fatality, permanent disability, or lost time injury; o Data loss or unavailability of critical systems; o Security is compromised in sensitive / multiple areas; o Fraud / theft; or Negative media coverage resulting in reputational damage.	• Insufficient evidence to support regulatory compliance. • Deficiencies that could result in: o Minor injury with no lost time; o Temporary data loss or unavailability of non-critical systems; o Security is compromised; o Fraud / theft with some mitigating controls; or o Public escalating concerns to OPG Management or local media.	• Documentation improvements to support regulatory compliance. • Deficiencies that could result in incidents that do not require medical treatment. • Deficiencies that do not result in any media attention negatively impacting OPG's reputation.
Financial	• Potential loss or financial impact =>5% of the sample population's value, or the department's OM&A budget if the former is unavailable.	• Potential loss or financial impact >=2% and <5% of the sample population's value, or department's OM&A budget if the former is unavailable.	• Potential loss or financial impact <2% of the sample population's value, or department's OM&A budget if the former is unavailable.
Operational Excellence	• Governance non-compliance or lack of/inadequate controls that may impact achievement of business or project objectives. • Errors in or insufficient internal reporting that drives senior management decision making. • Test results where =>25% of the sample had deficiencies in the execution of a key control.	• Governance non-compliance or lack of/inadequate controls with alternate controls in place to mitigate the impact to business or project objectives. • Errors in or insufficient internal reporting that could affect management decision. • Test results where >=10% and <25% of the sample had deficiencies in the execution of a key control.	• Governance non-compliance with procedural concerns or documentation issues which could impact OPG's ability to demonstrate appropriate due diligence. • Errors in or insufficient internal reporting that has minimal decision making impact. • Test results where <10% of the sample had deficiencies in the execution of a key control.

Opportunity for improvement: *Observation with no risk impact that is provided to management for consideration to improve efficiency of processes and documentation (e.g. automation, duplication of activities).*

OVERALL REPORT RATING SCALE

An overall audit rating is assigned based on the number of observations identified for the audit and their assigned risk rating:

	Number of Findings			
Finding Risk Rating	**1**	**2**	**3 - 4**	**=> 5**
High	Requires Improvement	Not Effective	Not Effective	Not Effective
Moderate	Generally Effective	Generally Effective	Requires Improvement	Not Effective
Low	Effective	Effective	Generally Effective	Requires Improvement

APPENDIX B – PROCESS OWNER & DISTRIBUTION LIST

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	Giselle Contaste	Manager, Internal Audit
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	Shahid Chishty	Section Manager, Refurbishment Quality Management
	Tony Kim	Section Manager, Refurbishment Quality Management

ONTARIO POWER GENERATION

Internal Audit

Market Renewal Program

January 26, 2024

Report Rating: **Requires Improvement**

1. BACKGROUND & OVERVIEW

In 2016, the Independent Electricity System Operator ("IESO") initiated its Market Renewal Program ("MRP"), with a stated goal of improving the current electricity market design by improving how electricity is supplied, scheduled and priced in the Ontario market. In September 2022, the IESO communicated a revised MRP in-service date of May 2025.

The MRP will lead to a fundamental redesign of Ontario's electricity market, and will include:

- A single schedule market with location-specific energy market pricing for a more competitive and efficient market;
- A financially binding day ahead market to procure the majority of Ontario's electricity needs a day in advance; and
- An enhanced real-time unit commitment engine for better commitment decision making in the pre-dispatch timeframe.

The MRP will introduce a significant shift in how market participants operate in the market, and will require substantial changes to processes and systems to ensure OPG is commercially ready to participate in the renewed market.

This was a risk-based audit identified in Internal Audit's ("IA") 2023 Audit Plan, selected given the significant impact of MRP to OPG's market strategy, revenue, business processes, technical systems and tools.

2. OBJECTIVE & SCOPE

The objective of this audit was to assess OPG's readiness for participation in the MRP against the IESO timeline and OPG project plans and schedules, including validation of the closure of management actions from the previous MRP audit.

The audit included activities from January 1, 2023 to October 31, 2023, and precursor activities from prior periods as relevant.

3. CONCLUSION

Report Rating: **Requires Improvement**

Overall, the processes and controls covering key processes in project management and reporting for the MRP require improvement. Key observations identified during the engagement are summarized below.

No.	Finding	Risk Type	Risk Rating[1]		
			High	Moderate	Low
1	Business requirements of the Lepton suite development were not clearly traced, and schedule changes were not assessed and controlled to ensure timely delivery.	Operational	X		
2	Project management plans and the integrated project schedule were not kept up-to-date, project performance metrics have not been consistently published, and reported earned value metrics were not reflective of deliverables completed for the MRP Umbrella project.	Operational		X	
3	The scope and schedule of the business process redevelopment initiative were not well defined and tracked for timely completion.	Operational		X	
Total		**3**	**1**	**2**	**-**

4. SUMMARY OF POSITIVE OBSERVATIONS

The following positive observations were noted during this engagement:

- Market participants are required to establish reference levels (i.e., prices that reflect the approximate cost of dispatch for each unit during the market power mitigation process) with the IESO, to enable the development of a method of using past data to forecast future costs in the single schedule market contemplated by the IESO's MRP. The MRP team has submitted reference levels for all OPG dispatchable stations per IESO requirements as of March 2023. The reference level negotiation is ongoing, tracked via the reference level schedule, and is supported by appropriate evidence as required in the project management plan ("PMP").

- A market renewal training strategy has been developed for execution, with a clearly defined scope, high-level schedule, targeted audience, risk mitigation actions and differentiated training objectives and content.

- Activities associated with the MRP Information Technology ("IT") project have been executed in compliance with the Enterprise Portfolio Management Office ("EPMO") and IT Project governance for project management, reporting and delivery, with any exceptions to governance properly justified, authorized and documented.

[1] Please refer to Appendix A for risk rating definitions

5. SUMMARY OF FINDINGS

1. The business requirements of the Lepton suite development were not clearly traced, and schedule changes were not assessed and controlled to ensure timely delivery.		**High**
Observation	**Potential Impact**	**Management Action Plans**
The MRP was comprised of two separate projects: • The MRP IT project, developing or upgrading 26 market renewal tools (classified as a level B project); and • The MRP Umbrella project (classified as a level C project), covering energy market business activities and upgrading two business applications (i.e., Lepton and Riv24, collectively referred to as the Lepton suite). All enterprise projects classified as level A to D are required to follow the scalable project delivery controls established in OPG's Project Management Program (OPG-PROG-0039), including the tracing of business requirements to project completion and the establishment of a schedule performance measurement baseline. The MRP Umbrella project applied an 'agile' approach for Lepton suite development, which is currently undefined in EPMO governance. In lieu of governance, the MRP Project team defined an agile methodology, following consultation with the IT Projects organization. This resulted in a project schedule being developed with three-week 'sprints', with user stories and associated project tasks being allocated to each sprint. In reviewing the Lepton suite upgrade initiative, the following was noted: *Fulfilment of business requirements not being traced* Management was using the Microsoft Azure DevOps ("ADO") tool to manage system development, which provides end-to-end traceability functionality by linking business requirements, user stories and test cases. The development of the Lepton suite did not establish linking that identifies business requirements to user stories and test cases, and therefore could not generate automated ADO queries to demonstrate which business requirements were captured by user stories and tested. This resulted in the realization of business requirements not being tracked, as it was a time-intensive manual process. *Challenges in scope and schedule management led to changes in both project scope and schedule* From the date of the IESO formally communicating delays to the MRP project implementation for market participants to the date of this report, the total number of sprints for the Lepton suite upgrade schedule increased from 32 sprints to 50 sprints. It was noted that the rationale for increases in the number of sprints was not consistently documented nor approved by a relevant authority. In addition, goals set by Management to consider a sprint complete by completing approximately 80% of sprint tasks led to the deferral of tasks to subsequent sprints, potentially resulting in an increase in overall schedule.	The Lepton suite may not be able to fully support operations on market renewal go-live if all business requirements are not completed. The absence of prioritization for business requirements may lead to the development team investing time in lower-priority tasks first, placing the timely completion of essential functionalities at risk. The addition of business requirements during the Execution phase (post Gate 3) may result in scope creep, impacting on-time and on-budget completion of the project. Delays may not be detected if the schedule performance measurement baseline is not established. Lack of change controls and increase in number of sprints may lead to MRP project schedule extension, hindering go-live when the new IESO market goes live.	Management will develop a project plan for Lepton suite scope and schedule management, establish the scope performance baseline, and maintain the Requirement Listing for scope assessment and management. **Action Owner:** Javed Kotowaroo, Senior Market Affairs Advisor **Target Completion Date:** April 15, 2024 Management will take actions to improve ADO traceability (e.g., updating naming convention, document Business Requirement Document ("BRD") IDs, and building queries). **Action Owner:** Amy Beard, Real Time & Day Ahead Markets Supervisor **Target Completion Date:** April 15, 2024 Management will include an integrated UAT (User Acceptance Testing) testing for all business requirements at an appropriate time in the project schedule. The integrated UAT testing will provide assurance on realization. The appropriate timing will ensure that the Lepton suite team has sufficient buffer time to remediate in case there are any missed business requirements, **Action Owner:** Andrew Li, Senior Market Specialist **Target Completion Date:** April 15, 2024 Management will develop more ADO dashboards for progress tracking and include appropriate status updates in the monthly reporting. **Action Owner:** Javed Kotowaroo, Senior Market Affairs Advisor **Target completion date: April 15, 2024**

2. PMPs and the integrated project schedule were not kept up-to-date, project performance metrics have not been consistently published, and reported earned value metrics were not reflective of deliverables completed for the MRP Umbrella project.		**Moderate**
Observation	**Potential Impact**	**Management Action Plans**
The Project Integrated Management Manual (OPG-MAN-00120-0010-006) requires projects to have a standardized PMP. Changes to the PMP should be identified and assessed, which results in a PMP that is progressively elaborated by controlled and approved updates extending through to project closure. The *Project Schedule Management Manual* (OPG-MAN-00120-0014) requires projects to use a project schedule as the main planning tool. The Scalable Project Delivery Model requires the MRP project team to prepare monthly reporting to the project team and key stakeholders on key project metrics, including Quality, Schedule, Cost, and Risk, while reporting to the MRP Steering Committee occurs at a higher level on a bi-monthly basis. A review of the MRP project management and performance reporting practices noted the following: • The integrated project schedule has not been reconciled with initiative project schedules since June 2023. As a result, the activity dates and milestones identified in the existing integrated schedule did not match those defined in the business process and offer strategy initiative schedules. Performance metric dashboards have also not been updated since June 2023. Management had been developing a new integrated schedule to enable greater automation of project activities and updating of project milestones, which has yet to be implemented as of the date of this report. • Project earned value reporting (i.e., Schedule Performance Index or “SPI”) was not reflective of whether the project was achieving expected deliverables, as MRP Umbrella project did not use a “deliverable based” approach to calculate the earned value. Rather, the “level of effort” approach was used, as some of the MRP Umbrella initiatives lacked scope definition when the integrated schedule was initially developed; • The project’s Risk Management Plan requires high and moderate risks to have mitigation actions and reported in monthly status update meetings. However, moderate risks were accepted without mitigation and were not reported in monthly meetings; and • The MRP IT and MRP Umbrella PMPs were not updated to address significant changes, (e.g., Hybrid Tools were transferred from MRP Umbrella to MRP IT). The MRP IT project documented any changes in Steering Committee meeting materials, while the MRP Umbrella project did not document changes in scope, performance and risk management consistently.	Inaccurate schedules may impede Management’s ability to monitor project performance and establish corrective actions where required, potentially leading to project delays and the development of deliverables that do not meet the project’s requirements. The project’s SPI metrics may not be reflective of actual project achievement given the "level of effort” approach used in earned value reporting, as the SPI would have been calculated based on resource time spent on deliverables rather than the actual achievement of those deliverables. MRP stakeholders may not be able to assess and challenge the acceptance of moderate-level risks, as they were not reported in monthly status update meetings. The absence of clear and consistent PMPs may lead to ineffective project management and execution, as project personnel are unclear on the appropriate practices to follow and/or their accountabilities.	Management will complete the work on integrated schedules and build performance dashboards accordingly. Upon completion, the MRP Umbrella and IT projects will follow EPMO governance for project management and reporting. Amendments to the methodology applied in calculating earned value will also be addressed through this management action. **Action Owner:** Lindsey Arseneau-MacKinnon, Vice President, Energy Markets **Target Completion Date:** April 15, 2024 Management will update the risk management plan and adjust risk reporting accordingly. **Action Owner:** Javed Kotowaroo, Senior Market Affairs Advisor **Target Completion Date:** April 15, 2024 Management has developed a project governance change registry to capture changes for updating the PMP. The registry is a living document which will also serve as interim governance until the updated PMP is issued. **Action Owner:** Javed Kotowaroo, Senior Market Affairs Advisor **Target Completion Date:** Completed Management will update the PMP to address hybrid tool changes. **Action Owner:** Nuno De Matos, Project Manager **Target Completion Date:** April 15, 2024

3. The scope and schedule of the business process redevelopment initiative were not well defined and tracked for timely completion.		**Moderate**
Observation	**Potential Impact**	**Management Action Plans**
The Front End Planning for Programs and Strategic Projects Guide (OPG-GUID-00120-0009) section 6.2 recommends that a Project Management Plan (PMP) is prepared for each discrete scope within a program, to describe the requirements on management and execution for the specific scope / initiative. OPG-MAN-00120-0014 section 2.2.7 indicates that the level 2/3 activity description for a project should start with a verb, contain a unique, specific object, leave no room for confusion, and is no longer than two months in duration. A review of the MRP's business process redevelopment initiative ("the initiative") identified the following: • The MRP PMP identified key milestones for the initiative which included completion of a Business Process Redevelopment Strategy by June 2023, which has not been completed as of the date of this report. Management decided to forgo the document and opted to develop a Terms of Reference ("TOR") document instead, which is considered to serve as a project plan. The TOR did not contain the level of detail and clarity expected of a project plan, including commentary regarding scope, schedule, risk, quality, change control, documentation management, integration with interfacing groups, and roles and responsibilities. • The initiative included three phases, with Phase 1 starting on August 9, 2022 and ending on December 31, 2023. As of December 2023, the initiative completed five out of nine planned deliverables, related to business process flowcharts/diagrams. However, the deliverables did not fully address general and specific objectives documented for Phase 1. Examples include: o There were 16 milestones to be completed during Phase 1, with seven of the 16 completed as of December 2023; o The completed flowcharts/diagrams did not identify information around resources, sub-processes, desk duties, packages, MRP parameters and MRP Impact etc. as required by specific objectives; and o Further Lines of Business needs to be addressed during Phase 2 were not identified as required by general objectives. • The initiative schedule did not contain sufficient detail to guide execution activities and assess performance. For example, interdependencies of business process redevelopment and system development activities were not documented, and instances were noted where activities had durations greater than that permitted by OPG-MAN-00120-0014, with descriptions not being prepared with the required detail to drive execution.	A lack of a well-defined Business Process Redevelopment scope could hinder the initiative's progression, as project personnel may not be clear on the initiative's objectives, scope, schedule, and deliverables. As the completion of Phase 1 deliverables set the foundation for subsequent phases, delays in their completion could impact the timely and orderly progression of Phase 2 and 3 activities. Project schedules lacking defined activities and interdependencies may indicate inadequate planning, causing delays as project personnel expend execution-phase time determining deliverables, generating potentially irrelevant outputs, or rectifying implemented design issues. Management may not be able to assess schedule performance if level 2 and 3 activities are unavailable and durations are not defined.	Management will revise the TOR to contain the elements of a project plan and schedule with greater definition, which will be shared with relevant stakeholders for alignment and used to guide execution and tracking. **Action Owner:** Margaret Koontz, Senior Manager, Market Affairs **Target Completion Date:** April 15, 2024

