

1 **DARLINGTON NEW NUCLEAR PROGRAM**
2 **OVERVIEW**

3
4 **1.0 SUMMARY**

5 The Darlington New Nuclear Program (“DNNP”) is a small modular reactor (“SMR”) project at
6 the eastern portion of OPG’s Darlington New Nuclear site. This first-of-a-kind project includes
7 the design, licensing, site preparation, construction, and commissioning of four SMR facilities
8 (referred to as units) using the BWRX-300 reactor technology.

9
10 During the 2027-2031 IR term, the first of these four units is scheduled to enter commercial
11 operation. The construction of this first unit is currently in progress. Planning and preparations
12 are ongoing for the remaining three units, with future construction subject to requisite
13 approvals.

14
15 The DNNP will have a total output of approximately 1,200 MW across the four units, which is
16 enough electricity to reliably and safely power about 1.2 million homes. An aerial photo of the
17 DNNP site as of October 2025 is provided in Figure 1 below.

1

Figure 1 – Aerial Photo of DNNP Site (October 2025)



2

3 The BWRX-300 SMR is a 300 MW water-cooled, natural circulation design with passive safety
4 systems. It leverages the existing Economic Simplified Boiling Water Reactor design
5 certification, utilizing licensed and proven nuclear fuel, incorporating proven components and
6 supply chains.

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8 The DNNP will help Ontario meet its demand for reliable, cost effective and clean energy. The
9 Province of Ontario has noted that:

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[T]he Ontario government has approved Ontario Power Generation's (OPG) plan to begin construction on the first of four small modular reactors (SMRs) at the Darlington nuclear site. Once complete, this SMR will be the first of its kind in the G7, producing enough reliable, affordable and clean electricity to power the equivalent of 300,000 homes, supporting thousands

1 of good-paying jobs across the province and helping secure
2 Ontario's energy supply for decades to come.¹
3

4 On September 11, 2025, Prime Minister Mark Carney announced that the DNNP was under
5 consideration as one of the nation-building projects that the Federal Government will support
6 through the newly established Major Projects Office. The Federal Government's
7 announcement noted that:

8
9 This project will make Canada the first G7 country to have an
10 operational small modular reactor (SMR), accelerating the
11 commercialization of a key technology that could support
12 Canadian and global clean energy needs while driving \$500
13 million annually into Ontario's nuclear supply chain. Once
14 complete, Darlington's first of four planned SMR units will
15 provide reliable, affordable, clean power to 300,000 homes,
16 while sustaining 3,700 jobs annually, including 18,000 during
17 construction, over the next 65 years.²
18

19 The DNNP project will be executed in phases. In the first phase, OPG (as the initial project
20 developer and ongoing Project Manager) will construct the first SMR unit and the Common
21 Scope Facilities (i.e., those common facilities necessary to support the first unit as well as the
22 remaining three units). The Common Scope Facilities include the Condenser Cooling Water
23 intake and discharge structures, and common buildings such as administration, fabrication and
24 security buildings. The first unit is planned to be placed in commercial operation in October
25 2030. This first phase is the focus of this Application. For ease of presentation, in this
26 Application the first SMR unit and the Common Scope Facilities are referred to as "Unit 1".
27

28 The Application provides evidence to support its request for approval of the forecast Unit 1 in-
29 service amount in 2030 and, pursuant to Ontario Regulation 53/05 ("O. Reg. 53/05"), the
30 recovery of interest amounts on capital expenditures for the DNNP prior to the underlying

¹ Province of Ontario, News Release: Ontario Leads the G7 by Building First Small Modular Reactor, May 8, 2025 <<https://news.ontario.ca/en/release/1005889/ontario-leads-the-g7-by-building-first-small-modular-reactor>>.

² Prime Minister of Canada, Prime Minister Carney announces first projects to be reviewed by the new Major Projects Office, September 11, 2025 <<https://www.pm.gc.ca/en/news/news-releases/2025/09/11/prime-minister-carney-announces-first-projects-be-reviewed-new>>.

1 assets being placed in service under the concurrent cost recovery (“CCR”) framework.³ More
2 specifically, the evidence demonstrates that:

- 3 • Detailed planning necessary to determine the scope for Unit 1 has been completed to
4 support a high confidence cost and schedule estimate for these facilities; and
- 5 • The project has in place the partners, contracting strategy, processes and oversight
6 necessary to execute Unit 1 safely, on time, on budget, and with the required quality.

7
8 During the execution of Unit 1, work will continue on planning and preparations for the
9 remaining three units at the DNNP site. None of these units will enter commercial operation or
10 have any associated forecast in-service amounts entering rate base during the IR term, and
11 none have been presently approved for construction by the Canadian Nuclear Safety
12 Commission (“CNSC”) or OPG’s Board of Directors.

13 14 **1.1 OPG and DNNP LP**

15 As discussed in Ex. A1-4-4, DNNP LP is expected to be a newly prescribed generator under
16 O. Reg. 53/05 and is entering into a lease for the DNNP facilities with OPG. DNNP LP will
17 undertake the development, construction, and operation of the DNNP facilities, with OPG
18 contracted to act as the project manager and operator of the facilities. The Application assumes
19 that DNNP LP enters into the lease and associated agreements and that the DNNP asset
20 transfer from OPG all occur at the end of 2025. DNNP LP will not have its own workforce and
21 will contract for all applicable services with OPG, and will therefore reimburse OPG for its fully
22 allocated costs of providing the services.

23
24 As such, while the evidence from Ex. D2-4-1 to Ex. D2-4-10 may refer to OPG as project
25 proponent or project owner, once the foregoing is completed, DNNP LP will be responsible for
26 the project’s completion and in-service. Any evidence set out in those exhibits regarding the

³ As discussed in Ex. I1-1-3, O. Reg. 53/05 has established a framework for recovery of interest amounts for capital expenditures on the DNNP prior to such assets being placed in service, expected to be effective January 1, 2026. The Application refers to this framework as concurrent cost recovery. In this Application, OPG’s request for approval for recovery of forecast interest amounts under this framework over the IR term includes all DNNP capital expenditures released to date by OPG’s Board of Directors.

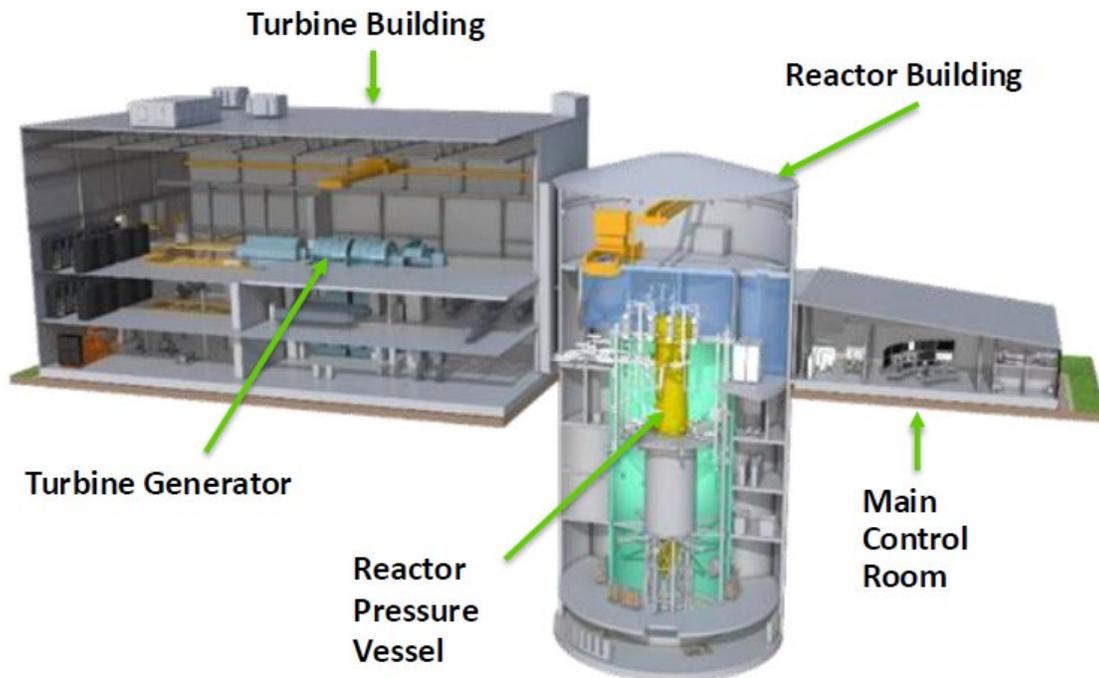
1 project is adopted by DNNP LP for purposes of this Application and the OEB's determination
2 of DNNP LP's revenue requirement in respect of the DNNP.

3 4 **1.2 Project History**

5 In 2018, OPG began the initial planning and preparation phase for a SMR facility at the
6 Darlington New Nuclear site where it has held a CNSC Licence to Prepare Site since 2012.
7 The early planning work focused on a review of available technologies.

8
9 In November 2021, after a rigorous technology selection process,⁴ OPG's Board of Directors
10 approved the selection of GE-Hitachi's BWRX-300 Boiling Water Reactor as the best
11 technology for the DNNP. The Province of Ontario concurred with this selection. A simplified
12 schematic of GE-Hitachi's BWRX-300 is provided in Figure 2 below.

13
14 **Figure 2 - BWRX-300 Technology Schematic**



15

⁴ Refer to EB-2023-0336, Ex. H1-1-1, Section 5.15 for details on the technology selection process.

1 With the technology selection process completed, OPG's Board of Directors approved the
2 project to move into the Initiation Phase as the first phase of the capital project. Key milestones
3 achieved during the Initiation Phase included the execution of initial commercial agreements,
4 completion of the conceptual design, engineering and early works planning, progression of the
5 cost and schedule estimate, and the submission of a Licence to Construct application to the
6 CNSC for the first SMR.

7
8 During this phase, the contractual framework for the DNNP was selected, including the main
9 program partners. This contractual work culminated in the execution of an Integrated Project
10 Agreement ("IPA") on January 1, 2023. The scope of the IPA provides for a stand-alone
11 BWRX-300 nuclear power plant, including design, engineering, licensing support,
12 procurement, construction, installation, testing, commissioning, completion and turnover of the
13 facility, including related training, infrastructure and ancillary buildings. The agreement sets out
14 responsibilities and accountabilities of the parties under the contractual framework.

15
16 In December 2022, OPG's Board of Directors gave approval for the project to proceed to the
17 Definition Phase. This approval was based on the significant progress achieved during the
18 earlier Initiation Phase.

19
20 The original parties to the IPA were OPG, GE-Hitachi Nuclear Energy Americas LLC / GEH
21 SMR Technologies Canada Ltd. (together, "GE-Hitachi"), Candu Energy Inc. (is a subsidiary
22 of AtkinsRéalis Group Inc., and is referred to throughout this Application as "Candu" or
23 "AtkinsRéalis") and AECON Construction Group Inc ("AECON"). The IPA was used to jointly
24 execute the planning work under the subsequent Definition Phase. For additional information
25 on this agreement and the contractual framework, see Ex. D2-4-2.

26
27 During the Definition Phase, OPG and the other parties to the IPA continued to progress
28 planning, detailed engineering, long lead time procurement and DNNP site preparations and
29 to demonstrate readiness for the execution of Unit 1. This included advancement of the

1 Standard Plant Design⁵ for major systems, procurement of all long lead items for Unit 1,
2 development of a detailed Unit 1 schedule, completion of a Class 3 cost estimate, completion
3 of site preparation activities and submission of the Licence to Construct application to the
4 CNSC.

5

6 In May 2025, a planned amendment to the IPA (the “Validation Amendment”) was executed,
7 reflecting the improved definition and maturity of the project. This amendment finalized the
8 Target Cost, pricing and compensation details, and the incentive / disincentive mechanisms to
9 drive “best for project” behaviours by the parties. This amendment also added Kiewit Nuclear
10 Canada Corp. (“Kiewit”) to the IPA to assist with the construction of the facility. The addition of
11 Kiewit allows them to fully participate in the construction of Unit 1.

12

13 Recognizing their shared accountability for construction of the facility, AECON and Kiewit
14 formed AECON Kiewit Nuclear Partners (“AECON Kiewit”), a general partnership between
15 AECON Construction Group and Kiewit Nuclear Canada Corp. This general partnership
16 became effective at the start of the Execution Phase for Unit 1.

17

18 On March 6, 2025, OPG’s Board of Directors approved the \$7.7B Release Quality Estimate
19 (“RQE”) for Unit 1, transitioning Unit 1 into the Execution Phase. On May 8, 2025, the Ontario
20 Government announced its approval of OPG’s plan to proceed with construction on the first of
21 four SMRs at the DNNP site.⁶

22

23 The RQE represents a comprehensive description of Unit 1’s scope, cost and schedule. It is a
24 Class 3 estimate, completed in accordance with the guidelines of the Association of
25 Advancement of Cost Engineering International Recommended Practices 18R-97 “Cost
26 Estimate Classification System-As Applied in Engineering, Procurement and Construction for

⁵ The Standard Plant Design refers to all the engineering design that is intended to be common across a fleet of BWRX-300 reactors. Site Specific Design refers to the design adaptations, additional work, and documentation required to tailor the Standard Design to the unique characteristics, regulatory requirements, and physical constraints of a particular site.

⁶ Province of Ontario, News Release: Ontario Leads the G7 by Building First Small Modular Reactor, May 8, 2025 <<https://news.ontario.ca/en/release/1005889/ontario-leads-the-g7-by-building-first-small-modular-reactor>>.

1 the Process Industries”. Chart 1 below provides a simplified breakdown of the Unit 1 RQE and
 2 its relationship to the forecast Unit 1 in-service addition during the IR term.

3
 4

Chart 1 - Simplified Breakdown of Unit 1 RQE⁷

Component	Cost (\$B)	% of RQE
Unit 1 ⁸	5.1	66
Contingency ⁹	1.4	18
RQE Capitalized Interest	1.2	16
Total RQE	7.7	100
Less: RQE Capitalized Interest after Jan. 1, 2026 due to CCR	(1.1)	
Capital In-Service Addition	6.6	

5

6 As approved by OPG’s Board of Directors, the three remaining units have progressed into the
 7 Definition Phase with a Class 4 estimate, with their RQEs to follow in future years. To date,
 8 \$521M in capital funding (including interest) has been released for the three remaining units
 9 to progress planning and early procurement activities. Other than the associated forecast CCR
 10 interest amounts totaling \$113.5M over the IR term, the Application is not seeking recovery of
 11 amounts in respect of the three remaining units.¹⁰

12

13 During the Execution Phase for Unit 1, OPG and the IPA parties will complete their respective
 14 work scopes under the oversight of the Execution Director, the Project Leadership Team and
 15 the program’s Executive Board. See Ex. D2-4-2 for additional information on project
 16 governance and structure.

⁷ The Unit 1 RQE does not include non-capital costs incurred, mainly in 2020-2021, in relation to technology selection and other preliminary planning and preparation activities in support of the November 2021 OPG Board of Directors’ decision to proceed with the capital project. As discussed in Section 4.1, these costs were approved for recovery in EB-2023-0336 through the balance in OPG’s Nuclear Development Variance Account. Unit 1 RQE only includes capital costs.

⁸ Approximately \$1.1B of the Unit 1 cost relates to Common Scope Facilities.

⁹ Includes associated escalation.

¹⁰ Actual capital costs incurred during the IR term in relation to the three subsequent DNNP units beyond the currently released funding will result in incremental CCR interest amounts that will be recorded for future recovery in the Darlington New Nuclear Project Variance Account re Capital Cost Amounts (see Ex. H1-1-1, Section 6.3).

1 The Execution Phase for Unit 1 will end with the final completion of construction and
2 commissioning of Unit 1, planned for October 2030, and the subsequent project closeout
3 activities.

4
5 As a result of O. Reg. 53/05 requiring the recovery of interest amounts in respect of the DNNP
6 prior to the underlying assets being placed in service, the associated forecast in-service
7 additions do not include capitalization of interest effective January 1, 2026. Project cost
8 performance will continue to be measured on an interest-included basis, with CCR interest
9 amounts replacing go-forward capitalized interest, against the \$7.7B RQE.

10
11 In addition, the federal government has proposed a 15% refundable Clean Electricity
12 investment tax credit ("CEITC") for certain clean electricity investments, including nuclear
13 energy equipment, that could be available to OPG. At the time of filing, no legislation
14 implementing this credit is in place and the CEITCs are not reflected in OPG's 2025-2031
15 Business Plan. OPG will account for such credits as a reduction in the capital costs of the
16 underlying projects. As discussed elsewhere in the evidence, the Application proposes to
17 return to customers the revenue requirement of the CEITCs through a series of variance
18 accounts, including the Darlington New Nuclear Project Variance Account re Development
19 ("DNNPVARD") established under O. Reg. 53/05. The CEITCs are discussed further in Ex. F4-
20 2-1, Section 3.6.1.

21 22 **2.0 APPROVALS SOUGHT**

23 This Application seeks approval for the following in respect of the DNNP:

- 24 • In-service additions to DNNP LP's rate base of \$6,585M in 2030 on a forecast basis.¹¹ If
25 actual additions to rate base or their timing are different from forecast amounts and their
26 timing, the revenue requirement impact of the difference will be recorded, subject to O.

¹¹ The Application also seeks disposition of the portion of OPG's Nuclear Development Variance Account balance as at December 31, 2024 related to the DNNP, as discussed in Ex. H1-1-1, Section 5.15.

1 Reg. 53/05, in the DNNPVARD and any amounts greater than the forecast amounts added
2 to rate base will be subject to a prudence review in a future proceeding.¹²

- 3 • DNNP CCR interest amounts on a forecast basis totaling \$1,119.7M over the 2027-2031
4 period as described in Ex. I1-1-3 and calculated in Ex. I1-1-1, Table 6. If actual CCR
5 interest amounts are different from the forecast amounts, the difference will be recorded,
6 subject to O. Reg. 53/05, in the Darlington New Nuclear Project Variance Account re
7 Capital Cost Amounts for future disposition.

8
9 As discussed in Ex. H1-1-1, Section 8.6, the DNNPVARD will capture and return to customers
10 the revenue requirement impact of any CEITCs received for the DNNP during the IR term.

11 12 **3.0 EVIDENCE ROADMAP**

13 The evidence related to DNNP is organized as follows:

- 14 • **Ex. D2-4-1 (Darlington New Nuclear Program Overview)** – provides a summary of the
15 program and its history, the approvals sought, and a description of the relevant regulatory
16 framework, including O. Reg. 53/05, the IESO Annual Planning Outlook, government
17 support and the relevant requirements of the CNSC.
- 18 • **Ex. D2-4-2 (Darlington New Nuclear Program Structure)** – explains the commercial and
19 contracting strategies for Unit 1 and describes how OPG has structured its role as project
20 Owner.
- 21 • **Ex. D2-4-3 (Darlington New Nuclear Program Contracts)** – explains the contractual
22 framework for Unit 1.
- 23 • **Ex. D2-4-4 (Darlington New Nuclear Program Planning)** – describes the work
24 undertaken during the planning process to develop an accurate scope, schedule and cost
25 estimate for Unit 1, including the incorporation of lessons learned from prior projects.
- 26 • **Ex. D2-4-5 (Darlington New Nuclear Program Scope)** – describes the steps taken during
27 the Definition Phase to define the Unit 1 scope, explains the importance of a well-defined
28 scope to successful execution and provides an overview of the scope.

¹² As further discussed in Ex. H1-1-1, Section 6.1, the DNNPVARD will also record, in accordance with O. Reg. 53/05, any net revenues earned or foregone by DNNP LP due to deviations from the OEB-approved production forecast for the DNNP facilities due to a difference between the actual in-service date and the OEB-approved forecast in-service date of Unit 1.

- 1 • **Ex. D2-4-6 (Darlington New Nuclear Program Schedule)** – describes how the Unit 1
2 schedule was developed, including how risks to the schedule were considered in the
3 planning process.
- 4 • **Ex. D2-4-7 (Darlington New Nuclear Program Contingency)** – describes the process by
5 which the contingency amounts were determined and why the use of a contingency
6 estimate is important to accurate Unit 1 costing.
- 7 • **Ex. D2-4-8 (Darlington New Nuclear Program Costs and In-Service Amounts)** –
8 describes the process by which the Class 3 RQE for Unit 1 was developed. It also provides
9 a break-down of these estimates by major work bundle and information on in-service
10 amounts.
- 11 • **Ex. D2-4-9 (Darlington New Nuclear Program Execution)** – describes how the execution
12 of work will be managed with the goal of delivering Unit 1 safely, on time, on budget, and
13 with the required quality, and provides a status update on this work.
- 14 • **Ex. D2-4-10 (Independent Studies)** – provides a summary of Pegasus Global Holdings,
15 Inc.’s independent and objective assessment of OPG’s plan and approach to the execution
16 of the DNNP. The final report is provided as an attachment to that exhibit.

17

18 A detailed breakdown of the DNNP evidence structure is provided as Attachment 1.

19

20 OPG has also engaged independent experts to review key aspects of the DNNP. The following
21 independent expert reports are provided in support of the evidence:

- 22 • A Better Through Total Collaboration (“BTTC”) review and assessment of the governance,
23 processes and procedures established and implemented by OPG to develop the DNNP
24 Unit 1 RQE (Ex. D2-4-8, Attachment 2);
- 25 • Opinion of Howard W. Ashcraft on OPG’s use of the Integrated Project Delivery (“IPD”)
26 contracting model – April 19, 2023 (Ex. D2-4-2, Attachment 1); and
- 27 • Opinion of Howard W. Ashcraft on OPG’s implementation of the IPD contracting model and
28 Validation Amendment to the IPA – September 26, 2025 (Ex. D2-4-2, Attachment 2).

1 In addition, OPG has retained an independent expert to provide evidence as follows:

- 2 • Pegasus Global Holdings, Inc., to provide an independent and objective assessment of
3 OPG's plan and approach to execution of the DNNP (Ex. D2-4-10, Attachment 1).
4

5 **4.0 REGULATORY AND PLANNING FRAMEWORK**

6 This section describes the key regulatory instruments, documents and frameworks that apply
7 to the DNNP.
8

9 **4.1 Ontario Regulation 53/05 and Prior OPG Applications**

10 **4.1.1 EB-2020-0290 and EB-2023-0336**

11 In EB-2020-0290, OPG identified non-capital preliminary planning and preparation costs in
12 2020 and 2021 for a new SMR at the Darlington New Nuclear site, to be recorded in OPG's
13 Nuclear Development Variance Account ("NDVA"). This included costs for technology designer
14 selection. In its EB-2020-0290 Decision and Order, the OEB found that these costs were
15 appropriate to be recorded in the NDVA. Over the 2020-2022 period, OPG recorded debit
16 additions of \$105.2M to the account in relation to non-capital preliminary planning and
17 preparation costs for an SMR at the Darlington New Nuclear site, the majority of which related
18 to selecting an appropriate technology for such SMR. These costs were reviewed in EB-2023-
19 0336 and approved for clearance through an OEB-approved settlement proposal.¹³
20

21 **4.1.2 DNNP LP and O. Reg. 53/05**

22 As discussed in Ex. A1-4-4, O. Reg. 53/05, sets out the criteria pursuant to which DNNP LP
23 becomes a prescribed generator as well as the OEB regulatory framework for its prescribed
24 assets, which include the DNNP. In addition, as discussed in Ex. I1-1-3, O. Reg. 53/05 was
25 amended in December 2025, to introduce provisions for the recovery of interest amounts in
26 respect of DNNP prior to the underlying assets being placed in-service.

¹³ OPG agreed to a \$91,000 reduction to the NDVA balance sought for recovery as part of the OEB-approved settlement proposal in EB-2023-0336.

1 **4.2 Government Support**

2 In October 2021, the Province of Ontario asked the IESO to develop a *Pathways to*
3 *Decarbonization* report. This report was released in December 2022 and recommended “no-
4 regrets” actions that could be taken today to develop needed electricity resources with long-
5 lead times. One of the report’s “no regrets” recommendations was to accelerate current efforts
6 to acquire new non-emitting supply, including the planning, siting and environmental
7 assessment work needed for new nuclear generation. The report specifically assumed that a
8 300 MW SMR will be online in Ontario by the end of the decade.¹⁴

9

10 On July 7, 2023, the Government of Ontario announced that it was working with OPG to
11 commence planning and licensing for three additional SMRs at the Darlington Nuclear site.

12

13 On July 10, 2023, the Government of Ontario released its *Powering Ontario’s Growth* (“POG”)
14 report. Building on the IESO’s earlier *Pathways to Decarbonization* work, the POG report
15 stated:

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22

Ontario’s CANDU reactors’ unique ability to be refurbished after
30-40 years helped Canada’s nuclear sector to continue to
thrive. In turn, this has positioned Ontario as a leading
jurisdiction in nuclear technology at a time when tackling climate
change and the need for clean zero-emitting energy is an
international priority.

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29

The provincial government is building on this experience and
moving forward with the first grid-scale SMR project in North
America at the Darlington nuclear site to help meet the demand
for reliable, affordable, and clean electricity, while at the same
time showcasing Ontario’s nuclear expertise to the world and
leveraging it to create export opportunities to drive economic
growth.¹⁵

¹⁴ Independent Electricity System Operator, *Pathways to Decarbonization: A report to the Minister of Energy*, December 15, 2022, p. 20 <<https://www.ieso.ca/-/media/Files/IESO/Document-Library/gas-phase-out/Pathways-to-Decarbonization.pdf>>.

¹⁵ Province of Ontario, *Powering Ontario’s Growth: Ontario’s Plan for a Clean Energy Future*, July 10, 2023, p. 45 <<https://www.ontario.ca/files/2023-07/energy-powering-ontarios-growth-report-en-2023-07-07.pdf>>

1 The Province of Ontario noted that it expects the modular construction of SMRs will drive down
2 the cost of future units and help cement Ontario's nuclear supply chain as a supplier to the
3 world.¹⁶ Accordingly, the report makes clear that the Government of Ontario is supportive of
4 advancing the planning and licencing for three additional SMRs at the Darlington New Nuclear
5 site.

6
7 As discussed above, on May 5, 2025, the Province of Ontario, following review of the cost
8 estimate for the DNNP, further announced that it had approved the plan to begin construction
9 of the first of four SMRs at the Darlington site, noting that:

10
11 The construction of the four units will support the government's
12 plan to protect Ontario's workers and economy by creating up to
13 18,000 Canadian jobs and injecting \$500 million on average
14 annually into Ontario's economy. The construction, operation
15 and maintenance of the four units will add \$38.5 billion to
16 Canada's GDP over the next 65 years.¹⁷
17

18 On June 12, 2025, the Province of Ontario released *Energy for Generations*, an integrated
19 energy plan.¹⁸ This plan is a comprehensive roadmap for meeting Ontario's future energy
20 needs out to 2050 and is anchored in four guiding principles: affordability, security, reliability
21 and clean energy. The plan confirmed the Province of Ontario's support for the four-unit DNNP
22 and affirmed that the construction, operation and maintenance of the four units will add \$38.5B
23 to Canada's GDP over the next 65 years with 80% of project spending going to Ontario
24 companies. Construction and operations will sustain, on average, an estimated 3,700 highly
25 skilled jobs for the next 65 years.

26
27 On October 23, 2025, the Province of Ontario and the federal government announced that,
28 through respective entities, they would be investing directly into the DNNP. The announcement
29 noted that, "The province and federal government are making historic investments in this
30 nation-building project, including a \$1 billion provincial investment through the Building Ontario

¹⁶ *Ibid.*

¹⁷ Province of Ontario, News Release: Ontario Leads the G7 by Building First Small Modular Reactor, May 8, 2025
<<https://news.ontario.ca/en/release/1005889/ontario-leads-the-g7-by-building-first-small-modular-reactor>>.

¹⁸ Energy for Generations – Ontario's Integrated Power Plan, June 2025 <<https://www.ontario.ca/files/2025-07/mem-energy-for-generations-en-2025-07-18.pdf>>.

1 Fund and a \$2 billion federal investment through the Canada Growth Fund, respectively.”¹⁹
2 These investment commitments form the basis for the DNNP LP partnership structure, as
3 discussed in Ex. A1-4-4.

4
5 Altogether, the DNNP is supported by both the provincial and federal governments as being
6 key to both Ontario and Canada’s future energy security.

7
8 **4.3 CNSC Regulatory Framework**

9 OPG’s nuclear operations are subject to the jurisdiction of the CNSC, an independent federal
10 government agency that derives its powers from the *Nuclear Safety and Control Act*.

11
12 The CNSC’s regulatory control extends to regulating all aspects of site preparation,
13 construction, operation, and decommissioning of nuclear facilities. The CNSC exercises its
14 mandate in respect of OPG’s nuclear operations through issuance of licences for defined
15 licensed activities and continuous monitoring and inspections to ensure compliance with those
16 licences.

17
18 The three CNSC licences necessary for the delivery of Unit 1 at the Darlington New Nuclear
19 site, and the status of those licences is as follows:

- 20 • **Licence to Prepare Site:** This licence requires the applicant to demonstrate the suitability
21 of the proposed site for the construction and operation of the nuclear facility, taking into
22 account the activities involved in preparing the site, and demonstration of adequate
23 consultation with stakeholders and consideration of their views.

¹⁹ Province of Ontario, News Release: Ontario Investing \$1 Billion to Build Small Modular Reactors at Darlington, October 23, 2025 <<https://news.ontario.ca/en/release/1006638/ontario-investing-1-billion-to-build-small-modular-reactors-at-darlington>>.

1 OPG received an initial Licence to Prepare Site from the CNSC in August 2012. In June
2 2020, OPG applied to the CNSC to renew the licence and in October 2021, the CNSC
3 issued the Licence to Prepare Site renewal to OPG for a period of 10 years, valid until
4 October 2031.

- 5
- 6 • **Licence to Construct:** This licence requires the applicant to demonstrate that the
7 proposed facility design conforms to regulatory requirements and will provide for safe
8 operation over the proposed life of the plant; and a demonstration of responsibility for all
9 activities pertaining to design, procurement, manufacturing, construction and
10 commissioning of the facility.

11

12 In October 2022, OPG applied for a Licence to Construct one BWRX-300 reactor and
13 supporting infrastructure at the Darlington New Nuclear site, and on April 24, 2024, the
14 CNSC announced that it had determined that the existing environmental assessment for
15 the DNNP was applicable to the GE-Hitachi BWRX-300 reactor. In making this
16 determination, the CNSC concluded that OPG's proposed SMR technology was bounded
17 by the existing environmental assessment and that OPG's commitments remained
18 appropriate. A Licence to Construct for one BWRX-300 reactor was subsequently issued
19 by the CNSC on April 4, 2025.

- 20
- 21 • **Licence to Operate:** This licence requires the applicant to demonstrate that appropriate
22 safety management systems, plans and programs have been established and that any
23 outstanding issues from the construction stage have been resolved. OPG plans to submit
24 a Licence to Operate application for Unit 1 in 2026.

1

LIST OF ATTACHMENTS

2

3 Attachment 1: Detailed Breakdown of Evidence Structure

1 **Attachment 1: Detailed Breakdown of Evidence Structure**

2
3 The Darlington New Nuclear Program (“DNNP”) evidence is organized into 10 different
4 schedules as follows:

5
6 **Ex: D2-4-1: Darlington New Nuclear Program Overview**

7 1.0 Summary

8 1.1 OPG and DNNP LP

9 1.2 Project History

10 2.0 Approvals Sought

11 3.0 Evidence Roadmap

12 4.0 Regulatory and Planning Framework

13 4.1 Ontario Regulation 53/05 and Prior OPG Applications

14 4.1.1 EB-2020-0290 and EB-2023-0336

15 4.1.2 DNNP LP and O. Reg. 53/05

16 4.2 Government Support

17 4.3 CNSC Regulatory Framework

18 Attachments

19 Attachment 1: Detailed Breakdown of Evidence Structure

20
21 **Ex: D2-4-2: Darlington New Nuclear Program Structure**

22 1.0 Overview

23 2.0 Commercial and Contracting Strategies

24 2.1 IPD Principles and Benefits

25 3.0 Organization Structure and OPG as Owner and Licence Holder

26 3.1 Owner Oversight

27 3.2 Overall Management Team

28 3.3 Project Management Teams

29 3.4 Functional Teams

30 3.4.1 Procurement Function

31 3.4.2 Site Engineering Office Function

- 1 4.5.2 Sub-Contractors
- 2 4.5.3 Audit
- 3 4.5.4 Fuel Assemblies
- 4 4.5.5 Warranties
- 5 4.5.6 Change Orders

6 Attachments

- 7 Attachment 1: Illustrative Incentive/Disincentive Scenarios
- 8 Attachment 2: Integrated Project Agreement Summary

9

10 **Ex: D2-4-4: Darlington New Nuclear Program Planning**

- 11 1.0 Overview
- 12 2.0 Planning
 - 13 2.1 First-of-a-Kind Risks
 - 14 2.1.1 Selecting the Right Partners
 - 15 2.1.2 Selecting the Right Commercial Framework
 - 16 2.1.3 Regulatory Engagement
 - 17 2.2 Investment in Planning
 - 18 2.3 Lessons Learned
 - 19 2.4 Engineering and Licensing Progression
 - 20 2.5 Key Component Mock-up and Testing

21 Attachments

- 22 Attachment 1: Detailed Description of DNNP Program Phases

23

24 **Ex: D2-4-5: Darlington New Nuclear Program Scope**

- 25 1.0 Overview
- 26 2.0 Importance of Scoping
- 27 3.0 Approach to Work Scope Definition
- 28 4.0 Structure of Major Work Bundles
- 29 5.0 Scope for Major Work Bundles
 - 30 5.1 Owner Program & IPD Project Management Office (“PMO”)
 - 31 5.1.1 OPG’s Program Management and PMO

1		5.1.2	NOPs' PMOs
2	5.2		Site Preparation
3	5.3		Design Engineering
4	5.4		Nuclear Island
5		5.4.1	Reactor Building
6		5.4.1.1	Reactor Building Structure
7		5.4.1.2	Reactor Pressure Vessel and Internals
8		5.4.1.3	Key Structures, Systems and Components
9		5.4.2	Other Buildings within Nuclear Island
10	5.5		Conventional Island
11		5.5.1	Turbine Building
12		5.5.1.1	Steam Supply, Turbine Generator and Other Support Systems
13		5.5.2	Grid Connection
14	5.6		Balance of Plant
15		5.6.1	General Facilities and Site Infrastructure
16		5.6.2	Condenser Cooling Water System
17		5.6.3	Power Block and Yard Construction
18	5.7		Digital Strategy
19	5.8		Commissioning and Start-up
20			
21			Ex: D2-4-6: Darlington New Nuclear Program Schedule
22	1.0		Overview
23	2.0		Schedule Development
24	3.0		Multi-Level Scheduling Approach
25	4.0		Critical Path and Schedule Overview
26	5.0		Working Schedule Versus High Confidence Schedule
27			Attachments
28		Attachment 1:	Unit 1 Release Quality Estimate Project Working Schedule
29			Diagram
30			Ex: D2-4-7: Darlington New Nuclear Program Contingency
31	1.0		Overview

- 1 2.0 Contingency
- 2 3.0 Contingency Development
- 3 3.1 Qualitative and Quantitative Risk Assessment
- 4 4.0 Contingency Amounts

5

6 **Ex: D2-4-8: Darlington New Nuclear Program Costs and In-Service Amounts**

- 7 1.0 Overview
- 8 2.0 Unit 1 Release Quality Estimate
 - 9 2.1 Cost Estimating Structure
 - 10 2.1.1 IPA Costs
 - 11 2.1.2 Non-IPA Costs
 - 12 3.0 Unit 1 Cost and In-Service Amount Breakdown
 - 13 3.1 Concurrent Cost Recovery
 - 14 3.2 In-Service Envelope and Development Variance
 - 15 Account
 - 16 4.0 Unit 1 Major Work Bundle Costs Breakdown
 - 17 4.1 Owner Program & IPD PMO
 - 18 4.2 Site Preparation
 - 19 4.3 Design Engineering
 - 20 4.4 Nuclear Island
 - 21 4.5 Conventional Island
 - 22 4.6 Balance of Plant
 - 23 4.7 Digital Strategy
 - 24 4.8 Commissioning and Startup
 - 25 5.0 Units 2-4 Status
 - 26 6.0 IR Term Capital Expenditures and In-Service Amounts

27 Attachments

- 28 Attachment 1: DNNP Unit 1 Execution Phase Funding Release and Units 2-4
- 29 Definition Phase Funding Release, March 2025
- 30 Attachment 2: BTTC Third-Party Assurance Report on RQE

31

1 **Ex: D2-4-9: Darlington New Nuclear Program Execution**

2 1.0 Overview

3 2.0 Project Execution and Support by Functional Teams

4 3.0 Project Management Office Function

5 4.0 Operations and Maintenance Function

6 5.0 Cost and Schedule Performance Monitoring

7 6.0 Risk Management

8 7.0 Change Management

9 7.1 Initiation

10 7.2 Screening Scope Changes/Additions

11 7.3 Review and Evaluate

12 7.4 Decision

13 7.5 Implementation

14 8.0 Reporting

15 9.0 Oversight

16 9.1 External Assurance

17 9.2 Internal Assurance

18 9.3 Integrated Project Agreement Parties Assurance Programs

19 10.0 Current Status as of September 30, 2025

20

21 **Ex: D2-4-10: Darlington New Nuclear Program Independent Studies**

22 1.0 Independent Review of Plan and Approach to Program Execution

23 Attachments

24 Attachment 1: Pegasus Global Holdings, Inc. – Testimony of Joseph Miller

25 Attachment 2: Pegasus Global Holdings, Inc. Engagement Letter

DARLINGTON NEW NUCLEAR PROGRAM STRUCTURE

1.0 OVERVIEW

This exhibit describes the methods by which OPG will manage the Darlington New Nuclear Program (“DNNP”) and delivery of Unit 1 / Common Scope Facilities (“Unit 1”), on behalf of DNNP LP. These methods include the commercial and contracting strategies used and the OPG Management System.

The OPG Management System provides a framework for project execution through established controls. The value of this system has been demonstrated through the effective execution of other major projects, including the Darlington Refurbishment Program (“DRP”). Refer to Attachment 3 for additional information on the OPG Management System.

This exhibit explains how the commercial and contracting structure underpinning the DNNP supports the project’s successful execution. It also includes an explanation of the principles and benefits of an Integrated Project Delivery (“IPD”) Model and why this model is the best model for the DNNP.

In addition, this exhibit explains how OPG has organized itself to operate in the role of Owner and Licence Holder. It describes the roles of the other main parties to the project, including the structure and governance of the project’s Executive Board, Project Leadership Team, and the various Project Management and Functional Teams.

2.0 COMMERCIAL AND CONTRACTING STRATEGIES

The DNNP is a large, complex first-of-a-kind project. To manage the work, OPG developed an overall commercial strategy as well as contracting strategies for specific scopes of work.

The commercial strategy is a commercial framework with guiding principles for establishing and maintaining commercial relationships with third parties to support the DNNP.

1 Prior to selecting its commercial strategy, OPG reviewed best practices from industry
2 associations and performed benchmarking of other large construction projects. The primary
3 commercial strategy selected by OPG to deliver Unit 1 is an IPD model in which the key
4 parties involved in the design, fabrication and construction of a project are joined together
5 under a single agreement.

6

7 The main benefits of an IPD model are:

- 8 • integrated people, systems, and processes to enhance team collaboration and optimize
9 project outcomes, reduce waste, improve workflow and maximize value;
- 10 • early involvement by all participants such that facilities managers, end users, contractors
11 and suppliers are all involved in the design process;
- 12 • processes are outcome-driven, and decisions are made collaboratively by project team
13 members from the various organizations by considering what is “best for project”.
- 14 • communications throughout the project are open and transparent; and
- 15 • a shared risk and reward structure, appropriately balanced between team members, is
16 used over the life of a project to incent all parties to work towards common project
17 objectives.

18

19 This model builds on the successes of the One Team¹ approach that was used by the DRP.

20 It also reflects key learnings from the “Strategic Project Management Lessons Learned and
21 Best Practices for New Nuclear Power Construction” published by the Nuclear Energy
22 Institute.² In these reports, the Nuclear Energy Institute concluded that:

23

24 Industry data and our personal experience clearly show that
25 an owner-led integrated project team approach is the best
26 strategic organization practice that has achieved the greatest

¹ The “One Team” approach is based on recognizing that OPG and the Non-Owner Parties have a variety of talent, and that in the interest of the best outcomes for the DNNP, each organization should provide that “best” resource to the team in the position where that person can yield the highest value in terms of DNNP outcomes. The One Team approach was successfully implemented on the Darlington Refurbishment Program as described in EB-2020-0290, Ex. D2-2-3 “Remaining Units Planning” and Ex. D2-2-4 “Contracts”.

² The Nuclear Energy Institute (“NEI”) is a trusted resource for member companies, government agencies and officials, and news outlets and publications covering nuclear clean energy. NEI conducts research and provides meaningful insights, enhancing member understanding of the trends that impact their businesses.

1 degree of success for NNP and other construction first-of-a-
2 kind (“FOAK”) projects.³
3

4 The key parties in the DNNP IPD model are the Owner and Licence Holder (OPG), the
5 technology Designer (GE-Hitachi), the Architect and Engineering Firm (AtkinsRéalis), and
6 the Constructor (AECOM Kiewit).
7

8 The Owner and Licence Holder is responsible for, among other things, defining the project’s
9 requirements, providing access to the site, undertaking all Canadian Nuclear Safety
10 Commission licensing activities (with the assistance of the other parties to the agreement as
11 required), and leading operational commissioning.
12

13 The remaining three parties to the agreement (GE-Hitachi, AtkinsRéalis and AECOM Kiewit)
14 are responsible for delivering a fully functional facility in accordance with OPG’s
15 requirements. Details on the IPD commercial strategy, parties, and their roles and
16 responsibilities are provided in Ex. D2-4-3.
17

18 The principles and benefits of this model, as well as a comparison to more traditional design-
19 bid-build (“DBB”) or engineering, procurement and construction (“EPC”) models, are
20 provided in Section 2.1 below.
21

22 **2.1 IPD Principles and Benefits**

23 The IPD model is a delivery method that enhances project collaboration and integration
24 between the parties throughout all phases of the project. It employs risk sharing rather than
25 risk transfer. IPD encourages proactive behavior by removing impediments to creativity and
26 collaboration, aligning stakeholders’ goals with project objectives, and incentivizing action
27 that adds value to the project.⁴

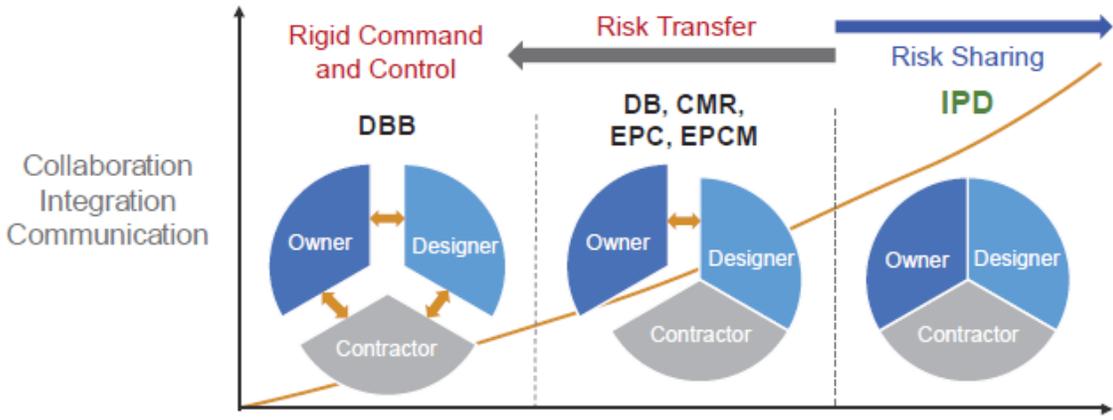
³ Nuclear Energy Institute. (2020). “NEI 20-08, Strategic Project Management Lessons Learned & Best Practices for New Nuclear Power Construction”, p. 16.

⁴ Ashcraft, H. W., “The IPD Framework.” White paper (San Francisco, CA: Hanson Bridgett LLP, 2012).

1 The shift from risk transfer to risk sharing represents a change in project delivery philosophy
 2 that is intended to create a high level of trust and to promote open communication among
 3 project participants. Figure 1 shows the evolution of project delivery methods and the
 4 expected improvements in collaboration, integration, and communication. Figure 2 identifies
 5 the components and culture of various delivery models.⁵

6
 7

Figure 1 - Project Delivery Method Shift from Risk Transfer to Risk Sharing



8
 9

Figure 2 - Components and Culture of Various Project Delivery Methods



11

⁵ Construction Industry Institute Final Report 341 "Integrated Project Delivery for Industrial Projects".

1 **Design-Bid-Build (“DBB”)** uses bilateral transactional contracts to transfer project
2 risks and create a win-lose or “best for me” culture with a defined decision-making
3 hierarchy.

4
5 **Engineering, Procurement and Construction (“EPC”)** adds some elements that
6 increase project collaboration and integration, such as early involvement of key
7 participants, partnering, and front-end planning.

8
9 **Integrated Project Delivery (“IPD”)** is a progression to a completely integrated and
10 collaborative project delivery method, shifting from a transactional contract to a
11 relational contract, incorporating shared project risks and rewards and a more
12 collaborative decision-making process, and focusing on what is “best for the project”
13 instead of what is “best for me.”

14
15 The IPD model is not a replacement of other commercial approaches such as DBB or EPC.
16 Rather, the IPD model represents a commercial strategy option that can be adopted taking
17 into consideration factors including project size, scope, complexity, application of first-of-a-
18 kind technology, regulatory environment, vendor capacity and capability, risk tolerance of
19 owner and vendors, and owner engagement requirements.

20
21 For example, the DRP and Pickering Refurbishment Program (“PRP”) have implemented a
22 “multi-prime contractor” model in which each program has more than one prime contractor.
23 In this model, the Owner has a separate contract with each prime contractor, and each prime
24 contractor is responsible for completion of the work that is within the scope of its particular
25 contract. The Owner is the integrator among the prime contractors and is responsible for the
26 entire program.

27
28 The multi-prime contractor model works well when the project scope definition is more
29 defined, specific and detailed scope can be assigned to a single contractor, and low levels
30 of contractor integration are required. In this model, OPG retains control over the entire
31 refurbishment program, including the deliverables, costs and schedule, and OPG can assign

1 risks to the parties best able to manage those risks. This strategy allows OPG to agree to a
2 reasonable balance between the transfer of risk to contractors and the costs of the contracted
3 services. Details on the PRP commercial strategy are provided in Ex. D2-3-3 and details on
4 the DRP commercial strategy were provided in EB-2016-0152.⁶ In contrast, given the size,
5 complexity and inherent uncertainties associated with the design and construction of a first-
6 of-a-kind nuclear facility, the risk transfer that occurs in a multi-prime model would not be
7 cost-effective for the DNNP.

8
9 Instead, OPG selected the collaborative IPD model for Unit 1. The IPD model is a mature
10 commercial strategy that has been successfully applied since the mid 2000s. It has been
11 utilized for many significant infrastructure and industrial projects. The development of the
12 IPD model was partly a response to a lack of productivity growth in the construction industry.
13 Research by the Lean Construction Institute, the American Institute of Architects, California
14 Council, and the Center for Integrated Facility Engineering, Stanford University led to a new
15 model IPD that collaboratively harnesses the talents and insights of all participants to
16 optimize efficiency. Survey results from projects that used IPD showed lower cost and
17 schedule growth over the project and higher owner satisfaction scores.⁷

18
19 The American Institute of Architects, National and California Council has identified nine
20 principles necessary for a successful application of an IPD model.⁸ These principles have
21 been embedded into the DNNP organization, processes and technology, and are reflected
22 in the commercial arrangements.

- 23 • Mutual Respect and Trust – All parties understand the value of collaboration and are
24 committed to work as a team in the best interests of the project.
- 25 • Mutual Benefit and Reward – All participants benefit from the IPD. Compensation
26 structures recognize and reward early involvement. Compensation is based on the value

⁶ See EB-2016-0152, Ex. D2-2-2 for further information.

⁷ IPD: Performance, Expectations, and Future Use, University of Minnesota, September 25, 2015
<<https://ipda.ca/site/assets/files/1144/20150925-ipda-ipd-survey-report.pdf>>.

⁸ Integrated Project Delivery: A Guide, The American Institute of Architects, 2007
<https://assets.aiacontracts.com/ctrzdweb02/zdpdfs/ipd_guide.pdf>.

1 added by an organization and it rewards “what’s best for project” behavior, such as
2 providing incentives tied to achieving project goals.

- 3 • Collaborative Innovation and Decision Making – Ideas are freely exchanged among all
4 participants. Key decisions are evaluated by the project team and, to the greatest
5 practical extent, made unanimously.
- 6 • Early Involvement of Key Participants – Key participants are involved from the earliest
7 practical movement. Decision making is improved by the influx of knowledge and
8 expertise of all key participants.
- 9 • Early Goal Definition – Project goals are developed early, agreed upon and respected by
10 all participants. Project outcomes are held at the center within a framework of individual
11 participant objectives and values.
- 12 • Intensified Planning – The IPD approach recognizes that increased effort in planning
13 results in increased efficiency and savings during execution.
- 14 • Open Communication – IPD’s focus on team performance is based on open, direct, and
15 honest communication among all participants. Responsibilities are clearly defined in a
16 no-blame culture leading to identification and resolution of problems. Disputes are
17 recognized as they occur and promptly resolved.
- 18 • Appropriate Technology – Technologies are specified early to maximize functionality,
19 generality and interoperability. Open and interoperable data exchanges based on
20 disciplined and transparent data structures are essential to support IPD.
- 21 • Organization and Leadership – The project team members are committed to the project’s
22 goals and values. Leadership is taken by the team member most capable of doing the
23 specific work or services with support from the entire team. This is referred to as the ‘best
24 athlete’ approach. Roles are clearly defined, and the environment supports open
25 communication and appropriate risk taking.

26
27 In a project with the size, complexity and first-of-a-kind nature of the DNNP, it is critical that
28 the responsibilities and accountabilities for project risks and execution be clear. It is also
29 critical that incentives be put in place to promote the best outcomes for the project, with a
30 focus on cost management, schedule adherence and generation performance. Adoption of
31 an IPD model provides a commercial framework that promotes these best outcomes while

1 recognizing the uncertainty associated with first-of-a-kind projects and the shared
2 management of risks.

3
4 OPG's use of the IPD model was reviewed by Howard W. Ashcraft, a construction lawyer
5 with extensive experience in major infrastructure projects and an IPD expert. Mr. Ashcraft
6 concluded that IPD was the best choice for the DNNP and further stated:

7

8 The Darlington SMR is a First-of-a-kind (FOAK) project. I
9 believe IPD is well suited to meet the challenges of nuclear
10 generation FOAK projects, even challenges that are unknown
11 at the time of contracting. IPD's flexibility allows it to adjust
12 while adhering to the initial project principles and goals. In
13 addition, the jointly shared risk/reward (profit) pool buffers
14 overruns and is an incentive to meet the agreed goals. Joint
15 validation and project management increases commitment to
16 project success and transparency. Moreover, limiting change
17 orders and claims among the parties, in combination with a
18 risk/reward pool that is allocated based on project rather than
19 individual success, compels the parties to solve problems
20 because it is the most financially fruitful path for all parties. In
21 comparison with traditional project delivery, IPD is a good
22 solution to achieving higher performance, lower risk, and
23 balanced accountability in a FOAK nuclear generation project.

24

25 OPG has properly adapted IPD principles to a nuclear
26 generation project, with due consideration of nuclear safety
27 and regulatory constraints and the compromises necessary to
28 make a major project feasible. The IPD contract that has been
29 prepared provides an excellence foundation for organizing and
30 successfully executing the project.⁹

31

32 Mr. Ashcraft's opinion on OPG's use of the IPD model is provided as Attachment 1 to this
33 exhibit. In September 2025, Mr. Ashcraft further reviewed OPG's implementation of the IPD
34 model to date, including the execution of a validation agreement as between the IPD
35 partners. This opinion is attached as Attachment 2 to this exhibit.

⁹ Ashcraft, H. W., "Use of IPD for the Darlington Small Nuclear Reactor" (Seventh Star LLC, April 2023), p. 2.

1 Key elements of the IPD contractual model and details on how OPG will use this model to
2 enable successfully delivery of the DNNP are provided in Ex. D2-4-3.

3
4 **3.0 ORGANIZATION STRUCTURE AND OPG AS OWNER AND LICENCE HOLDER**

5 The organization structure and OPG's role as Owner and Licence Holder reflects the
6 commercial strategy and IPD model adopted for Unit 1. OPG retains overall responsibility for
7 deliverables, costs and schedule and continues to serve as the design authority for the
8 DNNP. OPG will always remain the License Holder of this site in accordance with Canadian
9 Nuclear Safety Commission regulations and license requirements and has established an
10 organization structure to optimize oversight and project management of all contract partners
11 for the DNNP licensed activities.

12
13 To effectively perform the various aspects of this role, OPG has established an organization
14 structure that is aligned with its commercial model, which allows for increased integration
15 and collaboration between the IPD partners. Owner oversight is maintained separately from
16 the integrated teams to ensure independence and ultimate accountability as the licensee.
17 Details on oversight and project assurance are provided in Ex. D2-4-9.

18
19 OPG will retain overall accountability for the licensed activities conducted during the Licence
20 to Construct phase. GE-Hitachi is the Design Authority¹⁰ for the power block (nuclear and
21 conventional systems in the powerhouse), the intake structure, and switchyard systems and
22 structures. OPG is the Design Authority for site establishment, temporary works, and
23 interfaces with existing OPG structures, systems, and components. GE-Hitachi will maintain
24 Design Authority through the design, construction, inspection and testing, and fuel-out
25 commissioning phases. Design Authority for the entire facility will transfer to OPG prior to
26 fuel load, at the same time as Operational Authority.

¹⁰ The Design Authority is responsible for: the management of design; defining/controlling the design basis, authorizing design changes; maintaining configuration control; ensuring work is performed by qualified and competent people; and ensuring that the requisite knowledge is maintained

1 Staffing and resourcing needs will vary over the lifecycle of the project to reflect the scope
2 and key deliverables of the project phases. The project scope is comprised of eight Major
3 Work Bundles:

- 4 • Owner Program and IPD Project Management Office
- 5 • Site Preparation
- 6 • Design Engineering
- 7 • Nuclear Island
- 8 • Conventional Island
- 9 • Balance of Plant
- 10 • Digital Strategy
- 11 • Commissioning and Start-up

12
13 With the Site Preparation scope essentially complete, the Design Engineering, Nuclear
14 Island, Conventional Island and Balance of Plant Major Work Bundles contain most of the
15 remaining design and construction scope, which is the focus of the Unit 1 Execution Phase.
16 These four Major Work Bundles are also referred to as “Execution Bundles”. The scope and
17 description of each Major Work Bundle is provided in Ex. D2-4-5 and the project phases are
18 described in Ex. D2-4-4.

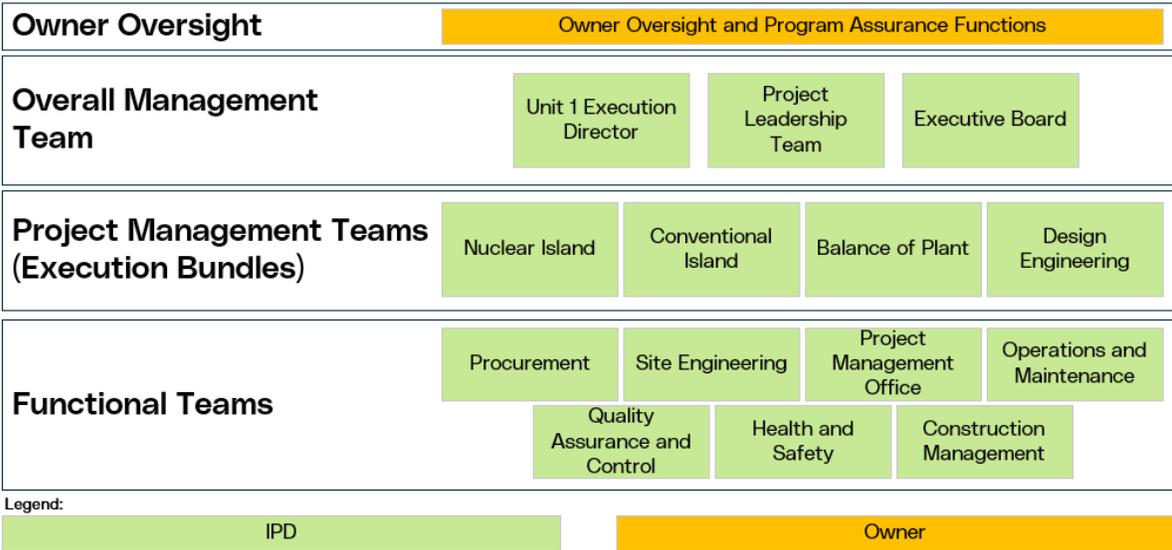
19
20 The Execution Phase organization for Unit 1 is designed around the delivery of the Execution
21 Bundles. The organization structure consists of four primary aspects.

- 22 • The **Overall Management Team** which has a tiered governance model enabling
23 decisions to be made as close to the workforce as possible, with escalation of larger, more
24 strategic decisions for senior level decision making.
- 25 • Dedicated **Project Management Teams** (“PMT”) that are responsible for the
26 management, oversight and delivery of the Execution Bundle scope.
- 27 • **Functional Teams** that are dedicated to performing specific types of work associated
28 with their functional area, provide program management within that area, and provide
29 support across the Execution Bundles.
- 30 • **Owner Oversight** outside of the IPD team.

1 Most roles within the PMT and Functional Teams are staffed using a “best athlete” approach,
 2 where the incumbent to the position may come from any of the four partner companies,
 3 avoiding duplication of roles and cost. There are key roles within the PMT and Functional
 4 Teams that must be staffed by OPG, as the Owner. Additionally, there are key roles within
 5 the PMT and Functional Teams which require the Project Leadership Team (“PLT”,
 6 described below) to approve the proposed incumbent. A description of these roles is provided
 7 in the Darlington New Nuclear Project – Program Management Plan which is included in
 8 Attachment 3.

9
 10 A diagram of how the organization is structured, including the Overall Management Team,
 11 dedicated PMTs, the Functional Teams, and Owner Oversight is provided in Figure 3 below.

12
 13 **Figure 3 – DNNP Unit 1 Organizational Structure**



14
 15 The organizational structure for DNNP Unit 1, as well as the roles and responsibilities
 16 detailed within the IPD commercial terms, address delivery of the full Unit 1 scope described
 17 in Ex. D2-4-5.

1 **3.1 Owner Oversight**

2 In addition to Functional Teams within the IPD, OPG retains its own oversight function to
3 support the project. This oversight function includes support and program assurance from
4 external organizations such as independent oversight bodies and internal oversight provided
5 by functional groups such as Planning and Controls function, Finance, Human Resources,
6 Nuclear Regulatory Affairs and Indigenous Relations. This oversight function is described in
7 further detail in Ex. D2-4-9.

8
9 **3.2 Overall Management Team**

10 The Overall Management Team structure reflects the collaborative principles of an IPD
11 model and adopts a tiered approach to governance and decision-making. The Overall
12 Management Team consists of the following three levels:

- 13 • **Executive Board** – Comprised of four executive members from each of the four IPD
14 parties. The Executive Board is responsible for strategic oversight of the DNNP and will
15 provide executive-level Integrated Project Agreement (“IPA”)¹¹ collaborative guidance for
16 the DNNP to achieve its objectives. Executive Board decisions are made by a majority
17 of the parties, however OPG may override decisions if it does not agree. In addition, since
18 it (and subsequently DNNP LP) carries the most risk, OPG can overrule an Executive
19 Board decision on certain issues set out in the IPA. Additional detail on the Executive
20 Board and OPG’s rights can be found in Ex. D2-4-3, Section 4.2.
- 21 • **Project Leadership Team** – Comprised of dedicated strategic level leadership with
22 representation from the four parties. The PLT is responsible for providing project
23 oversight, strategic project decisions, staffing, dispute resolution and overall
24 accountability for the DNNP IPD model. The PLT provides management-level
25 collaborative guidance to the parties and to the PMTs for the DNNP to achieve its
26 objectives. The PLT is accountable for monitoring project progress and for developing
27 benchmarks, metrics, and standards for progress evaluation. The PLT has authority to
28 approve changes within their prescribed level of authority and decisions must be

¹¹ Details on the IPA provided in Ex. D2-4-3.

1 unanimous. If the PLT cannot reach a unanimous decision, the unresolved issue is
2 escalated to the Executive Board.

- 3 • **Unit 1 Execution Director** – Provides overall accountability for the construction of Unit
4 1, including its delivery within the established cost and schedule. The Execution Director
5 leads the Nuclear Island, Conventional Island, and Balance of Plant Execution Bundles
6 and the Construction Management and Health and Safety Functions. They have
7 authority to set priorities across all work bundles. The Execution Director reports to the
8 PLT.

9
10 Details on the change control process and integration of these roles within the broader
11 oversight model for the program is described in Ex. D2-4-9. Details on the IPD commercial
12 agreement are provided in Ex. D2-4-3.

13 14 **3.3 Project Management Teams**

15 Dedicated PMTs have been established for each of the four Execution Bundles: Design
16 Engineering, Nuclear Island, Conventional Island and Balance of Plant.

17
18 Each PMT has a Lead. The PMT Lead reports into the Unit 1 Execution Director (or
19 responsible PLT Lead for the Design Engineering Work Bundle) and is responsible for
20 ensuring the effective planning and successful execution of their major work bundle, and for
21 ensuring that their team (consisting of OPG and IPD partner members) deliver the work
22 safely, to the quality specified, on time and on budget. A PMT Lead is supported by a
23 dedicated PMT, as well as by Functional Teams. The Execution Bundles are:

- 24 • Design Engineering Bundle – PMT Lead is responsible for the engineering design of the
25 project from conceptual through detailed site-specific design.
- 26 • Nuclear Island Execution Bundle – PMT Lead is responsible for the planning and
27 execution of procurement and installation activities associated with the Reactor Building,
28 Control Building, and Radwaste Building.
- 29 • Conventional Island Execution Bundle – PMT Lead is responsible for the planning and
30 execution of procurement and installation activities associated with the Turbine
31 Generator, Turbine Building, Annex Building, and Conventional Island systems.

- 1 • Balance of Plant Execution Bundle – PMT Lead is responsible for planning and execution
2 of the procurement and construction activities for the remainder of the facilities outside
3 of the Power Block,¹² as well as the overall site preparation and site management during
4 construction.

5
6 Details on the Unit 1 scope consisting of the eight Major Work Bundles, including the four
7 Execution Bundles, is provided in Ex. D2-4-5. As explained in Ex. D2-4-8, the costs
8 associated with this project management role form part of the cost for each of the Major Work
9 Bundles.

10 11 **3.4 Functional Teams**

12 The Functional Teams are dedicated to performing specific types of support for the Execution
13 Bundles and the DNNP as a whole. Functional Teams set standards, manage the DNNP at
14 the overall level and provide support in specific areas (such as quality, procurement,
15 construction and digital strategy). The Functional Teams are responsible for providing the
16 required support, coordination, integration and oversight of the work that is performed by the
17 PMTs. Each of the Functional Teams is described below.

18
19 As explained in Ex. D2-4-8, the costs associated with each Functional Team form part of the
20 cost for each of the Major Work Bundles.

21 22 **3.4.1 Procurement Function**

23 The Procurement Function is responsible for developing and leading the overall procurement
24 strategy for all major work bundles, ensuring alignment with cost, schedule, quality, and
25 regulatory requirements. This includes overseeing bundle-level procurement teams,
26 standardizing procurement processes, promoting local and Indigenous sourcing, and
27 managing supplier relationships. The function also ensures just-in-time delivery of critical
28 materials, enforces supplier performance standards, coordinates with other project functions,
29 and maintains a strong procurement team to support the project's long-term success.

¹² Power Block refers to the nuclear and conventional systems in the powerhouse.

1 3.4.2 Site Engineering Office Function

2 The Site Engineering Office acts as the point of contact for the Design Authority at the site,
3 ensuring all work aligns with design and regulatory requirements. It leads the resolution of
4 technical and design issues during construction, oversees site engineering staff across all
5 disciplines, manages design changes, supports construction and operations teams to uphold
6 design intent, and maintains document control as well as engineering team readiness. The
7 office also plays a role in risk management related to engineering activities.

8
9 3.4.3 Project Management Office Function

10 The Project Management Office (“PMO”) leads the governance, integration, and coordination
11 of project execution support functions to enable schedule adherence, cost control, risk
12 management, and effective decision-making. The team ensures that project management
13 processes, tools, and reporting standards are established, implemented, and maintained
14 across all PMT and Functional Teams to support predictable project outcomes. This includes
15 managing the digital platforms for the project, specifically the common data environment
16 shared between the parties. The PMO oversees development and continuous improvement
17 of project performance management systems, including schedule and cost dashboards,
18 earned value metrics, and executive-level reporting, and facilitates cross-functional
19 alignment across engineering, procurement, construction, commissioning, and oversight
20 stakeholders to ensure project-wide integration and issue resolution. The PMO is responsible
21 for managing the risk management and change control processes.

22
23 3.4.4 Operations and Maintenance Function

24 The Operations and Maintenance team provides leadership and oversight of all operational
25 functions required to support the transition from construction to commissioning, startup and
26 ultimately plant operations. The team oversees the integration of operations and
27 maintenance requirements into design, construction and commissioning to ensure readiness
28 for operational turnover, and is a key advisor to the Unit 1 OPG PLT member on operational
29 impacts, strategic planning and transition-to-operations decisions. The scope of activities
30 funded within the DNNP include design and construction reviews to determine and influence
31 the impact to operations; commissioning and startup activities including associated

1 consumable materials; security costs once site is turned over to DNNP LP; and tools and
2 equipment required for commissioning and commercial operations (for example, radiation
3 protection equipment, chemistry laboratory equipment, maintenance tools, and fueling
4 equipment). The scope of activities excluded from the DNNP include training of future
5 operational staff; development of processes, procedures and staff plans for long-term
6 operations of the facility; work management and plant maintenance planning; and
7 development and implementation of the Management System for the facility operations.
8 Details on such operational readiness scope funded through OM&A costs outside of the
9 DNNP is provided in Ex. F2-2-1.

10 11 3.4.5 Quality Assurance and Control Function

12 The Quality Assurance and Control team is responsible for ensuring an aligned approach to
13 DNNP quality assurance in coordination with the IPD partner quality teams and programs.
14 The team develops strategic plans for source surveillance activities for procurements and
15 oversees process improvement programs and initiatives including the Adverse Condition or
16 Event Reporting and Corrective Action Program, Non-Conformance Reporting, human
17 performance programs, and benchmarking.

18 19 3.4.6 Health and Safety Function

20 The Health and Safety team is responsible to lead the development, implementation and
21 continuous improvement of the project's Health, Safety and Environmental programs,
22 aligned with regulatory requirements, project objectives and industry best practices. This
23 includes the establishment and enforcement of a comprehensive risk management
24 framework, including identification, mitigation and monitoring of health, safety and
25 environmental risks across all project phases.

26 27 3.4.7 Construction Management Function

28 The Construction Management team is responsible for managing and executing the
29 assigned scope as per the plan developed by the Execution Bundles, applying construction
30 best practices to deliver the construction works per safety, quality, cost and schedule
31 objectives. The team actively supports the Execution Bundles in planning the construction

1 works, ensuring readiness, and providing construction insight into the constructability and
2 documentation reviews. The team manages site-wide logistics including space planning,
3 warehousing and material management on site, and equipment fleet strategies. The team is
4 also responsible to ensure that the project is staffed with trained, competent and qualified
5 trades resources, including trades leadership, to meet project execution needs. The
6 Construction Management Function is further described in Ex. D2-4-9.

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LIST OF ATTACHMENTS

- Attachment 1: Opinion of Howard Ashcraft on DNNP’s use of IPD Contracting Model (April 19, 2023)
- Attachment 2: Opinion of Howard Ashcraft on DNNP’s Implementation of IPD Contracting Model and Validation Amendment to the IPA (September 26, 2025)
- Attachment 3: DNNP Program Management Plan (NK054-PLAN-01210-00008) and DNNP Project Charter

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April 19, 2023

VIA EMAIL ONLY

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Re: Use of IPD for the Darlington Small Nuclear Reactor

Dear Ms. Hill,

This letter summarizes my opinions regarding the use of Integrated Project Delivery (IPD) for the Darlington Small Modular Nuclear Reactor project (Darlington SMR).

1. Scope and Services Performed

1.1 Background

I have been engaged by Torys LLP on behalf of Ontario Power Generation Inc. as an IPD expert to provide consultation regarding applying IPD to the Darlington SMR project. I am one of the individuals who developed Integrated Project Delivery in the mid-2000s and have led the structuring over 150 pure IPD projects. A number of these projects are in Canada and include several for Canadian Nuclear Laboratories. A complete CV is in an Appendix to this letter.

1.2 Consultation

I have provided advice and consultation regarding IPD principles and their application to the Darlington SMR project. This has included IPD workshops, discrete meetings, and document review with respect to IPD principles. Attendees at the workshops included representatives of OPG and its IPD contracting parties, GE-Hitachi Nuclear Energy Americas LLC and GEH SMR Technologies Canada, Ltd., Candu Energy Inc., and AECOM Construction Group Inc. (the Non-Owner Parties).

2. Summary Opinion

There are a variety of considerations that affect the choice of project delivery systems. In choosing a project delivery system, I assess the goals, opportunities and constraints affecting the sponsors, participants, and lenders and then structure the key structural and business elements to achieve the agreed goals. This analysis does not always result in recommending IPD, as each determination is project specific, but where projects are large, complex, faced with significant cost and schedule

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challenges, and the team can execute a collaborative project, IPD is often the preferred solution. In my opinion, it is the best choice for this project.

The Darlington SMR is a First-of-a-kind (FOAK) project.¹ I believe IPD is well suited to meet the challenges of nuclear generation FOAK projects, even challenges that are unknown at the time of contracting. IPD's flexibility allows it to adjust while adhering to the initial project principles and goals. In addition, the jointly shared risk/reward (profit) pool buffers overruns and is an incentive to meet the agreed goals. Joint validation and project management increases commitment to project success and transparency. Moreover, limiting change orders and claims among the parties, in combination with a risk/reward pool that is allocated based on project rather than individual success, compels the parties to solve problems because it is the most financially fruitful path for all parties. In comparison with traditional project delivery, IPD is a good solution to achieving higher performance, lower risk, and balanced accountability in a FOAK nuclear generation project.

OPG has properly adapted IPD principles to a nuclear generation project, with due consideration of nuclear safety and regulatory constraints and the compromises necessary to make a major project feasible. The IPD contract that has been prepared provides an excellent foundation for organizing and successfully executing the project.

3. Discussion

3.1 Integrated Project Delivery as a Solution for Challenging Complex Projects.

Traditional project delivery, which relies on contractually shifting risk to vendors, is not always successful. In view of the potential risks in traditional project delivery, project sponsors should consider alternative models for reliably delivering their megaprojects.

To move toward best practices, appropriate alternative contracting models such as integrated project delivery (IPD) help build long-term collaborative relationships. Relational contracts will need to become more prevalent than transactional contracts. (McKinsey 2017)

IPD is part of an overall trend to collaboration in major international projects. The World Economic Forum promulgated a series of recommendations that are nearly identical to the optimal IPD formulation developed by the American Institute of Architects, California Council (AIACC 2014, World Economic Forum 2016). In Finland, IPD is used to deliver major project infrastructure. (Saarinen 2021) Germany has recently issued governmental reports and sample contract information, for using IPD in public and private projects under EU regulations. (Breyer, Boldt et al. 2020, Boldt and Rodde 2022) In the US, the Construction Industry Institute has undertaken a research project to focus on IPD in the industrial sectors (CII 2019). In the UK, the Institution of Civil Engineers has issued the NEC4 Alliance Contract providing a sample agreement that differs somewhat from IPD but is part of the same collaborative trend. And FIDIC, one of the most conservative sources of infrastructure contracts, has instituted Task Group 17 to develop a

¹ I am aware of two other projects currently contemplating IPD for modular nuclear reactor projects and have heard that the traditional Hinkley Point C project in the United Kingdom has been modified to include IPD principles and processes.

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collaborative contract. (FIDIC 2021) The upshot is that international experts are turning to collaboration to achieve better and more reliable outcomes.

Canada is also adopting Integrated Project Delivery. Many of the Canadian projects are smaller, private projects but there are also significant infrastructure and industrial projects that are completed or underway. An informal survey disclosed the following:

Name	Status	Owner
Kingston Third Crossing Bridge	Complete	City of Kingston
Lloydminster Wastewater Treatment Plant	Complete	City of Lloydminster
Drayton Valley Raw Water Pump Station	Complete	Town of Drayton Valley
Barrie Wastewater Treatment Plant Upgrades	In progress	City of Barrie
South Kamloops Water/Wastewater Upgrades	In progress	City of Kamloops
OKIB IPD (Okanagan Indian Band water infrastructure project)	In progress	OKIB
NOWRP (North Okanagan water recovery project)	In progress	Spallumcheen Township
St Albert IPD (water infrastructure)	In progress	City of St Albert
Malahat IPD (water infrastructure project)	In progress	Corix (on behalf of Malahat First Nation)
Cultus Lake IPD (water infrastructure project)	In progress	Town of Chilliwack
Taza Wastewater Treatment Facility	Awarded, not started	Corix (on behalf of Tsuut'ina Nation)
Kelowna Community Center (includes infrastructure upgrades)	Early Development	City of Kelowna
Vitalus Nutrition Processing Facility	Design	Vitalus Nutrition
Regional District of Nanaimo	Early Development	Regional District of Nanaimo
Advanced Nuclear Materials Research Centre	In progress	Canadian Nuclear Laboratories
CNL Support Facilities (Chalk River)	Partially complete	Canadian Nuclear Laboratories

There is significant interest and capability in delivering major Canadian projects using an IPD approach, including projects on nuclear sites.

3.1.1 Integrated Project Delivery Briefly Described

(a) Key Elements

A hallmark of IPD is its use of a multi-party contract to tie individual success to overall project outcome. IPD allows parties to define success to meet their specific goals and can include specific performance variables, but always includes consideration of cost and schedule.

The non-owner parties (NOPs) profit is directly tied to the project achieving the agreed goals. In this instance, the NOPs are placing their profit and part of their overhead at risk. This layer is a buffer that protects the sponsor from project overruns. If the project is very successful, a portion of the savings is shared with the NOPs. This provides security and incentive.

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Parties have limited ability to assert claims against each other and because their outcomes are tied together must collaborate or suffer reduction in their individual profits. Moreover, the IPD contract typically includes key participants in the supply chain to enhance efficiency, increase project focus, and reduce risk. In the Darlington SMR, there are three key Non-Owner Parties (NOPs), but they cover broad work scopes. For example, the constructor, AECON, is executing key trade work that would often be subcontracted. Thus, almost all of this project is brought under the IPD umbrella.

The IPD formula is more than a contract. In 2014 the AIA California Council set forth the key characteristics of an IPD project combining structural elements (Business Model and Contract Structure) and Behavioral Elements. (AIACC 2014) These elements work synergistically: the contract enables, the business model incentivizes, and the enabling behaviors implement the collaborative working environment. The contract removes impediments to collaboration and creates the opportunity for higher performance and reliability. This holistic approach is the framework of modern IPD projects.²

(b) Applicability of IPD to FOAK Nuclear Generation

FOAK projects often encounter issues, discover opportunities, or respond to changes in technology that require modifications of the project. In comparison with other project delivery methods, IPD is highly adaptive. IPD, by aligning the full project team to overall project success, adapts to change instead of retreating into individual defensive positions. Researchers have noted that IPD is a resilient project delivery approach. (Cheng, Allison et al. 2016). The best-for-project decision process used in IPD encourages positive evaluation of alternatives. In addition, because the Owner agrees to pay the NOPs' direct costs in most circumstances, parties need not battle to prove that increased costs resulting from change should be imposed on other parties, thus avoiding corrosive, and wasteful, conflict in mid-project. And because of financial transparency, a change event does not become an opportunity to enhance profits.

The same attributes that function well if changes occur are also present in the initial negotiations. IPD seeks to have reasonable allocations of risk that are visible to all parties. This creates an opportunity to avoid pricing based on excessive contingencies—which can be hidden if projects are not jointly validated and financially transparent.

Given its transparent joint project management structure, the IPD process uncovers problems promptly and allows the parties to resolve them collaboratively and expediently before they become intractable. The early involvement of key members of the supply chain integrates their knowledge into the project design and logistic planning often avoiding problems or detecting them at an early stage when they cost less to resolve.

In addition, IPD projects tend to build a cohesive project culture with decisions and responsibilities shared horizontally amongst the parties. Information is diffused amongst project team members who are used to evaluating and making decisions together. This lessens a major risk on megaprojects, loss of information and control as key personnel retire or transfer to other projects. Because IPD does not rely on hierarchical command-and-control, the loss of a leader is

² In 2016, the World Economic Forum issued a report, *Shaping the Future of Construction* that contained recommendations that are virtually identical to the AIACC elements, (WEF 2016) Figure 11, p. 28).

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less impactful, information does not leave with the leader, and the replacement will be supported by the collaborative team because it is in their best interest—and consistent with the IPD culture—to do so.

In my opinion, these attributes of IPD provide the sponsor, and the IPD team, with the framework and tools to undertake FOAK projects.

3.1.2 Summary of research regarding IPD outcomes

I recently summarized the published studies regarding the effectiveness of IPD relative to other project delivery methods and commented on the strengths and limitations of different analytical approaches. (Ashcraft 2022) Case histories and subjective surveys strongly support using IPD and are consistent with studies showing a positive correlation between team integration and cohesiveness (hallmarks of IPD) and project success. In quantitative studies, IPD outperformed “other” project delivery methods. IPD also does well in pair-wise comparisons, for example IPD v. Design/Build, although these are difficult to analyze statistically because of the great variability between projects in relatively small data sets, and the great variability in project structure within a general grouping, such as Design/Build. Even with these limitations, IPD favors well exceeding other project delivery methods on most parameters, although not always to a 95% confidence interval.³ As noted previously, the choice of project delivery system should be based on the specific characteristics of a project and the project team, but the existing research does support IPD as a high-performance project delivery system.

