

PICKERING REFURBISHMENT PROGRAM

PROGRAM STRUCTURE

1.0 OVERVIEW

This exhibit sets out the commercial strategy that establishes OPG as Owner and defines OPG's relationships with its external contractors for the Pickering Refurbishment Program ("PRP"). The exhibit also describes OPG's supporting organizational structure for the PRP. OPG's approach to its commercial strategy for the PRP was informed by operational experience and lessons learned from the Darlington Refurbishment Program ("DRP") and largely follows a similar approach.

2.0 COMMERCIAL AND CONTRACTING STRATEGIES

The PRP is a multi-phase project consisting of individual projects of varying sizes. While there are significant scope differences between the DRP and the PRP (see Ex. D2-3-5), the inherent nature of the core refurbishment work is similar, thereby providing an opportunity for the PRP to leverage and build on the DRP's successful program and commercial structure.

In an oversight role, OPG will be accountable for the safe and reliable design of the nuclear facilities, managing plant operations during the phased return of units, and ensuring compliance with Canadian Nuclear Safety Commission ("CNSC") licensing requirements. This strategy will allow OPG to effectively manage risks while ensuring the work is optimized and carried out in a way that preserves long-term operational integrity.

To effectively manage the work, OPG has developed a comprehensive commercial strategy along with tailored contracting strategies for the major work bundle. Like the DRP, OPG has chosen a "multi-prime contractor" model as the commercial framework, where multiple prime contractors are engaged for different portions of the work.

1 The multi-prime contractor model is particularly suited for projects like DRP and PRP, where
2 the project scope definition is more defined, specific and detailed scope can be assigned to a
3 single contractor, and low levels of contractor integration are required. OPG, as owner, holds
4 separate contracts with each prime contractor, who is responsible for delivering the work within
5 the scope of their specific agreement.

6
7 In this model, OPG retains control over the entire refurbishment program, including the
8 deliverables, costs and schedule, and can assign risks to the parties best able to manage
9 those risks, while also allowing for the cost-effective use of specialized contractors. This
10 strategy further allows OPG to agree to a reasonable balance between the transfer of risk to
11 contractors and the costs of the contracted services.

12
13 As part of the multi-prime contractor structure, OPG selected engineering, procurement and
14 construction (“EPC”) as the preferred delivery model for each of the prime contractors for the
15 PRP. Integral to the DRP’s success using the multi-prime EPC model was to maintain positive
16 and productive long-term working relationships with all its contractors through a collaborative
17 contract management approach,¹ namely, OPG’s “One Team” approach. The “One Team”
18 approach establishes a unified working model where OPG and contractors operate with shared
19 control structures, integrated reporting systems and joint accountability for project outcomes.

20
21 Given inherent similarities in the nature of work between DRP and PRP, OPG determined that
22 a collaborative EPC model is also best suited to the PRP, as it enables direct accountability
23 for each contractor’s specific deliverables, while utilizing existing proven commercial
24 frameworks and collaborative principles of the One Team approach. Utilizing the collaborative
25 EPC model across all prime contractors, rather than a combination of other approaches, also
26 minimizes burden on OPG’s organizational structure and substantively reduces interface
27 management and schedule coordination challenges, cost control complexity and information
28 asymmetry. Importantly, adopting this model allows OPG to leverage proven successful

¹ Collaborative contract management is an industry-recognized approach for mega-program owners that focuses on upholding the terms of a contract while also establishing mutual goals and guiding principles, creating structures for alignment of expectations and interests over the long-term life of the project, fostering trust and collaboration, and producing healthy and sustainable partnerships.

1 contractors and their respective contracts from the DRP to the PRP, creating significant
2 efficiencies in planning and negotiating. This model also allows OPG to still engage newly
3 qualified contractors where applicable, ensuring adequate capacity and expanded contractor
4 base and capabilities to meet PRP project objectives.

5
6 OPG will act as the integrator, overseeing all prime contractors and managing the overall PRP.
7 This is appropriate for several reasons, including the operational complexities of working in a
8 nuclear power plant that will be transitioning from having all units offline to a combination of
9 on- and offline units over time.

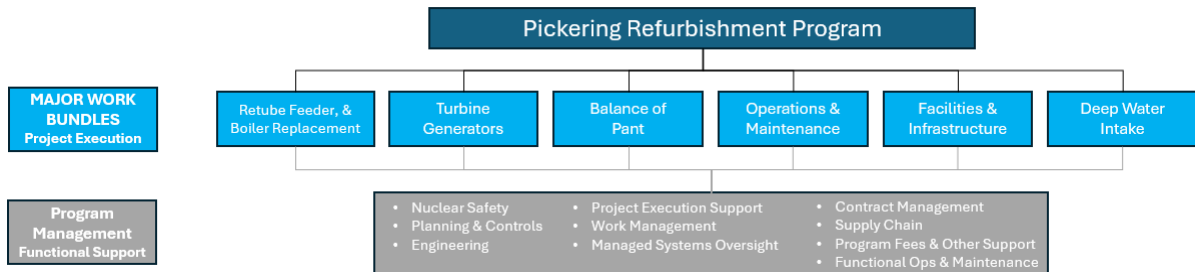
10
11 For each major work bundle, OPG is developing specific contracting strategies. A “contracting
12 strategy” outlines the approach for successful project delivery for each major bundle within the
13 PRP. These strategies consider factors such as the nature and scope of the work, the
14 contractor marketplace, and potential long-term commercial relationships. Each strategy
15 determines the most appropriate sourcing, contract structure, and pricing mechanism for the
16 specific work bundle. The strategies also detail the work assignments for each contractor,
17 allowing OPG to maintain flexibility in adapting to the work's unique requirements, market
18 conditions, and post-refurbishment needs. The contracts for the major work bundles are
19 outlined in Ex. D2-3-3.

20 21 **3.0 OPG STRUCTURE AS OWNER**

22 As the owner, OPG retains overall responsibility for deliverables, costs and schedule and
23 continues to serve as the design authority for the PRP. OPG will at all times remain the license
24 holder and operator of the plant in accordance with the CNSC regulations and license
25 requirements. To effectively perform the various aspects of this role, OPG has established an
26 organizational structure comprised of two primary aspects. First, OPG has established
27 dedicated project management teams that are responsible for the management, oversight and
28 delivery of specific major work bundles. Second, OPG has established functional support
29 groups (“Functions”) that are dedicated to performing specific types of work to support the
30 major work bundles and the integration of the overall PRP.

A diagram of how the organization is structured, considering both the dedicated project management teams and the Functions, is provided in Figure 1 below.

Figure 1 – PRP Organizational Structure



3.1 Project Management Teams

As described in Ex. D2-3-3, scopes of work have been grouped into six major work bundles. Each of the six major work bundles has OPG project directors. The project directors are responsible for ensuring the effective planning and successful execution of their major work bundle within the overall PRP, and for ensuring that the corresponding contractors deliver the contracted services safely, to the quality specified, on time and on budget. The project directors are supported by a dedicated project management team, as well as by OPG's Program Management Functional Support as noted in Figure 1 (above). As explained in Ex. D2-3-8, the costs associated with this project management role form part of the cost for each of the major work bundles.

3.2 Functional Support Groups

Functional Support Groups are teams within OPG that are responsible for performing specific types of support for the major work bundles and the PRP as a whole. Functions set standards, manage the PRP at the overall Program level and provide support in specific areas (such as engineering, oversight, and procurement). The Functions are responsible for providing the required support, coordination, integration and oversight of the work that will be performed by the project management teams and external contractors. Each Function is described below.

1 A description of OPG's Program Management System, which is a framework of controlled
2 documents through which PRP objectives, plans, processes, roles, responsibilities and
3 decision-making are documented, is set out in Attachment 1.

4
5 Exhibit D2-3-9 describes in greater detail the roles that the execution management and support
6 functions will have in the Execution Phase, such as the Project Execution Support Function,
7 Work Management Function, Functional Operations and Maintenance, and Planning and
8 Controls Function.