APPENDIX A – RATING DEFINITIONS FOR AUDIT REPORTS

Finding: *Noted deficiency with potential impacts to the achievement of business unit/process area objectives, assessed using the following criteria:*

	High Risk	Moderate Risk	Low Risk
Safety & Social License	• Potential regulatory non-compliance. • Deficiencies that could result in: o Fatality, permanent disability, or lost time injury; o Data loss or unavailability of critical systems; o Security is compromised in sensitive / multiple areas; o Fraud / theft; or o Negative media coverage resulting in reputational damage.	• Insufficient evidence to support regulatory compliance. • Deficiencies that could result in: o Minor injury with no lost time; o Temporary data loss or unavailability of non-critical systems; o Security is compromised; o Fraud / theft with some mitigating controls; or o Public escalating concerns to OPG Management or local media.	• Documentation improvements to support regulatory compliance. • Deficiencies that could result in incidents that do not require medical treatment. • Deficiencies that do not result in any media attention negatively impacting OPG's reputation.
Financial	• Potential loss or financial impact =>5% of the sample population's value, or the department's OM&A budget if the former is unavailable.	• Potential loss or financial impact >=2% and <5% of the sample population's value, or department's OM&A budget if the former is unavailable.	• Potential loss or financial impact <2% of the sample population's value, or department's OM&A budget if the former is unavailable.
Operational Excellence	• Governance non-compliance or lack of/inadequate controls that may impact achievement of business or project objectives. • Errors in or insufficient internal reporting that drives senior management decision making. • Test results where =>25% of the sample had deficiencies in the execution of a key control.	• Governance non-compliance or lack of/inadequate controls with alternate controls in place to mitigate the impact to business or project objectives. • Errors in or insufficient internal reporting that could affect management decision. • Test results where >=10% and <25% of the sample had deficiencies in the execution of a key control.	• Governance compliance with procedural concerns or documentation issues which could impact OPG's ability to demonstrate appropriate due diligence. • Errors in or insufficient internal reporting that has minimal decision making impact. • Test results where <10% of the sample had deficiencies in the execution of a key control.

Opportunity for improvement: *Observation with no risk impact that is provided to management for consideration to improve efficiency of processes and documentation (e.g., automation, duplication of activities).*

OVERALL REPORT RATING SCALE

An overall audit rating is assigned based on the number of observations identified for the audit and their assigned risk rating:

	Number of Findings			
Finding Risk Rating	**1**	**2**	**3 - 4**	**=> 5**
High	Requires Improvement	Not Effective	Not Effective	Not Effective
Moderate	Generally Effective	Generally Effective	Requires Improvement	Not Effective
Low	Effective	Effective	Generally Effective	Requires Improvement

APPENDIX B – PROCESS OWNER & DISTRIBUTION LIST

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	Abhay Lakhanpal	Senior IT Leader/Advisor
	Javed Kotowaroo	Senior Market Affairs Advisor

ONTARIO POWER GENERATION

Internal Audit

Third Party Risk Management

February 22, 2024

Report Rating: [redacted]

1. BACKGROUND & OVERVIEW

Third party risk arises from organizations relying on outside parties to perform services or activities on their behalf. Externally driven disruptions including pandemics, international conflicts, and economic instability have created pressure on global supply chains and highlighted organizations' dependence on critical third parties. To mitigate these pressures, third party networks are being expanded to ensure business continuity. The overall trend of increased reliance on, and operational integration with, third parties across industries has increased over the past several years, and in turn organizations are increasingly subject to additional sources of third party risk.

OPG makes extensive use of third parties across the enterprise to support the company's operations, strategic projects, and initiatives. This reliance on third parties may impact the achievement of OPG's business objectives if there are performance issues in areas such as quality, safety, cost, schedule, and cyber security. A multi-year enterprise-wide initiative led by Supply Chain was started in 2023 to develop an integrated vendor risk management program. While Supply Chain has the primary accountability over procurement, the ongoing management of vendor risks requires collaboration from areas across OPG including, but not limited to, [redacted]

This was a risk-based audit identified in Internal Audit's ("IA") 2023 Audit Plan, selected given the reliance on third parties in supporting OPG's operations, strategic projects and initiatives, and the importance of managing the risks associated with third parties to achieve organizational objectives.

2. OBJECTIVE & SCOPE

The objective of this audit was to assess the progress and effectiveness of programs and processes established by OPG's Supply Chain and Cyber Security groups to manage risks related to the reliance on the products and services provided by third parties to the organization.

The scope included activities from October 1, 2022 to September 30, 2023, and some precursor activities from prior periods.

3. CONCLUSION

Report Rating: [redacted]

Overall, the effectiveness of programs and processes established by OPG's Supply Chain and Cyber Security groups to manage risks related to the reliance on the products and services provided by third parties to the organization [redacted]. Key observations identified during the engagement are summarized below:

No.	Finding	Risk Type	Risk Rating[1]		
			High	Moderate	Low
1	[redacted]	[redacted]	[redacted]		
2					
3					
4					
Total					

4. SUMMARY OF POSITIVE OBSERVATIONS

Progress in managing the risks associated with third parties was noted in the following areas:

- The Critical Procurement Planning initiative, which aimed to address quality oversight issues with parts ordered by ("EPC") vendors from sub-suppliers, was completed collaboratively between the Supply Chain, Nuclear Projects, and Engineering teams. This resulted in changes to Project Management Plans ("PMPs") that now include a specific section for project teams to consider critical procurement to enhance OPG oversight down to the sub-supplier level.

- The Framework for the Supplier Relationship Management ("SRM") process was redefined, with supplier segmentation finalized, the OPG scorecard process expanded, and completion of scorecards and surveys for Partner Suppliers.

- A Cyber Security third party risk management governance was developed, which includes cyber considerations over vendor planning, due diligence, contract negotiations, ongoing monitoring and termination. Cyber Security risk and due diligence assessments were also updated in collaboration with external consultants.

[1] Please refer to Appendix A for risk rating definitions

5. SUMMARY OF FINDINGS

1. [redacted]	[redacted]
Observation	**Potential Impact**
Based on leading practices, information on third parties that have been granted access to applications/systems should be centrally managed. A standardized process to remove access for vendors once business relationships have ended is important to remove any residual third party risk to the organization. [redacted] Vendors have access to OPG applications via single sign-on ("SSO") or utilizing a corporate local area network account, i.e. [redacted] In assessing potential risks and gaps with [redacted] it was noted that: • [redacted] [redacted]	• [redacted] [redacted]

Management Action Plans
[redacted]
[redacted]
[redacted]
[redacted]
[redacted]
[redacted]

2. [redacted]

Observation	Potential Impact	Management Action Plans
Supply Chain gathers and monitors business and market intelligence from the external environment (e.g., forecasts on commodity prices, interest rate and inflation, and other broader macroeconomic outlooks) and publishes a Supply Chain Market Report on a monthly basis. The report has developed in response to the elevated global inflation levels following the COVID-19 pandemic, aimed to create proactive awareness across the enterprise for consideration in managing projects and operations, and is envisioned as one of the elements of the Supply Chain Risk Management Framework and Supply Chain Excellence initiatives. In reviewing this initiative, the following was observed: • [redacted] [redacted]	• [redacted]	[redacted]

3. [redacted]		
Observation	**Potential Impact**	**Management Action Plans**
For new vendors requiring access to OPG systems, cyber security risk assessments assist in safeguarding technology platforms and helping develop plans for vendor risk mitigation. In reviewing Cyber Security's Third Party Risk Management governance, it was noted that [redacted]	• [redacted]	[redacted]

4. [redacted]		
Observation	**Potential Impact**	**Management Action Plans**
As part of the 'Cyber Security Road Map' developed by the Cyber Security team to address third party risks, a commitment was made to have greater oversight of [redacted]	• [redacted]	[redacted]

APPENDIX A – RATING DEFINITIONS FOR AUDIT REPORTS

Finding: *Noted deficiency with potential impacts to the achievement of business unit/process area objectives, assessed using the following criteria:*

	High Risk	Moderate Risk	Low Risk
Safety & Social License	• Potential regulatory non-compliance. • Deficiencies that could result in: o Fatality, permanent disability, or lost time injury; o Data loss or unavailability of critical systems; o Security is compromised in sensitive / multiple areas; o Fraud / theft; or o Negative media coverage resulting in reputational damage.	• Insufficient evidence to support regulatory compliance. • Deficiencies that could result in: o Minor injury with no lost time; o Temporary data loss or unavailability of non-critical systems; o Security is compromised; o Fraud / theft with some mitigating controls; or o Public escalating concerns to OPG Management or local media.	• Documentation improvements to support regulatory compliance. • Deficiencies that could result in incidents that do not require medical treatment. • Deficiencies that do not result in any media attention negatively impacting OPG's reputation.
Financial	• Potential loss or financial impact =>5% of the sample population's value, or the department's OM&A budget if the former is unavailable.	• Potential loss or financial impact >=2% and <5% of the sample population's value, or department's OM&A budget if the former is unavailable.	• Potential loss or financial impact <2% of the sample population's value, or department's OM&A budget if the former is unavailable.
Operational Excellence	• Governance non-compliance or lack of/inadequate controls that may impact achievement of business or project objectives. • Errors in or insufficient internal reporting that drives senior management decision making. • Test results where =>25% of the sample had deficiencies in the execution of a key control.	• Governance non-compliance or lack of/inadequate controls with alternate controls in place to mitigate the impact to business or project objectives. • Errors in or insufficient internal reporting that could affect management decision. • Test results where >=10% and <25% of the sample had deficiencies in the execution of a key control.	• Governance compliance with procedural concerns or documentation issues which could impact OPG's ability to demonstrate appropriate due diligence. • Errors in or insufficient internal reporting that has minimal decision making impact. • Test results where <10% of the sample had deficiencies in the execution of a key control.

Opportunity for improvement: *Observation with no risk impact that is provided to management for consideration to improve efficiency of processes and documentation (e.g. automation, duplication of activities).*

OVERALL REPORT RATING SCALE

An overall audit rating is assigned based on the number of observations identified for the audit and their assigned risk rating:

	Number of Findings			
Finding Risk Rating	**1**	**2**	**3 - 4**	**=> 5**
High	Requires Improvement	Not Effective	Not Effective	Not Effective
Moderate	Generally Effective	Generally Effective	Requires Improvement	Not Effective
Low	Effective	Effective	Generally Effective	Requires Improvement

APPENDIX B – PROCESS OWNER & DISTRIBUTION LIST

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ONTARIO POWER GENERATION

Internal Audit

Artificial Intelligence Governance

May 1, 2024

Report Rating: [redacted]

1. BACKGROUND & OVERVIEW

Artificial intelligence ("AI") technologies are increasingly being implemented across various industries, including the energy sector. OPG is exploring and adopting AI solutions in various areas, such as predictive maintenance, anomaly detection, and project management. The use of AI also carries inherent risks, including potential biases in datasets, data security, privacy concerns, and ethical considerations around its applications, and unintended consequences as inputs to the systems change.

A comprehensive yet adaptive governance framework sets a foundation to manage risks while enhancing the responsible use of AI. Such a framework should guide the development, deployment, and ongoing management of AI projects and systems, while promoting ethical use of AI and mitigating potential risks.

AI projects are managed through the IT projects process and follow a defined lifecycle with various phases including Definition/Planning, Execution, In-Service, and Closeout. Key controls throughout the lifecycle include policies, procedures and review activities which ensure proper definition, scope management, and validation of project deliverables. Additionally, project estimates are reviewed and monitored throughout the lifecycle to ensure alignment with allocated budgets and released funds.

This was a risk-based engagement identified in Internal Audit's ("IA's") Audit Plan, selected given the recent increased inherent risks of AI technology.

2. OBJECTIVE & SCOPE

The objective of this audit was to evaluate the design and operating effectiveness of processes and controls related to the AI governance framework components as illustrated in Appendix A, such as organizational engagement, planning and alignment, policies and standards, governance and oversight, controls and procedures, and digital training, fluency and change management.

The scope included activities from January 1, 2023, to December 31, 2023, and relevant precursor activities from prior periods where appropriate.

This engagement was conducted in conformance with the International Standards for the Professional Practice of Internal Auditing.

3. CONCLUSION

Report Rating: [redacted]

Overall, the design and operating effectiveness of controls and processes for AI governance [redacted]. Key observations identified during the engagement are summarized below:

No.	Finding	Risk Type	Risk Rating[1]		
			High	Moderate	Low
1	[redacted]	[redacted]			
2	A talent development program that integrates AI training, knowledge transfer and people management practices to effectively leverage AI technologies is not in place.				
3	[redacted]				
4	[redacted]				
5	Existing AI procedures and documents have not been updated in a timely manner to incorporate relevant documentation references.				
6	[redacted]				
Total					

4. SUMMARY OF POSITIVE OBSERVATIONS

- OPG has recognized the growing prevalence, benefits, and risks of AI faster than its peers in the industry and noted that lines of business ("LOBs") across the organization were interested in or already using AI. In response, an AI governance program was proactively established to centralize AI innovation, including the formation of an AI Committee to discuss AI use cases, share AI developments, AI regulations and AI best practices. The AI Committee includes a diverse group of members from across the enterprise to bring knowledge from their respective areas of expertise and make necessary and timely recommendations.

- OPG formed a qualified AI Centre of Excellence ("CoE") that is responsible for developing AI systems, managing AI risks, and providing subject matter expertise to the organization on AI-related inquiries. AI CoE members critically evaluate AI models presented to the AI Committee for Responsible AI risks (such as robustness and fairness).

- OPG developed a robust list of Responsible AI principles that covers the nuances presented by AI risks. These principles are documented and shared in the 'Usage of AI' Terms of Reference ("ToR") to validate that AI is used in an ethical, fair, and explainable manner. In addition, the document outlines techniques for enabling developers to implement AI responsibly.