Project performance is sensitive to many factors. Team composition, chemistry, leadership, production system optimization, collaboration and colocation, and similar issues also affect project success. IPD provides a commercial and legal structure that encourages better behavior and supports many of the elements that lead to positive outcomes and thereby increases the likelihood of success. Nonetheless, it—and all project delivery systems—is sensitive to project execution factors.

Very truly yours,



Howard W. Ashcraft⁴

³ The 95% confidence interval ($p=.05$ null hypothesis) is a standard in academic research. It is difficult to achieve when data is “noisy” as it is in comparing projects and outcomes, especially if the data sets are small.

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Fellow, American Bar Foundation
Fellow, American College of Construction Lawyers
Hon. Fellow, Canadian College of Construction Lawyers
Associate Fellow, Saïd Business School, Oxford University

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Howard Ashcraft

Education

Stanford University, AB Human Biology 1974

University of California Berkeley Law, JD, 1979

Professional Work Experience

2021-Present, Seventh Star LLC, Owner

Provide consulting services regarding the structure and organization of infrastructure projects that use collaborative project delivery systems.

1993-Present, Hanson Bridgett LLP, Partner.

Specialist lawyer practicing in construction, environmental, and related supporting fields. I have been the lead trial attorney on major complex construction disputes. I have also developed the principles, contracts, and standards for using Integrated Project Delivery, a collaborative, lean and technology intensive project delivery. System that we have applied on over 160 pure IPD projects. In addition, I have served on the Management Committee, and as Section Leader for the Litigation and Construction Sections.

1979-1993, Severson & Werson, Shareholder.

Specialist lawyer practicing in construction, environmental, and related supporting fields. My primary competencies at S&W included trial of complex construction disputes, use of technology in the analysis and presentation of construction claims and management of electronic evidence.

Admitted to Practice

- United States Supreme Court
- California – All Courts
- Nevada—All Courts
- District of Columbia—All Courts

Academic Work Experience

2015—Present, Stanford University, Adjunct Professor, Civil and Environmental Engineering.

Responsibilities include teaching CEE102A, *Legal and Ethical Principles in Design, Construction and Project Delivery*, counseling graduate students regarding theses and research, and participating in the Center for Integrated Facility Engineering.

2019—Present, Saïd Business School, Oxford University, Associate Fellow, Module 5 Leader, MSc Major Programme Management

Responsibilities include designing module curriculum, coordinating with SBS staff, choosing, and reviewing lecturers, delivering lectures, preparing module assignment, marking assignment, counseling student and theses advisees.

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Academic Lectures.

In addition to teaching at Stanford and Oxford, lecturing at University of Copenhagen, Yale University School of Architecture, Georgia Tech, Stanford University, University of California, Berkeley, University of North Carolina School of Architecture, and a Joint Harvard Business School/Massachusetts Institute of Technology project management program.

Fellowships and Honorary Memberships

Life Fellow, American Bar Foundation

The American Bar Foundation was founded by the American Bar Association in 1952 as an independent honorary and research organization. The Fellows comprise a global honorary society of attorneys, judges, law faculty, and legal scholars whose public and private careers have demonstrated outstanding dedication to the highest principles of the legal profession and to the welfare of their communities. Membership in the Fellows is limited to one percent of lawyers licensed to practice in each jurisdiction. Fellows are recommended by their peers and elected by the Board of the American Bar Foundation.

Member, National Academy of Construction

The NAC is a national organization honoring engineers, constructors and affiliated professionals that have demonstrated exceptional leadership and services to the construction industry. Membership is limited, with members chosen by nomination and election.

Associate Fellow, Saïd Business School, Oxford University.

Manage and teach Module 5, Commercial Leadership, in the MSc in Major Programme Management.

Fellow, American College of Construction Lawyers

The ACCL is the highest-level US legal organization focused on construction law. Membership is limited, with members chosen by nomination and election.

Honorary Fellow, Canadian College of Construction Lawyers.

The CCCL is similar to the ACCL in goals and structure but focused on Canadian practice. Non-Canadians elected to membership are elected as Honorary Fellows.

Honorary Member AIA California Council.

The AIACC is the largest component within the American Institute of Architects. Individuals who have demonstrated intellectual and professional leadership that benefits architecture may be appointed as honorary members for their contributions upon approval of the Board.

Rankings and Awards

- Chambers and Partners, Band 1
- International Bar Association, International Construction
- Best Lawyers Recommended Attorney
- *Thought Leader, Who's Who Legal (2023)*
- *Pioneer Award, Lean Construction Institute (2022)*
- *Best Lawyers® Construction Law/Litigation (2023)*

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- *Best Lawyers in America*,[®] Lawyer of the Year, Construction Law–Litigation, San Francisco (2013, 2023)
- *Best Lawyers in America*,[®] Lawyer of the Year, Construction Law, San Francisco (2023)
- Best Lawyers in Northern California - Construction Law, *Best Lawyers*[®] (2019-2020)
- Recommended Lawyer, *The Legal 500* (2019)
- *Best Lawyers in America* (2006-2022)
- Northern California Super Lawyers, Construction Litigation (2004-2023)
- *The Legal 500*, Recommended Construction Attorney (2015-2023)
- Commendation for assistance in developing IPD: An Updated Working Definition and service on the AIACC IPD Taskforce, AIA California Council (2014)
- Special Achievement Award, American Institute of Architects, San Francisco Chapter (2008)
- President's Award, American Institute of Architects, California Counsel (2007)
- Top 10 Northern California Super Lawyers, *San Francisco Magazine* (2004)
- *Who's Who Legal: Construction*
- Martindale-Hubbell AV Rating

Board and Committee Memberships

Founding Board Member, Center for Innovation in the Design and Construction Industry.

Governing Committee Member (former), American Bar Association Forum on the Construction Industry.

Construction Documents Committee Chair (former) American Bar Association Forum on the Construction Industry.

National Building Information Modeling Standard, Versions 1 & 2, Subcommittee Chair.

AIA California Council, Integrated Project Delivery Taskforce.

Publications

Books

Integrating Project Delivery, co-author, Wiley 2017, Hoboken New Jersey. This is the leading textbook and practice manual for Integrated Project Delivery. It is currently being translated into Chinese for republication in 2020.

Integrated Project Delivery: An Action Guide for Owners, co-author, Pankow Foundation 2018. This is the leading guide to executing Integrated Project Delivery Agreements. The German translation will be issued in Spring/Summer 2020.

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Building Information Modeling: A Framework for Collaboration, *The Construction Lawyer*, Vol. 28, No. 3 (Summer 2008).

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September 26, 2025

VIA EMAIL ONLY

Ms. Krista Hill
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Re: Validation Amendment to the Darlington SMR IPD Agreement.

Dear Ms. Hill:

Overview

Torys LLP has engaged me on behalf of Ontario Power Generation Inc. to consult on the implementation of Integrated Project Delivery (IPD)¹ for the Darlington SMR project. This included advice regarding the concepts expressed in the SMR IPD agreement important in an IPD project. I provided a prior letter outlining my opinion that IPD is an appropriate project delivery system for the Darlington SMR project (the Project).

IPD agreements are not static. The IPD team is expected to analyze, with the owner's full participation, the critical elements of the project to develop a strategy for meeting the owner's requirements. This process, known as Validation, provides additional detail unavailable at contract signing and documents, again with full owner participation, the scope, schedule, and target outturn cost. The Validation details are documented in a Validation Report and incorporated into the IPD agreement with a Validation Amendment.

IPD Agreements also plan for changes in the IPD Parties. New parties may be added to the existing Integrated Project Agreement, or existing parties may be removed when it is in the best interests of the Project. In this case, the "Constructor" in the IPD agreement has been augmented by adding Kiewit Nuclear Partners to AECON Construction Group Inc. in a general partnership. The general partnership is now the overall "Constructor" and each general partner is individually referred to as a "Constructor Partner". This change is entirely consistent with the development of an IPD project. Because these terms are used throughout the IPA, there are a multitude of changes to reference the parties correctly; however, the underlying structure remains unchanged.

¹ Integrated Project Delivery (IPD) is the project delivery methodology being used for this project. Integrated Project Agreement (IPA) is title of the IPD agreement. In this memorandum, I will refer to IPD when describing general principles and practices and IPA where I am referring to the contract that was signed by the parties to implement an IPD approach.

Recipient

Page 2

The Project has recently achieved a CNSC License to Construct, completed the Validation phase, and has prepared a Validation Amendment. I have been asked to review the Validation Amendment to determine if it remains consistent with IPD principles. In my opinion, it is and reflects the normal development of an IPD agreement during the Validation phase. Note, also, that the Validation Amendment is a jointly developed document and thus has been agreed by all IPD parties.

Work Performed

I was provided with the Validation Amendment and its myriad exhibits and schedules. I was also provided with a redline prepared by Torys to highlight where the Amendment affected or developed provisions in the existing IPD agreement. During that review, I noted areas where I wanted to confirm that my interpretation of the provisions was consistent with the drafter's intent and requested clarification from Torys. In all cases, our interpretations were consistent. I also asked for additional information to provide context for the provisions in the Validation Amendment.

I did not analyze whether the Target Outturn Cost (TOC) or other financial parameters are correct, as this is outside my remit.

There were a few changes that do not diverge from IPD principles but are worth noting.

The IPA in §6.10(b) required "full completion of the design." This requirement is waived in the Validation Amendment. As noted previously, the design was developed sufficiently to receive a License to Construct from CNSC. This reflects confidence regarding the essential design decisions. In an IPD project, the focus during Validation is on reducing the uncertainty regarding design decisions and project risks to an acceptable level. Completing all design issues, even minor issues, before proceeding into construction can unnecessarily delay the project without providing value. The IPD team's approach in this Project aligns with established IPD practice, and the issuance of the License to Construct indicates that the design has reached a mature stage.

The IPA foreshadowed certain events that might occur or not occur. Where these have occurred, the Validation Amendment documents the status. For example, the Validation Amendment affirms that the Non-Owner Parties will not receive a TOC incentive payment. This is not a change; it documents what has occurred within the possibilities envisioned in the IPA framework.

Similarly, many of the project schedules and exhibits were updated to reflect current information, consistent with regular IPD practice. I closely reviewed those related to governance and the risk-reward program and determined that they added detail to the IPA but were consistent with the executed contract. As noted above, IPD agreements are dynamic with exhibits and schedules being developed by the parties and documented in the Validation Amendment.

The IPA also clarifies several issues or reinforces the applicability of the IPA.

Regarding overhead incurred by Affiliates, i.e., companies substantially related to an IPA party, the Validation Amendment added:

Recipient

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“For greater certainty, no Monthly Overhead or Fixed Fee will be payable by Owner to any Non-Owner Party in respect of Project Operations performed by an Affiliate of such Non-Owner Party.” Validation Amendment 2.3(ix).

This does not change the IPD structure and was inferable from the IPA, but is clarified here and is beneficial to OPG.

The Validation Amendment replaces Section 2.7(d) in Schedule 20 to define payment for archiving media following final completion. (Validation Amendment 2.3(xiii)(A)), which does not affect IPD principles.

The IPA anticipated that specified information would be provided in the Validation Amendment. For example, the concept of a Project Critical Milestone is in the initial IPA but the actual dates were to be specified in the Validation Amendment.

“(a) Subject to Section 41, each Party will complete its respective Project Operations in accordance with this Project Agreement to achieve each of the Project Critical Milestones by the ~~date specified for completion thereof in the Validation Amendment~~ Project Critical Milestone Date.” 28.1 IPA, showing change by the Validation Amendment.

The related sections and definitions have been updated in the Validation Amendment as intended.

Conclusion

The Validation Amendment is consistent with the Integrated Project Agreement and provides the developed financial terms, additional detail, updates, and confirmation of decisions one would expect in a competent Validation Amendment.

Very truly yours,



Howard W. Ashcraft

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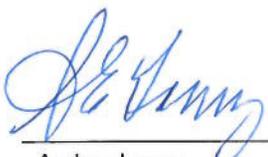
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Darlington New Nuclear Project (DNNP) – Program Management Plan

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Revision Summary

Revision Number	Date	Comments
R000	2020-12-07	Initial issue.
R001	2022-06-14	Comprehensive update to reflect revised Program governance structure, and support documents.
R002	2023-11-30	Comprehensive update to reflect programs applicable to the Licence to Construct Phase and the Integrated Project Delivery model.

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1.0 PROJECT OVERVIEW

As part of the Darlington New Nuclear Project (DNNP), Ontario Power Generation (OPG) intends to develop small modular reactor (SMR) technology for a proposed facility at the Darlington new build site, located on OPG lands, east of the existing Darlington Nuclear Generating Station (DNGS).

The primary objectives of this program are listed in NK054-PCH-01210-00002, Darlington New Nuclear Project Charter.

This Program Management Plan describes the overall program required to design, construct and bring an SMR online. In many cases, the details of individual projects or program requirements refer to sub-documents that will be updated as the program progresses. The terms 'program' and 'project' are used interchangeably in this plan document when referring to the overall DNNP.

The DNNP will utilize an Integrated Project Delivery (IPD) contract model for the Licence to Construct (LTC) phase that will maximize integration and collaboration with contract partners:

- OPG: Owner
- GE-Hitachi: Designer
- AtkinsRéalis: Architect & Engineering Firm
- Aecon: Constructor

Each contract partner is required to follow their quality assurance program and management system and is required to meet the applicable requirements of CSA N286-12 for the activities they will perform in compliance with the Nuclear Site License. As the Owner partner and licensee, OPG maintains overall ownership and authority of the DNNP commensurate with the Integrated Project Agreement (IPA).

Integration between the quality assurance programs and management systems of OPG and the IPA Non-Owner partners (NOPs) will be required for which project specific documentation will be produced to clarify such integration details and define processes necessary to deliver IPA agreement deliverables. Any documentation created to support this collaborative effort will be referenced within the DNNP Project Execution Plan.

2.0 PROGRAM GOVERNANCE, STRUCTURE, AND PLANNING

2.1 DNNP Governance Structure

The DNNP governance structure and hierarchy is shown in Appendix A.

The highest level documents include the following OPG corporate governing documents that sets the overall direction for how OPG will administer the DNNP:

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1. N-CHAR-AS-0002, Nuclear Management System

This Charter provides overall direction regarding administration of Nuclear licensing activities and establishes requirements to which OPG employees shall comply.

2. OPG-PROG-0039, Project Management Program

This Program establishes how the requirements, objectives, and commitments for the management of projects across all business areas within OPG are fulfilled.

DNNP specific governance defines the overall management system compliance and associated implementation as well as execution requirements associated with the project. These include:

Tier 1

1. NK054-PCH-01210-00002, Darlington New Nuclear Project Charter

This Charter describes the business vision and scope of the project as defined by the line of business.

2. NK054-PLAN-01210-00008, DNNP Program Management Plan

This Plan receives authority from the DNNP Charter and describes the overall program required to design, construct and bring an SMR online, including program governance, structure and planning. The details of individual projects or program requirements are further detailed in sub-document Program Management Plans and Project Execution Plans, as detailed in Section 2.2 and 2.23 below. These will be refined as the program progresses.

Tier 2

3. DNNP Program Management Plans (PgMPs) detailed in Section 2.2 below.

4. DNNP Project Execution Plans (PEPs) & Functional Management Plans detailed in Section 2.3 below.

Tier 3

5. Process Control & Support Documents: Manuals, Guides, Instructions, Contractor/Owner Interface Requirements (COIR), Organization Charts, Forms, etc.

Document mapping to management system compliance for the LTC phase been captured in DA1-IPD-NN-NN-LLIS-PM-0001, DNNP N286-12 Compliance Matrix.

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2.2 DNNP Program Management Plans

The PgMPs takes authority from NK054-PCH-01210-00002, Darlington New Nuclear Project Charter and NK054-PLAN-01210-00008, DNNP Program Management Plan.

The PgMPs describe how DNNP is managed to meet the intent of OPG’s Nuclear Management System while establishing program-specific requirements, and outlines OPG’s specific oversight accountabilities for the program. The PgMPs are designed to provide assurance that all aspects of the program applicable to the LTC phase of the project will be conducted in accordance with the requirements of:

- Canadian Standards Association Standard N286-12, Management System Requirements for Nuclear Facilities
- N-CHAR-AS-0002, Nuclear Management System
- OPG Corporate and Nuclear governance

The PgMPs may also refer to key implementing documents as required. In cases where no specific DNNP program requirements apply, the program will default to the program documents under N-CHAR-AS-0002, Nuclear Management System.

Typical content of PgMPs is provided in Appendix B – Program Management Plan Section Requirements.

2.3 DNNP Project Execution Plans

The PEPs takes authority from NK054-PCH-01210-00002, Darlington New Nuclear Project Charter and NK054-PLAN-01210-00008, DNNP Program Management Plan.

DA1-IPD-NN-NN-TPLN-PM-0003, Darlington Small Modular Reactor – Project Execution Plan (PEP) presents the top-level management plan that provides the overarching framework for executing the mandate under the IPA. The PEP outlines the plans, resources, mechanisms, and procedures expected to be implemented for the successful Project Management, Engineering, Procurement, Construction, Commissioning and Closeout of the project.

The PEP will govern the activities during the execution of the project and will be used in conjunction with each partner’s governance, meeting the applicable requirements of CSA N286-12.

The Execution Management Plans describes aspects related to specific projects or project bundles under the IPA and are sub-plans to the PEP.

The Functional Management Plans set out specific requirements for implementation/execution of the specific function (e.g. Quality, Project Controls, etc.) on the project and are sub-plans to the PEP.

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2.4 Revision Cycle Requirements

Program owners shall review their PgMPs annually and revise as required.

PEPs and Functional Management Plans are reviewed and revised as required when the project goes through each gate.

Revisions may be required to support business planning or significant project milestones.

3.0 PROGRAM SCOPE

The scope of DNNP will be defined and controlled in accordance with the, OPG-MAN-00120-0011, Project Scope Management.

As a First-Of-A-Kind (FOAK) deployment of a boiling water reactor (BWR) technology, the scope of the project is expected to evolve through the development phase. External stakeholders and factors, as well as internal decisions on the direction of the project, will mold the scope to meet the objectives set out for DNNP. OPG Engineering has developed a Nuclear Facility Site Requirements Document, which will form the basis of the OPG design requirements.

A DNNP scope review and approval process has been developed and is described in NK054-PLAN-01210-00100 Sheet 0015, Darlington New Nuclear Project (Project Controls) Program Management Plan and DA1-IPD-NN-NN-TPLN-PM-0004, Darlington New Nuclear Project (DNNP) Project Controls Plan

The scope of the DNNP consists of all the work required to design, procure, construct and commission an on-grid SMR for Unit 1. Additionally, work is required to ensure successful start-up and operation, which is included in the project scope. The scope is broken down into bundles of work that include the projects and activities required for successful execution of the program. These bundles are further described below and shown in Appendix C – DNNP Work Breakdown Structure, which outlines scope that falls under the IPD model.

3.1 Site Preparation

This bundle includes the work authorized to be performed under the Nuclear Power Reactor Site Preparation Licence (PRSL 18.00/2031).

As described in the Licence, site preparation activities include:

- (a) Construction of site access control measures;
- (b) Clearing and grubbing of vegetation;
- (c) Excavation and grading of the site to a finished elevation of approximately +78 metres above sea level;
- (d) Installation of services and utilities (domestic water, fire water, sewage, electrical, communications, natural gas) to service the future nuclear facility;
- (e) Construction of administrative and support buildings;

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- (f) Construction of environmental monitoring and mitigation systems; and,
- (g) Construction of flood protection and erosion control measures.

It also allows possession and use of required prescribed information. The Site Preparation bundle is broken down into three main projects: Early Works, Main Site Preparation (Front Eng Engineering), and Geotechnical Surveys & Studies.

3.1.1 Early Works

Early works scope includes the scope that may be performed at a very early state of nuclear facility design. It is planned to be the first construction activities on the site, and includes: modification of existing roads, installation of domestic and fire water, IT duct banks, public announcement system, sanitary lines, construction power, trailer complex, temporary parking, and laydown areas. Also, site excavation, grubbing, leveling of the site to meet design specifications of the planned nuclear facility is included in the scope. This project is described in NK054-PMP-01210-00036, DNNP – Site Preparation Early Works – Project Management Plan.

3.1.2 Main Site Preparation (Front End Engineering)

The Main Site Preparation scope includes Front End Engineering and the Preliminary Design of the following:

- Sanitary system, domestic and firewater distribution system within the DNNP site
- Administrative building which will also house a full scope simulator
- Permanent warehouse
- Stormwater management system
- PA/LAN/telephone and tie-in of utilities that were installed in the Early Works phase

This project is described at high-level in NK054-PMP-01210-00006, Main Site Preparation Project Management Plan, and NK054-SOW-01210-00007 Scope of Work.

3.1.3 Geotechnical Surveys & Studies

This work includes a series of onshore and offshore core drillings and testing to provide the required data for site characterization and design of the power block, buildings, intake structure (geotechnical survey phase 1 and 2).

3.2 Design Engineering & Major Procurement

3.2.1 Power Block

The Power Block is defined as the Reactor Building, Turbine Building, Control Building, and Radwaste Building and the corresponding structures, systems, and components (SSCs) within these buildings. Additionally, this project includes the Protected Area

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(PA) fence and yard, security systems within the PA, and the cooling water building and related SSCs. This project is further described in DA1-IPD-NN-NN-TPLN-PM-0001, DNNP – Nuclear Island Project Management Plan.

3.2.2 Grid Connection

The scope includes design and construction to connect the unit to electrical grid. The transmission line from OPG-Hydro One demarcation point to the Hydro One transmission station, is being owned and implemented by Hydro One with support and oversight by this project team.

3.3 Nuclear Island

The Nuclear Island bundle consists of all the work required to design, procure, and construct the Reactor Building, Control Building and the Radiation Waste Building of the Nuclear Facility. This includes all systems, components and structures (SSCs) contained within the Reactor, Control, and Radwaste Buildings. Major systems include the Nuclear Boiler System, Isolation Condensers, Control Rod Drive System, as well as I&C/DCS systems (including the Simulator system). The project is described in DA1-IPD-NN-NN-TPLN-PM-0001, DNNP – Nuclear Island Project Management Plan.

3.4 Conventional Island

The Conventional Island bundle consists of all the work required to design, procure, construct, and commission the Turbine, Generator, Moisture Separator, Feed Water Heaters, Condenser and supporting systems, structures and components in the turbine building, diesel generator, BOP, as well as the Turbine Building itself. This project is described in DA1-IPD-NN-NN-TPLN-PM-0002, DNNP – Conventional Island and Balance of Plant Project Management Plan.

3.5 Balance of Plant

3.5.1 Cooling Water & Shoreline Protection

This scope includes design and construction of a cooling water intake and discharge that will provide lake-water cooling to the condensers as well as any other loads. This project also involves design and construction of shoreline protection to prevent erosion of the shoreline of Lake Ontario in proximity to the nuclear facility. The engineering of the shoreline is included in the IPD model. Construction is not included in the IDP model and will be completed by OPG facilities. This project is described in NK054-PMP-01210-00003, DNNP – CCW and Shoreline Protection Project Management Plan.

3.5.2 Security Building

The scope includes design and construction of the security system. It includes the security building and associated security systems and plant physical security features, including but not limited to, fencing, lighting, cameras, and access control points. This

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project is described in DA1-IPD-NN-NN-TPLN-PM-0002, DNNP – Conventional Island and Balance of Plant Project Management Plan.

3.5.3 Site Establishment

This area includes design, construction and commissioning of the site perimeter, temporary facilities, temporary services and utilities, lunchrooms/site offices, roads and walkways, snow removal, site access, initial site earthworks and grading, storm water management, logistics for first fills, and removal of temporary facilities services upon completion of the work. It also includes detailed design and construction of the Administration Building, Warehouse, Fabrication Shop, Utility corridor, and the supporting geotechnical survey and required studies. This project is described at high-level in DA1-SNC-ZZ-ZZ-TPLN-ZZ-0009, Site Establishment Project Management Plan.

3.6 Digital Strategy

The Digital Strategy is divided into two projects – Digital Project Delivery (DPD) and SMR Digital Operations.

DPD focuses on development and implementation of digital processes and tools for the project lifecycle including design, testing, installation, commissioning and handover to Operations and is further described in DA1-IPD-NN-TPLN-DI-0001, DNNP Information Management Plan and DA1-IPD-NN-NN-TPLN-0008, DNNP Information Technology Plan.

The second project is SMR Digital Operations which focuses on Digital Systems and Processes that are envisioned to support project and operational decision-making at the facility, which takes guidance from DA1-OPG-NN-NN-TREP-DI-0001, DNNP Digital Strategy Business Requirements Document.

3.7 Operational Readiness, Commissioning & Startup

The Operations bundle includes activities to support the design of the plant, development of operating and maintenance processes and transition from project to an operational organization to support of the full range of operational commissioning and commercial operations. These activities are described in NK054-PLAN-01210-00100 sheet 0005, Operations and Maintenance Program Management Plan, which includes process descriptions and accountabilities.

Specific activities for commissioning, turnover of systems to the operational organization and start-up and testing of the nuclear facility are described in NK054-PLAN-01210-00100 Sheet 0019, Darlington New Nuclear Project Turnover and Commissioning Program Management Plan. This document describes the processes that will ensure compliance with both regulatory requirements and internal OPG governance to ensure eventual safe operation of the plant.

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Training encompasses activities that support operation of the facility during operational readiness, commissioning and operating unit. Training is described in NK054-PLAN-01210-00029 sheets 0001 and 0002, Darlington New Nuclear Project (DNNP) – Training Plan and NK054-PLAN-01210-00100 Sheet 7, DNNP – Project Training Program Management Plan.

4.0 PROGRAM MANAGEMENT

The Program Management bundle contains program activities and costs that are programmatic in nature, and not included in other bundles. This includes managing scope, budget, schedule, risks, and stakeholder communications.

The Program Management bundle is broken down into three distinct projects to manage activities and costs. These projects include Program Management & Support, EA & Licensing, and Engineering.

4.1 Program Management & Support

The Program Management & Support project contains program activities and costs that are programmatic in nature. This includes: project staffing and expenses, DNNP governance development, training, stakeholder management, Indigenous engagement and capacity funding, utilities and site expenses, decommissioning plans and financial guarantees, and project insurance.

4.2 Environmental Assessment & Licensing

Activities related to licensing requirements of the facility including licence applications, licence fees, managing regulatory commitments, Environmental Assessment related activities and follow-up monitoring can be found in NK054-PMP-01210-00005, DNNP – Environmental Assessment & Licensing Project Management Plan.

The main objectives of the Environment Assessment & Licensing project are to obtain the required regulatory licences and permits for DNNP and to complete all the remaining DNNP regulatory commitments. This is to support the DNNP objective to deploy the SMR BWRX-300 at DNNP site. The scope for Environment Assessment & Licensing project is to address the licensing and environmental needs for site preparation, construction and operation phases of DNNP, and to address the DNNP regulatory commitments.

The Environmental Program is described in NK054-PLAN-01210-00100 Sheet 0014, DNNP – Environmental Program Management Plan.

4.3 Licensing

Nuclear Regulatory Affairs activities will be governed by N-PROG-RA-0002, Conduct of Regulatory Affairs. Regulatory requirements and commitments with the CNSC and other regulatory agencies are currently documented in the DNNP Power Reactor Site Preparation Licence (PRSL) PRSL 18.00/2031 and associated DNNP Licence

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Conditions Handbook. Future requirements include a LTC prior to nuclear facility construction, and a Licence to Operate (LTO) prior to nuclear operation.

NK054-PLAN-01210-00100 Sheet 0008, DNNP – Licensing Program Management Plan includes a description of how the Licensing program will be managed.

4.4 Corporate Regulatory Affairs

Compliance with the IESO Market Rules and engagement of stakeholders through the IESO Connection Assessments and Approval process is a critical part of this project. Corporate Regulatory Affairs is supporting the project and communications with the IESO to inform the status of the project and discuss the requirements. A System Impact Assessment is planned as part of the initiation phase. Details of the project that will connect to the electrical grid can be found in NK054-PMP-01210-00004, DNNP – Grid Connection Project Management Plan.

4.5 Engineering

OPG Engineering activities and funding is captured in its own project within the Program Management bundle.

The DNNP Engineering Program is described in NK054-PLAN-01210-00100 Sheet 0004, DNNP – Engineering Program Management Plan and DA1-IPD-NN-NN-TPLN-PM-0005, Darlington New Nuclear Project (DNNP) Design Plan.

It describes how describes how Engineering will manage engineering work for the DNNP and outlines engineering scope, roles and responsibilities, integrated design requirements, design oversight, division of design authority (DA), software, and other requirements.

4.6 Procurement and Contract Management

Procurement activities to support materials and services required during the project will be completed in accordance with OPG-PROG-0009, Items and Services Management.

The selection of IPD partner(s) is considered to be a business development process, not a procurement process, which is documented in the associated contract order approvals.

Commercial Management and Supply Chain will provide unified support to fulfil DNNP's procurement and contracting needs including developing procurement strategy, contracting methodology and terms and conditions. NK054-PLAN-01210-00100 Sheet 0016, DNNP – Contract Program Management Plan and NK054-PLAN-01210-00100 Sheet 0017, DNNP – Supply Chain Program Management Plan describes how major contracts within the DNNP will be managed and controlled.

DA1-IPD-NN-NN-TPLN-PM-0006, Master Subcontractor Management Plan describes the strategy and subcontract management processes that will be used by the NOPs for

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the procurement of engineered and nonengineered equipment, construction material and services associated with DNNP under the IPA.

4.7 Construction and Quality Management

Project Quality for DNNP is managed through DA1-IPD-NN-NN-TPLN-PM-0003, DNNP Project Execution Plan which gives authority to DA1-IPD-NN-NN-TPLN-QA-0001, DNNP – Quality Management Plan.

NK054-PLAN-01210-00100 Sheet 0009, DNNP Construction and Quality Program Management Plan describes OPG's role in construction and quality oversight during the planning and construction of DNNP including vendor activities in Engineering, Procurement and Construction (NK054-PLAN-01210-00100 Sheets 0004, 0017 and 0009, respectively).

4.8 Project Assurance & Performance Improvement

NK054-PLAN-01210-00100 Sheet 0002, DNNP – Project Assurance Program Management Plan describes the program assurance model for DNNP and sets out the performance improvement and corrective action processes throughout the LTC phase of the project.

4.9 Operations & Maintenance

NK054-PLAN-01210-00100 Sheet 0005, DNNP – Operations & Maintenance Program Management Plan details how DNNP Operations & Maintenance programs will support the project phase, develop programs for the operational phase and develop processes to transition from a project to an operational organization.

A separate DNNP Program Management Plan exists for turnover and commissioning – tightly linked to the Operations and Maintenance programs. This plan is issued as NK054-PLAN-01210-00100 Sheet 0019, DNNP – Turnover and Commissioning Program Management Plan.

4.10 Safety

4.10.1 Nuclear Safety

N-POL-0001, Nuclear Safety & Security Policy governs the overall treatment of Nuclear Safety at OPGN facilities. It recognizes that nuclear power poses unique hazards, and that protection of workers, public and the environment from these hazards is the overriding priority. This policy states that nuclear safety shall have clear priority over schedule, cost and production.

N-PROG-MP-0014, Reactor Safety Program for DNNP is owned by Engineering under NK054-PLAN-01210-00100 Sheet 0004, DNNP – Engineering Program Management Plan.

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4.10.2 Health & Safety

The safety program as it applies to DNNP is described in NK054-PLAN-01210-00100 Sheet 0012, DNNP – Health and Safety Program Management Plan,

4.10.3 Radiological Safety

There are no governance requirements for radiological safety because there are no radiological hazards associated with the licensed activities covered under the DNNP Licence to Construct. If required, the temporary use of radioactive sources (e.g., nuclear gauges) will be covered under licenses and radiological safety programs specific to those activities.

4.11 Security and Emergency Management

Security programs for DNNP are described in NK054-PLAN-01210-00100 Sheet 0020, DNNP – Nuclear Security Program Management Plan.

Emergency Management program for DNNP is described in NK054-PLAN-01210-00100 Sheet 0011, DNNP – Project Emergency Management Program Management Plan.

The construction phase does not include any activities that require management of a nuclear fire protection program, therefore this program is not applicable at this time. DNNP Business Continuity has been incorporated into OPG-PROC-0209, Enterprise Projects Business Continuity Plan.

4.12 Nuclear Waste

The construction phase does not include any activities that require management of radioactive wastes, therefore there are no governance requirements for nuclear waste during this phase.

4.13 Stakeholder and Indigenous Relations

NK054-PLAN-01210-00100 sheet 0013, DNNP – Stakeholder Relations and Indigenous Relations Program Management Plan, DA1-IPD-NN-NN-TPLN-PM-0007, Integrated Communication Framework, and DA1-IPD-NN-NN-TPLN-PM-0008, DNNP Indigenous Engagement Implementation Plan describes the internal and external interfaces and communication protocols applied for the life cycle of DNNP.

Project bundles may also have specific stakeholder and Indigenous engagement plans that speak to requirements of the various projects.

4.14 Decommissioning

NK054-PLAN-01210-00100 sheet 0021, DNNP – Decommissioning Management Plan describes the programs applicable to the LTC phase of the project.

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4.15 Document Management

The document management program, as applied to DNNP, defines and controls the processes and records that comprise the management system as well as maintain objective evidence to demonstrate effective implementation of the management system through project execution.

The requirements are detailed in NK054-PLAN-01210-00100 Sheet 0018, DNNP – Document Management Program Management Plan, DA1-IPD-NN-NN-TPRO-DI-0001, DNNP Document Management Procedure, and DA1-IPD-NN-NN-TPLN-DI-0001, Information Management Plan.

4.16 Project Controls

OPG-PROG-0039, Project Management Program governs DNNP to ensure successful integration and control each of the projects within the program, including requirements for monitoring project performance.

Specific aspects of Project Controls for DNNP is detailed in NK054-PLAN-01210-00100 Sheet 0015, Darlington New Nuclear (Project Controls) Program Management Plan and DA1-IPD-NN-NN-TPLN-PM-0004, Darlington New Nuclear Project (DNNP) Project Controls Plan. This includes management of scope, schedule, cost, change, decisions, reporting, risk, and lessons learned.

4.17 Resource Management

OPG resource management and planning is reviewed and reconfirmed on an annual basis as part of the business planning cycle.

Staffing and resourcing requirements will vary over the life cycle of the project and is captured in DA1-IPD-NN-NN-TPLN-PM-0003, Darlington Small Modular Reactor – Project Execution Plan (PEP). DNNP will be staffed by OPG and IPD partners with a combination of permanent and temporary, augmented, or seconded staff to fulfill project needs throughout its lifetime.

Onboarding of staff onto the project is done in accordance with established OPG HR processes, as well as DA1-IPD-NN-NN-TPLN-PM-0009, DNNP – Onboarding and Training Plan.

Training requirements are to be consistent with that of OPG's Project and Engineering organizations. The DNNP training program is described in NK054-PLAN-01210-00100 sheet 0007, DNNP – Training Program Management Plan.

5.0 PROJECT ORGANIZATION

The integrated project organization is captured in DA1-IPD-NN-NN-TPLN-PM-0010, DNNP – IPD Project Organization Chart.

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The DNNP project organization is based on a matrix organization, with many interfaces to existing OPG functional groups supporting the DNNP objectives.

Key OPG project personnel are as follows:

DNNP Key Role Identification and Description

Role	Role Description for DNNP
Chief Projects Officer	Sponsor for the Darlington New Nuclear Project.
Chief Nuclear Engineer	DNNP Licence holder.
SVP SMR Execution	Overall accountability for successful execution of the Darlington New Nuclear Project.
DNNP Project Director(s)	Accountability for successful execution of their respective areas of the Darlington New Nuclear Project. Primary responsibility for scope/schedule/cost development, project reporting, risk management, contract management, decisions related to strategic direction, resourcing, stakeholder relations, and management of program contingency within given authority.
DNNP Manager(s) – Projects	On behalf of the DNNP Project Director, accountable for developing scope, schedule, cost through all phases of the project(s) under their responsibility. Accountable for project monitoring to ensure cost/schedule/scope stays within the approved envelope. Working with Engineering, develop scopes of work for contracts, and provide oversight of staff to ensure safety and quality.
Director, Project Controls	Overall accountability for Project Controls, including cost, risk, estimating, gating, change control, schedule management, Reporting and ensure the enterprise project management systems are updated with quality for DNNP to meet the requirements of the Project Management Program.
Sr. Manager Project Controls	Responsible to lead and provide project controls support in cost, risk, estimating, gating, change control, schedule management, reporting and ensure the enterprise project management systems are updated with quality for DNNP to meet the requirements of the Project Management Program.
VP Enterprise Commercial Management	Overall accountability to develop contracting strategies for partnerships and vendor services, negotiating contracts, providing project with advice for managing contracts, and leading contract disputes. This position works closely with Law and Supply Chain on behalf of projects for major contract awards.
Operations & Maintenance Director – DNNP	Overall accountability for Operations & Maintenance programs as they apply to the DNNP project through the project lifecycle. This includes design reviews for operability and maintainability, oversight of training, operations and maintenance staffing, and development of programs for operation of the site. As the senior license owner of the operating plant, accepts turnover from construction and accountable for ensuring the systems and processes are in place to safely operate the plant.
Operations & Maintenance Manager – DNNP	Accountability for the turnover and commissioning aspects of the program. Matrixed to Director Ops & Maintenance.
Manager Operations Training – DNNP	Accountability for DNNP training programs.
Engineering Director	Accountable for Engineering aspects of OPG's New Build programs, and OPG Design Authority for aspects of DNNP. Provides design direction and guidance for the scope related to DNNP and site. Includes development of owners' requirements and engineering scope. Responsible to ensure adequate qualified resources for the OPG design and engineering support activities. Responsible to ensure all design-related regulatory requirements, applicable design standards, and OPG policies and procedures are met. Responsible for developing the Management Systems Plan for Construction and O&M phases.
Manager, Engineering Programs & Methods	Prepare and direct the Overall Management System and QA requirements for DNNP. Accountable to develop the Engineering Oversight Model, Engineering Contract Management, and Engineering Quality Oversight Plan.
Manager, Design Engineering	Accountable for execution and oversight of design engineering and technical

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Role	Role Description for DNNP
	acceptance of Engineering products and service through the owners Engineers.
Corporate Relations Senior Manager – DNNP	Provide strategic advice to maintain relationships with the public and local government (Host Communities). Accountable to ensure regulatory requirements with respect to public information are met. Responsible to develop public and stakeholder management plans. Leads public and OPG messaging for DNNP. Supports Indigenous community relations planning and activities.
Manager, Projects EA & Licensing	Project Management accountability for the EA & Licensing Project which primarily includes management of activities supporting Licensing. Working closely with Regulatory Affairs Licensing Manager, supports licence application activities, licence hearings, and other related requirements. In addition to licensing, this role includes managing commitments related to the licensing process and supports PMTs with permytry as required.
Manager, Regulatory Affairs DNNP Licensing	Accountable to ensure licence and other regulatory requirements are met. Strategic planning and advice to strengthen relationships with the CNSC and manage issues related to regulatory concerns. Overall accountability for communications with CNSC related to DNNP. Responsible to develop licensing protocols with CNSC. Working closely with Manager, Projects EA & Licensing, to plan and manage licensing process, licence application activities, licence hearings, and other requirements.
Nuclear Environment, Director Environment Health & Safety	Responsible for supporting completion of Environment commitments for DNNP Site Preparation, including supporting various permits required prior to the start of site preparation activities. Provides support to the project regarding the Environmental Assessment commitments and licensing applications. Provide environmental support for site preparation and construction activities.
VP Construction Services	Overall accountability for Construction programs and execution oversight for the project, including expectations for safety, quality, cost and schedule.
Director(s) Construction Services	Accountable for the implementation of the DNNP Project with respect to Construction, ensuring that the DNNP work program is executed in accordance with expectations for safety, quality, cost and schedule.
Director Nuclear Waste NSS	Overall accountability for Nuclear Waste aspects of the project.
Nuclear Waste Manager – DNNP	Accountable for aspects of the project related to Nuclear Waste, including waste minimization, handling, storage, and licenses.
Director Security & Emergency Services	Overall accountability for Emergency Management and Security programs.

6.0 REFERENCES

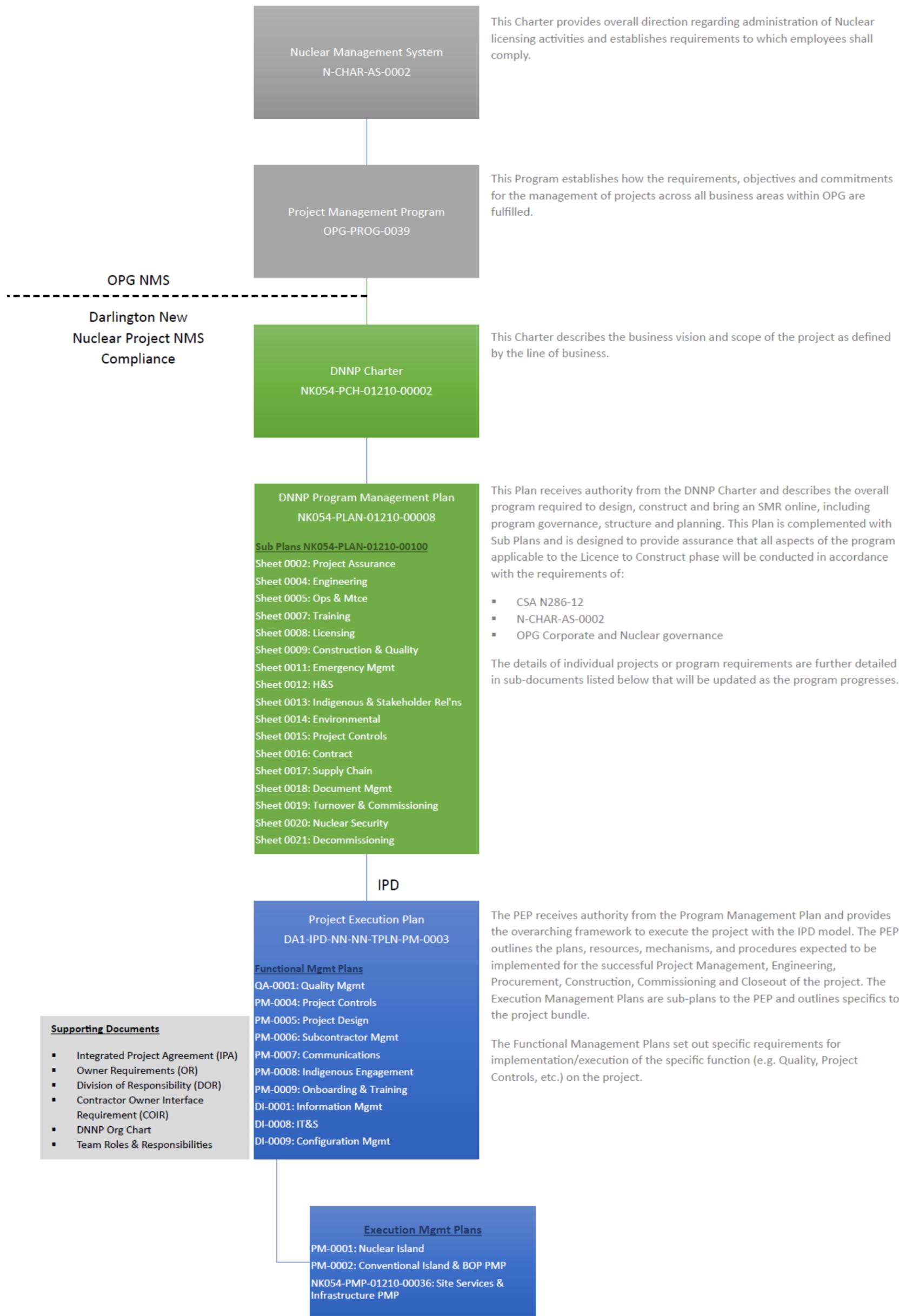
- CSA N286-12, Management System Requirements for Nuclear Facilities
- Reactor Site Preparation Licence (PRSL 18.00/2031)
- N-CHAR-AS-0002, Nuclear Management System
- N-POL-0001, Nuclear Safety & Security Policy
- N-PROG-MP-0014, Reactor Safety Program
- OPG-STD-0001, Requirements for Administrative Governance Documents
- OPG-PROG-0039, Project Management Program
- OPG-PROC-0209, Enterprise Projects Business Continuity Plan

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7.0 APPENDIX A – DNNP GOVERNANCE DOCUMENT STRUCTURE



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8.0 APPENDIX B – PROGRAM MANAGEMENT PLAN SECTION REQUIREMENTS

The Darlington New Nuclear Project (DNNP) follows OPG’s Nuclear Management System as documented in N-CHAR-AS-0002, Nuclear Management System.

Program Management Plan Section Requirements

PgMPs describe how program requirements and processes support project execution while meeting the intent of existing OPG’s Management System for DNNP. The structure and minimum content requirements for PgMPs are as follows:

Section 1.0, Purpose

This section:

- Provides a clear and concise description of the fundamental intent or focus of the PgMP.
- Outlines high-level rationale, background, and process details.

Section 2.0, Program Requirements

This section provides a “roadmap” that conveys how the program will meet DNNP requirements.

- Briefly describe any nuclear, corporate, or other business unit governance, governance support, and non-governance documents that provide implementing details for requirements, activities, and processes described by the PgMP.
- State requirements that have been mandated by functions for projects to follow as part of contract development and project execution.
- Illustrate (through figures or flowcharts) the entire PgMP framework, implementing and interfacing documents.
- Metrics/reporting requirements.

Section 3.0, Roles and Accountabilities

This section provides a high-level summary of accountabilities for manager level (Stratum IV) or higher positions or roles concerning the accomplishment and oversight of activities related to the implementation of the document, in accordance with the standards outlined in OPG-STD-0001, Requirements for Administrative Governance Documents.

Section 4.0, Definitions and Acronyms

This section lists definitions and acronyms in accordance with the standards outlined in OPG-STD-0001.

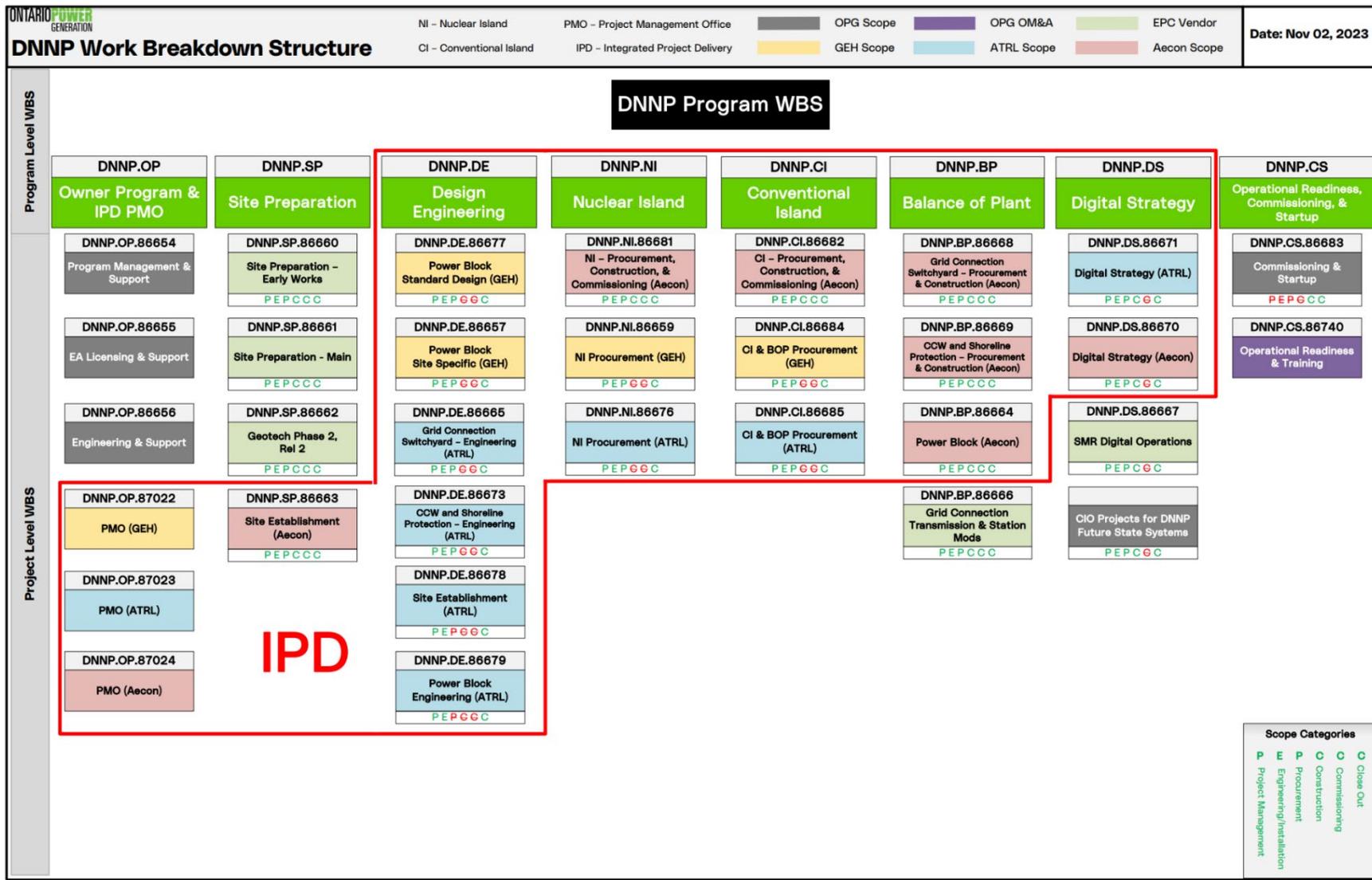
Section 5.0, References

This section lists the documents required to be used in conjunction with the PgMP and identifies each document in accordance with the standards outlined in OPG-STD-0001.

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9.0 APPENDIX C – DNNP WORK BREAKDOWN STRUCTURE



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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			
Project Number:	83274	Project Level:	A
Project Name:	Darlington New Nuclear Project	Facility/Site:	Darlington
Project Manager:	N/A	Executing Org:	Enterprise Projects
Project Manager R2:	N/A	Sponsor:	Subo Sinnathamby

Project Charter Approval	
Prepared by: Carol Lam Project Director, DNNP	 November 23, 2023
Reviewed by: Scott Ritzie Project Director, DNNP	 23NOV2023
Approved by: Dragan Popovic Senior Vice President, SMR Execution Project Sponsor	 1/5/2024
Accepted by: Subo Sinnathamby Chief Projects Officer Executing Organization Approval Authority	 January 11, 2024

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1.0 NEED BACKGROUND AND PROPOSAL

Ontario Power Generation (OPG) is seeking to grow its business and be a leader in energy innovation via the development of Small Modular Reactors (SMRs). Clean energy alternatives to reduce dependencies on fossil fuels is a priority growth opportunity for OPG. As the province moves to electrification additional generation will be needed to fulfill the expected increase in demand for energy.

To supply the capacity and energy needed, a diverse supply mix will be required. SMRs have the potential to be cost competitive against other clean energy options and provide job and economic benefits that intermittent renewables cannot. Consistent with OPG's Strategic Objectives and Climate Change Plan, enabling additional nuclear generation through SMRs will position OPG as an Energy Industry Leader and be a catalyst for a net-zero economy.

OPG has reviewed multiple SMR technologies and, over the course of 2021, worked with three developers to assess whether they would be a good fit at the Darlington site as well as for future deployments in the province. In December 2021 OPG selected GE Hitachi Nuclear Energy's BWRX-300 as its DNNP SMR technology. OPG's shareholder, the Minister of Energy, has instructed OPG to continue planning and preparation at the Darlington site. Additionally in July of 2023 the Minister instructed OPG to commence the planning and licencing for three additional SMRs at the Darlington New Nuclear site.

SMR technology will support addressing the following for the Ontario electricity market:

- Initiate path towards zero emissions (Immediate)
- Summer and winter capacity deficit (Short Term)
- Increased energy demand (Long Term)

The IESO has completed an analysis of the impact of one SMR on Ontario's electricity system. The analysis concluded that the addition of any of the three SMR technologies OPG considered for Darlington would help meet system capacity needs, reduce energy shortfalls, and reduce carbon emissions at a cost that is in line with the federal government's carbon rate of \$170/tonne by 2030, with a minimal impact on the average annual system cost.

This project charter covers Darlington New Nuclear Project (DNNP) – the first four SMR generating stations in Ontario. OPG already holds an Environmental Assessment ("EA") approval and a CNSC Licence to Prepare Site, which are necessary and valuable assets to start an SMR project. Through the first phase of the capital project, OPG partnered with GE-Hitachi (GEH) to progress design and engineering work. Successful completion of this phase further demonstrated the viability and business case for an SMR at Darlington. In October 2022, OPG completed a significant project milestone with the submission for the Licence to Construct application to the CNSC. This licence application is the next step in the deployment of Canada's first SMR at the Darlington site.

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1.1 Preliminary Project Level (Cost and Complexity Assessment) and Gate Strategy

The DNNP will be a highly complex program. Table 1-2 lists a preliminary breakdown of major scope areas. Within each of these areas there may be multiple projects.

Given the complexity of developing, designing, and building new nuclear technology, it will be broken down into phases with appropriate decision points and gates for progression. The gate strategy is documented in the Program Management Plan.

Table 1-2. Major Scope Phases

Scope Area		Description	Outcome
I	Technology Development and Design	Technology development and design of an SMR for on-grid application. Constructability Reviews including incorporation of modular manufacturing techniques.	Management Plan Strategy. Final technology/partner selection decision. Business Case Approval. CNSC Construction license.
II	Site Preparation	Activities required to prepare the site for reactor construction in accordance with the PRSL [1].	Site prepared for reactor construction activities. PRSL commitments met.
III	Procurement & Manufacture	Progress long lead items. Develop modular manufacturing capability.	Long Lead item procurement. Manufacture of modular components.
IV	Construction	Construction and testing of Reactor and supporting structures & systems.	Construction complete and turnover to Operations for commissioning.
V	Operations Preparation	Implementing the Management System, training staff, developing procedures, defining the operating organization, and implementing other tools (software/hardware).	Operations, Maintenance, and Engineering readiness. Procedures issued. CNSC Operating licence.
VI	Commissioning & Unit Start up	Commissioning & functional tests, fuel load, and synchronization.	First unit in-service for commercial operation.
VII	Subsequent Unit Construction	Complete sequential construction, licensing and turnover to Operations for commissioning.	Units 2, 3 and 4 unit in-service for commercial operation.

2.0 PROJECT OBJECTIVES (CRITICAL SUCCESS FACTORS)

The principal objective of the DNNP is to lead new nuclear technology development to provide safe, clean, efficient, and sustainable power to the Ontario electrical grid in the next decade via an SMR at Darlington. The current goal is to commence construction of the first SMR in 2025, complete construction by the end of 2028, and commercially available by the end of 2029.

Primary Objectives and Success Factors:

1. SMR technology development and design

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- (i) Safe
 - a. Inherently safe design and passive safety response systems.
 - b. Off-site releases resulting from a bounding accident scenario are sufficiently low that the need for emergency actions outside the exclusion zone is eliminated.
 - c. Security resilience.
 - d. As low as reasonably achievable operator radiation dose and operating radiation emissions.
 - (ii) Clean – minimizes environmental impact over the project lifecycle and supports net zero carbon goals.
 - (iii) Sustainable – acceptable lifecycle fuel and waste management strategy.
 - (iv) Efficient – total cost of generation competitive in the Canadian energy market (carbon cost factored in).
 - (v) Adaptable – able to adapt to a range of site specific conditions which will enable deployment of the technology in a fleet approach.
2. Confirm the business case for design and construction of an SMR facility at Darlington.
 3. Construction of an SMR facility on the Darlington site, with up to approximately 300MWe to the grid, complete by the end of 2028.
 4. Design the site and infrastructure and construct up to 3 additional reactors of the same design on the site.

Supporting Objectives:

5. Support the establishment of a Canadian supply chain related to SMR build and maintenance, maximizing benefits to Durham Region, Ontario and Canada.
6. Partner with Government and other stakeholders to advance SMR regulatory and technical standard frameworks.
7. Engage and provide opportunities to Indigenous communities.
8. Engage, educate and seek support from key stakeholders, local government, and the surrounding community.
9. Support the vision of a Canadian fleet of SMRs, and specifically an SMR in western Canada in the early 2030's.

3.0 COMMITMENTS, CONSIDERATIONS

3.1 Regulatory Commitments

CNSC licensing required for this project include:

- Site Preparation Licence (current licence 2021-2031)
- Construction Licence
- Operating Licence
- Waste related licence

A primary assumption of this project is that the new nuclear technology/design will fit into the existing Environmental Assessment (EA). This assumption will be reviewed

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periodically in the design phase of the project to ensure any gaps to this are recognized and managed.

With respect to the licensing processes for construction and operation, OPG has developed the necessary administrative protocols with the CNSC to ensure deliverables are provided and reviewed in accordance with an agreed schedule and key regulatory interfaces are managed. In order to increase regulatory confidence and reduce risk of late design changes related to regulatory approvals, designs should undergo the first two phases of the [Pre-licensing Vendor Design Reviews](#) [2].

A Notice of Project will be provided to the Ministry of Labour notifying the Ministry of construction activities on the site. A variety of other Permits will be required and will be managed through the Project.

3.2 Safety Considerations

- No **additional safety considerations**.
- Yes, **additional safety considerations (provide details)**.

Nuclear Safety shall be the primary consideration in the design. The design should incorporate passive safety features. Nuclear safety considerations will be documented in a supporting Safety Analysis Report.

In addition to the Nuclear Safety aspects, the design should incorporate security resilience features.

Conventional and construction safety requirements will follow all applicable municipal, provincial, and federal regulations as a minimum.

3.3 Environmental Considerations

An Environmental Assessment (EA), which includes the Environmental Impact Statement, was prepared and submitted to the Joint Review Panel (JRP) for the DNNP in 2009. The JRP's EA Report concluded that the DNNP Project was not likely to cause significant adverse environmental effects, provided the mitigation measures proposed and commitments made are implemented. Detailed regulatory and environmental commitments are tracked in the DNNP Commitments Report [NK054-REP-01210-00078](#) [3].

As discussed in Section 3.1, a periodic review of the assumptions of the PRSL with respect to the technology design and site preparation activities is required to ensure any gaps to this are recognized and managed.

- No, **environmental impact assessment is NOT required for the project**.
- Yes, **environmental impact assessment IS required for the project**.

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4.0 MAJOR MILESTONES

The DNNP schedule has been developed as part of the definition and front end planning processes. Milestone targets for the program are provided in Table 4-1.

Table 4-1. Major Milestones

Name	Deliverables/Acceptance Criteria/Rationale for Date	Date
Licence to Construct Application	Regulatory licencing period of 2 years	Q4 2022 (Complete)
Class IV Business Case and Release	Basis for a decision to proceed to Site Preparation construction	Q4 2022 (Complete)
Licence to Construct Issued	Regulatory license required to start construction	Q1 2025
Class III Business Case and Release	Basis for a decision to proceed to Nuclear Construction	Q1 2025
Start of Nuclear Construction	Major phase of project	Q1 2025
Construction Complete	Business objective	Q4 2028
Commercially Available	Business objective	Q4 2029

5.0 STAKEHOLDER SUMMARY

Stakeholders of this project include:

- Indigenous Communities with rights or interests in the project
- All levels of government (Province of Ontario, the municipality of Clarington, Durham Region, the Federal Government)
- General public (particularly residents and businesses in close proximity to the Darlington site)
- Other nuclear utilities and nuclear industry organizations
- Special interest groups
- Independent Electricity System Operator (IESO)
- Hydro One
- CN Rail
- Nuclear Waste Management Organization (NWMO)
- St Mary's Cement
- Nuclear suppliers of goods and services

Stakeholders also include potential future business partners of OPG in SMR build and operation.

The project will develop a comprehensive Indigenous & Stakeholder Relations Plan as part of the overall Program Management Plan.

6.0 FUNDING/COST

The full project cost will be estimated during the Development phase, followed by a business case submitted to the OPG Board of Directors for approval. Funding will be

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requested and released in phases, based on successful completion of key work programs and program milestones, in accordance with an approved release strategy. This strategy will be documented in the DNNP Program Management Plan.

7.0 RESOURCING (PROJECT TEAM)

A partnership between OPG, GEH, AtkinsRéalis, and Aecon Construction Group (Aecon), has been contracted to collectively develop and deploy the BWRX-300 SMR, and its supporting infrastructure at the Darlington Nuclear site in Ontario by the end of the decade. An Integrated Project Delivery (IPD) model has been selected to maximize integration and collaboration with contract partners.

The SVP, SMR Execution, will establish the OPG organization and resources necessary for successful completion of the DNNP.

7.1 Risks

A formal risk management process has been implemented within the DNNP to ensure that risks are identified, managed, and reported on a routine basis. These risks and associated actions are managed in a central database and form the basis of planning as well as on-going risk management.

Key risks within the program include:

- (a) Issues related to First of a Kind (FOAK) technology development and design may delay the overall schedule of the project and result in increased cost.
- (b) Issues with amendments/interpretation/application of Regulatory requirements for new technology and/or new nuclear construction may delay the overall schedule of the project and result in increased cost.
- (c) Delays in contract negotiation/issuance or delays in long lead item procurement may delay the overall schedule of the project.
- (d) Specialized resources required to execute the project may not be available due to other competing large nuclear and infrastructure projects, which may delay the overall schedule of the project.
- (e) Lack of a positive business case or shareholder support may result in project cancellation.
- (f) The Ontario Energy Board (OEB) may not approve full cost recovery through the rate case if the economics exceed existing generation options or if the project exceeds the approved budget.
- (g) Public and/or Indigenous opposition to new nuclear development may result in legal challenges, and delays or cancellation of the project.
- (h) The selected technology may result in gaps to the existing EA resulting in additional public consultation and regulatory reviews/approvals, delaying the project and adding cost.

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8.0 REFERENCES

[1] [Power Reactor Site Licence, PRSL 18.00/2022, OPG New Nuclear at Darlington Generating Station, Nuclear Power Reactor Site Preparation Licence. Licence to Prepare Site e-Doc 3990795](#)

[2] REGDOC 3.5.4 Pre-Licensing Review of a Vendor's Reactor Design, 2018

[3] [NK054-REP-01210-00078](#) Darlington New Nuclear Project Commitments Report

DARLINGTON NEW NUCLEAR PROGRAM CONTRACTS

1.0 OVERVIEW

This exhibit describes how OPG developed the distinct contracting approaches that it is using to execute the Darlington New Nuclear Program (“DNNP”) Unit 1 / Common Scope Facilities (“Unit 1”).

2.0 CONTRACTING STRUCTURE OVERVIEW

The DNNP is a large, complex, first-of-a-kind (“FOAK”) project that will be conducted in phases over a decade. Unit 1 scope includes design, engineering, licensing support, procurement, construction, installation, testing, commissioning, completion and turnover of the Unit 1 facility, including related infrastructure and ancillary buildings. The scope of the program is described in Ex. D2-4-5. A detailed description of DNNP’s phases is provided in Ex. D2-4-4, Attachment 1.

Given the size, complexity and inherent uncertainty associated with the design and construction of a FOAK nuclear facility, and the high cost of risk transfer, OPG selected the Integrated Project Delivery (“IPD”) model as the primary commercial model to deliver Unit 1. An overview of why OPG selected this model, its key principles, and the expected benefits are provided in Ex. D2-4-2. The details of the associated Integrated Project Agreement (“IPA”) contract are provided in Section 4 of this exhibit.

Prior to the start of the IPD commercial arrangement, OPG entered into a separate agreement to progress the BWRX-300 design (and therefore scope definition). It also used existing, standard commercial arrangements to progress small site preparation projects during the Initiation Phase. An overview of these Initiation Phase contracts is provided in Section 3.0.

3.0 INITIATION PHASE CONTRACTS

On November 10, 2021, the OPG Board of Directors approved OPG proceeding with the Initiation Phase of a Small Modular Reactor (“SMR”) capital project at the DNNP site. This

1 approval recognized the GE-Hitachi BWRX-300 design as the preferred technology, and as
2 such, GE-Hitachi as the preferred technology Designer. Additional details on the SMR
3 technology selection were provided in EB-2023-0336, Ex. H1-1-1, Section 5.15.

4
5 Following technology selection, the scope of the Initiation Phase was to progress engineering
6 and project development with the preferred technology designer, GE-Hitachi; submit an
7 application for a Licence to Construct (“LTC”) to the Canadian Nuclear Safety Commission
8 (“CNSC”); and to commence initial site preparation work. This resulted in several agreements
9 including the Technology Collaboration Agreement (“TCA”) and contracts for site preparation
10 work which are described below.

11 12 **3.1 Technology Collaboration Agreement**

13 The TCA is the primary agreement with GE-Hitachi for development of the BWRX-300
14 Standard Plant Design.¹ The agreement is between GE-Hitachi (the “Designer”) and three
15 “Contributors” – OPG, Tennessee Valley Authority, and BWRX TCA (registered in Warsaw,
16 Poland). The agreement is premised on the following:

- 17 • The Contributors intend to work with the Designer to advance the development of the
18 BWRX-300 reactor plant technology.
- 19 • The Contributors are willing to fund a portion of the cost associated with the development
20 of the Standard Plant Design.

21
22 The TCA provides the commercial framework under which OPG and the other Contributors
23 are to collaborate with GE-Hitachi on development of the Standard Plant Design and monitor
24 progress of the design.

25
26 The TCA establishes a shared pricing model for development of Standard Plant Design where
27 the costs are shared between the Designer and the Contributors.

¹ The Standard Plant Design refers to all the engineering design that is intended to be common across all BWRX-300 reactors. Site Specific Design refers to the design adaptations, additional work, and documentation required to tailor the Standard Design to the unique characteristics, regulatory requirements, and physical constraints of a particular site.

1 Overall, the TCA facilitates early engagement by OPG into Standard Plant Design, influencing
2 the design plan and technology design decisions. The TCA also allowed OPG to share the
3 costs associated with developing the first-of-a-kind Standard Plant Design with the Designer
4 and other parties interested in constructing a SMR after OPG.

6 **3.2 Site Preparation Contracts**

7 Site Preparation is one of the DNNP's eight Major Work Bundles. It consists of early works,
8 site preparation and geotechnical work. Advancement of these work scopes within the Initiation
9 Phase informed engineering design, scoping and licensing activities, and progressed site
10 preparation activities under the Licence to Prepare Site originally issued by the CNSC in 2012
11 and renewed in 2021. A description of the Major Work Bundle scopes, including details of the
12 Site Preparation bundle scope is provided in Ex. D2-4-5.

13
14 In general, these discrete work scopes are well-defined, relatively small (representing
15 approximately 1% of the Unit 1 cost), and considered low risk. OPG leveraged its existing and
16 proven Extended Services Master Service Agreement and contractor pool to execute these
17 scopes.

19 **4.0 INTEGRATED PROJECT AGREEMENT**

20 OPG has selected the IPD model as the primary commercial tool to deliver Unit 1 and has
21 entered into an associated IPA contract to formalise this arrangement. An overview of why
22 OPG selected the IPD model, key principles of the model, and expected benefits of this model
23 are provided in Ex. D2-4-2. A summary of the IPA is provided in Attachment 2.

25 **4.1 Contract Overview**

26 The initial IPA was executed on January 1, 2023. The scope of the IPA provides for a stand-
27 alone BWRX-300 nuclear power plant (Unit 1), including design, engineering, licensing
28 support, procurement, construction, installation, testing, commissioning, completion and
29 turnover of the facility, including related training, infrastructure and ancillary buildings. The IPA
30 recognizes the roles and responsibilities set out in the TCA and the Standard Plant Design
31 which forms part of the overall scope of the IPA (excluding the funding of the costs).

1 The original parties to the IPA were:

- 2 • **Owner:** OPG
- 3 • **Designer:** GE-Hitachi Nuclear Energy Americas LLC / GE-Hitachi SMR Technologies
4 Canada Ltd. (together “GE-Hitachi”) (now known as GE Vernova Hitachi Nuclear Energy
5 Americas LLC / GE Vernova Hitachi SMR Technologies Canada, Ltd (together “GVH”))
- 6 • **Architect and Engineering (“A&E”) Firm:** Candu Energy Inc. (“Candu”) or AtkinsRéalis
7 Group Inc. (“AtkinsRéalis”)²
- 8 • **Constructor:** AECON Construction Group Inc (“AECON”)

9

10 Cumulatively, the Designer, A&E Firm and Constructor, along with the later addition of Kiewit
11 Nuclear Canada Corp. (discussed below) are referred to as Non-Owner Parties (“NOPs”).

12

13 Given the FOAK nature of this nuclear facility, along with the size, complexity and uncertainty
14 associated with its design and construction, selection of the NOPs via a traditional procurement
15 process would have been infeasible. Specifically, the limitations of a formal request for
16 proposal process did not permit the necessary iterative discussions and bespoke agreements
17 that were required to develop the options for the project. For example,

- 18 • the technical and commercial complexity of the DNNP facility and the magnitude of the
19 associated commercial risk do not lend itself to imposing the same commercial contract
20 and technical specifications on each potential partner;
- 21 • OPG sought partners that were willing to invest in building the DNNP in a collaborative
22 manner which does not align with traditional procurement practices;
- 23 • the length of time that the licensing, construction and commissioning of the DNNP facility
24 will take presents unique pricing challenges not usually seen in traditional procurement
25 processes (for example, construction will begin several years after the agreement is
26 entered into with the NOPs); and
- 27 • the significant differences in commercial risk tolerance and capability among potential
28 partners means that the “apples to apples” comparison required by most traditional
29 procurement approaches is not feasible (for example, it may be advisable to segregate

² Candu Energy Inc. is a wholly owned subsidiary of AtkinsRéalis Group Inc.

1 scopes of work in different ways depending on the selected vendors and their respective
2 capabilities).

3
4 The selection of the Designer was tied to the competitive technology selection process which
5 occurred in 2021.³ Based on learning from discussions with the potential technology
6 Designers, and OPG's assessment of the Canadian construction services market, it was
7 deemed essential that the chosen Designer take an active and potentially leading role in
8 selecting the Constructor and A&E Firm due to the need for strong working relationships and
9 a high degree of trust between the parties, as well as early Constructor and A&E Firm
10 involvement.

11
12 Accordingly, OPG developed the following objectives for IPD partner selection:

- 13 • Demonstrated capability and experience in taking on large, complex projects that include
14 both nuclear and conventional scopes of work. This included appropriate qualifications,
15 experienced staff, and knowledge of local labour markets and requirements. This also
16 included the ability to deploy a fit-for-purpose strategy that aligns nuclear and conventional
17 quality requirements with an appropriate approach to execution.
- 18 • Financial capacity and willingness to take on risk, including non-traditional approaches to
19 partnership that demonstrate a commitment to the success of the DNNP.
- 20 • Alignment with a "One Team"⁴ integrated approach to partnership and project
21 management, including co-location, with a drive to trust and transparency.
- 22 • Alignment of corporate objectives around elements such as net zero emissions, Indigenous
23 partnership, supplier and employment objectives, and local spending.

24
25 The Designer performed a due diligence process on potential Constructor and A&E firms and
26 made a recommendation to OPG based on this process. After an evaluation and review
27 process, OPG accepted the recommended firms. As part of this acceptance, OPG ensured
28 that the selected Constructor had appropriate qualifications to meet the project objectives, and
29 that the contractual arrangement with the Constructor and A&E Firm demonstrated use of best

³ Additional details on the SMR technology selection were provided in EB-2023-0336, Ex. H1-1-1, Section 5.15.

⁴ Refer to D2-4-2, Section 2.0 for a description of the "One Team" approach.

1 industry practices and value-for-money and included appropriate incentive mechanisms and
2 levels of risk allocation.

3
4 OPG's acceptance of AtkinsRéalis and AECOM also reflected its extensive knowledge of these
5 companies based on previous commercial relationships between OPG and the proponents, as
6 well as their recent successful experience executing Darlington Refurbishment Program
7 ("DRP") scope and their understanding and adoption of the "One Team" collaborative
8 approach.

9
10 On May 7, 2025, a planned amendment to the IPA (the "Validation Amendment") was
11 executed. The period between signing the IPA and the Validation Amendment was the
12 Definition Phase (also referred to as the Validation Phase). The purpose of this phase was to
13 align the four parties regarding the project scope and design, schedule, cost, and quality,
14 ultimately improving the definition and maturity of the project. This approach is consistent with
15 recommended best practices and guidance received from Howard W. Ashcraft, a construction
16 lawyer with extensive experience in major infrastructure projects and an IPD expert.
17 Specifically, the scope of this phase included the following:

- 18 • development of the design by the Designer and A&E Firm;
19 • support for the Owner and Licence Holder in obtaining the CNSC LTC and other permits,
20 licence and approvals;
21 • development of the project schedule;
22 • greater project definition through confirmation, refinement and enhancement of the
23 Owner's requirements, as required, as design was further developed; and
24 • finalization of the Target Cost, pricing and compensation details, and the
25 incentive/disincentive mechanism.

26
27 This work informed the Unit 1 Release Quality Estimate ("RQE") and the terms of the IPA,
28 including the Target Cost for the IPA work associated with Unit 1, and an incentive/disincentive
29 system to drive "best for project" behaviours by all parties. Details on the scope of the project
30 allocated to each NOP are provided in Ex. D2-4-5. Details on the Target Cost and the
31 incentive/disincentive system are described in Section 4.4 below.

1 The Validation Amendment also added Kiewit Nuclear Canada Corp. (“Kiewit”) to the IPA to
2 assist with the construction of the DNNP facility. The addition of Kiewit at this stage allows
3 them to fully participate in the construction of the Unit 1. This early involvement is also
4 beneficial to DNNP should Kiewit be involved with the construction of Units 2, 3, and 4, allowing
5 it to embed experience and lessons learned to deliver unit-over-unit efficiencies. Recognizing
6 their shared accountability for construction of the facility, AECON and Kiewit formed AECON
7 Kiewit Nuclear Partners (“AECON Kiewit”), a general partnership between AECON
8 Construction Group and Kiewit Nuclear Canada Corp.

9
10 Consistent with the IPD model and associated best practices discussed in Ex. D2-4-2, the
11 following key principles were incorporated into the IPA:

- 12 • A shared governance structure between the parties for joint management and decision
13 making (further described in Section 4.2 below);
- 14 • A flexible allocation of work to the party, or parties, best suited to perform the work (further
15 described in Section 4.3 below); and
- 16 • A shared risk model to motivate cost, schedule and project performance by all parties
17 (further described in Section 4.4 below).

18
19 The following sections describe the key elements of the IPD contractual model and how the
20 Owner will use this model to successfully deliver the DNNP.

21 22 **4.2 Governance**

23 The IPA reflects the collaborative principles of an IPD model and adopts a tiered approach to
24 governance and decisions making. The IPA defines four levels of governing bodies, specifically
25 (1) Executive Board, (2) Project Leadership Team (“PLT”), (3) Unit 1 Execution Director, and
26 the (4) Project Management Teams. A description of the governing bodies, decision-making
27 approach and the associated organizational model are provided in Ex. D2-4-2.

28
29 Generally, the framework supports collaborative decision-making as close to the workforce as
30 possible, with larger, more strategic decisions escalated to the PLT and/or the Executive Board
31 as appropriate. Decisions escalated to the Executive Board are approved via majority vote;

1 however, the Owner has the ability in most cases to overrule any Executive Board decision,
2 ensuring that the Owner's objectives and priorities are achieved, and that the Owner maintains
3 control and oversight of all strategic decisions.
4

5 **4.3 Allocation of Work**

6 A Division of Responsibilities ("DOR") was established within the IPA, clarifying the lead and
7 support responsibilities of each of the parties. The DOR was jointly refined during the Validation
8 Phase to allow for the flexible assignment of work to the party or parties best suited to perform
9 the work. The PLT has the authority to amend the DOR by reallocating responsibility for
10 aspects of the project to another party, and/or including additional responsibilities and their
11 party assignment. The project change control process, used to make changes in work
12 allocation, is described in Ex. D2-4-9.
13

14 **4.4 Pricing and Risk and Reward Framework**

15 4.4.1 Pricing

16 Under the IPA, the NOPs are compensated monthly for all allowed, direct, DNNP-specific costs
17 incurred (Allowed Costs) as well as a portion of their overhead calculated as a specified
18 percentage for categories of costs (Monthly Overhead). The remaining portion of their
19 overhead and profit is held by the Owner as a Fixed Fee that funds the Risk Pool.
20

21 OPG's approval of AtkinsRéalis and AECOM Kiewit's Allowed Costs, associated rates, monthly
22 overheads, and profit held-at-risk was based on OPG's extensive knowledge of these
23 companies from previous commercial relationships. OPG was satisfied that the agreed to
24 pricing model and rates are comparable to those in projects that have been awarded following
25 competitive bids and are therefore appropriate and reasonable.
26

27 OPG's evaluation of GE-Hitachi's overhead rates was based upon their actual incurred indirect
28 costs. Through a third-party review of the costs, GE-Hitachi's overhead rates were validated
29 and concluded to be appropriate and reasonable.