9
10 3.2.1 Project Execution Support Function

11 This Function offers support across key work bundles, including (1) construction execution and
12 field support, (2) quality management, (3) nuclear refurbishment project parts integration, and
13 (4) program execution strategy. The activities in this Function are detailed further in Ex. D2-3-
14 9.

15
16 3.2.2 Work Management Function

17 This Function is responsible for developing, monitoring, and controlling the integrated
18 execution schedule. While each project and contractor is accountable for creating a valid and
19 executable schedule, this Function validates these schedules and integrates them into the
20 overall schedule. This Function ensures proper planning before execution, manages and
21 controls unit scope, coordinates day-to-day work control and interface activities, resolves
22 issues, initiates and oversee changes, and monitors and reports on risks, schedule status, and
23 performance metrics. The activities in this Function are detailed further in Ex. D2-3-9.

24
25 3.2.3 Engineering Function

26 This Function has overall engineering and design authority and accountability for all work within
27 the scope of the PRP, including all units while in their refurbishment state. Given that a
28 significant portion of the plant modifications for the PRP will be executed by external
29 contractors, an important aspect of the PRP is that this Function must authorize all associated
30 permanent and temporary design changes. In doing so, this Function ensures that appropriate
31 interfaces and oversight protocols are maintained throughout the design, procurement,

1 installation, commissioning and closeout processes to ensure compliance with design
2 requirements. The group is organized into four departments:

- 3 • **Design Engineering** carries out the design authority role as delegated from the Chief
4 Nuclear Engineer, which includes responsibilities for preparing, reviewing and approving
5 all permanent and temporary design changes developed under OPG's Quality Assurance
6 program. Design Engineering prepares and approves in-house design deliverables or
7 collaborates with contractors to develop and accept contractor design deliverables. Design
8 Engineering provides design completion assurance verification and review in accordance
9 with design release of in-house modifications. Design Engineering provides inputs to
10 project oversight plans to assure that engineering vendor partners are performing work in
11 accordance with engineering change control as well as meeting design requirements and
12 project scope. Design Engineering also includes support for procurement from the
13 Procurement Engineering group, described as a distinct Function in Section 3.2.5 below.
- 14 • **Performance Engineering** is made up of System Engineering resources with matrix
15 support from Components and Equipment, digital computer control and Major Components
16 engineering departments. Performance Engineering initiates work requests and scope
17 work orders and prepares need statements, scope of works and engineering change
18 requests for PRP scope.
- 19 • **Components and Equipment Engineering** implements a component-based inspection
20 program to assure the health of a select group of nuclear power plant components. The
21 program consists of component inspection and testing as well as component health
22 trending and aging management strategies to ensure the following considerations are
23 addressed: nuclear reactor safety, production targets (reliability), compliance to regulatory
24 standards and cost, conventional safety and environment.
- 25 • **Nuclear Safety Engineering** is described as a distinct Function in Section 3.2.4 below.

26 27 3.2.4 Nuclear Safety Function

28 This Function performs safety analysis, either directly or through the verification and/or
29 acceptance of contracted nuclear safety analysis work. It also provides ongoing nuclear safety
30 support for refurbishment-related regulatory issues. In addition, this Function provides nuclear
31 safety support for safety improvement opportunities and the major work bundles, as well as

1 nuclear safety reviews of critical documents. This Function also ensures refurbishment work is
2 completed in adherence with OPG's reactor safety program and risk and reliability program,
3 including the management of refurbishment impacts on Pickering's operating policies and
4 principles and probabilistic risk assessment.

6 3.2.5 Procurement Engineering Function

7 This Function involves pre-purchase technical review of items and services in order to establish
8 purchasing and acceptance requirements that meet the design intent and to support plant
9 operations in resolving technical issues related to purchases. Procurement Engineering
10 provides services including assistance on design bill of materials, catalogue identifier creation
11 and support to setting catalogue identifiers to ready for engineering vendor partners.
12 Procurement Engineering collaborates with Design Engineering to update the master
13 equipment list, bill of materials and engineering changes, and provides asset management
14 system access to design service providers and performance quality assurance program
15 selection adjustments.

17 3.2.6 Planning and Controls Function

18 This Function supports the PRP by establishing and applying project controls, such as cost
19 management, reporting, and risk management, at both the Program and project levels. The
20 Function applies industry best practices and recommendations to set standards. Specifically,
21 its responsibilities include front-end planning, program-level scope control, project controls
22 (including implementing a gated approval process for major work bundles), cost management,
23 earned value management, forecasting, reporting, change control, and risk management. The
24 Function also allocates funding for the information technology tools necessary for executing
25 the refurbishment. As the PRP transitions from the Definition Phase to the Execution Phase,
26 the focus will shift from establishing governance, tools, and processes to monitoring program
27 performance through project controls, metrics, and reporting. Given its crucial role during the
28 execution phase, its activities are also outlined in Ex. D2-3-9.

1 3.2.7 Managed System Oversight Function

2 This Function provides and coordinates performance assurance and oversight for the PRP-
3 managed system. The oversight role includes managing the low-level reporting tool that
4 enables OPG to track trends and implement corrective actions to address those trends. This
5 involves conducting root cause analysis and introducing revised processes, training programs,
6 or other measures as needed. The Function carries out oversight in accordance with the PRP's
7 self-assessment plan and individual project oversight plans. Additionally, it coordinates and
8 facilitates the oversight by OPG's internal audit group and all third parties, including the
9 independent oversight for OPG's Board of Directors, namely, the Refurbishment Review
10 Board, and the Ministry of Energy's oversight. See Ex. D2-3-9 for more information on the
11 Pickering Oversight Assurance Framework.

12
13 Furthermore, this Function manages OPG's Nuclear Managed System, which is the
14 governance framework and process support documentation implemented to manage all
15 activities related to the PRP (see Attachment 1). One of the CNSC's conditions in the Power
16 Reactor Operating License for Pickering requires OPG to comply with Canadian Standards
17 Association N286, Management System Requirements for Nuclear Power Plants, in managing
18 all aspects of its operations. The PRP Management System meets these Canadian Standards
19 Association N286 requirements.

20
21 Additionally, this Function is responsible for monitoring the creation, revision, superseding, and
22 obsolescence of controlled documentation and processes.

23
24 3.2.8 Supply Chain Function

25 This Function supports all procurement-related activities concerning the overall cost, schedule,
26 and quality of the program, while providing oversight on procurement actions carried out by
27 the Engineering, Procurement, and Construction contractors. The goals of this Function are to
28 ensure: (1) cost certainty and the optimization of risk transfer for each contract, (2) value for
29 money, and (3) that contractual commitments such as cost, quality and schedule are adhered
30 to. Key responsibilities of this Function include awarding contracts through established
31 procurement processes, assisting projects in identifying and assessing strategies for long-lead

1 and at-risk materials, ensuring compliance with relevant quality requirements and OPG policies
2 in procurement processes, and overseeing contractor procurement activities using a risk-
3 based approach.

4 5 3.2.9 Contract Management Function

6 This Function provides commercial support throughout the PRP by overseeing contract
7 administration, ensuring consistency in the execution of agreements across projects,
8 interpreting contract terms and conditions, developing contract management plans, facilitating
9 change management processes, reviewing invoices, and monitoring compliance with contract
10 requirements. It also tracks and reports on performance under master contracts, identifies
11 commercial issues, and supports claims management and dispute resolution. Additionally, this
12 Function focuses on establishing and maintaining strong commercial relationships with third-
13 party contractors.

14 15 3.2.10 Program Fees and Other Support Function

16 This Function covers a diverse range of support to facilitate the execution of the PRP,
17 including:

- 18 • Nuclear Refurbishment Finance organization;
- 19 • Nuclear Regulatory Affairs organization;
- 20 • CNSC fees, other licence fees and insurance costs for the PRP;
- 21 • Refurbishment Communications organization;
- 22 • Refurbishment Human Resources and Labour Relations organization; and
- 23 • other miscellaneous support costs, including information technology software fees.