[1] Please refer to Appendix B for risk rating definitions

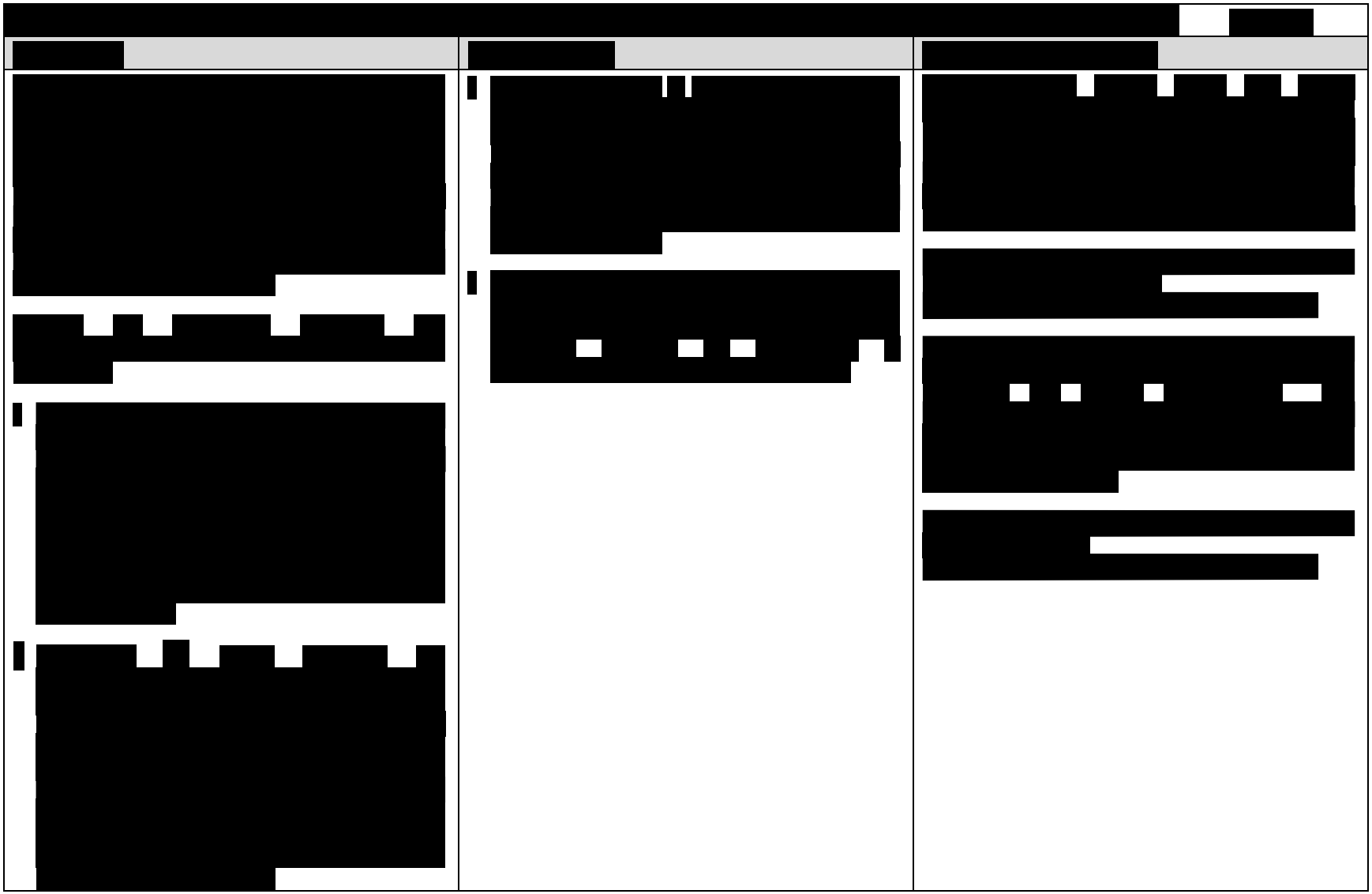
5. SUMMARY OF FINDINGS

1.		

2. A talent development program that integrates AI training, knowledge transfer and people management practices to effectively leverage AI technologies is not in place.		[redacted]
Observation	**Potential Impact**	**Management Action Plans**
Digital Technology & Services ("DT&S") has hosted AI roadshows and education sessions across the enterprise, and conducts optional AI trainings for AI Committee members. The OPG intranet page also provides links to self-study materials and online courses on the topic of AI. Through stakeholder interviews and documentation review, the following observations were noted: • **Knowledge transfer:** Over the past two years, the AI Committee has faced considerable member turnover, with no knowledge transfer strategy for its members. • **AI trainings:** DT&S has developed a mandatory computer-based training for all end users of ChatOPG to make them aware of Generative AI risks such as hallucination and inaccuracies. However, there is no mandatory AI training for employees including AI developers (including the LOB, the AI Committee members, and the AI CoE members) to enable effective AI development and validate safe and ethical AI practices. Moreover, there are no trainings for the second line oversight functions on identifying, assessing, and mitigating AI risks, Responsible AI principles, AI monitoring and incident response.	• The lack of a defined knowledge transfer strategy for AI Committee members may lead to loss of expertise and knowledge from member turnover and affect the AI Committee's ability to review and govern AI systems efficiently and effectively. • The absence of mandatory AI and AI risk trainings for employees, especially employees directly involved with the use and assessment of AI systems and risks, may lead to the development of AI systems that exceed OPG's AI risk appetite and tolerance levels and fail to address the organization's objectives.	Management will develop a knowledge transfer strategy for AI Committee members. This will involve identifying potential successors for each role on the Committee, while considering the specific skills and expertise required to continue AI advancement. **Action Owner**: Daniel Lau, Director, IT Portfolio Planning & Controls **Target Completion Date:** August 30, 2024 Management will establish mandatory training programs on AI definition, AI risk appetite and tolerance, AI development, AI risk management, AI third-party risks and Responsible AI principles. The training will be customized for each stakeholder group (e.g., LOBs, AI Committee, AI CoE, and second line oversight functions) based on the level of AI understanding required for their roles and responsibilities. **Action Owner**: Mishca De Costa, Senior Manager, Digital Innovation & Strategy **Target Completion Date:** August 9, 2024 Management will define AI training as part of the AI strategy and roadmap and document and review training content, monitor training completion and consider completion as a qualification for individuals involved in AI decision making processes (e.g., LOBs, AI Committee, AI CoE, and second line oversight functions). Training materials will be customized based on the audience (end users versus developers). **Action Owner**: Mishca De Costa, Senior Manager, Digital Innovation & Strategy **Target Completion Date:** August 16, 2024

3. [redacted]	[redacted]
Observation	**Potential Impact**	**Management Action Plans**
[redacted]	[redacted]	[redacted]

3. [redacted]		[redacted]
[redacted]		[redacted]

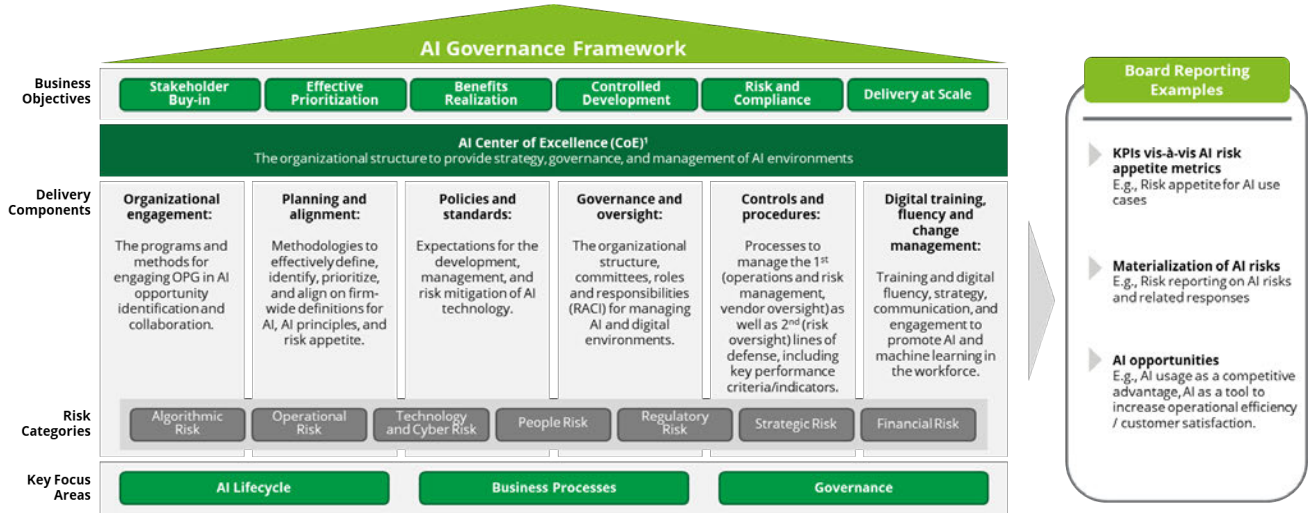


5. Existing AI procedures and documents have not been updated in a timely manner to incorporate relevant documentation references.		[redacted]
Observation	**Potential Impact**	**Management Action Plans**
To assist with the planning, development and deployment of AI systems and applications, and to manage AI risks, OPG has integrated existing processes such as the *IT Project Intake* process, the *IT Change Management* process, the *Procurement* process, and the *Management of Employee Personal Information Policy* into its AI governance program. In addition, OPG has drafted a 'Usage of AI' ToR and 'Terms of usage for Generative AI' document, including Code of Business Conduct, for governing AI and Generative AI. Through key stakeholder interviews and documentation review, the following observations were noted:. • **AI risk documentation:** The 'Usage of AI' ToR, the Responsible AI principles or risk assessment procedures that evaluate Responsible AI principles do not reference various risk governance documents (i.e., OPG-PROG-0042 *Cybersecurity*, OPG-STD-0181 *Third-Party Risk Management*, and OPG-PROG-0004 *Enterprise Risk Management*). • **Policy update:** The 'Usage of AI' ToR and 'AI Committee' ToR have not been revised or assessed for outdated information (e.g., personnel changes or changes to AI risk assessments) since their release in March and April 2022, respectively.	• A lack of documentation of risk governance documents in OPG's 'Usage of AI' ToR, Responsible AI principles and risk assessment procedures can lead to inconsistency and incompleteness in the assessment and management of AI-specific risks across the organization. • AI ToRs that do not have a defined revision cycle may result in incorrect or outdated information being communicated to employees. This can result in employees referring to outdated ToRs and procedures when completing their AI risk assessments, allowing them to circumvent certain procedures when developing AI applications.	Management will update existing AI policies and procedures (e.g., 'Usage of AI' ToR, Responsible AI principles and risk assessment procedures) to reference existing risk policies (e.g., OPG-PROG-0042 *Cybersecurity*, OPG-STD-0181 *Third-Party Risk Management*, OPG-PROG-004 *Enterprise Risk Management*, etc.). **Action Owner**: Mishca De Costa, Senior Manager, Digital Innovation & Strategy **Target Completion Date:** September 6, 2024 Management will define a regular cadence for revising the 'Usage of AI' ToR and 'AI Committee' ToR, (including updating the individuals representing the AI Committee). **Action Owner**: Mishca De Costa, Senior Manager, Digital Innovation & Strategy **Target Completion Date:** September 6, 2024

6. [redacted]

[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

APPENDIX A – AI GOVERNANCE FRAMEWORK



APPENDIX B – RATING DEFINITIONS FOR AUDIT REPORTS

Finding: *Noted deficiency with potential impacts to the achievement of business unit/process area objectives, assessed using the following criteria:*

	High Risk	Moderate Risk	Low Risk
Safety & Social License	• Potential regulatory non-compliance. • Deficiencies that could result in: ○ Fatality, permanent disability, or lost time injury; ○ Data loss or unavailability of critical systems; ○ Security is compromised in sensitive / multiple areas; ○ Fraud / theft; or ○ Negative media coverage resulting in reputational damage.	• Insufficient evidence to support regulatory compliance. • Deficiencies that could result in: ○ Minor injury with no lost time; ○ Temporary data loss or unavailability of non-critical systems; ○ Security is compromised; ○ Fraud / theft with some mitigating controls; or ○ Public escalating concerns to OPG Management or local media.	• Documentation improvements to support regulatory compliance. • Deficiencies that could result in incidents that do not require medical treatment. • Deficiencies that do not result in any media attention negatively impacting OPG's reputation.
Financial	• Potential loss or financial impact =>5% of the sample population's value, or the department's OM&A budget if the former is unavailable.	• Potential loss or financial impact >=2% and <5% of the sample population's value, or department's OM&A budget if the former is unavailable.	• Potential loss or financial impact <2% of the sample population's value, or department's OM&A budget if the former is unavailable.
Operational Excellence	• Governance non-compliance or lack of/inadequate controls that may impact achievement of business or project objectives. • Errors in or insufficient internal reporting that drives senior management decision making. • Test results where =>25% of the sample had deficiencies in the execution of a key control.	• Governance non-compliance or lack of/inadequate controls with alternate controls in place to mitigate the impact to business or project objectives. • Errors in or insufficient internal reporting that could affect management decision. • Test results where >=10% and <25% of the sample had deficiencies in the execution of a key control.	• Governance compliance with procedural concerns or documentation issues which could impact OPG's ability to demonstrate appropriate due diligence. • Errors in or insufficient internal reporting that has minimal decision making impact. • Test results where <10% of the sample had deficiencies in the execution of a key control.

Opportunity for improvement: *Observation with no risk impact that is provided to management for consideration to improve efficiency of processes and documentation (e.g. automation, duplication of activities).*

OVERALL REPORT RATING SCALE

An overall audit rating is assigned based on the number of observations identified for the audit and their assigned risk rating:

	Number of Findings			
Finding Risk Rating	**1**	**2**	**3 - 4**	**=> 5**
High	Requires Improvement	Not Effective	Not Effective	Not Effective
Moderate	Generally Effective	Generally Effective	Requires Improvement	Not Effective
Low	Effective	Effective	Generally Effective	Requires Improvement

APPENDIX C – PROCESS OWNER & DISTRIBUTION LIST

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Mandy Yu	Senior Manager, Internal Audit

ONTARIO POWER GENERATION

Internal Audit

Long Lead Materials Procurement and Supplier Capacity Risk Mitigation

July 19, 2024

Report Rating: **Requires Improvement**

1. BACKGROUND & OVERVIEW

Long Lead Materials ("LLM") are items that require a longer lead time for production, acquisition, or delivery compared to other materials, and can impact detailed engineering and construction schedules. For station maintenance and projects, including replacement of equipment and components, it is necessary to identify long lead items early in the process and develop procurement strategies.

Capacity constraints with key vendors and their products may cause delays to schedules and production. With the global energy transition, demand for energy related materials and services has been increasing as new facilities are constructed worldwide. To mitigate this risk, Supply Chain management initiated a Supplier Capacity Risk Mitigation Program in June 2023 which is cross-functional in nature. Under this program, items and services categories critical to OPG's growth and ongoing operations are identified and include various LLM such as turbine generators and transformers, and other materials and services with known vendor capacity shortage including pressure vessels, heat exchangers, construction services, and environmental services.

As a part of the Supplier Capacity Risk Mitigation Program, Supply Chain ("SC") aims to reduce lead-time through procurement advancement, procurement pooling, utilizing Vendor of Record and global inventory strategies. Supply Chain is engaging stakeholders, including OPG Asset Management, in gathering enterprise-wide demand data, performing risk analysis on capacity constraints for upcoming projects and growth areas, and developing risk mitigation plans.