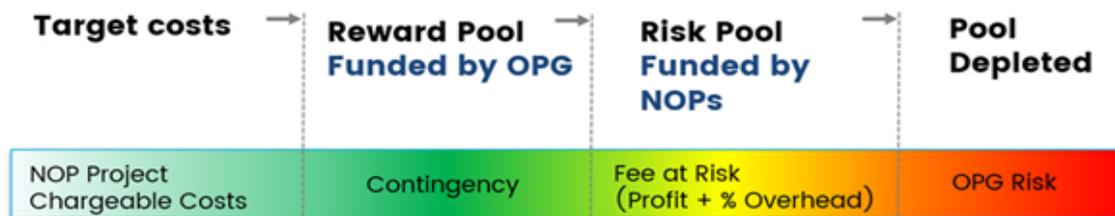
1 The monthly invoiced costs are reviewed by the Owner prior to payment. For disputed invoices,
2 an expedited cost dispute resolution procedure is available using a cost adjudicator retained
3 for the project. In addition, the Owner has broad audit rights which are described in Section
4 4.5.3 below.

5
6 **4.4.2 Risk and Reward Framework**

7 Aligned with the key principles of the IPD Model described in Ex. D2-4-2, the IPA uses a shared
8 Risk and Reward framework to motivate cost, schedule and project performance by all parties
9 through to the completion of the project. Under this framework, all parties' financial
10 incentives/disincentives are tied to project success, and each other's performance, reinforcing
11 "best for project" decisions, and collaboration to expeditiously resolve issues and effectively
12 manage project risks.

13
14 The basic structure of the financial incentives under the agreed IPA is provided in Figure 1
15 below.

16 **Figure 1 - Illustration of the IPA Risk and Reward Framework**



17
18 The Risk and Reward framework considers the following:

- 19
- 20 • **Target Cost:** Reflects the Class 3 estimate to complete the IPA scope, excluding
21 contingency. The Target Cost was refined during the Validation Phase and was extensively
22 challenged by OPG during the development of the Unit 1 RQE. Details on the development
23 of the scope, schedule and associated cost of the Unit 1 RQE are described in Ex D2-4-5,
24 Ex. D2-4-6 and Ex. D2-4-8, respectively.
 - 25 • **Reward Pool:** Reflects the estimated amount of contingency determined necessary to
26 address the cost uncertainty, schedule uncertainty and discrete risks that are associated
with executing the scope included in the IPA. This was informed by a quantitative risk

1 assessment. As with any project, contingency refers to amounts that are expected to be
2 expended because there are risk items and uncertainties that will occur and cannot be
3 entirely mitigated or avoided. Details on how contingency is developed and challenged is
4 described in Ex. D2-4-7.

- 5 • **Risk Pool:** The Risk Pool is a sum of each NOP's agreed Fixed Fee (based on the
6 projected costs of each NOP). This Fixed Fee reflects each NOP's portion of overhead that
7 is not being compensated monthly, and profit for the project that is held by the Owner until
8 certain project objectives are achieved. This Fixed Fee is placed at risk under the Risk
9 Pool.

10
11 Both the Risk Pool and Reward Pool are broken down into two sub-pools: (1) Execution sub-
12 pool and (2) Warranty / Unplanned Capability Loss Factor ("UCLF") sub-pool. When targets in
13 respect of execution cost/schedule or Warranty / UCLF are missed, amounts in the applicable
14 sub-pools are used to cover the cost of delays or additional work. The value of the Warranty /
15 UCLF sub-pools are designed to provide sufficient incentive to the NOPs to focus on quality
16 during installation and recover a portion of costs in the event defects are discovered during the
17 warranty period.

18
19 When actual costs exceed the Target Cost, amounts are taken first from the Reward Pool
20 portion of each sub-pool, and then, if the Reward sub-pool is fully depleted, from the Risk Pool
21 portion of each sub-pool⁵. In the event that the actual costs exceed the Target Cost such that
22 both the Reward Pool and the Risk Pool are depleted, the remaining cost to complete the
23 project would reside with the Owner.

24
25 A summary of the Reward Pool and Risk Pool amounts, by sub-pool, are provided in Chart 1.

⁵ Depletion of the Risk Pool will occur at 70% of the cost incurred, with the remaining 30% of the cost incurred funded by the Owner via non-IPA scope contingency.

Chart 1 - IPA Reward Pool and Risk Pool Funded Amounts (\$M)

	Execution Sub-Pool	Warranty / UCLF Sub-Pool	Total
Reward Pool	547	68	615
Risk Pool	385	48	432
Total*	932	115	1,047

* All amounts exclude escalation.

4.4.3 Execution Sub-Pool Depletion and Release of Funds

To incentivize project performance throughout project execution, any remaining non-depleted Execution Sub-Pool funds may be released to the NOPs in accordance with the following:

- **Achievement of Project Critical Milestones:** The NOPs may receive a small portion of the total Execution Sub-Pool from the Reward Pool based on the achievement of certain Project Critical Milestones, and adequate project health (considering program cost, program schedule, quality, safety and collaboration). These potential payouts are designed to reward performance as the project progresses while leaving sufficient contingency to manage remaining risks. This is based on lessons learned from past projects where incentives are most effective when they are balanced between near-term, interim milestones as well as success at completion. The agreed to Project Critical Milestones are as follows:
 - Baseline 3 Design Complete by December 2025
 - Reactor Building Basemat Ready by January 2026
 - CNSC Operating License Application Submitted by March 2026
 - Centerline Install Commenced by December 2027
 - Reactor Pressure Vessel Placed by November 2027
 - Mechanical Completion by October 2029

To demonstrate critical milestone achievement, the project teams must provide the PLT with all documents, records and other evidence necessary to support such a determination. If the PLT unanimously endorses that all requirements have been satisfied, the Owner will perform an independent determination and if satisfied, calculate payment amount for each

1 NOP. A description of the governing bodies, decision-making approach and the associated
2 organizational model are provided in Ex. D2-4-2.

- 3 • **At Final Completion of the Project:**⁶ Following Final Completion, the Owner will pay out
4 and/or retain the remaining amount in the Execution Sub-Pool, as follows:
- 5 ○ Any remaining amount within the Reward Pool Execution Sub-Pool is distributed 70%
6 to the NOPs and 30% to the Owner. Since this sub-pool addresses project risk which
7 is expected to be expended based on quantitative risk analysis, payout of any
8 remaining amount from this sub-pool would be a result of successful risk mitigation and
9 effective resolution of issues jointly between all parties. The distribution of any
10 remaining payout between the NOPs and the Owner is designed to motivate all parties,
11 including the Owner, to consume contingency only if it is essential to project success.
 - 12 ○ Any remaining amount within the Risk Pool Execution Sub-Pool following Final
13 Completion is distributed to the NOPs.

14
15 The Risk and Reward Framework and associated release of funds are designed to drive “best
16 for project” behaviours throughout the lifecycle of the project, with an emphasis on final
17 completion of the project. The largest portion of the maximum Execution Sub-Pool payouts
18 that the NOPs could receive over time is tied to the Final Completion of the project, signifying
19 the importance of that milestone. In addition, the milestones and success criteria are not NOP
20 specific, driving collaboration across NOPs.

21
22 A demonstration of the Risk and Reward Framework and associated NOP payouts under
23 various scenarios is provided in Attachment 1. The correlation of the Risk and Reward
24 Framework to project contingency is provided in Ex. D2-4-7.

25 26 4.4.4 Warranty / UCLF Sub-Pool Depletion and Release of Funds

27 The Warranty / UCLF Sub-Pools provide an incentive related to the achievement of key
28 operational objectives and performance measures. To incentivize project performance, any
29 remaining non-depleted Warranty / UCLF Sub-Pool funds would be released to the NOPs at

⁶ Final Completion is defined as the point in time when all Punchlist Items are resolved and the Final Completion Certificate is issued per the terms in the IPA.

1 the end of the warranty period, which extends until 36 months after the date of Mechanical
2 Completion⁷ of the facility. Details on the warranty and UCLF are provided in Section 4.5.

3 4 **4.5 Other Key IPA Contract Terms**

5 **4.5.1 Allowed Schedule and Cost Adjustments**

6 The approved high confidence schedule for Unit 1 has an October 17, 2030 completion date,
7 for a total duration of 66 months (See Ex. D2-4-6 for further information on the DNNP
8 schedule). This high confidence schedule includes contingency for certain schedule risks that
9 may be encountered during construction or commissioning.

10
11 The IPA tightly restricts any adjustments to the Target Cost and to the program schedule.
12 During the Execution Phase, only specified events or circumstances will permit the NOPs to
13 an extension of time to achieve the Project Critical Milestones, delaying deductions from the
14 Execution Sub-Pool or to an adjustment in the Target Cost. These specified events or
15 circumstances are for developments beyond the control of the NOPs, allowing them to remain
16 focused on things within their control. For example, these specified events or circumstances
17 include suspension of the project by the Owner or an unforeseen regulatory development. For
18 a more complete list of specified events, refer to the IPA contract summary in Attachment 2.
19 The list of specified events and circumstances in the IPA is typical for major nuclear projects
20 and reflects OPG's experience from the development of the nuclear refurbishment contracts.

21
22 Any extension of time will be limited to delays in the critical path and the NOPs are incentivized
23 to mitigate the impact of any delay. Similarly, any increase to the Target Cost is limited to the
24 increase in Allowed Costs and monthly overhead directly caused by the event or circumstance,
25 with the NOPs having a duty to mitigate the cost increase.

⁷ Mechanical Completion is defined as the point in construction whereby the principles of mechanical completion, based on Prudent Industry Practice (excluding any agreed upon Punchlist Items not required to achieve Mechanical Completion), have been satisfied (through the appropriate static and preoperational testing and as substantiated in documents, records and certificates) and that the Project is ready for Turnover and Fuel Assembly loading.

1 The NOPs are not entitled to a schedule delay or a Target Cost adjustment if the cost
2 exceedance or schedule delay is due to a failure of a NOP to discharge an adequate “Standard
3 of Care” (i.e., generally accepted practices in the North American nuclear power industry,
4 amongst other criteria).

5
6 **4.5.2 Sub-Contractors**

7 The NOPs are fully responsible for the performance of their subcontractors. They must ensure
8 that the specified terms of the IPA are flowed down as appropriate to all subcontractors,
9 including the provisions relating to health, safety, security, environmental, quality
10 management, transfer of title, site access, intellectual property, audit, records and information
11 management requirements, cybersecurity, and others.

12
13 All subcontracts must be entered into in accordance with a Subcontractor Management Plan
14 approved by the PLT. The plan sets out minimum requirements for competitive subcontracting,
15 interface obligations and other matters, with the selection of key subcontractors (i.e.,
16 subcontracts above a specified dollar threshold or containing key work scope) requiring PLT
17 approval.

18
19 **4.5.3 Audit**

20 Under the IPA, the Owner has broad audit rights to monitor the performance and quality of the
21 work. Any time, until two years after the project, the Owner may give notice to an NOP requiring
22 an audit by the Owner or a designated third-party auditor in respect of the work performed by
23 the NOP.

24
25 The Owner may also audit all records in respect of invoices submitted by the NOP for a period
26 of two years after final completion of the project (and any payment made by the Owner is
27 subject to readjustment based on any such audit).

28
29 OPG conducted its first post-payment audit in Q3 2023. It covered the first seven months of
30 work under the IPA (January 1, 2023-July 31, 2023). The audit found small variances (less
31 than 1.2%) in the total invoiced amounts across all NOPs. The variances were mostly due to

1 incorrect overtime billings, the incorrect application of monthly overhead rates, and
2 unsubstantiated expenses. In all cases, OPG had already identified these issues through its
3 own invoice reviews and was working with the applicable NOPs to resolve the inaccurate
4 billings.

5
6 **4.5.4 Fuel Assemblies**

7 GE-Hitachi's obligations to design the fuel assemblies (the physical entity of fuel elements and
8 related appurtenances) and the assemblies' core components (permanent or replaceable
9 components of the ore of the reactor) are part of the IPA. GE-Hitachi is also obligated to ensure
10 that the fuel design is compatible with the facility and the core loading pattern for the first cycle.
11 Fuel assemblies required for commissioning and operating the unit form part of the fuel costs
12 discussed in Ex. F2-5-1.

13
14 **4.5.5 Warranties**

15 There are several types of warranties with respect to capacity and operations of the DNNP
16 facilities' Unit 1. For example, the net capacity target is 309 MWe for the BWRX-300, adjusted
17 for water intake flows, lake temperature, condenser performance and house loads, as
18 appropriate. Unlike other warranties described below, this is tied specifically to GE-Hitachi as
19 the core reactor design is the critical driver of output. This net capacity guarantee target aligns
20 with expected output of the unit, demonstrating GE-Hitachi's commitment to the success of its
21 design.

22
23 If this net capacity is not achieved, the Owner is entitled to receive liquidated damages that
24 are calculated based on the net capacity deficiency. These damages are designed to ensure
25 GE-Hitachi delivers a quality design, and if necessary, remedies any deficiencies.

26
27 The NOPs have also guaranteed a UCLF for the facility for unplanned losses due to defective
28 work, to be calculated at two intervals: (1) at the end of the first year, and (2) the second period
29 (which commences following the end of the first year and ends at the later of (i) 90 days
30 following the return to service of the Unit following the first refueling outage, and (ii) the one-
31 year anniversary of the end of the first year). The UCLF will be calculated in accordance with

1 the formula described in the IPA. If the UCLF is greater than the guarantee percentage, a
2 deduction will be made from the Warranty / UCLF Sub-Pool for each MWh below the committed
3 output.

4
5 In general, the warranties extend for 36 months after Mechanical Completion of the facility,
6 and function in such a way that any defect identified after Mechanical Completion is funded
7 through the Warranty / UCLF pools, such that all parties have an incentive to promptly resolve
8 any defect in order to minimize warranty costs and UCLF deductions to protect the Warranty /
9 UCLF pools.

10

11 4.5.6 Change Orders

12 The project objective of the IPA can be broadly defined as the Owner and NOPs collectively
13 delivering a finished and fully functional facility in accordance with the IPA. Under an IPD
14 model, changes at the initiative of the NOPs are limited to very specific events, such as force
15 majeure or change in regulation or laws. However, the Owner may issue a change order (or
16 Change Directive) if it desires a change to be implemented. The PLT will prepare an estimate
17 of the impact of the change on the cost and schedule (including the Target Cost, Fixed Fee
18 of each Party, etc.). After the estimate is prepared and approved by the Owner (or the matter
19 is determined pursuant to the Dispute Resolution Procedure), the PLT will issue a Change
20 Confirmation, and the Parties will implement the Change.

1

LIST OF ATTACHMENTS

- 2 Attachment 1: Illustrative Incentive/Disincentive Scenarios
- 3 Attachment 2: Integrated Project Agreement Summary

1 **Attachment 1 – Illustrative Incentive/Disincentive Scenarios**

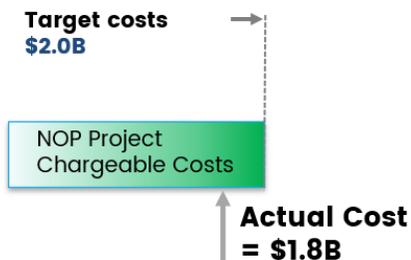
2
3 **Illustrative Risk/Reward Pool Scenarios – Paid at Final Completion**

4
5 **General Assumptions:**

- 6
- 7 • Below scenarios are for illustrative purposes only
 - 8 • Risk and Reward Warranty Sub Pools will not be used for cost overruns during Execution Phase
 - 9 • Incentive milestone payments (which will be drawn from the Reward Pool, if achieved) are not considered in these scenarios
 - 10 • Illustrative Target Cost = \$2.0B
 - 11 • Illustrative Reward Pool = \$250M
 - 12 ○ Illustrative Execution Reward Sub pool (80%) = \$200M
 - 13 ○ Illustrative NOPs/OPG split for Reward Pool retained: 70% NOPs / 30% OPG
 - 14 • Illustrative Risk Pool = \$250M
 - 15 ○ Illustrative Execution Risk Sub pool (80%) = \$200M
 - 16 ○ Risk Pool is depleted at 70% of the cost incurred, with the remaining 30% funded by OPG scope contingency (not shown in the scenario's below).
- 17
18
19
-

20
21 **Scenario 1: Total Actual Costs = \$1.8B (\$200M under Target Cost)**

- 22
- 23 • Amount by which Actual Cost < Target Cost = \$200M
 - 24 ○ 70% of which will be shared by the NOPs (\$140M)
 - 25 ○ 30% is retained by OPG (\$60M)
 - 26 • Execution Reward Pool = \$200M remaining (\$200M - \$0), 70% of which will be shared by the NOPs (\$140M)
 - 27 • Execution Risk Pool = \$200M remaining (\$200M - \$0), to be paid to each NOP based on proportionate share
- 28
29
30



**Total Execution
Reward/Risk
Subpools to
NOPs = \$480M**

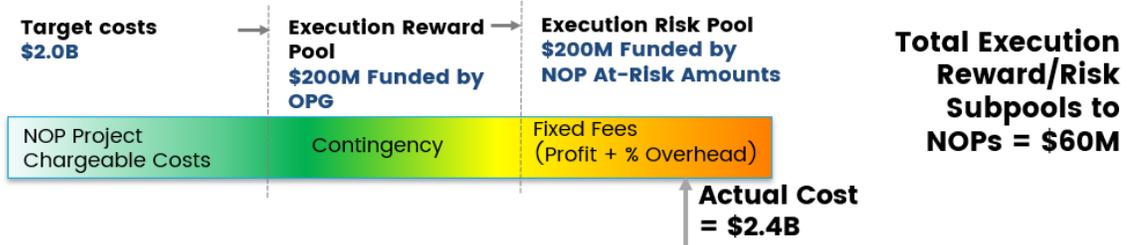
Scenario 2: Total Actual Costs = \$2.1B (\$100M over Target Cost)

- Execution Reward Pool = \$100M remaining (\$200M - \$100M), 70% of which will be shared by the NOPs (\$70M)
- Execution Risk Pool = \$200M remaining (\$200M - \$0), to be paid to each NOP based on proportionate share



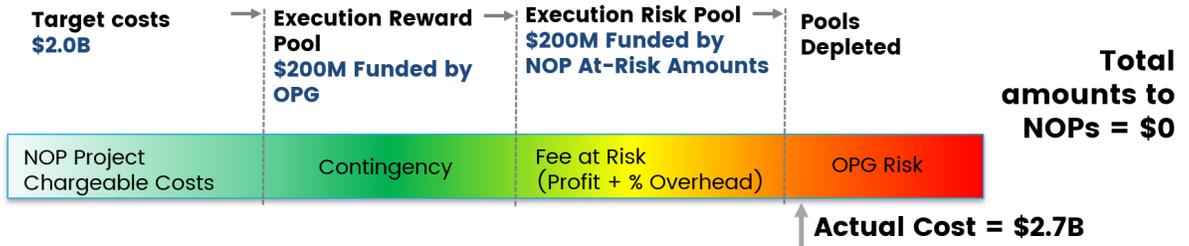
Scenario 3: Total Actual Costs = \$2.4B (400M over Target Cost)

- Execution Reward Pool = \$0 (FULLY DEPLETED)
 - \$200M in Costs Exceeding Execution Reward Pool Contingency
 - Execution Risk Pool to be Accessed
- Execution Risk Pool = 70% of \$200M = \$140M of Execution Risk Pool utilized
 - \$60M (\$200M - \$140M) remaining, to be paid to each NOP based on proportionate share



1 **Scenario 4: Total Actual Costs = \$2.7B (\$700M over Target Cost)**

- 2
- 3 • Execution Reward Pool = \$0 (FULLY DEPLETED)
- 4 ○ \$500M in Costs Exceeding Execution Reward Pool Contingency – Execution
- 5 Risk Pool to be Accessed
- 6 • Execution Risk Pool Amounts used = 70% of \$500M = \$350M
- 7 ○ Execution Risk Pool Fully Depleted +\$300M in costs to be funded by OPG.
- 8 • All costs in excess of the Risk Pool are funded by OPG (EXECUTION
- 9 RISK/REWARD POOLS FULLY DEPLETED)



11

Exhibit D2-4-3, Attachment 2

Integrated Project Agreement Summary

This Attachment was filed as confidential information in its entirety.

DARLINGTON NEW NUCLEAR PROGRAM PLANNING

1.0 OVERVIEW

While Small Modular Reactor (“SMR”) technology has been under development for some time, the Darlington New Nuclear Program (“DNNP”) is the G7’s first commercial, grid-scale SMR. In developing the project, OPG has taken steps to manage the first-of-a-kind (“FOAK”) SMR technology risks and ensure a successful execution of the DNNP Unit 1 / Common Scope Facilities (“Unit 1”). This includes major investments in planning during the Initiation and Definition phases of the project, which has enabled OPG to establish a detailed scope and a high-confidence schedule and cost estimate for Unit 1 aimed at minimizing scope creep risk, schedule delays and resulting cost increases.

This exhibit summarizes the extensive planning effort to enable the DNNP to be completed safely, on time, on budget, and with the required quality.

2.0 PLANNING

2.1 First-of-a-Kind Risks

Constructing and commissioning a BWRX-300 SMR at the Darlington New Nuclear site involves FOAK risks. These risks are attributable to a new technology design and have potential downstream impacts on supply chain and component fabrication, construction methods, commissioning and associated licensing and regulatory requirements.

OPG has actively taken steps to manage the risks associated with FOAK technology, which may also encompass first-in-a-while aspects, into the planning and execution of the DNNP. This includes the implementation of a comprehensive and robust risk management system, which is further defined in Ex. D2-4-7.

In addition to identification and management of discrete risks in alignment with the risk management system, OPG has implemented programmatic risk mitigation through leveraging of commercial agreements, strategic partnerships with capable vendors, and early and transparent engagement with regulators. Details are provided below.

1 2.1.1 Selecting the Right Partners

2 OPG has mitigated FOAK risk by (1) undertaking a comprehensive technology partner
3 selection process, and (2) selecting the right partners to participate in the Integrated Project
4 Agreement ("IPA").

5

6 Selection of the technology partner (Designer) involved several key considerations, such as
7 safety, technological readiness, ability to license at the Darlington New Nuclear site,
8 environmental impact, cost, and economic development potential. The detailed process OPG
9 used to review available technologies was the subject of EB-2023-0336,¹ under which the
10 costs OPG incurred and recorded in the Nuclear Development Variance Account ("NDVA")
11 were approved for clearance.²

12

13 Based on the results of this comprehensive assessment, GE-Hitachi's BWRX-300 was
14 selected for the DNNP. GE-Hitachi is a world-leading provider of advanced reactors, fuel, and
15 nuclear services with a proven track record of success. See Ex. D2-4-2 for additional details.

16

17 In addition, OPG engaged AtkinsRéalis (Architect and Engineering ("A&E") Firm) and AECON
18 (Constructor) as partners to the project.³ Both companies have long histories of successfully
19 planning and executing large complex projects. Details on the IPA, including the process and
20 considerations pertaining to partner selection, are provided in Ex. D2-4-3.

21

22 The four parties collaboratively engaged in detailed planning and costing work during the
23 Definition Phase to develop a Class 3 Release Quality Estimate ("RQE") and a schedule for
24 project execution, improving project planning and scope maturity, and reducing risk. See Ex.
25 D2-4-6 and Ex. D2-4-8 respectively for additional information on the scheduling and costing
26 process.

¹ Refer to EB-2023-0336, Ex. H1-1-1, Section 5.15 for details on the technology selection process.

² EB-2023-0336, Decision and Order, June 13, 2024, pp. 4-5. NDVA approved as per settlement proposal which included a \$91,000 reduction to the NDVA balance sought for recovery in the application.

³ AECON Construction Group and Kiewit Nuclear Canada Corp. later formed AECON Kiewit as described in Ex. D2-4-3, Section 4.1.

1 2.1.2 Selecting the Right Commercial Framework

2 OPG also addressed FOAK technology risk by engaging with the technology Designer early,
3 contributing to the development of the Standard Plant Design⁴ to ensure it best suits OPG's
4 current and future needs and leveraging partners to share the costs of technology
5 development. Accordingly, the Standard Plant Design for the SMR selected for the DNNP is
6 developed under a Technology Collaboration Agreement ("TCA").

7
8 The TCA provides the commercial framework under which OPG is collaborating with GE-
9 Hitachi on the development of the Standard Plant Design and is monitoring progress of the
10 design. This collaboration is achieved through a Design Center Working Group consisting of
11 representation from the parties to the agreement. The Design Center Working Group was
12 established to assist the technology Designer with developing the Standard Plant Design.
13 Further information on the commercial arrangement under the TCA is described in Ex. D2-4-
14 3, Section 3.1.

15
16 As described in Ex. D2-4-2, OPG has selected an Integrated Project Delivery ("IPD") model as
17 the primary commercial framework to deliver Unit 1. This model is appropriate for large FOAK
18 projects as it drives early involvement of all participants in the design process, "best for project"
19 collaborative decision making, and a shared risk and reward structure, all of which will reduce
20 risk to DNNP LP and ratepayers. This arrangement has been formalized in the IPA described
21 in Ex. D2-4-3. Through this agreement, FOAK risks are mitigated through:

- 22 • Early engagement of all parties during the Definition Phase (also referred to as the
23 Validation Phase) to align on project scope, design, schedule, cost, and quality, ultimately
24 improving the maturity of the project (see Ex. D2-4-3, Section 4.1); and
25 • The Risk and Reward Framework where the financial incentives/disincentives are tied to
26 project success and the performance of the IPA Parties,⁵ reinforcing "best for project"
27 decisions, and collaboration across IPA Parties to expeditiously resolve issues and
28 effectively manage project risks (see Ex. D2-4-3, Section 4.4.2).

⁴ Standard Plant Design means the design specifications, drawings, analyses, 3D models, and other deliverables, for those systems, structures and components within the BWRX-300 Main Parts List that have been identified as standard are anticipated to form the basis of a standardized BWRX-300 design for future deployments.

⁵ "IPA Parties" includes the Non-Owner Parties ("NOPs") and OPG/DNNP LP.

1 2.1.3 Regulatory Engagement

2 OPG continues to mitigate the regulatory risk associated with FOAK technology by
3 implementing an outreach to the Canadian Nuclear Safety Commission (“CNSC”) on the plans
4 for the DNNP. This included the early submission of information to facilitate CNSC staff reviews
5 and feedback, as well as leveraging the CNSC’s Memorandum of Cooperation with the U.S.
6 Nuclear Regulatory Commission for joint reviews on select key areas.

7
8 In parallel to the technology assessment and selection process, OPG advanced CNSC
9 licensing efforts, including an application to renew the existing Licence to Prepare Site and
10 licensing plans and document preparation for a Preliminary Safety Assessment Report and the
11 Licence to Construct (“LTC”) application.

12
13 OPG’s efforts resulted in an October 2021 decision by the CNSC to renew the Darlington
14 Licence to Prepare Site for a further ten years to 2032. In addition, on April 24, 2024, the CNSC
15 announced that it had determined that the existing environmental assessment for the DNNP
16 was applicable to the GE-Hitachi BWRX-300 reactor. In making this determination, the CNSC
17 concluded that the proposed SMR technology was bounded by the existing environmental
18 assessment and that OPG’s commitments remained appropriate.

19
20 On April 4, 2025, the CNSC issued a LTC for Unit 1, allowing the DNNP to proceed to the
21 Execution Phase.

22
23 OPG is planning to submit the Unit 1 Licence to Operate application to the CNSC in the second
24 quarter of 2026 in order to enable a decision prior to the planned commercial operation of Unit
25 1. Further detail on the Unit 1 schedule is provided in Ex. D2-4-6.

26
27 **2.2 Investment in Planning**

28 OPG has organized the DNNP into three phases: Initiation, Definition and Execution. Detailed
29 descriptions of these phases are provided in Attachment 1.

1 The Initiation Phase was successfully completed at the end of 2022 with OPG's Board of
2 Directors granting approval to proceed with the DNNP following the selection of the technology.

3
4 The Definition Phase (also referred to as the Validation Phase) commenced in January 2023
5 and concluded in March 2025 with the OPG Board of Directors approving the Unit 1 Class 3
6 Release Quality Estimate ("RQE"). On May 5, 2025, the Province of Ontario, following its
7 review of the cost estimate for the DNNP, also announced that it had approved the plan to
8 begin construction of the first of four SMRs at the Darlington New Nuclear site.

9
10 During the Definition Phase, and in anticipation of the start of the Execution Phase, OPG made
11 a significant investment in planning and preparatory work to maximize cost estimate and
12 schedule accuracy for Unit 1.

13
14 The primary outputs of the Definition Phase were:

- 15 1) a commercial framework and executed commercial agreements with selected parties;
- 16 2) substantial planning progress, including completion of scoping, Standard Plant Design for
17 major systems, cost estimating and scheduling;
- 18 3) completion of pre-requisite activities to enable the commencement of Unit 1 construction
19 including geotechnical work and site preparation work, key component mockup and testing,
20 and long lead material procurement;
- 21 4) submission of the LTC application to the CNSC and support for the licensing process; and
- 22 5) approval from OPG's Board of Directors of the Unit 1 RQE.

23
24 The key planning deliverables of this phase were jointly developed by the OPG and the Non-
25 Owner Parties ("NOPs"). These deliverables were subsequently assessed and challenged by
26 OPG prior to the finalization of the Unit 1 RQE. Additional information on the scoping,
27 scheduling, contingency development and costing is provided in Ex. D2-4-5, Ex. D2-4-6, Ex.
28 D2-4-7 and Ex. D2-4-8, respectively.

1 Obtaining approval of the Unit 1 RQE from OPG's Board of Directors signified that detailed
2 planning was sufficiently complete, including a scope, cost, and schedule baseline for delivery
3 of the first SMR unit. In addition, RQE approval established the basis for release of Execution
4 Phase funding for the Unit 1 construction and commissioning.

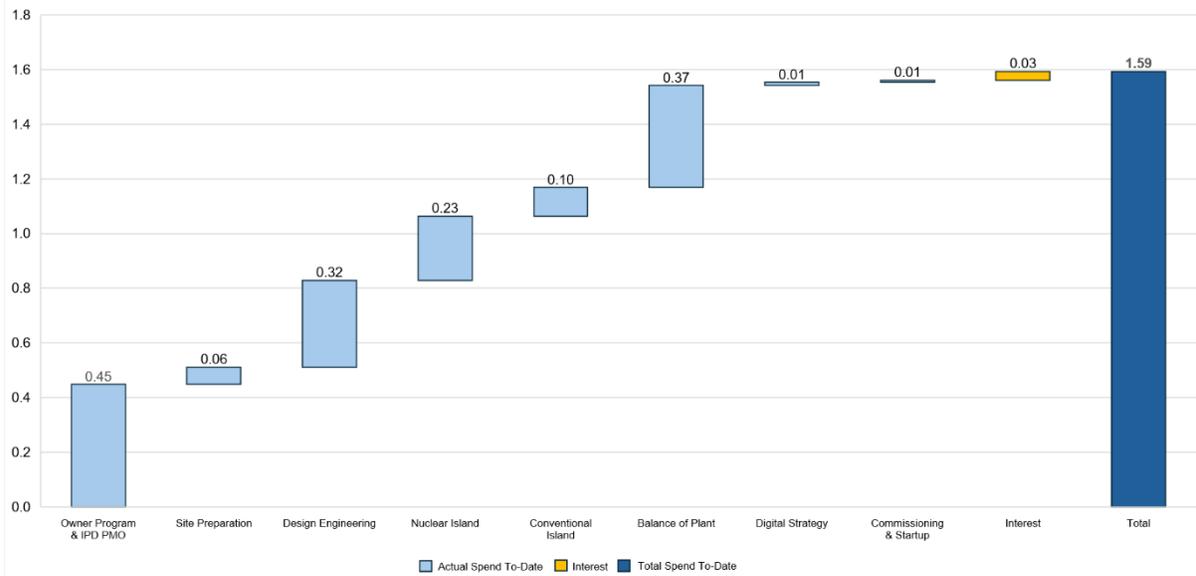
5
6 OPG successfully met the following key Definition Phase milestones to obtain RQE approval:

- 7 • *Scope Definition*: Developed a detailed definition of scope aligned with project objectives;
- 8 • *Commercial Framework and Project Team*: Finalized the commercial agreements and
9 established the main project team with representation from across the IPA Parties, with the
10 execution teams in place to manage Unit 1 construction;
- 11 • *Lessons Learned*: Incorporated review of benchmarking and operating experience and
12 lessons learned into project planning;
- 13 • *Engineering and Licensing*: Progressed detailed engineering and completion of the
14 Standard Plant Design for major systems. Submitted the Unit 1 LTC application to the
15 CNSC and supported the review process. The licence was subsequently issued in April
16 2025;
- 17 • *Key Component Mockup and Testing*: Completed a mock-up testing program on
18 Diaphragm Plate Steel Composite reactor building construction to demonstrate design and
19 regulatory compliance, and established a prototype program for critical components that
20 vary from other proven designs;
- 21 • *Cost Estimation*: Documented the basis of estimate and underlying assumptions for all
22 major cost elements necessary to deliver Unit 1 in accordance with Class 3 estimate quality
23 requirements, as defined by Association for the Advancement of Cost Engineering
24 International ("AACE"), a non-profit association that is a recognized authority in project and
25 program cost and schedule management;
- 26 • *Scheduling*: Developed an integrated Level 1 Execution Project Schedule depicting key
27 components of Unit 1 critical path and integration logic, and an integrated and resource-
28 loaded Level 3 schedule for the Unit 1 Execution Phase; and
- 29 • Obtained and responded to the findings of an independent assessment of the RQE.

1 Life-to-date DNNP Unit 1 capital expenditures (to the end of September 2025), which includes
 2 the extensive planning work carried out during the Initiation Phase and the Definition Phase,
 3 are \$1.59B inclusive of interest. A high-level summary of the expenditures during the Initiation
 4 and Definition Phases is provided in Figure 1 below.

5
 6
 7

**Figure 1 – Summary of Life to Date Actual Expenditures on Unit 1
 as of September 2025 (B\$)**



8
 9

10 OPG’s achievements during the Definition Phase with respect to the integration of lessons
 11 learned, engineering and licensing progression, and key component mock-up and testing are
 12 discussed below. OPG’s achievements regarding scope definition are discussed in Ex. D2-4-
 13 5, commercial framework and project team in Ex. D2-4-2 and Ex. D2-4-3, scheduling in Ex.
 14 D2-4-6, contingency development in Ex. D2-4-7, and cost estimation and the RQE in Ex. D2-
 15 4-8.

16
 17

2.3 Lessons Learned

18 The lessons learned process for the DNNP is a structured and continuous approach designed
 19 to capture, analyze, and apply knowledge gained throughout the project lifecycle.

1 OPG’s planning efforts included reviews of operating experience and lessons learned from
 2 OPG’s nuclear and hydroelectric projects, including the Darlington Refurbishment Program
 3 (“DRP”), as well as recent and ongoing large construction projects including construction of
 4 Électricité de France Energy’s Hinkley Point ‘C’ Nuclear Generating Station Units 1 and 2, and
 5 construction of Southern Company’s Vogtle Nuclear Generating Station Units 3 and 4.

6 OPG conducted benchmarking visits and project reviews and participated in industry working
 7 groups on nuclear refurbishments (e.g., CANDU Owners Group working group, World
 8 Association of Nuclear Operators) and new nuclear projects (e.g., Institute of Nuclear Power
 9 Operators working group). OPG incorporated additional operating experience from the Nuclear
 10 Energy Institute and non-nuclear mega projects such as the Windsor-Detroit Bridge and the
 11 Portlands Energy Center.

12

13 The lessons learned program will continue during the Execution Phase and new benchmarking
 14 and collaborations are planned. As set out in Chart 1 below, key lessons learned and OPG’s
 15 responses include:

16

17

Chart 1 – Key Lessons Learned

Lesson Learned	Response
DRP – Direct Lessons	Incorporated proven processes, oversight mechanisms, and stakeholder engagement strategies from the DRP to strengthen planning and execution.
Benchmarking with international mega projects (Windsor-Detroit Bridge, Hinkley Point C, Vogtle, Kajima Corporation, etc.)	Conducted site visits and collected data to identify proven project delivery methods and avoid common pitfalls. Integrated selected best practices into DNNP planning.
Adverse Condition and Event Reporting	Implemented Adverse Condition and Event Reporting across the project, trained teams on intrusive oversight, developed Issues Management Policy, and established High Impact Teams for rapid response to critical issues. Quality Oversight Program monitors compliance and drives corrective actions.

Lesson Learned	Response
Integrated Technology & Project Setup	Adopted integrated scheduling tools aligned with the work breakdown structure for better visibility and coordination. Leveraged digital tools to enhance project controls, work packaging, and progress tracking.
Advanced Boiling Water Reactor Steel Composite Experience	Engaged with Kajima Corporation via site visit to incorporate advanced boiling water reactor steel composite construction know-how into DNNP's structural design and construction approach.
Constructability, Layout, Space, Weather Proofing	Reviewed Lungmen Nuclear Power Plant lessons to optimize plant layout for maintainability, improve weather-proofing strategies, and plan sequencing to reduce environmental/weather delays.
Onboarding of External Expertise	Brought in personnel with direct new build Boiling Water Reactors, greenfield construction, and commissioning experience to support design, construction and commissioning phases.
Shared Database through GE-Hitachi with Tennessee Valley Authority Input	Established a shared lessons learned knowledge platform with GE-Hitachi, incorporating Tennessee Valley Authority insights to ensure early issue identification and rapid resolution.
Construction Best Practice References – Nuclear Energy Institute Reports	Incorporated Nuclear Energy Institute guidelines on design completion, schedule and cost estimation reliability, and strategic project management for nuclear new builds into project planning and decision-making.

1
 2 The Lessons Learned program is a core component of OPG's continuous improvement efforts.
 3 This process is designed to capture best practices and areas for improvement on an ongoing
 4 basis. Lessons are documented and stored and serve as a valuable resource allowing teams
 5 to retrieve and implement lessons learned to the DNNP. By integrating these lessons learned
 6 into planning and execution, OPG aims to proactively address challenges, enhance
 7 performance, and foster a culture of learning across all operations.

1 OPG has also worked closely with its partners to ensure lessons learned from reviewed
2 projects relating to contractor safety, quality, cost, and schedule were integrated into the DNNP
3 major work bundles.

4 5 **2.4 Engineering and Licensing Progression**

6 The quality of an estimate is directly related to how well the project scope has been defined –
7 the greater the detail, the more accurate the estimate. An important achievement during the
8 Definition Phase was that engineering was approximately 70% complete, with over 95% of the
9 major system deliverables for Standard Plant Design issued. OPG considered this level of
10 engineering completion to be especially important in a FOAK project, which far exceeds the
11 recommended practice of 30% to 40% of engineering deliverables being complete to achieve
12 a Class 3 estimate per AACE recommended practices. Details on AACE and development of
13 the Unit 1 RQE are provided in Ex. D2-4-8.

14
15 Substantial progression of engineering was achieved through a collaborative effort between
16 OPG and the partners, enabling the development of accurate estimates and schedules for the
17 work, and providing the basis for purchasing materials.

18
19 At the completion of the Definition Phase, OPG had submitted the LTC application to the CNSC
20 and had participated in the second of the resulting two-part public CNSC hearings in January
21 2025. The CNSC issued the LTC in April 2025, allowing OPG and the partners to progress
22 construction work for the first SMR unit. Authorization to operate the reactor is subject to a
23 future CNSC licensing hearing and decision.

24 25 **2.5 Key Component Mock-up and Testing**

26 During the Definition Phase, OPG and the partners identified specific components and
27 processes that were deemed FOAK or first-in-a-while, which could represent increased risk.

1 Prior to the Diaphragm Plate Steel Composite reactor building construction, the parties
2 undertook a mock-up and testing program to demonstrate design and regulatory compliance.
3 This included an on-site mock-up program to test specific concrete mixes and an installation
4 to train workers in the site-specific conditions.
5
6 For certain critical and long-lead components (e.g., Fine-Motion Control Rod Drives, Isolation
7 Condenser System components, Gamma Thermometers, Fuel Supports, Reactor Isolation
8 Valves and Instrument and Control panels), prototype programs were developed to
9 demonstrate the suitability of these components for BWRX-300 conditions. These programs
10 are intended to reduce commissioning risks and were necessary to provide supporting
11 evidence to the CNSC.

1	LIST OF ATTACHMENTS	
2		
3	Attachment 1:	Detailed Description of DNNP Program Phases

1 **ATTACHMENT 1**

2 **DETAILED DESCRIPTION OF DNNP PROGRAM PHASES**

3
4 Consistent with industry best practice and OPG's project management governance, the DNNP
5 is structured into distinct phases: the Initiation Phase, the Definition Phase and the Execution
6 Phase. For additional information on OPG's project management approach and governance,
7 see Ex. D2-4-2.

8
9 • **Initiation Phase** (*also referred to preliminary planning phase*) – OPG commenced the
10 Initiation Phase following selection of technology Designer GE-Hitachi and their BWRX-
11 300 design in late 2021. This phase included progressing engineering and project planning,
12 performing an economic feasibility assessment, commencing the first phase of site
13 preparation activities, developing and submitting a Licence to Construct application to the
14 CNSC, and progressing to a formal agreement with GE-Hitachi to further develop the
15 project schedule and engineering for the preferred design. During this phase the
16 contractual framework for the DNNP was selected, including the main project partners.
17 This work culminated in the signing of the Technology Collaborative Agreement and an
18 Integrated Project Agreement. This phase was successfully completed at the end of 2022
19 with the OPG Board of Directors' approval to proceed to the Definition Phase of the DNNP.

20
21 • **Definition Phase** (*also referred to as the Validation Phase or the detailed planning and*
22 *design phase*) – OPG commenced the Definition Phase in 2023 to plan and prepare for
23 the successful construction of Unit 1. The Definition Phase is critical to the success of the
24 project, as discussed in Ex. D2-2-4. During this phase, OPG and the Non-Owner Parties
25 progressed joint planning of the project. This work culminated in the signing of the planned
26 Validation Amendment to the Integrated Project Agreement in May 2025. Details on the
27 commercial framework are provided in Ex. D2-4-3. Through activities carried out during
28 this phase, OPG progressed detailed engineering and completion of the Standard Plant
29 design for major systems, defined the scope of the work to be undertaken, and developed
30 a detailed Unit 1 schedule and Class 3 Release Quality Estimate for Unit 1. In addition,
31 OPG and the Non-Owner Parties progressed the procurement of long lead items and site
32 preparation activities, and supported the Licence to Construct application process before

1 the CNSC. The Definition Phase came to a successful conclusion in March 2025 with OPG
2 Board of Directors' approval of the Unit 1 Release Quality Estimate. This included a full
3 release of funds to execute construction of Unit 1, and a partial release of funds to progress
4 planning and long lead material procurement for the subsequent Units (Units 2-4). OPG
5 Board of Directors also approved the project moving into the Execution Phase for Unit 1.

- 6
- 7 • **Execution Phase and Commissioning** – OPG progressed into the Execution Phase for
8 Unit 1 in April 2025. This was supported with the issuance of the Unit 1 Licence to Construct
9 approval by the CNSC on April 4, 2025. During this phase, OPG will complete the
10 remaining engineering, licensing, procurement, construction, and commissioning to
11 support Unit 1 commercial operation, scheduled for late 2030. Execution Phases for each
12 of the subsequent units will be subject to approval by OPG Board of Directors prior to their
13 commencement and pending CNSC issuance of the appropriate licence.

DARLINGTON NEW NUCLEAR PROGRAM SCOPE

1.0 OVERVIEW

OPG has engaged in an extensive planning process for the Darlington New Nuclear Program (“DNNP”). This has involved a thorough, methodical and disciplined process for identifying and defining the scope of the work that is to be undertaken during the project.

This evidence describes:

- the steps taken by OPG and the Non-Owner Parties (“NOPs”) to identify and define the scope of the work to be performed for Unit 1 / Common Scope Facilities (“Unit 1”);
- the progression of the design and engineering work; and
- the resulting scope of work identified for each of the Major Work Bundles.

2.0 IMPORTANCE OF SCOPING

For Unit 1, OPG and the NOPs have established a clear, well-defined program scope, which has provided the basis for establishing high confidence estimates of the budget and schedule. The parties have also implemented a change control process to control scope. This process addresses operating experience from other major nuclear projects where cost and schedule overruns were significantly driven by scope growth. The DNNP change control process is described in Ex. D2-4-9, Section 7.0.

Having a detailed understanding of scope enables the development of a schedule that is inclusive of all work. Moreover, given the interdependencies within the project, any scope changes during execution could trigger cascading effects, leading to cost and schedule consequences. By investing in scope definition prior to execution, and maintaining rigorous scope control, OPG mitigates these risks.

In addition, having a detailed definition of scope has enabled the parties to take the necessary steps to ensure completion of all corresponding engineering, and to secure the necessary materials, parts, tools, labour and craft resources to support the schedule.

1 **3.0 APPROACH TO WORK SCOPE DEFINITION**

2 The scope of the project includes the design, engineering, licencing support, procurement,
3 construction, installation, testing, commissioning, completion, and facility turnover, including
4 related, infrastructure, and ancillary buildings, to deploy a fully functional facility (Unit 1).

5
6 The work scope definition process for the DNNP commenced in November 2021 with
7 technology selection and the subsequent commencement of the Initiation Phase. During the
8 Initiation Phase, OPG and GE-Hitachi progressed scope definition with the completion of
9 conceptual design for the BWRX-300 Small Modular Reactor (“SMR”) technology. This
10 resulted in:

- 11 • a defined set of owner requirements and plant requirements;
- 12 • a defined Main Parts List including plant level documentation, structures and systems that
13 make up the BWRX-300; and
- 14 • a detailed list of plant and system design documents that identify the expected scope of
15 work for each of the main deliverables defined in the Main Parts List.

16
17 OPG undertook a detailed review of the plant requirements, the Main Parts List and the
18 detailed list of plant and system design documents to ensure they were aligned with OPG’s
19 requirements as Owner and Licence Holder. A scope baseline was established and
20 documented in the Integrated Project Agreement (“IPA”), executed in January 2023. A
21 description of the Integrated Project Delivery (“IPD”) Model and its benefits is provided in Ex.
22 D2-4-2. Details of the IPA are provided in Ex. D2-4-3.

23
24 OPG commenced the Definition Phase (also referred to as the Validation Phase) of the project
25 in 2023. During this phase, which spanned over two years, OPG and the NOPs further
26 developed the scope of the project. Early collaboration between the parties resulted in
27 consideration of cross-party perspectives and requirements, leading to a more comprehensive
28 scope.

1 As the Unit 1 scope was refined, it went through a robust challenge and change control process
2 proportionate to the potential schedule, cost and risk impact. Scope was challenged in the
3 following forums:

- 4 • Design Centre Working Group (“DCWG”): The Technology Collaboration Agreement
5 (“TCA”) provides the commercial framework for OPG to collaborate with GE-Hitachi on the
6 development of the Standard Plant Design. Membership includes representatives from all
7 parties to the TCA. This forum enables OPG to provide direct feedback into the design.
8 Operations and Maintenance Working Group: Similar to the DCWG, this group reviews the
9 BWRX-300 design through the lens of plant operations and maintenance, equipment
10 reliability, chemistry, refueling outage performance, environment, radiological protection,
11 decommissioning, and emergency preparedness.
- 12 • Gate Review Board (“GRB”): The DNNP GRB is the governing body that controls and
13 monitors project progression through Phase Gates. A Phase Gate is a defined point during
14 the life of a project, from the early concept to post implementation phases, when executive
15 leadership considers project status and decides whether to grant approval to proceed to
16 the next gate. Funding for the proposed project scope is only released once the project has
17 been approved to move through the gate by the DNNP GRB. The NOPs also form part of
18 the DNNP GRB for their areas of scope. See Ex. D2-1-1 for more information on the Phase
19 Gates process.
- 20 • Change Control Board (“CCB”): The CCB governs the DNNP Owner’s scope change
21 management process, controlling cost, schedule and scope changes. Details on the
22 change management process are provided in Ex. D2-4-9.
- 23 • Options Review Board (“ORB”): The ORB governs the evaluation and recommendation
24 with respect to a design scope change within the DNNP.

25 26 **4.0 STRUCTURE OF MAJOR WORK BUNDLES**

27 The scope of Unit 1 is organized into eight Major Work Bundles. Major Work Bundles are
28 logical groupings of work scope, each consisting of several individual projects, defined by OPG
29 for purposes of effectively organizing and contracting work, and assigning project management
30 accountabilities.

1 OPG uses the Major Work Bundle approach for all its major nuclear projects, including the
2 Darlington Refurbishment Program and the Pickering Refurbishment Program. The use of
3 work bundles is consistent with recommendations from the Project Management Institute
4 (“PMI”) for large multi-faceted projects such as the DNNP.¹

5

6 The scope of each Major Work Bundle is broken down into unique projects, and each project
7 has a party accountable for delivering the scope. All tasks necessary to deliver Unit 1 are
8 assigned to one of the projects within the eight Major Work Bundles. The eight Major Work
9 Bundles are:

- 10 • Owner Program and IPD Project Management Office (“PMO”)
- 11 • Site Preparation
- 12 • Design Engineering
- 13 • Nuclear Island
- 14 • Conventional Island
- 15 • Balance of Plant
- 16 • Digital Strategy
- 17 • Commissioning and Start-up

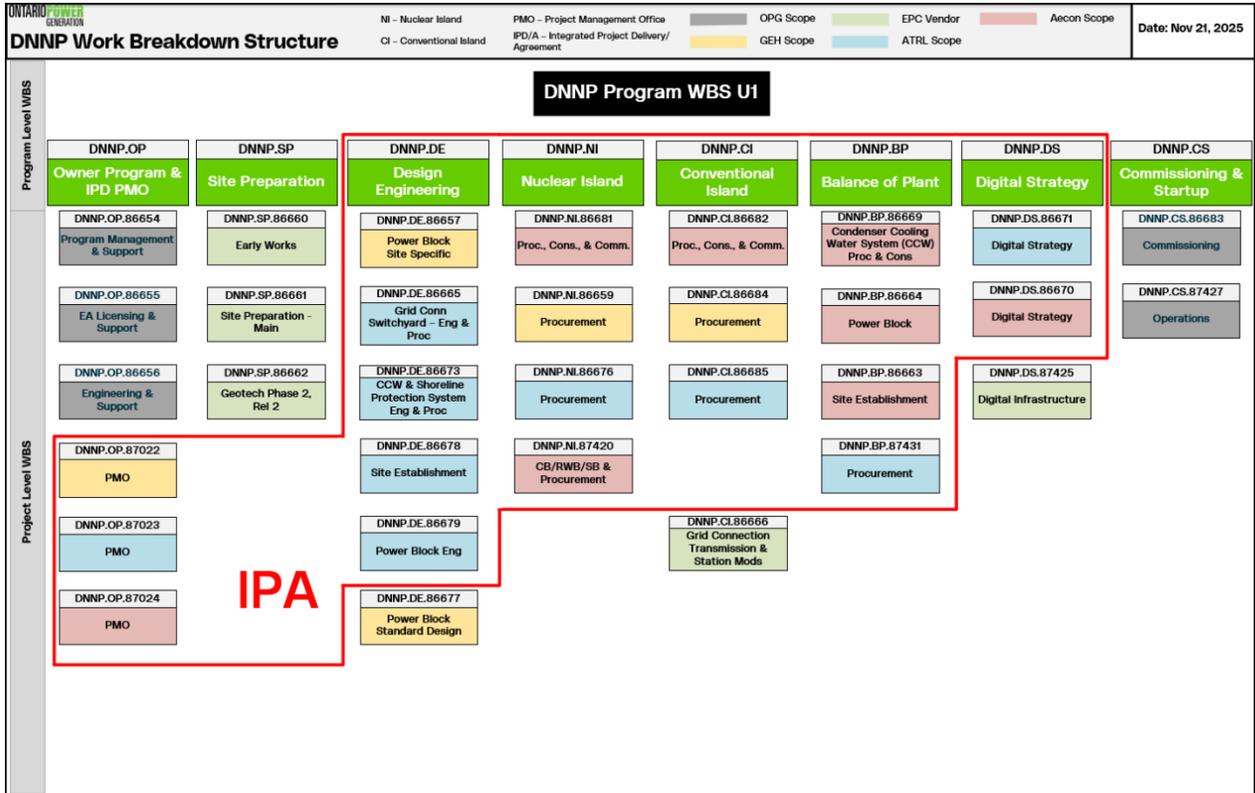
18

19 The Major Work Bundle hierarchy, referred to as a Work Breakdown Structure, is illustrated in
20 Figure 1. The figure identifies the primary party responsible for delivering the scope, whether
21 the scope is included in the IPA, and what scope categories the project contains (Project
22 Management, Engineering, Procurement, Construction, Commissioning and Close-out).

¹ PMI is a leading international association for project, program and portfolio management.

1

Figure 1 - DNNP Unit 1 Work Breakdown Structure



2

3

4 Following the assignment of a task to a specific Major Work Bundle, the corresponding Project
 5 Management Team (“PMT”) or Functional Team, through studies or preliminary engineering,
 6 further defines the scope of the work to be performed in connection with that task.

7

8 With the Site Preparation Major Work Bundle scope substantially completed, the Design
 9 Engineering, Nuclear Island, Conventional Island, and Balance of Plant Major Work Bundles
 10 contain most of the remaining design and construction work, which is the focus in the Unit 1
 11 Execution Phase. Each of these four Major Work Bundles, sometimes referred to as “Execution
 12 Bundles”, have their own PMT assigned. An overview of the organization structure in place to
 13 execute Unit 1 is provided in Ex. D2-4-2.

1 **5.0 SCOPE FOR MAJOR WORK BUNDLES**

2 For each Major Work Bundle, OPG and the NOPs have defined the relevant work, as well as
3 planned and integrated the work into the Unit 1 schedule. The scope of work associated with
4 each of the Major Work Bundles for Unit 1 is described below.

5

6 **5.1 Owner Program & IPD Project Management Office (“PMO”)**

7 The Owner Program and IPD PMO major work bundle is comprised of two main areas of scope
8 consisting of: (1) OPG’s Program Management and PMO, and (2) the NOPs’ PMOs. The scope
9 of these programs is predominantly tied to the roles and responsibilities of the PMT and
10 Functional Teams and OPG’s oversight model, described in Ex. D2-4-2 and Ex. D2-4-9,
11 respectively.

12

13 5.1.1 OPG’s Program Management and PMO

14 All OPG’s scope as Owner and Licence Holder, excluding the scope related to the
15 Commissioning and Start-up Major Work Bundle, is included in this bundle.

16 a) *Program Management*: This scope includes OPG’s project management, project controls,
17 commercial and project assurance, Indigenous relations, human resources, finance,
18 stakeholder relations, quality management, and construction oversight functions. It also
19 includes scope related to OPG’s oversight function.

20 b) *Environmental Assessment and Licensing*: This scope includes the preparation and
21 submission of Canadian Nuclear Safety Commission (“CNSC”) licence applications, as well
22 as the maintenance of the various licences for DNNP, including any related environmental
23 commitments.

24 c) *Engineering*: This scope includes Owner’s engineering oversight of contractors, including
25 NOPs and sub-contractors, throughout the project lifecycle from design to commissioning.
26 It also involves developing and maintaining the managed system used to govern DNNP.
27 Key responsibilities include reviewing NOP engineering deliverables to ensure safety,
28 performance, and design objectives are met; fulfilling CNSC licensee’s responsibilities of
29 providing assurance that all design objectives and requirements are met; evaluating NOP
30 design deliverables based on system safety and complexity to confirm quality; and
31 managing technical and licensing risks.

1 5.1.2 NOPs' PMOs

2 These work scopes include the various NOPs' management and oversight tasks as well as
3 their project management, project controls, and quality functions. A description of the roles and
4 responsibilities of the PMT and Functional Teams is provided in Ex. D2-4-2.

5

6 **5.2 Site Preparation**

7 Work within the Site Preparation Major Work Bundle has been substantially completed. This
8 bundle covers work that OPG undertook to prepare the DNNP site prior to it being turned over
9 to AECOM Kiewit for construction.

10

11 This bundle mainly consisted of early works scope, covering site preparation and infrastructure
12 development necessary for the project. This included:

- 13 • site clearing, grubbing, the grading of approximately 56 acres of DNNP land, and the
14 excavation of approximately 800k m³ of material (see Figure 2);
- 15 • construction of roadways (including the necessary drainage and stormwater management),
16 laydown areas, parking lots and a temporary office complex;
- 17 • installation of permanent domestic water and fire water lines for the construction phase
18 and plant operations;
- 19 • installation of a public address system and fibre optic network for use during construction
20 and plant operations; and
- 21 • installation of construction power.

1

Figure 2 – Grading at the DNNP Site



2

3

4 **5.3 Design Engineering**

5 The Design Engineering Major Work Bundle is one of the four Execution Bundles. It has its
6 own PMT to execute the scope. Essentially all of the engineering necessary to deliver the Unit
7 1 facility is included in this bundle, with the design scope assigned to either GE-Hitachi or
8 AtkinsRéalis. This includes the engineering scope associated with the Power Block (e.g., the
9 Reactor Building, Turbine Building, Control Building and Radwaste Building), and outside of
10 the Power Block (e.g., the Condenser Cooling Water System and Shoreline Protection, grid
11 connection switchyard, and site establishment scope). It also includes a portion of the
12 procurement related to the grid connection switchyard, the Condenser Cooling Water System
13 and the Shoreline Protection scope. An illustration of the BWRX-300 technology and
14 associated components and systems that are included in the design scope is provided in
15 Figure 3. An overview of the power block layout is provided in Figure 4, and an aerial
16 photograph of the power block construction is provided in Figure 5.

1

Figure 5 – DNNP BWRX-300 Power Block Construction



2

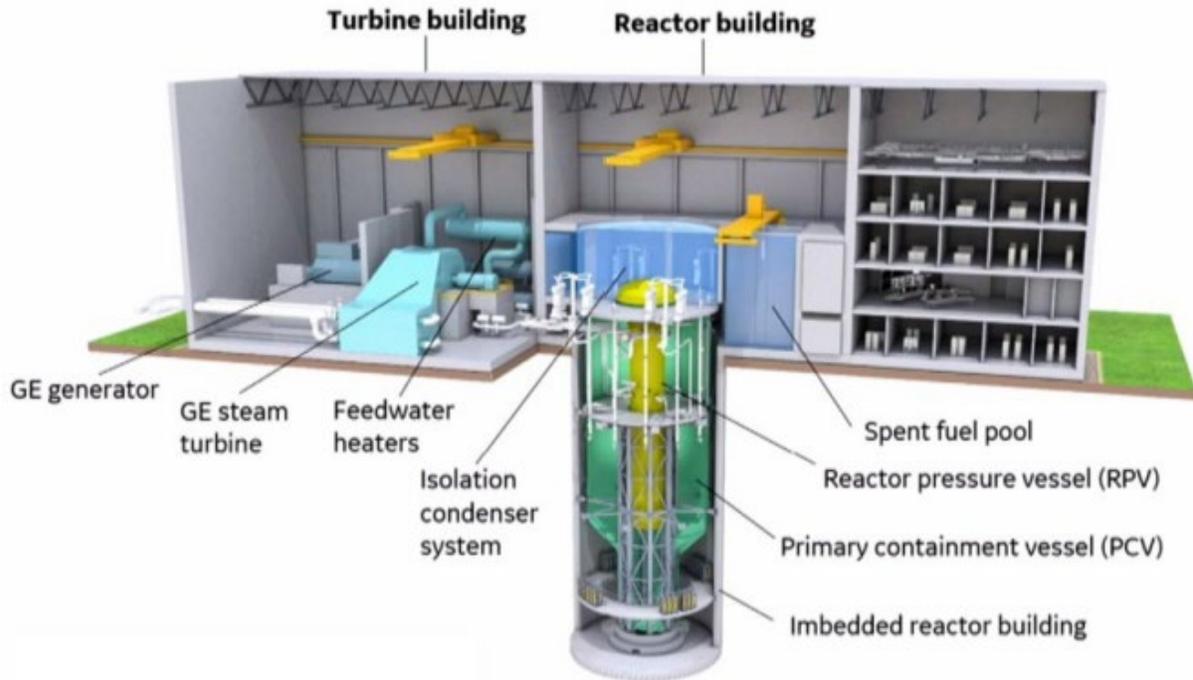
3

4 **5.4 Nuclear Island**

5 The Nuclear Island major work bundle is one of the four Execution Bundles. It has its own PMT
6 assigned to execute the scope. This bundle is comprised of the procurement, construction,
7 installation and testing of components within the Nuclear Island, defined as the Reactor
8 Building, Control Building, Radiation Waste Building, and Plant Services Building. An
9 illustrative cross section of the Power Block is provided in Figure 6.

1

Figure 6 – DNNP BWRX-300 Power Block Conceptual Cross Section



2

3

4 5.4.1 Reactor Building

5 The Reactor Building is an engineered, reinforced structure that houses the Reactor Pressure
6 Vessel (“RPV”), primary containment, safety systems, and all essential piping and
7 instrumentation. Its design ensures the safe, secure, and reliable operation of the nuclear
8 reactor, while minimizing the risk of radiological release under all operating and accident
9 conditions. Key scope of the Reactor Building includes: (i) the Reactor Building structure, (ii)
10 the RPV, and (iii) other key structures, systems and components within the Reactor Building.

11

12 5.4.1.1 Reactor Building Structure

13 The Reactor Building is made of reinforced concrete with Diaphragm Plate Steel Composite
14 (“DPSC”) floors and walls. The DPSC floors and walls are needed to provide the structural
15 integrity necessary to house the RPV and associated equipment and to provide additional
16 radiation shielding. Fuel handling equipment and pools containing water needed for the
17 BWRX-300 passive safety systems will be in the above-grade portion of the Reactor Building.
18 A portion of the reactor building extends below grade where the DPSC vessel and the RPV

1 will be housed. The below-grade portion will also house reactor support and safety systems
2 and most essential power supplies and equipment. A view of the excavation of the Reactor
3 Building below grade is provided in Figure 7. The Secondary Control Room, located in the
4 Reactor Building, will provide a backup to the Main Control Room which will be located in the
5 Control Building.

6
7

Figure 7 – Reactor Building Shaft Excavation



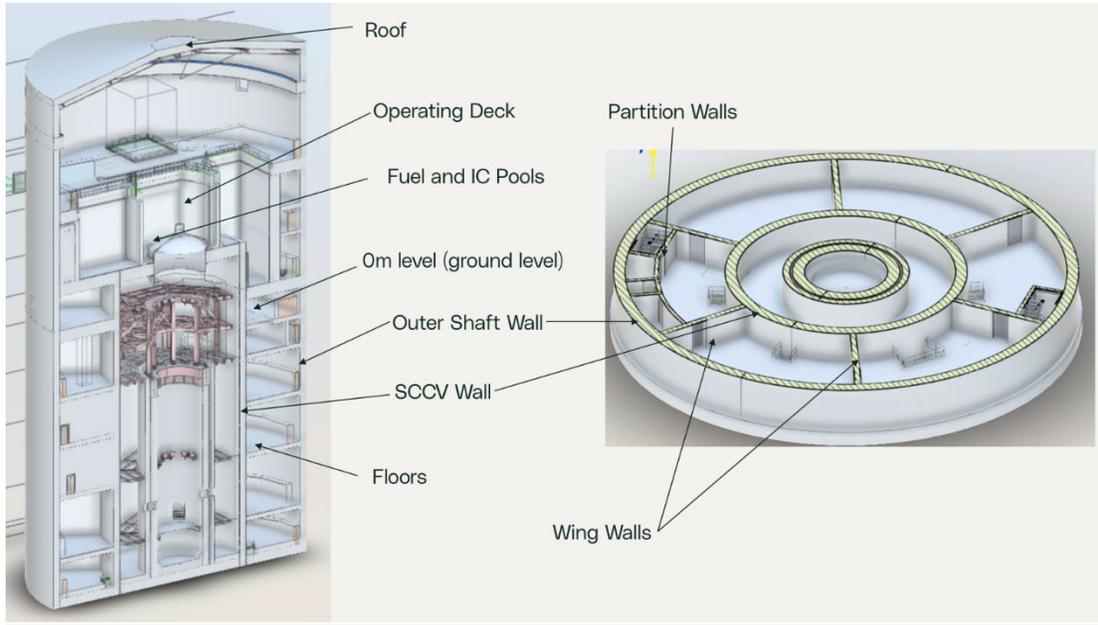
8
9

10 The DPSC involves the off-site fabrication of individual sub-assemblies. These assemblies are
11 then transported to site for assembly either within the fabrication shop (smaller internal
12 modules) or the pre-assembly area (large modules such as the basemat,² outer shaft walls,
13 and reactor building roof). The assembled modules are then hoisted for in-pit installation. A
14 cross-section view of the Reactor Building is provided in Figure 8. An illustration of the DPSC
15 module fabrication, assembly, and installation process is provided in Figure 9.

² Basemat refers to the bottom foundational ring of the Reactor Building.

1

Figure 8 – DNNP BWRX-300 Reactor Building Structure

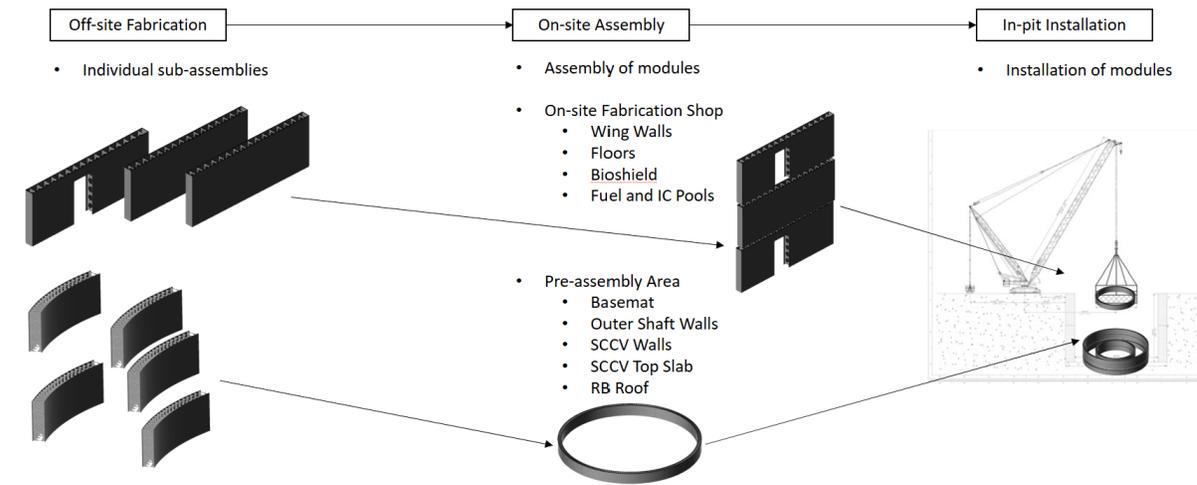


2

3

4

Figure 9 – DNNP DPSC Reactor Building Module Fabrication and Assembly



5

6

7 The Reactor Building structure is comprised of 56 individual sub-assemblies that will be filled
 8 with concrete. The basemat forms the floor of the Reactor Building structure. Once assembled,
 9 the basemat will span 37 metres and weigh approximately 935 metric tonnes. Each level will
 10 then be installed sequentially on top of the basemat with equipment that requires open top

1 construction being placed before installation of the floor for the next level. Placement of the
2 concrete within the installed modules will occur in parallel with the installation of the next
3 modules. Once a floor is released, the installation of the mechanical, electrical, and
4 instrumentation and control systems will commence.

5

6 5.4.1.2 Reactor Pressure Vessel and Internals

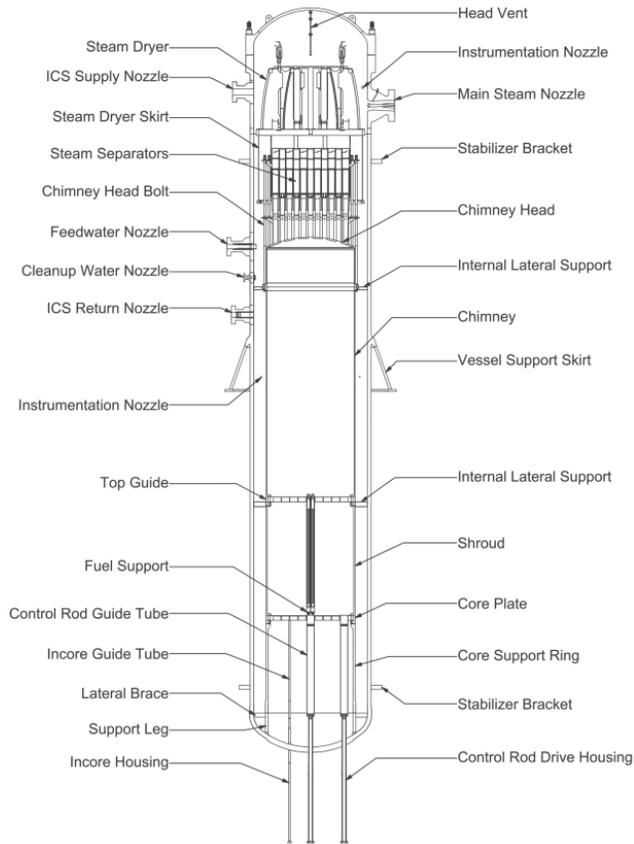
7 The RPV is a vertical, cylindrical pressure vessel fabricated from forged rings or rolled and
8 welded plate rings joined together. It has a removable top head by use of a head flange, seals,
9 and bolting. The RPV contains the fuel and generates the heat used to convert water into
10 steam. Contained within the RPV are the following major internal components:

- 11 • Core components (fuel assemblies, control rods and nuclear instrumentation)
- 12 • Core support structures (shroud, shroud support, top guide, core plate, control rod guide,
13 control rod drive housing and fuel support)
- 14 • Chimney
- 15 • Chimney head and steam separator assembly
- 16 • Steam dryer assembly

17

18 The following Figure 10 is a visual representation of the BWRX-300 RPV and the major internal
19 components.

1 **Figure 10 – Overview of BWRX-300 Core Reactor Pressure Vessel Internals**



2

3

4 Figure 11 shows one of the shell cans which will be assembled with other shell cans to form

5 the RPV.

1

Figure 11 – Reactor Pressure Vessel Shell Can #9



2

3

4 **5.4.1.3 Key Structures, Systems and Components**

5 Additional examples of key RPV structures, systems and components include:

- 6
- 6 • Fine Motor Control Rod Drive System: provides electric-motor-driven positioning of the
 - 7 control rods into and out of the reactor core for reactivity and shutdown control.
 - 8 • Isolation Condenser System: the Isolation Condenser System removes decay heat after
 - 9 any reactor isolation and shutdown event during power operations. The Isolation
 - 10 Condenser System limits increase in steam pressure and maintains the RPV pressure at
 - 11 an acceptable level. Reactor heat is transferred from each isolation condenser heat
 - 12 exchanger tube to the surrounding IC pool water by condensation and natural circulation.
 - 13 • Reactor Protection System: is a system of instrument channels, trip logic, trip actuators,
 - 14 manual controls, and shutdown logic circuitry that initiates the rapid insertion of control rods
 - 15 by hydraulic force to shut down the reactor when specific conditions are detected.

- 1 • Primary Containment Vessel: the Primary Containment Vessel encloses the RPV and
2 some of its related systems and components. The Primary Containment Vessel is dry, leak
3 tight, and located mostly below grade. It provides confinement of radioactive fission
4 products, steam, and water.
- 5 • Passive Containment Cooling System: is a passive containment heat removal system that
6 maintains the containment within its pressure limits for Design Basis.
- 7 • Boron Injection System: the Boron Injection System is a manual, independent and diverse
8 system for adding negative reactivity to the reactor. The Boron Injection System provides
9 an additional means of reactivity control.

10 11 5.4.2 Other Buildings within Nuclear Island

12 The Control Building will house the Main Control Room, emergency response facilities, and
13 electrical, control and instrumentation equipment. It will also be the entrance and exit for the
14 BWRX-300 power block during normal operations.

15
16 The Radwaste Building will house equipment associated with the handling, processing, and
17 packaging of solid and liquid radioactive waste generated by the nuclear facility. The Radwaste
18 Building will be used to house equipment and processes that package waste into approved
19 containers.

20
21 The Plant Services Building will serve as a warehouse that will run alongside the length of the
22 nuclear facility, providing an area for maintenance and storage.

23 24 **5.5 Conventional Island**

25 The Conventional Island major work bundle is one of the four Execution Bundles. It has its own
26 PMT assigned to execute the scope. This bundle is comprised of the procurement, construction
27 and installation and testing of components within the Conventional Island, defined primarily as
28 the Turbine Building, as well as scope associated with grid connection and ties to transmission,
29 and the construction of the security building.

1 5.5.1 Turbine Building

2 The Turbine Building will house most of the electrical equipment, power supplies and rotational
3 and electrical power conversion equipment, including the main turbine and generator and
4 associated support systems, and the main condenser, condensate and feedwater systems.

5

6 The Turbine Building structure is divided into:

7 • The Turbine Building shell structure which consists of a steel frame system with steel
8 columns, beams/girders, roof bar joists, and floor/roof decks as gravity load carrying
9 systems. The lateral force resisting system consists of braced frames and floor/roof decks
10 as diaphragms.

11 • The Shielding wall area which consists of reinforced concrete shear walls surrounding and
12 supporting the portion of the structure containing radioactive steam and water for shielding
13 (turbines, condenser, off-gas lines, heater tanks, and associated piping).

14 • The reinforced concrete pedestal supporting the turbine, generator, and exciter within the
15 Turbine Building shell structure and the shielding walls area. This turbine generator
16 pedestal is structurally isolated from both the shielding walls and the Turbine Building shell
17 structure for vibration control.

18

19 Figure 12 shows the piling for the Turbine Building structure.

1

Figure 12 – Piling for the Turbine Building Structure



2

3

4 **5.5.1.1 Steam Supply, Turbine Generator and Other Support Systems**

5 The main turbine equipment, steam supply system and associated piping and valves will be
6 located within the Turbine Building. The turbine equipment begins at the steam turbine valves,
7 which admit steam into the High-Pressure turbine. Steam within the High-Pressure turbine is
8 directed to the Moisture Separator Reheater where it is reheated before entering the Low-
9 Pressure turbines. Some of the steam from both the High Pressure and Low-Pressure turbines
10 is used for feedwater heating. Exhaust steam from the Low-Pressure turbines is directed to
11 the condenser. The Generator, Exciter, and Isophase Bus Duct system will convert the
12 rotational energy of the main turbine into electricity and distribute that to the grid through the
13 Generator Step-Up transformer and Unit Auxiliary Transformer.

14

15 The turbine is a two-stage reheat, condensing steam turbine. It converts the steam energy
16 from the reactor into rotational motion that the generator turns into electrical energy.
17 Fabrication of the Turbine Generator is in progress and is shown in Figure 13 and Figure 14.

1

Figure 13 – Turbine Generator Rotor (Post Machining)



2

3

4

Figure 14 – Turbine Generator Rotor (During Rough Machining)



5

1 5.5.2 Grid Connection

2 This scope covers grid connection modifications including construction of the Unit 1
3 transmission line. Additionally, it delivers interconnection, protection and control integration, at
4 the Hydro One switching stations. These upgrades are needed for reliable power export to the
5 grid.

6

7 **5.6 Balance of Plant**

8 The Balance of Plant major work bundle is one of the four Execution Bundles. It has its own
9 PMT assigned to execute the scope. This bundle involves the procurement, construction,
10 installation and testing of components in three categories; (1) General Facilities and Site
11 Infrastructure, (2) Condenser Cooling Water, and (3) Power Block and Yard Construction.

12

13 5.6.1 General Facilities and Site Infrastructure

14 This scope includes the construction of temporary structures necessary for the duration of the
15 construction period; permanent structures that support construction and unit operations; and
16 miscellaneous scope such as tools, consumables and equipment rentals.

17

18 The main temporary and permanent structures included within this scope are:

- 19 • Fabrication Shop: This permanent facility supports the construction of all four units,
20 handling a variety of processes including welding DPSC assemblies, piping spools, pipe
21 supports, and structural steel.
- 22 • Warehouses: Each of the temporary warehouses will serve as a storage space for the
23 DNNP during the construction of the units.
- 24 • Administration Building: This permanent facility will provide office space to accommodate
25 support staff during construction and subsequent DNNP operation. It includes open
26 concept offices, meeting rooms, and a simulator training area for the BWRX-300 SMR Full
27 Scope Control Room Simulator.
- 28 • DPSC Pre-assembly Building: A temporary building that supports assembly work for Unit
29 1, including welding during construction. The structure consists of a slab on grade with a
30 retractable fabric structure. The larger assemblies from the Fabrication Building will be sent
31 to this pre-assembly structure to complete the final modules. These will then be lifted into

1 the Reactor Building shaft. Following Reactor Building installation, the pre-assembly
2 building will be removed, providing space for various auxiliary systems which will be
3 installed under the Balance of Plant major work bundle.