24 25 3.2.11 Functional Operations and Maintenance

26 This Function is distinct from those set out above because it is both a functional and execution
27 organization. This Function provides functional support to the major work bundles in respect
28 of the unit(s) being refurbished and will also serves as the “custodian” of any operating unit(s)
29 in the plant, as they return to service, by ensuring that the ongoing refurbishment work does
30 not have any adverse impact. Importantly, this Function will serve as the “controlling authority”
31 for the units undergoing refurbishment within the construction island. The Operations and

1 Maintenance Function will also plan and execute project work required to maintain the
2 Pickering site throughout the refurbishment life cycle and operate as a Project Management
3 team. As this Function plays a significant role during the Execution Phase, its activities are
4 described in greater detail in Ex. D2-3-9.

5
6 PRP is leveraging a workforce strategy to blend OPG's existing workforce with contractor staff
7 where appropriate. This strategy seeks to redeploy existing OPG operational staff with critical
8 expertise and knowledge of the station to certain PRP work, such as radiation protection,
9 maintenance and fuel handling. That strategy ensures timely access to sufficient and proficient
10 labour to meet project schedules, fulfilling resource demands particularly during overlapping
11 units, leverages skilled employees familiar with the station for safe and efficient execution, and
12 mitigates the risk of potential labour shortages in the market. The PRP release quality estimate
13 incorporates the cost and schedule benefits of this blended workforce strategy. Further
14 description of this strategy is provided in Ex. D2-3-4, Section 2.3.

LIST OF ATTACHMENTS

Attachment 1: Program Management Governance Structure and Program Charter

Note: Program Charter included in Attachment 1 is marked "OPG Confidential", however, OPG has determined it to be non-confidential in its entirety.

PROGRAM MANAGEMENT SYSTEM STRUCTURE AND PROGRAM CHARTER

An important component of OPG's role as Program owner is its program management system. The system is a controlled document framework for the Pickering Refurbishment Program ("PRP") through which program objectives, plans, processes, roles, responsibilities and decision-making are documented.

The overall structure of the program management system is described in a program management document entitled Pickering Refurbishment Program Structure (NK30-CHAR-09701-0001), which is included in this Attachment 1. This document establishes the framework for the Pickering Refurbishment Program Management Plans, which are a series of documents that describe how the PRP is organized to meet the intent of OPG's Nuclear Management System, while also establishing program-specific requirements. The Pickering Program Structure establishes the following hierarchy of documents:

- Tier 1 – the Pickering Refurbishment Program Charter ("Program Charter"), which is also included in this Attachment 1;
- Tier 2 - the Refurbishment Program Structure document and the Program Management Plans; and
- Tier 3 - numerous manuals, guides, instructions, plans, constructor/owner interface requirements and forms

Title:

PICKERING UNITS 5 TO 8 REFURBISHMENT

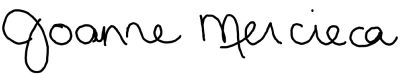
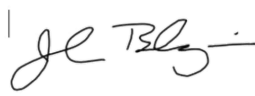
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The Project Charter describes the business vision and scope of the project as defined by the line of business. Sections 1.0 through 5.0 are **mandatory**. Sections 6.0 onwards are recommended however not compulsory. The sponsor should determine whether completion of these sections is required based on the project cost, complexity and needs.

General Project Information

Program Number:	N/A	Program Level:	S - Strategic
Program Name:	Pickering Refurbishment	Facility/Site:	PNGS
		Executing Org:	Pickering Refurbishment
		Sponsor:	Chief Projects Officer, Enterprise Projects

Program Charter Approval

Prepared by: Joanne Mercieca, Project Specialist	 25Apr24
Reviewed by: Kevin Tse, Senior Manager Project Controls	 25-Apr-24
Concurred by: Mehri Molanaie, Refurbishment Director Project Controls	 25-Apr-24
Accepted by: John Blazanin, Vice President, Refurbishment Execution	 25-April-24
Approved by: Subo Sinnathamby, Chief Projects Officer, Enterprise Projects Project Sponsor	 26-April-24

Program Charter

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1.0 NEED BACKGROUND AND PROPOSAL

The IESO estimates that electricity demand in Ontario may more than double in upcoming years from current levels of system capacity, driven by electrification in the industrial, mining, agricultural and transportation sectors, and efforts to address climate change impacts. In addition to the four Small Modular Reactors at the DNNP site, Pickering Units 5-8 provide the best alternative to meet Ontario's forecast electricity demand growth.

OPG's current CNSC approved licence states that the Pickering NGS 5-8 units will cease commercial operation by Dec 31, 2024. The generation loss of shutting down the four Pickering B units will result in the removal of approximately 2,100MW of emission free capacity annually to the electrical grid.

In September 2022, the Government of Ontario made two requests of OPG:

- (a) Seek CNSC approval to continue operating Pickering's Units 5 through 8 to the end of September 2026 (if deemed safe).
- (b) Conduct a feasibility assessment on the refurbishment of Pickering Units 5 – 8.

OPG undertook the task to complete a technical and economic assessment of refurbishing Pickering which included an assessment of regulatory requirements and risks commensurate with a project of this magnitude.

Based on OPG's assessment, refurbishment of Pickering Units 5-8 is the preferred alternative for the station to help meet Ontario's forecast electricity demand growth into the 2030s and beyond. The necessary studies and assessments undertaken in the Feasibility Assessment Report NK30-REP-09710-00005 [R1] determined that the PNGS Units 5-8 reactors can be safely and efficiently refurbished, addressing plant safety, reliability, regulatory requirements and outage/operating impacts. Additionally, Pickering Refurbishment provides significant environmental, societal, and economic benefits.

In August 2023, a recommendation was presented to the OPG Board and Shareholder for approval of the refurbishment of Pickering Units 5-8. The recommendation was approved by OPG's Board of Directors on August 11, 2023 and submitted to the Ministry of Energy for final approval which was granted by the Shareholder on January 30, 2024.

This Charter provides the summary of deliverables to complete the Refurbishment of Pickering units 5-8

1.1 Problem/Opportunity Statement

Table 1-1. Problem Statement

The problem:	Pickering Units 5-8 are to end commercial operation and go into safe storage state by December 2026. This will result in a loss of emission free generation for the province of Ontario
Affects/Impact:	Elimination of the generating capacity of the Pickering units affects the continued long-term supply of clean, economical, emission-free energy to the Ontario grid in a period of anticipated growth

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A successful solution:	Refurbishment of Pickering Units 5-8, to enable long term operation for a minimum of 30 years. Successful execution of the refurbishment program would also enhance OPG's reputation as a world leader in the clean energy sector by demonstrating a robust and socially responsible plan for CANDU Refurbishment. This in turn supports and enables OPG's strategic plans for growth in new nuclear projects as well as contributing to achieving Net-Zero carbon goals in Ontario and Canada
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1.2 Affected Business Drivers/Gap

The business driver for this project is to continue to provide approximately 2,100 MW of nuclear generation capacity to Ontario's electricity system. The original plan was to end commercial operations of Pickering units 5-8 in 2026. The IESO estimates that electricity demand in Ontario may more than double in 25 to 30 years from current levels of system capacity.

Pickering Refurbishment will result in another 30 years or more of emission-free, reliable energy production to the Ontario energy grid.

1.3 Preliminary Program Level (Cost and Complexity Assessment) and Gate Strategy

The Refurbishment program is categorized as a Strategic Project. Based on the complexity and estimated refurbishment program cost, this program and the underlying projects are classified as Scalability Level A.