This was a risk-based audit identified in Internal Audit's ("IA") 2024 Audit Plan, selected given the importance of securing long lead items to ensuring operational and project excellence, as well as enabling the realization of opportunities associated with OPG's growth strategy.

2. OBJECTIVE & SCOPE

The objective of this audit was to assess the design and operating effectiveness of processes and controls in identifying LLM demand, assessing vendor capacity constraints to meet projected demand for items and services, and execution of procurement strategies for LLM.

The audit scope included activities from October 1, 2022 to March 31, 2024, and focused primarily on the processes for proactive identification and addressing future demand from potential investments and candidate projects.

The audit did not assess activities related to the procurement of long lead materials for the Darlington New Nuclear Project ("DNNP").

This engagement was conducted in conformance with the International Standards for the Professional Practice of Internal Auditing.

3. CONCLUSION

Report Rating: **Requires Improvement**

Overall, the design and operating effectiveness of processes and controls to identify LLM demand, assess capacity constraints to meet projected demand, and execute procurement strategies requires improvement. Key observations identified during the engagement are summarized below:

No.	Finding	Risk Type	Risk Rating[1]		
			High	Moderate	Low
1	End-to-end processes, responsibilities and use of systems to enable the development of procurement strategies for demand identification from potential investments are not clearly defined or accepted by business units.	Operational	X		
2	Dispositions for supplier capacity risk mitigation actions are not consistently documented, and steady-state process is not yet determined to ensure periodic refresh of demand data and reassessment of risk mitigation plans.	Operational		X	
Total		**2**	**1**	**1**	**-**

4. SUMMARY OF POSITIVE OBSERVATIONS

The following positive observations were noted during this engagement:

- Supply Chain has developed an Enterprise Procurement Plan ("EPP") that aims to provide a consolidated view of all procurement requirements for materials and services to support OPG operations, projects, and corporate functions; and
- A Category Strategy Framework was introduced with the intent to provide intelligence and strategic insights by understanding stakeholder requirements, managing supplier relations and optimizing overall spend, thus enabling Supply Chain to develop robust category strategies and to seek sourcing opportunities.

[1] Please refer to Appendix A for risk rating definitions

5. SUMMARY OF FINDINGS

1. End-to-end processes, responsibilities and use of systems to enable the development of procurement strategies for demand identification from potential investments are not clearly defined or accepted by business units.		**High**
Observation	**Potential Impact**	**Management Action Plans**
A review of the Supplier Capacity Risk Mitigation Program ("the Program") and associated investment planning and procurement activities identified the following: ***Governance and process*** • An end-to-end process covering the procurement demand and strategy formation is not defined or documented, including the interfaces between business groups and defined roles and responsibilities in mitigating supplier capacity risks. While Asset Management and Supply Chain governance documents exist, they focus on specific departmental controls and do not assign roles and responsibilities to organizations upstream and downstream to their respective organizations' processes that support demand identification and supplier capacity risk mitigation. For example, SC's role is not specified in the *Strategic Asset Management Program* (OPG-PROG-0045). Critical processes to identify early demand signals and address them were not cited in the *Strategic Sourcing, Category Management and Strategic Contract Management* procedure (OPG-PROC-0211). • SC has not been a stakeholder participating in the investment planning process, including attendance at Asset Management Oversight Committees ("AMOC") meetings to provide procurement input and advice regarding future procurement. ***Systems and tools*** • There are currently no tools in place to capture early demand signals from future investments and equipment condition to provide reliable data to facilitate Supplier Capacity Risk Mitigation activities. For example, the configuration of [redacted] (investment planning system) does not enable long-term demand data to be analyzed in a useful manner for decision-making. Additionally, [redacted] is not integrated with other systems to receive equipment condition data that could be used for early demand identification for potential equipment needs in future maintenance or outage campaigns; and • Dashboards have not been configured for SC to access future demand information that were captured in [redacted]. Due to the factors cited above, future demand information is currently compiled by SC from multiple sources, including historical spend, information Asset Management extracted from [redacted] which has been subject to manual data investigation and analysis, and workshops that included stakeholders from across OPG.	Lack of defined roles and responsibilities between stakeholders in demand identification and supplier risk mitigation may lead to process breakdowns and performance issues. Delays in completing the integration of SC with Asset Management activities, including lack of SC's participation in AMOCs, could impact the company's ability to provide procurement advice at the front-end of the investment decision making process and collect insight on future procurement demands to mitigate vendor capacity risks. Unavailability of reliable demand data directly hinders the ability to periodically refresh demand information to assess continued adequacy of risk mitigation activities. The demand data supporting the Supplier Capacity Risk Mitigation initiative may be incomplete or inaccurate, given the manual and ad-hoc nature of the data collection effort.	Management will establish and document the desired end-to-end process and secure enterprise-wide alignment of the responsibilities for early demand identification and supplier capacity risk mitigation. Governance documentation will be updated where applicable. **Action Owners:** Jenn Polley, Director Supply Chain Programs & Strategy Brian Mori, Director Plant Reliability Peter Hassan, Director Station Engineering Hassan Qadri, Director Station Engineering **Target Completion Date:** January 15, 2025 Supply Chain Management will: • Attend the AMOC meetings to provide procurement input; and • Determine the extent and granularity of data needed for the chosen solution to provide advanced demand signals. **Action Owner:** Jenn Polley, Director Supply Chain Programs & Strategy **Target Completion Date:** January 15, 2025 Asset Management will: • Ensure future procurement information are captured in a consistent, complete, and detailed manner; • Implement solutions to ensure demand signals are available to facilitate Supplier Capacity Risk Mitigation; and • Invite Supply Chain to the AMOC meetings and obtain input. **Action Owner:** Brian Mori, Director Plant Reliability **Target Completion Date:** July 15, 2025

2. Dispositions for supplier capacity risk mitigation actions are not consistently documented, and steady-state process is not yet determined to ensure periodic refresh of demand data and reassessment of risk mitigation plans.		**Moderate**
Observation	**Potential Impact**	**Management Action Plans**
The *Strategic Sourcing, Category Management and Strategic Contract Management Procedure* (OPG-PROC-0211) 1.4.4.3 (c) states that mitigation actions should be evaluated annually during the category strategy review as part of category management activities. The Supplier Risk Mitigation initiative addressed 15 categories of materials and services at risk of vendor capacity shortages. SC identified mitigating actions for each category and held weekly update meetings with Asset Management and Engineering representatives to review upcoming demand and implement mitigation actions to ensure supply availability. A review of the initiative's plans and status documentation noted the following: • The planned risk mitigation to pool transformer procurement with other companies, including Hydro One and Bruce Power, was abandoned. Management decided to not pursue this plan, given the transformers required by Hydro One are different from those of OPG, and Bruce Power had their own procurement plans; • Management indicated the actions to address steam turbine demand are 100% complete, citing a Limited Note to Proceed ("LNTP") signed with vendors for all known demands. However, it was noted that the milestone tracker listed incomplete deliverables, such as developing a category strategy for steam turbines and monitoring progress. Updating and approving the category strategy should be completed per of OPG-PROC-0211 1.4.4.4; and • While Management indicated that the initiative identified demand for a 10 year period, providing SC with visibility on items to be procured over this timeframe, and that the initiative will transition to the annual Enterprise Procurement Plan (EPP) effort, the steady-state process for refreshing demand data and reassessing mitigation actions has not yet been identified or documented.	Inconsistent tracking and disposition of mitigation actions may result in untimely remediation of risks. Lack of defined processes may lead to the non-sustainability of supplier capacity risk mitigation actions over time, which may result in the inability to incorporate these tasks into the EPP for periodic demand data refreshes and assessments of vendor capacity and mitigation actions.	Management will: • Capture lessons learned regarding the expectation on dispositioning of supplier capacity mitigation actions; • Incorporate Capacity Risk Management process into governance and develop plans to transition the practices into the annual Enterprise Procurement Planning for steady-state support; and • Update OPG-PROC-0211 section 1.4.4.4 as necessary to clarify the expectations around the expectations around category strategy documentation. **Action Owners:** Abhie Vaidya, Director Category Management and Strategic Sourcing Jenn Polley, Director Supply Chain Programs & Strategy **Target Completion Date:** January 15, 2025

APPENDIX A – RATING DEFINITIONS FOR AUDIT REPORTS

Finding: *Noted deficiency with potential impacts to the achievement of business unit/process area objectives, assessed using the following criteria:*

	High Risk	Moderate Risk	Low Risk
Safety & Social License	• Potential regulatory non-compliance. • Deficiencies that could result in: ○ Fatality, permanent disability, or lost time injury; ○ Data loss or unavailability of critical systems; ○ Security is compromised in sensitive / multiple areas; ○ Fraud / theft; or ○ Negative media coverage resulting in reputational damage.	• Insufficient evidence to support regulatory compliance. • Deficiencies that could result in: ○ Minor injury with no lost time; ○ Temporary data loss or unavailability of non-critical systems; ○ Security is compromised; ○ Fraud / theft with some mitigating controls; or ○ Public escalating concerns to OPG Management or local media.	• Documentation improvements to support regulatory compliance. • Deficiencies that could result in incidents that do not require medical treatment. • Deficiencies that do not result in any media attention negatively impacting OPG's reputation.
Financial	• Potential loss or financial impact =>5% of the sample population's value, or the department's OM&A budget if the former is unavailable.	• Potential loss or financial impact >=2% and <5% of the sample population's value, or department's OM&A budget if the former is unavailable.	• Potential loss or financial impact <2% of the sample population's value, or department's OM&A budget if the former is unavailable.
Operational Excellence	• Governance non-compliance or lack of/inadequate controls that may impact achievement of business or project objectives. • Errors in or insufficient internal reporting that drives senior management decision making. • Test results where =>25% of the sample had deficiencies in the execution of a key control.	• Governance non-compliance or lack of/inadequate controls with alternate controls in place to mitigate the impact to business or project objectives. • Errors in or insufficient internal reporting that could affect management decision. • Test results where >=10% and <25% of the sample had deficiencies in the execution of a key control.	• Governance compliance with procedural concerns or documentation issues which could impact OPG's ability to demonstrate appropriate due diligence. • Errors in or insufficient internal reporting that has minimal decision making impact. • Test results where <10% of the sample had deficiencies in the execution of a key control.

Opportunity for improvement: *Observation with no risk impact that is provided to management for consideration to improve efficiency of processes and documentation (e.g. automation, duplication of activities).*

OVERALL REPORT RATING SCALE

An overall audit rating is assigned based on the number of observations identified for the audit and their assigned risk rating:

	Number of Findings			
Finding Risk Rating	**1**	**2**	**3 - 4**	**=> 5**
High	Requires Improvement	Not Effective	Not Effective	Not Effective
Moderate	Generally Effective	Generally Effective	Requires Improvement	Not Effective
Low	Effective	Effective	Generally Effective	Requires Improvement

APPENDIX B – PROCESS OWNER & DISTRIBUTION LIST

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	Aida Cipolla	Chief Financial Officer & Corporate Services Officer
	Steve Gregoris	Chief Nuclear Officer
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	Zeina Elhami	Chief Supply Officer
	Dave Burger	Vice President, Station Engineering
	Jessica Polak	Vice President, Supply Chain
	Andarz Roya	Vice President, Supply Chain
	Adam Chiarandini	Director, Enterprise Risk Management
	Peter Hassan	Director, Station Engineering
	Brian Mori	Director, Plant Reliability
	Julia Petrie	Director, Nuclear Oversight
	Jenn Polley	Director, Programs & Strategy
	Hassan Qadri	Director, Station Engineering
	Judy Tan	Director, Internal Audit
	Abhie Vaidya	Director, Category Management & Strategic Sourcing
	Trevor Carneiro	Senior Manager, Asset Investment Planning & Management
	Joseph Ng	Senior Manager, Internal Audit
	Adesola Busari	Manager, Internal Audit

ONTARIO POWER GENERATION

Internal Audit

Employees' Business and Travel Expenses

November 6, 2024

Report Rating: **Requires Improvement**

1. BACKGROUND & OVERVIEW

Based on the requirements of the Ontario Management Board of Cabinet's *Travel, Meal and Hospitality Expenses Directive* ("the Directive"), the Financial Services organization publishes OPG's Business Travel and Expense Standard ("the Standard"). The Standard outlines the principles, expectations, and requirements for OPG employees when incurring business related expenses for travel, meals, accommodations, and other types of expenditures. The Standard also outlines the roles and accountabilities for approvers of expense claims.

Usage of the corporate business expense card ("corporate card") is governed by the *Corporate Business Expense Card Instruction* (OPG-INS-08700-0001). In 2023, total business travel and expense reimbursement paid to employees was approximately $20 million.

Supervisors or Managers are responsible for reviewing their employees' expense reports to ensure compliance with the Standard and approving these expenses for reimbursement. In fulfilling this responsibility, OPG employees are expected to be knowledgeable about and adhere to the provisions of the Standard. The Financial Services group within the Shared Services organization is responsible for providing advice and direction on interpretation and application of the Standard. These responsibilities include reporting instances of non-compliance and/or exceptions to management and ensuring that approval limits based on the Organizational Authority Register ("OAR") are applied to each employee according to their position within the organization.

This was a risk-based audit identified in Internal Audit's ("IA") 2024 Audit Plan, performed to assess OPG's compliance with applicable legislation and governance, and the adequacy of related controls and processes surrounding employee business expenses.

2. OBJECTIVE & SCOPE

The objective of the audit was to assess compliance with the Standard and applicable legislation, and to assess the design and operating effectiveness of processes and controls related to monitoring and reporting of business and travel expenses.

The audit scope included expenses reimbursed from January 1, 2023 to March 31, 2024, and some precursor activities where relevant.

This engagement was conducted in conformance with the International Standards for the Professional Practice of Internal Auditing.

3. CONCLUSION

Report Rating: **Requires Improvement**

Overall, the design and operating effectiveness of processes and controls related to monitoring and reporting of business and travel expenses requires improvement. Based on a sample of expense claims, instances were identified where expenditures deviated from the Standard and related policies.

Key observations identified during the engagement are summarized below:

No.	Finding	Risk Type	Risk Rating[1]		
			High	Moderate	Low
1	Certain expenses were approved not in accordance with the Standard and related policies.	Operational		X	
2	Practices related to oversight and follow-up actions on reports identifying potential exceptions and non-compliance are inconsistent with the expectations outlined in the Standards.	Operational		X	
3	OPG's Standard does not provide detailed guidance over certain types of expenses, some of which have prescriptive requirements within the Directive.	Operational		X	
4	One instance was noted where an expense was not reported to the Office of the Integrity Commissioner ("ICO") and some instances were noted related to summation errors.	Operational			X
5	There is a lack of detailed vendor reporting for corporate card delinquency charges beyond 60 days.	Operational			X
Total		**5**	**-**	**3**	**2**

4. SUMMARY OF POSITIVE OBSERVATIONS

The following positive observations were noted during this engagement:

- Advancements have been made in automating processes and implementing preventative controls within SAP Concur ("Concur"), which has significantly reduced the number of errors and non-compliant requests from being approved. For example, the automation of meal allowances based on representation (i.e. management or represented employee) and preventing the possibility of expensing the same meal allowance multiple times within the same day;

- Management has automated the generation of employee expenses exception reports for post-approval review and follow-up. This was previously a manual and time-consuming process; and

- To further raise awareness of the expectations outlined in the Standard, Financial Services:
  - Has participated in the Leadership Onboarding & Orientation Program ("LOOP") for new management hires since March 2024, providing an overview of the Standard, information regarding Concur, and appropriate use of the corporate business expense card; and
  - Developed and rolled out the OPG Business Travel & Expense training course through MyPower software in July 2024.