4
5

Figure 15 – Fabrication (Left Building) and Warehouse Buildings (Center)



6
7
8

Figure 16 – Administration Building Construction



9

1

Figure 17 – Pre-Assembly Building Construction



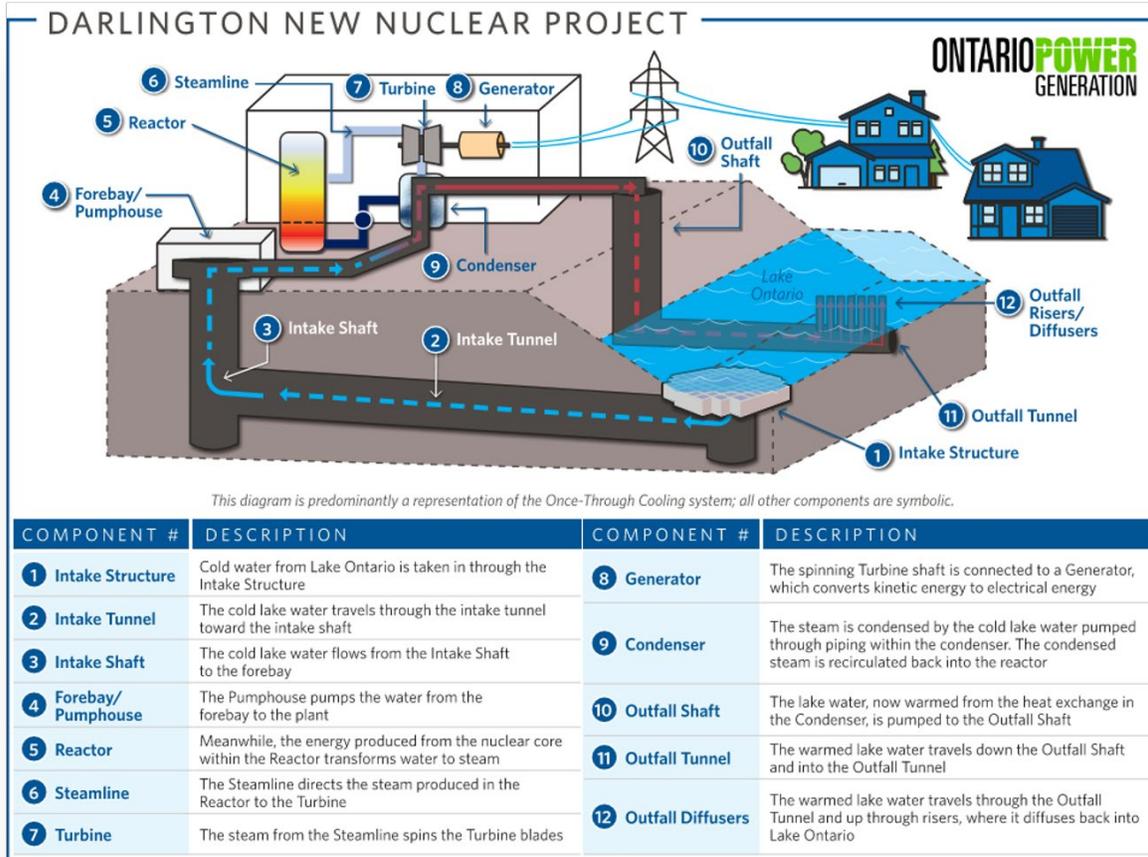
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3

4 **5.6.2 Condenser Cooling Water System**

5 This scope includes the construction of the once-through Condenser Cooling Water System
6 for Unit 1 including the intake and outfall conduits, an offshore intake structure, an onshore
7 forebay, offshore diffusers, and circulating water pumps and piping to service the main
8 condenser. An overview of the system is provided in Figure 18.

1 **Figure 18 – Illustration of the Once-Through Condenser Cooling Water System**



2
 3 Excavation of the condenser cooling water tunnel will be completed using a Tunnel Boring
 4 Machine (“TBM”). A TBM is an advanced machine used to excavate tunnels with precision and
 5 efficiency, allowing for the development of complex underground structures. The TBM,
 6 Condenser Cooling Water intake liner, and the precast concrete segments are shown in Figure
 7 19, Figure 20 and Figure 21 respectively.

1

Figure 19 – Tunnel Boring Machine (TBM) – “Harriet Brooks”



2

3

4

Figure 20 – Condenser Cooling Water System Intake Liner



5

1 **Figure 21 - Condenser Cooling Water Tunnel Pre-Cast Concrete Segments**



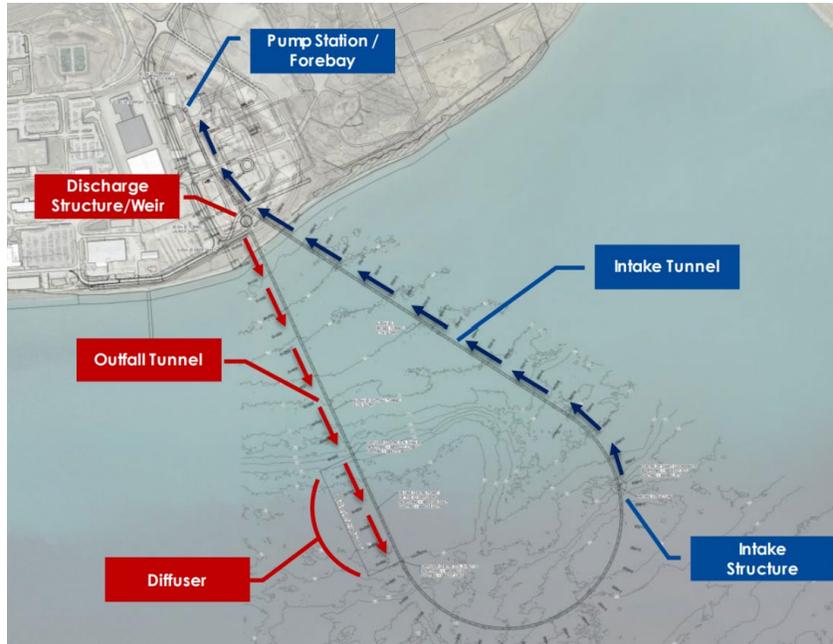
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3

4 The TBM will bore the Condenser Cooling Water tunnels which are approximately 6 metres in
5 diameter. This tunnel will be lined with more than 13,000 pre-cast concrete segments. To
6 improve constructability, the intake tunnel and outfall tunnel will be created with one complete
7 3.2 kilometre 'loop' of the TBM. An overview of the planned tunnel is provided in Figure 22.
8 Both the intake tunnel and outfall tunnel are sized to accommodate four-unit operation at the
9 DNNP site.

1

Figure 22 – Condenser Cooling Water Tunnel



2

3

4 **5.6.3 Power Block and Yard Construction**

5 The Power Block and Yard Construction work included in this Major Work Bundle includes
6 miscellaneous scope that is outside the Nuclear Island and Construction Island major work
7 bundles. This includes general yard construction and the procurement and installation of water,
8 gas, and chemical pads and equipment.

9

10 **5.7 Digital Strategy**

11 This Major Work Bundle involves the definition of an Information Management Strategy and
12 the assessment of digital tools to support the delivery of the first SMR facility as part of the
13 DNNP, including design, testing, installation, and commissioning.

14

15 The scope in this bundle includes:

16

- Digital Strategy:
 - Information Management Strategy: The process of organizing, controlling and
17 managing information throughout the lifecycle of the project. Information Management
18 includes the governance, creation, modification, storage, retrieval, and dissemination
19

1 of information in a structured and controlled manner. An effective Information
2 Management Strategy ensures that information quality, accuracy, and consistency are
3 maintained throughout the project.

- 4 ○ Common Data Environment Execution: The Common Data Environment is a system of
5 tools that will serve as a single source of project information. The Common Data
6 Environment enables project teams to share, store, and manage project-related
7 information, including documents, drawings, specifications, and other data, in a
8 structured and controlled manner.
- 9 ● Digital Infrastructure: This involves putting in place the technology infrastructure necessary
10 during construction, including Local Area Networks and wireless network.

11
12 The Information Management Strategy, Common Data Environment and Technology
13 Infrastructure provide the tools to enable a collaborative approach to project planning and
14 execution. The necessity of information sharing in an IPD model is further described in Ex. D2-
15 4-2.

16
17 The digital strategies, systems and tools necessary for facility operations are excluded from
18 the scope of this major work bundle and the DNNP. They are executed through OPG's
19 information technology capital budget as described in Ex. D3-1-1 and are expected to be
20 subject to an asset service fee payable by DNNP LP to OPG as described in Ex. F3-2-1.

21 22 **5.8 Commissioning and Start-up**

23 This major work bundle contains the OPG scope necessary to commission and start up the
24 Unit 1 facility, including the equipment and tools necessary such as radiation protection
25 equipment, furniture and fixtures and plant equipment and tools. Commissioning support from
26 each of the NOPs is accounted for in the Nuclear Island, Conventional Island, Balance of Plant,
27 Digital Strategy and Owner Program & IPD Project Management Office major work bundles.

28
29 The scope associated with operational readiness, including development of operating and
30 maintenance procedures and development and delivery of training, is excluded from the scope
31 of this major work bundle and the DNNP and is described in Ex. F2-2-1.

DARLINGTON NEW NUCLEAR PROGRAM SCHEDULE

1.0 OVERVIEW

The ability to validate, integrate, and manage the program schedule is a central aspect of the Darlington New Nuclear Program (“DNNP”) strategy.

OPG has developed a fully integrated schedule for Unit 1 / Common Scope Facilities (“Unit 1”) which incorporates detailed schedules for each of the major work bundles. The work bundle schedules are detailed down to the individual work packages or components within each bundle. OPG has put in place controls and processes and is positioned to effectively manage the project schedule.

This exhibit describes:

- the manner in which OPG and the Non-Owner Parties (“NOPs”) developed the fully integrated schedule;
- the use of a multi-level scheduling approach;
- the Unit 1 critical path; and
- the difference between DNNP’s working schedule and the high confidence schedule.

This exhibit focuses on schedule development. Schedule management, including monitoring, analysis, reporting, and risk mitigation are described in Ex. D2-4-9.

2.0 SCHEDULE DEVELOPMENT

Establishing an accurate and realistic schedule is a critical planning tool for any complex project like the DNNP.

The Unit 1 schedule reflects the total of the estimated duration of the individual tasks included within the developed scope. This schedule is needed to properly strategize, plan and prepare for upcoming project work, to determine resource requirements, to understand how the work is progressing, and to apply corrective actions if required.

1 OPG and the NOPs have collaboratively developed the Unit 1 schedule with input from
2 appropriate project stakeholders. The development process is characterized by multiple layers
3 of review and rigorous challenge, including cross-party challenge sessions where each project
4 team actively defended and refined their own segment of the schedule and associated
5 resource estimates and costs, ensuring no single party can unduly influence the overall
6 estimate. In addition, OPG has conducted independent challenges, drawing on prior
7 experience, lessons learned from other major construction projects, and knowledge of project
8 constraints, milestones, resource requirements and critical path considerations.

9
10 These reviews include vertical slice analyses, where the schedule is reviewed in relation to
11 other project work being executed in the same time period. This approach ensures that
12 schedule assumptions are robust and balanced, and that there is transparency in how resource
13 estimates and durations are established by each partner.

14
15 Further, once the schedule is drafted, all scope and its associated cost, schedule and risk
16 analysis undergoes formal approval through the DNNP Gate Review Board prior to being
17 released for execution. The Gate Review Board is an OPG governance requirement within
18 Phase Gate Management, and has representation from OPG and NOP project leadership, as
19 well as OPG oversight functions such as Finance and the Enterprise Project Management
20 Office. Only after these independent checks and formal reviews is the schedule activated. This
21 process is designed to drive a high standard of schedule quality and integrity.

22
23 In general, scheduling requires consideration of the following:

- 24 • Defining the scope of work to be completed;
- 25 • Identifying key activities, including their start and finish dates, duration, and required
26 resources;
- 27 • Establishing the sequence and logical relationships between activities and milestones;
- 28 • Identifying and optimizing the critical path;
- 29 • Continuously monitoring and updating schedules to track performance, forecast
30 outcomes, and mitigate schedule risks; and

- 1 • Conducting forward-looking planning to assess priorities, opportunities, and potential
2 risks.

3
4 Prior to the DNNP Release Quality Estimate approval, the project schedule was updated to
5 include a Quantitative Risk Assessment. This resulted in a change to the Critical Path dates to
6 ensure the schedule encompassed the risks and opportunities. Further information is detailed
7 in Section 5.0.

8
9 OPG and the NOPs have developed a breakdown of work that is deliverable-orientated, and
10 which includes Unit 1 work down to the individual work components that make up a bundle
11 (also referred to as “work packages”). The work breakdown reflects the corresponding
12 contracting strategies such that work scope, budgets and responsibilities are clearly allocated.

13
14 The project schedules have been reviewed for overall quality to ensure they meet process
15 requirements. These reviews will be performed on a regular basis as part of normal updating
16 of the schedule. Additionally, schedules have been refined through an iterative review process
17 and approved by project teams and key stakeholders. These reviews consider project and
18 program constraints, milestones, resource needs, and the critical path to validate the
19 schedule’s feasibility.

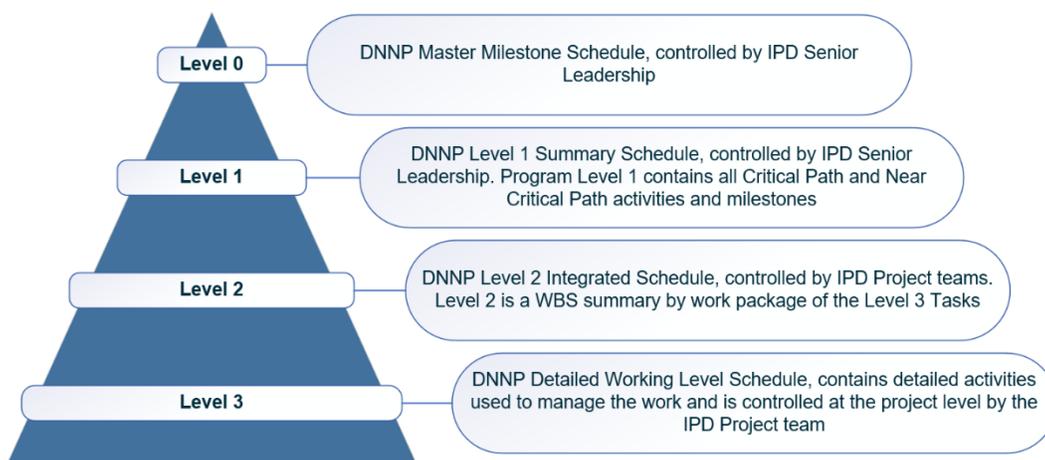
20 21 **3.0 MULTI-LEVEL SCHEDULING APPROACH**

22 Based on its past practices and project governance, OPG has established the Unit 1 Schedule
23 using a multi-level scheduling approach.

24
25 As shown in Figure 1 below, project schedules are prepared with varying levels of detail, from
26 Level “0”, which contains the milestones managed by OPG that identify the major deliverables
27 and timelines for the Unit 1 project, to Level “3”, which contains the greatest level of detail
28 showing individual work components at the task level.

1 For example, the parties to the project will perform their project management activities with
2 the Level 0 to Level 2 Working Schedules. The Level 3 Working Schedule will be used to
3 monitor and control most work for the completion of Unit 1, including engineering,
4 procurement, construction, installation, testing, commissioning, completion and facility
5 turnover.

6 **Figure 1 - Multi-level Scheduling Framework¹**



7
8 Level 0 is the *DNNP Project Milestone Schedule*. It is used by OPG senior management and
9 the NOPs as the basis for establishing the master schedule. It includes key milestones such
10 as program release milestones, regulatory milestones, nuclear construction preparation
11 milestones, and construction execution milestones.

12
13 The Level 1 schedule contains the critical path milestones, the tier 1 milestones and the
14 elevated tier 2 milestones. The Level 1 schedule provides a high-level management summary
15 of the Unit 1, represents all phases and major work bundles, and is used by project managers
16 and scheduling functions.

¹ A Level 1 schedule is comprised of Control Accounts, which represent high level execution scopes of work. A Level 2 schedule is comprised of Work Packages, which are used to integrate costs and schedule as well as provide grouping for related Level 3 activities. Earned Value Management (a project management technique that integrates project scope, cost, and schedule to provide an objective measure of project performance and progress) is performed at this level.

1 Level 2 schedules are a roll up of the integrated Level 3 schedule to the work package level.
2 They are updated based on the detailed Level 3 schedules. Each work package in the Level 2
3 schedule is assigned a baseline start and finish date, along with budgeted labour units. The
4 project team responsible for that work package is accountable for meeting these dates and
5 budget labour units. Progress on the work packages is tracked in the field by the accountable
6 PMT, and OPG uses key performance indices to monitor, control and provide oversight on the
7 progress of the work.

8
9 Level 3 schedules are Project Detailed Production Schedules which further break down work
10 into detailed activities. Level 3 schedules are prepared by the group executing the work. The
11 lowest level of tasks to be executed is developed here.

12
13 Once approved, schedules serve as a benchmark for measuring implementation performance.
14 These approved schedules are archived and will not be modified, except by means of a re-
15 baselining process involving cost and schedule analysis and only through authorized change
16 control. The schedule change management process is discussed in Ex. D2-4-9.

17 18 **4.0 CRITICAL PATH AND SCHEDULE OVERVIEW**

19 The critical path refers to the longest sequence of dependent activities in a project plan which
20 must be completed on time for the timely delivery of the overall project. Activities on the critical
21 path cannot be started until one or more predecessor activities are complete. If the critical path
22 is delayed for one day, the entire project will be delayed for one day, unless the critical path
23 activities following the delay are completed one day earlier than planned or future critical path
24 activities are forecast to be completed earlier than the original plan.

25
26 Figure 2 presents a simplified Unit 1 construction schedule sequence and illustrates the major
27 critical path phases for the construction and deployment of Unit 1 which form the basis of the
28 Release Quality Estimate ("RQE"). Figure 3 presents a cross section of the reactor building
29 and levels. The major critical path phases of the project are:

- 30 • Excavation post issuance of the License to Construct ("LTC") by the CNSC;

- 1 • Basemat installation – the basemat is the primary foundation support at the base of the
- 2 reactor unit. It acts to transfer the load of the reactor unit and its components safely onto
- 3 the ground;
- 4 • Construction of the Reactor Building Levels 1-4;
- 5 • Reactor Pressure Vessel placement;
- 6 • Construction of the Reactor Building Levels 5-8;
- 7 • Completion of equipment installation and nuclear construction; and
- 8 • Testing and Commissioning of Unit 1 prior to fuel load and post fuel load, and placing Unit
- 9 1 into commercial operation.

10

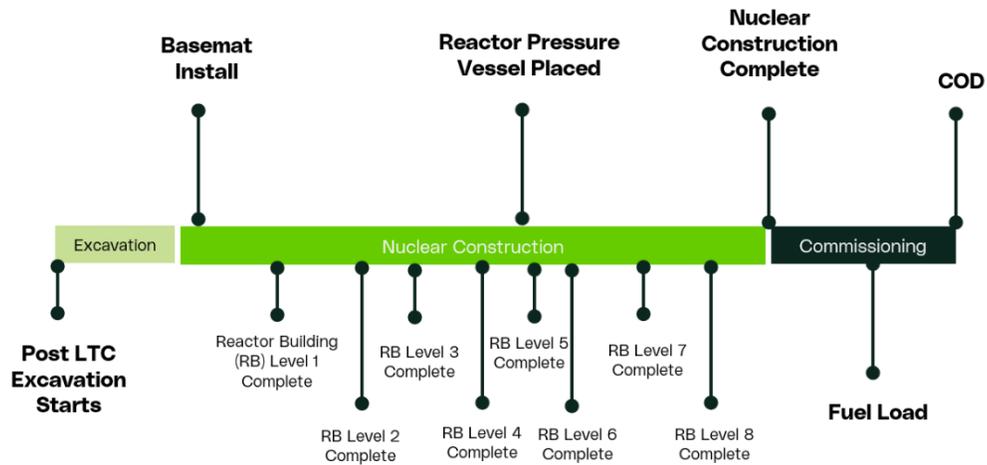
11 As a project progresses, the critical path may shift due to factors such as emerging risks,
12 resource reallocations, or schedule optimizations. Any alterations to the critical path are
13 managed through the change management process which includes evaluating the effects of
14 the modifications, securing the necessary approvals and revising the schedule to reflect
15 updated objectives and constraints. For example, construction of the Reactor Building by levels
16 is achieved through placement of prefabricated steel modules referred to as Diaphragm Plate
17 Steel Composites. Within the RQE, fabrication of these first-of-a-kind modules has been
18 planned as near critical path activities. As discussed in Ex. D2-4-9, fabrication of these
19 modules has shifted to critical path as of September 30, 2025. Details on the Diaphragm Plate
20 Steel Composite modules are provided in Ex. D2-4-5.

21

22 A more detailed schedule for Unit 1 as of the RQE is provided in Attachment 1. Additional detail
23 on the management of the critical path schedule, the current status of critical path, and the
24 change management process can be found in Ex. D2-4-9.

1

Figure 2 - Simplified Unit 1 Construction Schedule Sequence

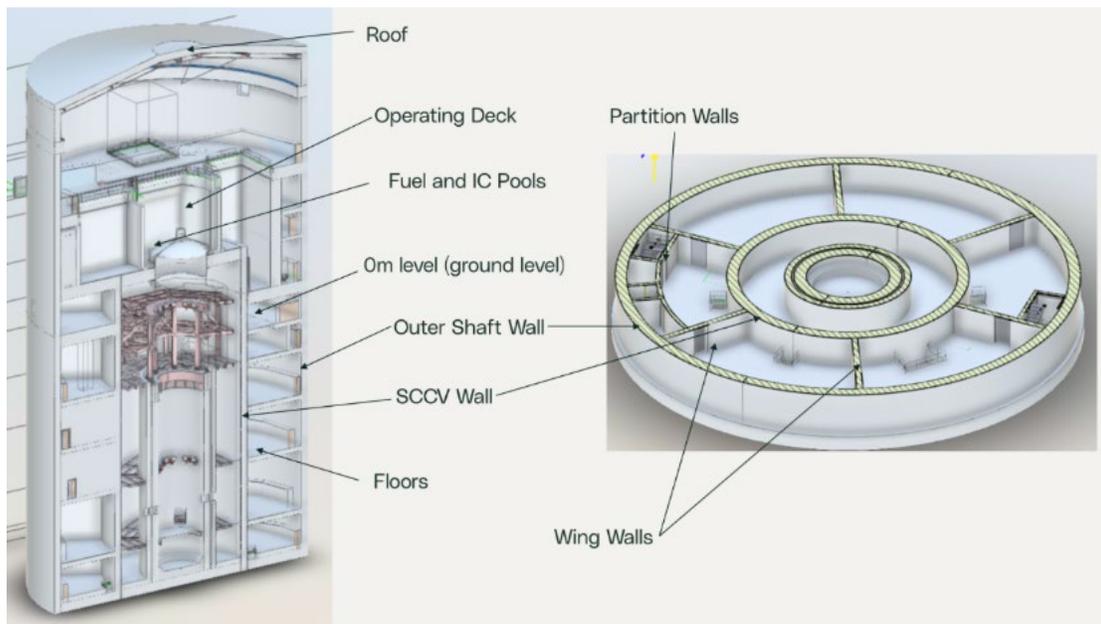


2

3

4

Figure 3 - DNNP BWRX-300 Reactor Building Structure



5

6

7 5.0 WORKING SCHEDULE VERSUS HIGH CONFIDENCE SCHEDULE

8 The Working Schedule represents the DNNP's most current and detailed timeline,
9 incorporating input from engineering, procurement, construction, and commissioning teams.

10 This schedule is continually updated to reflect the latest progress, risks, and lessons learned

1 from ongoing activities. It includes all major milestones, critical path activities, and
2 dependencies between work packages. As part of the schedule development process, OPG
3 has integrated all schedules, determined the critical path and created the schedule provided
4 in Attachment 1. This schedule is the Working Schedule. It is used to manage day-to-day
5 project performance and to determine NOP incentives and disincentives, where applicable. It
6 is also the basis for measuring the use of project-controlled schedule contingency.

7

8 OPG has also evaluated the risks and uncertainties for each element of the schedule based
9 on robust risk analysis, historical performance data, and expert judgment to determine the
10 amount of schedule contingency required to deliver Unit 1. This resulted in a schedule that
11 includes contingency for certain schedule risks that may be encountered during construction
12 execution and commissioning. Through probabilistic analysis, OPG expects to execute Unit 1
13 within this schedule. This High Confidence Schedule is the basis for the RQE, which serves
14 as the control budget. This High Confidence Schedule is also the schedule from which project
15 success will be assessed.

16

17 Based on these definitions, OPG is targeting for Unit 1 to enter commercial operation per the
18 High Confidence Schedule on October 17, 2030. Internally, OPG is managing the day-to-day
19 performance of Unit 1 against the Working Schedule.

LIST OF ATTACHMENTS

1

2

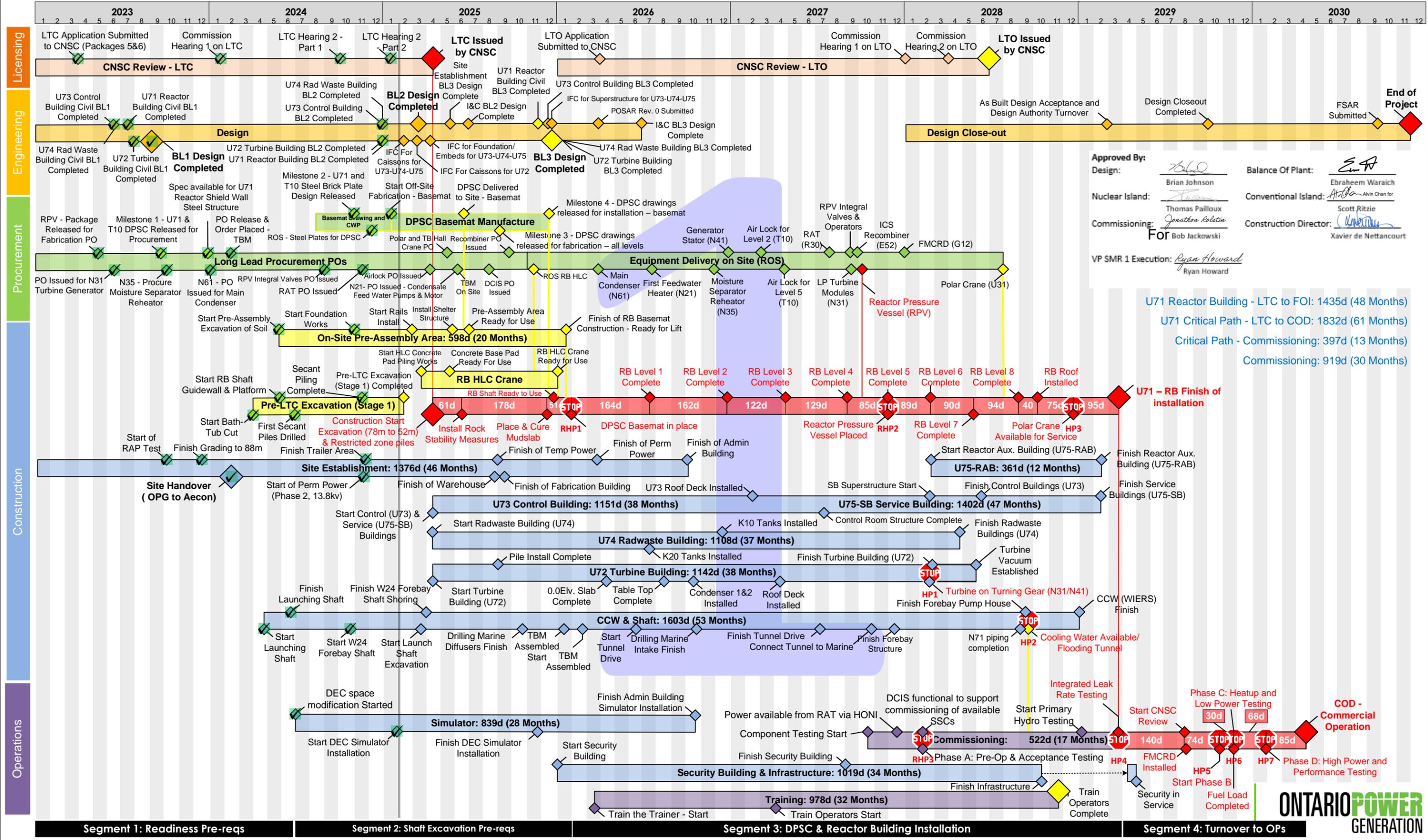
3 Attachment 1: Unit 1 Release Quality Estimate Project Working Schedule Diagram

Darlington New Nuclear Project | Level 1 – SMR 1 (Rev 7: 22-Feb-25)

Near Critical Path
Critical Path

Completed

OPG Confidential



Approved By:
 Design: *Brian Johnson*
 Nuclear Island: *Thomas Pailoux*
 Commissioning: *Jonathon Rolatin*
 VP SMR 1 Execution: *Ryan Howard*

Balance Of Plant: *Ebraheem Waraich*
Conventional Island: *Alvin Chan for*
Construction Director: *Scott Ritzie*
Xavier de Nettancourt

For Bob Jackowski

U71 Reactor Building - LTC to FOI: 1435d (48 Months)
 U71 Critical Path - LTC to COD: 1832d (61 Months)
 Critical Path - Commissioning: 397d (13 Months)
 Commissioning: 919d (30 Months)



DARLINGTON NEW NUCLEAR PROGRAM CONTINGENCY

1.0 OVERVIEW

Risk management is a systematic approach for proactively identifying, analyzing, managing and responding to project risks.

OPG has implemented a comprehensive and robust risk management system for the Darlington New Nuclear Program (“DNNP”). A key product of this system is the contingency that is included in the Release Quality Estimate (“RQE”) for Unit 1 / Common Scope Facilities (“Unit 1”). Contingency is an important tool for managing uncertainty and risk throughout the life of the project.

The process for developing the Unit 1 contingency is set out in this exhibit. The process used for managing contingency during the Execution Phase is described in Ex. D2-4-9.

2.0 CONTINGENCY

Determining the amount of contingency for a particular project is integral to the estimating, scheduling and risk management processes. Importantly, contingency refers to amounts that are expected to be expended because there are risks and uncertainties that will occur and that cannot be entirely mitigated or avoided.

Contingency is included as a component of a project cost estimate just like any other cost component. It is not an extra amount that will not be spent if the project goes as planned, nor is it a tool to compensate for an underdeveloped project plan. It is a necessary, legitimate and thoughtfully developed part of the estimated project cost based on residual (post mitigated) risk and uncertainty.

The Association for the Advancement of Cost Engineering International (“AACE”), a leading authority in the area of cost engineering, management and estimation, defines “contingency” as an amount that is added to an estimate to allow for items, conditions or events, for which the state, occurrence or effect is uncertain and that experience shows will likely result, in

1 aggregate, in additional costs. In addition, the AACE definition states that “contingency is
2 generally included in most estimates and is expected to be expended.”¹ Contingency is
3 typically estimated using statistical analysis informed by judgment based on experience. It
4 considers only residual (post-mitigated) risk exposures. Similarly, the Project Management
5 Institute, a leading professional membership association for the project, program and portfolio
6 management profession, explains that contingency allowances are part of the funding
7 requirements for a project, necessary to account for cost uncertainty.²

8
9 OPG developed the Unit 1 estimate in accordance with AACE’s recommended practices for
10 estimate classification. As part of this approach, OPG identified and classified risks, and
11 performed Monte Carlo simulation analysis based on industry best practices (including AACE
12 guidelines). OPG used this risk quantification to inform the contingency components of the Unit
13 1 RQE.

14
15 OPG also engaged Better Through Total Collaboration (“BTTC”), a consulting company that
16 specializes in assurance services for major capital projects, to conduct a third-party review and
17 assessment of the governance, processes and procedures used to develop the RQE, including
18 the contingency component.

19
20 For the risk management component of the RQE, BTTC concluded that DNNP has
21 “...demonstrated not only alignment to AACE best practice, but execution of compliance over
22 and above what is stated in their suite of risk Management Plans.”³

23
24 In terms of process maturity, BTTC scored the contingencies component of the basis of
25 estimate, the risk analysis and contingency component of the development process, and the
26 and the entire risk management plan, including quantitative risk assessment, as “Effective”. An
27 “Effective” score means that “Leading practices have been incorporated into the specific

¹ “Cost Engineering Terminology”, Recommended Practice 10S-90, AACE International, WV, rev. 2007.

² Project Management Institute, *Guide to the Project Management Body of Knowledge (PMBOK Guide)*, 4th ed., 2008, Section 7.1.2.6 at p. 173.

³ Better Through Total Collaboration, “Third Party Assurance Report: Governance, Process and Procedures” (April 30, 2025), p. 7.

1 governance, process, and procedural areas, comprehensively addressing all
2 recommendations outlined in industry best practice guidelines.”⁴

3
4 In terms of compliance with the risk plans and controls, BTTC found that DNNP “...consistently
5 met all requirements outlined in the relevant management plans. Controls were well-defined
6 and actively followed, demonstrating effective implementation and oversight.”⁵

7
8 For additional information on the BTTC report, and the report itself, see Ex. D2-4-8.

9
10 **3.0 CONTINGENCY DEVELOPMENT**

11 In order to determine the total contingency for Unit 1, OPG calculated contingency components
12 for Integrated Project Agreement (“IPA”) scope risks, non-IPA scope risks, execution profit-at-
13 risk and warranty and Unplanned Capability Loss Factor (“UCLF”) risk. While this structure
14 differs somewhat from that typically used by OPG for major projects, it reflects the first-of-a-
15 kind (“FOAK”) nature of the project and the contractual model for the DNNP. The four
16 contingency components are described below. Details of the IPA and underlying commercial
17 framework are discussed in Ex. D2-4-3.

18
19 **1. OPG (Non-IPA) Scope Contingency:** Addresses the cost uncertainty, schedule
20 uncertainty and discrete risks that are associated with executing the scope excluded from
21 the IPA. This contingency was informed by the quantitative risk assessment process
22 (described below) and is funded by OPG.

23
24 **2. IPA Scope Contingency:** Addresses the cost uncertainty, schedule uncertainty and
25 discrete risks that are associated with executing the scope included in the IPA. This
26 contingency was informed by the quantitative risk assessment process (described below)
27 and is part of the agreed IPA. Under the terms of the IPA, this contingency is funded by
28 OPG via the Reward Pool, specifically the Execution Sub-Pool.

⁴ *Ibid.*, p. 4.

⁵ *Ibid.*, p. 7.

1 **3. IPA Profit at Risk Pool:** This component leverages the Risk Pool funds available under
2 the IPA, associated with execution. The execution Risk Pool was established to incentivize
3 the Non-Owner Parties (“NOPs”) to achieve the Unit 1 execution project objectives,
4 including cost and schedule adherence. It is composed of the contributions from the agreed
5 Fixed Fees of NOPs for execution scope, representing their profit and a share of their
6 overheads.

7
8 This amount in the Risk Pool will be drawn upon by the project to manage risks that arise
9 during project execution, above and beyond the funds available from the Reward Pool. At
10 completion of Unit 1, any remaining funds within the Risk Pool will be paid out to the NOPs
11 in accordance with the IPA.

12
13 **4. IPA Warranty and Unplanned Capability Loss Factor Pool:** This component leverages
14 both the IPA Reward Pool (funded by OPG) and the Risk Pool (funded by the NOPs’ Fixed
15 Fees) tied to warranty claims and UCLF. This Pool was established to incentivize the NOPs
16 to achieve key operational objectives and performance measures. It will remain open for
17 36 months following mechanical completion.

18 19 **3.1 Qualitative and Quantitative Risk Assessment**

20 OPG has established a risk management team within the DNNP Project Management Office
21 (refer to Ex. D2-4-2) and equipped them with the necessary tools to identify, develop, manage
22 and monitor risks associated with the DNNP.

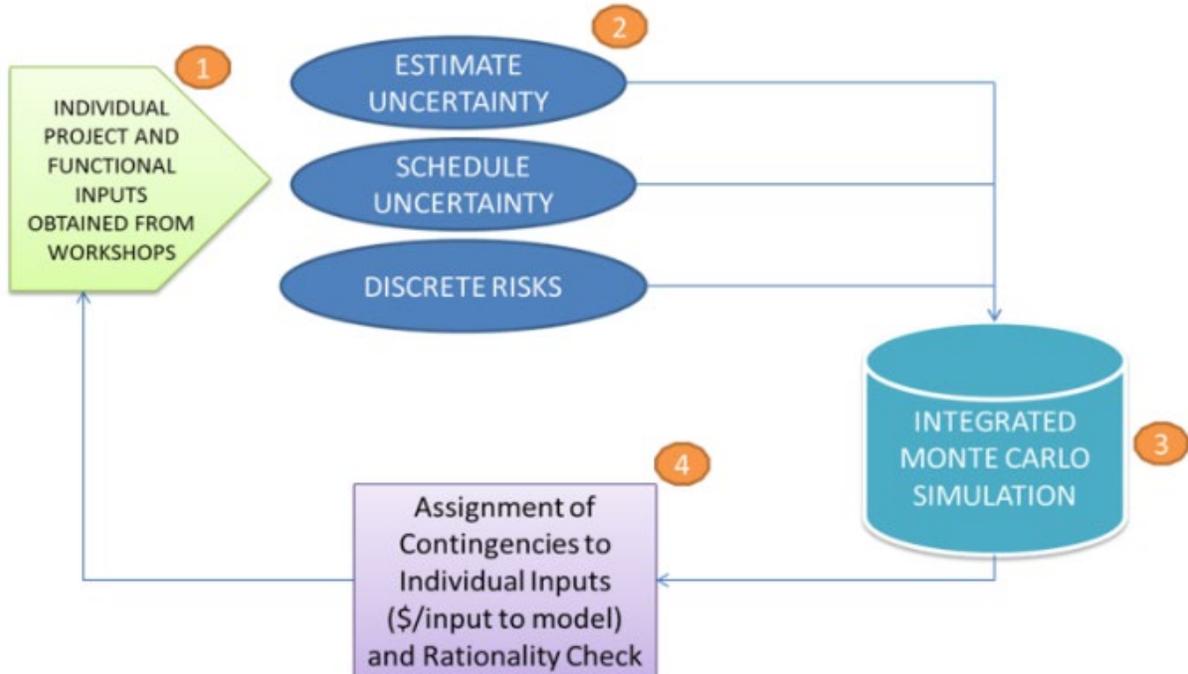
23
24 The contingency estimate was developed through a detailed evaluation of: (1) the uncertainties
25 in estimating cost and schedule, (2) discrete risks relating to cost and schedule, and (3)
26 contingent work across each project and the entire Unit 1. This process relied upon the use of
27 both qualitative and quantitative methods, including an integrated cost and schedule Monte
28 Carlo simulation.

- 29 • *Cost estimating uncertainty* is the possibility that the costs of the projects are more or less
30 than the applicable estimates, taking into consideration the estimate classification of the
31 base project cost (excluding discrete risk events).

- 1 • *Schedule estimating uncertainty* is the possibility that the actual schedule durations for the
2 projects are more or less than the estimate durations (excluding discrete risk events).
- 3 • *Discrete risks* are the incremental cost and schedule impacts to the project baselines if risk
4 events were to occur. These include risks that are specific and applied to individual bundles
5 scope, such as delays to procurement of a specific component for a specific project, as
6 well as global risks that could impact the DNNP in an overarching manner, such as with
7 respect to the availability of sufficient skilled trades resources to execute the construction
8 work program.

9
10 An illustration of the iterative process to gather, process, and refine the contingency inputs is
11 shown in Figure 1 below.

12
13 **Figure 1 –**
14 **Iterative Process for Gathering, Processing, and Refining Contingency Inputs**



1 A comprehensive risk register including AACE estimate classifications for each scope and
2 detailed schedule logic was used to develop the contingency estimate. The risk register was
3 initially developed by subject matter experts from the Project Management Teams (“PMTs”)
4 and Functional Teams. It was then vetted through a series of challenge sessions to ensure
5 reasonability and that the risks in the register are legitimate and being effectively managed.
6 The NOPs and contract staff supported the contingency development process by developing
7 the base cost and schedule estimates to approved AACE estimate classifications and by
8 identifying risks that were added to the risk registers. OPG provided independent owner
9 oversight to challenge inputs and drive reasonable outputs during these sessions.

10
11 The “cost uncertainty” and “schedule uncertainty” components of contingency were reviewed
12 by the PMTs and Functional Teams in collaboration with individual subject matter experts in
13 workshops and with reference to the AACE estimate classification and schedule durations.
14 This practice of identifying and modeling the integrated effects of risk and uncertainty on
15 schedule is an approach which is considered best practice and was successfully applied to the
16 Darlington Refurbishment Program.

17
18 The contingency amount for the DNNP was established through a rigorous and systematic risk
19 management process, drawing on industry best practices and lessons learned. OPG used
20 @Risk, a leading risk analysis software tool from Palisade Corporation, an internationally
21 recognized leader in this field.

22
23 A comprehensive risk identification exercise was undertaken, involving multidisciplinary teams
24 to capture potential technical, regulatory, schedule, and supply chain risks. Each identified risk
25 was then assessed for its likelihood and potential impact on both cost and schedule, with
26 findings documented in a detailed risk register. Next, an integrated Monte Carlo simulation
27 representing execution of the Unit 1 scope was conducted by OPG’s risk management team.
28 A Monte Carlo simulation is a computerized mathematical technique that replicates execution
29 of the project thousands of times, accounting for the potential realization of risk events and
30 uncertainties. It provides decision makers with a range of possible outcomes and the
31 probabilities that those outcomes will occur to certain confidence levels.

1 A Monte Carlo simulation builds models of possible results by substituting a range of values
2 for any factor that has inherent uncertainty. The model is then used to calculate the results in
3 an iterative manner, involving thousands of iterations, each using a different set of random
4 values from the probability functions.⁶ The intent is to simulate the outcome of Unit 1 scope
5 risk and uncertainty variables thousands of times and integrate these results to determine the
6 contingency estimate confidence level. As a result, the RQE contingency estimate is a high
7 confidence estimate based on the risk and uncertainty profile.

8
9 After initial contingency development workshops were completed and a preliminary
10 contingency estimate was prepared, management reviews were held to validate the overall
11 adequacy of the contingency estimate. This further ensured that the level of detail and the input
12 of risks and uncertainties were reasonable.

13 14 **4.0 CONTINGENCY AMOUNTS**

15 The detailed evaluation of cost and schedule uncertainties and discrete risks, as well as the
16 FOAK nature of the project and the IPA contractual framework, enabled OPG to determine the
17 contingency amount to include in the Unit 1 RQE. The outcome of this analysis yielded that, at
18 a high confidence level, the Unit 1 RQE should include \$1.24B⁷ (2024\$) of total contingency
19 and incremental protections, including the IPA incentive/disincentives. The components of this
20 total contingency amount are set out in Chart 1 below.

21
22 *Project contingency* is derived from the individual discrete risks and cost uncertainties
23 managed by PMTs or Functional Teams and have a localized project impact if they occur. The
24 *Program contingency* is derived from overarching program risks managed at the executive
25 level that could influence the overall DNNP's objectives, may require program-wide response
26 and may have a global impact on the DNNP.

⁶ Palisade Corporation, *Monte Carlo Simulation* <http://www.palisade.com/risk/monte_carlo_simulation.asp>.

⁷ Escalation is excluded.

1 For a project the size, duration, and FOAK nature as the DNNP, there are several low
2 probability, high consequence events that could impact the project and that are outside of the
3 contingency amount in the RQE. Due to their low probability, these items would not contribute
4 sufficiently to a probabilistic assessment used in establishing contingency. Examples of such
5 events may include force majeure, a significant labour disruption, changes in the political
6 environment, and unforeseen changes to financial and other economic factors beyond those
7 assumed in the program. As a more direct example, in light of the volatility characterizing the
8 current economic trade environment, the inclusion of tariffs in RQE calculations could result in
9 either excessive or insufficient contingency. As such, tariffs were excluded on the basis of the
10 high uncertainty for both their probability and impact. If such an event were to occur,
11 Management would evaluate the cost and schedule consequences of the event and provide a
12 recommendation to the Board of Directors for approval on the appropriate response.

13

14 A breakdown of the DNNP contingency amounts is set out below in Chart 1.

15

16

Chart 1 – Unit 1 Contingency by Component¹

Component	Contingency (\$M)
OPG (Non-IPA) Scope Contingency	193
IPA Scope Contingency	547
IPA Execution Profit at Risk	385
IPA Warranty and UCLF Risk and Reward	115
Total Contingency	1,240

17

¹ Note: Escalation is excluded.

18

19 A breakdown of the specific components of the Unit 1 Monte Carlo simulation results by Major
20 Work Bundle, used to inform development of the contingency is provided in Chart 2, below.

Chart 2 – Unit 1 QRA Monte Carlo Simulation Results by Major Work Bundle

#	Bundle/Scope	IPA (\$M)	Non-IPA (\$M)	Total (\$M)
1	Owner Program and IPD PMO	77	84	161
2	Site Preparation	0	0	0
3	Design Engineering	11	0	11
4	Nuclear Island	237	0	237
5	Conventional Island	166	0	166
6	Balance of Plant	58	0	58
7	Digital Strategy	0	(12)	(12)
8	Commissioning and Start Up	0	62	62
9	Total Contingency¹	550	134	684

¹Totals may not add due to rounding

The Monte Carlo simulation results related to the IPA scope produced a contingency estimate for Unit 1 of \$550M at a 90% confidence level (often referred to as P90). This simulation result supported the establishment of the Execution Sub-Pool of the Reward Pool, set out in the IPA and funded by OPG, at a value of \$547M. Under the terms of the IPA, the funds in the Execution Sub-Pool of the Reward Pool can be used to address risks that arise during project execution.

The Monte Carlo simulation results related to the Non-IPA scope produced a contingency estimate for Unit 1 of \$134M at a 90% confidence level. Recognizing the FOAK nature of the technology, higher uncertainty, and limited relevant historical data to inform the risk profiles, OPG has allocated \$193M to the contingency pool. Altogether, the level of OPG-funded contingency is supported by the Monte Carlo simulations.

In addition, OPG negotiated incremental cost protections that are funded by the NOPs through the Execution Sub-Pool of the Risk Pool funds available under the IPA. The Risk Pool was established to incentivize the NOPs to achieve the Unit 1 project objectives, including cost and schedule adherence during execution. It is composed of the contributions from the Fixed Fees of the NOPs, representing their profit and a share of their overheads. This amount in the Execution Sub-Pool of the Risk Pool will be drawn upon by the project to manage risks that arise during project execution that are above and beyond the funds available from the IPA

1 scope contingency.⁸ Similarly, the Warranty and UCLF Risk and Reward pool components are
2 included in the overall contingency for Unit 1. Details on the pricing and risk reward framework
3 within the IPA is described in Ex. D2-4-3.

4

5 Authorization of the use of contingency funds is strictly controlled through the change
6 management process, which requires an explanation of the risk or uncertainty element that
7 has been realized and requires escalation for use of any contingency funds. Additional
8 information regarding the change management process is found under Ex. D2-4-9.

9

10 The DNNP LP's proposed revenue requirement reflects the forecast Unit 1 DNNP in-service
11 additions based on the cost and schedule in the RQE. As set out in Section 6.1 of Ex. H1-1-1,
12 subject to Ontario Regulation 53/05, the difference between the revenue requirement impact
13 of the actual costs incurred and firm financial commitments made for the DNNP and those
14 forecast costs and firm financial commitments reflected in the 2027-2031 annual nuclear
15 revenue requirements approved by the OEB in this proceeding will be recorded in the
16 Darlington New Nuclear Project Variance Account re Development. As such, in the event of
17 any unallocated contingency at the point of in-service, the favourable revenue requirement
18 variance will be recorded in the account and returned to customers in a future period.

⁸ Depletion of the Execution Sub-Pool of the Risk Pool will occur at 70% of the cost incurred, with the remaining 30% of the cost incurred funded by the Owner via the OPG (Non-IPA) Scope Contingency.

1 **DARLINGTON NEW NUCLEAR PROGRAM**
2 **COSTS AND IN-SERVICE AMOUNTS**

3
4 **1.0 OVERVIEW**

5 The Release Quality Estimate (“RQE”) provides a high confidence estimate of the cost of Unit
6 1 based on the costs spent to date and estimated costs to completion, as derived from the
7 detailed planning that has been undertaken. This is the first unit planned to be constructed as
8 part of the planned four-unit Darlington New Nuclear Program (“DNNP”).

9
10 On March 6, 2025, OPG’s Board of Directors approved the RQE cost estimate and schedule
11 to complete the design, procurement, construction, and commissioning of Unit 1 and Common
12 Scope Facilities (“Unit 1”), a copy of which is attached as Attachment 1. With this approval, the
13 project moved into the Execution Phase for Unit 1.

14
15 The RQE to complete the design, procurement, construction and commissioning of Unit 1,
16 including scope common to the four-unit facility, is \$7.7B including interest, escalation and
17 contingency. The full amount of the RQE comprises capital costs.

18
19 This exhibit describes the process used for determining the RQE, along with the results of an
20 independent review of the governance structures, processes and procedures used to develop
21 the RQE. It also provides a breakdown of the RQE costing and resulting capital in-service
22 amounts forecasted to enter rate base in 2030, and discusses the relationship of these
23 amounts with the provisions of Ontario Regulation 53/05 (“O. Reg. 53/05”) that provide for
24 recovery of interest amounts in respect of the DNNP prior to the assets being placed in service.

25
26 **2.0 UNIT 1 RELEASE QUALITY ESTIMATE**

27 The purpose of the RQE is to produce a comprehensive description of Unit 1’s scope, and a
28 high confidence estimate of the cost and schedule to complete that scope. Importantly, the
29 quality of an estimate is directly related to how well the project scope has been defined. For
30 purposes of classifying its cost estimates, OPG relies upon the estimate accuracy classification

1 standards established by the Association for the Advancement of Cost Engineering
2 International (“AACE”).
3
4 Specifically, OPG developed and classified the RQE in accordance with AACE’s
5 Recommended Practice No. 18R-97,¹ which defines classes of cost estimates based on the
6 level of engineering and scope definition completed. As seen in Chart 1 below, the estimate
7 classes range from Class 5 (most conceptual with the widest range of potential variability) to
8 Class 1 (most mature with the narrowest range of potential variability).

¹ AACE Recommend Practice 18R-97: “Cost Estimate Classification System – As Applied in Engineering, Procurement and Construction for the Process Industries” was originally published in 1997. It is the basis for OPG’s estimating governance and has been used to classify OPG projects and major programs such as the Darlington Refurbishment Program. In 2022, AACE published a new Recommended Practice 115R-21: “Cost Estimate Classification System – As Applied in Engineering, Procurement, and Construction for the Nuclear Power Industries”, includes more stringent requirements for project definition maturity, which is a primary characteristic for estimate development, and wider accuracy ranges for estimates for nuclear industries (class 3 expected accuracy range of -10% to -20% on the low side to +20% to +60% on the high side). The +/- value represents typical percentage variation after the application of appropriate contingency for a given scope, essentially recognizing that nuclear projects inherently have greater accuracy variability.

As part of the development of RQE, OPG assessed its estimate under both AACE Recommended Practice 18R-97 and AACE Recommended Practice 115R-21, including meeting the more stringent estimate maturity requirements under AACE Recommended Practice 115R-21. Based on OPG’s estimate maturity and scope definition at the time of RQE, OPG considered the RQE falling within the accuracy ranges presented in AACE Recommended Practice 18R-97. OPG will continue to refer to both recommended practices going forward as applicable.

1 **Chart 1 - Generic Cost Estimate Matrix – AACE Recommended Practice No. 18R-97**

ESTIMATE CLASS	<i>Primary Characteristic</i>	<i>Secondary Characteristic</i>		
	MATURITY LEVEL OF PROJECT DEFINITION DELIVERABLES Expressed as % of complete definition	END USAGE Typical purpose of estimate	METHODOLOGY Typical estimating method	EXPECTED ACCURACY RANGE Typical variation in low and high ranges at an 80% confidence interval
Class 5	0% to 2%	Concept screening	Capacity factored, parametric models, judgment, or analogy	L: -20% to -50% H: +30% to +100%
Class 4	1% to 15%	Study or feasibility	Equipment factored or parametric models	L: -15% to -30% H: +20% to +50%
Class 3	10% to 40%	Budget authorization or control	Semi-detailed unit costs with assembly level line items	L: -10% to -20% H: +10% to +30%
Class 2	30% to 75%	Control or bid/tender	Detailed unit cost with forced detailed take-off	L: -5% to -15% H: +5% to +20%
Class 1	65% to 100%	Check estimate or bid/tender	Detailed unit cost with detailed take-off	L: -3% to -10% H: +3% to +15%

2
3

4 The Unit 1 RQE is a Class 3 estimate, and it is being used as the control budget for the delivery
 5 of Unit 1. Seventy-three percent of the estimated costs in the RQE meet or exceed the level of
 6 estimate accuracy corresponding to a Class 3, with the remaining 27% at Class 4. These
 7 estimate classifications, and the associated maturity of scope definition are considered during
 8 the risk analysis and contingency development. Generally, scope elements with a lower
 9 estimate class and greater uncertainty would generate a greater risk profile and need for
 10 contingency.

11

12 The expected accuracy range of a Class 3 estimate under the above AACE guideline is -10%
 13 to -20% on the low side to +10% to +30% on the high side.

14

15 OPG engaged Better Through Total Collaboration (“BTTC”) to provide an independent review
 16 of the governance structures, processes and procedures used to develop the RQE. BTTC is
 17 an infrastructure consultancy with expertise in providing independent assurance services for
 18 major capital projects.

1 BTTC's review consisted of (1) an evaluation of the governance and processes used to
2 develop the RQE, and (2) an assessment of how well OPG adhered to this governance and
3 set of processes during the development of the RQE.

4
5 Overall, BTTC concluded that OPG has an effective set of governance, processes and
6 procedures:

7
8 The assurance review concluded that OPG and DNNP have
9 established a suite of Effective management plans that are
10 generally aligned with industry best practice across all Control
11 Areas relevant to the development of the Release Quality
12 Estimate. The review also concluded that DNNP have not only
13 demonstrated alignment of management plans to AACE best
14 practice but have generally implemented the requirements of the
15 management plans fully, with only a small number of areas
16 showing partial compliance. Where Risk Management is
17 concerned, DNNP have demonstrated not only alignment to
18 AACE best practice, but execution of compliance over and
19 above what is stated in their suite of risk Management Plans.²

20
21 This conclusion provides an independent assurance of the quality and soundness of the Unit
22 1 RQE. BTTC's final report arising from this review is provided in Attachment 2.

23
24 As set out in their report, in relation to workstream (1), BTTC assessed the effectiveness of
25 OPG's governance and processes against five control areas deemed fundamental to the
26 development of a robust RQE: (1) basis of estimate; (2) development of cost estimate; (3) cost
27 estimate classification; (4) reviewing, validating and documenting the estimate, and (5)
28 developing a project risk management plan. As noted earlier, BTTC concluded that OPG had
29 established a strong suite of governance, processes and procedures that are generally aligned
30 with industry-recommended practices across all Control Areas related to the development of
31 the RQE.

² Better Through Total Collaboration, "Third Party Assurance Report: Governance, Process and Procedures" (April 30, 2025), p. 7.

1 With respect to OPG’s application of the governance (or workstream (2)), BTTC developed a
2 Compliance Assessment Framework to facilitate the clear identification of areas of strong and
3 weak compliance. The compliance checks conducted across the selected areas indicate that
4 OPG has generally adhered to the governance frameworks, processes, and procedures under
5 review. For the small number of requirements where full compliance was not achieved, it was
6 typically found that OPG had implemented alternative controls and governance processes that
7 still demonstrated strong control environments. OPG has since taken steps to close any
8 compliance gaps.

9
10 Across both workstreams, taking into consideration current status and any recommendations
11 made, BTTC found that the progress to be positive for a project of this size and complexity.³
12

13 **2.1 Cost Estimating Structure**

14 For cost estimating purposes, the Unit 1 scope was divided into two components, reflecting
15 the nature of the work and the commercial strategy: (1) costs covered by the Integrated Project
16 Agreement (“IPA”), and (2) non-IPA project costs. The associated contingency, interest and
17 escalation⁴ were then determined for each category. Estimates for the RQE were developed
18 for all the scopes identified for the project. These estimates can be mapped to the Work
19 Breakdown Structure described in Ex. D2-4-5.

20 21 **2.1.1 IPA Costs**

22 This component of the RQE captures the capital costs for project scope that is covered by the
23 IPA. This is work assigned to the NOPs (i.e., GE-Hitachi, AtkinsRéalis and AECOM Kiewit).
24 For additional detail of the planning performed during the Definition Phase and how that
25 assisted the development of the RQE, see Ex. D2-4-4.

³ *Ibid.*, pp. 7-8.

⁴ Escalation for 2025 onwards was calculated on IPA and Non-IPA costs based on existing commercial agreements, supplier estimates, applicable collective agreements, or otherwise as reflected in OPG’s business planning escalation assumptions (Ex. A2-2-1).

1 In general, this work covers the:

- 2 • Project Management and Digital Strategy
3 • Site-Specific Design Engineering
4 • Nuclear Island, Conventional Island, and Balance of Plant Major Work Bundle procurement
5 and construction

6

7 The RQE used engineering inputs from GE-Hitachi's Baseline 2 design because:

- 8 • The design was sufficiently complete for construction planning, detailed component design,
9 and equipment procurement/fabrication;
10 • The key system and component design documentation and calculations of record had been
11 issued; and
12 • A comprehensive design validation and verification had been performed.

13

14 Quantities were developed from design drawings. Productivity rates were applied to the
15 developed quantities to produce estimates for labour costs and construction equipment usage.
16 Level of Effort estimates were used to develop the indirect construction costs.

17

18 For engineered equipment, the project team obtained vendor pricing where possible for the
19 major cost items (e.g., reactor pressure vessel, steam turbine generator, condenser, feedwater
20 heaters, moisture separator reheaters, condensate purification system equipment, polar crane,
21 large pumps, and valves).

22

23 The direct costs of materials, construction equipment, and subcontractors were developed for
24 each activity.

25

26 2.1.2 Non-IPA Costs

27 This component of the RQE captures capital costs for project scope that is outside of the IPA
28 contractual framework.

1 In general, this work consists of the:

- 2 • Owner Program Management including project management, licensing, and engineering
- 3 oversight
- 4 • Site Preparation and Early Works
- 5 • Power Block Standard Design Engineering
- 6 • Grid Connection
- 7 • Digital Infrastructure
- 8 • Commissioning and Start-Up

9

10 Additional details on these scopes of work can be found in Ex. D2-4-5.

11

12 OPG's program management labour and non-labour costs were developed by a Level of Effort
13 assessment at the individual organizational level, while other non-labour costs were developed
14 from inputs from the project team and contractors. Managers from each of the respective
15 organizational units were tasked with building their estimates from a detailed evaluation of
16 resource types and job families necessary to execute the work, including OPG labour,
17 temporary staff, and staff augmentation. When deliverables were outsourced to a third party,
18 the internal/labour programs were adjusted accordingly.

19

20 Staffing plans were integrated with their associated OPG function to optimize overall
21 resources. Benchmarking of staffing levels against other OPG major projects and external
22 benchmarks (as available) was also completed. The staffing plans were also subjected to a
23 series of executive challenge sessions at which individual departments presented their plans
24 to OPG senior management. These sessions led to refinements to the planned resource levels,
25 durations, and department deliverables. The plans were also compared to previously approved
26 estimates (Class 4) to provide another level of challenge.

3.0 UNIT 1 COST AND IN-SERVICE AMOUNT BREAKDOWN

Based on the RQE, the Application is requesting a capital in-service addition of \$6,584.9M in 2030 for the placement of Unit 1 into commercial operation. A detailed breakdown of the components of this estimate is provided in Chart 2 below.

Chart 2 – Breakdown of RQE Budget and In-Service Additions for Unit 1 (\$M)

#	Bundle / Scope	Total Cost	%
1	Owner Program and IPD PMO	1,041	13.5
2	Site Preparation	63	0.8
3	Design Engineering	449	5.8
4	Nuclear Island	1,257	16.3
5	Conventional Island	1,016	13.2
6	Balance of Plant	1,082	14.1
7	Digital Strategy	43	0.6
8	Commissioning and Start Up	145	1.9
10	Sub-Total Major Work Bundles	5,097	66.2
11	Contingency ¹	1,436	18.7
12	RQE Capitalized Interest	1,165	15.1
13	Total Release Quality Estimate^{2,3}	7,698	100
14	Less: RQE Capitalized Interest after Jan. 1, 2026 (removed due to CCR)	(1,113)	
15	Capital In-Service Addition	6,585	

¹ Contingency is discussed in Ex. D2-4-8 and includes incremental protections through IPD profit-at-risk.

² Escalation is included in each of the Major Work Bundle in-service amounts and Contingency, and accounts for \$485M of the Unit 1 RQE cost.

³ There are no OM&A costs included in the Unit 1 RQE.

There are additional costs associated with placing the first unit in-service which will not be incurred in deploying the remaining three units. In particular, the Unit 1 cost includes all scope necessary to deploy and operate all common facilities such as Condenser Cooling Water intake and discharge structures, and common buildings such as administration, fabrication and security buildings, which are necessary to support the deployment of all four planned SMRs.

1 These common facilities are essential to enable Unit 1 operation and have been designed to
2 accommodate four-unit operation.

3

4 **3.1 Concurrent Cost Recovery**

5 Chart 2 displays the RQE cost of \$7.7B less the interest amounts included in the RQE, as
6 interest amounts will be recovered prior to the assets being placed in service, pursuant to O.
7 Reg. 53/05. The RQE was developed and approved prior to the O. Reg. 53/05 amendments
8 that established these requirements. As discussed in Ex. I1-1-3, O. Reg. 53/05 has established
9 a framework for recovery of interest amounts on capital expenditures for the DNNP prior to the
10 assets being placed in service, effective January 1, 2026. The Application refers to this
11 framework as concurrent cost recovery (“CCR”). Pursuant to this framework, the Application is
12 requesting recovery of forecast interest amounts totaling \$1,004.9M over the IR term in respect
13 of Unit 1. The requested Unit 1 in-service addition therefore does not include capitalization of
14 interest effective January 1, 2026. Detailed calculations of the forecast CCR interest amounts
15 are provided in Ex. I1-1-1, Table 6. Any differences between the actual CCR interest amounts
16 and such forecast amounts will be recorded in the Darlington New Nuclear Project Variance
17 Account re Capital Cost Amounts in accordance with O. Reg. 53/05.

18

19 Program cost performance will be measured inclusive of CCR interest amounts, as well as the
20 credit or charge associated with the outstanding Canada Infrastructure Bank debt held by OPG
21 as discussed in Ex. C1-1-2, Section 4.5, against the RQE.

22

23 **3.2 In-Service Envelope and Development Variance Account**

24 While actual costs may ultimately be different than forecast for individual line items shown in
25 Chart 2, OPG/DNNP LP is committed to completing the construction and commissioning of
26 Unit 1 within the total in-service envelope budgeted for this purpose, being approximately
27 \$6.6B. To the extent there are deviations, OPG/DNNP LP will record, subject to O. Reg. 53/05,
28 the associated revenue requirement impacts within the Darlington New Nuclear Project
29 Variance Account re Development Variance Account, using the same process as for the DRP.

4.0 UNIT 1 MAJOR WORK BUNDLE COSTS BREAKDOWN

The total cost of the Major Work Bundles for Unit 1 is \$5,097M, including escalation and excluding contingency and interest. As illustrated in Chart 2 above, the Major Work Bundles account for 66% of the total Unit 1 RQE cost. The cost estimate of each of the Major Work Bundles is detailed in the sections below, excluding contingency and interest.

The cost estimates for all Major Work Bundles are based on the detailed scoping, scheduling, and contingency development as discussed in Ex. D2-4-5, Ex. D2-4-6 and Ex. D2-4-7. Cost estimation processes are described in Section 2.1 of this exhibit and were employed for each of the work bundles. The scope of each Major Work Bundle is executed by Project Management Teams and Functional Teams, as discussed in Ex. D2-4-2.

4.1 Owner Program and IPD PMO

The Owner Program and IPD PMO major work bundle accounts for \$1,041M of the forecast Unit 1 in-service amount. A breakdown of the Owner Program and IPD PMO cost estimate is set out in Chart 3 below.

Chart 3 – Owner Program and IPD Project Management Office Costs Breakdown (\$M)

#	Category	Cost	%
1	Program Management and Support	315	30
2	EA Licensing and Support	155	15
3	Engineering and Support	181	17
4	PMO (GE-Hitachi)	134	13
5	PMO (AtkinsRéalis)	141	14
6	PMO (AECOM Kiewit)	100	10
7	Sub-Total	1,026	99
8	Escalation ¹	15	1
9	Total	1,041	100

¹ Escalation on NOP costs only. Escalation on OPG costs is embedded within individual lines above.

1 This bundle primarily covers the project management support that is being provided to the
 2 DNNP.

3

4 **4.2 Site Preparation**

5 The Site Preparation Major Work Bundle accounts for \$63M of the forecast Unit 1 in-service
 6 amount. A breakdown of the Site Preparation cost estimate is set out in Chart 4 below.

7

8

Chart 4 – Site Preparation Costs Breakdown (\$M)

#	Category	Cost	%
1	Early Works and Site Preparation	49	77
2	Geotech	14	23
3	Sub-Total	63	100
4	Escalation	0	0
5	Total	63	100

9

10 This bundle covers work that OPG and its partners undertook to prepare the DNNP site prior
 11 to it being turned over to AECON Kiewit for the construction of Unit 1. This work has been
 12 substantially completed.

13

14 This bundle includes projects related to Site Preparation Early Works, Site Preparation –
 15 Main,⁵ and geotechnical investigations needed for the Unit 1 design.

16

17 **4.3 Design Engineering**

18 The Design Engineering Major Work Bundle accounts for \$449M of the forecast Unit 1 in-
 19 service amount. A breakdown of the Design Engineering cost estimate is set out in Chart 5
 20 below.

⁵ The Site Preparation – Main scope represents costs incurred in 2022 and 2023. The full scope transitioned under the IPA and is addressed in the Balance of Plant work bundle within Site Establishment.

1

Chart 5 – Design Engineering Costs Breakdown (\$M)

#	Category	Cost	%
1	Power Block Site Specific (GE-Hitachi)	175	39
2	Grid Connection Switchyard – Engineering and Procurement (AtkinsRéalis)	1	0
3	CCW and Shoreline Protection – Engineering and Procurement (AtkinsRéalis)	56	12
4	Site Establishment (AtkinsRéalis)	9	2
5	Power Block Engineering (AtkinsRéalis)	76	17
6	Power Block Standard Design (GE-Hitachi)	121	27
7	Sub-Total	437	98
8	Escalation	11	2
9	Total	449	100

2

3 This Major Work Bundle is shared between GE-Hitachi and AtkinsRéalis. It includes design
 4 projects by GE-Hitachi such as Power Block Standard Design and Power Block Site Specific
 5 design work. AtkinsRéalis’s work in this bundle includes design projects such as Grid
 6 Connection Switchyard – Engineering and Condenser Cooling Water and Shoreline Protection
 7 – Engineering.

8

9 **4.4 Nuclear Island**

10 The Nuclear Island Major Work Bundle accounts for \$1,257M of the forecast Unit 1 in-service
 11 amount. A breakdown of the Nuclear Island cost estimate is set out in Chart 6 below.

1

Chart 6 – Nuclear Island Costs Breakdown (\$M)

#	Category	Cost	%
1	Procurement, Construction and Commissioning (AECON Kiewit)	566	45
2	Procurement (GE-Hitachi)	370	29
3	Procurement (AtkinsRéalis)	67	5
4	Control Building, Radwaste Building, Service Building & Procurement (AECON Kiewit)	143	11
5	Sub-Total	1,146	91
6	Escalation	110	9
7	Total	1,257	100

2

3 This work bundle includes construction of the Reactor Building, Control Building, Radwaste
 4 Building, Service Building, nuclear systems, and instrumentation and controls. The work is
 5 shared between GE-Hitachi, AtkinsRéalis, and AECON Kiewit.

6

7 GE-Hitachi and AtkinsRéalis are primarily responsible for nuclear island design and
 8 procurement while AECON Kiewit is primarily responsible for construction and commissioning
 9 of the nuclear island.

10

11 **4.5 Conventional Island**

12 The Conventional Island Major Work Bundle accounts for \$1,016M of the forecast Unit 1 in-
 13 service amount. A breakdown of the Conventional Island cost estimate is set out in Chart 7
 14 below.

1

Chart 7 – Unit 1 Conventional Island Costs Breakdown (\$M)

#	Category	Cost	%
1	Procurement, Construction and Commissioning (AECON Kiewit)	563	55
2	Procurement (GE-Hitachi)	134	13
3	Procurement (AtkinsRéalis)	201	20
4	Grid Connection Transmission and Station Modifications	29	3
5	Sub-Total	926	91
6	Escalation	90	9
7	Total	1,016	100

2

3 This work bundle includes construction of the Turbine Building, the turbine, the condenser and
 4 auxiliaries, the electrical system and the security building.

5

6 **4.6 Balance of Plant**

7 The Balance of Plant Major Work Bundle accounts for \$1,082M of the forecast Unit 1 in-service
 8 amount. A breakdown of the cost estimate of the Balance of Plant is set out in Chart 8 below.

9

10

Chart 8 – Balance of Plant Costs Breakdown (\$M)

#	Category	Cost	%
1	Condenser Cooling Water System– Procurement and Construction (AECON Kiewit)	472	44
2	Power Block (AECON Kiewit)	92	9
3	Site Establishment (AECON Kiewit)	444	41
4	Procurement (AtkinsRéalis)	14	1
5	Sub-Total	1,023	95
6	Escalation	59	5
7	Total	1,082	100

11

1 This work bundle is primarily the accountability of AECON Kiewit. Under this bundle AECON
 2 Kiewit is responsible for the procurement and construction of general facilities and site
 3 infrastructure (e.g., fabrication shop, warehouses, administration building and the pre-
 4 assembly building; Condenser Cooling Water System and Yard Construction).

5

6 **4.7 Digital Strategy**

7 The Digital Strategy major work bundle accounts for \$43M of the forecast Unit 1 in-service
 8 amount. A breakdown of the Digital Strategy cost estimate is set out in Chart 9 below.

9

10

Chart 9 – Digital Strategy Costs Breakdown (\$M)

#	Category	Cost	%
1	Digital Strategy (AtkinsRéalis)	18	40
2	Digital Strategy (AECON Kiewit)	9	22
3	Digital Infrastructure	13	31
4	Sub-Total	40	92
5	Escalation	3	8
6	Total	43	100

11

12 This major work bundle is shared by OPG, AtkinsRéalis and AECON Kiewit. The work includes
 13 information management during the life cycle of the project (e.g., documents, drawings,
 14 specifications, and other data) and the technology infrastructure necessary during construction
 15 including Local Area Networks and wireless network.

4.8 Commissioning and Start-up

The Commissioning and Start-up major work bundle accounts for \$145M of the forecast Unit 1 in-service amount. A breakdown of the Commissioning and Start-up cost estimate is set out in Chart 10 below.

Chart 10 – Commissioning and Start-up Costs Breakdown (\$M)

#	Category	Cost	%
1	Commissioning	72	50
2	Operations	73	50
3	Sub-Total	145	100
4	Escalation ¹	0	0
5	Total	145	100

¹ Escalation on NOP costs only. Escalation on OPG costs is embedded within individual lines above.

This work bundle contains the OPG scope necessary to commission and start up the Unit 1 facility. It also includes the equipment and tools necessary for commissioning and subsequent operation including radiation protection equipment, furniture and fixtures, and plant equipment and tools necessary for commissioning and start up.

5.0 UNITS 2-4 STATUS

As announced by the Province of Ontario, the DNNP is planned to deliver a four-unit SMR facility at the Darlington New Nuclear site.

In November 2023, OPG’s Board of Directors approved a funding release of \$110M for Definition Phase work for the three subsequent units (“Units 2-4”). This work included preliminary planning, procurement and site grading.

In March 2025, OPG’s Board of Directors approved the release of additional funding in the amount of \$411M to continue the Definition Phase work for Units 2-4, bringing the overall Units 2-4 release amount to \$521M, inclusive of interest. This includes advancement of design and multi-unit engineering impact assessments; preparation and submission of a Licence to

1 Construct application for Units 2-4; advancement of project planning; and procurement of long
2 lead materials.

3
4 The RQEs for Units 2-4 will follow in future years. None of Units 2-4 will enter commercial
5 operation or have any associated forecast in-service amounts entering rate base during the IR
6 term. Progressing with the Execution Phase of Units 2-4 requires future approval by OPG's
7 Board of Directors, DNNP LP's Board of Directors and a Canadian Nuclear Safety Commission
8 ("CNSC") Licence to Construct.

9
10 The Application is seeking recovery of forecast CCR interest amounts totaling \$114.9M over
11 the IR term related to the released funds for Units 2-4. Capital costs during the IR term that
12 are beyond the currently released funding would result in incremental CCR interest amounts
13 that will be recorded for future recovery in the Darlington New Nuclear Project Variance
14 Account re Capital Cost Amounts.

15 16 **6.0 IR TERM CAPITAL EXPENDITURES AND IN-SERVICE AMOUNTS**

17 Capital expenditures for the DNNP for the historical years (actual) and for the 2025 to 2031
18 period (forecast) are provided in Ex. D2-4-8, Tables 1-3, based on the Unit 1 RQE and the
19 released funds for Units 2-4. The associated capital in-service amounts are provided in Ex.
20 D2-4-8, Tables 4-7. The figures in these tables do not include capitalization of interest effective
21 January 1, 2026 as a result of the concurrent cost recovery framework under O. Reg. 53/05
22 providing for recovery of interest amounts prior to the assets being placed in service, as
23 discussed in Section 3.0.

24
25 The sole in-service amount for the DNNP over the historical, bridge years and IR term is the
26 \$6,584.9M forecast for Unit 1 in October 2030. As this Application represents the first time
27 that the capital budget for the DNNP will be before the OEB, there are no prior OEB-
28 approved amounts.

29

LIST OF ATTACHMENTS

1

2

3 Attachment 1: DNNP Unit 1 Execution Phase Funding Release and Units 2-4 Definition
4 Phase Funding Release, March 2025

5

6 Attachment 2: BTTC Third-Party Assurance Report on RQE

March 6, 2025

**Darlington New Nuclear Project – Unit 1 Execution Phase Funding Release and Units 2-4
Definition Phase Funding Release**

DECISION REQUIRED

The purpose of this memo is to provide a summary of the business case for the four-unit Darlington New Nuclear Project (DNNP) and request Board approval for the following:

- Approval to transition from the validation phase to the execution phase for the first unit of DNNP, including a release of **\$5,755 Million** to complete the remaining Unit 1 and common site scope for the four-unit program. If approved, this would bring the overall Unit 1 release to **\$7,698 Million**.
- Approval to release additional funding in the amount of **\$411 Million** to continue with the definition phase of Units 2-4. If approved, this would bring the overall Units 2-4 release to **\$521 Million**.

This release covers the full Unit 1 execution phase costs until October 2030, and Units 2-4 costs until the first quarter of 2027. If approved, the cumulative funding release for DNNP would be **\$8,218 Million**.

The current program estimate, reflecting a Class 3 estimate to complete Unit 1 and common site scope, and Class 4 estimate to complete the remaining four-unit small modular reactor (SMR) program, is **\$20,949 Million**, with a projected levelized cost of electricity (LCOE) of [REDACTED] and a schedule that places all four SMR units in service by 2035. Each unit has an expected net output capacity of 315MW.

BACKGROUND

In December 2022, as part of the approval to proceed with the Unit 1 definition phase, the Board approved a cumulative funding release of **\$1,299 Million** to proceed with planning, engineering, procurement and site preparations. Additional funding releases were approved in November 2023 (**\$110 Million** for Units 2-4 preliminary planning, procurement and site grading) and November 2024 (**\$643 Million** for Unit 1 procurement) resulting in a life-to-date release of **\$2,052 Million**.

Since that time, OPG has progressed Unit 1 definition phase with completion of the standard plant design for major systems, procurement of all long lead items for Unit 1 and common site scope, completion of site preparation activities and submission of the License to Construct (LTC) application to the Canadian Nuclear Safety Commission (CNSC). OPG expects the CNSC to issue the LTC by mid-April 2025 enabling the project to progress into the nuclear construction for Unit 1. The start of nuclear construction in April 2025 is the current assumption built into the Class 3 estimate for Unit 1. As part of the planning process, OPG has updated the cost estimate, progressed schedule development, and performed an updated risk and contingency analysis with the following conclusions:

- There continues to be technical high confidence in the design and ability to construct and commission the first-of-a-kind BWRX-300 reactor plant technology.
- The Class 3 estimate to complete design, procurement, construction and commissioning of Unit 1, including site scope common to the four-unit program, is **\$7,698 Million**. This estimate incorporates higher inflation and interest forecasts, improved scope definition, updated vendor and procurement estimates and contingency. The four-unit program estimate, incorporating a Class 4 estimate to complete Units 2-4, is **\$20,949 Million**.

- The overall program schedule for commercial operations delivers all four units by the end of 2035, with the high confidence Unit 1 commercial operation date of October 15, 2030, providing critical supply to meet Ontario's electricity demand.
- Commercial operation of the four 315MW units continues to provide a cost effective source of baseload supply to the system. The projected LCOE of [REDACTED]
- The four-unit DNNP will be financed using a combination of the corporate debt platform, operating cash flow and other potential sources, with project costs recovered as part of regulated assets.
- Delivery of the four SMR units at Darlington would provide significant long term economic and social benefits and help meet Ontario and Canada's carbon emission goals.

The project is adequately prepared for progression, and management is now requesting Board approval to proceed with the DNNP Unit 1 execution phase in order to progress the following major activities:

- Completion of the construction and commissioning of Unit 1.
- Submission of the Unit 1 Licence to Operate (LTO) application to the CNSC.
- Development of operations and maintenance procedures, and completion of staff training and certification.
- Submission of the LTC application to the CNSC for Units 2-4.
- Site establishment works for Units 2-4 including grading and distribution of site services such as water, power, and local area networks.
- Establishment of commercial agreements for Units 2-4, and advancement of procurement activities for long lead materials.

ANALYSIS

Throughout the definition phase, the project team has completed all major activities required to proceed with the next phase of the program:

- An Integrated Project Agreement (IPA) for Unit 1 was signed between the technology provider (GE-Hitachi or GEH), Architect Engineer (Atkins Realis), Constructor (AECOM) and Owner (OPG) on January 1st, 2023. During the definition phase, an amendment to the IPA was negotiated ("Validation Amendment" or VA) including the target cost and fully detailed incentive and disincentive program between all parties to drive "best for project" behaviours. The VA also includes the addition of another vendor (Kiewit) as Constructor, jointly with Aecon. The VA agreement is agreed to by the parties and will be signed pending this approval and the issuance of the LTC by the CNSC, expected in mid-April 2025.
- Overall engineering is ~70% complete with over 95% of the major system deliverables for the BWRX-300 standard plant design issued.
- The two-part LTC public hearings successfully concluded in January 2025, marking a significant milestone in the approval of the BWRX-300 technology in Canada. Four out of five key regulatory issues discussed with the CNSC have been resolved. Resolution of the remaining open item on the Break Exclusion Zone (BEZ) is expected by June 2025 with no impact to issuance of the LTC.