1.3.1 Program Funding/Gating Release Strategy

Funding for the Pickering Refurbishment Program (PRP) will be released in phases using a gating methodology. i.e. The program will progress from one phase to the next after completing specific deliverables and updating cost and schedule estimates. Approvals, including a release of funds, are required to proceed to the next phase. This release strategy assumes a Q1 2027 start of Unit 5 construction pre-requisites with a year end 2030 unit in-service milestone.

Funding Release Plan:

Program Release	Applicable Gates	Scope	TCD
Release #1A-1	Bundle Gate 1	- Procurement of Major Long Lead Materials for U5/U6 - Completion of Scope Refinement - Advancement of Preliminary Engineering	Jan-24
Release #1A-2	Bundle Gate 2	- Procurement of materials for U5/U6 - Procurement of all materials for U7/U8 - Completion of Detailed Design	Nov-24
Release #1B RQE	Bundle Gate 2/ Gate 3	- Completion of Installation/Work Planning - Execution of Facilities, Defueling, U5/U6 Layup, and selected common work	Nov-25

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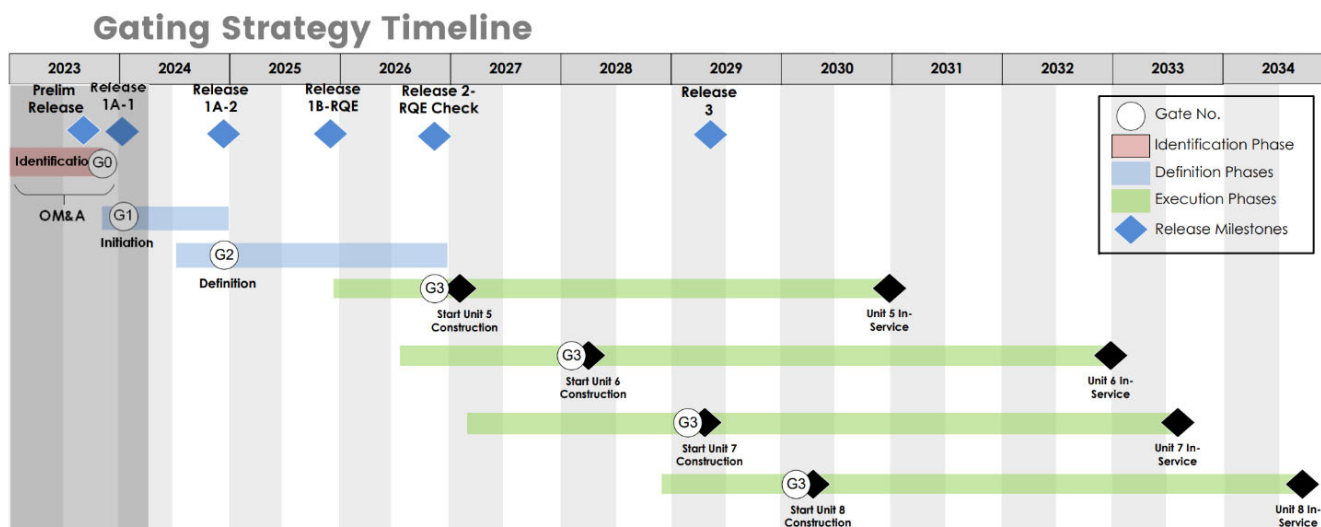
Program Release	Applicable Gates	Scope	TCD
Release #2-RQE check	Bundle Gate 3	- Full execution and close out of U5 and U6 (T/G, BOP, RFBR, SGs) - Execution of U7 T/G - Execution of U7/U8 Layup	Nov-26
Release #3	Gate 3	Full execution and Close out of U7 and U8	May 29

1.3.2 Program Gating Strategy

A gate is a key decision and control point that occurs before the next phase begins. The gate represents a logical point at which senior management can determine whether and how to proceed. Gates also provide an opportunity to assess performance to date and to alter the course of a project and take remedial actions as necessary.

Each project in the Refurbishment program will follow the processes documented in OPG-MAN-00120-0019 Project Phase-Gate Management Strategy [R2] to acquire funding releases.

The Gating strategy for the PRP is demonstrated below:



2.0 PROGRAM OBJECTIVES (CRITICAL SUCCESS FACTORS)

Program objectives are to:

- Obtain the necessary corporate, government and regulatory approvals (e.g. Environmental Assessments, Integrated Safety Review, and Integrated Improvement Plan) for refurbishment in a timely and cost effective manner.
- Set the targets for a safe, scientifically-sound, sustainable, and fiscally responsible refurbishment plan.

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- Execute front-end planning engaging Fit for Purpose strategies to develop cost, schedule, and resource targets for functional and project elements, including a full risk assessment.
- Establish contracts that incentivizes vendors collaboration and performance to execute the program including material supply, engineering, training, installation, commissioning for each of the underlying projects.
- Manage the pre-execution planning and preparation activities for the refurbishment scope.
- Execute the refurbishment work program.
- Complete all work and return units to service by mid-2030's.

2.1 Scope

The key scope items for refurbishment will include:

- Replacement of all Feeders and Fuel Channels
- Replacement of all Boilers
- Replacement and upgrades of the bulk of the Turbine & Generator centreline & auxiliary equipment and controls upgrade
- Re-design of the station's water intake structure
- Replacement of select Fuel Handling equipment and enhancement of maintenance capabilities
- Replacement and modifications of various Balance of Plant systems and equipment including Digital Control Computers, Main Power Output Transformers, Standby Generators and Emergency Power Generator #3
- Station modifications to further improve plant safety based on modern Laws (e.g., licensing requirements), Regulations, Codes, and Standards
- Facilities and infrastructure upgrades to support refurbishment activities.

A Project Scope Review Board is in place for approving original, new or modified scope. Reference NK30-PLAN-09701-10003 Pickering Refurbishment - Program Scope Review Board Terms of Reference [R3].

A Change Control Board with supporting governance will be established to manage cost, schedule, and scope baseline changes.

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2.2 Critical Success Factors (Target Performance)

Table 2-1. Critical Success Factors

ID	Success Factor	Success Indicator
1.	All Major Components Order placed June 2024	Contracts awarded to Major Component vendors
2.	Licence Amended July 2026 (as required)	If required, would provide regulatory certainty to proceed with refurbishment scope prior to the final licence approval scheduled in 2028
3.	Unit 5 Construction start February 2027	Unit 5 de-fuelling complete, TG and Boiler Replacement start
4.	Pickering Units 5 to 8 In Service mid 2030s	Refurbishment scope is executed event free, on time and within the allocated budget.

3.0 PROGRAM MANAGEMENT PROCESSES

The Pickering Refurbishment Program will perform work in accordance with this charter which is developed following the principles of N-POL-0001, Nuclear Safety and Security Policy [R4] and N-CHAR-AS-0002, Nuclear Management System [R5], and meets the requirements of CSA N286 [R16].

OPG-PROG-0039, Project Management [R6], and its associated implementing standards, provide the principles and requirements for planning, organizing, executing, and controlling resources to ensure safe and effective execution and completion of the Refurbishment program. Safety and quality of work shall be the overriding priority and will not be compromised for cost or schedule.

A suite of Program Management Plans describing the high-level business level requirements and processes that will deliver the program benefits will be created. They take their authority from this program charter.

Project Management Plans will be prepared to describe how each project in the Program will develop and execute its work scope.

Refer to Appendix A for structure mapping.

4.0 COMMITMENTS, CONSIDERATIONS

For detailed information on the reviews performed for Regulatory, Environmental and Safety considerations for the Refurbishment program, refer to NK30-REP-09710-1255849 Pickering Refurbishment Feasibility - Licencing Basis Document [R7].

Additional studies will likely be required to further evaluate, validate, and refine scope during the project Definition Phase in support of regulatory and environment considerations of the program.

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4.1 Regulatory Commitments

The program regulatory strategy focuses on compliance with REGDOC-2.3.3. (Periodic Safety Reviews) [R14] and REGDOC-2.9.1. (Environmental Protection) [R15] as required by the PNGS License Condition Handbook.