[1] Please refer to Appendix A for risk rating definitions

5. SUMMARY OF FINDINGS

1. Certain expenses were approved not in accordance with the Standard and related policies.		Moderate
Observation	**Potential Impact**	**Management Action Plans**
For a sample of expenses tested and based on analysis of relevant data, the following were approved expenses that were exceptions to the Standard and related policies: *A. Expense types that have prescribed limits or restrictions. Pre-approval and documented rationale are required for exceptions:* 1. **Accommodation** ***Lack of justification and insufficient rationale documented:*** Accommodations were booked outside of the Concur tool without justification for the use of alternative booking platforms (e.g. Airbnb, Expedia), such as lower costs. IA noted the reimbursement of 305 claims for Airbnb and Expedia amounting to $45,415, representing ~0.5% of total accommodation transactions within the review period. 2. **Business Class Rail Travel** ***Lack of written pre-approval:*** Two separate expenses for $367.25 each did not have pre-approval for business class travel instead of economy. This represents two out of 494 or 0.4% of the samples taken. 3. **Purchase Card transactions** ***Incorrect use of Purchase Card ("P-Card") instead of Corporate Amex Credit Card:*** The *P-Card Procedure* (OPG-PROC-0064) outlines the intended use of P-Cards (i.e. for materials and services under $100K) and that business and travel related expenses should be charged to corporate cards. To enforce this, select Merchant Category Codes ("MCC") for non-permitted expenses are blocked from purchases. Exceptions may be made with justification and approval from Finance Controllership and Financial Services team, e.g. allowing overtime meal purchases at remote locations where corporate cards are not accepted. For a sample of 12 P-Card transactions that had incurred expenses for MCC categories that are normally blocked, IA noted the following exceptions: o A hotel booking of $141.25 was made without evidence of approval; and o Three separate Purchase Cards were 'unblocked' with approval to allow for food purchases and overtime meals. However, one card was charged $51 for gas/fuel expenses, another card purchased BBQ food items totalling $943.14, and the last card had a group meal totalling $3,058.26. While these purchases represent valid business expenses, due to their nature they should have been made on corporate cards.	Non-compliance with the eligibility requirements stated in the BT&E Standard and inappropriate use of Purchase Cards due to lack of enforcement of usage guidelines may result in the reimbursement of ineligible expenses, which could lead to non-compliance with the Standard/Directive, increased expenditures, and negative impact to OPG's social license.	Management will develop and communicate a plan to require mandatory completion of the OPG Business Travel & Expense training course for existing managers, administrative staff, and new hires, and for annual refresher training to be conducted to highlight changes to Concur and the Standard, as required. As part of the training, approvers will be reminded of their responsibility to thoroughly review expenses, exception reports, and take follow-up action. **Action Owner**: Bryan Shaddock, Director Accounting, Financial & Admin Services **Target Completion Date:** December 9, 2024 Management will revise the Standard to describe exception reports and related line management responsibilities in more detail, which will also be reviewed as a topic in the mandatory training. **Action Owner**: Rob Eddy, Senior Manager, Transaction Processing **Target Completion Date:** November 30, 2024 Management will develop quarterly reports that highlight significant exceptions, which will be provided to Enterprise Leadership Team ("ELT") members to action and follow up with support from Controllership. **Action Owner**: Rob Eddy, Senior Manager, Transaction Processing

B. Expense types that have prescribed limits or restrictions where exceptions are not allowed: 4. **Retirement Celebrations** ***Non-reimbursable expenses claimed:*** 17 claims were approved related to retirement celebrations totaling $724.31. Such expenses are not reimbursable per section 1.8.5 of the Standard, which refers to OPG-PROC-0207 *Employee Recognition*. 5. **Group Meals** ***Claims exceeded prescribed limits:*** Three group meal claims from a sample of 20 exceeded meal limits ranging from $0.99 to $7.62 in excess per person, for a total of $1,597.24. In analyzing the samples, IA used an average rate of $17.39 per person and assumed a 50%/50% attendance of the events by management and represented employees as the first sample was for group meals hosted by OPG and 700 meals were ordered for both OPG and external companies' representatives, the second was for an OPG event where 500 meals were ordered but a list of names was not included as part of the claim, and the third was for a group meal for five external consultants and one OPG employee. 6. **Meals Outside Canada** ***Claims exceeded prescribed limits:*** Six out of 12 sampled claims exceeded meal limits for the respective country, ranging from $12.77 to $39.68 CAD in excess per meal for a total of $141.56. For the six instances, IA noted the following: • Three instances where employees used the rate of a large metropolitan city (e.g. Tokyo) in the country rather than the rate for the city they visited (e.g. Osaka/Other); and • Three instances where employees used an incorrect rate for the meal claims (e.g. used dinner meal limit for a breakfast claim).		**Target Completion Date:** February 28, 2025 Management will ensure that all P-Cards will remain blocked, and related communication will be sent to impacted employees. A semi-annual review will be conducted for unblocked P-Cards to ensure there remains valid and documented justification. **Action Owner**: Rob Eddy, Senior Manager, Transaction Processing **Target Completion Date:** November 15, 2024 Management will assess the implementation of additional controls and reporting capability in SAP Concur to prevent and detect user errors over group meals and facilitate compliance and exception reporting. **Action Owner**: Rob Eddy, Senior Manager, Transaction Processing **Target Completion Date:** February 28, 2025 Management will contact the relevant employees regarding the exceptions and will seek reimbursement. **Action Owner**: Rob Eddy, Senior Manager, Transaction Processing **Target Completion Date:** December 31, 2024

2. Practices related to oversight and follow-up actions on reports identifying potential exceptions and non-compliance are inconsistent with the expectations outlined in the Standards.		**Moderate**
Observation	**Potential Impact**	**Management Action Plans**
According to the Roles and Accountabilities set out in the Standard, Controllership (Finance) is responsible for following up on identified instances of non-compliance, Financial Services (Shared Services) is responsible and accountable for providing advice and direction on interpretation and application of the Standard, and for reporting identified/detected instances of non-compliance or exceptions to management. Managers are responsible for taking appropriate action in cases of non-compliance. On a quarterly basis, Financial Services produces various exception reports. These reports identify a range of potential non-compliance items, such as duplicate meals and transactions, mobile expenses not processed through Supply Chain, personal expenses, miscellaneous expenses over $300, approved delinquency charges, and a listing of expenses from non-recommended vendors. These reports are uploaded to databases that are accessible by line management and Finance Controllership for review and action. Samples of the exception reports were reviewed, and it was noted that there is no evidence to support that exception reports were reviewed by senior leaders to ensure approvers were carrying out their responsibilities in accordance with the Standard. IA interviewed Controllership and noted inconsistencies in following up with line management. A control exists whereby Financial Services reviews and holds from payment all expense reports greater than and equal to $20K. IA tested a sample of related transactions and did not note any exceptions.	Inadequate follow-up on reported instances of potential non-compliant expenses may result in inappropriate reimbursements not being corrected, which could lead to non-compliance with the Standard/Directive, increased expenditures, and negative impact to OPG's social license.	Management will revise the Standard to clearly outline that line managers, instead of Controllership, have direct accountability and responsibility to review the exception reports and follow up on exceptions. **Action Owner**: Rob Eddy, Senior Manager, Transaction Processing **Target Completion Date:** November 30, 2024 For a period of 12 months, Management will conduct a random sample of 10 exception reports on a quarterly basis. Key findings will be reported to the ELT for awareness. **Action Owner**: Rob Eddy, Senior Manager, Transaction Processing **Target Completion Date:** February 15, 2025

3. OPG's Standard does not provide detailed guidance over certain types of expenses, some of which have prescriptive requirements within the Directive.		**Moderate**
Observation	**Potential Impact**	**Management Action Plans**
The following sections in the Directive were either not explicitly referenced in the Standard, or required more explicit guidance to achieve consistent application across the organization: <u>Reimbursable meals</u> ***Lack of information on minimum distance allowed:*** According to the Directive, a meal expense can be claimed if work is conducted during a meal period (i.e. lunch or dinner) and/or work is conducted at a location at least 24 kilometres away from an individual's base location. However, OPG's Standard states that a meal claim can be made "when the claimant is away from his or her regular work location on OPG business" and it does not specify a minimum distance. <u>Mileage claims</u> ***Lack of clarity on incremental mileage claims:*** The Standard states that "Mileage may be claimed when personal vehicles are used for 'incremental' travel and in accordance with collective agreements." The term 'incremental' lacks clarity and detail in providing consistent guidance on how business mileage should be calculated. According to management, the incremental mileage calculation should be: A) Distance from employee's home/starting point to destination *minus* B) Distance from employee's home/starting point to base location. Negative values would indicate that the travel is not subject to reimbursement. Total mileage claims for fiscal 2023 amounted to $2.8 million, or 14% of total employee business expenses incurred during the same year. The data logged in Concur (i.e. starting and ending location) to calculate mileage is insufficient for IA to evaluate whether expenses complied with the calculation above without obtaining more information from requestors and approvers. Management had previously identified the lack of clarity on incremental mileage claims as an area requiring attention, and at the time of audit report issuance, has completed the management action plan to configure the Concur automated mileage calculation capability.	• The lack of clarity on the minimum distance eligible to claim meals may result in employees claiming meal expenses that do not meet the minimum distance expectations, leading to non-compliance with the Directive; and • Lack of clarity and guidance, over situations when mileage travelled is reimbursable, may lead to inconsistent reimbursement practices across business units and increased expenditures.	Management will update the Standard to align with the Directive, as follows: a) Include additional guidance on meal allowances by specifying the required 24km travel distance to claim meal expenses for management; b) Revise the mileage policy to provide a clear and detailed explanation of incremental travel; and **Action Owner**: Rob Eddy, Senior Manager, Transaction Processing **Target Completion Date:** November 30, 2025 Management will work with stakeholders to configure the Concur tool so that the automated calculation of mileage based on the inputted data incorporates the incremental travel formula. Once completed, the change will be communicated to all employees. **Action Owner**: Rob Eddy, Senior Manager, Transaction Processing **Target Completion Date:** Completed – October 22, 2024

4. One instance was noted where an expense was not reported to the Office of the Integrity Commissioner ("ICO") and some instances were noted related to summation errors.		**Low**
Observation	**Potential Impact**	**Management Action Plans**
The ICO requires the reporting of expenses of the Chief Executive Officer ("CEO") and their direct reports on a quarterly basis, and reporting of the 'Top 5 employees' with the highest total expenses semi-annually. During the review of ICO submissions, it was noted that expenses related to a training course amounting to $1,908 for one CEO direct report (now a former employee) was not included in the Q3 2023 report to the ICO. Additionally, for the first semi-annual report submission of Top 5 employees for 2023, it was identified that the summarized totals for four individuals were incorrect. Supporting receipts and details are also provided as part of the submission, and these were complete; however, they were incorrectly tallied when calculating the total spend for the four noted individuals.	Inaccurate and incomplete reporting to the ICO regarding employee business expenses could lead to non-compliance with ICO requirements and negative impact to OPG's social license.	Management will notify the ICO of the error and will revise and resubmit the summarized total amount for the Top 5 employees for 2023, including all supporting receipts and details to facilitate their review. **Action Owner**: Rob Eddy, Senior Manager, Transaction Processing **Target Completion Date:** Completed – October 29, 2024. Management will update the reporting logic to pull from the source system (Concur) thereby ensuring summarized totals match expense claims. The first report will be generated in early 2025, and in the interim a cross-checking review process will be implemented. **Action Owner**: Rob Eddy, Senior Manager, Transaction Processing **Target Completion Date:** January 31, 2025

5. There is a lack of detailed vendor reporting for corporate card delinquency charges beyond 60 days.		**Low**
Observation	**Potential Impact**	**Management Action Plans**
Management receives reports listing aged delinquency charges from the corporate card vendor at the 45 and 60 day mark for action and follow-up. IA reviewed corporate cards with aged balances and noted that the corporate card vendor's '*60 Day Cardmember Delinquency*' report includes cancelled accounts dating back to 2001. Financial Services explained that the master data file cumulatively retains all corporate card accounts with delinquency balances, and accounts are not removed even if paid. The data file contains the original delinquency balance, which is not brought to zero even if paid in full. As a result, the information from the vendor that has historically and currently been provided to OPG may not provide adequate tracking or certainty on what has been paid, and what are net outstanding items. Typically, if the outstanding balance on corporate card is not settled by the due date (within 60 days), a delinquency charge is applied. Any corporate card account with an unpaid balance for more than 180 days is considered cancelled, and the vendor deducts the amount from rebates owed/to be paid to OPG for these charges. According to management, for 2023 the total rebate was ~$92k.	Incomplete or unclear payment records for cancelled cards may create challenges for OPG in validating and tracking outstanding balances if disagreements arise with the corporate card vendor.	Management will run the aging delinquency report (greater than 61 days) on a monthly basis and will follow up with employees directly to ensure all outstanding balances are paid by the employee and OPG does not incur any costs. **Action Owner:** Rob Eddy, Senior Manager, Transaction Processing **Target Completion Date:** Completed – October 22, 2024

APPENDIX A – RATING DEFINITIONS FOR AUDIT REPORTS

Finding: *Noted deficiency with potential impacts to the achievement of business unit/process area objectives, assessed using the following criteria:*

	High Risk	Moderate Risk	Low Risk
Safety & Social License	• Potential regulatory non-compliance. • Deficiencies that could result in: o Fatality, permanent disability, or lost time injury; o Data loss or unavailability of critical systems; o Security is compromised in sensitive / multiple areas; o Fraud / theft; or o Negative media coverage resulting in reputational damage.	• Insufficient evidence to support regulatory compliance. • Deficiencies that could result in: o Minor injury with no lost time; o Temporary data loss or unavailability of non-critical systems; o Security is compromised; o Fraud / theft with some mitigating controls; or o Public escalating concerns to OPG Management or local media.	• Documentation improvements to support regulatory compliance. • Deficiencies that could result in incidents that do not require medical treatment. • Deficiencies that do not result in any media attention negatively impacting OPG's reputation.
Financial	• Potential loss or financial impact =>5% of the sample population's value, or the department's OM&A budget if the former is unavailable.	• Potential loss or financial impact >=2% and <5% of the sample population's value, or department's OM&A budget if the former is unavailable.	• Potential loss or financial impact <2% of the sample population's value, or department's OM&A budget if the former is unavailable.
Operational Excellence	• Governance non-compliance or lack of/inadequate controls that may impact achievement of business or project objectives. • Errors in or insufficient internal reporting that drives senior management decision making. • Test results where =>25% of the sample had deficiencies in the execution of a key control.	• Governance non-compliance or lack of/inadequate controls with alternate controls in place to mitigate the impact to business or project objectives. • Errors in or insufficient internal reporting that could affect management decision. • Test results where >=10% and <25% of the sample had deficiencies in the execution of a key control.	• Governance compliance with procedural concerns or documentation issues which could impact OPG's ability to demonstrate appropriate due diligence. • Errors in or insufficient internal reporting that has minimal decision making impact. • Test results where <10% of the sample had deficiencies in the execution of a key control.