- Fabrication of key long lead components is in progress, with delivery dates aligned to the construction schedule. This includes fabrication of the Tunnel Boring Machine (June 2025 delivery), Reactor Pressure Vessel (October 2027 delivery) and the modular steel structural system (referred to as the Diaphragm Plate Steel Composite (DPSC); May 2025 delivery of basemat structure.
- The Level 1 Execution Project Schedule depicting key components of Unit 1 and common site scope critical path, major scope, and integration logic has been developed. This is underpinned by a detailed resource loaded Level 3 working schedule which will be used to monitor and control Unit 1 construction and commissioning. The corresponding Class 3 cost estimate for Unit 1 has been developed.
- A comprehensive Indigenous Engagement Plan (IEP) for the DNNP was finalized in 2021 to cover the period from 2021-2024 with a focus on Site Preparation and LTC activities. The 2024-2028 IEP proposes to encompass the continued regular engagement regarding remaining LTC and LTO activities.
- The core Project team has been established with representation from across the IPD parties, with the execution teams in place to manage Unit 1 construction.

The definition phase has advanced scope, design maturity and vendor pricing on key contracts and materials through progression of detailed engineering deliverables, providing increased certainty on technical requirements and material quantities, and informing development of the Unit 1 cost estimate and schedule.

1. The Release Quality Estimate (RQE) to design, construct, and commission the first SMR (Unit 1) including site scope common to the four-unit program is \$7,698 Million including interest, escalation and contingency.

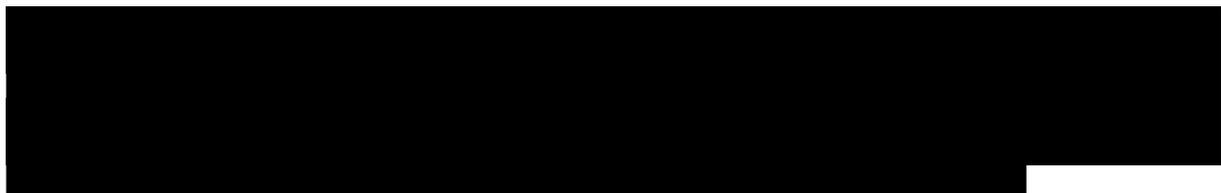
The Class 3 estimate to complete the design, construction and commissioning of Unit 1 is **\$7,698 Million** including **\$1,650 Million** of interest and escalation and **\$1,240 Million** of contingency. This estimate includes scope and costs to deliver common infrastructure facilities (\$1,061 Million) that are necessary to deploy and operate all four units, including Unit 1. Since the definition phase Class 4 estimate (Unit 1) and Class 5 estimate (Units 2-4) provided to the Board in December 2022, the estimate has been updated to reflect higher inflation, associated interest impacts, improved scope definition, revised schedule durations, improved risk definition and quantification, and updated vendor estimates. The project cost estimate reflects interest costs based on OPG's current credit ratings. Details on the Unit 1 and the four-unit program cost by scope, is provided in **Appendix 1**.

The estimate was developed in accordance with OPG and industry practices and meets the Association for the Advancement of Cost Engineering (AACE) Class 3 definition. The estimate reflects engineering completion of over 70% (including standard plant design which is substantially complete), and a finalised IPA.

Contingency is derived through a detailed evaluation of the estimate uncertainties (cost and schedule) discrete risks (cost and schedule) and contingent work across the program. These inputs were loaded into a fully integrated Monte Carlo simulation to assist in estimating contingency requirements in consideration of the risk and uncertainty profile presented. As a result, the Unit 1 estimate includes **\$1,240 Million** of contingency which is approximately 48% of the overall direct cost exposure at risk. The recommended AACE cost estimate range and accuracy for a Class 3 estimate is +30% to -20% (see **Appendix 2: SMR Unit 1 Estimate Classification**) which substantiates that the Unit 1 contingency requested is adequate given the estimate class. A comparison of the project cost exposure vs. contingency is provided in **Appendix 3**.

2. The estimate to execute the four-unit SMR Program is \$20,949 Million including interest, escalation and contingency. The estimate is at Class 4.

The current four-unit SMR Program estimate is **\$20,949 Million** [REDACTED]. This Class 4 estimate reflects a Class 3 estimate for Unit 1 including common site scope, and a Class 4 estimate for the three subsequent units (Units 2-4). This estimate reflects higher inflation, associated interest impacts, improved scope definition, revised schedule durations and sequencing, improved risk definition and quantification, and updated vendor estimates. See **Appendix 1: Unit 1 and Four Unit Program Cost by Scope** and **Appendix 4: Overall Program Cost by Unit**.



The final Units 2-4 cost estimates will be confirmed during the respective Unit Release Quality Estimates (Class 3), incorporating previous unit performance and lessons learned.

3. An overall high confidence schedule to complete the four-unit SMR Program has been established, with Unit 1 in commercial operation by October 15, 2030 and all units in commercial operation by 2035. The schedule for Units 2-4 will be confirmed during respective RQEs.

As part of the definition phase, the IPD parties have integrated all vendor schedules for each scope component, determined the critical path for the project, and created a schedule for Unit 1 critical path (provided in **Appendix 5: Unit 1 Level 1 Working Schedule**). The IPD parties evaluated risks for each critical path element of the Unit 1 schedule, determined the amount of contingency required to deliver the project, and produced a medium confidence (P50) working schedule and high confidence (P90) schedule.

OPG will manage day-to-day project performance using the detailed, Level 3 resource loaded working schedule. This schedule will also be used to determine the IPD parties' incentives and disincentives and will form the basis of project-controlled schedule contingency.

A high confidence schedule includes contingency for certain schedule risks that may be encountered during construction or commissioning. This schedule will be the basis for external communication and measurement. The high confidence duration for Unit 1 construction and commissioning is 66 months.

Unit 1 durations considered civil construction and Boiling Water Reactor (BWR) commissioning operating experience (OPEX) and reflected project specific impacts such as the two-part License to Construct hearing and reactor pressure vessel fabrication timelines. [REDACTED]

[REDACTED] the final Units 2-4 schedule durations will be confirmed during the respective Unit Release Quality Estimates (Class 3), incorporating previous unit performance and lessons learned.

The four-unit high confidence schedule and Unit 1 working schedule is provided in **Table 1**.

Table 1: Four-Unit and Unit 1 Schedule

Unit	Start	Working Schedule		High Confidence Schedule		
		Finish	Duration (Months)	Contingency (Months)	Finish	Duration (Months)
Unit 1	15-Apr-25	30-Apr-30	61	6	15-Oct-30	67
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

** Units 2-4 schedules to be confirmed during the respective Unit Release Quality Estimates (Class 3), incorporating previous unit performance and lessons learned.*

An overview of the four-unit schedule for DNNP is provided in **Appendix 6: Four Unit Program Schedule**.

4. Building and operating a fleet of four SMRs at Darlington will provide a source of critical supply to help meet Ontario’s electricity demand and generate economic benefits to the province.

The current LCOE for the four-unit SMR Program is projected at [REDACTED]. Refer to **Appendix 7: Levelized Cost of Electricity and Sensitivities** and **Appendix 9: Business Case Assumptions** for more details.

The IESO has projected electricity demand in the province to grow by as much as 75% by 2050. Along with the Pickering Units 5-8 Refurbishment project, DNNP is the only viable option for nuclear generation capacity to come online by the 2030s. The four-unit project is supported by the Province and has been included by the IESO as a source of incremental baseload supply in its most recent Annual Planning Outlook. Overall, DNNP is well positioned to cost effectively help meet Ontario’s electricity demand and support grid reliability.

Building and operating a fleet of four SMRs at Darlington is expected to provide economic benefits to Ontario and expand Ontario’s nuclear supply chain and presence within the global market. The Conference Board of Canada estimates that the SMR program is expected to boost Ontario’s GDP by \$15.3 Billion (\$2019) over 65 years and is expected to sustain on average 2,000 jobs per year over the same period. With Ontario suppliers accounting for more than 80% of DNNP spending, building and operating a first-of-a-kind BWRX-300 reactor will position Ontario as a global leader in SMR technology.

5. Release Strategy

The project has established a release strategy that will further provide the Board with opportunities to review project performance, prior to allowing the program to proceed to the next phase. Funding will be sought on a unit-by-unit basis in accordance with the release strategy as depicted in **Appendix 8: Four Unit Program Release Strategy** and **Appendix 10: Release Strategy by Scope and Value**.

Management will seek the release of funds in advance of each unit’s execution period to complete unit specific planning and mobilization activities.

Table 2 below shows the details of the current request, and the cumulative release amount for the program (\$M):

Table 2: DNNP Release Strategy

Release	Total (Released)	Release (Request)	Contingency	Interest & Escalation	Total (Request)	Grand Total
5A	\$2,052M	\$3,466M	\$1,069M	\$1,632M	\$6,166M	\$8,218M

6. Financing and Regulatory Structure

Under the current rate-setting methodology, OPG will begin to recover project costs and earn revenue as the underlying assets enter service. OPG’s next rate application, for 2027-2031, is expected to include a request for the OEB’s approval of the forecasted in-service amounts of Unit 1 and common site scope as part of the four-unit program and their associated revenue requirement.

It is anticipated that a majority of the project costs will be financed using a combination of OPG’s corporate debt platform and reinvestment of operating cash flows, with additional funding provided by the federal ITCs (subject to reintroduction of federal legislation) and other potential sources. OPG continues to pursue a range of financing solutions as part of its overall corporate funding strategy in support of energy transition.

7. Indigenous Relations

OPG recognizes that it must conduct its business in a manner that is both socially and environmentally responsible. OPG's demonstration of this commitment is found within the company's Reconciliation Action Plan that provides a framework for engaging (and consulting where appropriate) with the Indigenous communities and supporting programs, committees and community initiatives that reflect its tenets and puts the philosophy into practice.

Active engagement and consultation on various aspects of the DNNP continue, including design and architecture, site preparation and site establishment, environmental monitoring and restoration, provincial and federal permitting. Waste storage and management has also been identified as a key topic and a waste table has been established to address questions and to have open dialogue with the Michi Saagig Nations on the topic. Key advancements in 2024 include:

- The Michi Saagig Nations, with OPG's support, have advanced progress on the groundwork to create an Indigenous Knowledge Study which will inform a cumulative effects study and an augmented environmental monitoring plan.
- 17 permits have been reviewed and received following engagement with the Michi Saagig Nations.
- The commercial participation table has continued to meet bi-weekly.
- A new waste table was created to discuss overarching plans for the future of OPG waste. An environment table will also begin meeting in the first quarter of 2025.
- Advancements on aquatic offsetting and terrestrial restoration planning and execution.
- Letters on Intent to create a Project Agreement and a Long-term Relationship agreement were signed between OPG and the Michi Saagig Nations.

8. Key Program Risks

The key program risks used in the current analysis are as follows:

Risk Title	Risk Description	Mitigation
First-Of-A-Kind Design	First of a kind design challenges may lead to cost overrun and schedule delay	Tiered approach that includes design analysis, second/third party assessment, qualification, mock-ups/prototype testing and commissioning tests.
Regulatory Uncertainty	First of a kind design may increase regulatory requirements from the CNSC causing schedule delay	Implement early submission of information to facilitate CNSC staff reviews and feedback. Leverage CNSC memorandum of cooperation with the Nuclear Regulatory Commission (NRC) in the United States for joint reviews on select key areas.
Indigenous Relations	Indigenous opposition may impact regulatory timelines	Consistent and proactive consultation with Indigenous Nations, including economic reconciliation opportunities.
Tariffs	Potential impact of Global US and retaliatory Canadian tariffs or other trade restrictions may lead to cost overrun and schedule delay	Contingency does not currently factor for this black swan risk. Assessment of current and future potential US suppliers in the DNNP supply chain for both Unit 1 and Units 2-4. Monitoring of any tariff implementation by the US and Canada in conjunction with the use of scenario based planning to maintain equipment / material specific impact estimates.

RECOMMENDATION / RESOLUTION

That the Board of Directors approve:

1. The SMR Unit 1 RQE Class 3 cost estimate and schedule to complete design, procurement, construction, and commissioning of Unit 1, including site scope common to the four-unit program as set out in the memorandum.
2. Transition of the Unit 1 from the validation phase to the execution phase, including a release of **\$5,755 Million** to complete the remaining Unit 1 and common site scope, and **\$411 Million** to continue to progress Units 2-4 planning, design, and procurement, bringing the total life-to-date program funding release to **\$8,218 Million**; and
3. Delegation of approval authority to the OPG President and CEO for approval of the various commercial agreements needed to support the project.

Recommended by:

**Approved for submission to the
Board of Directors by:**



Subo Sinnathamby
Chief Projects Officer



Nicolle Butcher
President and Chief Executive Officer

This Board memo was reviewed and approved for submission to the Board of Directors by the Major Projects Committee at their meeting of March 5, 2025.

APPENDICES

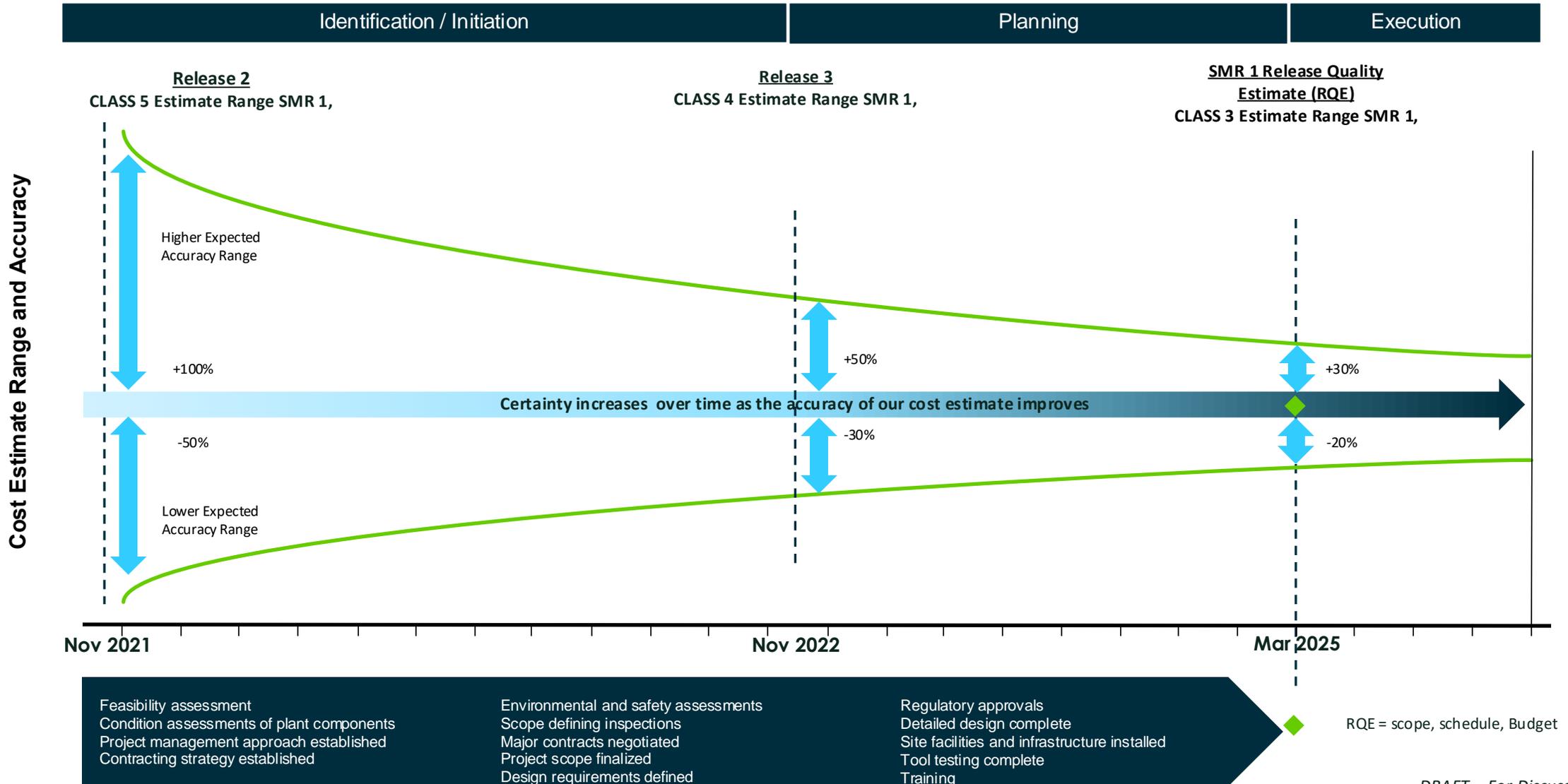
1. Unit 1 and Four Unit Program Cost by Scope
2. SMR Unit 1 Estimate Classification
3. Cost Exposure vs. Contingency
4. Overall Program Cost by Unit
5. Unit 1 Level 1 Working Schedule
6. Four Unit Program Schedule
7. Levelized Cost of Electricity and Sensitivities
8. Four Unit Program Release Strategy
9. Business Case Assumptions
10. Release Strategy by Scope and Value

Appendix 1: Unit 1 and Four Unit Program Cost by Scope

Bundles/Scope (\$ billions)		Current Estimate	
		Unit 1 (Incl Common) Class 3	Four Units Class 4
Power & Non Power Block (IPD)	Nuclear Island	1.0	█
	Conventional Island	0.9	█
	Balance of Plant	0.9	█
	Project Management	0.5	█
	Engineering	0.4	█
	Commissioning & Other Costs	0.02	█
		3.8	█
PMT & Functions (OPG)	Project Management Costs	0.3	█
	Functional Direct Support Costs	0.4	█
	Non IPD Project Costs	0.3	█
		1.0	█
Total before Contingency		4.8	█
Contingency		1.2	█
Project Sub-Total (\$2024)		6.0	█
Financial	Escalation	0.4	█
	Interest	1.2	█
		1.6	█
Grand Total		7.7	20.9

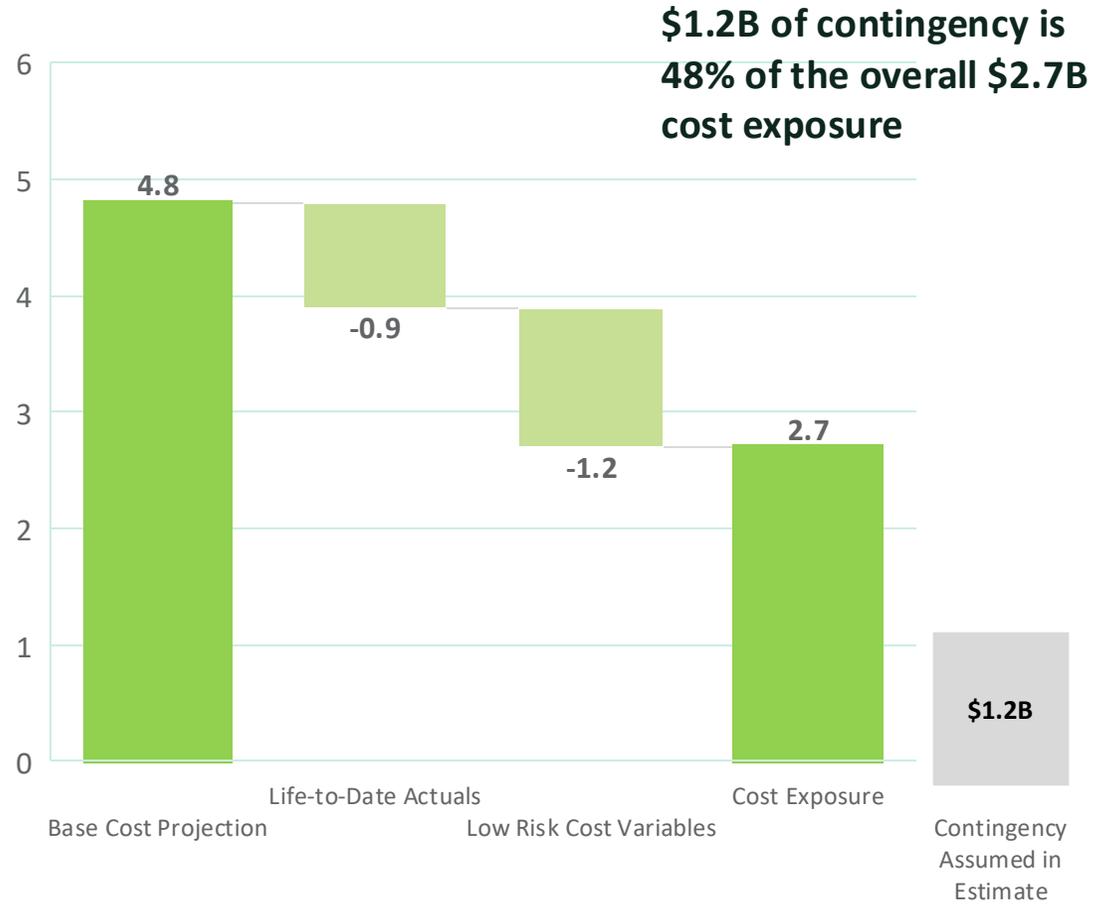
Appendix 2: SMR Unit 1 Estimate Classification

OPGs Estimate Classification is based on recommended practice by **Association for the Advancement of Cost Engineering (AACE) International**.

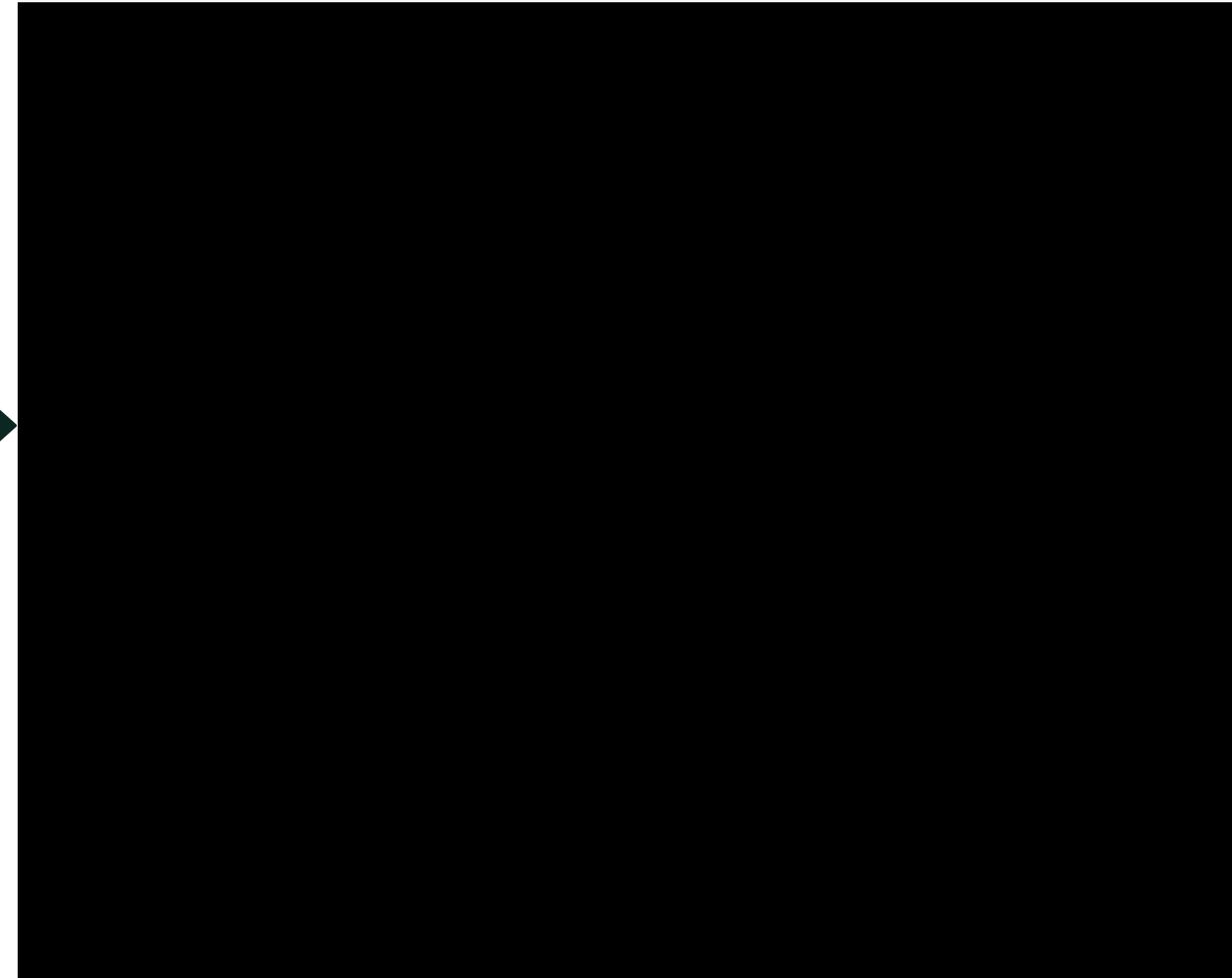


Appendix 3: Cost Exposure vs. Contingency

Comparison of Cost Exposure vs. Contingency (\$B) |
Unit 1 and Common (Class 3) ONLY

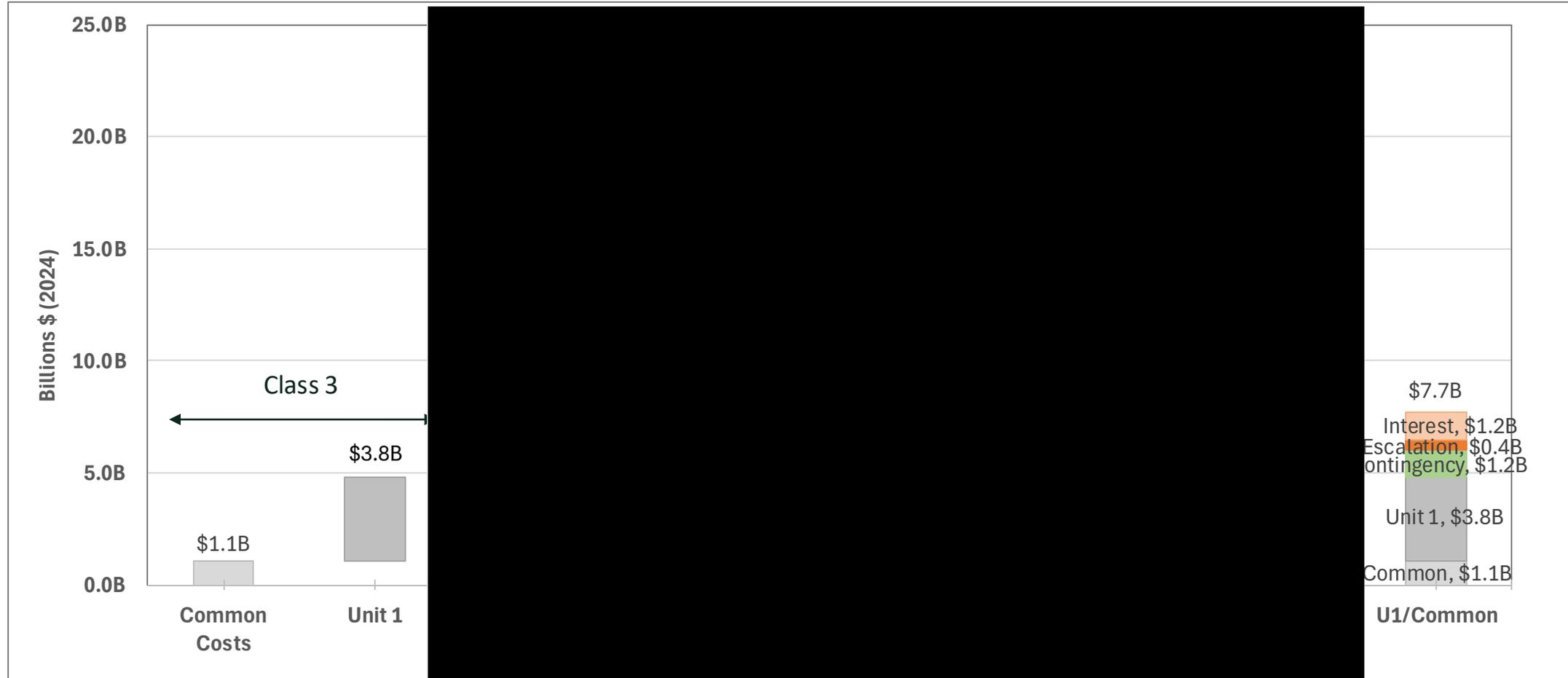


Comparison of Cost Exposure vs. Contingency (\$B) |
Unit 1 and Common (Class 3) and Unit 2-4 (Class 4)

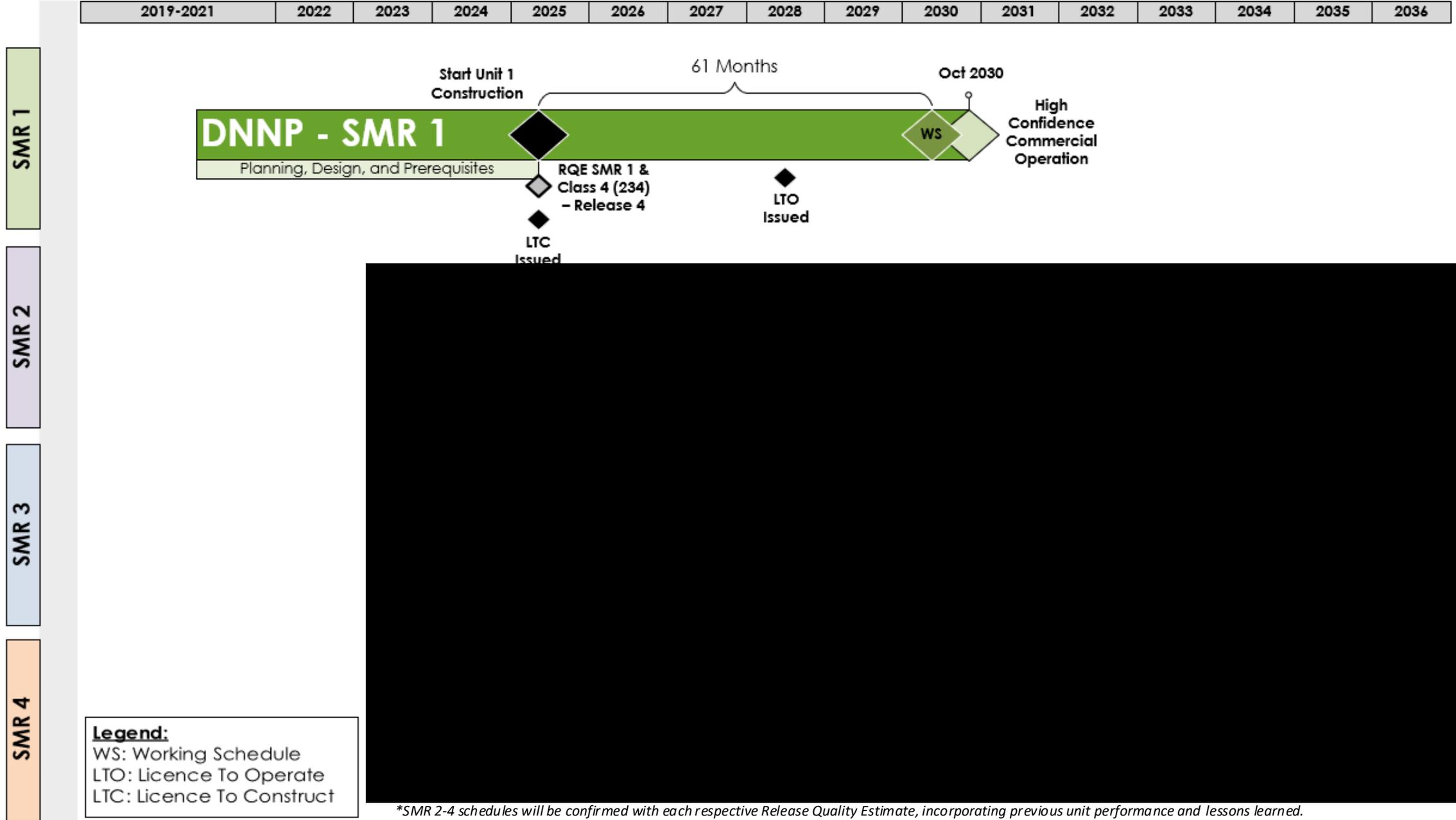


Appendix 4: Overall Program Cost by Unit

Summary of Capital Estimate (\$B) by Unit | Unit 1 and Common (Class 3), Unit 2-4 (Class 4)



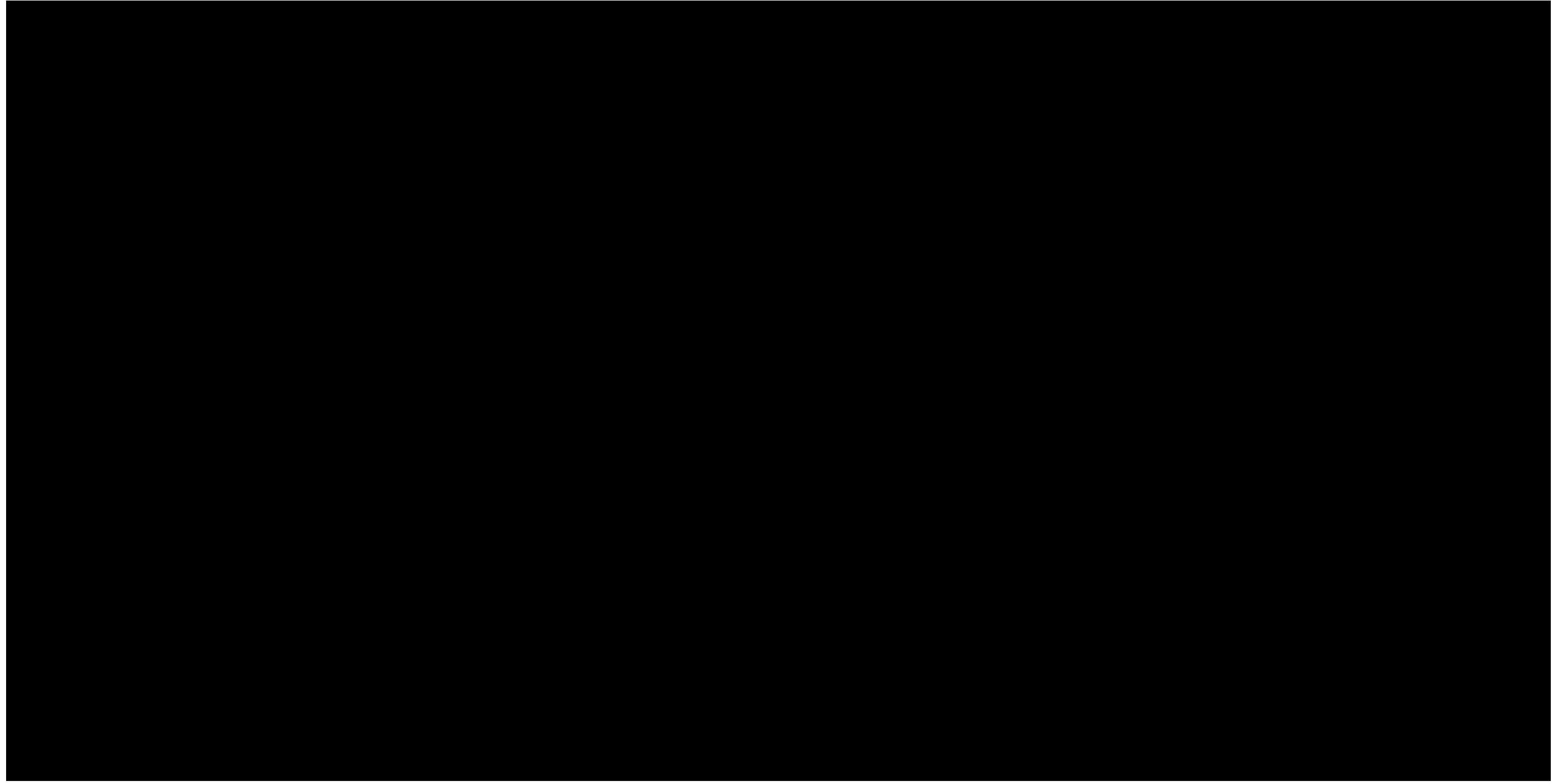
Appendix 6: Four Unit Program Schedule



Legend:
WS: Working Schedule
LTO: Licence To Operate
LTC: Licence To Construct

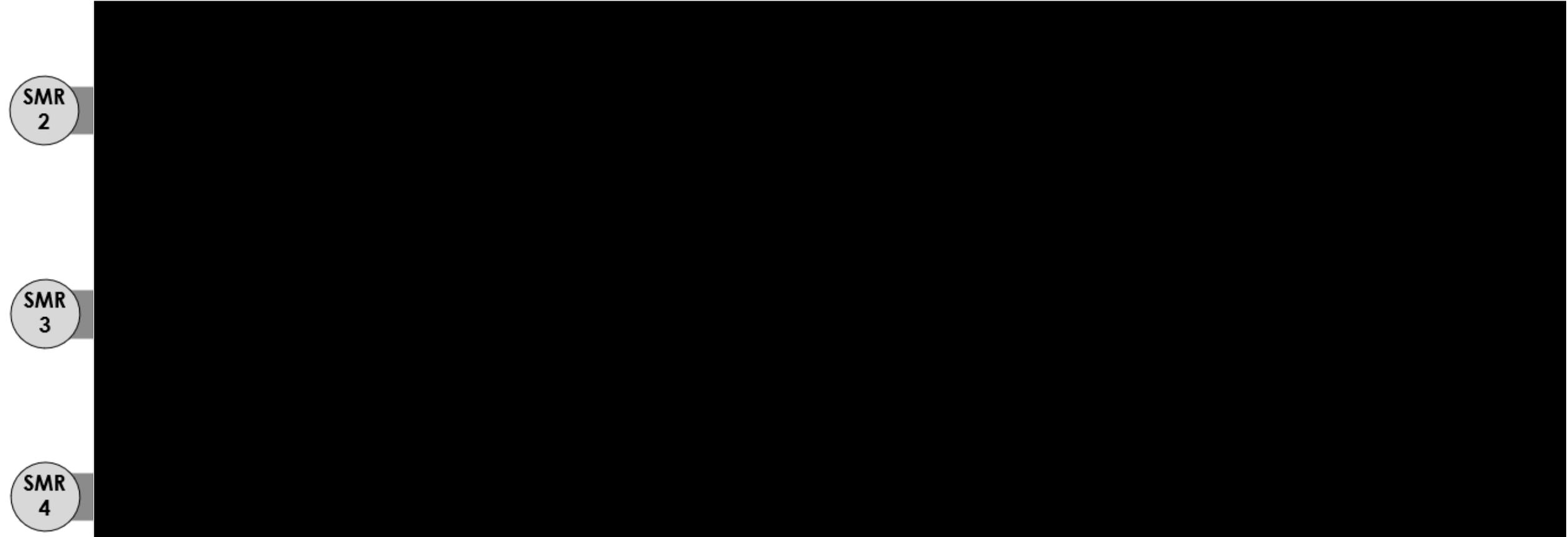
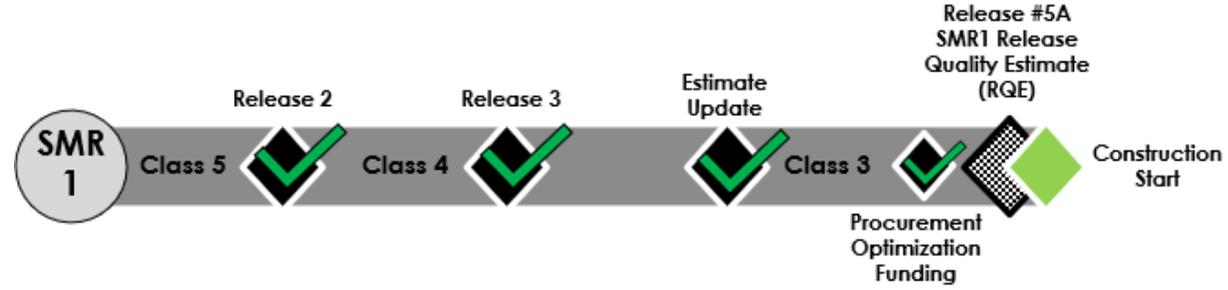
*SMR 2-4 schedules will be confirmed with each respective Release Quality Estimate, incorporating previous unit performance and lessons learned.

Appendix 7: Levelized Cost of Electricity and Sensitivities



Appendix 8: Four Unit Program Release Strategy

2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
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Appendix 9: Business Case Assumptions

Category	Assumptions		
Procurement Escalation	Materials & Equipment (uncommitted): 5.0% trending down to 4.2% by 2031 General Inflation: 2.5%		
Labour Escalation	Vendor Trades (EPSCA): <ul style="list-style-type: none"> 4.0% trending down to 2.8% by 2030 	Vendor Non-trades (ESMSA): <ul style="list-style-type: none"> 3.75% trending down to 2.50% by 2026 	OPG Labour: <ul style="list-style-type: none"> 2.75%
Interest Capitalization	<ul style="list-style-type: none"> 5% corporate debt (long-term) Existing Canada Infrastructure Bank facility for SMR 1 (\$970M) Assumed government debt funding support for Units 2-4 (~\$2B at ~4%) 		
15% Clean Electricity ITC, Other Government Funding	<ul style="list-style-type: none"> ~75% of qualifying project costs (excluding capitalized interest) eligible for ITC \$56M Future Electricity Fund funding for Units 2-4 site preparation and planning 		
Unit Output, Unit Life and Unit Capability Factor (UCF)	<ul style="list-style-type: none"> 315 MW, 60 years, ~94% UCF First unit outage at 12 months, progress to 24-month outage cycle Ramp down to 2% FLR 		
OM&A Costs (\$2024)	<ul style="list-style-type: none"> Base/Support: ~\$150M/yr (4-units); Outage: ~\$15M/unit/yr (average) 		
Sustaining Projects (\$2024)	<ul style="list-style-type: none"> ~\$300M/unit (lifecycle) 		
Fuel (\$2024)	<ul style="list-style-type: none"> ~\$30M/unit/yr (average; excl. initial fuel) 		
LCOE Discount Rate	<ul style="list-style-type: none"> 7% 		
Discrete Risks Not Included	<ul style="list-style-type: none"> No allowance for tariffs, major regulatory changes during subsequent licences or legal challenges 		



BTTC

Better Through
Total Collaboration

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Third Party Assurance Report

Governance, Process, and Procedures

30 April 2025



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1. Introduction

1.1. Report Purpose

This report provides a comprehensive account of the Third-Party Assurance (3PA) Review undertaken by BTTC in relation to the Darlington New Nuclear Project (DNNP). It sets out the scope and objectives of the assurance activities, describes the methodology employed, and presents the executive summary, key findings, detailed assessment outcomes, and associated recommendations.

1.2. BTTC Introduction

BTTC is a high-performance infrastructure consultancy built on the belief that complex projects can be delivered Better Through Total Collaboration. With deep expertise in providing independent and third-party assurance, BTTC supports public sector clients and asset owners on some of the largest capital investment programs across Canada, the UK, and Europe.

We specialize in assurance services for major capital projects delivered through progressive and collaborative contracting models, including Integrated Project Delivery (IPD), Alliance, and Progressive Design-Build.

Our in-house capabilities enable us to provide public sector organizations with a fully developed, ready-to-implement framework of independent assurance activities.

1.3. Third Party Assurance Scope

BTTC was appointed by OPG to provide 3PA services in relation to the review and assessment of the Governance, Processes and Procedures (GPP) established and implemented by OPG to develop the Release Quality Estimate (RQE) for the DNNP.

The scope of work commissioned by OPG for the Third-Party Assurance Review was structured around two primary workstreams:

- **Assurance Workstream 1 (AW1):** This workstream focuses on evaluating the governance structures, processes, and procedures (hereafter referred to as Management Plans) that OPG has implemented for the DNNP in relation to the development of the RQE. The objective of this review is to determine whether OPG has established robust and effective Management Plans for the RQE, and to assess the extent to which these plans align with industry-leading best practices.
- **Assurance Workstream 2 (AW2):** This workstream focuses on assessing the extent to which OPG and DNNP have adhered to the Governance, Processes, and Procedures (collectively referred to as the Management Plans) established for the development of the DNNP RQE. The assessment was carried out by performing a comparative analysis of DNNP output deliverables and submittals against selected key Management Plans and their corresponding requirements.

2. Assurance Workstream 1 (AW1)

The following section provides details on the methodology implemented by BTTC for Assurance Workstream 1.

2.1. Outline Review Methodology

The diagram below illustrates the seven-step methodology employed by BTTC to conduct **Assurance Workstream 1**.



(1) Identify Control Areas

Control Areas (CA) have been identified to enable BTTC to assess if key estimating and risk development activities have been set out across a broad range of management plans at both organisation and project level. Control Areas can be found in Section 2.2 of this document.

(2) Develop Assessment Criteria

BTTC has drawn upon the Association for the Advancement of Cost Engineering (AACE) Recommended Practices and internal BTTC best practice to develop a comprehensive assessment matrix for each Control Area. Each Control Area is further broken down into multiple sub-areas, with clearly defined tests and checks tailored to evaluate specific aspects of governance, process, and procedural effectiveness. The full assessment criteria for each control area can be found in Appendix B – AW1 Detailed Assessment Record and Outcomes.

(3) Map OPG Management Plans

BTTC have mapped the OPG management plans to the Control Areas. As many OPG plans overlap across control areas and sub-category checks, this has enabled BTTC to assess the effectiveness of a broad range of management plans with differing levels within the hierarchy, against predefined control area assessment criteria. Detailed mapping can be found in Appendix A of this document.

(4) Maturity Assessment

A detailed assessment was conducted across all Control Areas using the established Assessment Criteria. This involved a systematic review of all relevant Management Plans that had been mapped to each Control Area. Following this evaluation, maturity ratings were assigned to each Control Area in accordance with the maturity framework outlined in Section 2.3.

(5) Validation Period

Validation of draft findings to ensure alignment on initial assessment. In some cases, additional evidence was provided in response to questions and observations for BTTC consideration.

(6) Update Assessment & Recommendations

Update and finalize assurance findings and recommendations.

(7) AW1 Complete

Final assurance activities and report production for AW1 is completed.

2.2. Control Areas

BTTTC have identified five **Control Areas** (CA) which are fundamental to the development of a robust RQE. These Control Areas have been used to review the overall effectiveness of the management plans established by OPG. These Control Areas are:

ID	Control Area
CA1	Basis Of Estimate
CA2	Development of Cost Estimate
CA3	Cost Estimate Classification
CA4	Reviewing, Validating and Documenting the Estimate
CA5	Developing a Project Risk Management Plan

2.3. Maturity Ratings

BTTTC has developed a maturity assessment framework to ensure consistency throughout the review process and enable DNNP to prioritize efforts effectively. To support both the overall maturity assessment and facilitate the ranking of individual findings by importance, two criteria sets have been established.

Control Area Maturity Rating

The below table sets out the Four Tier approach that has been used to assess the overall maturity of the individual management plans:

Maturity Rating	Maturity Description
(4) Optimized	Leading practices have been integrated into the specific governance, processes, and procedures, fully aligning with all recommended industry best practice guidelines in a comprehensive and optimized manner.
(3) Effective	Leading practices have been incorporated into the specific governance, process, and procedural areas, comprehensively addressing all recommendations outlined in industry best practice guidelines. However, the information is less integrated compared to those rated as 'Optimized', which may increase the risk of details being overlooked.
(2) Minor Improvements Required	Leading practices have generally been adopted across the relevant governance, process, and procedural areas. However, certain aspects may not fully align with the defined criteria outlined in industry best practice guidelines. As a result, minor improvements are recommended. These gaps are not expected to significantly affect the overall quality or confidence in the RQE.
(1) Major Improvements Required	There are significant gaps in the governance, processes, and procedures established for the RQE. Key management plans are either absent, poorly designed, or incorporate ineffective practices. As a result, major improvements are necessary. These deficiencies could have a fundamental impact on both the quality and confidence in the RQE.

Individual Recommendations

Each individual recommendation will be assessed and categorized based on their significance in relation to the possible impact it has on the robustness and quality of the RQE. The below table outlines these categories:

Category	Description
(A) Critical	Items that could significantly impact the level of confidence in final RQE and should be addressed as a priority.
(B) Important	Items that will have less of an impact than Category A items on the level of confidence in final RQE. These items could still have some impact the quality of the RQE and should be considered.
(C) Minor	Items that likely will not materially impact the level of confidence in the final RQE but should still be considered to minimize the risk.

3. Assurance Workstream 2 (AW2)

The following section provides details on the methodology implemented by BTTC for Assurance Workstream 1.

3.1. Outline Review Methodology

The diagram below illustrates the six-step methodology employed by BTTC to conduct **Assurance Workstream 2**.



(1) Develop Compliance Ratings

Established the compliance ratings and associated criteria used to assess how comprehensively OPG/DNNP has met specific requirements outlined in the management plan(s). Refer to section 3.2 for Compliance Ratings.

(2) Identify Compliance Checks

Developed a compliance assessment schedule detailing the specific areas within key management plans where **Compliance Checks** would be conducted. This stage also involved identifying the relevant OPG/DNNP submittals and output documents to be assessed against the requirements of the applicable management plans.

(3) Assess & Score Compliance

For each Compliance Check the relevant DNNP submittal / project deliverable was assessed for how well it complied with the specific requirements set out in the OPG/DNNP Management Plan.

(4) Validation Period

Validation of draft findings to ensure alignment on initial assessment. In some cases, additional evidence was provided in response to questions and observations for BTTC consideration.

(5) Update Assessment & Recommendations

Update and finalize assurance findings and recommendations.

(6) AW2 Complete

Final assurance activities and report production for AW2 is completed.

3.2. Compliance Ratings

BTTC has developed a Compliance Assessment Framework to promote consistency across the review process and facilitate the clear identification of areas of strong and weak compliance. In addition to assigning compliance ratings, each recommendation is categorized based on its potential impact on the RQE.

Compliance Ratings

The below table sets out the Four Tier approach that has been used to assess the overall compliance rating for the areas reviewed as part of AW2:

Compliance Rating	Compliance Rating Description
(4) Exceeds Compliance Requirements	Of the areas reviewed, the assurance review found that DNNP not only met, but consistently exceeded the requirements established in the relevant management plans. There is a clear culture of proactive continuous improvement and innovation in the implementation of compliance measures.
(3) Full Compliance	Of the areas reviewed, the assurance review found that DNNP consistently met all requirements outlined in the relevant management plans. Controls were well-defined and actively followed, demonstrating effective implementation and oversight.
(2) Partial compliance	Of the areas reviewed, the assurance review found that DNNP met some requirements , while others were not achieved. While controls exist, adherence is inconsistent or incomplete, resulting in moderate risk to the quality and confidence of the Release Quality Estimate.
(1) Significant Non-compliance	Of the areas reviewed, the assurance review found that DNNP exhibited frequent or systemic violations of the minimum requirements set out in the management plans. These compliance gaps pose a significant risk to the quality and confidence of the Release Quality Estimate.
N/A Not Applicable	This rating is used when management plans describe a process, procedure, or requirement that cannot be verified through the compliance activities undertaken. It does not indicate a negative outcome ; it simply means that the requirement falls outside the scope of what can be assessed for compliance.

Individual Recommendations

Each individual recommendation will be assessed and categorized based on their significance in relation to the possible impact it has on the robustness and quality of the RQE. The below table outlines these categories:

Category	Description
(A) Critical	Items that could significantly impact the level of confidence in final RQE and should be addressed as a priority.
(B) Important	Items that will have less of an impact than Category A items on the level of confidence in final RQE. These items could still have some impact the quality of the RQE and should be considered.
(C) Minor	Items that likely will not materially impact the level of confidence in the final RQE but should still be considered to minimize the risk.

4. Executive Summary

The assurance review concluded that OPG and DNNP have established a suite of Effective management plans that are generally aligned with industry best practice across all Control Areas relevant to the development of the Release Quality Estimate. The review also concluded that DNNP have not only demonstrated alignment of management plans to AACE best practice but have generally implemented the requirements of the management plans fully, with only a small number of areas showing partial compliance.

Where Risk Management is concerned, DNNP have demonstrated not only alignment to AACE best practice, but execution of compliance over and above what is stated in their suite of risk Management Plans.

4.1. Assurance Workstream 1

The assurance review found that OPG and DNNP have established a strong suite of governance, processes and procedures that are generally aligned with industry-recommended practices across all Control Areas related to the development of the Release Quality Estimate.

Control Area Maturity Assessment

The 5 Control Areas were further broken down into 74 sub-elements with multiple criteria and checks undertaken in each sub-element. BTTC assessed the maturity of all 74 sub-elements and the overall maturity of each Control Area. The below table outlines the overall Maturity Rating across each entire Control Area. As demonstrated below, all Control Areas scored an overarching maturity rating of 3 (Effective), which BTTC believe to be positive for a project of this size and complexity.

ID	Control Area	Maturity Rating
CA1	Basis Of Estimate (CA1)	3
CA2	Development of Cost Estimate (CA2)	3
CA3	Cost Estimate Classification (CA3)	3
CA4	Reviewing, Validating and Documenting the Estimate (CA4)	3
CA5	Developing a Project Risk Management Plan (CA5)	3

The below table provides a view of the CA Sub-Area individual maturity ratings across each Control Area.

ID	Control Area	No. of maturity ratings			
		4	3	2	1
CA1	Basis Of Estimate (CA1)	3	16	1	0
CA2	Development of Cost Estimate (CA2)	5	21	3	0
CA3	Cost Estimate Classification (CA3)	1	2	0	0
CA4	Reviewing, Validating and Documenting the Estimate (CA4)	5	6	0	0
CA5	Developing a Project Risk Management Plan (CA5)	0	8	0	0

A summary dashboard can be found in Section 4.3 which provides a snapshot of all 74 CA Sub-Areas and their individual maturity assessment result.

Key Findings and Recommendations

The assurance review identified just **10** key recommendations for improvement across all control areas. The recommendations identified were categorized based on their possible impact to the quality and confidence of the RQE as outlined in Section 2.2 of the document. The assurance review identified **(Zero Cat A)**, **(Four Cat B)** and **(Six Cat C)** recommendations. Given the size and nature of the capital project, this outcome is considered both expected and reasonable.

Category of Recommendations	Number Raised
Category A (Critical)	0
Category B (Important)	4
Category C (Minor)	6

4.2. Assurance Workstream 2

The compliance checks conducted across the selected areas indicate that OPG and DNNP have generally adhered to the governance frameworks, processes, and procedures under review. In some cases, the requirements were not fully complied with, while in others, OPG exceeded the expected standards. For the small number of requirements where full compliance was not achieved, it was typically found that OPG had implemented alternative controls and governance processes. Although these differed from the prescribed requirements, they still demonstrated strong control environments.

Compliance Ratings

The 3 Plans were further broken down into 42 Sub-Areas, with BTTC assessing on whether they complied with the requirements outlined in the relevant management plans. The below table provides a view of the overall compliance ratings across each Plan.

Compliance ratings across each Plan.

Plan	No. of compliance ratings				
	4	3	2	1	N/A
Estimate Plan (DA1-IPD-NN-NN-TPLN-CE-0001)	2	21	4	0	6
Project Risk Management (OPG-MAN-00120-0015-005)	1	4	0	0	0
Functional Plan - Project Controls (DA1-IPD-NN-NN-TPLN-PM-0004)	1	3	0	0	0

A summary dashboard can be found in Section 4.4 which provides a snapshot of all 42 Compliance Ratings Sub-Areas and their individual rating.

Key Findings and Recommendations

The assurance review identified just **4** key recommendations for improvement across all control areas. The recommendations identified were categorized based on their possible impact to the quality and confidence of the RQE as outlined in Section 2.2 of the document. The assurance review identified **(Zero Cat A)**, **(Three Cat B)** and **(One Cat C)** recommendations. Given the size and nature of the capital project, this outcome is considered positive.

Category of Recommendations	Number Raised
Category A (Critical)	0
Category B (Important)	3
Category C (Minor)	1

Third Party Assurance Report

4.4. AW2 Compliance Assessment Dashboard

An overview of the Compliance Rating results for all 42 Sub-Areas assessed is provided in the below summary dashboard. Detailed review findings, evidence and ratings for each sub-area outlined below can be found in Appendix C of this report.

Estimate Plan (DA1-IPD-NN-NN-TPLN-CE-0001)		Project Risk Management (OPG-MAN-00120-0015-005)		Functional Plan - Project Controls (DA1-IPD-NN-NN-TPLN-PM-0004 DNNP)	
2.1 Coding Structure	3	2.2 Identify Risks	4	6.1 Plan Risk Management	3
2.2 Cost Estimate Approach	3	2.2 Identify Risks	3	6.3 Risk Assessment	3
2.3 Quantity Development	3	2.3 Perform Qualitative Risk Analysis	3	6.3 Risk Assessment	4
2.4 Equipment, Bulk Material, and Subcontract Pricing	N/A	2.4 Perform Quantitative Risk Analysis	3	6.4 Risk Monitoring and Control	3
2.5 Equipment and Bulk Material Pricing	2	2.5 Plan and Implement Risk Responses	3		
2.6 Subcontract Pricing	3				
2.7 Offsite Fabrication	3				
2.8 Offsite Module Assembly	3				
2.9 Freight	2				
2.1 Direct Labour Hours, Wage Rates and Productivity	N/A				
2.11 Direct Labor Hours	3				
2.12 Construction Labour Wage Rates	2				
2.13 Construction Work Week and Overtime	3				
2.14 Construction Labour Productivity	3				
2.15 Indirect Labor Hours	3				
2.16 Indirect Material	3				
2.17 Indirect Construction Equipment	3				
2.18 Construction Indirect Cost and Construction Management	3				
2.19 Engineering and Project Management Cost Estimate	3				
2.2 Home Office Services and Engineering Support	3				
2.21 Field Services	3				
2.22 Commissioning and Start-up Costs	3				
2.23 Other Costs	3				
3 Roles and Responsibilities	N/A				
3.1 Executive Board	N/A				
3.2 Project Leadership Team (PLT)	N/A				
3.3 Project Management Team (PMT)	N/A				
4 Resources and Tools	3				
5 Communication and Co-ordination	3				
5.1 Estimate Reporting	3				
5.2 Estimate Assumptions	4				
5.3 Exclusions	4				
6 Estimate Reviews	2				

5. Key Recommendations

5.1. Assurance Workstream 1

The below table captures the key recommendations proposed by the Third-Party Assurance team across each of the five control areas. Each recommendation has been assigned a category (A-C) based on the possible impact the finding / observation could have on the robustness and confidence in the RQE.

Control Area	ID	Finding / Observation	Recommendation	Benefit / Impact	Category (A-C)
Basis Of Estimate (CA1)	CA1.1	Allowances: EST-DTG-001 Estimating Desk Top Guide Section 6, BOE-TMP- 012 BoE Template for OPG Use and NK054-PLAN-01210-00108 DNNP Estimate Plan (JUNE 2023) identify the potential addition of Allowances into an estimate both described as “normal estimating allowances”	AACE (34R-05 ‘Basis of Estimate’ and 36R-08 ‘Development of Estimate Plans’) is more detailed in its requirement and that any Allowances are identified and the levels and type used. AACE goes on to describe the common estimating allowances such as takeoff allowances, wastage, unmeasured items, overbuy, working height, site constraints, rework etc. - The Plans would benefit to being more prescriptive on what is deemed to be included in ‘normal estimating’ allowances.	This is a clarity and completeness area for the overarching OPG plans and procedures/manuals. Amplification on what constitutes ‘normal estimating’ allowances will prevent subjective views on estimating allowance parameters by different estimating teams and promote a consistent approach.	C
Development of Cost Estimate (CA2)	CA2.1	Estimating Kick Off: AACE treat the Estimate Kick Off meeting as a standalone requirement. OPG-MAN-00120-0019 Project Phase Gate Management- Pre Gate Project planning Kick Off Meetings are required as part of the Phase gate management process. DA1-IPD-NN-NN-TPLN-CE-0001 Estimate Plan Section 5 develop a road map for the development of the program cost estimate progression.	AACE 36R-08 ‘Development of Estimate Plans’ requires a discreet and defined hold point for Estimate Kick off Meeting prior to commencement of the activity to communicate goals, objectives and cost strategy. It is noted that an estimate Kick Off Meeting did occur for the DNNP, however the requirement to hold the meeting is unclear within the documents provided and therefore consistency in approach cannot be guaranteed. It is recommended that relevant management plans clearly indicate the requirement to hold an estimate Kick Off meeting at a specified point.	A separate estimate Kick Off Meeting will enable the appropriate team members to attend and ensure that sufficient time is available to communicate goals, objectives and cost strategy without being clouded by general project phase gate issues.	C
	CA2.2	Process Equipment: – AACE contains a detailed requirement that the estimated value of expected equipment should be based on budgetary / firm quotes, in-house pricing or another stated basis. Where quotes have been obtained, a summary of the bidding process should be provided including details on the minimum number of bidders and how bids are to be normalized for evaluation. EST-DTG-001 Estimating Desk Top Guide Section 6.4 requires the Estimator to capture the cost of long lead materials as well as non-long lead materials. NK054-PLAN-01210-00108 and DA1-IPD-NN-NN-TPLN-CE-0001 requires the equipment to be listed, however none of the plans and procedures request bidding information and details of the procurement process.	The AACE guideline 36R-08 ‘Development of Estimate Plans’ is prescriptive on the requirement for a summary of the bidding process used to obtain market pricing. OPG and DNNP Estimate plan requirements are generic and therefore subject to estimating judgement. On a nuclear project, safety case analysis, equipment validation and qualification requirement criteria greatly affect the cost accuracy of the bids received and should be well documented. It is recommended that a summary of budgetary / firm cost information obtained from the market and used in the estimate is included as part of the estimate substantiation. The Scalable Project Delivery Criteria could have an added level of detail for information on required number of bidders, bid analysis and review depending on the size and complexity of the project.	Ensuring the procurement process is well planned and documented is essential in ensuring that the estimate pricing is based on the latest information and any gaps, or budgetary pricing can be identified. Analysis of received bids can assess the level of competition encountered in obtaining rates and prices from the marketplace and also the amount of normalisation necessary to compare bids which can be an indicator of scope certainty. The aforementioned points will aid in evaluating the accuracy of the estimates	B
	CA2.3	<i>Note: This recommendation is similar to Recommendation CA1.1, but it pertains to the development of a cost estimate rather than the basis of a cost estimate.</i> Allowances: EST-DTG-001 Estimating Desk Top Guide Section 6, BOE-TMP- 012 BoE Template for OPG Use and NK054-PLAN-01210-00108 DNNP Estimate Plan (JUNE 2023) identify the potential addition of Allowances into an estimate both described as “normal estimating allowances”	<i>Note: This recommendation is similar to Recommendation CA1.1, but it pertains to the development of a cost estimate rather than the basis of a cost estimate.</i> AACE (34R-05 ‘Basis of Estimate’ and 36R-08 ‘Development of Estimate Plans’) is more detailed in its requirement and that any Allowances are identified and the levels and type used. AACE goes on to describe the common estimating allowances such as takeoff allowances, wastage, unmeasured items, overbuy, working height, site constraints, rework etc. - The Plans would benefit to being more prescriptive on what is deemed to be included in ‘normal estimating’ allowances.	This is a clarity and completeness area for the overarching OPG plans and procedures/manuals. Amplification on what constitutes ‘normal estimating’ allowances will prevent subjective views on estimating allowance parameters by different estimating teams and promote a consistent approach.	C
	CA2.4	Risk Analysis and Contingency: Requires the estimate to identify the method of risk analysis and contingency determination including software to be used. A	Recommend NK054-PLAN-01210-00108 DNNP Estimate Plan and DA1-IDP-NN-NN-TPLN-CE-00001 DNNP Estimate Plan be updated to include specific references to OPG-MAN-00120-0015-005 Project Risk	While there are plans and procedures for managing risk and contingency, they aren't detailed or referenced in the Developing the Basis of Estimate section. The estimate plans	B

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		summary of the risk analysis results should be included in a separate section of the basis of estimate with a cost risk profile chart OPG-MAN-00120-0015-005 Project Risk management Sections 2.4.1 and 2.4.2 describe the methodology to be used depending on the project level, Monte Carlo (A and B) and EMV (C). and state the type of risks that will be included in the QRA, Section 3.0 outline types of contingency assessment that can be used on the project, but it is not specific on what will be used on the project. OPG-MAN-00120-0012 - Project Estimating management lists risk register as an input (App A item 3)	management and OPG-MAN-00120-0012 Estimating Manuals. Estimate plans should inform where the risk information and contingency is held, how it's been treated, and its relationship to the main estimate.	offer limited information on risk and contingency. It's important to consider how the development of the estimate will influence risk and contingency, as it helps address any missing information or assumptions needed to fill design gaps.	
Cost Estimate Classification (CA3)	CA3.1	General Process: OPG-MAN-00120-0012 Project Estimating Section 2 and EST-DTG-001 Estimating Desk top guide Section 4. Both documents refer to AACE RP 18R-97 'Cost Estimate Classification for the Process Industry'.	These documents should be updated to incorporate AACE 115R-21 specifically for the Nuclear Industries as expected accuracy ranges differ and contains a more detailed estimate input checklist and maturity matrix. Further, OPG plans and procedures should reference the following AACE RP's where appropriate: <ul style="list-style-type: none"> • 56R-08 Cost Estimate Classification - Building and General Construction for OPG Non-Nuclear (Normal Civils) • 18R-97 Cost Estimate Classification - EPC / Process for OPG Non-Nuclear Complex Projects 	AACE RP's ensures consistency in approach and that engineering deliverables stated within the RP's are in line with those likely to be encountered for the project at hand. Measures which flow from the engineering inputs such as estimating accuracy and range of outcomes will attract a higher level of confidence than would otherwise be the case.	B
	CA3.2	Assessment Team and Documenting the Cost Estimate Classification Process – AACE RP 115R-21 is not specific as to who should review and assess the classification of the estimate.	The OPG plans and procedures satisfy the AACE requirements as written. To further improve, OPG plans could require the involvement (and sign off) of a mix of senior project team members including the estimators, risk, PM and technical/engineering staff to review and assess completeness and maturity of the cost estimate.	Formal review and sign off prepares the estimate for future audit and potentially for any challenges arising from a Nuclear Governance requirement.	C
Reviewing, Validating and Documenting the Estimate (CA4)	N/A	No key recommendations identified.			
Developing a Project Risk Management Plan (CA5)	CA5.1	General Process: All risk management documents.	While overall, OPG risk management is of a good standard, to improve this suite of documents to a level of best practice, it is recommended that the team make references clear in the Risk Management Plan (RMP) to other documents such as the basis of estimate that contain important information.	This would improve the clarity of the overarching process and allow the demonstration of guidance in practice.	C
	CA5.2	Quantitative Risk Assessment: Define escalation, including the types of risks and how budget values are derived. DA1-IPD-NN-NN-TPLN-PM-0004 DNNP Functional Plan Project Controls: Section 6.1 describes that budget values will be derived using the project schedule and estimate values.	This requirement is partially covered in the project controls plan, however, cost escalation on contingency is not clearly described across the suite of documents provided. It is recommended to make it clear how escalation is dealt with.	It is important that the project team, namely the risk and estimating teams, understand how escalation will be managed concerning risk. This will avoid under or over estimation of risk impacts on the project.	B
	CA5.3	Qualitative Risk Assessment: Describe the risk matrix used to assess the probability and impact/consequence of risks. DA1-IPD-NN-NN-TPLN-PM-0004 DNNP Functional Plan Project Controls: Section 6.3 describes the risk matrix used for the assessment of impact/consequence.	Appendix A of OPG-MAN-00120-0015-005 Project Risk Management could include some information on how the risk matrix will be used in practice. It would also be beneficial to provide the evidence of what this scale is based on.	For the understanding of the project team, it would be helpful to be clear in how to use the risk matrix in practice; additionally, it would be beneficial to provide the traceability of the scoring mechanism for future reference.	C

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5.2. Assurance Workstream 2

The below table captures the key recommendations proposed by the Third-Party Assurance team for Assurance Workstream 2. Each recommendation has been assigned a category (A-C) based on the possible impact the finding / observation could have on the robustness and confidence in the RQE.

DNNP Management Plan	ID	Finding / Observation	Recommendation	Benefit / Impact	Category (A-C)
DNNP Estimate Plan	AW2.1	<p>DA1-IPD-NN-NN-TPLN-CE-0001 Estimate Plan Section 2.5 requires the source pricing will be identified, including supplier quotes, database pricing etc.</p> <ol style="list-style-type: none"> 1. Equipment 2. Piping, speciality piping, cable, cable tray conduit 3. Structural steel, rebar, plate etc. 4. Control system components (control valves, I/O, transmitters, gauges etc.) <p>The BOE/RQE does not detail/record what materials are the subject of supplier quotations and to what level (budget, firm, historical data etc.) - the RQE estimate does provide embedded information however it is limited in the flat extract of the estimate used in this study. A Summary table detailing information such as supplier name, firm quote/budget/database/number of bidders/sole source etc. would have been expected in the BOE.</p> <p>We have also been issued (29/04/25) with 3 summary files for equipment which record the maturity of the pricing/quotation but has limited vendor/supplier information, number of bidders, RFQ status etc. The vendor status description differs between DNNP partner information.</p> <p>As of 30/04/25 we have not received any information on Bulk materials</p>	<p>Equipment and bulk materials summary tables should be attachments to the BOE document. This would formally record and capture all the detailed requirements of the estimate plan, and the information used for pricing within the RQE.</p> <p>Recording and capturing this exact data within the BOE will allow greater audit and traceability of cost information contained within the RQE.</p> <p>Whilst reviewing work stream 2 with the DNNP team it is evident that a substantial amount of the information required by the DNNP estimate plan is available, however it is not centrally stored within a designated Class 3 records folder and has been difficult to retrieve easily and quickly.</p>	<p>Auditability and traceability of key pricing information.</p> <p>Ease of finding key information used within the class 3 estimate.</p> <p>Detailed records of vendors, number of bidders, quotes received, quotes status is important information as it captures the level of maturity, missing information, plug numbers etc for reporting movements from the estimate as pricing becomes firmer.</p> <p>Further, recording the source of cost information is an activity that is used when assessing the accuracy of cost data and facilitates the appropriate inclusion of design development and estimating uncertainty allowances.</p>	B
DNNP Estimate Plan	AW2.2	<p>DA1-IPD-NN-NN-TPLN-CE-0001 Estimate Plan Section 2.9 Freight</p> <p>Freight is generally included with material and equipment pricing. Separate shipments will be included as required. Special Loads will be identified and included as required.</p> <p>There is limited information captured within the BOE document and RQE estimate to identify what has been included in respect of freight.</p> <p>Our assessment of "Special loads" meaning within the estimate plan would be for the very large, specialist equipment and high value bulk materials. Also, due to size of the project many bulk materials will require a high number of separate shipments.</p>	<p>It is recommended that handling, shipping, transportation and storage of large equipment / modules warrants being captured in detail, with freight provisions further detailed and recorded by the project as a separate item within the RQE.</p> <p>Further, Incoterm requirements including duties/import tax, shipping options (factory to site, factory to port, port to site etc., and by which partner/vendor etc.), roles and responsibilities and transportation methods should all be detailed in the estimate reflecting the associated high cost and risk.</p>	<p>Detailing freight provisions separately allows auditability and traceability of included/excluded ownership, responsibility and cost provisions. It allows analysis of the full logistics trail for equipment and records the responsible party and facilitates accurate tracking and reporting the cost for the logistics and freight.</p> <p>For this type of project with its complexity and scale, freight will be a large cost outlay which covers a wide range of logistical operations under one heading. Therefore, separately recording in detail exactly what is covered by vendor quotes/prices will allow the full logistics process to be appropriately priced reflecting multiple part inputs during equipment/materials transportation to the site.</p>	B
DNNP Estimate Plan	AW2.3	<p>DA1-IPD-NN-NN-TPLN-CE-0001 Estimate Plan Section 2.12 requires the labour wage rates be based on craft mix and crew compositions.</p>	<p>Recommend assessment of craft mix and crew composition to ensure an appropriate blended hourly rate. For example, tray, trunking, conduit, hangers, de-scaling pipe and preparation, bevelling, cutting etc. would</p>	<p>Inclusion of craft and crew mix assessment embedded into the estimate file/software will improve accuracy of labour cost/trade and removes the requirement for a manual adjustment.</p>	B

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		<p>The BOE does detail shift, rate source, productivity factors.</p> <p>We also recognise the BOE details the factor uplift for non-working foreman (FM and GM) which covers the element not included in the hourly rate, and the labour factors for productivity/complexity factors used to uplift the man hours. These are added within Hard Dollar and not visible on the RQE flat extract.</p> <p>The BOE has no section on crew mix and crew composition detailed.</p> <p>From our assessment of the RQE labour rates on Mechanical and Electrical sections have no crew mix and composition adjustment. These rates are based 100% of Journeyman level.</p>	<p>not be undertaken solely by Journeyman labour and would use a higher percentage of apprentices and general labour for these types of works.</p> <p>This hourly rate should be calculated and used directly against the labour hours embedded into the estimate workbook/software and detailed within the BOE document.</p> <p>Note: It is recognised that within the RQE (CBS 29 - Below the line adjustment) there are items for "adjusting labour cost for Apprentice composition".</p>	<p>Including a craft and crew mix assessment allows tracking of estimated crew composition to actual as work progresses for reporting and tracking, records union requirements for Apprenticeship levels and is generally considered to be estimating good practice.</p>	
DNNP Estimate Plan	AW2.4	<p>DA1-IPD-NN-TPLN-CE-0001 Section 6.0 'Estimate Reviews' details a 5 step Estimate Review process including an Estimate Walk Through, Project Scope and Technical review, Contract Compliance review, and Estimate Team review and a Project Team Reasonability Review.</p> <p>Although a substantial and comprehensive estimate review process has been described in the Basis of Estimate and other associated documents, it is evident that the review process does not align with that stated in the Estimate Plan (as described above).</p> <p>The reviews undertaken as described in the RQE Roadmap and records of the Cost Challenge meetings are generally in alignment with the requirements of the Estimate Plan although there is a difference in activity terminology.</p> <p>Evidence was not received however for undertaking a Contract Compliance review as required by the Estimate Plan albeit it was noted that this may have been undertaken by the Commercial PMT as part of their review process.</p>	<p>The review process undertaken and described in the Basis of Estimate documents, (in addition to records of the Cost Challenge meetings), demonstrate a process which is appropriate for the scale and complexity of the project being delivered. The review process is not however in full alignment with that detailed in the Estimate Plan.</p> <p>It is recommended that the review process in the Estimate Plan be updated to reflect the project.</p>	<p>The Estimate Review process should be scaled to the size and complexity of the project and the resultant process be included in the Estimate Plan itself. This enables the RQE Roadmap to flow directly from the Estimate Plan and provides appropriate time and resource to be scheduled in good time for the estimate reviews to take place.</p> <p>Challenges to the proposed Estimate Review process can also be raised and changes implemented if considered necessary in advance of finalising the RQE Roadmap.</p>	C

6. Appendix A – AW1 Control Area and Document Mapping

The below table outlines the OPG and DNNP management plans that BTTC assessed across the 5 Control Areas for Assurance Workstream 1.