Regulatory commitments and the licensing approach will be further developed during the definition phase.

4.2 Safety Considerations

☒ No **additional safety considerations**.

The PRP will perform work in accordance with the managed systems defined in

- OPG-POL-0032, Safe Operations Policy, [R8]
- OPG-POL 0001 Employee Health and Safety Policy [R9]
- N-POL-0001, Nuclear Safety and Security Policy, [R4]
- N-CHAR-AS-0002, Nuclear Management System, [R5]

Any additional direction will be supplied in individual Program Management Plans. Listing of PgMPs is in Appendix A.

☐ Yes, **additional safety considerations (provide details)**.

4.3 Environmental Considerations

☒ No, **environmental impact assessment is NOT required for the project**.

The Refurbishment Program will adhere to the obligations outlined in OPG-POL-0021, Environmental Policy [R10]

OPG previously explored Pickering B Refurbishment in the mid-2000s and as part of those activities, completed an Environmental Assessment (EA) in 2007. The EA concluded that a refurbishment project is not likely to cause significant adverse environmental effects and the CNSC agreed with that conclusion.

In accordance with REGDOC-2.9.1 [R15], an Environmental Risk Assessment (ERA) is required as a minimum, every 5 years or when a significant change occurs (or for planned activities). CSA N288.4, N288.5 and N288.6 standards establish the requirement for environmental and effluent monitoring programs and ERAs.

OPG will complete a new ERA to support potential licence amendments and the future 2028 relicensing submission for refurbishment and continued operations of PNGS and the NSS Pickering Waste Management Facility.

☐ Yes, **environmental impact assessment IS required for the project**.

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5.0 MAJOR MILESTONES

Table 4-1. Program Major Milestones

The Unit Synchronized to Grid dates in the table below are tentative dates and subject to change. Final dates will be established as part of the definition phase planning and the program Release Quality Estimate.

Name	Deliverable	Date
Pickering B Shut Down	Units in shutdown state (GSS)	October 2026
Unit 5 Return to Service	Unit Synchronized to Grid	December 2030
Unit 6 Return to Service	Unit Synchronized to Grid	December 2032
Unit 7 Return to Service	Unit Synchronized to Grid	July 2033
Unit 8 Return to Service	Unit Synchronized to Grid	August 2034

6.0 RIGHTS HOLDERS AND STAKEHOLDER SUMMARY

Rights Holders:

- Indigenous Communities with interests in the site,

Stakeholders of the Pickering Refurbishment Program include:

- All levels of government (Province of Ontario, Pickering and Durham Region, Federal Government),
- OPG Pickering Nuclear Generating Station and Supporting Organizations
- Canadian Nuclear Safety Commission (CNSC)
- The general public (particularly residents and businesses in close proximity to the Pickering site),
- Ontario Power Authority (OPA), Independent Electricity System Operator (IESO), and Hydro One,
- Nuclear Waste Management Organization,
- Nuclear suppliers of goods and services.

Comprehensive stakeholder management plans will be available in individual Program and Project Management Plans.

7.0 RESOURCING (PROGRAM TEAM)

See Appendix B for the current Refurbishment organizational structure. The chart below provides a high-level overview of the Refurbishment Program organization.

Detailed roles and responsibilities for station staff are documented in the N-MAN-08131-10000 [R11] series.

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Table 7-1. Program Team

Role	Name/Title	Responsibilities
PN Refurbishment	John Blazanin VP Refurbishment Execution	Accountable for execution of the program, ensuring objectives and scope of work are delivered with quality, on schedule, within budget and safely
PN Refurb Ops & Mtce	Shawn David, Project Director Ops & Mtce	Ensure plans, procedures and qualified staff are in place to support & execute refurbishment activities
Retube and Feeder Replacement (RFR)	Samad Kasaai Director, RFR	Accountable for all project activities within the RFR scope. Provide oversight and leadership to project teams.
Turbine Generator	Brad Dennis Director TG Replacement	Accountable for all project activities within the Turbine Generator scope. Provide oversight and leadership to project teams.
Balance of Plant and Boiler Replacement	Pejman Asgaripour Director Projects	Accountable for all project activities within the Balance of Plant and Boiler Replacement scope. Provide oversight and leadership to project teams.
Planning & Controls	Mehri Molanaie Director Project Controls	Accountable for front-end planning of the program and associated projects, providing oversight and guidance as required. Monitor cost, schedule against approved work program
PN Refurb Engineering	Stephen Strickland Director, Engineering	Accountable for ensuring engineering and technical support services are provided to the program
PN Controllership	Derek Kindon, Director Controllership	Provide financial oversight and supports finance approval
PN Commercial - Darlington Refurbishment	Dennis Li Director Commercial Management	Support strategic and major contracts for execution of the PRP
PN Reg Affairs Strategy	Kristina Bamma Director, Reg Affairs	Provide oversight of the regulatory interface, compliance with regulatory requirements and regulatory issue resolution
EPO & Strategic Projects	Paul Mascarin Director, Supply Chain	Approve procurement strategy, ensure the integrity of OPG is managed to ensure the Code of Business Conduct and Supplier Code of Conduct is upheld and all suppliers and proponents are treated fairly, ethically and responsibly
Pickering Refurbishment	Reza Asadikia Director, Construction Services Execution	Accountable for providing construction planning support, and oversight during installation for contract adherence and safety issues.
Human Resources	Sandy Strecker, Manager Human Resources	Accountable for the definition, implementation and continual improvement of the Staffing Plan for the PRP

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8.0 PROGRAM BOUNDARIES

Each Project Management Plan developed for the projects within the Refurbishment scope will list the Boundaries specific to the individual project.

Listed below are Overall Program Boundaries that potentially impact all or several of the individual projects and/or the program as a whole:

8.1 Assumptions

Table 8-1. Assumptions

ID	Description	Impact if Assumption is Invalid
1.	Any changes to the safety report and/or design basis will be considered in the Business Case only if imposed by the PSR, EA or other regulatory requirements or if approved by the Refurbishment program's Scope Review Board.	This could change the scope of the refurbishment program and thus the basis for the recommendation in the Feasibility Report could be incorrect.
2.	The refurbishment focuses on replacing the known age limiting components and equipment in the execution phase. The maintenance or replacement of other equipment should be part of the thirty-year life cycle plan for the station.	If additional equipment added the Refurbishment scope may significantly alter the basis for the recommendations in the Feasibility Report.
3.	The Clean Electricity Investment Tax Credit (ITC) for the project will be eligible through to 2034	Changes to the LCOE assumptions could impact the economic benefits of the program.
4.	Refurbishment of Pickering Units 5-8 start of execution will be dependent on regulatory approval and long lead materials availability. The units may need be placed in a Safe Storage condition prior to refurbishment if there are delays in either approval or materials availability.	The basis for the recommendation in the Feasibility Report, including the risk and economic analysis, could be impacted.
5.	Staggered start of removal phase on each of the four units to benefit from efficiencies in resources and equipment progressing from one unit to the next	Increased cost and schedule including delays to interfacing projects, additional equipment and reduced opportunity for unit to unit improvement.

8.2 Constraints

Table 8-2. Constraints

ID	Description	Impact of Constraint
1.	Government Approval of the Program	Government direction may change resulting in cancellation or scope reduction of program
2.	Licence approved by CNSC	Delay of approval may result in additional scope and impact the program schedule.