Opportunity for improvement: *Observation with no risk impact that is provided to management for consideration to improve efficiency of processes and documentation (e.g. automation, duplication of activities).*

OVERALL REPORT RATING SCALE

An overall audit rating is assigned based on the number of observations identified for the audit and their assigned risk rating:

	Number of Findings			
Finding Risk Rating	**1**	**2**	**3 - 4**	**=> 5**
High	Requires Improvement	Not Effective	Not Effective	Not Effective
Moderate	Generally Effective	Generally Effective	Requires Improvement	Not Effective
Low	Effective	Effective	Generally Effective	Requires Improvement

APPENDIX B – PROCESS OWNER & DISTRIBUTION LIST

Distribution:

Aida Cipolla
Chief Financial Officer and Corporate Services Officer

Sarah Hough
Vice President, Shared Services

cc:	Ken Hartwick	President & Chief Executive Officer
	Ranjika Manamperi	Chief Information Officer
	Alec Cheng	Senior Vice President, Chief Controller & Accounting Officer
	Bryan Shaddock	Director, Accounting
	Joseph Ng	Director, Internal Audit
	Rob Eddy	Senior Manager, Transaction Processing
	Anthony Ling	Senior Manager, Internal Audit
	Anju Philip	Audit Associate
	Samantha Priffer	Management & Professional Trainee

ONTARIO POWER GENERATION

Internal Audit

Severe Weather Preparedness

July 19, 2024

Report Rating: **Requires Improvement**

1. BACKGROUND & OVERVIEW

The Renewable Generation ("RG") Operations organization is responsible for operating and maintaining a diverse fleet of over 60 hydroelectric, thermal and solar generating facilities. RG facilities are located throughout the province of Ontario, including Kenora, Thunder Bay, Kapuskasing, Timmins, North Bay, Renfrew, Muskoka, Peterborough, Belleville and Niagara.

The risks presented by severe weather events may have a significant impact on the RG fleet, particularly as many facilities are located in remote areas that may face challenges in receiving timely assistance from first responders. In recent years, flooding events have occurred along the Sturgeon, Wanapitei, Mattagami, Ottawa, Muskoka and Mississippi Rivers, and a tornado damaged the Calabogie Generating Station.

The Dam & Public Safety team, responsible for overseeing dam safety, public safety and dam safety emergency management, has established policies, procedures and plans for hazard management, including severe weather events. An emergency management and communication structure is in place with response teams, internal communication channels, and external communication protocols defined. In addition to facility-level Emergency Preparedness and Response Plans ("EPRPs"), Dam Safety EPRPs have been established in which frequent exercises such as full-scale exercises, pre-freshet readiness workshops, tabletop exercises and call tests assist in hazard preparation. Following these exercises or real events, after action reports ("AARs") are prepared to document the incident and highlight key lessons learned. Corrective action plans are required and developed for specific types of lessons learned.

This was a risk-based engagement defined in Internal Audit's ("IA's") 2024 Audit Plan and was selected given the potential significant impact of severe weather events on OPG's RG facilities.

2. OBJECTIVE & SCOPE

The objective of this audit was to assess the design and operating effectiveness of processes and controls addressing severe weather preparedness across RG.

The scope included activities from January 1, 2022 to March 31, 2024, and relevant precursor activities from prior periods where appropriate.

This engagement was conducted in conformance with the International Standards for the Professional Practice of Internal Auditing.

3. CONCLUSION

Report Rating: **Requires Improvement**

Overall, the design and operating effectiveness of controls and processes addressing severe weather preparedness across RG require improvement. Key observations identified during the engagement are summarized below:

No.	Finding	Risk Type	Risk Rating[1]		
			High	Moderate	Low
1	Both Dam Safety and Facility-Level Emergency Preparedness & Response Plans ("EPRPs") do not contain plans or procedures for handling certain adverse weather conditions, including wildfires.	Operational	X		
2	Assessments of post-exercise and real event observations in After Action Reports ("AARs") focused solely on items mandated by prescribed governance without considering their impact, while Corrective Action Plans ("CAPs") were not added to the RG tracking module in a timely manner.	Operational		X	
3	Some governance provisions related to the conduct of tabletop exercises were not followed.	Operational			X
4	Communications with external stakeholders were inconsistently or inadequately performed.	Operational			X
Total		**4**	**1**	**1**	**2**

4. SUMMARY OF POSITIVE OBSERVATIONS

The following positive observations were noted during this engagement:

- The "all-hazards" tabletop exercises in Spring 2024, facilitated by the Dam & Public Safety team and involving all regions across RG, observed that participants were engaged, proactively identified both site-specific and fleet-wide challenges, and embraced continuous improvement by noting areas for further sustainment.

- The template for AARs was improved to better summarize observations, opportunities for improvement, findings and corrective action plans.

[1] Please refer to Appendix A for risk rating definitions

5. SUMMARY OF FINDINGS

1. Both Dam Safety and Facility-Level EPRPs do not contain plans or procedures for handling certain adverse weather conditions, including wildfires.		**High**
Observation	**Potential Impact**	**Management Action Plans**
Section 4.16 of Standard 8, *Standard for Dam Safety Emergency Preparedness and Response Plans ("EPRPs")*, states that "the Dam Safety EPRP should identify plans, procedures and equipment available to deal with situations under adverse weather conditions, such as extreme cold, snow, and rainstorm conditions." The 2024 "all-hazards" tabletop exercises attended by IA emphasized the importance of these plans, as facilitators asked participants about their existence (e.g., high winds/freezing rain in Niagara and Southwest Operations; wildfires in Northeast, Northwest and Southeast Operations). Despite engagement from participants, it was noted that none from each of the five RG operational groups were able to demonstrate knowledge of established procedures/policies for the weather conditions in question. In reviewing a sample of 16 facility-level EPRPs, it was noted that none contained adverse weather-related plans or procedures. Further, in a sample of eight out of 25 Dam Safety EPRPs across the RG operational groups, it was noted that while each of these contained plans and procedures for flood conditions, only five contained plans and procedures for snow conditions, and none had plans or procedures for other extreme weather events (e.g., extreme cold, wildfires, high winds and tornados/hurricanes). While the Dam & Public Safety organization has an all-hazards approach to emergency preparedness, the unpredictability of severe weather events necessitate more targeted plans for specific events which certain river systems or facilities may be susceptible to (e.g., wildfires in northern Ontario and high wind events in southern Ontario). This had been identified as an opportunity for improvement ("OFI") by Management in both the 2022 and 2024 wildfire tabletop exercises, as well as a lesson learned from the response to forest fires near the Kipling Generating Station ("GS") in September 2023, but CAPs to ensure that such plans would be developed where considered appropriate had not been recorded.	Recovery efforts to mitigate business disruptions, asset damage, and/or employee injury may be impacted if facilities do not have plans or procedures for specific severe weather incidents.	Management will review which regions require specific plans and procedures for certain severe weather events, based on readiness discussions, experience from recent events, and routine exercises in consideration of regional risk profiles. Prior to the Target Completion Date, each RG operation group will identify back to the Director, Dam & Public Safety what specific plans and procedures (if any) are required to be prepared along with proposed timelines. By the Target Completion Date, timelines for completion of the plans and procedures will be mutually agreed to by the operation group management and the Director, Dam & Public Safety. **Action Owner:** Jarrod Malenchak, Director, Dam & Public Safety **Target Completion Date:** January 1, 2025

2. Assessments of post-exercise and real event observations in After Action Reports focused solely on items mandated by prescribed governance without considering their impact, while Corrective Action Plans were not added to the RG tracking module in a timely manner. — **Moderate**

Observation	Potential Impact	Management Action Plans
In reviewing the governance and practices associated with AARs and CAP tracking, the following was noted: *Impacts are not considered when categorizing post-exercise and real event observations* Section 11.2.5.3 of Standard 11, *Emergency Management and Communication Structure,* identifies three categories of post-exercise/real event observations in AARs, as follows: **Category / Governance / Impact / Corrective Action** Opportunity for Improvement ("OFI") — Not described or requirement is unclear in terms of governance. — Minor impact not significantly affecting response or recovery. Maybe addressed through a clarification of OPG governance leading to improvements in plans. — OFI to be included in the corrective action plan at management's discretion Finding — Described in governance. — Non-compliance which may affect OPG response or recovery efforts and requires corrective actions beyond improvements in OPG governance documents. — Corrective action plan required. Significant Finding — Described in governance. — Non-compliance leading to regulatory violation or contravening an agreement with external stakeholder. — Corrective action plan required. Inquiries of Management indicated that the primary criteria for assessing an observation as a Finding/Significant Finding versus an OFI is whether it is mandated by prescribed governance, rather than an assessment of the potential impact of the observation. By not considering the potential impact associated with observations, this process contributed to wildfire preparedness plans, including associated actions such as training of employees and equipment requirements for fire protection, not being established for regions in RG that are at greater risk for wildfires, as highlighted in finding 1. *CAPs were not added to AS9 for tracking in a timely manner* The RG *Corrective Action Management* governance (RG-PROC-AS-0002) requires CAPs to be added to AS9 for action tracking. During the audit, it was noted that CAPs for certain AARs had not been documented in AS9 in a timely manner, with some being documented seven months after the completion of the associated AARs. While Management commenced discussions in May 2024 to add a provision to RG-PROC-AS-0002 to require CAPs from AARs to be documented in AS9 within 90 days of the AAR report, this revision has not been finalized as of the date of this audit report.	By only assessing observations by reference to whether the requirement is described in governance (i.e. a non-conformance), observations which could have a significant impact on OPG's facilities, environment and people may not be addressed in a timely manner. Not documenting CAPs in the work management system in a timely manner may lead to delays in implementing corrective actions.	Management will: • Update Section 11.2.5.3 of Standard 11 to ensure that the impact from observations in the AARs are given more prominence when defining observation categories; • Update governance to ensure that AARs clearly indicate which actions (i.e., CAPs) will be undertaken as an outcome of the report and all observations have been clearly dispositioned; and • Review existing Emergency Management OFIs to determine if any should be elevated to "Finding" or "Significant Finding" based on their impact, and document CAPs as appropriate. **Action Owner:** Jarrod Malenchak, Director, Dam & Public Safety **Target Completion Date:** October 15, 2024 If the proposed update to RG-PROC-AS-0002 requiring CAPs to be created within 90 days of the After Action Report does not come into fruition, Dam & Public Safety Management will include in their governance clarifying that the CAPs are to be created within 90 days with an action plan identifying deliverables and target completion dates. **Action Owner:** Jarrod Malenchak, Director, Dam & Public Safety **Target Completion Date:** October 15, 2024

3. Some governance provisions related to the conduct of tabletop exercises were not followed.		**Low**
Observation	**Potential Impact**	**Management Action Plans**
A review of the relevant policies, procedures and plans for severe weather preparedness noted the following: *All-hazards tabletop exercises not documented in governance* Section 5.8 of Standard 8 details the frequency, participant, objective and process requirements for call tests, "classic" tabletop exercises, pre-freshet readiness workshops and full-scale exercises. It was noted that a variation of pre-freshet readiness workshops which considered an all-hazards approach commenced in 2022; however, these "all-hazards" tabletops are not yet documented in governance. *External copyholders not invited to "classic" tabletops* Section 5.8.2 of Standard 8 outlines the requirements for external copyholders – specific individuals identified by OPG as having a direct role to play in acting in a dam safety emergency, who have a controlled copy of OPG's external EPRP in order to assist them in preparing their response – as they relate to "classic" tabletop exercises: • Subsection (2) states that internal and external copy holders should be invited to participate; and • Subsection (3) states that normal objectives should be to familiarize internal and external copyholders with OPG's Dam Safety EPRP and to verify the EPRP's external roles and responsibilities are consistent with external copyholders. In two of the three "classic" tabletop samples reviewed, it was noted that external copy holders were not invited; however, tabletops were conducted at coordination/stakeholder meetings, which external copyholders attended. *Lack of consistency in facilitation of all-hazards tabletop exercises* The "all-hazards" tabletop exercises attended by IA featured general questions by facilitators to participants and included scenario discussions. Although there were engaging conversations on various severe weather-related topics, facilitators did not consistently clarify requirements per OPG standards or best practice following these questions or discussions.	The absence of specific governance for "all-hazards" tabletop exercises may result in unclear objectives and an inability to demonstrate due diligence. Situations where practice differs from governance may lead to ambiguities, especially during phases of personnel transitions. Lack of clarification of requirements during all-hazard tabletop exercises may result in unintended differences between exercises.	Management will update governance as follows: • Create an "all-hazards" tabletop subsection which details frequency, participant, objective and process requirements; • Revise the language regarding the invitation of external copy holders to "classic" tabletops in Section 5.8.2 of Standard 8; • Clarify the inclusion of tabletop exercises at coordination/stakeholder meetings in Section 5.7; and • Document clear instructions for facilitators on what should be done after questions or discussions occur during exercises to provide a reasonably consistent result. **Action Owner:** Jarrod Malenchak, Director, Dam & Public Safety **Target Completion Date:** December 31, 2024

<table>
<tr><th colspan="2">4. Communications with external stakeholders were inconsistently or inadequately performed.</th><th>Low</th></tr>
<tr><th>Observation</th><th>Potential Impact</th><th>Management Action Plans</th></tr>
<tr>
<td>A review of the relevant policies, procedures and plans for severe weather preparedness noted the following:

Incomplete discussion of required items at coordination/stakeholder meetings
Section 5.7 of Standard 8 states that RG Operations groups are to arrange coordination/stakeholder meetings with external copy holders every two years, where six specific requirements are to be discussed.