Control Area (CA)	Basis Of Estimate (CA1)	Development of Cost Estimate (CA2)	Cost Estimate Classification (CA3)	Reviewing, Validating and Documenting the Estimate (CA4)	Developing a Project Risk Management Plan (CA5)
AACE Primary Recommended Practice	34R-05	36R-08	115R-21	31R-03	72R-12
OPG Management Plans	OPG-MAN-00120-0012 PROJECT ESTIMATING	OPG-MAN-00120-0012 PROJECT ESTIMATING	OPG-MAN-00120-0012 PROJECT ESTIMATING	OPG-MAN-00120-0012 PROJECT ESTIMATING	OPG-MAN-00120-0015 PROJECT RISK MANAGEMENT
	OPG-MAN-00120-0011 PROJECT SCOPE MANAGEMENT	OPG-MAN-00120-0013 PROJECT COST MANAGEMENT	EST-DTG-001 ESTIMATING DESKTOP GUIDE	EST-DTG-001 ESTIMATING DESKTOP GUIDE	COST-DTG-003 CONTINGENCY MANAGEMENT
	AN-00120-0010 PROJECT INTEGRATION MANAGEMENT	SCALABLE PROJECT DELIVERY MODEL	SCALABLE PROJECT DELIVERY MODEL	OPG-MAN-00120-0019 PROJECT PHASE GATE MANAGEMENT	ACTIVATING RISK THREAT CHECKLIST
	BOE-TMP- 012 BOE TEMPLATE FOR OPG USE	OPG-MAN-00120-0019 PROJECT PHASE GATE MANAGEMENT	NK054-PLAN-01210-00100-00015 DNNP (PROJECT CONTROLS) PROGRAM MANAGEMENT PLAN	OPG-MAN-00120-0010 PROJECT INTEGRATION MANAGEMENT	FOAK-FIAW Job Aid REV4 Oct8
	OPG-MAN-00120-0013 PROJECT COST MANAGEMENT	BOE-TMP- 012 BOE TEMPLATE FOR OPG USE	NK054-PLAN-01210-00108 DNNP ESTIMATE PLAN (JUNE 2023)	BOE-TMP- 012 BOE TEMPLATE FOR OPG USE	COR-PROC-OPG-PROC-0094 ENTERPRISE RISK MANAGEMENT REPORTING
	EST-DTG-001 ESTIMATING DESKTOP GUIDE	EST-DTG-001 ESTIMATING DESKTOP GUIDE		OPG-MAN-00120-0017 PROJECT COMMS AND STAKEHOLDER MANAGEMENT	DA1-IPD-NN-NN-TPLN-PM-0004 DNNP FUNCTIONAL PROJECTS CONTROL PLAN (PCP)
	OPG-MAN-00120-0015 PROJECT RISK MANAGEMENT	OPG-MAN-00120-0011 PROJECT SCOPE MANAGEMENT		OPG-MAN-00120-0015 PROJECT RISK MANAGEMENT	DNNP ROC Presentation Apr30 2025
	OPG-REF-00120-0976041 ACTIVATING RISK THREAT CHECKLIST	OPG-MAN-00120-0010 PROJECT INTEGRATION MANAGEMENT		NK054-PLAN-01210-00100-0004 DNNP PROJECT ENGINEERING PROGRAM MANAGEMENT PLAN	DA1-IPD-NN-NN-TPLN-PM-0004 DNNP ROC and SUB TOR
	COST-DTG-003 CONTINGENCY MANAGEMENT	OPG-MAN-00120-0015 PROJECT RISK MANAGEMENT		DA1-IPD-NN-NN-TPLN-PM-0004 DNNP FUNCTIONAL PROJECTS CONTROL PLAN (PCP)	DNNP - Risk Register Template
	NK054-PLAN-01210-00108 DNNP ESTIMATE PLAN (JUNE 2023)	DAI-IDP-NN-NN-TPLN-CE-0001 DNNP ESTIMATE PLAN		DAI-IDP-NN-NN-TPLN-CE-0001 DNNP ESTIMATE PLAN	
	DAI-IDP-NN-NN-TPLN-CE-0001 DNNP ESTIMATE PLAN	NK054-PLAN-01210-00100-00015 DNNP (PROJECT CONTROLS) PROGRAM MANAGEMENT PLAN		NK054-PLAN-01210-00100-00015 DNNP (PROJECT CONTROLS) PROGRAM MANAGEMENT PLAN	
		NK054-PLAN-01210-00108 DNNP ESTIMATE PLAN (JUNE 2023)			

7. Appendix B – AW1 Detailed Assessment Record and Outcomes

7.1. CA1 – Basis of Estimate

Recommended Practice AACE 34R-05	Control Area Maturity Rating	3
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CA Sub-Area	Control Area Requirements / Content	OPG Management Plans	Assessment of Alignment with CA Sub-Area Requirements	Maturity Rating
<i>Details the sub-areas assessed for each control area.</i>	<i>Outline high-level content and information in accordance with Recommended Practices.</i>	<i>Reference Management Plans (s) used within the assessment of each CA Sub-Area</i>	<i>Document evidence demonstrating alignment with requirements, including specific management plan references. Identify any gaps, concerns, or issues, and provide corresponding recommendations.</i>	<i>See Section 2.3 for Maturity Rating definitions.</i>
Inputs to the BOE	Scope of the estimate. Methodologies used to develop the estimate. Sources and quality of supporting data. All inputs to the estimate. All required outputs. Any areas of uncertainty within the estimate including significant risks.	OPG-MAN-00120-0012 Project Estimating OPG-MAN-00120-0011 Project Scope Management NK054-PLAN-01210-00108 DNNP ESTIMATE PLAN (JUNE 2023)	OPG-MAN-00120-0012 - Project Estimate Document states that inputs to the estimate define estimate class - in Appendix A Estimate Input Checklist and Maturity Matrix it states the docs required for each class of estimate. OPG-MAN-00120-0012 - scope requirements are acknowledged. OPG-MAN-00120-0012 - Project Estimate doc suggests there's an understanding that the stated inputs are required for the BOE, which are: Project scope, strategy, risk, phases, schedule, WBS, shift, walk-down, assumptions, long-lead MRs/POs, work packages. Engineering: EWRRs, conceptual/design reports, modifications, changes, studies, budgets, specs, drawings, equipment list, BoM, spares, and all-discipline drawings. OPG-MAN-00120-0012 - states that all estimates should include a BOE 3.2.1. OPG-MAN-00120-0012 - BOE should consider the level of project definition, project cost, type of project, WBS, contracting strategy. OPG-MAN-00120-0012 - BOE parallel with the estimate to ensure that any changes in assumption, exclusions or exceptions are captured. OPG-MAN-00120-0012 - ensure that the estimate package (including the estimate calculations, BOE or notes and assumptions, and all relevant supporting documents) are recorded within the project working files. OPG-MAN-00120-0011 - Document provides thorough process for establishing and documenting the scope of work, very detailed within this plan under Section 3 Scope requirement, Section 4 Estimate Process, Section 5 Estimate development.	4

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<p>Estimate Basis Format and Content</p>	<p>Project Purpose – Describe the project, including type, capacity, location, and timing. Identify the estimate's purpose (e.g., approval, cost control update, project control, resource planning).</p> <p>Project and Estimate Objectives – Define alignment with cost, schedule, pricing, and risk strategies.</p> <p>Project Scope Description – Clearly outline included and excluded components, structured by work breakdown elements.</p> <p>Project Execution Plan Summary - Define execution assumptions, including labor, procurement, fabrication, and modularization strategies.</p> <p>Project Execution Plan Summary - Align cost and schedule assumptions., Project Execution Plan Summary - Identify schedule events impacting costs (e.g., outages, weather, planned downtime).</p> <p>Construction, Fabrication, and Operating Parameters - noting of assumptions, AACE classification with justification/reasoning.</p>	<p>OPG-MAN-00120-0010 Project Integration Management</p> <p>OPG-MAN-00120-0011 Project Scope Management</p> <p>OPG-MAN-00120-0012 Project Estimating BOE-TMP- 012 BoE Template for OPG Use</p> <p>OPG-MAN-00120-0013 Project Cost Management</p> <p>NK054-PLAN-01210-00108 DNNP ESTIMATE PLAN (JUNE 2023)</p> <p>DA1-IPD-NN-NN-TPLN-CE-0001 Estimate Plan</p>	<p>OPG-MAN-00120-0010 - requirement for early-stage classification and providing justification.</p> <p>OPG-MAN-00120-0011 - process for making / agreeing scope changes and applying these to relevant documents including the BOE.</p> <p>OPG-MAN-00120-0011 - Document provides thorough process for establishing and documenting the scope of work.</p> <p>OPG-MAN-00120-0012 - BOE parallel with the estimate to ensure that any changes in assumption, exclusions or exceptions are captured.</p> <p>BOE-TMP- 012 BOE Template for OPG Use - Covers OPG execution plan in 5.5.1 - covers methodology strategies around fabrication, demo, install, mock up etc.</p> <p>OPG-MAN-00120-0012 - scope requirements are acknowledged, OPG-MAN-00120-0012 - Classification.</p> <p>OPG-MAN-00120-0012 - Project Estimate Document discusses the requirements for the estimate to align to schedule which will result in it being cost loaded.</p> <p>OPG-MAN-00120-0013 - requirement for cost estimates should be time-phased by month and in alignment with the supporting schedule.</p> <p>NK0054-Plan-01210-00108 section 4.2 "the estimating team will have to meet the requirements of the Estimate Deliverable Maturity Matrix as outlined for DNNP based on AACE RP 115R-21".</p> <p>DA1-IDP-NN-NN-TPLN-CE-0001 is a well written plan and captures all requirements of AACE succinctly - and explains process to be followed.</p>	<p style="text-align: center;">4</p>
<p>Methodology</p>	<p>Identify primary estimating methodology used:</p> <p>Cost resources identified</p> <p>Historical data types and benchmarking</p> <p>Coding Structure</p>	<p>OPG-MAN-00120-0010 Project Integration Management</p> <p>OPG-MAN-00120-0011 Project Scope Management</p> <p>OPG-MAN-00120-0012 Project Estimating</p> <p>OPG-MAN-00120-0013 Project Cost Management</p> <p>EST-DTG-001, ESTIMATING DESKTOP GUIDE</p> <p>DA1-IPD-NN-NN-TPLN-CE-0001, Estimate Plan</p>	<p>OPG-MAN-00120-0010 - includes setting WBS and then utilising this to set CBS.</p> <p>OPG-MAN-00120-0011 - Covers WBS breakdown which later influences CBS.</p> <p>OPG-MAN-00120-0012 - Project Estimate Document discusses the coding structure of estimates and the requirement to align CBS and wbs.</p> <p>OPG-MAN-00120-0012 - includes the use of standard estimating template.</p> <p>OPG-MAN-00120-0012 - external estimate cost databases may be referenced for pricing.</p> <p>OPG-MAN-00120-0012 - Estimating tools (InEight or Excel templates).</p> <p>OPG-MAN-00120-0013 - includes importance of selecting and breaking down correct unit of measure.</p> <p>OPG-MAN-00120-0013 - includes alignment between cost management plan and wbs.</p> <p>Section 6 - Estimate Preparation details cost resource type for each major cost category.</p> <p>Well written plan and captures all requirements of AACE succinctly - and explains process to be followed.</p>	<p style="text-align: center;">4</p>

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<p>Design Basis</p>	<p>Identifies Engineering and design deliverables, technical assumptions, and attachments such as:</p> <p>Estimate Deliverables Checklist – Aligns with the company’s project process.</p> <p>Engineering Drawings List – Includes revision details and other design information (e.g., specifications, equipment lists, and measurement units).</p> <p>Summary of Key Quantities</p>	<p>OPG-MAN-00120-0012 Project Estimating</p>	<p>OPG-MAN-00120-0012 - Appendix A Inputs to the Estimate</p> <p>Engineering: EWRRs, conceptual/design reports, modifications, changes, studies, budgets, specs, drawings, equipment list, Bills of Materials, spares, and all-discipline drawings.</p> <p>Appendix A - Inputs to the Estimate item 27 includes a Bill of Materials (BoM) Appendix A - Inputs to the Estimate item 30 includes all discipline drawings</p>	<p>3</p>
<p>Quantity Basis</p>	<p>Define Quantity Sources & Methodology: Material take-offs, sketches, standard designs, computer-simulated take-offs, or factored values.</p> <p>Specify Input Contributions: Vendors, discipline specialists, and project execution personnel.</p> <p>Clarify Design Stage & Allowances: State the design phase and calculation methods for quantity allowances.</p> <p>3D Model Usage & Quality Control: Identify portions derived from 3D models and ensure safeguards for accuracy and completeness.</p> <p>Identify Non-Engineering Quantities: Sketch-based, software-forced, and factored quantities.</p> <p>Use a Summary Table: Provides a quick reference for quantity sources and development methods.</p> <p>External Assumptions: Ensure engineering and other external providers clearly document their quantity assumptions for the Basis of Estimate (BOE).</p>	<p>DA1-IPD-NN-NN-TPLN-CE-0001 Estimate Plan</p> <p>OPG-MAN-00120-0012 Project Estimating</p> <p>NK054-PLAN-01210-00108 DNNP ESTIMATE PLAN (JUNE 2023)</p> <p>OPG-MAN-00120-0013 Project Cost Management</p>	<p>Section 2 - Quantities will be developed using engineering documentation, such as Process & Instrumentation Diagrams(P&IDs), Equipment Lists, Electrical one-line diagrams, Valve lists, Instrumentation lists where possible.</p> <p>Section 2.3 Quantity Development. 3D model to support building sizing and bulk material quantification;</p> <p>OPG-MAN-00120-0012 - Project estimating doc discusses the requirement for estimates to split out time specific related costs and to quantity resource requirements such as LPM.</p> <p>3.2.2 Resource Requirement - Quantities of resources such as labour, materials and equipment. note - Estimate template reference required Quantity and unit against line items.</p> <p>Section 5.0 Estimate development, Section 5.3 details how quantities will be approached. Table 5.1 details the quantity information to be developed and recorded.</p> <p>Section 10.2 Estimate assumptions - Depending on the level of scope definition, assumptions will be made and documented.</p> <p>3.2.3 Estimate should be prepared in accordance with the level of project scope definition and utilize the appropriate estimate inputs (Appendix A Item 27 of the inputs is Bills of materials, Quantities etc).</p> <p>2.1.5 - considers the importance of selecting and breaking down correct unit of measure.</p>	<p>3</p>

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<p>Cost Basis</p>	<p>The cost basis outlines the methods and sources used for determining material, labor, and subcontract pricing:</p> <p>Pricing sources for all major equipment (vendor quotes, historical data, etc.).</p> <p>Bulk material and commodity pricing sources, including any discount strategies</p> <p>The pricing source for all labor hours, and all labor productivity adjustments. Provide appropriate detail if productivities vary by trade and/or location within the project (plant, etc.).</p> <p>All wage rates used (including crew/craft rates, craft mix, etc.). Identify all items included in all-in rates (if used).</p> <p>Pricing source and methodology for construction indirects.</p> <p>Pricing source for all start-up costs.</p> <p>Pricing source and methodology for all home office costs (project management, engineering, design, etc.). Document the basis for any contractor fee costs.</p> <p>Pricing source and methodology for costs such as freight, taxes, duties, etc.</p> <p>Pricing source for any owner's costs included in the estimate.</p> <p>Currency exchange rates if applicable, as well as the stability and/or volatility of rates.</p> <p>Escalation indices used, and the method of calculation (including duration).</p> <p>Contingency development and basis. Location factors used and the basis for these factors.</p> <p>Influence of local market conditions.</p> <p>Capital costs vs. expense costs, or another categorization as necessary.</p> <p>Any other pricing factors or external influences that may have a significant impact on project cost should be identified.</p>	<p>OPG-MAN-00120-0012 Project Estimating</p> <p>BOE-TMP- 012 BoE Template for OPG Use</p> <p>EST-DTG-001</p> <p>ESTIMATING DESK TOP GUIDE</p> <p>BOE-TMP- 012 BoE Template for OPG Use</p> <p>EST-DTG-001</p> <p>ESTIMATING DESK TOP GUIDE</p> <p>NK054-PLAN-01210-00108 DNNP ESTIMATE PLAN (JUNE 2023)</p> <p>NK054-PLAN-01210-00108 DNNP ESTIMATE PLAN (JUNE 2023)</p>	<p>OPG-MAN-00120-0012 - Project estimating doc - Escalation cost should be calculated by the Project Manager using the "Escalation Calculation Template", available on the Investment Management website.</p> <p>OPG-MAN-00120-0012 - shows awareness off calculating an appropriate level of contingencies as in accordance with Project Risk Management</p> <p>OPG-MAN-00120-0012 - external estimate cost databases may be referenced for pricing.</p> <p>OPG-MAN-00120-0012-Estimating tools (InEight or Excel templates)</p> <p>Section 5.5.1 Direct Labour cost. Includes labour rates source calculations and overtime rules, shift patterns, trade and crew mix and estimating factors for difficulty height, location etc. Local / international also.</p> <p>Section 6 - Estimate Preparation details cost resource type for each major cost category</p> <p>Section 10 Escalation</p> <p>BOE-TMP- 012 BoE Template for OPG Use - Currency exchange rates are covered in BOE template.</p> <p>Section 10 Escalation</p> <p>Section 11.1 Contingency Development</p> <p>Section 5.4 and 5.5 for material bulks and equipment, 5.10 and 5.11 for labour hours and labour wage rates, 5.14 productivity</p>	<p>3</p>
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<p>Planning Basis</p>	<p>Outlines project management, design, procurement, and construction strategies.</p> <p>Details assumptions on work schedules (e.g., hours per day, shifts, overtime).</p> <p>Notes on constructability, modularization, and use of specialized equipment.</p> <p>Identifies the overall project schedule and key milestones.</p>	<p>BOE-TMP- 012 BoE Template for OPG Use</p> <p>OPG-MAN-00120-0012 Project Estimating</p> <p>NK054-PLAN-01210-00108 DNNP ESTIMATE PLAN (JUNE 2023)</p>	<p>Section 5.5.1 Direct Labour cost. Includes labour rates source calculations and overtime rules, shift patterns, trade and crew mix and estimating factors for difficulty height, location etc. Local / international also.</p> <p>Section 5.5.1 Construction execution plan, list of major fabrication, demolition/removal, and installation approach, mock up (if any) activities for major scope</p> <p>OPG-MAN-00120-0012 - Project Estimate Document discusses the requirements for the estimate to align to schedule which will result in it being cost loaded.</p> <p>Section 5.0 Estimate development, 5.7 off site fabrication, 5.8 offsite module assembly</p> <p>Section 5.12 and 5.13 cover hours, shifts etc</p>	<p>3</p>
<p>Bulk Commodity Material</p>	<p>Specifies the percentage of bulk material costs from various sources (quotes, in-house pricing). Differentiates between materials for fabrication and site installation.</p> <p>Differentiates between materials for fabrication and site installation.</p> <p>Notes special considerations (e.g., on-site concrete batch plants) and material responsibility (owner/contractor/sub-contractor).</p>	<p>EST-DTG-001</p> <p>ESTIMATING DESK TOP GUIDE</p> <p>NK054-PLAN-01210-00108 DNNP ESTIMATE PLAN (JUNE 2023)</p>	<p>Section 6 - Estimate Preparation details cost resource type for each major cost category</p> <p>Section 6.4 - Estimating Procurement Cost (note materials costs not specifically mentioned)</p> <p>Section 5.4 and 5.5 for material bulks and equipment</p> <p>Also Section 5 detailed code and scope section details indirects for fabrication and site installation etc</p>	<p>3</p>
<p>Labour</p>	<p>Construction Labor Costs: Crew mix descriptions (apprentices, foremen, etc.), union/non-union factors, labor agreements</p> <p>Construction Labor Productivity: Basis for productivity calculations, including labor density, work conditions, site logistics, and other variables.</p> <p>Construction Work Week and Overtime: Specifies final labor schedules and overtime use.</p>	<p>EST-DTG-001</p> <p>ESTIMATING DESK TOP GUIDE</p> <p>OPG-MAN-00120-0012 Project Estimating</p> <p>BOE-TMP- 012 BoE Template for OPG Use</p> <p>DA1-IPD-NN-NN-TPLN-CE-0001</p> <p>Estimate Plan</p>	<p>Section 6 - Estimate Preparation details cost resource type for each major cost category</p> <p>Section 6.5 - Construction Costs</p> <p>Section 6.6 - Commissioning Costs</p> <p>Appendix A Item 7 - estimate input checklist requires the estimator to declare assumed shift patterns</p> <p>Section 5.5.1 Direct Labour cost. Includes labour rates source calculations and overtime rules, shift patterns, trade and crew mix and estimating factors for difficulty height, location etc. Local / international also.</p> <p>Section 2.10 Direct Labour Hours, Wage Rates and Productivity</p> <p>Covers all areas of AACE requirements</p>	<p>3</p>
<p>Demolition</p>	<p>Covers general demolition of decommissioned/abandoned facilities.</p> <p>Details revamp-related demolitions and how scope and cost were determined.</p>	<p>N/A</p>		<p>N/A</p>

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<p>Allowances</p>	<p>Describe the level and types of allowances used in the estimate</p> <p>Examples include, wastage, unmeasured items, overbuy, working height, site constraints</p>	<p>EST-DTG-001 ESTIMATING DESK TOP GUIDE</p> <p>ESTIMATING DESK TOP GUIDE</p> <p>BOE-TMP- 012 BoE Template for OPG Use</p> <p>NK054-PLAN-01210-00108 DNNP ESTIMATE PLAN (JUNE 2023)</p>	<p>Section 6 - Estimate Preparation details cost resource type for each major cost category</p> <p>Section 6.5 - Construction Costs Table 8 includes difficulty and height factors but the origins of the factors are unclear.</p> <p>Section 6 - requirement to record any cost allowance assumptions made. Any significant impacts on costs including factors e.g. exchange rates</p> <p>Section 5.0 Estimating Development- The base estimates shall include the costs of all quantified in-scope work plus normal estimating allowances (i.e. Base Estimate = Base Scope Costs + Estimating Allowances).</p>	<p>2</p>
<p>Assumptions</p>	<p>Capture All Additional Assumptions: Include any assumptions not covered elsewhere in the estimate.</p> <p>Document all assumptions, regardless of their expected impact.</p>	<p>OPG-MAN-00120-0012 Project Estimating</p> <p>(Facility) BoE-00120 Template</p> <p>DA1-IPD-NN-NN-TPLN-CE-0001 Estimate Plan</p>	<p>OPG-MAN-00120-0012 - BOE parallel with the estimate to ensure that any changes in assumption, exclusions or exceptions are captured</p> <p>Appendix A Item 9 - Project list of assumptions / constraints</p> <p>OPG-MAN-00120-0012 - ensure that the estimate package (including the estimate calculations, BoE or notes and assumptions, and all relevant supporting documents) are recorded within the project working files</p> <p>Section 5.2 Estimate assumptions - all assumptions shall be reviewed and validated by the scope owners prior to finalising the estimate. When assumption may lead to risks those are appropriately documented and monitored</p>	<p>3</p>
<p>Exclusions</p>	<p>Purpose of Exclusions Section: Identify costs that are not included in the estimate but might be expected to be</p>	<p>OPG-MAN-00120-0012 Project Estimating</p> <p>BOE-TMP- 012 BoE Template for OPG Use</p> <p>DA1-IPD-NN-NN-TPLN-CE-0001 Estimate Plan</p>	<p>OPG-MAN-00120-0012 - BOE parallel with the estimate to ensure that any changes in assumption, exclusions or exceptions are captured</p> <p>Section 5.3 Exclusions</p>	<p>3</p>
<p>Exceptions</p>	<p>Identify any anomalies or variance to estimating practice</p> <p>Good practice is to provide a checklist as an attachment to the BOE</p>	<p>OPG-MAN-00120-0012 Project Estimating</p> <p>BOE-TMP- 012 BoE Template for OPG Use</p>	<p>OPG-MAN-00120-0012 - BOE parallel with the estimate to ensure that any changes in assumption, exclusions or exceptions are captured</p> <p>Section 8 refers. General or project specific exclusions and exceptions</p>	<p>3</p>
<p>Risks and Opportunities</p>	<p>Significant risks identified are stated</p> <p>Risk modelling is described -if undertaken</p>	<p>OPG-MAN-00120-0012 Project Estimating</p> <p>OPG-MAN-00120-0015 Project Risk Management</p>	<p>Appendix A - item 3 Risk Register</p> <p>Section 2.2 refers to the Quality Risk Checklist OPG-REF-00120-0976041</p> <p>Section 2.2 states that risk identification workshops should be performed on all level A and B projects during next phase planning, it also highlights that for level A projects going through Gate 2/3 and projects that require board approval, the workshops should be facilitated by a risk management SME from the Enterprise PMO.</p> <p>Section 2.3 outlines the steps in the process of qualitative risk analysis.</p> <p>Section 2.2 states the importance of the Project Manager involving the project team in risk identification activities.</p> <p>Sections 2.4.1 and 2.4.2 describe the methodology to be used depending on the project level, Monte Carlo (A and B) and EMV (C).</p>	<p>3</p>

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			<p>Sections 2.4.1. and 2.4.2 state the type of risks that will be included in the QRA.</p> <p>Section 2.4.1 highlighted that schedule and cost input will be included in the QRA for level A.</p> <p>Section 2.4.1 refers to a Monte Carlo input file, and to OPG-GUID-00120-10055 for instructions on how to complete the file.</p>	
Containments	Cost elements which relate to mitigation and prevention of risks.	<p>OPG-MAN-00120-0015 Project Risk Management</p> <p>OPG-REF-00120-0976041 Activating Risk Threat Checklist</p> <p>OPG-REF-00120-0976041 Activating Risk Threat Checklist</p>	<p>Section 2.5 lists and explains the applicable response strategies for both threats and opportunities. Section on actions defines threat response as mitigate, transfer or avoid.</p>	N/A
Contingencies	<p>Level of contingency identified</p> <p>Methods used to quantify contingency identified</p>	<p>OPG-MAN-00120-0012 Project Estimating</p> <p>COST-DTG-003 CONTINGENCY MANAGEMENT</p>	<p>OPG-MAN-00120-0012 - shows awareness off calculating an appropriate level of contingencies as in accordance with Project Risk Management</p> <p>Section 3.0 outline types of contingency assessment that can be used on the project, but it is not specific on what will be used on the project.</p>	3
Management Reserve	<p>Level of management reserve</p> <p>Purpose of management reserve</p> <p>Approval process and tracking of management reserve should be identified</p>	N/A	<p>OPG has advised BTTC that the allocation of management reserve is handled outside the RQE estimate production process and is managed at the OPG Program/Corporate level. As such, this requirement is not applicable.</p>	N/A
Reconciliation	Overview of variances between current and previous estimate - scope, pricing, labour prod, estimate refinement etc.	BOE-TMP- 012 BoE Template for OPG Use	<p>Section 9 - provide an overview of the major differences between the current and last submitted estimate. Cost impacts due to scope changes, pricing updates labour productivity estimate refinement etc</p>	3
Benchmarking	<p>Documents any comparisons made between current estimate and other data sources</p> <p>Variances to BM should be explained</p>	<p>EST-DTG-001 ESTIMATING DESK TOP GUIDE</p> <p>BOE-TMP- 012 BoE Template for OPG Use</p>	<p>Section 9 as part of estimate validation - project level benchmarks for engineering etc as a proportion of overall costs. Variances to be challenged and justified.</p> <p>Section 10 - compare project estimated costs against costs from historical data and industry norms. Justification of differences. Detailed benchmarking report</p>	3
Estimate quality assurance	<p>Identify all estimate reviews</p> <p>Review comments should be appended</p> <p>Future reviews documented</p> <p>External reviews should be documented</p>	<p>OPG-MAN-00120-0012 Project Estimating</p> <p>DA1-IPD-NN-NN-TPLN-CE-0001 Estimate Plan</p>	<p>OPG-MAN-00120-0012 - Project estimating document discusses the planning and documenting of the estimate review cycles, and the development from AACE classifications through stages.</p> <p>OPG-MAN-00120-0012 - doc proposes that in some cases third party estimate reviews are undertaken</p> <p>OPG-MAN-00120-0012 - estimate reviews should occur by the appropriate authority defined in the Scalable Project Delivery Model</p> <p>OPG-MAN-00120-0012 - Estimate review objectives - should confirm alignment with project goals, suitability for purpose, and shared understanding of the estimate's basis and uncertainties.</p> <p>Section 6.0 Estimate Review</p>	3

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Estimating Team	Identification of estimating team	OPG-MAN-00120-0012 Project Estimating	OPG-MAN-00120-0012 - Project estimating document discussed the requirements of the estimating team including the level of expertise required for the various levels.	3
Attachments	Estimate deliverables checklist Reference document - drawings, manuals, specs etc. Addition - reconciliation, benchmarking, risk analysis, escalation calc	OPG-MAN-00120-0012 Project Estimating DA1-IPD-NN-NN-TPLN-CE-0001 Estimate Plan	Appendix A Item 7 - estimate input checklist requires the estimator to declare assumed shift patterns. Appendix A Misc items - estimate input checklist. AACE 115R-21 Input and maturity checklist referred to	3

7.2. CA2 – Development of Cost Estimate

Recommended Practice 36R-08	Control Area Maturity Rating	3
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CA Sub-Area	Control Area Requirements / Content	OPG Management Plans	Assessment of Alignment with CA Sub-Area Requirements	Maturity Rating
<i>Details the sub-areas assessed for each control area.</i>	<i>Outline high-level content and information in accordance with Recommended Practices.</i>	<i>Reference Management Plans (s) used within the assessment of each CA Sub-Area</i>	<i>Document evidence demonstrating alignment with requirements, including specific management plan references. Identify any gaps, concerns, or issues, and provide corresponding recommendations.</i>	<i>See Section 2.3 for Maturity Rating definitions.</i>
Estimate Plan Development Process	Inputs to the Estimate Plan Estimate Recipient and objectives Estimate Developer Scope and Execution Project and Estimate Schedule Coding Structures and Formatting Uncertainty - Risks and Opportunities Lessons Learned Benchmarking Review and validation Process Cash Flows Recasting	OPG-MAN-00120_0012 Project Estimating OPG-MAN-00120_0013 Project Cost Management NK054-PLAN-01210-00108 DNNP ESTIMATE PLAN (JUNE 2023)	OPG internal - objectives stated by gate phasing Scalable defines who produces the estimate Section 3.1 Plan the estimate Section 3.2 - Develop the Estimate OPG-MAN-00120-0013 - requirement for cost estimates should be time-phased by month and in alignment with the supporting schedule The purpose of (this) Estimate Plan is to clearly define the strategies and processes associated with Darlington New Nuclear Project (DNNP) estimate progression, for the development of cost estimates and schedule for the execution of the first of a kind (FOAK) unit at Darlington site.	4
Prepare Draft Estimate Plan	Based on all the inputs available included related clarifications Other deliverables if part of a package should be stated Should be integrated with other planning processes such as schedule development, risk analysis and project Controls.	OPG-MAN-00120_0013 Project Cost Management OPG-MAN-00120_0012 Project Estimating Scalable Project Delivery Model (for type A projects) NK054-PLAN-01210-00108 DNNP ESTIMATE PLAN (JUNE 2023)	Section 2 - states that a Cost management plan includes estimate plan requirement as part of overall PMP. Prepared by Estimators [PMO] in conjunction with PM based on SoW. Estimator embedded within project team as required. Section 4.0 details the Estimate Plan, deliverables and inputs/sources/ detailed requirements	4
Estimate Plan Review	A set of review meetings is held to communicate defined requirements and responsibilities Imperative that everyone commits to meeting their assigned dates Issues and concerns are documented and planned to be resolved	OPG-MAN-00120_0013 Project Cost Management Scalable Project Delivery Model (for type A projects) DA1-IPD-NN-NN-TPLN-CE-0001 Estimate Plan DA1-IPD-NN-NN-TPLN-PM-00004 DNNP functional Plan project controls	Section 2 - PMP is a formally approved document which is updated through each Phase Gate stage Reviewed by Estimators [PMO] [Peer Review] Estimate plan is prepared, reviewed and approved by members of the Alliance and Client team. 3.5 Role of the Project Controls	3

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<p>Estimate Plan Approval</p>	<p>Endorsed by the client team to indicate alignment and approval Occurs after other key stakeholders have signed to indicate buy in.</p>	<p>OPG-MAN-00120_0013 Project Cost Management DA1-IPD-NN-NN-TPLN-CE-0001 Estimate Plan</p>	<p>PMP is a formally approved document which is updated through each Phase Gate stage General - Estimate plan is prepared, reviewed and approved by members of the Alliance and Client team.</p>	<p>3</p>
<p>Estimate Kick Off meeting</p>	<p>Communication of the approved basis for proceeding Goals, objectives and cost strategy are highlighted</p>	<p>OPG-MAN-00120-0019 PROJECT PHASE GATE MANAGEMENT DA1-IPD-NN-NN-TPLN-CE-0001 Estimate Plan</p>	<p>Pre Gate Project planning kick-off meetings are required as part of the Phase gate management process Section 5.0 details the requirement to produce an estimate development road map to 'be used as the primary communication tool for measuring the progression of the estimate to each release'.</p>	<p>2</p>
<p>Estimate Development Process</p>	<p>Extremely important to freeze the engineering inputs at some pre-defined point in the development process. Changes should be dealt with by Change Control Final version of the estimate plan may be used as the starting point for the Basis of Estimate by carrying over common elements and structure from the plan.</p>	<p>OPG-MAN-00120_0012 Project Estimating OPG-MAN-00120_0012 Project Estimating (Facility) BoE-00120 Template OPG-MAN-00120_0013 Project Cost Management DA1-IPD-NN-NN-TPLN-CE-0001 Estimate Plan</p>	<p>Section 3.2 deals with develop estimate , obtaining inputs, quantifying the project scope, costing the scope, optimizing the project costs Appendix A Inputs to the Estimate Engineering: EWRRs, conceptual/design reports, modifications, changes, studies, budgets, specs, drawings, equipment list, Bills of Materials, spares, and all-discipline drawings. Appendix A - change list required on engineering changes Section 9 - note of the major differences between latest estimate and previous estimates Section 2.4 Control Costs - change control to the baseline budget principles is detailed in this section. More Post contract orientated but cross referenced to Project Estimating Manual Section 5.0 details the requirement to produce an estimate development road map to 'be used as the primary communication tool for measuring the progression of the estimate to each release'.</p>	<p>4</p>

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<p>Estimate Plan Format and Content</p>	<p>Suggested topics and content for a class 3-1 estimate</p> <p>Purpose of estimate</p> <p>Project Scope Summary - major components aligning with the WBS / CBS</p> <p>Estimate Confidence - desired AACE estimate class and accuracy at 80% confidence after applying contingency</p> <p>Key Estimate Development Milestones - table of the key deliverables and planned dates</p> <p>Input Deliverables - expected level of project definition expressed as engineering deliverables</p> <p>PEP Summary - key project execution assumptions such as procurement route, weather windows etc</p> <p>Construction, Fabrication and Operating Parameters - checklist of applicable location parameters</p> <p>Social, Cultural, Environmental, Security and Sustainability Parameters</p>	<p>Scalable Project Delivery Model (for type A projects)</p> <p>OPG-MAN-00120_0013 Project Cost Management</p> <p>OPG-MAN-00120_0012 Project Estimating</p> <p>EST-DTG-001</p> <p>ESTIMATING DESK TOP GUIDE</p>	<p>BOE - Prepared by Estimators [PMO]</p> <p>Section 5</p> <p>Define Scope WBS Hierarchy (Basis for estimating [Work Package]) WBS Dictionary Validate Scope Control Scope</p> <p>PMP is a formally approved document which is updated through each Phase Gate stage</p> <p>Section 2 - PMP is a formally approved document which is updated through each Phase Gate stage</p> <p>Section 2.1 contains the cross reference to the AACE classification system with clear direction that the classification system should be used for OPG nuclear and OPG process industry projects</p> <p>Section 3.2 deals with develop estimate , obtaining inputs, quantifying the project scope, costing the scope, optimizing the project costs</p> <p>Section 6.0 'Estimate Preparation' describes how to prepare estimate for Project Management, Inspection, Engineering, Procurement, Construction, Commissioning, and closeout in a project. Each section is followed with a picture of the estimating template along with a table of examples. Examples describe the cost calculation method for each class of estimate using the proper estimating technique.</p>	<p style="text-align: center;">4</p>
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<p>Estimating Methodology</p>	<p>Should include the anticipated use of cost resources, historical data and project benchmarking</p> <p>Estimating tools - software and how it is used</p> <p>Coding Structure - WBS and CBS</p> <p>Filing Structure - description of the filing structure used to organise the data. Filed and maintained according to the WBS and code of accounts</p> <p>Estimate Report format - format should be agreed with the owner before starting the estimate. Summary forms, detail and reference to quotes and in-house cost information. Benchmark analysis, reference design documents etc.</p> <p>Design basis - technical and project information via a company standard estimate deliverables checklist. MTO's</p> <p>Units of measure</p> <p>Currency and exchange rates</p> <p>Rounding</p> <p>Quantity basis - expected source of quants for each commodity (quants mapping) including detailed take offs CAD, vendor input. Quants should be applied neat with no allowances or factors supplied.</p>	<p>EST-DTG-001</p> <p>ESTIMATING DESK TOP GUIDE</p> <p>(Facility) BoE-00120 Template</p> <p>OPG-MAN-00120_0012 Project Estimating</p> <p>OPG-MAN-00120-0011-R005</p> <p>PROJECT SCOPE MANAGEMENT</p> <p>OPG-MAN-00120-0010-R006</p> <p>PROJECT INTEGRATION MANAGEMENT</p> <p>OPG-MAN-00120-0011-R005</p> <p>PROJECT SCOPE MANAGEMENT</p> <p>DA1-IPD-NN-NN-TPLN-CE-0001</p> <p>Estimate Plan</p>	<p>Section 6.0 'Estimate Preparation' describes how to prepare estimate for Project Management, Inspection, Engineering, Procurement, Construction, Commissioning, and closeout in a project. Each section is followed with a picture of the estimating template along with a table of examples. Examples describe the cost calculation method for each class of estimate using the proper estimating technique.</p> <p>Section 9 as part of estimate validation - project level benchmarks for engineering etc as a proportion of overall costs. Variances to be challenged and justified.</p> <p>Section 10 - compare project estimated costs against costs from historical data and industry norms. Justification of differences. Detailed benchmarking report</p> <p>Section 3.2.14 - use of InEight or .xls generated templates.</p> <p>2.4.1 - The project manager should create a project WBS in accordance with the Standardized WBS [Appendix A].</p> <p>2.4.3 - The SoW document (including the WBS and associated dictionary) should be developed early in the project planning process and is an input into the Project Estimating process</p> <p>2.4.5 - The minimum WBS requirements are identified in the Scalable Project Delivery Model</p> <p>The WBS is translated into the scheduling system and rolled up into the cost breakdown structure (CBS) for implementation within the cost system.</p> <p>Section 1.1 Documentation of project scope is represented by the Project Management Plan (PMP), while documentation of product scope is represented by the Requirements Traceability Matrix (RTM) or similar.</p> <p>Section 2.6 Control Scope is the process of monitoring the status of the project and product scope and managing changes to the scope performance measurement baseline.</p> <p>The project manager should ensure that, as a result of the scope change, all affected documentation is updated as required. This may include but is not limited to the project charter, PMP, basis of estimate (BoE), BCS, and design documents</p> <p>Section 4.0 Resources and tools captures the proposed software to capture each work scope item</p> <p>Section 5.1 - Estimate outputs are reported in specific outputs for analysis and comparisons.</p>	<p>4</p>
<p>Process Equipment</p>	<p>Expected equipment to be based on firm quotes, budgetary quotes, in-house pricing or other basis.</p> <p>Summary of the bidding process such as minimum number of bidders and how bids are to be normalized for evaluation.</p>	<p>EST-DTG-001</p> <p>ESTIMATING DESK TOP GUIDE</p> <p>(Facility) BoE-00120 Template</p> <p>NK054-PLAN-01210-00108 DNNP ESTIMATE PLAN (JUNE 2023)</p> <p>DA1-IPD-NN-NN-TPLN-CE-0001</p>	<p>Section 6.4 - Estimating Procurement Cost. Estimator should capture cost of long lead material as well as non-long lead material in this section. Material cost can be estimated using past projects information, Cat IDs, Quotations, estimating database, etc</p> <p>Section 5.4 - Procurement refers list of equipment and spare parts to be provided by vendors and procurement summary</p> <p>Section 5.4 and 5.5 for material bulks and equipment</p> <p>Table 2.1, item 3.1 List of Equipment</p> <p>Section 2.5 Equipment and Bulk Material Pricing table 5.2</p>	<p>2</p>

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Equipment Spares	<p>Costs determined for each type of spare</p> <p>Capital spares / critical spares per owner and vendor requirements</p> <p>Maintenance spares</p> <p>Commissioning or start up spares</p> <p>Initial inventory to start the facility</p> <p>Stock inventory</p>	<p>Estimate Plan (Facility) BoE-00120 Template</p> <p>NK054-PLAN-01210-00108 DNNP ESTIMATE PLAN (JUNE 2023)</p>	<p>Section 5.4 - Procurement refers list of equipment and spare parts to be provided by vendors and procurement summary</p> <p>Section 2.23 Warranty/spare parts. Spare parts and similar construction consumables required to support startup/commissioning will be estimated.</p>	3
Bulk Commodity Materials	<p>Expected % of materials which will be from budget quotes, firm quotes, in house pricing or other sources.</p>	<p>EST-DTG-001</p> <p>ESTIMATING DESK TOP GUIDE</p> <p>NK054-PLAN-01210-00108 DNNP ESTIMATE PLAN (JUNE 2023)</p> <p>(Facility) BoE-00120 Template</p>	<p>Section 6 - Estimate Preparation details cost resource type for each major cost category</p> <p>Section 6.4 - Estimating Procurement Cost (note materials costs not specifically mentioned)</p> <p>Section 5.4 and 5.5 for material bulks and equipment</p> <p>Section 5.4 - Procurement list of equipment and spare parts to be provided by vendors and procurement summary</p>	3
Labour	<p>Details of crew mixes and union / non-union rates. Benefits and other factors used to build up labour rates</p> <p>How Labour productivity will be determined including location, complexity etc</p> <p>Work schedule and overtime parameters including seasonal influences</p>	<p>EST-DTG-001</p> <p>ESTIMATING DESK TOP GUIDE</p> <p>EST-DTG-001</p> <p>ESTIMATING DESK TOP GUIDE</p> <p>(Facility) BoE-00120 Template</p>	<p>Section 6.5 'Estimating Construction Costs - Direct Field Cost. This section captures the trade hours or cost for installation. An estimate can be a factor based (class 5) or it can be a quantity-based estimate. A class 3 estimate can be prepared by adding installation hours or costs against each line of Bill of Materials (BOMs).</p> <p>Section 6.5 'Estimating Construction Costs - Table 8 example of a class 3 estimate description 'Removing existing lights in turbine hall (<i>considering difficulty factor of 2.1 and height factor of 1.2</i>)'. Origins of the difficulty and height factors are not stated.</p> <p>Section 5.5.1 Direct Labour cost. Includes labour rates source calculations and overtime rules, shift patterns, trade and crew mix and estimating factors for difficulty height, location etc. Local / international also.</p>	3
Allowances	<p>Matrix showing estimating allowances including:</p> <p>MTO allowance (allowance for unmeasured items)</p> <p>Waste</p> <p>Equipment design development</p> <p>Rework</p>	<p>(Facility) BoE-00120 Template</p> <p>NK054-PLAN-01210-00108 DNNP ESTIMATE PLAN (JUNE 2023)</p>	<p>Section 6 - requirement to record any cost allowance assumptions made. Any significant impacts on costs including factors e.g. exchange rates</p> <p>Section 2.0 Methodology - The base estimates shall include the costs of all quantified in-scope work plus normal estimating allowances (i.e. Base Estimate = Base Scope Costs + Estimating Allowances).</p> <p>Section 10.2 Estimate assumptions - Depending on the level of scope definition. assumptions will be made and documented</p>	2
Offsite Fabrication / Assembly and associated Logistics / Freight	<p>Handling, unloading, temporary works, road closures</p>	<p>(Facility) BoE-00120 Template</p> <p>NK054-PLAN-01210-00108 DNNP ESTIMATE PLAN (JUNE 2023)</p>	<p>Section 5.4 - any % / flat rates in the estimate to account for freight / taxes etc</p> <p>Section 5.5.1 - provide a construction execution plan, list of major fabrication and installation approach activities for major scopes of work.</p> <p>Section 5.5.2 - list of construction direct support work (incl temp facilities)</p> <p>Section 5.7, 5.8 and 5.9 covers Off site, Modules and freight</p>	3

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Construction Indirect Costs	Field Staff Temporary Facilities Temporary Services Utility Consumption Construction Equipment Small Tools Consumables Scaffolding Camp and travel	EST-DTG-001 ESTIMATING DESK TOP GUIDE (Facility) BoE-00120 Template OPG-MAN-00120-0012 Project Estimating NK054-PLAN-01210-00108 DNNP ESTIMATE PLAN (JUNE 2023)	Section 6.5 - Indirects is a function of the Construction Costs Section 6.1 - Project Management Section 6.2 Inspections Section 6.3 Engineering Costs Section 5.5.1 Direct Labour cost. Includes labour rates source calculations and overtime rules, shift patterns, trade and crew mix and estimating factors for difficulty height, location etc. Local / international also. Section 3.2.3 WBS reference Appendix B - PM / Engineering / Inspection costs. Schedule based estimate per org chart. Section 5.18 details Indirect cost and construction management	3
Commissioning and Start Up	Reference to definitions of completion, testing requirements (contractor and owner)	(Facility) BoE-00120 Template EST-DTG-001 ESTIMATING DESK TOP GUIDE	Section 5.6 - including estimating methods for commissioning working costs, testing FAT / SAT allowances and exclusions Section 6.6 - Estimating Commissioning Costs	3
Engineering and Home Office	Front end or sunk costs Estimated work week for home office staff Site visit, vendor inspections etc As built drafting	EST-DTG-001 ESTIMATING DESK TOP GUIDE (Facility) BoE-00120 Template	Section 6.2 Inspections Section 6.3 Engineering Costs Section 6.6 - Estimating Commissioning Costs Section 5.6 - including estimating methods for commissioning working costs, testing FAT / SAT allowances and exclusions	3
Owner Costs	Management staff Engineering Permits and licences Supervisory staff Land, taxes Utility diversions or periodic payments Direct construction works	EST-DTG-001 ESTIMATING DESK TOP GUIDE OPG-MAN-00120-0011 PROJECT SCOPE MANAGEMENT NK054-PLAN-01210-00108 DNNP ESTIMATE PLAN (JUNE 2023)	Section 8 - Work package descriptions in the cash flow include OPG costs A.4 Standardized control accounts categories include OPG engineering oversight, project controls, PM, H&S OPG procurement, tools, long lead packages. Section 5.23 Other costs and Section 6.0 Owners costs, 7.0 Non IPD costs	3
Clarifications, Qualifications and Assumptions	Rationales to be provided	OPG-MAN-00120-0012 - Project Estimating Management (Facility) BoE-00120 Template	OPG-MAN-00120-0012 - BOE parallel with the estimate to ensure that any changes in assumption, exclusions or exceptions are captured. OPG-MAN-00120-0012 - ensure that the estimate package (including the estimate calculations, BoE or notes and assumptions, and all relevant supporting documents) are recorded within the project working files Appendix A Item 9 - Project list of assumptions / constraints	3

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Exclusions	All known estimate exclusions should be listed with an explanation of why.	OPG-MAN-00120-0012 - Project Estimating Management (Facility) BoE-00120 Template	OPG-MAN-00120-0012 - BOE parallel with the estimate to ensure that any changes in assumption, exclusions or exceptions are captured Section 8 refers - Please provide General or project specific exclusions and exceptions and reasons if applicable	3
Exceptions	Identification of any anomalies or variances to the organization's standard estimating procedures and practices. Good practice involves providing a checklist as an attachment to the BOE that will document any exceptions that are identified.	OPG-MAN-00120-0012 - Project Estimating management (Facility) BoE-00120 Template	OPG-MAN-00120-0012 - BOE parallel with the estimate to ensure that any changes in assumption, exclusions or exceptions are captured. Section 8 refers - Please provide General or project specific exclusions and exceptions and reasons if applicable	3
Late Changes	Detailing how late changes subsequent to the estimate deliverable cut-off date will be handled.	OPG-MAN-00120_0012 Project Estimating NK054-PLAN-01210-00100 DNNP PROGRAM MANAGEMENT PLAN	Appendix A - change list required on engineering changes Section 2.5 - DNNP scope change management throughout project lifecycle Section 2.9 Change Management	3
Escalation	Basis of how escalation will be determined including the base date. Description of the intended escalation calculations As a minimum should be broken down into major categories of equipment, materials, labour and engineering. Reference to amounts included in Risk Quantification section if appropriate	EST-DTG-001 ESTIMATING DESK TOP GUIDE (Facility) BoE-00120 Template	Section 10 - Interest and escalation calculations "Escalation Calculation Template", available on the Investment Management website. Section 6 escalation rates used based on historical information or other data stated	3
Risk Analysis and Contingency	Identify the method of risk analysis and contingency determination including software to be used See other AACE RP's (40R-08, 62R-11, 63R-11)	OPG-MAN-00120-0012 - OPG-MAN-00120-0015-005_ Project Risk Management	Appendix A - item 3 Risk Register Specifies both PMIS and SharePoint will be used for the storage of information and documentation. Sections 2.4.1 and 2.4.2 describe the methodology to be used depending on the project level, Monte Carlo (A and B) and EMV (C). Section 3.0 outline types of contingency assessment that can be used on the project, but it is not specific on what will be used on the project. Sections 2.4.1. and 2.4.2 state the type of risks that will be included in the QRA.	3
Management Reserve	Allowance for anticipated changes in scope - intended use should be identified as well as approval process and tracking.	N/A	OPG has advised BTTC that the allocation of management reserve is handled outside the RQE estimate production process and is managed at the OPG Program/Corporate level. As such, this requirement is not applicable.	N/A
Reconciliation	Template to show the major differences between the current estimate and the last published estimate for the project.	(Facility) BoE-00120 Template	Section 9 - provide an overview of the major differences between the current and last submitted estimate. Cost impacts due to scope changes, pricing updates labour productivity estimate refinement etc	3

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Benchmarking and Validation	<p>Identification of all of the estimate reviews to take place.</p> <p>Comparisons to overall estimate metrics incl key quants, ratios historical data and industry data</p>	<p>EST-DTG-001</p> <p>ESTIMATING DESK TOP GUIDE</p> <p>(Facility) BoE-00120 Template</p>	<p>Section 9 as part of estimate validation - project level benchmarks for engineering etc as a proportion of overall costs. Variances to be challenged and justified.</p> <p>Section 10 - compare project estimated costs against costs from historical data and industry norms. Justification of differences. Detailed benchmarking report</p>	3
Cash Flow	<p>Cash flow in a table format according to the intervals required by the owner</p> <p>Describe how the cash flow is formulated e.g. progress, milestones, earned value</p>	<p>EST-DTG-001</p> <p>ESTIMATING DESK TOP GUIDE</p> <p>OPG-MAN-00120-0012</p>	<p>Section 10 - Escalation - Escalation calculation template is available</p> <p>OPG-MAN-00120-0012 - Project Estimate Document discusses the requirements for the estimate to align to schedule which will result in it being cost loaded.</p>	3
Estimate Development Schedule	<p>Integration of the estimate plan with other phase deliverables for tracking.</p> <p>Keeps focus on the engineering and execution development activities required to meet the objectives for that phase and the desired estimating accuracy.</p> <p>Keeps focus on the engineering and execution development activities required to meet the objectives for that phase and the desired estimating accuracy.</p>	<p>EST-DTG-001</p> <p>ESTIMATING DESK TOP GUIDE</p> <p>OPG-MAN-00120-0019</p> <p>PROJECT PHASE GATE MANAGEMENT</p> <p>ESTIMATING DESK TOP GUIDE</p> <p>OPG-MAN-00120-0019</p> <p>PROJECT PHASE GATE MANAGEMENT</p>	<p>Section 4.0 Estimate Classification - Estimates should be prepared in accordance with the level of project scope definition and utilize the appropriate estimate inputs required to achieve an estimate class. This includes technical deliverables, schedule information, WBS, historical cost information (as applicable)</p> <p>Section 2.1 - Project Lifecycle phases</p> <p>Section 2.2 - Gate deliverables including estimate deliverables</p> <p>Section 2.1 - Project Lifecycle phases</p> <p>Section 2.2 - Gate deliverables including estimate deliverables</p>	3
Estimate Responsibility Matrix	<p>Matrix indicating which documents will be used in the estimating process, who will provide them, the expected level of completion and the date.</p> <p>Useful tool in planning and managing the key estimating deliverables.</p>	<p>OPG-MAN-00120-0010-R006</p> <p>PROJECT INTEGRATION MANAGEMENT</p> <p>OPG-MAN-00120-0012</p> <p>NK-054-01210-00100-00015 (project Controls) Programme management plan</p>	<p>App A Scalable Project Delivery model - details responsibility for inputs and reviews during estimate development through phase gate process.</p> <p>App A Project Estimate Input Checklist - list of all inputs and deliverables to be used in estimate production. section 4.2 refers to 115R-21 and the Input deliverables Matrix.</p> <p>DNNP Program will develop a Roadmap that identifies all the necessary activities that are required for development of the program cost estimate progression.</p> <p>The roadmap will reference each function responsible for producing/managing a part of the estimate. A detailed plan will be updated when the project reaching towards Release Quality Estimate.</p>	3

7.3. CA3 - Assessing the Cost Estimate Classification

Recommended Practice 115R-21	Control Area Maturity Rating	3
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CA Sub-Area	Control Area Requirements / Content	OPG Management Plans	Assessment of Alignment with CA Sub-Area Requirements	Maturity Rating
<i>Details the sub-areas assessed for each control area.</i>	<i>Outline high-level content and information in accordance with Recommended Practices.</i>	<i>Reference Management Plans (s) used within the assessment of each CA Sub-Area</i>	<i>Document evidence demonstrating alignment with requirements, including specific management plan references. Identify any gaps, concerns, or issues, and provide corresponding recommendations.</i>	<i>See Section 2.3 for Maturity Rating definitions.</i>
General Process	<p>Table 3 Matrix within the AACE document maps the extent and maturity of estimate input information (deliverables) against the 5 estimate classification levels.</p> <p>General Project data: Not required (NR), Preliminary (P) Defined (D) Technical deliverables: Not required (NR), started (S), Preliminary (P), Complete (C)</p> <p>Assessment criteria to be used - Preliminary vs defined, Started vs preliminary</p>	<p>OPG-MAN-00120-0012 Project Estimating</p> <p>EST-DTG-001 Estimating Desk top guide</p> <p>NK-054-01210-00100-00015 (project Controls) Programme management plan</p> <p>NK054-PLAN-01210-00108 DNNP Estimate plan</p> <p>DA1-IPD-NN-NN-TPLN-CE-0001</p>	<p>Section 2.0 - The OPG plan, recognises importance of the classification as recommended by AACE. We note that 115R-21 is missing, 18R-97 whilst not using the designation number, is referred to "for Process Industry" For "OPG Non-nuclear building projects 56R-08 should be used.</p> <p>The document Explains the 5 classes of estimate maturity levels to be used. Appendix A contains the Estimate Input checklist and maturity matrix and Appendix B Estimate Classification checklist which is the standard document check list for OPG , however under the Scalable Project Delivery Model allows project specific decisions to use the AACE (115r or 18R etc) if the Project team feel this is more applicable for larger complicated projects.</p> <p>Section 4 - As per the Association for the Advancement of Cost Engineering International Recommended Practice No.18R-97(Cost estimate Classification for Process Industries), cost estimates are categorized by four characteristics: maturity level of project definition deliverables (primary), end usage, estimating methodology, and expected accuracy.</p> <p>Section 2.7 Class 4 Progression followed the guidelines of AACE recommended practices 18R-97 Cost estimate classification. This Maturity matrix will be updated for Class 3 estimate in reference to the new recommended practice 115R-21 Cost Estimate Classification System as applied tin Engineering, Procurement and Construction for the Nuclear Power Industries</p> <p>Section 4.2 An assessment of the class of estimate achieved by each project scope will be performed by the estimating team based upon OPG Governance and AACE recommended practice. The general estimate accuracy scales as outlined in AACE RP 18R—07 and in addition the estimating team will have to meet the requirements of the Estimate Deliverable Maturity Matrix as outlined for DNNP based on AACE RP 115R-21</p> <p>DA1-IPD-NN-NN-TPLN-CE-0001 section 1.2.1 Estimate progression is aligned with the guidelines of AACE Recommended Practises 115R-21 Cost Estimate Classification System as applied in Engineering, Procurement and Construction for Nuclear Power Industries</p>	3

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<p>AACE Table 3 Assessment</p>	<p>Completed Class 3 AACE Classification matrix (table 3 - 93 deliverables) - assessment on completeness and maturity of required deliverables.</p> <p>Where deliverables not at AACE required maturity show how overall "score" was calculated</p>	<p>OPG-MAN-00120-0012 Project Estimating</p> <p>EST-DTG-001 Estimating Desk top guide</p> <p>NK-054-01210-00100-00015 (project Controls) Programme management plan</p> <p>NK054-PLAN-01210-00108 DNNP Estimate plan</p>	<p>Section 2.1 The required inputs to achieve an estimate classification are provided in the Estimate Input checklist and maturity matrix (Appendix A) - Appendix A which contains the deliverables list and Appendix B check list is not from 56R-08, 18R-97 or 115R-21 and is far less detailed</p> <p>Section 4.0 Maturity Matrix (table 2) - this table is far less detailed than the AACE requirement and has 27 deliverables, 3 less than appendix A which lists 30. OPG need to have a consistent maturity list from AACE within their procedures</p> <p>Section 2.7 Class 4 Progression followed the guidelines of AACE recommended practices 18R-97 Cost estimate classification. This Maturity matrix will be updated for Class 3 estimate in reference to the new recommended practice 115R-21 Cost Estimate Classification System as applied in Engineering, Procurement and Construction for the Nuclear Power Industries</p> <p>Section 4.2 An assessment of the class of estimate achieved by each project scope will be performed by the estimating team based upon OPG Governance and AACE recommended practice. The estimating team will be required to meet the requirements of the Estimate Deliverable Maturity Matrix as outlined for DNNP based on AACE RP 115R-21</p>	<p style="text-align: center;">4</p>
<p>Assessment Team</p>	<p>The AACE document does not specifically state who should review and assess.</p>	<p>OPG-MAN-00120-0012 Project Estimating</p> <p>Scalable Project Delivery Model (For type A project)</p> <p>NK054-PLAN-01210-00108 DNNP Estimate plan</p>	<p>Section 2.0 Document states "The cost estimator, in accordance with the Scalable Project Delivery Model [R2], should determine the estimate class based upon the maturity level of project definition based on the status of specific key planning and design deliverables"</p> <p>Estimate Classified by Estimators (PMO)</p> <p>Section 4.2 An assessment of the class of estimate achieved by each project scope will be performed by the estimating team based upon OPG Governance and AACE recommended practice</p>	<p style="text-align: center;">3</p>

7.4. CA4 - Reviewing, Validating and Documenting the Estimate

Recommended Practice AACE 31R-03	Control Area Maturity Rating	3
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CA Sub-area	Control Area Requirements / Content	OPG Management Plans	Assessment of Alignment with CA Sub-Area Requirements	Maturity Rating
<i>Details the sub-areas assessed for each control area</i>	<i>Outline high-level content and information in accordance with Recommended Practices.</i>	<i>Reference Management Plans (s) used within the assessment of each CA Sub-Area.</i>	<i>Document evidence demonstrating alignment with requirements, including specific management plan references. Identify any gaps, concerns, or issues, and provide corresponding recommendations.</i>	<i>See Section 2.3 for Maturity Rating definitions.</i>
Background	<p>Ensure that all parties agree on and understand the estimates basis, content and outcome including the estimates probabilistic characteristics (e.g. range, cost distribution etc.)</p> <p>The quality review determines if the estimate is:</p> <p>Suitable for given purpose</p> <p>Address stakeholder requirements</p> <p>Ensure all parties agree on basis, content and outcome</p>	<p>OPG-MAN-00120_0012</p> <p>EST-DTG-001</p>	<p>Section 3.3 states ' the key benefit of this process is an agreement and an alignment on the total estimate package by the estimator and project team and confirmation that the estimate meets the project and organisation requirements</p> <p>Section 3.3.2 - reviews should confirm that the estimate</p> <p>a - reflects the project strategy</p> <p>b - is suitable for the given purpose</p> <p>c - ensure all parties agree on basis, content and outcome</p> <p>First step noted in section 9.0 'Validation' is to ensure that the proper estimating technique was used relative to the class of estimate.</p>	3

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<p>General Process</p>	<p>The level of detail and diligence used during the estimate review cycle will vary with strategic importance, total value and purpose of the estimate.</p> <p>Review is typically qualitative</p> <p>Validation is typically quantitative</p>	<p>OPG-MAN-00120_0012</p>	<p>Section 3.3 - Review, Validate and Document the Estimate - Review, validate and document the estimate is the process of formally verifying the details of the estimate including the BoE. The key benefit of this process is an agreement and an alignment on the total estimate package by the estimator and project team, and confirmation that the estimate meets the project and organization requirements.</p> <p>The end result of an estimate review should be a set of consistent, clear and reliable documentation (i.e., the estimate and its backup) that has the concurrence and understanding of the project team and management and follows industry standards or best practices (e.g., for authorization, control, bid etc.) Each project team member must accept and take ownership of those parts of the estimate and budget for which they will be responsible</p> <p>Section 3.3.1 - Estimate reviews should occur by the appropriate authority defined in the scalable project delivery model. For A and B projects, PMO estimator peer reviews should occur.</p> <p>It is recommended that anyone that provided significant input to the project estimate and/or that was involved in its preparation, and /or will be responsible for managing some element of the costs should be considered as a review team participant at the appropriate phase and step. This may include technical (engineering/design)/scope reviews, estimating team reviews, project team reviews and management reviews</p> <p>Section 3.3.2 Estimate reviews should confirm the estimate: a) reflects the project strategy, objectives, scope and risk b) is suitable for a given purpose (e.g., cost analysis, decision making, control, bidding etc.) c) ensures that all parties agree on and understood the estimate basis, content, and outcome including the estimate probabilistic characteristics (e.g., range, cost distribution etc.)</p> <p>Section 3.3.3 - the level of detail and diligence used during the estimate review should be commensurate with strategic importance total value and purpose.</p>	<p style="text-align: center;">3</p>
<p>Estimate Review Cycles</p>	<p>Review process should be used at every phase of the project scope</p> <p>Multiple reviews are performed with varying purposes, scope and participants e.g. internal estimating, engineering reviews, project team reviews, management reviews etc.</p>	<p>OPG-MAN-00120_0012</p> <p>OPG-MAN-00120-0019</p> <p>PROJECT PHASE GATE MANAGEMENT</p>	<p>Section 3.3.1 - estimate reviews should occur by the appropriate Authority defined in the Scalable Project Delivery model for A and B projects. PMO estimator peer reviews should occur.</p> <p>Section 2.1 - Project Lifecycle phases</p> <p>Section 2.2 - Gate deliverables including estimate deliverables</p>	<p style="text-align: center;">4</p>

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<p>Plan for the Estimate Reviews</p>	<p>A person must be made responsible for the planning and managing the review process</p> <p>Review team will consist of the lead estimator, lead scheduler and planners and those that provided significant cost input for the part of the estimate being reviewed.</p> <p>In some cases the project or client may require that an independent third party be involved in the review or prepare an independent check estimate</p> <p>The BoE is a key estimate review input....describe(s) all of the basis documents that served as an input to the estimatecritical and required for effective change management</p>	<p>DA1-IPD-NN-NN-TPLN-PM-0004 DNNP FUNCTIONAL PROJECTS CONTROL PLAN (PCP)</p> <p>OPG-MAN-00120_0012</p> <p>OPG-MAN-00120-0019</p> <p>PROJECT PHASE GATE MANAGEMENT</p> <p>OPG-MAN-00120-0010-R006</p> <p>PROJECT INTEGRATION MANAGEMENT</p> <p>OPG-MAN-00120-0012</p> <p>DA1-IPD-NN-NN-TPLN-CE-0001</p> <p>Estimate Plan</p>	<p>Section 3.5 Project Controls PMT - Lead business case development and estimates; Manage and implement gated review process for bundles</p> <p>Section 3.3.1 - Estimate reviews should occur by the appropriate authority defined in the scalable project delivery model. For A and B projects, PMO estimator peer reviews should occur Note- it is recommended that anyone that provided significant input to the project estimate and/or that was involved in its preparation, and /or will be responsible for managing some element of the costs should be considered as a review team participant at the appropriate phase and step. This may include technical (engineering/design)/scope reviews, estimating team reviews, project team reviews and management reviews</p> <p>Section 2.1 - Project Lifecycle phases</p> <p>Appendix A Scalable Project Delivery Model - estimates for all Project Classifications are reviewed by the estimating team as part of the PMO (including peer review) or the PM for lower value projects.</p> <p>Appendix A Inputs to the Estimate Engineering: EWRRs, conceptual/design reports, modifications, changes, studies, budgets, specs, drawings, equipment list, Bills of Materials, spares, and all-discipline drawings.</p> <p>Section 6.0 - Estimate reviews states 'The IPD Project Control team and Estimating team will establish, collaboratively with area leads and the PMT team, an oversight plan that outlines the approach, participation level, review process, feedback and documentation of observations.</p>	<p style="text-align: center;">4</p>
<p>Technical (Engineering / Design) / Scope Reviews</p>	<p>First review is by the technical team - in some cases the technical team will manage the works so they must buy in to the estimate</p> <p>Technical team must develop confidence that the information in the BoE deliverables has been qualified in the estimate.</p> <p>The estimate should be checked to ensure it is integrated with the schedule</p>	<p>OPG-MAN-00120_0012</p> <p>NK-054-PLAN-01210-00100 - Project Engineering Program Management Plan</p> <p>OPG-MAN-00120-0012</p> <p>DA1-IPD-NN-NN-TPLN-PM-0004 DNNP FUNCTIONAL PROJECTS CONTROL PLAN (PCP)</p> <p>DA1-IPD-NN-NN-TPLN-CE-0001</p> <p>Estimate Plan</p>	<p>Section 3.3.1 - Estimate reviews should occur by the appropriate authority defined in the scalable project delivery model. For A and B projects, PMO estimator peer reviews should occur Note- it is recommended that anyone that provided significant input to the project estimate and/or that was involved in its preparation, and /or will be responsible for managing some element of the costs should be considered as a review team participant at the appropriate phase and step. This may include technical (engineering/design)/scope reviews, estimating team reviews, project team reviews and management reviews</p> <p>Section 2.3.3 DNNP Engineering must ensure that appropriate interface and oversight protocols are maintained throughout the design, procurement, installation, commissioning and close out phases.... additionally, this ensures compliance with design requirements and managed systems</p> <p>OPG-MAN-00120-0012 - Project Estimate Document discusses the requirements for the estimate to align to schedule which will result in it being cost loaded.</p> <p>Section 9. Estimate Reviews - Responsibility, areas to be addressed, flow chart of review process,</p> <p>Section 6.0 - Estimate Reviews, Stage 2 in the proposed Estimate Review process includes a Technical Review including team sign off of scope</p>	<p style="text-align: center;">4</p>
<p>Estimating team reviews</p>	<p>Functional checks by the estimating team including comp check.</p> <p>Potential use of a peer review team for fresh eyes.</p> <p>Estimating team check consistency with the Basis of estimate document</p> <p>Estimating team ensure that the estimate was prepared in accordance with appropriate guidelines.</p>	<p>OPG-MAN-00120_0012</p> <p>EST-DTG-001</p> <p>DA1-IPD-NN-NN-TPLN-PM-0004 DNNP FUNCTIONAL PROJECTS CONTROL PLAN (PCP)</p> <p>DA1-IPD-NN-NN-TPLN-CE-0001</p> <p>Estimate Plan</p>	<p>Section 3.3.1 - Estimate reviews should occur by the appropriate authority defined in the scalable project delivery model. For A and B projects, PMO estimator peer reviews should occur Note- it is recommended that anyone that provided significant input to the project estimate and/or that was involved in its preparation, and /or will be responsible for managing some element of the costs should be considered as a review team participant at the appropriate phase and step. This may include technical (engineering/design)/scope reviews, estimating team reviews, project team reviews and management reviews</p> <p>First step noted in section 9.0 'Validation' is to ensure that the proper estimating technique was used relative to the class of estimate.</p> <p>Section 9. Estimate Reviews - Responsibility, areas to be addressed, flow chart of review process,</p> <p>Section 6.0 - Estimate Reviews, Stage 4 in the proposed Estimate Review process includes an Estimating Team Review including consistency with BoE documents and adheres to project, contract and BP guidelines.</p>	<p style="text-align: center;">4</p>

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<p>Project Manager / Project Team reviews</p>	<p>Objective is to gain the entire project teams support of the estimate, especially that of the PM</p> <p>Ensure that the estimate is presented in an understandable manner and that is complete, consistent, repeatable, traceable and defensible.</p> <p>Validation - should include estimate review metrics that summarises and compares several key benchmark ratios and factors vs historical values from similar projects</p> <p>The goal of validation is to ensure that key metrics from the estimate are in line with (or an improvement on) the same metrics from similar projects.</p> <p>Validation considered to be a top-down review</p> <p>The PM should agree with the risks that were identified, their assessment, probabilistic outcome and contingency amounts</p> <p>Gaining credibility by clearly explaining the differences and reasons for differences with preceding estimates - can be at high level but back up should be available</p> <p>Variances with preceding estimates may trigger additional reviews</p>	<p>OPG-MAN-00120_0012</p> <p>EST-DTG-001</p> <p>(Facility) BoE-00120 Template</p> <p>OPG-MAN-00120-0019</p> <p>PROJECT PHASE GATE MANAGEMENT</p> <p>(Facility) BoE-00120 Template</p> <p>DA1-IPD-NN-NN-TPLN-PM-0004 DNNP FUNCTIONAL PROJECTS CONTROL PLAN (PCP)</p> <p>DA1-IPD-NN-NN-TPLN-CE-0001</p> <p>Estimate Plan</p>	<p>Section 3.3.4 - Estimates including the BoE and supporting documentation should be accepted by the Project Manager</p> <p>Section 3.3.1 - Estimate reviews should occur by the appropriate authority defined in the scalable project delivery model. For A and B projects, PMO estimator peer reviews should occur.</p> <p>It is recommended that anyone that provided significant input to the project estimate and/or that was involved in its preparation, and /or will be responsible for managing some element of the costs should be considered as a review team participant at the appropriate phase and step. This may include technical (engineering/design)/scope reviews, estimating team reviews, project team reviews and management reviews.</p> <p>Section 3.3.4 - Estimates including the BoE and supporting documentation should be accepted by the Project Manager</p> <p>Section 9.0 'Validation' seeks to ensure the estimated costs are within acceptable benchmark ranges (tables noted within the DTG). If not within these ranges, the estimated costs should be challenged and justified.</p> <p>Section 10 - compare project estimated costs against costs from historical data and industry norms. Justification of differences. Detailed benchmarking report</p> <p>Section 2.1 Project life cycle phases and gate reviews</p> <p>See 3.3.4 PM sign off above which should cover this item</p> <p>Section 9 - provide an overview of the major differences between the current and last submitted estimate. Cost impacts due to scope changes, pricing updates labour productivity estimate refinement etc.</p> <p>Section 3.5 Project Controls PMT - Lead business case development and estimates; Manage and implement gated review process for bundles</p> <p>Section 9. Estimate Reviews - Responsibility, areas to be addressed, flow chart of review process,</p> <p>Section 6.0 - Estimate Reviews, Stage 5 in the proposed Estimate Review process includes a Project Team Review including checks for consistency, traceability etc. (as detailed in AACE RP)</p>	<p style="text-align: center; font-size: 24pt;">4</p>
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<p>Management Reviews</p>	<p>The level of management review varies with strategic importance and size of project</p> <p>Aim to demonstrate that metrics for the correct estimate are in line with data from other similar projects</p> <p>Emphasis on cost risks and escalation, drivers and market forces</p> <p>Responsibility to set contingency and escalation values in accordance with the level of confidence they want</p>	<p>OPG-MAN-00120_0012</p> <p>EST-DTG-001</p> <p>EST-DTG-001</p> <p>ESTIMATING DESK TOP GUIDE</p> <p>OPG-MAN-00120-0017 Project comms and stakeholder management</p> <p>OPG-MAN-00120-0015-005_Project Risk Management</p> <p>OPG-MAN-00120-0017 Project comms and stakeholder management</p> <p>OPR-MAN-0120-0019 Phase Gate Management</p> <p>DA1-IPD-NN-NN-TPLN-PM-0004 DNNP FUNCTIONAL PROJECTS CONTROL PLAN (PCP)</p>	<p>Section 3.3 - Review, Validate and Document the Estimate - Review, validate and document the estimate is the process of formally verifying the details of the estimate including the BoE. The key benefit of this process is an agreement and an alignment on the total estimate package by the estimator and project team, and confirmation that the estimate meets the project and organization requirements.</p> <p>The end result of an estimate review should be a set of consistent, clear and reliable documentation (i.e., the estimate and its backup) that has the concurrence and understanding of the project team and management and follows industry standards or best practices (e.g., for authorization, control, bid etc.) Each project team member must accept and take ownership of those parts of the estimate and budget for which they will be responsible</p> <p>Section 9.0 'Validation' seeks to ensure the estimated costs are within acceptable benchmark ranges (tables noted within the DTG). If not within these ranges, the estimated costs should be challenged and justified.</p> <p>Section 10 - Interest and escalation calculations</p> <p>"Escalation Calculation Template", available on the Investment Management website.</p> <p>Section 3.3.1 - Estimate reviews should occur by the appropriate authority defined in the scalable project delivery model. For A and B projects, PMO estimator peer reviews should occur.</p> <p>It is recommended that anyone that provided significant input to the project estimate and/or that was involved in its preparation, and /or will be responsible for managing some element of the costs should be considered as a review team participant at the appropriate phase and step. This may include technical (engineering/design)/scope reviews, estimating team reviews, project team reviews and management reviews</p> <p>Section 2.1 states that the risk management plan should be tailored to the project size, complexity, importance and development approach. It also mentions that FOAK/FAW projects are inherently riskier, and the approach considers this.</p> <p>Section 3.3.3 The level of detail and diligence used during the estimate review should be commensurate with the Strategic importance, total value, and purpose of the particular estimate.</p> <p>Section 2.1 Project life cycle phases and gate reviews. Initiation phase and development phase cover hard gate sign off as a pre-requisite to progression to the next stage</p> <p>Phase Gate Road map - table clearly defines class of estimate to be reviewed on Initiation, development and definition stages</p> <p>Section 3.5 Project Controls PMT - Lead business case development and estimates; Manage and implement gated review process for bundles</p> <p>Section 9. Estimate Reviews - Responsibility, areas to be addressed, flow chart of review process,</p> <p>Section 2.2 - 'when executive management carefully considers...provide a standardised, comprehensive review of project scope schedule, risk, cost and quality.</p>	<p style="text-align: center; font-size: 24pt;">3</p>
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<p>Reviewing Estimates Prepared by Others</p>	<p>Using the existing principles</p> <p>Basis of estimate - well organised and complete?</p> <p>Estimating personnel - level of estimating experience</p> <p>Methodology - appropriate for the level of information</p> <p>Documentation - appropriate level of detail</p> <p>Validation Metrics - report and benchmark ratios</p> <p>Detail Spot check on selected areas to withstand greater scrutiny</p>	<p>(Facility) BoE-00120 Template</p> <p>OPG-MAN-00120_0012</p> <p>OPG-MAN-00120-0010-R006</p> <p>PROJECT INTEGRATION MANAGEMENT</p>	<p>Comprehensive BoE checklist - used for all estimates</p> <p>Section 3.2.10 Vendor prepared estimates (e.g. bid proposals) may require validation of the estimate and class by a PMO estimator (as defined in Scalable Project delivery model). The PMO Estimator should confirm the integrity of the bid by verifying estimating methods, assessing the assumption, and making sure that the adopted ground rules are consistently applied throughout the submitted estimate/bid</p>	<p style="text-align: center;">3</p>
<p>Documenting the estimate</p>	<p>Findings should be recorded and actions assigned to address any errors</p> <p>If changes required are significant, all or some part of the estimate review cycle may need to be repeated</p> <p>Ensure the BoE is updated to reflect the current basis</p>	<p>OPG-MAN-00120_0012</p> <p>OPG-MAN-00120_0017</p> <p>Project Communication and Stakeholder Management</p>	<p>Section 3.3.4 - Estimates including the BoE and supporting documentation should be accepted by the Project Manager</p> <p>Section 3.3.12 All estimates should include a BOE or equivalent documentation to record how the estimate was derived</p> <p>Section 3.2.13 The project manager should ensure that the estimate package, (including the estimate calculations, BoE or notes and assumptions., and all relevant supporting documents) are recorded within the project working files as per the Project Communications and stakeholder management. The estimate package should be complete, retrievable and auditable</p> <p>App D states the BoE template and the estimating template should be filed within the project documentation folder.</p>	<p style="text-align: center;">3</p>
<p>Feedback Loop</p>	<p>Important that the learnings of the review and validation process be incorporated back into the overall estimate</p> <p>The review process should include a feedback loop that ensures the major comments that require corrective action have been incorporated into the final estimate.</p> <p>Should be a structured process</p>	<p>OPG-MAN-00120_0012</p> <p>OPG-MAN-00120-0010-R006</p> <p>PROJECT INTEGRATION MANAGEMENT</p>	<p>Section 3.3.4 - Estimates including the BoE and supporting documentation should be accepted by the Project Manager</p> <p>Section 2.5.1 - The project manager should ensure that project knowledge, including lessons learned is shared and integrated into the project throughout the project life cycle.</p>	<p style="text-align: center;">3</p>

7.5. CA5 - Developing a Project Risk Management Plan

Recommended Practice AACE 72R-12	Control Area Maturity Rating	3
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CA Sub-area	Control Area Requirements / Content	OPG Management Plans	Assessment of Alignment with CA Sub-Area Requirements	Maturity Rating
<i>Details the sub-areas assessed for each control area</i>	<i>Outline high-level content and information in accordance with Recommended Practices.</i>	<i>Reference Management Plans (s) used within the assessment of each CA Sub-Area.</i>	<i>Document evidence demonstrating alignment with requirements, including specific management plan references. Identify any gaps, concerns, or issues, and provide corresponding recommendations.</i>	<i>See Section 2.3 for Maturity Rating definitions.</i>
General Process	<p>The risk management plan should be part of an overall project execution plan</p> <p>The plan should describe the processes, procedures, organization, tools, and systems for effective risk management.</p> <p>The plan should address risk management objectives for all stakeholder and project requirements</p> <p>The plan should establish a basis for good risk management practices.</p> <p>The risk management plan should be organized logically and be applicable to the specific project.</p>	<p>OPG-MAN-00120-0015-005_Project Risk Management COST-DTG-003 CONTINGENCY MANAGEMENT</p> <p>COST-DTG-003 CONTINGENCY MANAGEMENT OPG-MAN-00120-0015-005_Project Risk Management COR-PROC-OPG-PROC-0094-006</p> <p>COR-PROC-OPG-PROC-0094-006 DA1-IPD-NN-NN-TPLN-PM-0004 DNNP ROC and SUB ROC TOR</p> <p>OPG-MAN-00120-0015-005_Project Risk Management DA1-IPD-NN-NN-TPLN-PM-0004</p> <p>OPG-MAN-00120-0015-005_Project Risk Management</p>	<p>Section 2.1 states that the risk management plan should be included in the PMP. Section 2.2 refers to a list of other documents that input into the risk identification process. Section 6.0 refers to the PMP and Business Unit Specific Authorization Memos to identify approval levels.</p> <p>Sections 5.0 and 6.0 effectively describe the process of contingency allocation and drawdown on the project. Section 1.1 gives a good overview of the definition of risk management. Section 2.0 on enterprise risk management process aligns the risk management process to OPG's strategic plan.</p> <p>Section 3.0 outlines the enterprise roles and responsibilities of teams. Section 6.0 aligns the risk management process to project requirements considering DNNP. The 'objective' section covers this requirement in detail.</p> <p>Section 1.1 gives a good overview of the types of risk that make up the overall project risk as well as a definition of risk management Section 6.0 gives a comprehensive view of risk management on the project.</p> <p>Section 2.1 states that the risk management plan should be tailored to the project size, complexity, importance and development approach. It also mentions that FOAK/FAW projects are inherently riskier, and the approach considers this. Section 2.3 highlights what is required when qualitatively assessing risks at each project level.</p>	3
Establishing Requirements and Objectives	<p>Identify stakeholders and their expectations, requirements, and objectives for risk management.</p> <p>Make general project requirements more specific to guide risk assessment, treatment, and control.</p> <p>The risk management process should be aligned with the organizations culture, processes, structure, and strategy.</p> <p>Consider both external and internal contexts to ensure all important factors are included.</p>	<p>OPG-MAN-00120-0015-005_Project Risk Management OPG-POL-0004 DA1-IPD-NN-NN-TPLN-PM-000</p> <p>OPG-MAN-00120-0015-005_Project Risk Management DA1-IPD-NN-NN-TPLN-PM-0004</p> <p>COR-PROC-OPG-PROC-0094-006 DNNP ROC Presentation</p> <p>DNNP ROC Presentation DNNP – Probing Questions</p>	<p>Section 2.2 outlines some of the responsibilities of the risk owner and portfolio manager. The accountabilities section of this document covers the organisational responsibilities for risk. Annex G contains a detailed RASCI.</p> <p>Section 2.3 highlights what is required when qualitatively assessing risks at each project level. Section 6.0 covers this requirement in detail, including stages of identification, phase-gate monitoring and control.</p> <p>Section 2.0 on enterprise risk management process aligns the risk management process to OPGs strategic plan. Section on SMR-X culture charter aligns with the organizational culture.</p> <p>There is evidence of this process in the program and bundle risk distribution.</p>	3