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8.3 Dependencies

Table 8-3. Dependencies

ID	Description	Impact If Dependency Fails
1.	Two large elements in the cost model for the entire Fuel Channel and Boiler Replacement program will be the cost of tooling and equipment, and the direct cost of field labour	Misalignment between design and tooling/equipment will impact the cost of field labour
2.	Current site infrastructure has common elements to both Pickering A and Pickering B. These common elements will need to be separated to support Refurbishment activities as well as Pickering B future operations - Electrical grid, Information Technology Services, Roadways, Sites Services	Additional costs to program if site infrastructure is not sufficient or maintained to support Refurbishment activities
3.	Indigenous Relations - Duty to consult	Could result in changes to Refurbishment program scope and/or timeline
4.	NSS Waste Management – Pickering Contaminated Waste Building capacity to store refurb waste	Additional storage requirements may impact cost and schedule of refurbishment

8.4 Risks

Table 8-4. Risks

ID	Description	Impact If Risk Occurs
1.	Increased operational goals/parameters - The feasibility of meeting the station operational goals is based on future operations under similar reactor parameters	If power uprate is pursued, changes in operational parameters will necessitate analysis within the Definition Phase to confirm expected end of life
2.	Refurbishment Licence not issued	If the Licence renewal application is not approved in 2028, this would result in a delay to proceeding with P58 construction and corresponding delays to the planned return to service of the units.
3.	Impact Assessment Required - 2019 Impact Assessment Act	OPG has concurrence from the CNSC that the Pickering Refurbishment Project would follow the Nuclear Safety and Control Act's environmental protection review and is not subject to the IAA or any other applicable EA legislation. In future if it is decided that an assessment is required, it would result in significant impact to success of the program in increased cost/schedule delays.
4.	IFB Capacity - there is a risk that removing existing fuel to dry storage will not be able to be completed prior to restarting the first unit with sufficient space per the operating licence.	Securing additional storage facilities will impact program cost and schedule
5.	Technical complexity, changes for new or modified design because of OPEX, condition assessments, inventory assessments, or interface obstacles	If design modifications are significant, procurement of specialized material may impact approved program cost and schedule. Complexity may require greater engineering and planning efforts than currently anticipated

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ID	Description	Impact If Risk Occurs
6.	Procurement risk – For many of the required components there are limited qualified, experienced manufacturers available. Example: Boilers are supplied by one company for multiple sites.	Delays in material manufacture/delivery, critical path progression/ reliance on materials, resulting in cost increases and increased schedule durations.
7.	Schedule Compliance - with all units offline together, a schedule delay in one unit can cascade into the others	Extended overlapping units may result in increased costs and productivity losses.
8.	Changes for new or modified design because of OPEX, condition assessments, inventory assessments, or interface obstacles	Increased program costs and schedule durations
9.	Availability of skilled trades and knowledge-based workers	Increased program costs and schedule durations
10.	Resources to support relicensing activities for Pickering Units 5-8 refurbishment may pose challenges to the refurbishment schedule due to overlapping initiatives within OPG.	Increased program costs and schedule durations

9.0 TECHNICAL CONSIDERATIONS

Technical considerations of extending the service life of Pickering were included in the Feasibility assessment performed following the September 2022 request by the Ministry of Energy

The following areas were evaluated to identify potential required scope to support life extension, either to be executed prior to, during or post-Refurbishment:

- Major Components (Fuel Channels, Feeders, Boilers, etc.).
- Station Systems, Structures, and Components (SSCs), 54 System Condition Assessments completed.
- Resiliency to potential impacts of Climate Change.
- Modern laws, regulatory requirements, codes & standards important to the safe operation of a nuclear power plant.

The technical reviews completed confirmed there is high confidence that Pickering Refurbishment and the long-term operation of Units 5-8 is feasible through the completion of key scope items. The replacement of life-limiting elements (i.e., Fuel Channel assemblies and Boilers) will support an additional 300,000 EFPD which corresponds to 38 years of operation at an assumed 90% Capacity Factor.

There is potential for increased unit power output as a result of efficiencies being gained from the Turbine / Generator centerline component replacements (up to 36MW/unit, depending on design capabilities). This incremental generation is to be confirmed upon further analysis in the Definition phases of the projects.

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In addition, implementation of a deep-water intake will support improved water conditions / thermal performance, and potential exists for increases in reactor thermal power for additional MW output.

Turbine Generator and water intake scope are part of the reference scope for Pickering Refurbishment while increase of reactor power is undergoing further study to confirm feasibility and was not included in the feasibility study base case.

NK-30-REP-09710-00002 Pickering Refurbishment Retube and Feeder Replacement Feasibility Assessment [R12] was completed in June 2023. This assessment analyzed the OPEX from successful Fuel Channel Replacement Programs on 12 CANDU reactors world-wide. An assessment was conducted of the Darlington Refurbishment Program and the proposed Pickering program based on the differences between the reactor design, internal layout of the Reactor Building, radiological conditions, and available facilities on and off site.

Full-scale fuel channel replacement of Pickering A Units 1-4 was successfully completed in 1984. The replacement of all fuel channels and feeders on Pickering B will follow more than a dozen similar campaigns conducted on all classes of CANDU reactors over the prior 40 years.

Reference NK30-REP-09701-00006 Pickering Units 5-8 Refurbishment - Technical Feasibility Summary Report [R13]

10.0 ACRONYMS

CANDU	CANada Deuterium-Uranium [Reactor]
CNSC	Canadian Nuclear Safety Commission
DNNP	Darlington New Nuclear Project
EA	Environmental Assessment
EFPH	Effective Full Power Hours
ERA	Environmental Risk Assessment
MW	MegaWatts
NGS	Nuclear Generating Station
NR	Nuclear Refurb
NSS	Nuclear Sustainability Projects
OPEX	Operating Experience
OPG	Ontario Power Generation
P5-8	Pickering B units 5-8

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P'A'	Pickering A - units 1-4
PNGS	Pickering Nuclear Generating Station
PRP	Pickering Refurbishment Program
PSR	Periodic Safety Review
RFR	Retube & Feeder Replacement
RQE	Release Quality Estimate
SSC	Station Systems, Structures, and Components