In reviewing meeting minutes from the latest coordination/stakeholder meetings in each of the five RG operational groups, IA noted that not all requirements were discussed, as follows:

<table>
<tr><th>#</th><th>Requirement</th><th>Investigation Results (Past 2 Years)</th></tr>
<tr><td>1</td><td>OPG’s Dam Safety EPRP external notification plan.</td><td>Performed in 4 of the 5 RG operational group meetings.</td></tr>
<tr><td>2</td><td>The Communications Flow Chart for external stakeholders.</td><td>Performed in 3 of the 5 RG operational group meetings.</td></tr>
<tr><td>3</td><td>The Dam Safety EPRPs roles/responsibilities for external stakeholders.</td><td>Performed in 3 of the 5 RG operational group meetings.</td></tr>
<tr><td>4</td><td>The process for external stakeholders to notify OPG of a dam safety event when they are the first one to become aware of it.</td><td>Performed in 5 of the 5 RG operational group meetings.</td></tr>
<tr><td>5</td><td>The results of OPG Dam Safety EPRP exercises carried out in the interval between meetings.</td><td>Performed in 4 of the 5 RG operational group meetings.</td></tr>
<tr><td>6</td><td>Updates/revisions to OPG’s Dam Safety EPRP.</td><td>Performed in 4 of the 5 RG operational group meetings.</td></tr>
</table>

One specific RG operational group did not perform 5 out of the 6 required discussion items for coordination/stakeholder meetings.

Evidence to support communication to external agencies for the resumption of normal operations not available
Section 3.3.4 of Standard 11 states that when deactivating Emergency Operations Centres (“EOCs”), one priority is to notify external agencies that the EOC is being deactivated. In reviewing communications performed during the 2022 English River Dam Safety Event, it was noted that the Dam Safety team could not provide evidence to support that external agencies were notified when the Code Yellow changed to Code Green for normal operations.</td>
<td>Incomplete discussion of required topics at coordination/stakeholder meetings may lead to external copy holders lacking a comprehensive understanding of the expectations surrounding OPG’s Dam Safety EPRPs.

External agencies not being informed about the deactivation of EOCs may lead to misalignment, potentially diminishing the relationship with the stakeholders.</td>
<td>Management will create an outline document to be used when planning coordination/stakeholder meetings, which references the six discussion requirements required by Standard 8.

Action Owner: Jarrod Malenchak, Director, Dam & Public Safety
Target Completion Date: December 31, 2024

Management will review and update CAL 76288 to stress the necessity of retaining communications to external agencies when internal response centres are set up during EPRP activations, as mandated by Standard 11.

Action Owner: Jarrod Malenchak, Director, Dam & Public Safety
Target Completion Date: June 30, 2025</td>
</tr>
</table>

APPENDIX A – RATING DEFINITIONS FOR AUDIT REPORTS

Finding: *Noted deficiency with potential impacts to the achievement of business unit/process area objectives, assessed using the following criteria:*

	High Risk	Moderate Risk	Low Risk
Safety & Social License	• Potential regulatory non-compliance. • Deficiencies that could result in: o Fatality, permanent disability, or lost time injury; o Data loss or unavailability of critical systems; o Security is compromised in sensitive / multiple areas; o Fraud / theft; or o Negative media coverage resulting in reputational damage.	• Insufficient evidence to support regulatory compliance. • Deficiencies that could result in: o Minor injury with no lost time; o Temporary data loss or unavailability of non-critical systems; o Security is compromised; o Fraud / theft with some mitigating controls; or o Public escalating concerns to OPG Management or local media.	• Documentation improvements to support regulatory compliance. • Deficiencies that could result in incidents that do not require medical treatment. • Deficiencies that do not result in any media attention negatively impacting OPG's reputation.
Financial	• Potential loss or financial impact =>5% of the sample population's value, or the department's OM&A budget if the former is unavailable.	• Potential loss or financial impact >=2% and <5% of the sample population's value, or department's OM&A budget if the former is unavailable.	• Potential loss or financial impact <2% of the sample population's value, or department's OM&A budget if the former is unavailable.
Operational Excellence	• Governance non-compliance or lack of/inadequate controls that may impact achievement of business or project objectives. • Errors in or insufficient internal reporting that drives senior management decision making. • Test results where =>25% of the sample had deficiencies in the execution of a key control.	• Governance non-compliance or lack of/inadequate controls with alternate controls in place to mitigate the impact to business or project objectives. • Errors in or insufficient internal reporting that could affect management decision. • Test results where >=10% and <25% of the sample had deficiencies in the execution of a key control.	• Governance compliance with procedural concerns or documentation issues which could impact OPG's ability to demonstrate appropriate due diligence. • Errors in or insufficient internal reporting that has minimal decision making impact. • Test results where <10% of the sample had deficiencies in the execution of a key control.

Opportunity for improvement: *Observation with no risk impact that is provided to management for consideration to improve efficiency of processes and documentation (e.g. automation, duplication of activities).*

OVERALL REPORT RATING SCALE

An overall audit rating is assigned based on the number of observations identified for the audit and their assigned risk rating:

	Number of Findings			
Finding Risk Rating	**1**	**2**	**3 - 4**	**=> 5**
High	Requires Improvement	Not Effective	Not Effective	Not Effective
Moderate	Generally Effective	Generally Effective	Requires Improvement	Not Effective
Low	Effective	Effective	Generally Effective	Requires Improvement

APPENDIX B – PROCESS OWNER & DISTRIBUTION LIST

Distribution:

Nicolle Butcher
Chief Operations Officer

Nicholas Pender
Senior Vice President, Renewable Generation

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	Mandy Yu	Senior Manager, Internal Audit
	Neal Sengupta	Manager, Internal Audit

ONTARIO POWER GENERATION

Internal Audit

Security Incident and Crisis Management Audit

February 7, 2025

Report Rating: [redacted]

1. BACKGROUND & OVERVIEW

The *Safe Operations Policy* ("the Policy"), OPG-POL-0032, provides the overarching framework that serves as a basis for programs and procedures addressing security crises and incidents. The *Enterprise Security Program* (OPG-PROG-0035) derives its authority from the Policy, as it supports the protection of assets by ensuring security readiness, response capability, and implementation of the Enterprise Security Managed System Program Model. The Managed System Approach involves security planning, implementation, program evaluation, and management review initiatives to ensure the Enterprise Security Program is effectively maintained.

The *Crisis Management and Communications Centre ("CMCC") Procedure* (OPG-PROC-0028) derives its authority from OPG-PROG-0030 *Emergency Management Program*, and the purpose is to provide a framework for the highest level of response to significant incidents that require executive level leadership and decision-making. The *Violence Free Workplace Procedure* (OPG-PROC-0075) covers incidents of workplace violence, which also includes security threats from internal sources (e.g. OPG employees).

The Security Incident and Crisis Management audit was identified in Internal Audit's ("IA") 2024 Audit Plan, selected given the profile of previous industry and OPG security and safety-related incidents that have occurred.

2. OBJECTIVE & SCOPE

The objective of this audit was to assess whether processes and controls were designed and operating effectively to enable OPG management to manage and respond to security-related incidents or crises stemming from internal or external physical threats in a timely and effective manner.

The audit scope included activities from November 1, 2023 to October 31, 2024, and some precursor activities where relevant.

This engagement was conducted in conformance with the International Standards for the Professional Practice of Internal Auditing.

3. CONCLUSION

Report Rating: [redacted]

[redacted]

Key observations identified during the engagement are summarized below:

No.	Finding	Risk Type	Risk Rating[1]		
			High	Moderate	Low
1	[redacted]	[redacted]			
2	[redacted]				
3	[redacted]				
Total					

4. POSITIVE OBSERVATION

In addition to issuing automated reminders through the Training Information and Management System ("TIMS") tool to notify CMCC members of their mandatory requalification requirements, the Enterprise Emergency Management ("EEM") team ensures compliance by conducting follow-ups until the training is successfully completed. All CMCC members were found to have completed the required training as part of this audit.

[1] Please refer to Appendix A for risk rating definitions

5. SUMMARY OF FINDINGS

[redacted]

Observation	Potential Impact	Management Action Plans
A TRA refers to a documented analysis of assets, threats, and vulnerabilities for OPG facilities to determine the likelihood, consequences, and tolerances for security risks and to recommend cost-effective security measures and approaches to mitigating identified risks. [redacted] Out of a population of 107 non-nuclear facilities that included generating stations ("GS") and office buildings, IA sampled 4 facilities and noted the following observations: [redacted] [redacted]	[redacted]	[redacted]

Facility Name	Category Rating	Date of last completed TRA	TRA completed within review period? (Y/N)	Asset Analysis Performed? (Y/N)
[redacted]				

[redacted]

Observation	Potential Impact	Management Action Plans
Accountability and a process for tracking and managing actions arising from recommendations from incident reports and TRAs should be clearly outlined in governance and include assignment of owners and target completion dates. IA reviewed recommended actions from sampled incident reports and noted the following observations: • [redacted]	[redacted]	[redacted]

3. [redacted]		[redacted]
Observation	**Potential Impact**	**Management Action Plans**
OPG-STD-0064 *Facility Security and Access Control* states that OPG facilities shall implement, operate and maintain security measures that effectively accomplish set performance objectives. [redacted] IA assessed the four sampled non-nuclear facilities cited in Finding 1 for compliance with facility security requirements and noted that [redacted] OPG-STD-0064 also states that security measures should be consistent across OPG to the extent feasible. [redacted]	[redacted]	[redacted]

APPENDIX A – RATING DEFINITIONS FOR AUDIT REPORTS

Finding: *Noted deficiency with potential impacts to the achievement of business unit/process area objectives, assessed using the following criteria:*

	High Risk	Moderate Risk	Low Risk
Safety & Social License	• Potential regulatory non-compliance. • Deficiencies that could result in: ○ Fatality, permanent disability, or lost time injury; ○ Data loss or unavailability of critical systems; ○ Security is compromised in sensitive / multiple areas; ○ Fraud / theft; or ○ Negative media coverage resulting in reputational damage.	• Insufficient evidence to support regulatory compliance. • Deficiencies that could result in: ○ Minor injury with no lost time; ○ Temporary data loss or unavailability of non-critical systems; ○ Security is compromised; ○ Fraud / theft with some mitigating controls; or ○ Public escalating concerns to OPG Management or local media.	• Documentation improvements to support regulatory compliance. • Deficiencies that could result in incidents that do not require medical treatment. • Deficiencies that do not result in any media attention negatively impacting OPG's reputation.
Financial	• Potential loss or financial impact =>5% of the sample population's value, or the department's OM&A budget if the former is unavailable.	• Potential loss or financial impact >=2% and <5% of the sample population's value, or department's OM&A budget if the former is unavailable.	• Potential loss or financial impact <2% of the sample population's value, or department's OM&A budget if the former is unavailable.
Operational Excellence	• Governance non-compliance or lack of/inadequate controls that may impact achievement of business or project objectives. • Errors in or insufficient internal reporting that drives senior management decision making. • Test results where =>25% of the sample had deficiencies in the execution of a key control.	• Governance non-compliance or lack of/inadequate controls with alternate controls in place to mitigate the impact to business or project objectives. • Errors in or insufficient internal reporting that could affect management decision. • Test results where >=10% and <25% of the sample had deficiencies in the execution of a key control.	• Governance compliance with procedural concerns or documentation issues which could impact OPG's ability to demonstrate appropriate due diligence. • Errors in or insufficient internal reporting that has minimal decision-making impact. • Test results where <10% of the sample had deficiencies in the execution of a key control.

Opportunity for improvement: *Observation with no risk impact that is provided to management for consideration to improve efficiency of processes and documentation (e.g. automation, duplication of activities).*

OVERALL REPORT RATING SCALE

An overall audit rating is assigned based on the number of observations identified for the audit and their assigned risk rating:

	Number of Findings			
Finding Risk Rating	**1**	**2**	**3 - 4**	**=> 5**
High	Requires Improvement	Not Effective	Not Effective	Not Effective
Moderate	Generally Effective	Generally Effective	Requires Improvement	Not Effective
Low	Effective	Effective	Generally Effective	Requires Improvement

APPENDIX B – PROCESS OWNER & DISTRIBUTION LIST

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ONTARIO POWER GENERATION

Internal Audit

Pension and Benefits Administration

July 25, 2025

Report Rating: **Requires Improvement**

1. BACKGROUND & OVERVIEW

The administration of OPG's pension and benefits plans (the Plans") includes the management of the defined benefit pension plan and other benefit coverages (e.g. health, dental, life insurance etc.). The Pension and Benefits group within the Human Resources ("HR") department, along with HR Services, administers these Plans in accordance with the pension plan texts, employee benefit booklets and applicable legislation for Management and represented employees.

OPG engages external vendors (i.e. service organizations) for the administration of pension and benefit coverages to eligible employees, deferred vested members, pensioners, and beneficiaries in receipt of monthly pension (collectively known as "members"). These vendors include TELUS Health for the pension plan and Sun Life Financial ("SLF") for benefits.

System and Organization Controls Type 1 ("SOC 1") reports, issued under Canadian Standard on Assurance Engagements 3416 ("CSAE 3416"), cover controls at service organizations that are likely to be relevant to user entities' (e.g. OPG) Internal Controls over Financial Reporting ("ICOFR"). Complementary User Entity Controls ("CUECs") are controls that are expected to be implemented by a user entity to effectively rely on the service organization controls identified in the SOC 1 report. For OPG, the SOC 1 reports provided by TELUS Health and SLF are reviewed by the Pension and Benefits group to identify potential control exceptions/issues at the service organizations and assess impact to associated ICOFR controls and the services provided.

According to the 2023 Pension report to members, OPG's Pension Plan consisted of 7,930 active members. Its assets were valued at $15.9 billion and liabilities at $13.7 billion, leading to a surplus of $2.2 billion based on a going concern valuation basis.

This was a risk-based engagement identified in Internal Audit's ("IA") 2025 Audit Plan, selected due to the significance of controls supporting pension and benefits administration in mitigating the risks of processing inaccuracies, delays, and potential fraud.

2. OBJECTIVE & SCOPE

The objective of this audit is to assess the design and operating effectiveness of processes and controls for pension and benefits administration to ensure accuracy, completeness, and timely processing of pensions and benefits to eligible members.

The scope included activities from June 1, 2024 to May 31, 2025.

This engagement was conducted in accordance with the Global Internal Audit Standards.

3. CONCLUSION

Report Rating: **Requires Improvement**

Overall, the design and operating effectiveness of processes and controls for pension and benefits administration to ensure accuracy, completeness, and timely processing of pensions and benefits to eligible members require improvement. Key observations identified during the engagement are summarized below:

No.	Finding	Risk Type	Risk Rating[1]		
			High	Moderate	Low
1	A pension entitlement audit has not been performed since it was first conducted in 2019, increasing the risk of pension payments to deceased pensioners. Documentation is not required to support changes to pensioners' banking records or the enrolment of spouses and dependents for benefits, including any subsequent changes.	Social License / Financial / Operational / Fraud	X		
2	Complementary User Entity Controls ("CUECs") required by vendors engaged by OPG to administer pension and benefits coverages have not been fully assessed for applicability, relevance and effective implementation. Control deficiencies identified in vendor SOC 1 reports were dispositioned without documented rationale.	Operational		X	
3	Some P&B Standard Operating Procedures ("SOPs") are not current and do not address all processes.	Operational		X	
Total		**3**	**1**	**2**	**-**

4. SUMMARY OF POSITIVE OBSERVATIONS

The following positive observations were noted during this engagement:

- Since Q2 2025, the Pension and Benefits ("P&B") group has utilized Service Hub to standardize and digitize enrolment requests for employee events to increase data accuracy and security, enhance productivity and ownership, and monitor performance in real-time; and
- As part of its efforts to continuously improve administration of the benefits plan, the P&B group has strengthened its collaboration with OPG Security on investigations related to potential benefits fraud.