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<p>Developing the Risk Management Plan</p>	<p>Organize the plan in a logical manner and make it specifically applicable to the project.</p> <p>Consider the requirements and determine how each will be addressed in the context of the project.</p> <p>Include the following topics: scope, strategy and objectives, definitions, roles and responsibilities, qualitative risk assessment, quantitative risk assessment, risk management schedule, KPIs, communications, reporting, critical success factors, closeout and lessons learned, reference documents, software, and risk management plan revision control.</p>	<p>OPG-MAN-00120-0015-005_Project Risk Management</p> <p>DA1-IPD-NN-NN-TPLN-PM-0004 DNNP Functional Plan Project Controls</p> <p>OPG-MAN-00120-0015-005_Project Risk Management</p> <p>COR-PROC-OPG-PROC-0094-006</p> <p>DA1-IPD-NN-NN-TPLN-PM-0004 DNNP ROC and SUB ROC TOR</p>	<p>The plan is organized in a logical manner and is made applicable to the project.</p> <p>6.0 relates how the risk process fits in the context of the project.</p> <p>Section 3.0 details each role involved in risk management and their respective responsibilities.</p> <p>Section 2.0 on enterprise risk management covers the strategy and scope of risk.</p> <p>Section 2.2 highlights the phase-gate management but should have a risk management schedule that applies to the cycle.</p> <p>Section 6.4 includes a KPI/reporting strategy using a monthly scorecard to highlight and cascade outstanding actions.</p> <p>The 'committee structure' section of this document covers risk communications by establishing meeting occurrences and attendees.</p>	<p style="text-align: center;">3</p>
<p>Strategy</p>	<p>Define the purpose and objectives of the project in respect to risk management.</p> <p>Define project strategies and how they translate into risk management strategies.</p> <p>Define the company's risk appetite for qualitative and quantitative analysis.</p> <p>Define the project's priorities (e.g., cost, schedule, scope/quality).</p>	<p>DA1-IPD-NN-NN-TPLN-PM-0004</p> <p>COST-DTG-003 CONTINGENCY MANAGEMENT</p> <p>OPG-MAN-00120-0015-005_Project Risk Management</p> <p>OPG-POL-0004</p> <p>DA1-IPD-NN-NN-TPLN-PM-0004</p>	<p>Section 6.1 details the plan for risk management in alignment with the project requirements and objectives.</p> <p>Section 4.0 refers to the allocation and approval of time-phased contingency being driven by the project's strategy</p> <p>Sections 2.4.1 and 2.4.2 describe the methodology to be used depending on the project level, Monte Carlo (A and B) and EMV (C).</p> <p>The requirements section of this document details the risk appetite on an OPG level, including risk tolerance.</p> <p>Section 6.1 refers to the project's strategy regarding priorities and how this relates to the risk management process.</p>	<p style="text-align: center;">3</p>
<p>Quantitative Risk Assessment</p>	<p>Describe the method to be used for cost and schedule risk analysis (e.g., range estimating, Monte Carlo simulation).</p> <p>Define contingency and reserves, including the types of risks included in their determination and how budget values are derived.</p> <p>Describe the types of risks that will be included in the analysis to determine contingency and reserve amounts.</p> <p>Define escalation, including the types of risks and how budget values are derived.</p> <p>The document recommends that integrated cost and schedule risk analysis be performed.</p> <p>Identify any special forms to be used for quantitative risk assessment,</p>	<p>OPG-MAN-00120-0015-005_Project Risk Management</p> <p>COST-DTG-003 CONTINGENCY MANAGEMENT</p> <p>OPG-MAN-00120-0015-005_Project Risk Management</p> <p>DA1-IPD-NN-NN-TPLN-PM-0004 DNNP Functional Plan Project Controls</p> <p>OPG-MAN-00120-0015-005_Project Risk Management</p> <p>OPG-MAN-00120-0015-005_Project Risk Management</p> <p>OPG-MAN-00120-0015-005_Project Risk Management</p> <p>DA1-IPD-NN-NN-TPLN-PM-0004 DNNP Functional Plan Project Controls</p>	<p>Sections 2.4.1 and 2.4.2 describe the methodology to be used depending on the project level, Monte Carlo (A and B) and EMV (C).</p> <p>Appendix E details the Monte Carlo Analysis Process Timeline</p> <p>Section 3.0 outline types of contingency assessment that can be used on the project, but it is not specific on what will be used on the project.</p> <p>Sections 2.4.1. and 2.4.2 state the type of risks that will be included in the QRA.</p> <p>Section 6.1 describes that budget values will be derived using the project schedule and estimate values</p> <p>Section 2.4.1 highlighted that schedule and cost input will be included in the QRA for level A.</p> <p>Section 2.4.1 refers to a Monte Carlo input file, and to OPG-GUID-00120-10055 for instructions on how to complete the file.</p> <p>Specifies both PMIS (ePMX) and Sharepoint will be used for the storage of information and documentation.</p> <p>Section 6.3 states that @risk will be used to run QRAs</p>	<p style="text-align: center;">3</p>

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	<p>whether corporate standard or project-specific.</p> <p>Specify software to be used.</p>			
<p>Qualitative Risk Assessment</p>	<p>Describe the process for identifying risks. This might include brainstorming sessions, checklists, expert judgment, or other techniques.</p> <p>Define who is responsible for risk identification.</p> <p>Define when risk identification activities will occur (e.g., at project initiation, during planning phases, regularly throughout the project).</p> <p>Describe how identified risks will be documented and tracked. This usually involves a risk register or database.</p> <p>Define how changes to risk information will be controlled and versioned.</p> <p>Explain any coding or categorization system used for risks. This might involve assigning risk categories (e.g., technical, management, external) or using a Work Breakdown Structure (WBS) to organize risks.</p> <p>Define the risk statuses that will be used (e.g., open, closed, in mitigation, monitored).</p> <p>Describe how risk status will be updated and tracked.</p> <p>Describe the risk matrix used to assess the probability and impact/consequence of risks.</p> <p>Define the scales used for probability and impact (e.g., low, medium, high; numerical scales).</p> <p>Explain how risk levels will be determined based on the matrix (e.g., high-priority risks).</p> <p>Define the categories of risk responses that will be considered (e.g., avoid, mitigate, transfer, accept, exploit, share, enhance).</p>	<p>OPG-MAN-00120-0015-005_Project Risk Management</p> <p>OPG-MAN-00120-0015-005_Project Risk Management</p> <p>OPG-MAN-00120-0015-005_Project Risk Management</p> <p>OPG-MAN-00120-0015-005_Project Risk Management COR-PROC-OPG-PROC-0094-006</p> <p>OPG-MAN-00120-0015-005_Project Risk Management</p> <p>COST-DTG-003 CONTINGENCY MANAGEMENT OPG-MAN-00120-0015-005_Project Risk Management</p> <p>COR-REF-OPG-REF-00120-0976041 OPG-MAN-00120-0015-005_Project Risk Management</p> <p>OPG-MAN-00120-0015-005_Project Risk Management</p> <p>DA1-IPD-NN-NN-TPLN-PM-0004 DNNP Functional Plan Project Controls</p> <p>OPG-MAN-00120-0015-005_Project Risk Management</p> <p>FOAK-FAIW Job Aid REV4 Oct8 OPG-MAN-00120-0015-005_Project Risk Management</p> <p>OPG-MAN-00120-0015-005_Project Risk Management COR-REF-OPG-REF-00120-0976041</p> <p>OPG-MAN-00120-0015-005_Project Risk Management</p>	<p>Section 2.2 states that risk identification workshops should be performed on all level A and B projects during next phase planning, it also highlights that for level A projects going through Gate 2/3 and projects that require board approval, the workshops should be facilitated by a risk management SME from the Enterprise PMO. Section 2.3 outlines the steps in the process of qualitative risk analysis.</p> <p>Section 2.2 states the importance of the Project Manager involving the project team in risk identification activities.</p> <p>Section 2.2 outlines the fact that risk identification is an iterative process, and the frequency of iteration and participation will vary by situation.</p> <p>Section 2.2 states the risk register will be held on SharePoint. Section 2.6 explains how risks will be monitored (tracked), this is for both overall and individual project risks - reviewing and ensuring the implementation of risk response plans, tracking identified risks, identifying and analyzing new risks and evaluating risk process effectiveness throughout the project. Section 2.5 covers risk monitoring and reporting.</p> <p>Section 2.2 states the risk register will be held on SharePoint - SharePoint provides version control capabilities and version history.</p> <p>Section 4.0 describes assigning contingency to the WBS by work package type Section 2.2 highlights how to categorise the risk event using the RBS. Appendix D details the risk breakdown structure categories.</p> <p>Section on closing risk highlights categories used for status. Section 2.6 outlines some categories used once a risk has been closed.</p> <p>Section 2.6 explains how risks will be monitored (tracked), this is for both overall and individual project risks - reviewing and ensuring the implementation of risk response plans, tracking identified risks, identifying and analyzing new risks and evaluating risk process effectiveness throughout the project.</p> <p>Section 6.3 describes the risk matrix used for the assessment of impact/consequence.</p> <p>Appendix A.1.0 details the project risk assessment matrix considering probability, financial impact and schedule impact on a scale of 1-5 for both strategic projects and portfolio projects. Appendix A.2.0 does the same for opportunities.</p> <p>This document categorizes FOAK risk factors to consider when identifying risks and assigns a score to allow the project to assess the impact to the project. Appendix B contains risk heatmaps to assign each risk a score based on a scale of impact x probability.</p> <p>Section 2.5 lists and explains the applicable response strategies for both threats and opportunities. Section on actions defines threat response as mitigate, transfer or avoid.</p> <p>Section 2.5 details the process of planning and implementing risk responses, including communication, assigning roles and responsibilities, response timing, resources/budget/schedule, interaction of risk and response and ensuring response actions are SMART</p>	<p style="text-align: center;">3</p>

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	Describe how response strategies will be selected.			
Reporting	<p>Address the specifics of reporting, including what is to be reported, who is to write the reports, when they are to be issued, and how they are to be reported.</p> <p>Define if reports are stand-alone or part of an overall project report.</p> <p>KPIs that may be defined: Treatment plans developed and approved within the required time period Timing from identification to assessment and treatment Percentage of risks with action or treatment due dates being met For risks that have occurred, the severity of the actual consequence vs identified consequence</p> <p>Identify critical success factors that ensure risk program success.</p> <p>Closeout and lessons learned.</p>	<p>COST-DTG-003 CONTINGENCY MANAGEMENT OPG-MAN-00120-0015-005_Project Risk Management</p> <p>COR-PROC-OPG-PROC-0094-006</p> <p>DA1-IPD-NN-NN-TPLN-PM-0004 DNNP ROC and SUB TOR</p> <p>OPG-MAN-00120-0015-005_Project Risk Management</p>	<p>Section 8.0 outlines the type of contingency reporting including a brief description on what is contained in the reports. Appendix C.1.0 and C.2.0 and C.3.0 and C.4.0 show risk management deliverables at each phase gate including responsible leads and timescales of review meetings.</p> <p>Section 2.5.2 mentions a consolidated risk report, but this should be referred to in the RMP with specific reference to how this will be managed and whether it will be a part of another report.</p> <p>Section 6.4 includes a monthly scorecard for traceability of actions. The section on Scope details key performance indicators reported upon in the quarterly committee meeting.</p> <p>Section 2.6 states that at project closure, all risks should be given a closeout description and categorization.</p>	3
Risk Register	<p>Describe how the risk register will be maintained.</p> <p>Detail quality assurance procedures for the risk register.</p> <p>Include a risk register template in the appendix.</p>	<p>OPG-MAN-00120-0015-005_Project Risk Management</p> <p>OPG-MAN-00120-0015-005_Project Risk Management</p> <p>DNNP - Risk Register Template</p>	<p>Section 2.6 explains how risks will be monitored (tracked), this is for both overall and individual project risks - reviewing and ensuring the implementation of risk response plans, tracking identified risks, identifying and analyzing new risks and evaluating risk process effectiveness throughout the project.</p> <p>Section 2.2 refers to the Quality Risk Checklist OPG-REF-00120-0976041</p>	3

8. Appendix C – AW2 Detailed Assessment Record and Outcomes

Estimate Plan (DA1-IPD-NN-NN- TPLN-CE-0001) Reference	Requirements / Content	DNNP IPD Basis of Estimate RQE Reference	Evidence of meeting Requirements	Compliance Rating
<i>Details the sub-areas assessed for each control area</i>	<i>Outline high-level content and information required in accordance with OPG / DNNP Management Plans</i>	Document (s) Title and section reference	<i>Comments on alignment with the requirements of the AACE Record and actions / recommendations or queries</i>	<i>See Section 3.2 for Compliance Rating definitions.</i>
2.1 Coding Structure	Cost Structure Hierarchy for This Estimate: Bundle: Overall group of individual projects (e.g., NI, CI, BoP). Project Number: 5-digit identifier within a bundle. Control Account: 10-digit identifier where scope, budget, actual cost, and schedule are integrated for cost and performance management. Account: Cost types used to segregate the estimate into distinct work groups. System: Hierarchical structure of plant-level documentation, structures, and systems (MPL) for BWRX-300. Subsystem: Placeholder code used as required for further cost segregation.	4.4.10 4.4.10.1 to 4.4.10.5	Section 4.4.10 States Estimate activities are tagged in accordance with the defined coding structure so the estimate can be grouped into the following: Account; Area; System; Bundle and Partner. Additional coding will be implemented when the RQE is baselined and transitioned into Project Control space for budget monitoring and control (Control Accounts). As these Accounts were still in development at the time of estimating Control Accounts were not broadly used inside the RQE. The inclusion of code listings below represents a snapshot of the coding used at the time the RQE was developed. As the coding structure is defined at the project level inside design documents and deliverables and is a structure that continues to evolve as the design matures, the lists are included for reference only and should not be used as the defining coding structure for the project.	3

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<p>2.2 Cost Estimate Approach</p>	<p>This section outlines the cost estimate approach, including code of accounts, quantity development, pricing for equipment, bulk material, and subcontracts; construction inputs (craft labor hours, wage rates, construction material and equipment); home office services, field services, and other costs. It also includes qualifications, assumptions, and planned estimate reviews. A risk-based cost estimate approach will be applied to minimize risk and uncertainties, aiming to identify and conceptually design/size structures, systems, and equipment that most reduce project risk and uncertainty.</p>	<p>4.4.2 4.4.7 4.4.8 4.4.9</p>	<p>Section 4.4.2 States - Aecon assembled a multidisciplinary team of estimators from relevant divisions to perform the construction portion of the RQE. Each estimator or group was responsible to create a discipline estimate for each account. Quantities were primarily derived through manual take-offs from drawings and models and compared to engineering extracts where possible (as of the time of RQE, the models, drawings and engineering metadata therein was not complete enough to generate fully reliable Bills of Materials (BOMs) and Bills of Quantities (BOQs) Productivity rates were applied to the developed quantities to produce estimates for labor and construction equipment usage. Level of Effort (LOE) estimates were used to develop construction indirect costs. The direct costs of materials, construction equipment, and subcontractors are shown for each estimate activity where applicable. Individual Discipline estimates were compiled into the master estimate using inEight ("Hard dollar") software.</p> <p>Table 4-1 Details Estimating Methods by Scope</p> <p>All discipline-level estimates were compiled using inEight (Hard Dollar) software, with summarized outputs exported to Excel for presentation. Estimating tools and trade-specific productivity units were selected to accurately reflect the nature of each scope.</p> <p>Section 4.4.7 States Labour productivity analysis is performed based on Aecon's standard productivity calculation template and assessed for each trade i.e., —piping, electrical, mechanical, structural, and concrete. Section 4.4.8 details Integrated Digital Delivery Section 4.4.9 details Estimating Tools</p>	<p>3</p>
<p>2.3 Quantity Development</p>	<p>To reduce risk and uncertainties, the following approaches will be applied depending on the system or structure:</p> <ul style="list-style-type: none"> • Detail Quantities and Technical Parameters – Bulk material and equipment quantities are based on conceptual design details, using quantity and technical parameters. • Quantity Allowance – Quantities are an "engineered" allowance from conceptual design, with corresponding parameters. • Ratio-Based Estimate (\$/SF) – Uses supplier quotations or in-house pricing metrics; representative areas are developed for each system to support the estimate. 	<p>4.4.3 Section 5 (page 42 to 255)</p>	<p>Section 4.4.3 States Piping Quantities were derived from General Arrangement (GA) and P&ID drawings. Electrical quantities were developed from GA drawings and other documents listed in (refer attachment 1), Concrete quantities were derived from the GA drawings and 3D model dimensions. Building quantities were derived from GA drawings and from the 3D model. Process equipment installation estimates were based on component list provided, P&IDs, GA and coordination with design partners and the major equipment key vendors, (particularly the RPV and Turbine vendors on installation sequence details)</p> <p>Section 5 (page 42 to 255) Basis of estimate for each Account - where applicable has description and details / sizing , structures and buildings dimensions for concrete, steel and rebar densities, drawings used are referenced and general calcs used for the estimate. - Very Detailed 213 pages of information recording the basis of estimate. Assumption, allowances and exclusions are also listed by account.</p>	<p>3</p>
<p>2.4 Equipment, Bulk Material, and Subcontract Pricing</p>	<p>General heading covering many compliance areas.</p>			<p>N/A</p>

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<p>2.5 Equipment and Bulk Material Pricing</p>	<p>Budgetary pricing for equipment and bulk materials will be obtained. Items will include; equipment such as reactor vessels, pumps, heat exchangers, piping, structural steel, control system components. Pricing includes all freight to the jobsite with equipment and materials delivered under hook or to the appropriate laydown area. Source of pricing will be identified including supplier quotes, database pricing, etc.</p>	<p>4.3.1 4.3.2</p>	<p>Section 4.3.1 States In support of the project estimate, an equipment list has been developed to identify the major equipment and long lead items. The equipment list identifies the associated major pieces of equipment, technical requirements (quality classification and codes/standards), potential suppliers, cost, and the bases for the cost. The general approach as of the RQE development was as follows: •Equipment purchases for items that require iterative engineering input, (e.g. large pumps, major electrical components, large valves, complex vendor skids) will be largely done by one of the design partners. •Off-the-shelf and other commercially available equipment (e.g. tanks, hoists, smaller more standard valves) will be purchased by the construction partner. Equipment costs in the estimate are based on a combination of vendor provided budgetary quotations, in-house equipment pricing from recent nuclear projects and budgetary plug estimates. Where updated pricing was not available from the market; cost escalation has been applied on Class IV equipment prices to bring the cost to 2024 dollars. Sourcing of equipment will be based on a combined, extensive, global supply network, with an emphasis to the greatest extent possible, on Canadian suppliers, including OPG's approved suppliers' list. More details on equipment procurement is provided in Account 99 in Section 5.0.</p> <p>Section 4.3.2 States Construction bulk materials, including pipe and pipe fittings, electrical connecting material including electrical connection materials (e.g., cable and cable trays), fabricated steel, concrete, and other civil materials will be primarily procured by the construction partner. Material pricing for commodities is based on a combination of quotations from Canadian suppliers and in-house historical information. Material cost escalation since the Class IV estimate has been considered and included in the RQE. Most materials and commodities for the DNNP project can be sourced from the Canadian market. The material pricing in the estimate is current with no future escalation included beyond the date of the estimate. Material/commodity pricing will continue to fluctuate based on market demands. It is standard practice to monitor commodity pricing quarterly to support ongoing projects.</p>	<p>2</p>
<p>2.6 Subcontract Pricing</p>	<p>Subcontractor pricing will be itemized per the CBS breakdown, including: • Structural Steel Fabrication & Erection • HVAC • Fire Protection • Insulation • Painting • Building Cladding & Roofing • Architectural Finishes • Reinforcing Steel Fabrication and Installation • Piping Flushing & Cleaning Services • Field Erected Tanks • Refractory Work Budget quotes, unit prices, or recent pricing from similar projects may be used.</p>	<p>4.4.5 4.4.9</p>	<p>Section 4.4.5 States Key subcontractors have been engaged for the following scopes: HVAC, HVAC controls, and sheet metal for ducting; Fire protection and detection; Structural steel fabrication (budget unit prices); Reinforcing steel for concrete (budget prices); Insulation for process systems (budget unit prices); Fiber optic and wireless systems (budget price); Lightning protection; Communication systems and Public Address systems; Building elements: cladding, roofing, architectural finishes; Concrete supply.</p> <p>Section 4.4.9 States Estimating tools (software) and productivity units were used to prepare the individual trade estimates. The various tools and productivity units listed [in table 4-2] were used to best represent the nature of work for each of the trade disciplines. Pricing for Site Work, Foundations, Structural, and Architectural Building scopes was based on subcontractor inputs where available.</p>	<p>3</p>

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<p>2.7 Offsite Fabrication</p>	<p>Offsite fabrication will be considered for the following and further defined in the Basis of Estimate. It may include:</p> <ul style="list-style-type: none"> • Pipe Fabrication • Process Skids • Steel Bricks Forming Systems • Form Work Assemblies • Reinforcing Steel Assemblies • Structural Steel 	<p>4.4.6 5.4.2.8 5.8.2.4</p>	<p>Section 4.4.6 States Off-site fabrication for piping and DPSC modules is performed through Aecon as the leading organization. In addition, Aecon will be working with a strategic subcontracted partners to industrialize and supply an integrated, level loaded DPSC plan. Engagement of outside resources for some of the DPSC fabrication scope will be performed through the DPSC JV with E.S. Fox. to leverage excess capacity and evaluate economics of various logistical options, such as road, rail, and barge transport.</p> <p>Early investment for tooling and shop configuration works will be required and is assumed to be provided to support off-site fabrication. Investment in such tooling and equipment is required 18 months prior to the scheduled start of fabrication.</p> <p>Section 5.4.2.8 States This estimate for the off-site fabrication of DPSC modules is based on version 31 of the DPSC model, relevant DBRs that were available up to mid-August 2024, and details conveyed through the weekly design review meetings.</p> <p>Section 5.8.2.4 States The piping estimate is underpinned by a portion of the work that is performed in an offsite shop setting then shipped to site for final field integration and installation.</p>	<p>3</p>
<p>2.8 Offsite Module Assembly</p>	<p>Offsite and on-site module assembly will be considered and further defined in the Basis of Estimate. Offsite module assembly may include:</p> <ul style="list-style-type: none"> • DPSC modules • Process skids • Formwork assemblies • Reinforcing steel assemblies • Structural steel assemblies <p>On-site module assembly may include:</p> <ul style="list-style-type: none"> • DPSC modules • Formwork assemblies • Reinforcing steel assemblies • Structural steel assemblies <p>The estimate will include costs for on-site module assembly area(s) and temporary fabrication shop(s).</p>	<p>4.4.1 5.4.2.7</p>	<p>See 2.7 above for offsite module assembly.</p> <p>Section 4.4.1 States Offsite fabrication will be used to the extent practical with consideration that all fabricated components will be shipped by road. Consideration for rail or water shipments may be considered with the next phases of project execution.</p> <p>Section 5.4.2.7 States Presentation describes the plan for DPSC work from start of manufacturing to installation at site.</p> <p>On-Site Fabrication Shop for Wing Walls, Floors, Bioshield, Fuel and OC Pools. Individual sub-assemblies from off-site are assembled into modules for lifting into pit. 2 overhead gantry cranes (20T each) in fabrication shop. 4 work areas available in fab shop.</p> <p>Pre-assembly area for Basemat, outer shaft walls, SCCV Walls, SCCV Top Slab, Reactor Building (RB) Roof. Individual sub-assemblies from off-site are assembled into modules for lifting into shaft. Pre-assembly roof cover runs on rails to open for lifting operations. Mobile crane (80T) operating in pre-assembly area. Parallel work between OSW and SSCV possible.</p>	<p>3</p>
<p>2.9 Freight</p>	<p>Freight is generally included with material and equipment pricing, separate shipments will be included as required. <u>Special loads will be identified and included as required</u></p>	<p>5.8.2.4</p>	<p>Section 5.8.2.4 States The piping estimate is underpinned by a portion of the work that is performed in an offsite shop setting then shipped to site for final field integration and installation. Applicable cost rates per FDI were then applied to each weld for:</p> <p>f) Freight to site</p> <p>No further information is included in BOE and within RQE freight is not recorded.</p>	<p>2</p>
<p>2.10 Direct Labour Hours, Wage Rates and Productivity</p>	<p>Header</p>			<p>N/A</p>

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<p>2.11 Direct Labor Hours</p>	<p>The following information will be developed to estimate the number of hours needed to install the quantities. Construction Installation unit rates by commodity. Site Productivity (to adjust applicable installation unit rates); and For equipment/component the installation hours will be estimated with the support of construction using either weights, historical metrics, or based on a crew size and duration to complete the work</p>	<p>5.7.2</p>	<p>For productivity see section 2.14 of this table. Section 5.7.2 States The installation hours for major equipment were developed based on industry experience and past performance on similar reference projects.</p>	<p>3</p>
<p>2.12 Construction Labour Wage Rates</p>	<p>To determine labour cost, composite wage rates by commodity code will be developed which will account for OT, crew staffing of general foreman/foreman/journey man, apprentice and the percent each trade contributes to a commodity crew. To support this effort the following info will be collected: • Wage bulletins/Summary • Craft mix and crew compositions; and • labour information including recommended work week and incentives to attract labor (e.g., overtime; per diem; travel allowance; bonuses for safety, longevity and construction successes; etc.) • Construction wage rates will be in accordance with EPSCA agreements • EPSCA travel and subsistence amounts will be shown separately</p>	<p>4.4.11.2 DA1-OPG-NN-NN-TREP-PS-0003 Basis of Estimate</p>	<p>Section 4.4.11.2 States All rates are per the published Electrical Power Systems Construction Association (EPSCA) rate tables updated for 2024 (May 1, 2024, to April 30, 2025). The BOE has no section on crew mix and crew composition detailed. From our assessment of the RQE labour rates on Mechanical and Electrical these have no crew mix and composition adjustment. These are based 100% of Journeyman Rate only (so no apprentices or general labour which would lower the average rate) as example tray, trunking, conduit, hangers, de-scaling pipe and prep, bevelling, cutting etc. would not be by 100% Journeyman labour and would utilise apprentices and general labour for these types of works. We do however recognize that the RQE does have an adjustment for apprentices to mitigate this somewhat. A full analysis including craft mix and crew composition (general labour and other semi-skilled trades below journeyman) would increase accuracy.</p>	<p>2</p>
<p>2.13 Construction Work Week and Overtime</p>	<p>Overtime basis for purpose of the estimate is expected as follows: refer table 2.13 Final construction work weeks, shift patterns will be further developed and included in the Construction Work Packages (CWPs). Overtime assumptions and shift patterns will be reviewed and adjusted as required once estimate and schedule details are developed.</p>	<p>4.4.11.1</p>	<p>Section 4.4.11.1 States Construction Shifts, Calendars, Overtime, and Productivity All work, except for the Reactor Building excavation and construction, is assumed to occur on 5d x10hr shifts. Overtime costs are incurred as follows: Daily: 8hrs standard time (1.0x) + 2hrs overtime (1.5x) Weekly: 40hr standard time (1.0x) + 10hr overtime (1.5x) Overtime cost is calculated per the above factors. Note that all work over and above 10-hour days would be calculated at 2.0 x the base rate, if required. The following shifts are considered and included inside the RQE cost Day Shift: applied to all scopes Afternoon Shift: applied to select scopes including Reactor Building construction (specifically DPSC field labour), Account 6 Mechanical field labour, Account 7 Piping field labour, Account 8 Electrical field labour. For the labour categories listed here it was assumed that 1/3 of the total hours would be performed on the afternoon shift A shift premium of 1/7 (14.3%) was included in the labour costs for the afternoon shift in line with EPSCA labour agreements Work associated with the tunnels scope will be performed on a 5x12 hour - two shift operation with an additional 5 hours on Saturday.</p>	<p>3</p>

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<p>2.14 Construction Labour Productivity</p>	<p>Construction labour productivity will be assessed and included as required. Productivity will be assessed for items which may include:</p> <ul style="list-style-type: none"> • Congestion and stacking of trades • Location of support facilities affecting walk time for breaks etc. • Labour and skill level available • Overtime productivity effects • Height factor • Labour productivity factors will be shown separately in the estimate which allow assess and finalize the effect of productivity factors in the man hours / cost and schedule 	<p>4.4.11.3</p>	<p>4.4.7 Labour Productivity & Shift Patterns Labour productivity analysis is performed based on Aecon's standard productivity calculation template and assessed for each trade, i.e., piping, electrical, mechanical, structural, and concrete. Productivity analysis includes "wrench time" analysis, weather, and other productivity effects such as congestion, site conditions, and expected labour resources. Base shift pattern is 5d x10hr day shifts for most scopes, except RB shaft excavation and DPSC installation (RB structure), which is based on 5d x 20hr shifts. For both shift patterns, Aecon assumes that the 10 hours per week of premium time is paid at 1.5x base rate (i.e., 5d x 8hr with two hours of overtime per day at "time and a half"). Labour agreements attract a marginally higher rate for second shift base wages, and that is included in the estimate. The estimate includes second shift premium only for one third of the Mechanical, Piping, Electrical & Instrumentation (MPEI) process work scope. Work associated with the tunnels scope will be performed on a 5x12 hour - two shift operation with an additional 5 hours on Saturday.</p> <p>Section 4.4.11.3 States, The following productivity factor is being applied to direct trade labour hours to account for various productivity factors at site, - see figure 4-4. A detailed analysis can be provided separately.</p> <p>From the base value that was calculated, a management adjustment was applied to arrive at the factors outlined below, see table 4-6. Different factors were applied to different trades to account for the unique working conditions inherent in various types of work and estimating methodology.</p>	<p>3</p>
<p>2.15 Indirect Labor Hours</p>	<p>Craft labor hours for indirect construction and startup/commissioning activities will be estimated based on the project execution schedule and crew-based estimates, considering:</p> <ul style="list-style-type: none"> • Number of workers in crew • Number of months performing activity • Hours per month on site • Number of shifts per day • Crews per equipment (e.g., cranes) for some accounts <p>A back-pass will confirm total distributable hours align with historical metrics. Wage rates for indirect craft labor will follow the same approach as direct wage rates, using trade rates for certain activities (e.g., equipment operators) instead of composite crews. Final labor hours and wage rates will be based on local expertise in the construction execution plan.</p>	<p>4.4.11(.1 to .3) Section 5.14</p>	<p>Section 5.14 lists items included under Construction Indirects:</p> <ul style="list-style-type: none"> e. Site Support Labour <ul style="list-style-type: none"> i. Labourer clean up - trailer area ii. Labourers clean up - plant areas iii. Warehouse attendants iv. Tool & consumable crib attendants v. Equipment operators vi. Crane operators vii. Teamsters viii. Mechanic ix. Receiving/inspection x. Care and preservation yard xi. Confined space attendants, FME support, rescue team xii. Electricians - temp power maintenance xiii. Painters f. Site Support Labour - Scaffolding <ul style="list-style-type: none"> i. Site Security <ul style="list-style-type: none"> (i). Security/Watchman (using teamster rate) 	<p>3</p>

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<p>2.16 Indirect Material</p>	<p>The construction execution and utilization plans will define indirect (distributable) materials and facilities to support construction and startup/commissioning, including trailers, warehousing, test and inspection shops, support facilities (trash, toilets, water, break/lunch rooms), scaffolding, and laydown areas with installation materials.</p>	<p>Section 5.14 (.1 and .2) Account 83 and Z03</p>	<p>Section 5.14 lists items included under Construction Indirects:</p> <ul style="list-style-type: none"> a. Temporary Construction Facilities <ul style="list-style-type: none"> i. Trade trailers ii. Staff trailers iii. Washroom facilities iv. Office furniture v. Office equipment to use vi. Tool and consumable crib vii. Temporary fab areas - civil viii. Temporary fab areas - piping ix. Temporary fab areas - electrical x. Installation & removal of temporary facilities xi. Temporary enclosure assembly, retractable, over the Reactor Building construction area xii. Mechanic shop b. Site Utilities Install/Maintain/Remove <ul style="list-style-type: none"> i. Drinking water site wide ii. Waste disposal ix. Salt/sand ix. Receiving/inspection x. Care and preservation yard <p>First Fills: estimated cost of \$1M CAD as an allocation Scaffold Materials/Rentals</p>	<p style="text-align: center;">3</p>
<p>2.17 Indirect Construction Equipment</p>	<p>The construction execution plan will define indirect (distributable) construction equipment based on installation approach, work front locations, laydown areas, and delivery points. Equipment includes light, medium, and heavy-duty cranes; all on-site trucks (including personnel carriers/vans); earth-moving equipment (if self-performed); portable lifts; welding equipment; and special tools over \$2,000. Fuel, lubrication, and monthly repair estimates will be based on identified equipment and operating months.</p>	<p>limited Section 5.14 (.1 and .2) Account 83 and Z03 - no real details although list of indirect is detailed on 5.14</p>	<p>Section 5.14 lists items included under Construction Indirects:</p> <ul style="list-style-type: none"> d. Site Vehicles & Maintenance <ul style="list-style-type: none"> i. Road maintenance/grading/snow removal ii. Loader iii. Dump Trucks iv. Dust Control/Water trucks v. Site Truck /flat deck vi. Truck (tractor shunter) vii. Truck trailers viii. Mechanic Shop k. Cranes & Lift Equipment, including Self-Propelled Modular Transporter (SPMT) l. External Rentals not included in direct estimates m. Site Fab Equipment for DPSC 4. Small Tools & Consumables: Based on a percent of trade labour cost. 5. Medium Tools (larger than small tools, smaller than large equipment): Based on a percent of trade labour cost 	<p style="text-align: center;">3</p>

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2.18 Construction Indirect Cost and Construction Management

Construction Indirect Costs will be developed as a level-of-effort estimate based on trade support requirements and schedule. Categories may include:

Temporary Facilities: Site office, trade lunch/washroom, tool cribs, storage (note: site fabrication shops and construction warehouse included in direct estimate).

Trade Support Labor: Clean-up, tool crib and warehouse attendants, site transportation.

Trade Support – Scaffolding: May be subcontracted or self-performed; includes labor, materials, rentals. (Concrete-related scaffolding is direct; piping/electrical/mechanical scaffolding is indirect.)

Construction Equipment: Cranes, forklifts, boom trucks, heavy equipment moving, site trucks.

Construction Equipment Civil Site Work: All work for civil/site construction will be included as a direct cost within the civil/site work account estimate, including; Excavation, paving, and material handling equipment.

Project Support: First aid, rescue team, site security.

Utility Requirements: Installation, maintenance, and consumption (water, power, communication) from OPG terminal point.

Small Tools & Consumables: Percentage of trade labor, shown separately as indirect.

Small Equipment: Value greater than small tools/consumables, less than construction. Rental-based, between small tools and major equipment in value; shown separately as indirect.

Temporary Heating & Hoarding: Includes heating and hoarding for buildings and concrete/excavation winter work (may include weather-related additives).

Construction Management:
Estimated by level of effort against schedule. Includes project planning, travel, and subsistence.

Direct labor includes General Foremen and below; other roles are construction management, grouped per OPG estimate template: Project Management, Project Controls, EH&S and QA/QC, Staffing & Training.

Inspections:
 Third-party quality inspections categorized by account (e.g., concrete, soils, NDE).
 Quality reporting and documentation handled by Construction Management QA/QC personnel.

5.14.1

Section 5.14.1 States Construction indirect costs have been priced based on experience with similar or proportional scopes of work. These include indirect costs associated with construction equipment, tools, trailers, consumables, and indirect support personnel.

A list of indirect costs that have been included or accounted for are: Temporary Construction Facilities; Site Utilities Install/Maintain/Remove; Site Utility Charges; Site Support Labour; Site Support Labour - Scaffolding; Site Buildings - Temporary Building Heat & Hoard; Concrete/Excavation Work - Heat & Hoard; Site Security; Safety Facilities; Cranes & Lift Equipment; External Rentals; Site Fab Equipment for DPSC; Weather Cover for RB; First Fills; Small Tools & Consumables; Integrated Digital Delivery

Construction management detailed in 2.19 below

3

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2.19 Engineering and Project Management Cost Estimate

Engineering costs will be detailed and broken into Engineering, Engineering Project Management, and Licensing. Project Management costs will be shown separately, based on staff, manhours, and associated costs.

(from 2.18 above) Construction Management:
 Estimated by level of effort against schedule. Includes project planning, travel, and subsistence.
 Direct labor includes General Foremen and below; other roles are construction management, grouped per OPG estimate template: Project Management, Project Controls, EH&S and QA/QC, Staffing & Training.
 Inspections:
 Third-party quality inspections categorized by account (e.g., concrete, soils, NDE).
 Quality reporting and documentation handled by Construction Management QA/QC personnel.

- 4.1
- 5.12
- 5.15.1
- 5.15.2
- 5.15.3

Section 4.1 States The effort of an integrated PMT, including expenses to support the duration of the single-unit SMR facility have been accounted for as part of this cost estimate. The PMT will be responsible for managing its respective organization, and tactically feeding the governance to the project executive board, ensuring decisions are made rapidly, and project issues are dispensed efficiently. The PMT will comprise of construction management staff, which will include site support roles up to the superintendent level. The resources are aligned to the project Organization Breakdown Structure (OBS) and are supporting delivery of the appropriate 'Bundles' of scope. The specific bundles of scope and responsible organization is determined based on a best athlete approach, i.e., the organization that has the capability and available resources (labour, systems, etc.) to efficiently perform the work. This allocation of resources will be subject to change throughout the duration of the project. The hours are estimated using a level of effort (LOE) approach and are based on our historical experience and project specific requirements, such as scope of work, project duration, anticipated contracting structure, delivery schedule, etc. Discrete labour rates have been assigned to each position.

Section 5.12 States
 5.12.1 States Account 81 includes costs associated with project leadership, project management, and construction management. The costs associated with this account were estimated by preparing a staffing plan over the entire project schedule. This staffing plan considers all the staff necessary to manage the engineering resources and the number of craft onsite.
 5.12.2 The Aecon PMT estimate was developed using a comprehensive load board of roles and loading over the course of the full project. Rather than reproduce the extensive details of the load board itself, a copy of the Excel file containing the details is available as the Basis of Estimate
 File: Aecon Lifecycle MFL - All Bundles R9 - Frozen Nov11, 2024.xlsx
 5.12.3.1 GEH Project Management Team consists of individual project managers for specific scopes of work allocated to GEH through the project division of responsibility. These project managers assigned at site and home office are responsible for performing the functions outlined in the GEH quality program.
 5.12.3.7 Project Management costs have been estimated as a level of effort for the project team based on the schedule duration, utilizing the current labour rates build and accepted by ATRL. The project management team structure is as defined in the overall project estimate summary load board.

Section 5.15 Account 91 Engineering (pages 196 to 234) - Very detailed narrative provided on Engineering and design scope included

3

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<p>2.20 Home Office Services and Engineering Support</p>	<p>Home office services will be estimated to include primary and detailed engineering, procurement, resident engineering, and support for construction and commissioning. A staffing plan will define hours by labor classification, with applicable overtime, travel, per diem, relocation, and other costs (software, hardware, facilities, materials).</p>	<p>4.2 5.15.2.2 5.15.4.1.1</p>	<p>Section 4.2 States Hours required for engineering support of procurement, construction, and commissioning have also been included in the estimate. Engineering support of procurement is based out of the home office. Except for the Switchyard/Transmission Line Infrastructure EPC scope, which is assumed to be remote, engineering support of construction starts at home office and transitions to site. Engineering support of commissioning is based out of site.</p> <p>Section 5.15.2.2 States GEH provides design authority level of effort engineering support for construction and commissioning. This engineering support is primarily located at site with home office support via a dedicated Fix-it-Now team.</p> <p>Section 5.15.4.1.1 States GEH provides design authority level of effort engineering support for construction and commissioning. This engineering support is primarily located at site with home office support via a dedicated Fix-it-Now team. The estimate duration is based on construction schedule. GEHL's site engineering activities include the following:</p> <ol style="list-style-type: none"> 1. Aligning with construction and test organization for efficient completion of work. 2. Point of contact for GEH engineering queries 3. Respond to field RFIs related to GEH's SOW 4. Process Field Change Requests 5. Provide support for on-site GEH supplied equipment activities to the IPD during construction and erection, commissioning, and start-up. 6. Resolving technical issues during the project. 7. Coordinate with Home Office engineering for approval of Design Changes 	<p>3</p>
<p>2.21 Field Services</p>	<p>A field services staffing plan will be developed based on the project and construction execution schedules, covering construction and start-up/commissioning. The estimate will include hours by labor classification, overtime, travel, per diem, relocation, and other costs (software, hardware, facilities). Unlike the home office estimate, field services will involve more relocations. Site facilities and office materials will be included as indirect (distributable) costs.</p>	<p>5.15.5.1.2 5.13.1 5.15.5.1.1</p>	<p>Section 5.15.5.1.2 States Commissioning estimate comprises the following: Resident/field engineering support for commissioning:</p> <ol style="list-style-type: none"> i. Support turnover from construction. ii. Support issue troubleshooting iii. Amend design using Field Initiated Changes (FIC). <p>Estimate for Field Engineering support assumes use of ATRL design engineering process for construction package issuance and field change process. Estimate used resident engineering support during commissioning of U3 TGR Project as reference. The below assumptions are in relation to the Field Technical Specialists:</p> <ol style="list-style-type: none"> 1. Owns Advanced Authorized Process, but not CWP / ITP Development (by Project Coordinators) 2. Provides senior technical support to the bundles in coordination with PCs 3. No support included for Start-up and Testing 4. Avg 50 CWPs / FTS 	<p>3</p>

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<p>2.22 Commissioning and Start-up Costs</p>	<p>Pre-commissioning and commissioning will be customer-led, with support available on a rate basis pending agreement on effort. Pre-commissioning begins after construction testing and system turnover to OPG Operations. Construction testing starts post-installation and ends at turnover, specifics detailed in the Installation Specifications or supplier documentation. Initial station spare inventory will be estimated.</p>	<p>5.13.1 5.15.5.1.1 5.15.5.1.2</p>	<p>Section 5.13.1 States Start-Up and commissioning of the unit will be the responsibility of the Owner. Only trade labour support has been included in the estimate to support the Start-Up and Commissioning effort.</p> <p>5.13.2 Allowances, Assumptions, and Exclusions</p> <ol style="list-style-type: none"> 1. Trade labour support has been estimated on the following basis: 2. Pre-Operational Testing Support for six months = 130 days @ 10hrs/day 3. Commissioning Support for another six months = 130 days @ 10hrs/day 4. The following crew of Journeyman trades has been included to support both efforts: <ol style="list-style-type: none"> a. Qty 3 Boilermaker b. Qty 3 Carpenters c. Qty 3 Electricians d. Qty 3 Ironworkers e. Qty 3 Labourers f. Qty 3 Millwright g. Qty 3 Pipefitters h. Qty 3 Teamsters 5. A labour factor of 1.25 has been applied to the Journeyman trade labour hours to account for Foreman and General Foreman supervision required <p>Section 5.15.5.1.1 States GEH Startup and Commissioning Support Team consists of Technical Advisors to support the Owner's completion of Pre-operational and Startup testing on site. GEH support for test deficiency reports, test report reviews and/or approvals, temporary modifications is provided by GEH engineering. Pre-operational Test Specification/Procedure and Startup Test Specification/Procedure development are included in the Engineering estimate.</p> <p>The Owner is responsible for integrated commissioning strategy and GEH is responsible to provide sequencing of system to be commissioned.</p> <p>Constructor (Aecon) will plan and execute the Check and Test activities. Check and Test is defined as activities that confirm individual equipment is correctly installed, set up, and configured using local (temporary) power and/or instrument air, hydrostatic pressure testing, equipment/piping cleaning, etc.</p> <p>Commissioning equipment and testing costs are included in Construction and Owner budget. Constructor and Owner are responsible for Turnover from Construction to Commissioning. Owner is responsible for Handover from Commissioning to Operations prior to Fuel Load.</p> <p>Section 5.15.5.1.2 States ATRL will provide the commissioning specification and procedures for Circulating Condenser Cooling water, Pumphouse and Water intake, and Switchyard and Transmission lines.</p>	<p style="text-align: center;">3</p>
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<p>2.23 Other Costs</p>	<p>Other estimated costs include: Insurance: OCIP project; craft wage adders included for DIC Insurance. Bonds: Surety bond costs included if required. Escalation: Excluded; all pricing is overnight. Contingency: Determined at a P(x) value using AACE risk-based methods; included in Class 3 estimate. Fee: Not included. Warranty/Spare Parts: Estimated for startup/commissioning support.</p>	<p>Section 1 Section 5.18.2 Section 5.19.2 Section 6</p>	<p>Section 1 States This BOE documents the allowances, assumptions, and exclusions that define the scope and pricing basis for the 2024 overnight RQE of a stand-alone single-unit SMR facility. The estimate does not include contingency, escalation, bonds, insurance, treasury fees, and/or loans.</p> <p>Section 5.18.2 States The following cost estimates for commercial and insurance products by Aecon are included in the RQE as documented in the Integrated Project Agreement (IPA). Insurance - \$200,000 Letter of Credit - Construction 2023-2029 - \$4,070,400 Letter of Credit - Construction (between Substantial & Final Completion) - \$80,000</p> <p>Section 5.19.2 States No contingency cost or budget has been included in the Class IV construction estimate. A risk budget is being proposed as a separate cost and analysis but has not been included in the construction cost estimate directly.</p> <p>Section 6 States The RQE estimate is based on 2024 Canadian Dollars. No cost escalation beyond 2024 has been included in the estimate. Estimates for Engineering, Project Management, and Trade labour include base labour (i.e., salary) costs, fringe benefits and burdens, overhead and fee. Estimates for equipment, materials, subcontractor costs (excluding ATRL affiliates in post-validation phase) include a fee and exclude overhead. Other expenses such as travel costs and ATRL affiliates (post-validation phase) are pass through and do not include fee or overhead. The following expenses have been included in the estimate: Project management staffing is comprised of both local hires and staff that will be commuting to site. Travel cost for the commuting staff has been included in the estimate. The local hires and the staff that relocate to site do not attract travel cost. An allowance for software licenses (e.g., SmartPlant, Tekla, Solid Edge, Safety and Design Analysis) have been included in the estimate. A project management allowance to account for meetings, trainings, and other project expenses. Where costs or quotes were received in a currency other than Canadian Dollars (CAD), the following exchange rates are applied to convert costs to CAD [refer to Table 6-1] Escalation rates for engineered equipment have been applied to historical costs to bring the estimate to 2024 Canadian dollars (for more detail refer to Section 4.3 Procurement and Section 5, account 99).</p>	<p>3</p>
<p>3 Roles and Responsibilities</p>	<p>Header only.</p>			<p>N/A</p>
<p>3.1 Executive Board</p>	<p>The Executive Board will provide overall management and executive-level guidance to achieve the Project Objectives.</p>	<p>Attachment 3</p>	<p>No identifiable deliverable associated with 'overall management and executive level guidance' and therefore an associated reference in the estimate report would not be expected.</p> <p>More generally, Attachment 3 details the Integrated DNNP Unit 1 Organisation chart showing the relationship between the Executive Board, The Project Leadership Team and the Project management Team, providing information of structure, roles and names in each case.</p>	<p>N/A</p>

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<p>3.2 Project Leadership Team (PLT)</p>	<p>The PLT will provide management-level guidance to achieve Project Objectives, chaired by a designated Owner member. It will direct the Parties and PMTs, create and mentor PMTs, and monitor Project progress, developing benchmarks, metrics, and evaluation standards.</p>	<p>Attachment 3</p>	<p>No identifiable deliverable associated with 'management-level guidance to achieve project objectives' and therefore an associated reference in the estimate report would not be expected.</p>	<p>N/A</p>
<p>3.3 Project Management Team (PMT)</p>	<p>Will be multiple PMTs with the primary functional units covering all Project aspects, including risk management, design, engineering, licensing, construction, and commissioning. They will make day-to-day decisions to achieve the Project Objectives.</p>	<p>Attachment 3 Section 10</p>	<p>Attachment 3 details the Integrated DNNP Unit 1 Organisation chart showing the relationship between the Executive Board, The Project Leadership Team and the Project management Team, providing information of structure, roles and names in each case. Section 10 States The Class IV cost estimate was produced by a multidiscipline team across multiple organizations and all team members have extensive experience in the preparation of estimates for nuclear and non-nuclear projects. Table 10-1 to 3 States the Key Contributors to RQE Estimate from GEH/ATRL/AECON</p>	<p>N/A</p>
<p>4.0 Resources and Tools</p>	<p>The following tools will be used to prepare the estimates, with the master estimate summarized using Hard Dollar: Construction Estimate (including site work, buildings): Hard Dollar Process Systems: Accubid (imported to Hard Dollar) Trade Support: Excel (imported to Hard Dollar) Project Management: Excel (imported to Hard Dollar) Bulk Materials: Included with each estimate software used Process Equipment: Excel summary (imported to Hard Dollar) Master Integrated Estimate: Hard Dollar/Excel Owner's Cost Estimate: Excel Operating Cost Estimate: Excel</p>	<p>4.4.9</p>	<p>Section 4.4.9 States The following estimating tools (software) and productivity units were used to prepare the individual trade estimates. The various tools and productivity units listed below were used to best represent the nature of work for each of the trade disciplines. The Master estimate file was summarized using Hard Dollar (In-eight) software. Summary information from the Hard Dollar was exported in an excel format for presentation purposes. Table 4-2: Estimating Tools by Scope summarises the estimating tools for each work scope.</p>	<p>3</p>
<p>5.0 Communication and Co-ordination</p>	<p>The DNNP Program will create a Roadmap outlining activities for program cost estimate progression, serving as the primary communication tool for tracking estimate progress. It will reference responsible functions and be updated as the project approaches the Release Quality Estimate in 2024. Regular communications will occur through established venues: 1. Program and Project interface meetings 2. Project Controls meetings 3. Executive and leadership updates 4. IPD/vendor partner meetings Meeting frequency and participants will be documented in the master calendar and determined on an ad hoc basis.</p>	<p>SMRRBB_Oct_RQE_v1</p>	<p>A comprehensive Roadmap has been produced to detail the progression and review of the RQE in line with the Estimate Plan. Further meetings held which satisfy the communications requirements of the Estimate Plan have been evidenced by way of clarification session with the project team. Meetings discussed include: <ul style="list-style-type: none"> • T minus meetings (includes Project Controls swim lanes review) • Estimating Team update meetings • PLT cost update meetings • Executive meetings (Discipline VP's) • Board deep dives <p>A suggestion for future estimate plans was made to align the meeting title terminology between the estimate Plan and the Roadmap to establish clear compliance.</p> </p>	<p>3</p>

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<p>5.1 Estimate Reporting</p>	<p>Estimate outputs will be reported for analysis and comparison. All estimates should be presented with the ability to roll up by scope and phases (Project Management, Engineering, Procurement, Construction, Commissioning, and Closeout). For estimates prepared by the IPD team for power block and non-power block scopes, the following reports will include labor hours, labor costs, subcontractor costs, and material costs by Project, Area, System, Account, and responsible organization. Cash flows for the project lifecycle will also be provided.</p>	<p>RQE InEight / HardDollar outputs SMRRBB_Oct_RQE_v1</p>	<p>InEight / HardDollar functionality facilitates all of the stated estimate output requirements and is able to be presented in terms of scope and phase WBS / CBS. Note that InEight / HardDollar does not itself produce an 'Estimate Report' as indicated by the Estimate Plan section title but provides the data on which reports can be based. The production and delivery of cashflow forecasts are noted as discreet deliverables on the RQE Roadmap.</p>	<p>3</p>
<p>5.2 Estimate Assumptions</p>	<p>Assumptions are used to bridge gaps in scope or estimate basis, allowing completion of the estimate. They are documented based on scope definition and help bound scope, schedule, and cost estimates. All assumptions will be reviewed and validated by scope owners, with risks documented and monitored.</p>	<p>Section 5 (page 42 to 255)</p>	<p>Section 5 (page 42 to 255) Basis of estimate for each Account - where applicable has description and details on Allowances, assumptions and exclusions - Detailed 213-page Basis of estimate section - clearly identifying information and a thorough record of the scope of works</p>	<p>4</p>
<p>5.3 Exclusions</p>	<p>Project exclusions define what is explicitly not included in the project scope. These exclusions should not arise from a lack of information; instead, assumptions should be made to address missing details. Exclusions do not necessitate corresponding assumptions or risk entries. If an exclusion requires a risk entry, it may not truly be an exclusion. Exclusions should not duplicate work covered elsewhere within the program or project scope. When exclusions exist, the project manager must demonstrate how these issues will be managed.</p>	<p>Section 5 (page 42 to 255)</p>	<p>Section 5 (page 42 to 255) Basis of estimate for each Account - where applicable has description and details on Allowances, assumptions and exclusions - Detailed 213-page Basis of estimate section - clearly identifying information and a thorough record of the scope of works</p>	<p>4</p>
<p>6.0 Estimate Reviews</p>	<p>The IPD Project Control team and Estimating team will establish, collaboratively with area leads and the PMT team, an oversight plan that outlines the approach, participation level, review process, feedback and documentation of observations. Estimate Review Process includes: 1. Estimate Walk Through - Reports and Data 2. Project Scope and Technical Review 3. Contract Compliance Review 4. Estimate Team Reviews: Peer, Quality, Vetting and Validation 5. Project Team Reasonability Review ('Final review' which determines the reasonability of the estimate)</p>	<p>Section 10 Cost Challenge meetings SMRRBB_Oct_RQE_v1</p>	<p>Section 10 States The estimate has been reviewed extensively by the project team and internal subject matter experts from the Engineering, Project Management, Construction, Commissioning, Quality Assurance, and Procurement disciplines. Estimate peer checks and reviews have taken place to review estimating methodologies and cross check cost model calculations. An extensive series of Cost Challenge meetings has been undertaken including separate reviews of Civils, Project Management, Field Co-ordination, Procurement, Productivity, Project Controls, Quantities, Site Preparation, Circulating Cooling Water, Indirect Costs, NI PMT, QA, Structures, Other Direct Costs. Consolidated list of actions arising out of the Challenge sessions has been produced. RQE roadmap details 'Final (estimate) Package for Exec Review' and further 'ELT Review' and 'CEO Update' which can be assumed to align with the Project Team Reasonability Review / Final Review. Also noted are PLT Challenge Sessions. Although a substantial and comprehensive estimate review process has been undertaken, it is evident that the review process does not align with that stated in the Estimate Plan (as described in the text to the left of this box). The review process undertaken and described in the Basis of Estimate documents, (in addition to records of the Cost Challenge meetings), demonstrate a process which is appropriate for the scale and complexity of the project being delivered. Therefore, and as discussed in the clarification meetings with the project team, it is considered that the review process in the Estimate Plan itself may need to be updated.</p>	<p>2</p>

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Project Risk Management (OPG-MAN-00120-0015-005)	Requirements / Content	Evidence of Meeting Requirements	Compliance Rating
<i>Details the sub-areas assessed.</i>	<i>Outline high-level content and information required in accordance with OPG / DNNP Management Plans.</i>	<i>Document evidence demonstrating alignment with requirements, including specific management plan references. Identify any gaps, concerns, or issues, and provide corresponding recommendations.</i>	<i>See Section 3.2 for Compliance Rating definitions.</i>
2.2 Identify Risks	Section 2.2 highlights how to categorise the risk event using the RBS - <i>Risk owners should categorize the risk event using the Risk Breakdown Structure (RBS) list (Appendix D) provided in ePMX. The RBS should be applied to categorize the EVENT, not the cause. This allows for trending of risks against a project or portfolio to understand common themes and trends.</i>	This has been evidence in the ePMX screenshot provided, demonstrating the compulsory drop down menu for Risk Category.	4
2.2 Identify Risks	Section 2.2 specifies both PMIS (ePMX) and Sharepoint will be used for the storage of information and documentation.	Evidence of the use of Sharepoint for Risk documentation and ePMX for the Risk Register has been provided.	3
2.3 Perform Qualitative Risk Analysis	Section 2.3 highlights what is required when qualitatively assessing risks at each project level - <i>Qualitative risk analysis should follow the following process:</i> <ul style="list-style-type: none"> • <i>Step 1: Rate each risk based on its probability of occurrence and its potential impact in accordance with the standardized Project Risk Assessment Matrix scales (Appendix A). The impact rating should be assessed for both cost and schedule (NOTE: the higher of the two ratings will drive the overall score).</i> • <i>Step 2: Calculate the overall risk score by multiplying the probability rating by the highest impact rating (cost or schedule). For project level A, B, and C, the risk score should be calculated for the following:</i> • <i>Current score – Reflects the current state of the risk and is reviewed and updated regularly per the requirements of the Scalable Project Delivery Model [R2].</i> • <i>Current score = Current Probability x Current Impact (Highest).</i> • <i>Post score – Post Score is used to specify the estimated residual impact of the risk after all response actions have been successfully implemented, and changes throughout the course of the life cycle of the risk.</i> • <i>Post score = Post Probability X Post Impact (Highest).</i> 	Evidence of this is provided in the DNNP Risk Register - 11 Apr in columns DQ – EE. Evidence of this is provided in the DNNP Risk Register - 11 Apr in columns BM – CA. ePMX screenshot also provided to show how the calculation is performed in the source Risk Register.	3
2.4 Perform Quantitative Risk Analysis	Sections 2.4.1 and 2.4.2 describe the methodology to be used depending on the project level, Monte Carlo (A and B) and EMV (C) - <i>Performed by the PMO Risk Management SME based on project schedule, cost and risk input. Contingency estimate for the project is calculated based on three contributors – discrete risks (known unknowns), cost uncertainty and (for Scale A projects going to gate 3) schedule uncertainty. This process takes into account probabilistic or project-wide effects, such as correlation between risks, interdependency, and feedback loops, thereby indicating the degree of overall risk faced by the project.</i>	@risk model file provided demonstrates that all 3 contributors have been accounted for in the QRA, including discrete risks, cost uncertainty and schedule uncertainty This model also evidences the use of a correlation coefficient.	3
2.5 Plan and Implement Risk Responses	Section 2.5 lists and explains the applicable response strategies for both threats and opportunities - <i>Threat</i> <i>Avoid - Risk Avoidance is a risk response strategy whereby the project team acts to eliminate the possibility of the threat or protect the project from its impact(s). This may involve changing some aspect of the management plan or changing the objective that is in jeopardy in order to eliminate the threat impact entirely.</i> <i>Mitigate - Risk Mitigation is a risk response strategy whereby the project team acts to reduce the probability of occurrence and/or impact(s) of a threat.</i> <i>Transfer - Risk Transference involves shifting responsibility of a threat to a third party to manage the risk and to bear the impact(s) if the threat occurs. Examples include purchasing insurance or contractual arrangements with vendors to transfer the project risk.</i> <i>Accept - Risk Acceptance is a risk response strategy whereby the project team decides to acknowledge the threat and not take any further action unless or until the event occurs. Contingency or fallback plans may be developed ahead of time, to be implemented if the risk presents itself.</i>	Evidence of this is provided in the DNNP Risk Register - 11 Apr in columns CB – CC.	3

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Functional Plan - Project Controls (DA1-IPD-NN-NN-TPLN-PM-0004 DNNP)	Requirements / Content	Evidence of Meeting Requirements	Compliance Rating
<i>Details the sub-areas assessed.</i>	<i>Outline high-level content and information required in accordance with OPG / DNNP Management Plans.</i>	<i>Document evidence demonstrating alignment with requirements, including specific management plan references. Identify any gaps, concerns, or issues, and provide corresponding recommendations.</i>	<i>See Section 3.2 for Compliance Rating definitions.</i>
6.1 Plan Risk Management	Section 6.1 describes that budget values will be derived using the project schedule and estimate values - <i>Contingency is determined at the program level until Release Quality Estimate, based on project schedule, cost, and risk profile, through processes as defined in the OPG-MAN-000120-0015, Project Risk Management manual. Contingency will be determined and assigned at the Project level at RQE, and the drawdowns are tracked.</i>	The project provided the following statement, which is accepted as evidence due to the Risk Register being an iterative process and not yet at the final version - The project team provided their Basis of 3-point rationale for discrete risks with the best available information during the contingency calculation. The basis of 3-point rationale typically comes from their experience, known information, and knowledge of the project plans (Estimate and Schedule). As the project moves forward and more information is being known, the project team will continuously update the basis of rationale.	3
6.3 Risk Assessment	Section 6.3 states that @risk will be used to run QRAs.	@risk model provided and reviewed.	3
6.3 Risk Assessment	Section 6.3 describes the risk matrix used for the assessment of impact/consequence - <i>Figure 6.1: Risk Heat Map.</i>	The ePMX screenshot provided shows the categorization outlined in the Risk Matrix, this is a compulsory drop down selection for probability, finance, and schedule.	4
6.4 Risk Monitoring and Control	Section 6.4 includes a KPI/reporting strategy using a monthly scorecard to highlight and cascade outstanding actions - <i>The Enterprise Project Risk team shall provide periodic oversight commensurate for the level of risk and interface with the DNNP Program Team to review the risks for quality and ensure the ePMX tool is being updated as per the existing risk management governance. These reviews will ensure the risk and mitigating actions are up to date. Risks that are successfully mitigated or are no longer relevant or have occurred, shall be closed with a proper closure rationale. In the event a risk has occurred, an issue needs to be created.</i>	Evidence of reporting is provided in the EPPR Dashboard - 11 Apr. It demonstrates a monthly report on risks by score, bundle, accepted risks, top priority risks and activated risks.	3

Numbers may not add due to rounding.

Filed: 2025-12-12
 EB-2025-0297
 Exhibit D2
 Tab 4
 Schedule 8
 Table 1

Table 1
Capital Expenditures Summary - Darlington New Nuclear Program (\$M)

Line No.	Category	2020 Actual	2021 Actual	2022 Actual	2023 Actual	2024 Actual	2025 Budget	2026 Budget	2027 Plan	2028 Plan	2029 Plan	2030 Plan	2031 Plan
		(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)
	DNNP Capital												
1	Unit 1 & Common Scope Facilities	0.0	0.0	163.4	236.2	528.9	1,215.9	1,455.5	1,410.4	896.7	304.7	373.2	0.0
2	Unit 2 - 4	0.0	0.0	0.0	0.0	39.4	66.7	178.0	210.3	0.0	0.0	0.0	0.0
3	Total DNNP Released Capital	0.0	0.0	163.4	236.2	568.3	1,282.6	1,633.5	1,620.7	896.7	304.7	373.2	0.0

Numbers may not add due to rounding.

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 Table 2

Table 2
Comparison of Capital Expenditures - Darlington New Nuclear Program (\$M)

Line No.	Business Unit	2022 Actual	2023 Actual	2024 Actual	2025 Budget	2026 Budget	2027 Plan	2028 Plan	2029 Plan	2030 Plan	2031 Plan	2022-2026 Actuals & Budget	(m)-(k) Change	2027-2031 Plan
		(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)
	DNNP													
1	Unit 1 & Common Scope Facilities	163.4	236.2	528.9	1,215.9	1,455.5	1,410.4	896.7	304.7	373.2	0.0	3,599.9	(614.9)	2,985.0
2	Unit 2 - 4	0.0	0.0	39.4	66.7	178.0	210.3	0.0	0.0	0.0	0.0	284.0	(73.7)	210.3
3	Capital - Released DNNP Total	163.4	236.2	568.3	1,282.6	1,633.5	1,620.7	896.7	304.7	373.2	0.0	3,884.0	(688.7)	3,195.3

Numbers may not add due to rounding.

Filed: 2025-12-12
 EB-2025-0297
 Exhibit D2
 Tab 4
 Schedule 8
 Table 3

Table 3
 Capital Project Listing - Darlington New Nuclear Program Facility Projects
Projects > \$30M Total Project Cost

Line No.	Facility	Project Name	Project Number	Description of Asset Being Placed in Service	Category	Start Date	Final In-Service Date	Total Asset Cost (\$M)	1st Execution Business Case (\$M)	Total In-Service (\$M)	In-Service LTD (\$M)	In-Service IR Term (\$M)	In-Service 2025 (\$M)	In-Service 2026 (\$M)	In-Service 2027 (\$M)	In-Service 2028 (\$M)	In-Service 2029 (\$M)	In-Service 2030 (\$M)	In-Service 2031 (\$M)
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)	(s)
1	DNNP	DNNP Unit 1 & Common Scope Facilities	Various	Unit 1 In-Service	DNNP Unit 1 and Common Scope Facilities	Jan-22		6,584.9	6,584.9	6,584.9	0.0	6,584.9	0.0	0.0	0.0	0.0	0.0	6,584.9	0.0

Numbers may not add due to rounding.

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 Tab 4
 Schedule 8
 Table 6

Table 6
 Comparison of In-Service Capital Additions - Darlington New Nuclear Program (\$M)

Line No.	Business Unit	2025 Budget	(c)-(a) Change	2026 Budget	(e)-(c) Change	2027 Plan	(g)-(e) Change	2028 Plan	(i)-(g) Change	2029 Plan	(k)-(i) Change	2030 Plan	(m)-(k) Change	2031 Plan
		(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)
1	Unit 1 and Common Scope Facilities	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6,584.9	6,584.9	(6,584.9)	0.0
2	Total Unit 1 & Common Scope Facilities	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6,584.9	6,584.9	(6,584.9)	0.0
3	Minor Fixed Assets	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	Total In-Service Capital Additions	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6,584.9	6,584.9	(6,584.9)	0.0

DARLINGTON NEW NUCLEAR PROGRAM EXECUTION

1.0 OVERVIEW

The focus of this exhibit is on the management of the Execution Phase for the Darlington New Nuclear Program (“DNNP”). This refers to the methods by which the DNNP will be managed while delivering all scope, safely, on time, on budget, and to the required quality.

In addition, this exhibit provides an overview of the current Unit 1 execution status and a description of the activities of the Functional Teams that are particularly focused on execution management and support. The complete set of Functional Teams is discussed in Ex. D2-4-2.

The following components of execution management are discussed:

- Project Execution and Support by Functional Teams
- Project Management Office (“PMO”) Function
- Operations and Maintenance Function

In addition, the following key controlling methods and activities are described:

- Cost and Schedule Performance Monitoring
- Risk Management
- Change Management
- Reporting
- Oversight

These components will allow OPG to efficiently coordinate with engineering, procurement, and construction contractors; maintain control over work and track changes through integrated scheduling and cost monitoring tools; uphold worker protection, conventional and nuclear safety and environmental safety; ensure compliance with all quality requirements; effectively manage risks; and establish robust reporting mechanisms with strong internal and external oversight.

1 **2.0 PROJECT EXECUTION AND SUPPORT BY FUNCTIONAL TEAMS**

2 As described in Ex. D2-4-2, OPG has established an organization structure to effectively
3 manage the Unit 1 Execution Phase. This includes Project Management Teams (“PMT”) for
4 each of the four Execution Bundles (i.e., Design Engineering, Nuclear Island, Conventional
5 Island, and Balance of Plant) and supporting Functional Teams.

6

7 The PMT and Functional Teams focused on execution support and their key activities are
8 described below:

9

10 The **Project Management Team for each Execution Bundle** are primarily responsible for
11 the planning, execution and close-out of assigned project scope safely, on time, on budget and
12 with quality. This includes:

- 13 • leading other applicable functional teams to plan assigned scope in accordance with the
14 established DNNP readiness process;
- 15 • maintaining a schedule and cost budget through planning, execution and close-out;
- 16 • monitoring and responding to execution issues and changing conditions, coordinating
17 mitigation and escalation as needed;
- 18 • managing risk and opportunities for assigned scope;
- 19 • supporting the Construction Management Team with ensuring safe and quality execution
20 of assigned scope;
- 21 • managing equipment and materials procurement;
- 22 • reporting on progress, costs, risks/opportunities and issues and ensuring variances are
23 understood and mitigation plans are in place; and
- 24 • ensuring Lessons Learned are documented.

25

26 The **Construction Team** is responsible for the conduct of construction of all work on site
27 including applying construction best practices to deliver the construction works in alignment
28 with the project’s safety, quality, cost and schedule objectives. This includes:

- 1 • maintaining accountabilities as the Occupational Health and Safety Act Constructor,
2 ensuring legal compliance across the site;
- 3 • managing the allocation and availability of labour, materials, equipment and tooling for
4 assigned work packages;
- 5 • performing work to industry construction standards, codes and project specifications;
- 6 • enforcing site safety regulations, and participating in incident response and corrective
7 actions;
- 8 • supervising daily work activities of subcontractors, foremen and crews, driving productivity
9 and compliance; and
- 10 • operating a Construction Control Centre to manage short-term field work priorities and
11 issue resolution that arise in the field during execution.

12

13 Effective construction and field support is recognized in the industry as a key aspect of
14 managing large scale construction projects. In addition, based on industry best practices and
15 operating experience, OPG will provide continuous, planned and sustainable support and
16 monitoring of partner field activities via the Construction Center of Excellence oversight
17 function, described in Section 9.1 below. Implementation of the Construction Management
18 team and OPG's Construction Center of Excellence function will result in improved project
19 performance.

20

21 The **Quality Assurance and Control Team** is responsible for performing quality surveillance
22 at all stages of execution planning and in-field construction while also addressing critical and
23 emerging issues. For example, this team oversees the completion of work and ensures
24 regulatory requirements are met through periodic checks of the documentation to ensure what
25 has been done in the field is traceable, as required by DNNP's construction license issued by
26 the Canadian Nuclear Safety Commission ("CNSC") and in compliance with CSA N286-12. To
27 support quality data and reporting, DNNP has implemented methods, standards, and
28 governance by which consistent data and information can be developed and exchanged
29 between project parties. This includes the Adverse Condition or Event Reports, Corrective
30 Actions and Non-Conformance Reports which provide the project team with the ability to

1 identify, disposition, and action issues that arise on the project. Additional details on the Quality
2 Assurance function are described in Section 9.0 below.

3
4 The role of the **Procurement Team** is to ensure consistency and integrity in the processes
5 and systems used by each Execution Bundle and IPD partner related to the purchase and
6 delivery of parts. For example, this team ensures the consistency of information and tracks the
7 purchasing of key parts by the partners and/or their sub-vendors.

8 9 **3.0 PROJECT MANAGEMENT OFFICE FUNCTION**

10 The Project Management Office (“PMO”) Function is responsible for integrating, publishing and
11 controlling the Unit 1 execution schedules, and for ensuring all deliverables are known,
12 communicated and completed in accordance with the approved plan. Each Execution PMT is
13 accountable for ensuring that their individual plans and work readiness meet the quality and
14 timeline expectations of the PMO Function, as established through the execution planning
15 work that has been undertaken.

16
17 The PMO Function ensures the deliverables that are required throughout construction,
18 commissioning, unit start-up and project closure are planned and executed as per the
19 established project governance. This includes planning and coordination of scope, schedule,
20 risk identification and planning, and unit execution cost and data integrity. In essence, this
21 function provides an integrating force and establishes processes, reports and metrics to ensure
22 that the integrated set of projects is prepared, and subsequently executed, in accordance with
23 the jointly developed schedule.

24
25 During the Execution Phase, PMO Function activities include:

- 26
- 27 • ensuring work activities are properly planned, prepared, coordinated and monitored using
28 data systems, including ensuring parts and tools are readily available;
 - 29 • ensuring logistics required during the execution, including space, services, resources, and
30 permits, are planned, coordinated and executed;
 - 31 • monitoring work processes, identifying opportunities for efficiency improvements and
working with the PMTs and Functional Teams to realize these improvements;

- 1 • producing a detailed work execution schedule at a frequency required to ensure effective
- 2 execution of the planned work;
- 3 • performing critical reviews of upcoming work to ensure projects are aligned and challenged
- 4 to meet the execution durations;
- 5 • performing critical path and near critical path analysis, anticipating developments that may
- 6 impact schedule and provide an opportunity to adjust as necessary;
- 7 • optimizing critical path with due consideration for the impact on project costs;
- 8 • monitoring schedule contingency in the Level 2 schedule;
- 9 • ensuring that actual performance is tracked against established performance criteria by
- 10 providing timely and credible explanations of variances in project performance and
- 11 producing appropriate metrics to describe execution status;
- 12 • ensuring appropriate problem solving and analysis when unacceptable performance
- 13 deviations occur and that corrective actions are initiated and tracked to resolution; and
- 14 • providing and operating a Project Control Centre to manage project level priorities and
- 15 issues resolution.

16

17 **4.0 OPERATIONS AND MAINTENANCE FUNCTION**

18 This function supports the major work bundles, including the four Execution Bundles, with the
19 design, construction, testing, and commissioning phase of Unit 1. In this role, the Operations
20 and Maintenance Function will support design and construction reviews to determine the
21 impact on operations. In addition, the Operational Authority assigned to OPG will be satisfied
22 through the Operations and Maintenance Function. As Operational Authority, the Operations
23 and Maintenance Function will be responsible for the safety of the plant, its workers, and the
24 environment during fuel-in commissioning and unit start-up. This function ensures that plant
25 operation is in accordance with CNSC license requirements. OPG has established this function
26 within the DNNP organization to ensure that the relevant structures, systems and components
27 are constructed and commissioned to nuclear standards and placed in service in top-
28 performing condition in terms of safety, reliability and production.

1 Key responsibilities for the Operations and Maintenance Function during unit construction,
2 commissioning and start-up include:

- 3 • oversee and ensure license conditions are maintained for license to construction;
- 4 • license to operate application and implementation;
- 5 • overseeing the integration of operations and maintenance requirements into design,
6 construction and commissioning to ensure readiness for operational turnover;
- 7 • management system completion and implementation;
- 8 • controlling work protection and work authorization after system turnover;
- 9 • performing acceptance of systems and system commissioning; and
- 10 • conducting unit start-up and performance testing and turnover the unit to station
11 operations.

12 13 **5.0 COST AND SCHEDULE PERFORMANCE MONITORING**

14 The Earned Value Management (“EVM”) methodology is used by OPG as the primary tool for
15 DNNP cost and schedule management and monitoring. The EVM is a standard project
16 management technique for quantifying and measuring project progress and performance. It
17 provides a single objective system for tracking project progress, comparing planned work to
18 actual work completed, and forecasting future performance in terms of both budget and
19 timeline. In other words, the project “earns” progress as work is completed, thus allowing
20 management to implement corrective strategies if the project deviates from the plan.

21
22 Earned Value Management analysis requires three key components:

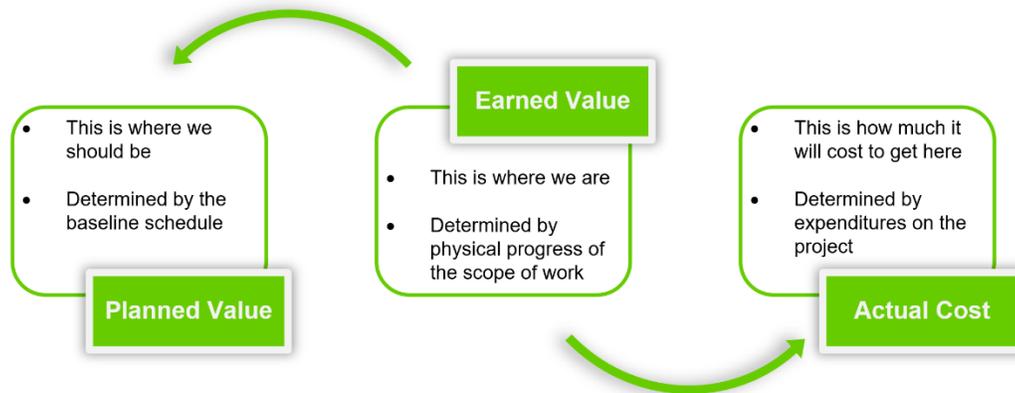
- 23 1. Planned Value – The value of work scheduled to be completed at a given point in time.
- 24 2. Earned Value – The budgeted value of completed work, calculated as the percentage of
25 physical progress achieved against the planned budget.
- 26 3. Actual Cost – The real expenditures incurred, sourced from finance/accounting records,
27 contractor invoices, and accruals.

1 The Earned Value Process is illustrated in Figure 1 and further described below:

2

3

Figure 1 – Earned Value Process Summary



4

5

6 Cost performance is assessed by using standard industry metrics at the program, project, and
7 functional levels. These earned value metrics provide insight into project efficiency and
8 progress.