11.0 REFERENCES

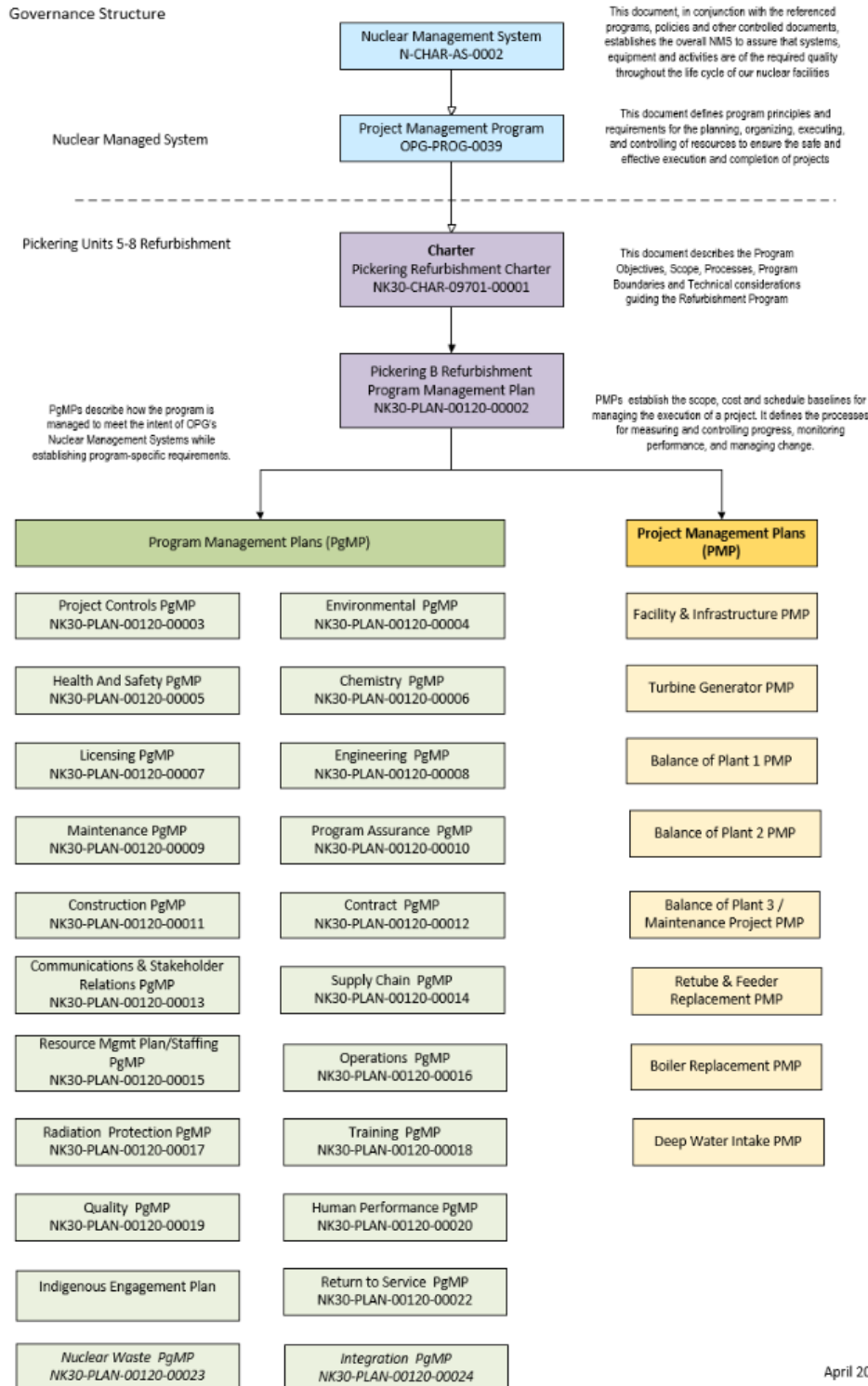
- [R 1] NK30-REP-09701-00005 – Pickering Units 5-8 Feasibility Assessment Final Report
- [R 2] OPG-MAN-00120-0019 Project Phase-Gate Management
- [R3] NK30-PLAN-09701-10003 Pickering Refurbishment - Program Scope Review Board Terms of Reference
- [R 4] N-POL-0001, Nuclear Safety and Security Policy
- [R 5] N-CHAR-AS-0002, Nuclear Management System
- [R 6] OPG-PROG-0039, Project Management
- [R 7] NK30-REP-09710-1255849 Pickering Refurbishment - Licensing Basis Document
- [R 8] OPG-POL-0032, Safe Operations Policy,
- [R 9] OPG-POL 0001 Employee Health and Safety Policy
- [R10] OPG-POL-0021, Environmental Policy
- [R11] N-MAN-08131-10000-Sheets – Accountabilities for Station Staff
- [R12] NK-30-REP-09710-00002 PR Retube and Feeder Replacement Feasibility Assessment
- [R13] NK30-REP-09701-00006 Pickering Units 5-8 Refurbishment - Technical Feasibility Summary Report
- [R14] REGDOC-2.3.3. Periodic Safety Reviews
- [R15] REGDOC-2.9.1. Environmental Protection
- [R16] N286 Management System Requirements for Nuclear Power Plants