[1] Please refer to Appendix A for risk rating definitions

5. SUMMARY OF FINDINGS

1. A pension entitlement audit has not been performed since it was first conducted in 2019, increasing the risk of pension payments to deceased pensioners. Documentation is not required to support changes to pensioners' banking records or the enrolment of spouses and dependents for benefits, including any subsequent changes.		**High**
Observation	**Potential Impact**	**Management Action Plans**
<u>*Pension entitlement audits*</u> Pension entitlement audits (also known as "alive and well audits", "life audits" or "retiree and survivor audits"), are considered typical industry governance practices that help ensure pension benefits are paid to the correct individuals. Letters are sent to all pensioners asking them to respond with their signatures to certify that they are alive. Individuals who did not respond within the predetermined timeframe will have their pension suspended until they confirm their status. These audits, or equivalent retiree/survivor verification processes, while not explicitly mandated by the Ontario *Pension Benefits Act* ("PBA") as enforced by the Financial Services Regulatory Authority of Ontario ("FSRA"), support the PBA requirement to maintain complete and accurate member records and help protect the financial integrity of pension plans. Many administrators of Canadian pension plans, including those registered with the FSRA, regularly conduct these audits, with some on a fixed interval (such as annually or biennially), while others carry out routine verification on a random sample of pensioners in lieu of a full audit. IA noted that OPG conducted an alive and well audit once in 2019, resulting in the identification of deceased pensioners and pensioners who did not respond to the audit for over two years and presumed deceased. Management indicated that the intention was to conduct the audit every five years with another one to be performed in 2024; however, in 2024 a business decision was made to defer this until after the implementation of the Human Resources Information System ("HRIS") scheduled for Q4 2025. In evaluating options and vendor performance from 2019, Management decided to permanently contract out pension payroll to a vendor that includes the "alive and well" service to be performed annually. As a result, the life audit did not take place in 2024 as planned, and contracting out is expected to take place on January 1, 2026. Between life audits, the P&B group relies on survivors or estate representatives to notify OPG of the death of a pension member or survivor.	Failure to verify pension entitlements on a regular basis may result in heightened fraud risk and continued payments to ineligible individuals, which could lead to financial exposure, reduced plan integrity, non-compliance with fiduciary obligations, and negatively impact OPG's social license.	Management will review the identified overpayment cases and initiate recovery actions. **Action Owner**: Wendy Leung, Senior Manager, P&B **Target Completion Date:** August 30, 2025 Management will: • Issue letters to pensioners over 90 years of age as soon as practically possible using TELUS Health, the existing service provider, and conduct the alive and well audit on this subset of the population; • Initiate a process to secure a vendor to perform "alive and well" audits; and • Define an appropriate interval for the conduct of future alive and well audits through this vendor which is understood to be annual based on vendor proposals and management preference. **Action Owner**: Wendy Leung, Senior Manager, P&B **Target Completion Date:** October 15, 2025

IA conducted high-level testing[2], which identified three deceased individuals that have been receiving pension payments from OPG in July 2025, as follows: **Deceased Pensioners** / **Date of Death** / **Amount Paid (since death)** Individual A / October 28, 2020 / $25,600 Individual B / April 5, 2023 / $16,949 Individual C / September 3, 2024 / $36,039 As IA's testing was limited, it is not known whether there are other deceased pensioners or survivors beyond those listed above. As of January 2025, OPG has 13,252 pensioners and/or surviving spouses, with 29 over 100 years old, and 575 between 90 to 100 years old, representing a total of 4.6% of retirees / survivors. *Changes to pensioners' banking records* FSRA's guidance on pension administrator responsibilities includes maintaining complete and accurate records that support timely and accurate benefit payments. Pensioners call OPG's HR Service Centre to communicate changes to banking information. After the pensioner completes the authentication process (i.e. responding to security questions covering personal identifiers such as full name, date of birth, postal code and phone number), the HR staff captures the new banking information in the system as provided by the pensioner. While OPG completes an authentication process, pensioners are not required to provide documentation such as a void cheque or direct deposit form to support the changes to the banking information. *Benefits enrolment / entitlement of spouses and dependents* For plan member updates, the corresponding CUEC within the SLF SOC 1 report states that "plan sponsors are responsible for sending accurate and authorized updated member information to SLF on a timely basis including new members, changes to members and terminated members". IA noted that OPG does not require employees to submit documentation to support spouse and dependent information submitted for benefits enrolment, or when there are changes subsequent to the initial enrolment, as they rely on the Code of Business Conduct training and management attestations affirming compliance. In contrast, employees are required to provide an annual attestation of school enrolment for dependents over the age of 19. IA noted a case of overpayment to an ineligible spouse amounting to $15K which is in the process of being recovered from the employee. This case was previously identified by Management, and recovery of overpayment is in progress.	Not requiring documentation such as a void cheque or direct deposit form to support banking information changes may increase fraudulent activities (e.g. ineligible beneficiaries directing pension payments to their own bank accounts after the pensioners' death). Not requiring the submission of documents to support spouse / dependent eligibility during benefits enrollment may result in benefits being provided to ineligible individuals, which could lead to inefficient use of plan assets.	Management will perform a cost-benefit analysis to evaluate the merits of requiring pensioners to submit documentation to support changes to banking information, and determine the appropriate course of action based on the results of the analysis. **Action Owners**: Wendy Leung, Senior Manager, P&B and Candice MacLennan, Senior Manager, HR Pay Support Services **Target Completion Date:** October 15, 2025 Management will perform a cost-benefit analysis to evaluate the merits of requiring new employees to provide supporting documents for their spouses and/or dependents upon benefits enrollment, or when there are changes subsequent to the initial enrolment made by existing employees, and determine the appropriate course of action based on the results of the analysis. **Action Owner**: Wendy Leung, Senior Manager, P&B **Target Completion Date:** October 15, 2025

[2] For testing purposes, IA performed an online search using annuitants' names for obituary information based on a "haphazard" sample of pensioners at and above the age of 83, as the annuitants' full names are not always recorded in OPG's HR systems and surviving family members may not always post online obituary for the deceased.

2. Complementary User Entity Controls ("CUECs") required by vendors engaged by OPG to administer pension and benefits coverages have not been fully assessed for applicability, relevance and effective implementation. Control deficiencies identified in vendor SOC 1 reports were dispositioned without documented rationale.		**Moderate**
Observation	**Potential Impact**	**Management Action Plans**

SOC 1 reports for TELUS Health and SLF are reviewed and signed off by the OPG process owner annually as part of the ICOFR program. CUECs are a standard and required component of SOC 1 reports, as they indicate that certain control objectives within the reports can only be achieved if CUECs assumed in the design of the Service Organization ("SO") controls are suitably designed and operating effectively, along with related controls at the SO. Under this shared responsibility model, when exceptions in the SOC 1 reports indicate control deficiencies identified at the SO, effective corresponding CUECs will help mitigate risks to the user entity of the deficiencies that exist at the SO.
 	
Mapping of CUECs to OPG Controls
While the 2024 SOC 1 reports were signed off as reviewed as part of ICOFR controls and P&B Management has a process document that identify the steps to be taken when performing a SOC 1 report review, IA noted the following observations:
• The expectation for P&B personnel to review all identified CUECs and to ensure OPG has the corresponding controls in place are not identified in the process document;
• A mapping of all CUECs from the SOC 1 reports to existing OPG controls, along with identification and acknowledgement of responsibilities by control owners, has not been performed; and
• All CUECs identified in the SOC 1 reports have not been reviewed to assess whether they are applicable to the services used by OPG.
 	
Subsequent to IA's identification of the issue, Management initiated the mapping of CUECs to existing controls; however, IA noted that not all CUECs identified in the SOC 1 reports have been fully assessed for their applicability to the services used by OPG. While the CUECs have been mapped to controls and control owners within OPG, confirmation and acknowledgement of responsibilities from the designated control owners have not been obtained. Additionally, a review has not been performed to validate whether all the controls are appropriately designed to address the required responsibilities or whether they are operating as intended.
 	
Assessment and disposition of SO control deficiencies
The existing P&B procedures do not include a requirement for the P&B reviewer to document criteria used to assess deficiencies identified on the SOC 1 reports and provide rationale to support disposition of the deficiencies. IA noted that the SOC 1 reports for SLF and TELUS Health included 13 control deficiencies, and in all cases the P&B reviewer dispositioned the deficiencies with the comment "no impact to OPG"; however, the criteria used for the assessment and the rationale on the "no impact" conclusion were not documented. As CUECs were not assessed when the SOC reports were reviewed, the impact of the control deficiencies identified at the two SOs on existing CUECs has not been determined.
	Failure to review, validate and implement CUECs may result in key control activities not being performed, reducing the effectiveness and reliability of the services rendered by vendors.
	
	When CUECs are not in place, and especially when deficiencies also exist in SO controls, the risk of control failure increases significantly. In such cases, SOs may also limit their liability, leaving OPG exposed to operational and compliance risks.
	
	Lack of documented criteria and rationale to support the assessment and disposition of SO control deficiencies may lead to inconsistent or incomplete evaluation of potential risks to OPG.
		Management will:
		• Update the existing P&B process document on the review of SOC 1 reports to:
		  ○ Include the requirement to review CUECs; and
		  ○ Require documentation of criteria used and rationale to support disposition of SO control deficiencies identified in the SOC 1 report;
		• Assess CUECs for applicability to OPG, map applicable CUECs against existing controls, identify owners for control execution and obtain acknowledgment to confirm responsibility acceptance for controls execution;
		• Review effectiveness of CUECs with relevant stakeholders (frequency to be defined in mapping document) to address any gaps where applicable and retain documentation as evidence of these reviews including any resulting actions; and
		• Use the updated process document in the review of the 2025 SOC 1 reports.
		
		Action Owner: Wendy Leung, Senior Manager, P&B
		Target Completion Date: January 15, 2026

3. Some P&B Standard Operating Procedures ("SOPs") are not current and do not address all processes.		Moderate
Observation	**Potential Impact**	**Management Action Plans**
OPG-STD-0001 *Requirements for Administrative Governance Documents* indicates that a Line of Business should define governance that meets the minimum requirements of their business and obligations. FSRA's *Interpretation Guidance on Pension plan administrator roles and responsibilities*, section 5 Fiduciary duties, dated June 5, 2024, states that "in determining whether the administrator's standard of care has been met, attention is paid to policies and procedures put in place by the administrator and how they were followed in the course of administering the plan. Appropriate policies and procedures, including written records of administrator decisions and activities, can help ensure and demonstrate that in respect of decision-making, only proper factors are considered." IA noted that the overarching *Human Resources Program* (OPG-PROG-0040) establishes the requirements, objectives, and commitments for the HR function within OPG, and provides high level direction on all HR functions including HR strategy, recruitment and onboarding, workforce planning and analytics, compensation and benefits, labour relations. OPG-PROG-0040 does not include any procedures specific to P&B. IA noted that while departmental SOPs are available to guide staff on P&B practices, some of the SOPs are not up to date. The SOPs also do not address P&B processes including: • Reconciliation of pension plan membership between TELUS Health and OPG records; • Management of access to the TELUS Health portal; and • Performance of life audits. As SOPs are not formal governance documents, a process to manage changes / updates to the documentation has not been defined. Management had launched an initiative late 2024 to update SOPs, which have been included in the 2025 performance objectives for the team. As of Q2 2025, 28 of the 55 SOPs are scheduled for update during the remainder of 2025.	Without formal governance, OPG may be unable to adequately demonstrate that staff understand their roles and responsibilities, and that decisions and plan administration reflect the required standard of care and align with documented policies and procedures. The absence of well-defined, up-to-date procedures may lead to process ambiguity and unclear accountabilities, which may affect the timely and effective completion of deliverables and knowledge transfer during staff turnover. SOPs may be modified by employees without authorization as document change control procedures are not in place.	Management will: • Refine and update the P&B program SOPs as part of the 2025 department performance objectives; • Expand the 2024 P&B process review initiatives to assess the need to adopt document change control for SOPs in accordance with OPG governance framework; and • Provide the updated P&B program SOPs to relevant HR stakeholders. **Action Owner**: Wendy Leung, Senior Manager, P&B **Target Completion Date:** December 31, 2025

APPENDIX A – RATING DEFINITIONS FOR AUDIT REPORTS

Finding: *Noted deficiency with potential impacts to the achievement of business unit/process area objectives, assessed using the following criteria:*

	High Risk	Moderate Risk	Low Risk
Safety & Social License	• Potential regulatory non-compliance. • Deficiencies that could result in: o Fatality, permanent disability, or lost time injury; o Data loss or unavailability of critical systems; o Security is compromised in sensitive / multiple areas; o Fraud / theft; or o Negative media coverage resulting in reputational damage.	• Insufficient evidence to support regulatory compliance. • Deficiencies that could result in: o Minor injury with no lost time; o Temporary data loss or unavailability of non-critical systems; o Security is compromised; o Fraud / theft with some mitigating controls; or o Public escalating concerns to OPG Management or local media.	• Documentation improvements to support regulatory compliance. • Deficiencies that could result in incidents that do not require medical treatment. • Deficiencies that do not result in any media attention negatively impacting OPG's reputation.
Financial	• Potential loss or financial impact =>5% of the sample population's value, or the department's OM&A budget if the former is unavailable.	• Potential loss or financial impact >=2% and <5% of the sample population's value, or department's OM&A budget if the former is unavailable.	• Potential loss or financial impact <2% of the sample population's value, or department's OM&A budget if the former is unavailable.
Operational Excellence	• Governance non-compliance or lack of/inadequate controls that may impact achievement of business or project objectives. • Errors in or insufficient internal reporting that drives senior management decision making. • Test results where =>25% of the sample had deficiencies in the execution of a key control.	• Governance non-compliance or lack of/inadequate controls with alternate controls in place to mitigate the impact to business or project objectives. • Errors in or insufficient internal reporting that could affect management decision. • Test results where >=10% and <25% of the sample had deficiencies in the execution of a key control.	• Governance compliance with procedural concerns or documentation issues which could impact OPG's ability to demonstrate appropriate due diligence. • Errors in or insufficient internal reporting that has minimal decision making impact. • Test results where <10% of the sample had deficiencies in the execution of a key control.

Opportunity for improvement: *Observation with no risk impact that is provided to management for consideration to improve efficiency of processes and documentation (e.g. automation, duplication of activities).*

OVERALL REPORT RATING SCALE

An overall audit rating is assigned based on the number of observations identified for the audit and their assigned risk rating:

	Number of Findings			
Finding Risk Rating	**1**	**2**	**3 - 4**	**=> 5**
High	Requires Improvement	Not Effective	Not Effective	Not Effective
Moderate	Generally Effective	Generally Effective	Requires Improvement	Not Effective
Low	Effective	Effective	Generally Effective	Requires Improvement

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