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APPENDICES

Appendix A: Pickering Refurbishment Program governance framework

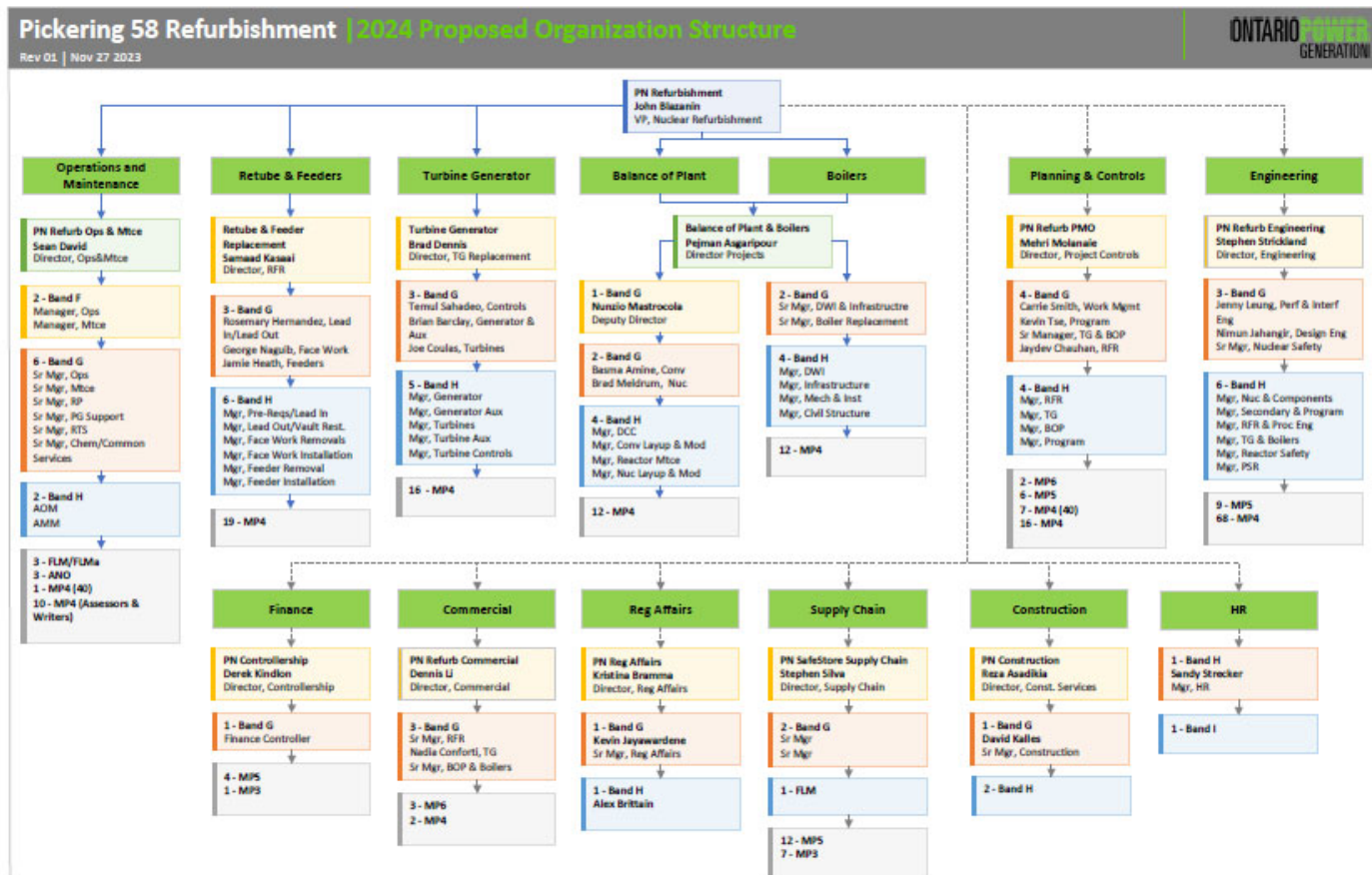


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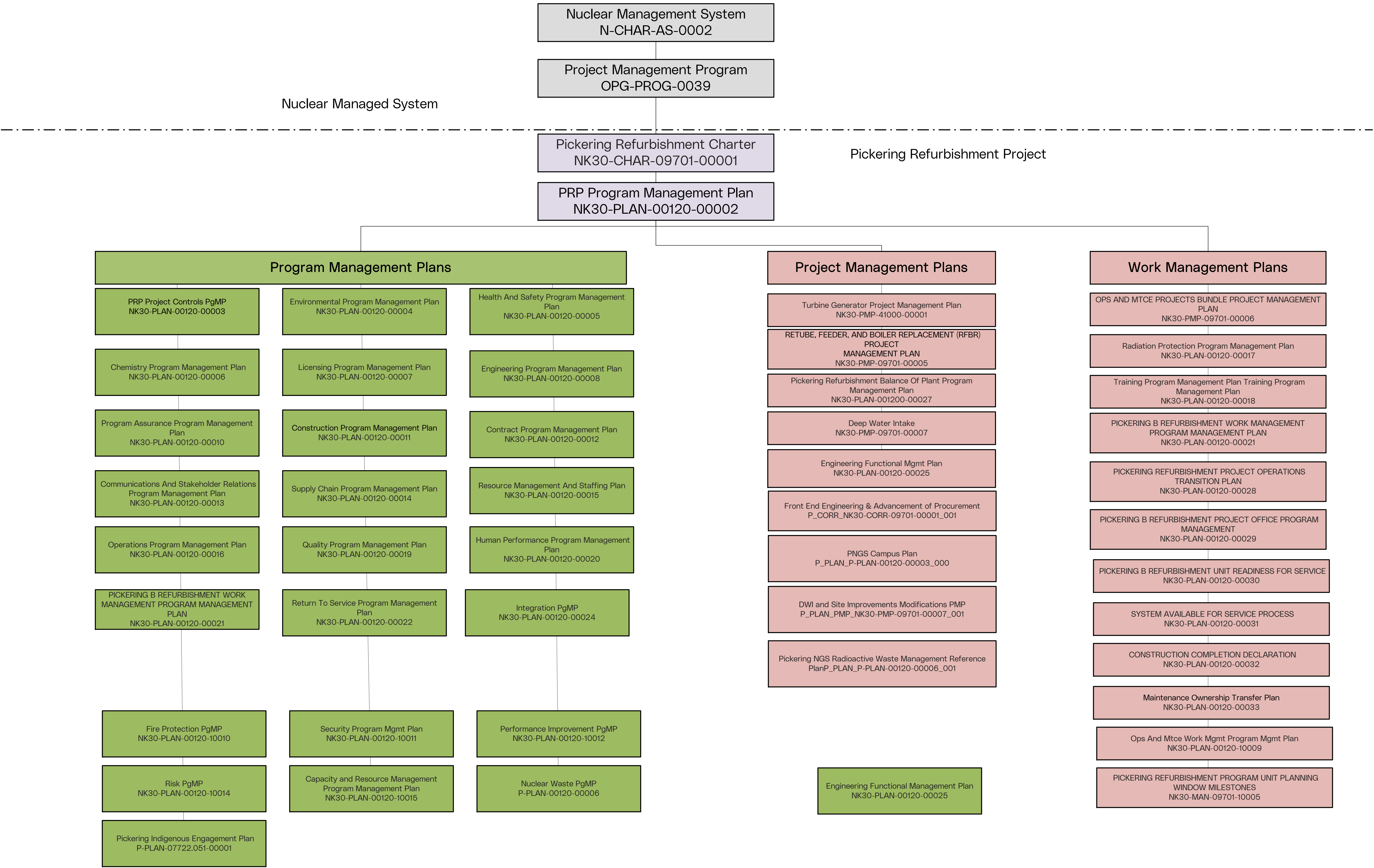
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Appendix B: Organizational Structure

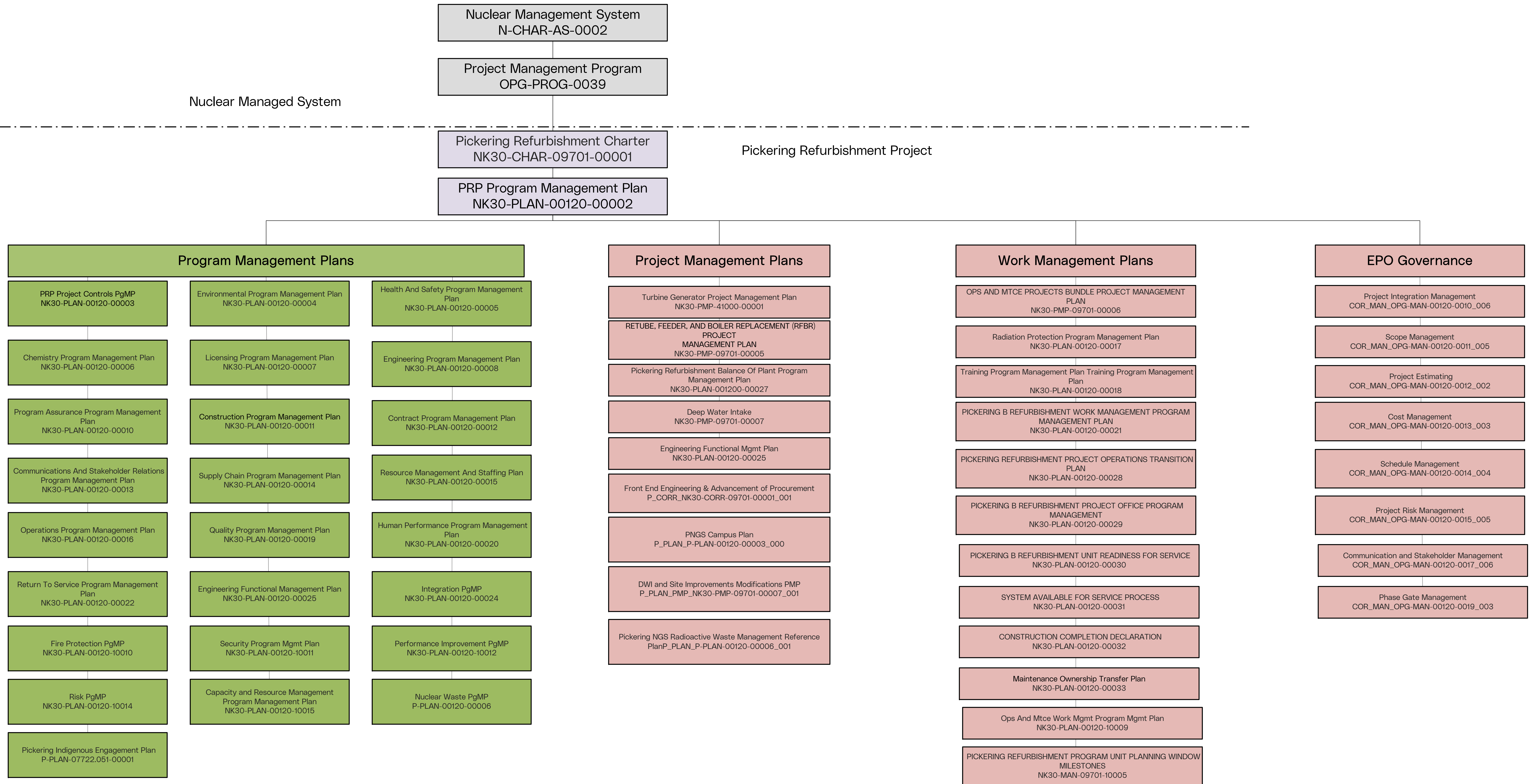
This organizational chart provides a high level overview of the NR organization and also identifies the key functions and roles that provide direct service or support to the Refurbishment Program.



Pickering Refurbishment Program Governance Structure



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Pickering Refurbishment Program Governance Structure

The Charter, in conjunction with the referenced programs, policies and other controlled documents established the overall NIMS to assure that systems, equipment and activities are of the required quality throughout the life cycle of our nuclear facilities

This document defines the program principles and requirements for the planning, organizing, execution and control of resources to ensure the safe and effective execution and completion of projects

Nuclear Managed System

This document describes the Program Objectives, Scope, Processes, Program Boundaries and Technical considerations guiding the Refurbishment Program

PgMPs describe how the program is managed to meet the intent of OPG's Nuclear Management Systems while establishing program-specific requirements

Pickering Refurbishment Project

PMPs establish the scope, cost and schedule baselines for managing the execution of a project. It defines the processes for measuring and controlling progress, monitoring performance and managing change