9

10 The following scenario illustrates how these metrics are calculated and interpreted:

11

12 Assume that four valves were scheduled for installation by the current date, each with a
13 budgeted or planned value of \$1,000, totaling \$4,000. As of today, three valves have been
14 installed, with a total expenditure of \$2,500. Based on the experience of installing the first three
15 valves, the cost to install the fourth valve is forecasted to be \$800. The earned-value metrics
16 are calculated as follows:

- 17 • **Schedule Performance Index (“SPI”)** measures progress relative to the planned
18 schedule ($SPI = \text{Earned Value} / \text{Planned Value}$). An SPI of 1.0 indicates that work is
19 proceeding as planned, while a value below 1.0 signifies a schedule delay. A value above
20 1.0 means work has been completed ahead of schedule. In this scenario, $SPI = \$3,000 /$
21 $\$4,000 = 0.75$, indicating that the project is behind schedule.

- 1 • **Cost Performance Index (“CPI”)** evaluates cost efficiency by comparing the value of
2 completed work to actual costs incurred ($CPI = \text{Earned Value} / \text{Actual Cost}$). A CPI of 1.0
3 means work has been completed at the planned cost, while a CPI below 1.0 indicates
4 higher-than-expected costs. A CPI above 1.0 suggests cost savings. Here, $CPI = \$3,000 /$
5 $\$2,500 = 1.2$, meaning the project is being executed more cost-effectively than planned.
- 6 • **Cost Variance (“CV”)** represents the difference between the budgeted value of work
7 performed and the actual cost incurred ($CV = \text{Earned Value} - \text{Actual Cost}$). In this case,
8 $CV = \$3,000 - \$2,500 = +\$500$, a favorable variance.
- 9 • **Schedule Variance (“SV”)** measures the difference between the budgeted value of
10 planned work and the earned value of completed work ($SV = \text{Planned Value} - \text{Earned}$
11 Value). Here, $SV = \$4,000 - \$3,000 = -\$1,000$, indicating an unfavorable schedule variance.

12
13 While SPI, CPI, and variance metrics provide insights into past performance, OPG also uses
14 forecasting to assess future project success and enable proactive corrective actions at both
15 the program and project levels. A key forecasting metric is the **Estimate at Completion**
16 **(“EAC”)**, which projects total expected costs ($EAC = \text{Actual Cost} + \text{Estimate to Complete}$).
17 Using the scenario, $EAC = \$2,500 + \$800 = \$3,300$.

18
19 Another important metric is the **Variance at Completion (“VAC”)**, which calculates the
20 difference between the original budget and the forecasted final cost ($VAC = \text{Budget at}$
21 $\text{Completion} - \text{Estimate at Completion}$). In this case, $VAC = \$4,000 - \$3,300 = +\$700$, indicating
22 expected cost savings.

23
24 In addition to measuring EVM in dollars, EVM can be measured in hours. The DNNP measures
25 and reports on planned hours compared to earned hours, and the associated schedule
26 variance. This measurement provides insight into the magnitude of effort that needs to be
27 earned to return the project to plan.

1 **6.0 RISK MANAGEMENT**

2 The DNNP has adopted a systematic approach to ensure risks and opportunities are identified,
3 assessed, analyzed, mitigated with adequate risk response, and monitored to a robust and
4 consistent standard to ensure that project objectives are achieved. This work is managed by
5 the PMO Function, with additional oversight from OPG’s Enterprise Project Management
6 Office Risk Team.

7

8 Risk management provides projects with forward-looking actions and metrics to reduce the
9 likelihood and minimize the impact of undesirable events (threats) during the project life cycle
10 and increase the likelihood of positive events (opportunities) that can result in a cost and/or
11 schedule saving.

12

13 Risk identification will continue throughout the lifecycle of the project utilizing various
14 techniques as listed below:

- 15 • Risks identified during operating experience reviews and meetings with subject matter
- 16 experts;
- 17 • Stakeholder interviews and reports; and
- 18 • Risk management meetings.

19

20 Specialists will qualitatively assess the probability and consequence of each identified risk and
21 capture the information in the appropriate Risk Register to prioritize the risks.

22

23 All DNNP PMTs are required to review their individual Risk Registers throughout the project
24 and adjust their assessments and mitigating actions as necessary. The Project Leadership
25 Team (“PLT”) is provided with a quarterly update on risks and risk mitigation actions. These
26 updates are documented and summarized in the project reports.

27

28 **7.0 CHANGE MANAGEMENT**

29 Change is inevitable in a project. A robust change management process provides guidance on
30 how changes are assessed, implemented, and reported.

1 The DNNP change management process ensures that all changes to project scope, cost, and
2 schedule are controlled and documented; that contingency fund allocation is managed; and
3 that the nature and cause of changes are documented, analyzed, approved, and implemented
4 to minimize the impact to cost, schedule and scope.

5 The key principles that OPG applies with respect to change management include:

- 6 • the executing organization will first attempt to mitigate the impacts of the change so that
7 change is managed at the lowest authorized level of the organization;
- 8 • a change that has a significant potential impact on scope, cost and schedule is reviewed
9 in detail and the recommended direction is approved at the appropriate level;
- 10 • only after a change is approved by the appropriate authority level is the work assigned for
11 action by the executing organization; and
- 12 • changes are not made solely for the purpose of correcting performance issues that are
13 within the control of the work program owner.

14

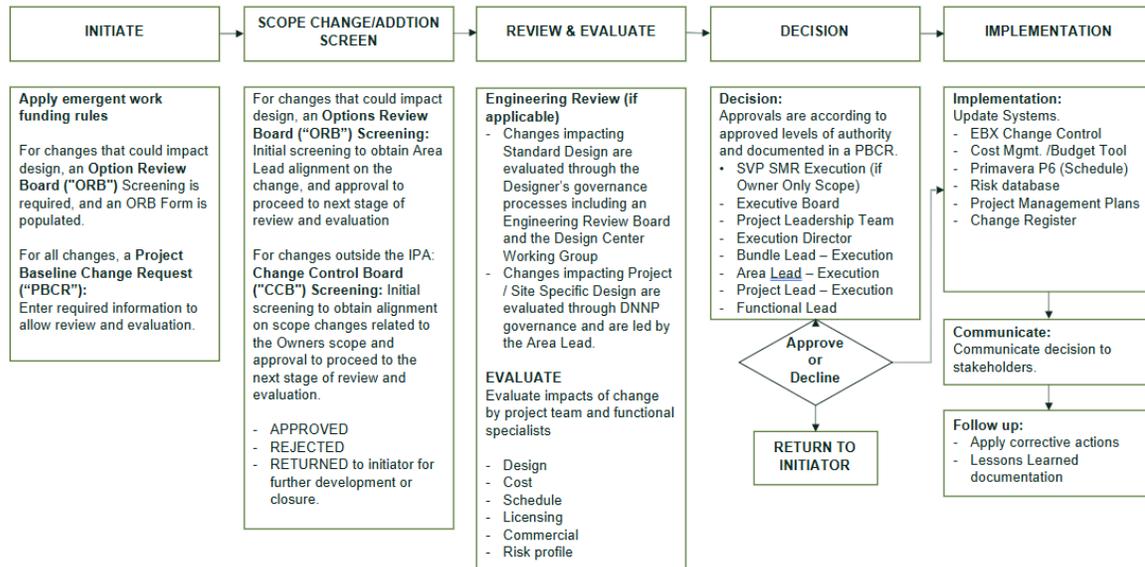
15 The change control process is applied from project inception through completion. The
16 constraints of cost, schedule and scope are continuously and rigorously managed by rejecting
17 or approving changes and subsequently incorporating approved changes into the revised
18 program and performance measurement baseline where applicable.

19

20 An overview of the DNNP change management process, including an illustration of the five
21 key steps, is shown in Figure 2 below, and further described below.

1

Figure 2 – Change Management Process Overview



2

3 **7.1 Initiation**

4 Scope change requests will originate from different areas including Field Change Requests,
 5 design development from either the technology Designer GE-Hitachi or the Architect and
 6 Engineering Firm AtkinsRéalis, GE-Hitachi Design Centre Working Group, Licensing, Project
 7 Management, Managed Systems Development, Safety Analysis, Indigenous or Stakeholder
 8 Engagement, or environmental reviews or monitoring. The initiator starts the process by
 9 describing the change in a Project Baseline Change Request form ("PBCR"). Information
 10 provided within the PBCR includes:

- 11
- business rationale or justification for the requested change;
 - technical supporting documents if applicable;
 - cost estimates, if applicable, prepared by OPG and/or contractors in sufficient detail to allow review, including hours, rates, quantities and assumptions (contractor estimates are reviewed and validated by OPG estimators);
 - a resource loaded schedule with affected activities and critical path impacts listed, if applicable;
 - impacts to the work breakdown structure including to the overall Program, if applicable;
- 12
13
14
15
16
17
18

- 1 • impacts to the risk register, including listing any additional risks, closed risks, changes in
- 2 impacts on probability, schedule and cost and mitigating actions required;
- 3 • a listing of the Work Packages affected by the proposed change;
- 4 • impacts to remaining contingency;
- 5 • the impact to the project life cycle estimate at completion, and provide a definitive estimate
- 6 at completion and compare to the approved budget; and
- 7 • any other relevant supporting documents that facilitate review and evaluation of the
- 8 change. For design changes, an Options Review Board (“ORB”) form is populated to be
- 9 reviewed at the ORB Meeting.

10

11 **7.2 Screening Scope Changes/Additions**

12 All proposed scope changes (including removal and additions) that impact the design are
13 initially screened by managers and subject matter experts. Given the high degree of
14 dependence and integration needed between the Execution Bundles, a formal ORB consisting
15 of the Execution and Functional Engineering Areas Leads is in place to assess the change.
16 The intent of an ORB review is to establish Area Lead alignment on the change, and either
17 approve the change to continue to next step, reject the change, or return the change to the
18 initiator for further development or closure.

19

20 **7.3 Review and Evaluate**

21 The evaluation of the impacts of the change on the DNNP is integral to the success of the
22 change management process. For changes which impact the Standard Design, the change
23 review and evaluation will be led by the technology Designer. For Project / Site Specific Design
24 changes that do not impact Standard Design, the change will be led by the Area Lead initiating
25 the change. If required, the PBCR is routed to the appropriate functional support group of
26 subject matter experts for an independent evaluation of the impacts of the change.

27

28 **7.4 Decision**

29 The core expectations relating to the change procedure are that: (a) the change is managed
30 at the lowest level of the organization that has the authority to do so, (b) the change with a
31 significant potential impact on program or project scope, cost and/or schedule is reviewed in

1 detail, and (c) the recommended direction is approved at the required level, as set out in Figure
2 2. The DNNP has a tiered decision-making model for the Execution Phase work. This approach
3 is consistent with industry best standards including recommended practices from the Project
4 Management Institute, the Construction Industry Institute, and the Association for the
5 Advancement of Cost Engineering International. Where appropriate, operating experience
6 from large scale nuclear and non-nuclear projects was adopted. For example, depending on
7 the level of impact to the project or Program, changes may be referred to the PLT or Executive
8 Board, as required. For decisions requiring PLT approval, representatives from Owners
9 Engineer, Project Controls, Operations, Procurement and Finance are in attendance for the
10 evaluation.

11
12 For decisions that are regarding scope outside of the Integrated Project Agreement (“IPA”), a
13 Change Control Board (“CCB”) is held with a quorum from Project Execution, Design, Project
14 Controls, Operations, Finance and Owners Engineer. For additional information on the DNNP
15 organizational structure and associated decision-making model, see Ex. D2-4-2.

16 17 **7.5 Implementation**

18 The final decision and disposition of a PBCR is communicated in writing to all stakeholders
19 listed on the PBCR. The status of a PBCR is then changed to “Approved”, and follow-up
20 actions, if any, are tracked to completion.

21 22 **8.0 REPORTING**

23 An integral part of successful project management is reliable and accurate performance
24 information. Reporting provides this performance information through the collection, collation
25 and presentation of data and information. The key objectives of reporting are:

- 26 • ensure information is being communicated to the right stakeholders such that the
27 appropriate decisions can be made, actions taken, or awareness generated;
- 28 • communicate the status of the Program including any trends, variance from plan, and
29 how the potential variance is being addressed or corrected; and
- 30 • ensure information is reliable, accurate and transparent.

1 A comprehensive reporting and data infrastructure framework has been established for
 2 reporting on the DNNP. The purpose of the framework is to provide consistent, accurate, and
 3 timely information on project status to enable effective decisions and improve project
 4 performance.

5

6 Similar to the Darlington Refurbishment Program (“DRP”), annual status reports are planned
 7 to be issued to the public and filed with the OEB for the duration of the DNNP, beginning in the
 8 IR term. This reporting will include a range of measures, including construction completion,
 9 cost performance, schedule performance, and safety performance. The metrics proposed for
 10 DNNP reporting are similar to those that were reported annually for DRP, with refinements
 11 based on OPG’s experience on reporting to date. Chart 1 illustrates the information that is
 12 planned to be provided through this public reporting for the duration of the DNNP.

13

14

Chart 1 – Public Reporting on the DNNP

Category	Measure
Introduction and Table Contents	N/A
Executive Summary	N/A
Overall Program Status	<ul style="list-style-type: none"> • High level overview of DNNP
Progress	<ul style="list-style-type: none"> • Key Achievements • % Complete
Safety	<ul style="list-style-type: none"> • Serious Injury Incident Rate
	<ul style="list-style-type: none"> • Summary of any material safety events
Significant Quality Events	<ul style="list-style-type: none"> • # of Significant Quality Events
Cost	<ul style="list-style-type: none"> • Cost Performance Index
	<ul style="list-style-type: none"> • Life-to-date cost • Forecast to Complete • Estimate at Complete
Schedule	<ul style="list-style-type: none"> • Current schedule performance (relative to OEB-approved)
	<ul style="list-style-type: none"> • Schedule Performance Index
	<ul style="list-style-type: none"> • Status of Key Milestones
	<ul style="list-style-type: none"> • Critical Path Progress
	<ul style="list-style-type: none"> • Forecasted Completion Dates

Category	Measure
Engineering	<ul style="list-style-type: none"> Summary of engineering status and key issues
Procurement	<ul style="list-style-type: none"> Summary of procurement status and key issues
Construction	<ul style="list-style-type: none"> Summary of construction progress and analysis of any material variances from plan Summary of any material labour issues Summary of any material environmental issues
Testing, Start-Up and Commissioning	<ul style="list-style-type: none"> Summary of systems tested, commissioned, started, and any material key results and issues
Program Risks and Risk Management	<ul style="list-style-type: none"> Key risks and mitigation Key issues and corrective actions
Staffing	<ul style="list-style-type: none"> Actual staffing levels against OEB-approved plan Summary of any material staffing issues

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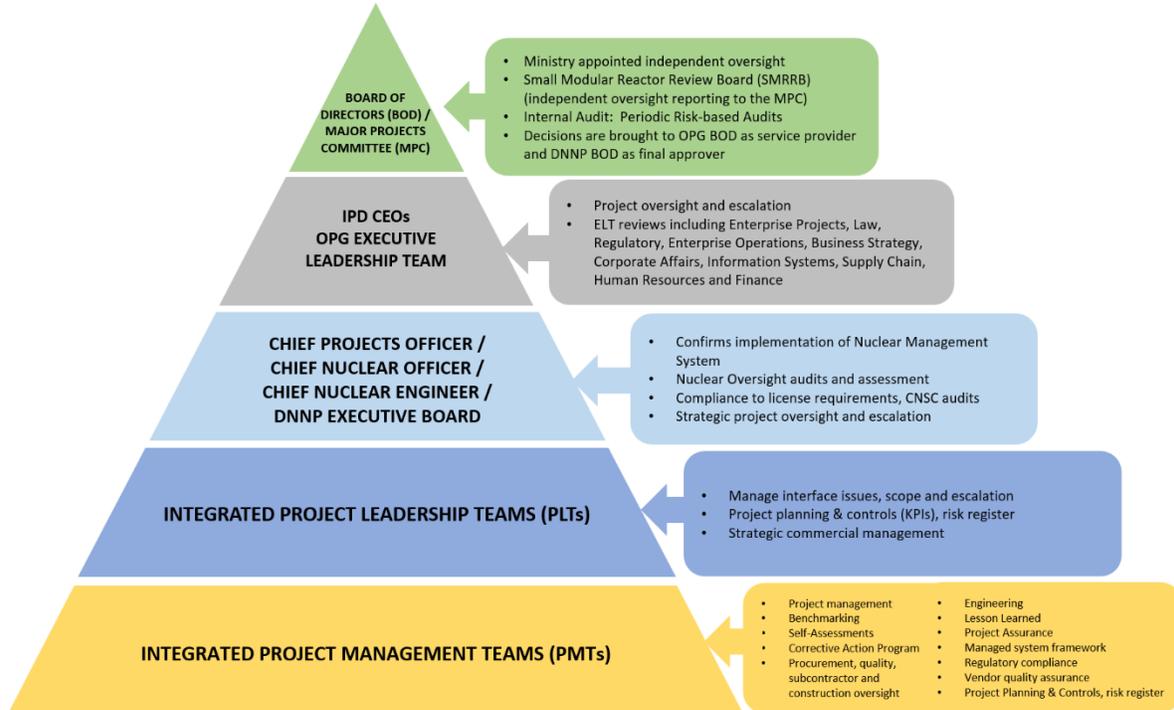
9.0 OVERSIGHT

A DNNP assurance plan is in place that is comprised of multiple layers of oversight, including from project staff, external contractors, project leadership, enterprise leadership and external advisors. The plan ensures robust oversight throughout the execution readiness and Execution Phase of the project, with a strong focus on key risk areas. Specifically, oversight will help to ensure that: (1) the DNNP meets safety, quality, cost and schedule expectations; (2) issues are identified and resolved expeditiously; and (3) transparent and accurate information is provided to OPG’s Board of Directors and DNNP GP’s Board of Directors to support effective oversight and decision-making.

The oversight and assurance processes are supported by transparent, timely and accurate information flows to support decision-making at appropriate levels within the organization. The flow of information and the organizational hierarchy of DNNP oversight and assurance providers is provided in Figure 3 below. This figure provides context for various levels of oversight and examples of activities during the project.

1

Figure 3 – DNNP Oversight and Assurance Model



2

3

4 As per Institute of Nuclear Power Operations (“INPO”) 17-004, Principles for Excellence in
 5 Corporate Performance, oversight is defined as “...the verification that the standards,
 6 expectations, and goals established through governance of the organization are met.
 7 Verification performed by managers and executives, up to and including the CEO and board
 8 of directors directly accountable for ensuring functional outcomes are met, is considered line
 9 oversight. Verification performed by personnel and groups; either internal or external to the
 10 organization and outside of the particular functional area, is considered independent
 11 oversight.”¹

¹ Institute of Nuclear Power Operations, “17-004, Principles for Excellence in Corporate Performance” (October 2017), p. 1-2.

1 DNNP Assurance is comprised of three main separate elements: External Assurance, Internal
2 Assurance, and the Integrated Project Agreement (“IPA”) Parties Assurance Programs. Each
3 element plays an important role in providing assurance to the stakeholders that the Program
4 is being executed safely, to the required quality, on time and on budget.

5
6 The key provisions of this oversight and assurance model are provided below.

7 8 **9.1 External Assurance**

9 External Assurance is defined as oversight from outside the project including the Province of
10 Ontario, industry and regulatory. The key provisions of External Assurance applied to DNNP
11 include:

- 12 • Independent Oversight provided by an independent advisor of the Ministry of Energy who
13 has been retained to monitor and report on the progress and performance of the DNNP on
14 a confidential basis directly to the Ministry of Energy. The Ministry of Environment,
15 Conservation and Parks, and the Ministry of Labour, Training, and Skills Development may
16 also provide oversight during the DNNP as required.
- 17 • Major Projects Committee of OPG’s Board of Directors, which supports program-level
18 oversight by OPG’s Board of Directors. As part of this oversight, the Major Projects
19 Committee has retained the Small Modular Reactor Review Board (“SMRRB”) to provide
20 independent assessments of the DNNP. The SMRRB provides independent assessments
21 of the DNNP progress, estimates, schedules, risks and opportunities, and provides
22 recommendations to enable early intervention, help mitigate the project risks and improve
23 overall project performance. The SMRRB is typically comprised of six external members
24 with expertise in nuclear plant operations, mega construction projects, Indigenous relations
25 and relevant regulatory requirements, typically with support from one internal OPG
26 member. It meets three times per year and reports directly to the Major Projects Committee
27 of OPG’s Board of Directors.
- 28 • OPG’s Nuclear Oversight is an independent function within OPG that is separate from line
29 management. Nuclear Oversight conducts the Independent Assessment Program to
30 ensure that the SMR project meets the requirements of the Nuclear Management System
31 as necessary. The findings are reported to OPG’s Chief Nuclear Officer and are shared

1 with the Major Projects Committee of OPG's Board of Directors as well as the DNNP LP's
2 Board of Directors.

- 3 • OPG's Internal Audit, which provides oversight in a broad range of areas such as
4 scheduling, cost estimates, contractor procurement, quality assurance, cost management,
5 contractor time keeping and IPD contracts. OPG's Internal Audit group has functional
6 independence from management. It publishes the results of audits in a report and requires
7 management actions be assigned and tracked to completion. The results of all audits are
8 presented to OPG's Chief Executive Officer and OPG's Board of Directors.
- 9 • DNNP GP's Board of Directors or Shareholders will provide oversight and decision-making
10 with respect to progress of the DNNP including on matters relating to the development,
11 design and construction of the DNNP. The Board will meet at least once every quarter. As
12 part of its oversight, the Board will receive progress reports from OPG detailing safety and
13 quality, project performance including engineering and licensing progress, cost and
14 schedule performance and Indigenous relations, and key risks associated with the
15 development, design, construction and commissioning of the DNNP facilities. The Board
16 also reviews annual project budgets, including any proposed revisions.
- 17 • Industry Regulatory and Other Oversight Bodies including the CNSC and the World
18 Association of Nuclear Operators may perform routine audits, assessments, and
19 inspections of DNNP performance. As the DNNP progresses, these reviews will include
20 insights into the Program's compliance with applicable licenses and regulations, and World
21 Association of Nuclear Operators best practices.

22 23 **9.2 Internal Assurance**

24 Internal Assurance is defined as oversight provided by functional organizations within OPG
25 and the DNNP organization to support the project. The key provisions of Internal Assurance
26 applied to DNNP include:

- 27 • Project-specific oversight and assurance processes and practices performed by the DNNP
28 Integrated PMTs and Functional Teams (i.e., the executing organization). This assurance
29 is based on risk management, operating experience, contract requirements, scope of work
30 and reviews of performance by each of the PMTs, as well as by the project execution
31 support Functional Teams. Assurance practices include project management,

1 benchmarking, self-assessments, Lessons Learned, corrective action programs, and
2 procurement quality subcontractor and construction oversight.

- 3 • Oversight of the DNNP executing organization by the DNNP Integrated PLT and project
4 functions, including the Quality Assurance and Control Team and the PMO Function
5 described in Section 2.0 and 3.0 respectively.
- 6 • Oversight and assurance provided by OPG's Chief Nuclear Officer, Chief Projects Officer
7 and Chief Nuclear Engineer, who confirm compliance to the Nuclear Management
8 System and licensing requirements throughout all project phases from design through to
9 turnover to operations. This is achieved through functions including:
 - 10 ○ OPG's Nuclear Regulatory Affairs, which interfaces with external regulators such as
11 the CNSC, Ministry of Energy and Ministry of Labour, Immigration, Training, and Skills
12 Development, who perform assessments of compliance. OPG seeks to anticipate and
13 address any issues in a way that maintains and builds regulatory confidence;
 - 14 ○ OPG's Owners Engineering, which performs oversight of contractors including Non-
15 Owner Parties ("NOP") and sub-contractors throughout the project lifecycle from design
16 to commissioning; and
 - 17 ○ OPG's Construction Centre of Excellence Function, which identifies, plans, executes
18 and reports on construction oversight activities and trends throughout the project
19 lifecycle.
- 20 • DNNP Executive Board, which is responsible for strategic oversight of the Program and
21 will provide executive-level IPA collaborative guidance for the DNNP to achieve its
22 objectives. This board is comprised of four executive members from each of the four IPD
23 parties. Executive Board decisions are made by a majority of the parties, however OPG
24 may override decisions if it does not agree. In this circumstance, the NOPs have the option
25 of seeking an adjustment to the Target Cost and/or schedule relief. Given the collaboration
26 philosophy underpinning the IPA and the structure of the compensation arrangements and
27 incentive payments, disputes are expected to be rare.
- 28 • IPD CEO and OPG's Executive Leadership Team, which reviews the performance of the
29 DNNP on a quarterly basis and provides reports to each company's Board of Directors (as
30 required) on topics such as: financial controls application and other financial implications;
31 enterprise risks that may stem from or impact the DNNP; legal and economic regulatory

1 issues; staffing, training and safety performance; and internal and external audit and
2 assessment reports.

3 4 **9.3 Integrated Project Agreement Parties Assurance Programs**

5 The IPA Parties' Assurance Programs refer to the Quality Programs that each of the IPA
6 Parties must implement to comply with N286 as required by the Nuclear Management System.
7 The IPA Parties will oversee the sub-contractors' quality programs to ensure it meets fit-for-
8 purpose requirements and ensure sufficient oversight to confirm that their respective
9 management system is followed and that all deficiencies are documented in their respective
10 corrective action system. Additionally, all Oversight Plans will be assessed frequently for their
11 effectiveness.

12
13 These levels of oversight during the Execution Phase will help to ensure that the DNNP meets
14 expectations on safety, quality, cost and schedule. They will also help to ensure that issues
15 are identified and resolved expeditiously, and that transparent and accurate information flows
16 up to OPG's Board of Directors and the DNNP GP's Board of Directors.

17 18 **10.0 CURRENT STATUS AS OF SEPTEMBER 30, 2025**

19 As of September 30, 2025, the DNNP was in its Execution Phase and was tracking slightly
20 behind the Working Schedule baseline plan. As of this date, overall Unit 1 work was 35%
21 complete, against a planned target of 37% and construction work was 12% complete, against
22 the planned Working Schedule baseline target of 15%.

23
24 The Unit 1 work variance was primarily due to delays in offsite fabrication of the Diaphragm
25 Plate Steel Composite ("DPSC"), design engineering, and construction. The DPSC is
26 constructed from prefabricated, modular steel and concrete blocks. It provides the structural
27 integrity necessary to house the Reactor Pressure Vessel and associated equipment. The
28 construction variance is primarily due to delays in DPSC offsite fabrication impacting onsite
29 construction activity and work stoppages to enable the contractors to put in place corrective
30 actions related to safety practices.

1 The DNNP's critical path is 81 days behind the Working Schedule baseline plan as of
2 September 30, 2025. As a consequence of the DPSC fabrication delays, the basemat
3 installation is forecast to commence on April 20, 2026, 81 days behind the planned date of
4 January 30, 2026. Recovery plans for the basemat lift and fabrication of the subsequent eight
5 levels are being developed along with an assessment of any impact to downstream segments
6 of the plan. OPG is evaluating opportunities to recover critical path and is closely monitoring
7 near critical path scope, including Reactor Building shaft excavation work.

8
9 Overall engineering progress is 78% complete, compared to a planned Working Schedule
10 baseline completion of 81%. A recovery plan to return engineering progress to plan is in place
11 to deliver the project's Baseline 3 Milestone by December 30, 2025.

12
13 Progress on some elements of the Nuclear Island, Conventional Island and Balance of Plant
14 Major Work Bundles is slightly behind schedule; however, none of these elements impact the
15 project's overall critical path.

16
17 As of September 2025, all other Level 1 milestones are now complete (see Chart 2 below).
18 OPG is actively managing all delays and expects to be able to recover the delays incurred to
19 date within the high confidence schedule. Challenges regarding the DPSC are associated with
20 managing first-of-a-kind construction issues, which, once resolved, are not expected to further
21 impact the project going forward.

1

Chart 2 - Program Milestone Progress (as of September 2025)

Project Name	Program Milestone Name	Baseline	Forecast	Status
Program Management and Support	Release 4 Approved by Board	15-Apr-25	5-Mar-25	Complete
Nuclear Island Construction & Procurement	Post-LTC Excavation Reactor Building Excavation Start (78m to 52m)	15-Apr-25	21-Apr-25	Complete
EA Licensing & Support	License to Construct (LTC) Issued by CNSC	15-Apr-25	4-Apr-25	Complete
Nuclear Island Construction & Procurement	Diaphragm Plate Steel Composite (DPSC) On-site fabrication - Basemat - Start of Installation / Construction (SOI)	4-Jul-25	15-Aug-25	Complete
Site Establishment	Site Establishment Detailed Engineering Complete (All BL3)	23-May-25	8-Aug-25	Complete
CCW (Design)	100% Tunnel Design Complete	28-Nov-25	5-Dec-25	Behind
Site Establishment	Fabrication Building - Finish of Installation / Construction (FOI)	16-Sep-25	5-Dec-25	Behind
Power Block Design	Milestone 4 - U71 and T10 DPSC Plate Design Released for Installation	15-Dec-25	12-Dec-25	On Track
Power Block Design	BL3 Design Complete - Mech, Cvl, Strctr, Archtctr & Elect	31-Dec-25	31-Dec-25	On Track
Nuclear Island Construction & Procurement	Reactor Building Shaft Ready to Use	24-Dec-25	29-Jan-26	Behind

2

1 **DARLINGTON NEW NUCLEAR PROGRAM**
2 **INDEPENDENT STUDIES**

3
4 **1.0 INDEPENDENT REVIEW OF PLAN AND APPROACH TO PROGRAM EXECUTION**

5 In September 2025, Pegasus Global Holdings, Inc. (“Pegasus-Global”) was retained to
6 conduct an assessment of OPG’s project management and preparedness with respect to the
7 DNNP. Pegasus-Global delivered its testimony in December 2025.

8
9 Pegasus-Global concluded that OPG has demonstrated readiness to execute the DNNP
10 through comprehensive pre-execution planning supported by a robust governance structure,
11 including development of a Class 3 Release Quality Estimate, a mature governance
12 framework, an Integrated Project Delivery contracting model that shares risks across the
13 partners, a well-developed suite of project controls that align with recognized industry
14 standards, and robust succession planning initiatives across OPG’s organization. Based on
15 Pegasus-Global’s evaluation of the pre-execution planning, project governance, and project
16 controls in comparison to generally accepted industry standards and practices, Pegasus-
17 Global concluded that OPG is ready to execute a project of this size and complexity. Pegasus-
18 Global’s testimony is included in Attachment 1.

LIST OF ATTACHMENTS

1

2

3 Attachment 1: Pegasus Global Holdings, Inc. – Testimony of Joseph Miller

4

5 Attachment 2: Pegasus Global Holdings, Inc. Engagement Letter

**TESTIMONY OF JOSEPH MILLER
PRESIDENT AND CHIEF EXECUTIVE OFFICER
PEGASUS-GLOBAL HOLDINGS, INC.
ON BEHALF OF
ONTARIO POWER GENERATION, INC.
IN RESPECT TO THE DARLINGTON NEW NUCLEAR PROJECT
BEFORE THE
ONTARIO ENERGY BOARD**

DECEMBER 2025

List of Acronyms and Abbreviations

AACE International	AACE
Business Case Summary	BCS
Board of Directors.....	BOD
Basis of Estimate.....	BOE
Boiling Water Reactor.....	BWR
Canadian Nuclear Safety Commission	CNSC
Construction Management Association of America	CMAA
Cost Performance Index.....	CPI
Critical Path Method.....	CPM
Darlington New Nuclear Project.....	DNNP or Project
Darlington Refurbishment Program	DRP
Executive Board.....	EB
First-of-a-Kind	FOAK
GE-Hitachi	GEH
Information Management Plan	IMP
Integrated Project Agreement	IPA
Integrated Project Delivery	IPD
Integrated Project Schedule	IPS
Knowledge, Skills, and Qualifications.....	KSQ
Ontario Power Generation Inc.	OPG
Pegasus-Global Holdings, Inc.®	Pegasus-Global
Project Baseline Change Request	PBCR
Project Execution Plan.....	PEP
Project Leadership Team.....	PLT
PMI Project Management Body of Knowledge	PMBOK
Project Management Institute	PMI
Quality Project Management Team.....	QPMT
Qualitative Risk Assessment.....	QRA
Release Quality Estimate	RQE
Small Modular Reactor	SMR
Darlington New Nuclear Project Unit 1.....	SMR1
Schedule Performance Index	SPI
Torys LLP	Torys
U.S. Government Accountability Office.....	GAO
Work Breakdown Structure.....	WBS

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I. EXECUTIVE SUMMARY

Section I of my testimony begins with a summary of my overall findings and conclusions from this assessment. **Section II** provides an introduction of my background, qualifications, the purpose of this assessment, and an overview of the documentation that Pegasus-Global Holdings, Inc. (“Pegasus-Global”) reviewed and the industry standards relied upon while conducting this assessment. **Section III** provides an overview and background information relating to the Darlington New Nuclear Project (“DNNP” or “Project”). **Section IV** contains an assessment of the pre-execution planning undertaken by the Project, which includes discussion of the Release Quality Estimate (“RQE”) schedule, RQE cost estimate, the pre-execution contracting strategy, and the lessons learned to date. **Section V** details the execution phase readiness, which includes an assessment of the overarching governance processes and structure, contract management strategy, project controls, and the lessons learned program. The findings and conclusions from this assessment are summarized below.

OVERALL CONCLUSION

- Based on Pegasus-Global’s review of Ontario Power Generation Inc.’s (“OPG’s”) pre-execution planning and execution phase processes and procedures as of the date of this report, I conclude that OPG has demonstrated readiness to execute the Project through comprehensive pre-execution planning supported by a robust governance structure, including development of a Class 3 RQE, a mature governance framework, an Integrated Project Delivery (“IPD”) contracting model that shares risks across the partners, a well-developed suite of project controls that align with recognized industry standards, and robust succession planning initiatives across their organization.

SUMMARY OF SECTION III – BACKGROUND INFORMATION

- Pegasus-Global’s review found that OPG has extensive experience with megaprojects, including nuclear megaprojects. I conclude that the extensive pre-execution planning that OPG has undertaken places the DNNP in a favorable position to have successful execution of the Project even with the inherent megaproject and first-of-a-kind (“FOAK”) risks. This pre-execution planning includes incorporation of lessons learned

from megaprojects (nuclear and non-nuclear), benchmarking, and collaboration with others who are planning to build BWRX-300 small modular reactors (“SMRs”). I find OPG’s assessment and management of megaproject and FOAK risks to be reasonable and aligned with industry standards and what we have seen in other megaprojects. With regard to FOAK risks, I conclude that OPG has established a robust process for identifying, tracking, and communicating FOAK risks and actively seeks to mitigate the risks.

SUMMARY OF SECTION IV – PRE-EXECUTION PLANNING

- For the pre-execution planning portion of the assessment, Pegasus-Global conducted an evaluation of the development of the RQE cost estimate and schedule that collectively will be used by OPG to monitor and control the execution of the DNNP SMR Unit 1 (“SMR1”). It also examined the contracting strategy implemented for the DNNP and the incorporation of lessons learned to date.
- I found that OPG’s RQE cost and schedule estimate were developed in alignment with industry standard practices, such as those prescribed by the Project Management Institute (“PMI”), AACE International (“AACE”), and the U.S. Government Accountability Office (“GAO”). The RQE includes contingency based on a P90 confidence level calculated by Monte Carlo simulations and supported by a comprehensive basis of estimate and schedule. The selection of a P90 confidence level provides greater assurance that the Project will be completed on schedule/on budget based on what is currently known; however, as a FOAK megaproject, there remains uncertainty, particularly around the “known-unknown” risk (i.e. risks that are identifiable, but with unknown details and impacts) and the “unknown-unknown” risk (i.e. risks not identifiable in advance) elements that can influence the execution and delivery of the Project. OPG has the appropriate tools and processes in place to manage these risk uncertainties.
- Both the RQE cost estimate and schedule were developed collaboratively with inputs and reviews from a variety of project participants, including each of the Integrated Project Agreement (“IPA”) partners that collectively are responsible for the design/engineering, procurement, and construction of the Project.

- OPG has followed a well-thought-out and disciplined contracting strategy. The IPD contracting model promotes collaboration, risk sharing, and transparency among the IPA partners. This contracting strategy serves to mitigate some of the risks associated with FOAK megaprojects and aligns the key project partners ahead of execution, including use of risk and reward pools as incentives/disincentives to the parties. This approach provides a very transparent view of contingency and risks to each major entity involved in the DNNP and encourages a collaborative approach to help other partners towards a common goal of successful project delivery without a single party solely bearing the burden of negative project impacts in this risk/reward pool commercial arrangement.
- Part of the collaboration is achieved through a “best athlete” approach where the project is staffed by the best available personnel to support the required tasks/scope, regardless of which of the IPA partners they are employed by. I found that the DNNP contract management process is in alignment with industry standards and is consistent with what I would expect for a project of this size.
- I found that OPG diligently identified appropriate data and information to support the Project’s development, including benchmarking a number of similar projects and seeking out and identifying lessons learned to inform the planning and development of the DNNP and took appropriate actions to evaluate and integrate the lessons learned to the Project. These efforts are consistent with what I would expect to see on a project of this size.

SUMMARY OF SECTION V – EXECUTION PHASE READINESS

- OPG has extensive experience in governing complex nuclear projects under a mature project management system. This framework has demonstrated sustained capabilities in areas such as project controls, engineering assurance, licensing, safety culture, and regulatory compliance.
- I found OPG’s governance structure to be well-organized and supported by strong processes and procedures that support a culture of accountability and continuous improvement. The overall framework provides confidence that the project is governed under robust, auditable, and transparent controls, consistent with the expectations of a leading nuclear operator.

- The DNNP governance documents show that OPG has built an integrated and scalable management framework encompassing the full project lifecycle—from early design and licensing through construction, commissioning, and operations. Each program area—whether engineering, construction, project controls, training, or stakeholder engagement—operates within a defined governance boundary that specifies roles, responsibilities, and performance expectations. This governance framework aligns with industry best practices and nuclear regulatory expectations, ensuring that the DNNP proceeds under a well-defined mandate with transparent accountability and effective oversight.
- OPG has established an appropriate organizational structure for the execution of the DNNP utilizing a “one-team” environment with its IPD partners. This organizational structure incorporates practices that PMI has identified as supporting improved collaboration, including defined roles and responsibilities, allocation of internal and partner employees into project teams, formal committees tasked with specific objectives, and standings meetings for regular review of project topics.
- OPG’s contract management process is aligned with industry standard practices and is supported by OPG’s Commercial Management group, who were also involved with the creation and negotiation of the IPA. The contract management plan for the Project was designed to align with the IPA, ensuring effective commercial management throughout the execution of the Project.
- Project control processes supporting the execution phase of the Project were assessed in the areas of schedule management, cost management, risk management, scope/change management, and reporting. I found DNNP’s project control processes used to govern the Project often match or exceed industry standards and best practices in their thoroughness and are appropriate for a project of this size and magnitude. The robust project controls will support OPG to appropriately plan, control, and monitor the execution of the Project.
- OPG’s lessons learned process goes beyond industry standards by establishing a process that enables the effective capture, documentation, evaluation, and incorporation and verification of lessons learned. Further, I found that OPG’s strategic incorporation of lessons learned such as use of the IPD concept and single risk register and schedule platform indicate a history of successfully incorporating lessons learned.

II. INTRODUCTION

Q. Please state your name and occupation.

A. My name is Joseph Miller, President and Chief Executive Officer of Pegasus-Global, an international consulting firm that provides services to the energy and infrastructure industries. Pegasus-Global is often engaged by clients to ensure that the appropriate governance, project controls, related processes and systems are in place to help support successful project execution. I am the Director of this engagement for Pegasus-Global and the sponsor of this assessment. I directed and actively participated in this assessment, and this testimony was prepared under my direction and supervision.

Q. Please summarize your educational background and professional experience.

A. I graduated from Purdue University with a Bachelor of Science degree in Mechanical Engineering. I have over 30 years of experience in the power sector. In the last 15 years, I have sponsored testimonies in 58 regulatory proceedings including base rate, fuel, Certificate of Public Convenience and Necessity, plant abandonment, prudence, and environmental cases. I have performed work on a wide range of engagements for public and private sector clients. My full experience and qualifications, including regulatory cases in which I have submitted testimony, are identified within my CV, attached as Exhibit JM-1.

Q. What is the purpose of your testimony?

A. Pegasus-Global was retained by Torys LLP (“Torys”) on behalf of OPG to conduct an assessment of OPG’s pre-execution planning, project management and preparedness for executing the DNNP. Pegasus-Global evaluated the pre-execution planning, project

governance, and project controls in comparison to generally accepted industry standards and practices to determine if OPG is ready to execute a project of this size and complexity.

Q. Can you summarize how Pegasus-Global conducted the assessment?

A. Pegasus-Global reviewed the processes, policies, and procedures that are being utilized or will be utilized by OPG and the DNNP organization to plan, manage, and control the Project and compared them to what Pegasus-Global would expect to see on a project of similar size and scope as well as to current industry practices and recommendations. Pegasus-Global also conducted interviews with key DNNP leadership from OPG to provide additional context and insight into the documentation.¹

Q. What documentation did Pegasus-Global review and rely on?

A. Pegasus-Global requested, obtained, and reviewed project documentation prepared to support the planning and execution of the DNNP to conduct its assessment and develop conclusions. The documentation relied upon by Pegasus-Global in this assessment is referenced throughout this testimony and includes project management policies and procedures, project planning material, governance documentation, and related project records.

Q. What industry standards did Pegasus-Global rely upon while conducting the review?

A. Pegasus-Global relied primarily on the industry standards published by the AACE and its Recommended Practices, the Construction Management Association of America (“CMAA”), and the PMI and its Project Management Body of Knowledge (“PMBOK”). Other sources of industry standards are noted herein.

¹ This engagement scope evaluated OPG’s preparedness for executing the Project and did not include interviews of the other DNNP partners outside of OPG.

III. BACKGROUND INFORMATION

A. GENERAL

Q. Please provide an overview of the DNNP.

A. The DNNP is the planned construction of four FOAK GE-Hitachi (“GEH”) BWRX-300 nuclear reactors and their supporting infrastructure. The Project is located at the existing Darlington Nuclear Generating Station outside of Bowmanville, Ontario. Each reactor will produce 300MW of carbon-free electricity. The Project will be constructed using an IPD model as established through the IPA between OPG and its alliance partners – GEH, Aecon Kiewit, and Atkins Realis – to maximize integration and collaboration across contract partners. The overall Project schedule anticipates SMR1 achieving commercial operation by the end of 2030 and all four units achieving commercial operation by the end of 2035.

Q. Is your assessment only for DNNP SMR Unit 1?

A. Yes. Pegasus-Global was engaged by Torys on behalf of OPG to assess the OPG’s project management and preparedness with respect to the execution of SMR1 of the DNNP, which is the only unit to thus far have established an RQE. However, SMR1 includes the common infrastructure facilities to support SMR1-4 of the DNNP. OPG’s program release strategy for the DNNP is structured such that the execution phase funding for SMR1, which was approved for release in March 2025 and also included funding to continue the definition phase development for SMR2-4. Driven in part by the FOAK nature of the DNNP, OPG’s program release strategy for the overall SMR1-4 is structured such that the RQE for the subsequent SMR2-4 is staggered to allow incorporation of information and lessons learned from the earlier units prior to the release of funding for the later units. This execution approach is similar to OPG’s approach on the Darlington Refurbishment Program (“DRP”)

that saw lessons learned from the earlier units executed and efficiencies gained in the subsequent units.

B. MEGAPROJECTS AND FOAK ASPECTS OF THE DNNP

Q. What is a megaproject?

A. “Megaprojects” are generally defined as exceptionally large and complex investment projects that attract a prominent level of public attention or political interest because of the significant costs (generally over \$1 billion) and the direct and indirect impacts on the community, environment, and companies undertaking such projects. Other attributes often include the execution of an engineered facility that is complex or unusual, contains FOAK elements, has an extended schedule of more than four years, involves multiple equipment and material suppliers, and involves multiple stakeholders and investors.²

Q. Does DNNP qualify as a “megaproject”?

A. Yes. DNNP is an exceptionally large and complex project that has attracted a prominent level of public and political attention, has a cost and schedule well in excess of \$1 billion and four years, respectively, and has direct and indirect impacts on the community, environment, and companies undertaking the Project.

Q. Why is the distinction between a megaproject and a typical construction project important when assessing project management and readiness for a megaproject?

A. A sound understanding of the distinctions between a megaproject and a typical construction project is essential to evaluate the prudence and reasonableness of management’s decisions and actions within a megaproject environment. Actual management of a megaproject is in

² Galloway, P., Nielsen, K., and Dignum, J., *Managing Gigaprojects: Advice from Those Who’ve Been There, Done That*. p.1 (2013)

itself more complex than the management of a typical construction project. Under *CSA N286-12* principles, the management of such projects must be conducted within an established management system that integrates governance, safety, quality, cost, schedule, and risk management.³ Challenges multiply across scope, interfaces, and stakeholder expectations, and the magnitude of risk and uncertainty increases significantly with megaprojects. Judging megaproject management actions against the standards of a typical project can result in conclusions that overlook the unique governance, integration, and risk-management demands inherent in such large-scale undertakings.

Each megaproject is inherently unique. Benchmarking is often limited, as few truly comparable projects exist. The technological, regulatory, and logistical challenges vary widely and directly shape the context in which management decisions must be made and evaluated. Because of this uniqueness, the framework for assessing management performance or prudence must be established specifically for each project, reflecting its particular risks, constraints, and execution environment.

Q. What are the characteristics of a FOAK project?

A. The key characteristic of a FOAK project is summarized by “you don’t know what you don’t know.” As more information becomes available, it can potentially lead to changes and/or additional risks to the project, which can be further exacerbated on a megaproject with the numerous interfaces within the project. Examples of such FOAK challenges include:

- Risk analyses may not reasonably estimate the unknown aspects of FOAK projects.
- Traditional contracts may not anticipate or allocate FOAK risks.
- Good faith design efforts can prove to need changes as the project is built because of unforeseen circumstances.

³ *CNSC Regulatory document REGDOC-2.1.1, Management System*

- Project leaders may face challenges in finding qualified suppliers, who may be challenged to meet material, quality and schedule requirements.
- Leaders may also face challenges in securing qualified and available craft labor for the FOAK aspects of the project and may further encounter lower than planned productivity rates and/or higher than planned quality issues.
- Constructability challenges including activity sequencing or area access, integration among disciplines, unique construction methods and tools, etc. may put additional pressure on the cost and schedule of the project.
- Integration of FOAK components and equipment can have unexpected challenges during startup and commissioning (including both FOAK components and equipment and the first time certain non-FOAK components have been integrated).

Therefore, the owner of a FOAK project must seek to continuously identify and mitigate what risks it can identify based on the information known at the time and seek to be prepared to respond to those risks it cannot identify at the start of the project.

Q. Is DNNP a FOAK project?

A. Yes. While DNNP is far from the first nuclear plant built in Canada or the United States, it will be the first BWRX-300 constructed among the G7 countries. Experience with new nuclear construction in North America and the United Kingdom remains limited, and there is presently no direct experience with the construction or operation of small modular reactors.

Q. What are the FOAK risks associated with the Project?

A. Given that DNNP is the first small modular nuclear plant constructed in North America, the Project has several FOAK (or similarly “first-in-a-while”) aspects that present risks to the Project, including but not limited to:

- The BWRX-300 design, including unidentified scope risks and startup and testing risks.
- Changes in licensing from that of the nuclear plants constructed in the 1960s-1980s.
- The potential for limited availability of qualified craft labor and the associated challenge of achieving the necessary productivity goals.
- The limited availability of qualified material and equipment suppliers, compounded by the time and rigor required to establish and qualify new

vendors through nuclear procurement, quality assurance, and oversight processes.

Q. What are Pegasus-Global’s findings related to how OPG is addressing these megaproject and FOAK risks?

A. OPG has extensive experience with the successful management of megaprojects including the DRP. OPG has reported that the \$12.8 billion DRP is tracking under budget and on schedule for completion by the end of 2026.⁴ OPG’s project management has been recognized as exceptional, receiving the 2021 Best Practice award from Electric Utility Cost Group for Excellence in Project Management and being named a finalist in the 2022 PMI Project Management Organization of the Year. In addition, the Company received recognition for “outstanding performance” at the 2023 PMO Global Awards.

OPG also has experience with FOAK risks. For example, aspects of the DRP were considered FOAK.⁵ OPG has recognized the FOAK risks for DNNP from the very beginning of the Project.⁶ With regard to the technology, the selection of the BWRX-300 will reduce FOAK risks, since the technology, while having many FOAK aspects, builds on lessons learned from the nine previous generations of GE Boiling Water Reactor (“BWR”) designs.⁷ OPG is addressing FOAK design issues through continued work with GEH and development of prototypes and proof of concept tests.⁸ OPG will use a cross

⁴ *Darlington Refurbishment Program Annual Report, 2024 Report, as per Decision and Order in EB-2020-0290*, p. 2 (18 Dec 2024)

⁵ *Testimony of Dr. Patricia D. Galloway, Darlington Refurbishment Program before the Ontario Energy Board*, p. 8, lines 18-19, EB-2020-0290 Exhibit D2-2-11, Attachment 1 (31 Dec 2020)

⁶ *Darlington New Nuclear Project Charter, NK054-PCH-01210-00002, Section 7.1 Risks*. p. 8 (11 Jan 2024)
The first risk listed in the Project Charter is, “*Issues related to First of a Kind (FOAK) technology development and design may delay the overall schedule of the project and result in increased cost.*”

⁷ *Application for a Licence to Construct a Reactor Facility*. p. 4 (Oct 2022).

⁸ *SMR-X Risk Report with Associated Action*, Report ID 0808A, Risk ID 63572, p. 144; Risk ID 70215, p. 146; Risk ID 63914, p. 175; Risk ID 63251, p. 225; Risk ID 72263, p. 237; Risk ID 73931, p. 244; Risk ID 61241, p. 247; Risk ID 61373, p. 248 (17 Sept 2025)

functional team with weekly interface meetings to enhance communication and awareness of FOAK-related issues such as the power block site layout.⁹ To minimize regulatory concerns with FOAK issues, OPG has engaged CSNC by submitting documents for FOAK-related items their review. Examples include submission of documents related to the Diaphragm Plate Steel Composite material and the submission of operator training documents.¹⁰

Q. What are your conclusions regarding the megaproject and FOAK risks associated with DNNP?

A. Based on our assessment, I conclude that the extensive pre-execution planning that OPG has undertaken places the DNNP in a favorable position to have successful execution of the Project. This pre-execution planning includes incorporation of lessons learned from megaprojects (nuclear and non-nuclear), benchmarking, and collaboration with others who are planning to build BWRX-300 SMRs. I found that OPG has identified many FOAK risks and is taking appropriate actions to mitigate these risks. OPG also has the tools and processes in place, including a collaborative execution environment, that supports early issue identification and resolution to address unexpected challenges as they arise. I find OPG's assessment and management of megaproject and FOAK risks to be reasonable, aligned with industry standards and consistent with what we would expect for a project of this nature.

⁹ Ibid., Risk ID 74122; p. 13; Risk ID 74125, p. 14

¹⁰ Ibid., Risk ID 57927, p. 284; Risk ID 50006, p. 273; Risk ID 61088, p. 104

IV. PRE-EXECUTION PLANNING

A. PRE-EXECUTION PLANNING BACKGROUND

Q. What aspects of pre-execution planning did you evaluate?

A. We evaluated the development of the RQE for schedule and cost as well as the initial contracting strategy and application of lessons learned for the pre-execution phase.

Q. What is the RQE estimating process?

A. OPG has produced estimates for DNNP in a progression of intervals with increasing accuracy and detail based on the maturity of the project definition and engineering maturity aligning with AACE Estimate Classes of 5, 4, and 3 leading to the update of the DNNP Business Case Summary (“BCS”) and establishment of the RQE which is a Class 3 estimate and establishes the target cost for DNNP execution phase.¹¹ A Class 3 estimate typically indicates that engineering and design completion is between 10% and 40% and that there are semi-detailed unit costs with assembly level line items. Class 3 estimates are often the basis for project funding approval.¹² In the case of the DNNP, the design was 70% complete at the time of the Class 3 estimate, which provides additional confidence in the estimate. The BCS included a holistic analysis of the proposed expenditure and proper internal controls to support and illustrate prudent decision-making along with costs, schedule, risks, and opportunities. The RQE was approved by the Board of Directors (“BOD”) in March 2025, and the approval released the funding to complete the execution phase for SMR1 plus the planning effort for SMR2-4.¹³

¹¹ *DNNP Estimate Plan (R01), DAI-IPD-NN-NN-TPLN-CE-0001*, pp. 5-6 (7 Oct 2024).

¹² *AACE Cost Estimate Classification System, Recommended Practice 115R-21*, pp. 5-12 (5 Feb 2022)

¹³ *DNNP RQE-SMR Request for Approval Memo*, (6 March 2025)

B. RQE SCHEDULE

Q. What is the RQE schedule?

A. The RQE schedule is the project-approved Level 3 resource loaded schedule that depicts the key components of the project, including integrated activity logic and a defined critical path that is based on the definition phase advancement of detailed engineering and deliverables. The RQE schedule is tied to the corresponding Class 3 cost estimate and is used to monitor and control the execution of SMR1.

Q. What are the industry standards related to developing the RQE schedule?

A. We assessed the RQE schedule using industry standards such as *AACE's Recommended Practice 61R-10: Schedule Design – As Applied in Engineering, Procurement, and Construction*, which states:¹⁴

Schedule design occurs after the project scope and execution strategy development process...has generated the project implementation basis, and translated that project implementation basis into controllable project scope definition and an execution strategy.

...

Schedule design is the collection, coordination, and organization of the inputs necessary to translate the execution strategy into a well-developed schedule. This should accurately represent the project's proposed means and methods for accomplishing the work. It also provides the basis for a technically sufficient [Critical Path Method ("CPM")] network which will allow for monitoring and control of the project.

Q. How did you assess the RQE Schedule?

A. We began the evaluation by examining the documents provided by OPG related to development of the RQE schedule for the Project. The evaluations were supplemented by interviews with key Project personnel. We reviewed several schedule management policies and procedures to guide and control the scheduling objectives, including the *DNNP Basis*

¹⁴ *AACE International Recommended Practice No. 61R-10: Schedule Design – As Applied in Engineering, Procurement, and Construction*, p. 2 (11 October 2013)

of Schedule (P01), the DNNP Scheduling Guide (C01), and the Project Schedule Management (R004). Additionally, we reviewed the desktop guide for Earned Value Management (R01) that manages how the project schedule and the earned value system interact.¹⁵ These documents provide the structure for developing the RQE schedule for DNNP. The observations gleaned from this review were assessed against industry standards to assess the RQE schedule estimate.

Q. What are your findings relative to the RQE schedule?

A. The project team identified key milestones, including the license to construct, the license to operate, and the planned commercial operation date. GEH developed the design schedule, which was reviewed in alignment with OPG's programmatic milestones. The constructor and engineer further developed the detail of the schedule in an integrated approach, leading to a complete and better-defined schedule. The RQE schedule was developed at the point when design was nearing 70% complete, allowing the construction team to further define the sequencing. These steps involved several interactive challenge sessions that looked at the integrated sequence and the accompanying risks.

As part of the development of the SMR1 schedule, the IPA parties identified the critical path of the schedule and evaluated risks for each critical path element and included schedule uncertainty risks, including determining the amount of contingency required. This process aligns with industry best practices.

The results of the Monte Carlo schedule risk analysis resulted in the creation of a medium-confidence (P50 confidence level) working schedule and a high-confidence (P90

¹⁵ *DNNP Basis of Schedule (DA1-OPG-NN-NN-TREP-PS-0001)*. (03 Mar 2025), *DNNP Scheduling Guide (DA1-IPD-NN-NN-TPRO-PM-0005)*. (19 June 2024), *Project Schedule Management (OPG-MAN-00120-0014)*. (23-03-02), *Earned Value Management (SCH-DTG-001)*. (June 2025)

confidence level) schedule which are discussed below. The working schedule will be used for day-to-day project management as well as for determining the incentives/disincentives of the IPA parties. The high-confidence schedule includes an additional six months of schedule contingency for certain schedule risks that may be encountered during execution. The high-confidence schedule is also used as the basis for external communications and progress measurement. Given that this is a FOAK megaproject, there remains a high degree of uncertainty present on the Project, including risks not currently known and/or the impact of known risks beyond what was contemplated in the risk assessments that could potentially impact the on-time completion. Because of the high level of uncertainty around a FOAK megaproject like the DNNP, it is important to have the appropriate governance structure, organizational structure, and tools, processes, and procedures in place to be able to identify and address issues as they arise. The governance structure, organizational structure, and tools, processes, and procedures in place for the DNNP are discussed elsewhere in this testimony.

Q. What is meant by a ‘confidence level’?

A. A confidence level reflects the probability that the actual result of implementing an estimate or schedule will be more favorable than the estimated amount or duration. Confidence levels are typically generated through probabilistic risk modeling, often using Monte Carlo analysis and simulations that represent probabilities based on what is currently known.

Q. What is a Monte Carlo analysis?

A. A Monte Carlo analysis is a risk quantification technique that uses a mathematical simulation to forecast the probability of completing the project on time or within budget. The analysis takes a range estimate for each project task and then generates a random

number within that range for each task. The computer software performs this thousands of times during a simulation run. The modeling requires an identification of a probability for each critical item relative to the probability of occurrence and probability of impact if it occurs, along with the monetary and time impact. This modeling results in many iterations being run to generate a cumulative probability distribution curve for a complete estimate. The probability factors that are in the Monte Carlo simulations are commonly 30%, 50%, and 90%, meaning that there is a corresponding likelihood of an underrun on the estimate, and expressed as “P30”, “P50”, and “P90”. For example, with a P50 confidence level, there is an equal chance (50%/50%) of an underrun or overrun of the underlying estimate or schedule. By utilizing a higher confidence number (e.g. P90), the owner and stakeholders reduce a significant amount of risk due to cost overruns by utilizing a contingency amount that corresponds to the high confidence number selected in order to account for the impacts of those identified risks, should they emerge.

Q. How do confidence levels differ from a point estimate?

A. A point estimate provides the value most likely to be realized on a project, given the information available at the time it was developed. A confidence level, on the other hand, provides additional information in identifying the underlying uncertainty of the estimate by providing a range of possible costs based on the identified risks and their respective impacts against a specified probability level. For example, a project with a point estimate of \$100 million could produce a range of \$80 million to \$120 million at a P90 confidence level.

Q. What are the reasons for selecting a higher or lower confidence level?

A. Selection of a confidence level is primarily reflective of the risk appetite of the owner. If the owner wishes to reduce the risk of overrunning the estimate, using a higher confidence level reduces the likelihood of a budget overrun and provides provisions for risks unknown at the time of the estimate, but likely to appear as the project progresses. On a megaproject, given the extended duration for execution and increased complexities compared to a typical project, it is common for a high confidence level to be selected as it provides more assurance that the estimate will be adequate for the duration of the project.

Q. What are your conclusions regarding DNNP's RQE schedule development?

A. DNNP's RQE level 3 schedule was developed in alignment with industry standards and is consistent with what we would expect for a project of this nature.

C. RQE COST ESTIMATE

Q. What is the RQE Cost Estimate?

A. The RQE cost estimate is a detailed financial projection that evaluates the cost implications of bringing a power plant to a state where it is ready for commercial operation. The RQE includes the costs necessary to ensure the plant meets performance, safety, regulatory, and operational standards. Key components of the RQE include capital costs to engineer, procure, construct, and commission the plant, quality assurance and compliance costs, and any other support costs such as regulatory and licensing support. This estimate is used to support final investment decisions and regulatory filings.

Q. Are there industry standards related to developing project estimates?

A. Yes. Many government bodies and project management or construction industry groups have written at great length about how to properly prepare and develop a cost estimate. Common themes reappear across these groups constituting best practices in estimating.

The US GAO has a twelve-step guide to estimating that is a good summary of industry standards for estimating project costs:¹⁶

1. *Define estimate's purpose;*
2. *Develop estimating plan;*
3. *Define program characteristics;*
4. *Determine estimating structure;*
5. *Identify ground rules and assumptions;*
6. *Obtain data;*
7. *Develop point estimate and compare it to an independent cost estimate;*
8. *Conduct sensitivity analysis;*
9. *Conduct risk and uncertainty analysis;*
10. *Document the estimate;*
11. *Present estimate to management for approval; and,*
12. *Update the estimate to reflect actual costs and changes.*

AACE International summarizes the cost estimating process as including:

*“...planning for the estimate, quantifying scope, applying cost to the scope, pricing of the project, reviewing, validating, and documenting the estimate.”*¹⁷ AACE has defined five classes of estimates based on the various estimate characteristics, such as maturity level of project definition deliverables, end usage, estimating methodology, expected accuracy range, and effort to prepare estimate. The maturity level of project definition deliverables (e.g. scope definition, plans and schedules, drawings, calculations, etc.) is the primary characteristic in determining the class of estimate, as it relates to the quality and completeness of the information available to the estimators.¹⁸ AACE adds that its cost estimate classification system, *“provides a generic and generally-acceptable classification system that can be used as a basis to compare against.”*¹⁹

¹⁶ U.S. Government Accountability Office, *Cost Estimating and Assessment Guide, Best Practices for Developing and Managing Capital Program Costs*, GAO-09-3SP, pp 9-11 (Mar 2009)

¹⁷ AACE International *Recommended Practice No. 46R-11, Required Skills and Knowledge of Cost Estimating*. p. 2 (16 Jan 2013)

¹⁸ AACE International *Recommended Practice No. 17R-97, Cost Estimate Classification System*. p. 1 (29 Nov 2011) and *Recommended Practice No. 115R-21, Cost Estimate Classification System – As Applied in Engineering, Procurement, and Construction for the Nuclear Power Industries*. (05 Feb 2022)

¹⁹ *Ibid.*, p. 2.

Q. How did Pegasus-Global assess the RQE Cost Estimate?

A. Pegasus-Global began its evaluation by examining the documents provided by OPG related to the development of the RQE cost estimate for the Project. The evaluations were supplemented by interviews with key Project personnel. Pegasus-Global reviewed the *DNNP Estimate Plan, (R01)* and *DNNP Functional Plan—Project Controls (PCP) (C04)* procedures that provide the structure for estimating project costs for DNNP.²⁰ In addition, we reviewed the DNNP Project Risk Report that provides a summary of risks and associated contingency for the RQE. The observations gleaned from this review were assessed against industry standards to assess the RQE cost estimate.

Q. What are the industry standards related to defining and determining contingency?

A. AACE provides that contingency is “[a]n amount added to an estimate to allow for items, conditions, or events for which the state, occurrence, or effect is uncertain and that experience shows will likely result, in aggregate, in additional costs.”²¹

AACE also identifies that contingency typically covers such uncertain “items, conditions, or events” as planning and estimating errors and omissions; minor price fluctuations; design developments and changes within the scope; and variations in market and environmental conditions. In summary, contingency typically falls into one of three categories: 1) cost estimating uncertainty; 2) schedule estimating uncertainty; and/or, 3) discrete risks. Contingency typically excludes major scope changes; large-impact extraordinary events (e.g. major strikes, global pandemics, natural disasters, geopolitical crises); management reserves; and extraordinary escalation or currency effects. Owners

²⁰ *DNNP Estimate Plan, DAI-IPD-NN-NN-TPLN-CE-0001*. (03 Oct 2024) and *DNNP Functional Plan – Project Controls (PCP), DAI-IPD-NN-NN-TPLN-PM-0004*. (30 Jul 2025)

²¹ *AACE International Recommended Practice No. 10S-90, Cost Engineering Terminology*. p. 30 (23 Aug 2022)

establish contingency levels based on an acceptable risk level, degree of uncertainty, and the desired confidence levels for meeting baseline requirements. When used to absorb the impacts of uncertainty, the contingency is a form of risk mitigation.²² Contingency is appropriately included in the cost estimate and is expected to be expended during the execution of a project or program as the risks and uncertainties manifest.²³

Q. Are there industry standards that establish what an appropriate amount of contingency is?

A. While there is not a single standard method in which contingency is calculated, there are general methods that are commonly used within the industry based on the experience and preference of the estimating organization. Methods include expert judgment, quantitative methods such as standardized percentages or more complex scoring mechanisms, simulations that combine expert judgment with analytical models, or parametric modeling based on multi-variable analysis of quantified risk drivers. Contingency development typically combines more than one of the above methods.²⁴

From a budget perspective, contingency is a separate project cost element or line item in the budget estimate. As a discrete line item, contingency is subject to the same processes as any other cost element, with one exception; unlike most cost elements, the contingency amount may increase or decrease from month-to-month as funds are used to address realized risks, or funds are returned to the program contingency when risks expire or projects are completed.

²² National Research Council of the National Academies. *The Owner's Role in Project Risk Management. Chapter 6, Contingency.* (2005)

²³ ACE International Recommended Practice No. 10S-90, *Cost Engineering Terminology.* p. 30 (23 Aug 2022)

²⁴ ACE International Recommended Practice No. 40R-08, *Contingency Estimating – General Principles.* pp. 1-4 (25 Jun 2008)

As noted above in the RQE Schedule section, confidence levels which reflect the probability that the result of risk actualization will be more favorable than the estimated amount or duration are typically generated through probabilistic risk modeling, often using Monte Carlo analysis and simulations that represent probabilities, not certainty. By utilizing a higher confidence number (e.g. P90), the owner and stakeholders reduce a significant amount of risk due to cost overruns. This is accomplished by utilizing a contingency amount that corresponds to the high confidence number selected to account for those identified risks, should they emerge. On a megaproject, given the extended duration for execution and increased complexities compared to a typical project, it is common for a higher confidence level to be selected as it provides more assurance that the estimate will be adequate for the duration of the megaproject.

Q. What are your findings related to the RQE cost estimate?

A. OPG established a baseline RQE cost estimate to establish the baseline budget for the execution phase of the DNNP. The RQE was approved by the BOD in April 2025 and is the benchmark for reporting costs on the project. The RQE developed for DNNP SMR1 is a Class 3 estimate (with 73% of the subcomponents at a Class 3 estimate level), prepared from the bottom up, based on project maturity and design progression to Baseline 2 status for the power block. Baseline 2 is comprised of the following:²⁵

- *Design sufficiently complete for construction planning*
- *Completed standard plant design*
- *Incorporation of site-specific design requirements, and prepare for construction planning*
- *Detailed component design*
- *Support for equipment procurement/fabrication required at this stage of design*

²⁵ DNNP – Estimate Plan, DAI-IPD-NN-NN-TPLN-CE-0001, R1. pp. 6-7 (7 Oct 2024)

- *Key system and component design documents and calculations of record issued to support licensing and construction*
- *Equipment specifications finalized for procurement*
- *Standard plant system designs are finalized based on integrated 3D model*
- *Vendor selections are completed and vendor designs are incorporated into the system design to the extent practical*
- *For off-the-shelf engineered equipment, specifications are conformed to catalogue information; for non-off-the-shelf equipment, specifications are conformed to vendor information*
- *Process flow calculations are refined based on actual system 3D modeling and vendor information. Process flow calculations and diagrams are updated to reflect final standard plant design.*
- *Maintenance requirements are incorporated into the design*
- *Piping and instrumentation diagrams are matured to reflect locations of vents/drains based on actual 3D model.*
- *The 3D model is fully detailed, including placement of pipe supports and a pipe stress analysis incorporating weights/center of gravity of selected equipment*
- *System design at the end of the Baseline 2 Design Phase supports the procurement of engineered equipment*
- *Standard mechanical system design is frozen*
- *Plant instrumentation and controls architecture and data flow diagrams are revised*
- *High level design packages and procurement packages are prepared for all plant instrumentation and control systems*

Per AACE's Recommended Practice 18R-97 on cost estimate classification for engineering, procurement, and construction in process industries, a Class 3 estimate provides an expected accuracy range of -10% to -20% on the low end and +10% to +30% on the high end. AACE notes that the expected accuracy range provides a general framework for likely outcomes of actual costs, but is affected by the state of technology, availability of applicable reference cost data, and other such risks.²⁶ More recently, in 2022, AACE issued Recommended Practice 115R-21 that provides cost estimate classifications specific for the nuclear power industries and provides that a Class 3 estimate typically

²⁶ *AACE International Recommended Practice No. 18R-97, Cost Estimate Classification System – As Applied in Engineering, Procurement, and Construction for the Process Industries.* p. 3 (07 Aug 2020)

offers an expected accuracy range of -10% to -20% on the low end and +20% to +60% on the high end, reflecting the unique cost drivers to nuclear projects (e.g. higher quality assurance and control requirements, productivity factors associated with performance of work within security protected environments, etc.).²⁷ OPG relied on guidance from AACE’s Recommended Practice 115R-21 in developing the RQE cost estimate, while utilizing the narrower general accuracy scales outlined within AACE’s Recommended Practice 18R-97 in presenting its estimate results.

The RQE is based on a comprehensive Basis of Estimate (“BOE”) document that was prepared prior to execution phase review and approval. The BOE, along with the RQE, formed the basis of the cost estimate of \$7.7 Billion. The BOE and RQE were produced by a multidiscipline team across multiple organizations and by team members that have extensive experience in the preparation of estimates for nuclear and non-nuclear projects. The estimate was reviewed extensively by the project team and internal subject matter experts from the Engineering, Project Management, Construction, Commissioning, Quality Assurance, and Procurement disciplines. Estimate peer checks and reviews were performed to review estimating methodologies and cross-check cost model calculations.²⁸

Q. What are your conclusions regarding DNNP’s RQE cost estimate development?

A. I conclude that the RQE development process aligns with GAO’s best practices and twelve-step estimate process and with the guidelines of *AACE Recommended Practices for Cost Estimate Classification* as applied to Nuclear Power Industries.²⁹ I found this use of both

²⁷ *AACE International Recommended Practice No. 115R-21, Cost Estimate Classification System – As Applied in Engineering, Procurement, and Construction for the Nuclear Power Industries.* pp. 4-5 (02 Feb 2022)

²⁸ *DNNP Integrated Basis of Estimate for Unit 1 Release Quality Estimate (RQE), DA1-OPG-NN-NN-TREP-PS-0003.* p. 259-261 (28 February 2025)

²⁹ *AACE International Recommended Practice No. 115R-21, Cost Estimate Classification System – As Applied in Engineering, Procurement, and Construction for the Nuclear Power Industries.* (05 Feb 2022)

AACE's Recommended Practices 115R-21 and 18R-97 to be reasonable as the estimate development process aligned with the guidance specific for nuclear power industries, while the narrower accuracy range provided by Recommended Practice 18R-97 reflects OPG's view of the expected accuracy range based on the design progression and risk and contingency identified within the estimate.

Both the *DNNP—Estimate Plan (R01)* and *DNNP Functional Plan—Project Controls (PCP) (C04)* procedures demonstrate alignment with industry standards that define the estimate classification system and *PMI's PMBOK*.³⁰ As an example, the *DNNP Estimate Plan* incorporates the estimate classification system prescribed by AACE into the procedure.

OPG prepared a comprehensive BOE document that aligns with the guidelines established by AACE in its *Recommended Practice on Basis of Estimates*.³¹ OPG's cost and schedule contingency development aligns with industry standards, such as those prescribed by AACE. OPG has completed this effort by identifying risks, estimating the probability of occurrence, estimating the risk impact, considering risk responses, addressing cost and schedule dependency, assessing overall outcomes through Monte Carlo simulations, and estimating and evaluating contingency.³²

OPG's estimating process is well-defined in its procedures and the results of the estimating process are fully explained within the BOE document as well as summarized in material presented to OPG's Board. OPG had a clear intent to ensure its process aligned

³⁰ *DNNP Estimate Plan, DAI-IPD-NN-NN-TPLN-CE-0001*. (03 Oct 2024) and *DNNP Functional Plan – Project Controls (PCP), DAI-IPD-NN-NN-TPLN-PM-0004*. (30 Jul 2025)

³¹ *AACE International Recommended Practice No. 34R-05, Basis of Estimate*. (05 Oct 2021)

³² *AACE International Recommended Practice No. 57R-09, Integrated Cost and Schedule Risk Analysis Using Risk Drivers and Monte Carlo Simulation of a CPM Model*. (09 Jul 2019)

with industry standards as prescribed by organizations such as AACE and followed through on that intent by holding itself to the industry standards. I find the estimating process OPG used to be reasonable and aligned with industry standards and what we have seen in other megaprojects.

I conclude OPG's method of determining its contingency amount for the RQE estimate was reasonable, including a comprehensive risk assessment, Monte Carlo simulations, vetting by internal and external to the Project parties, and the decision to use a P90 confidence level. I found the methodologies employed by OPG to develop the RQE estimate to be reasonable and appropriate. I found that the methodologies employed met accepted industry standards and guidelines as promulgated by AACE. Given that this is a FOAK megaproject, there remains a high degree of uncertainty present on the Project, including risks not currently known and/or the impact of known risks beyond what was contemplated in the risk assessments that could potentially impact the on-budget completion.

C. CONTRACTING STRATEGY

Q. What are the industry standards related to contracting strategy?

- A. The contracting strategy applied to a project should reflect the unique conditions, characteristics, and requirements of the project, as *PMI's PMBOK Guide* explains, "*The type of contracting vehicle depends on the size of the purchase, the stability of the scope of work, and the risk tolerances of the organizations.*"³³ The contracting strategy is informed by examining the project components and developing an approach that optimizes the contracting to meet program objectives.

³³ *PMI PMBOK*, p. 75 (7th ed. 2021)

Q. How did Pegasus-Global assess DNNP’s project management and readiness related to contracting strategy?

A. Pegasus-Global began its evaluation by examining project documentation concerning the selection and application of the IPD model through the IPA between the technology provider (GEH), architect-engineer (Atkins Realis), constructor (Aecon Kiewit), and OPG as the project owner. The evaluations were supplemented by interviews with key Project personnel. The documents reviewed included the *DNNP Contracting Strategy* (R000),³⁴ the *DNNP Contract Program Management Plan* (R001),³⁵ as well as a summary of the DNNP IPA.³⁶ The observations gleaned from this review were assessed against industry standards and Pegasus-Global’s industry experience to reach an informed decision on the contracting strategy selected by OPG for the Project.

Q. Please explain what an IPD contracting model is and its key characteristics.

A. The American Institute of Architects (California Council) has established the following definition for an IPD model:³⁷

Integrated Project Delivery (IPD) is a project delivery method that integrates people, systems, business structures and practices into a process that collaboratively harnesses the talents and insights of all participants to reduce waste and optimize efficiency through all phases of design, fabrication and construction.

Key characteristics of an IPD include:

- Unified team: Instead of working in silos on their respective scopes, all key partners collaborate from the early stages of design through construction and closeout.

³⁴ *DNNP Contracting Strategy, NK054-REP-01210-00119*. (15 Jul 2021)

³⁵ *DNNP Contract Program Management Plan, NK054-PLAN-01210-000100, Sheet Number 00016*. (21 Jun 2023)

³⁶ Summary of DNNP Integrated Project Agreement. (17 Oct 2025)

³⁷ American Institute of Architects (California Council) *Integrated Project Delivery: An Updated Working Definition*, Version 3, p. 4 (15 July 2014)

- Collaborative contract: A multiparty contract integrates the interests of the owner, architect, and contractor to promote alignment throughout the project.
- Shared risk and reward: All participants collectively share in the project's financial outcomes based on its overall performance, providing motivation to pursue common goals.
- Early involvement: Essential stakeholders are engaged at the outset to jointly develop a comprehensive project delivery plan.
- Shared and open information transfer: Technological tools are leveraged to facilitate transparent information access and effective collaboration among all parties.
- Collaborative culture: The IPD model fosters a shift towards trust, open communication, and teamwork that emphasizes continuous improvement rather than transactional and isolated practices.

Q. What types of projects are best suited to use IPD contracting?

A. The IPD model is particularly suited for large, complex, and FOAK projects, as it incentivizes parties to work together to minimize risks and streamline decision-making. The IPD model reduces construction risk primarily through its core principles of early engagement of key stakeholders, shared governance, collaboration, shared financial incentives (risk and reward), and a "no-blame" culture of open communication among key stakeholders.

Q. What are Pegasus-Global's findings relative to the contracting strategy for the Project?

A. As mentioned above, OPG has chosen the IPD model for its key contracts (technology, architect-engineer, and constructor). OPG chose the IPD model in order to maximize integration and collaboration between the partners by utilizing an integrated project team, collaborative behaviors, common information systems, a "best athlete"³⁸ approach to staffing positions, risk and reward sharing, accountability, transparency between partners,

³⁸ The "best athlete" approach means that positions are staffed with the best candidate, regardless of which of the partner companies that person works for. *DNNP Project Execution Plan, DA1-IPD-NN-NN-TPVS-PM-0001, C03*, p. 15-16 (10 Jan 2025)

and maximizing efficiencies. OPG has experience with elements of collaborative contracting through the DRP and has leveraged this experience for the DNNP. Industry studies on IPD contracting have found:³⁹

...information sharing in these project delivery teams facilitated the extent to which team member goals were in sync, produced decisions of a higher pedigree, and promoted the general effectiveness of IPD relative to other construction management delivery systems.

OPG has used certain elements of an IPD model in the DRP as well as the Otto Holden Generating Station refurbishment, which it found to improve collaboration among the key project partners. The DNNP IPA includes the key elements of IPDs including early involvement, collaboration, cooperation, transparency, shared governance structure, methods for resolving disputes, performance guarantees, and risk-sharing.

Q. How has OPG implemented risk and reward sharing in its IPD arrangement?

A. The risk and reward sharing on the DNNP is established through the contingency strategy developed for SMR1, which includes a “risk pool” and a “reward pool” as part of the total project contingency amount (in addition to contingency funds for OPG’s scope of work). The reward pool serves as the contingency funding for IPD execution risks identified through risk assessments, while the risk pool is a profit and overhead-at-risk component that OPG negotiated with its IPA partners. The total amount of the risk pool considered the magnitude of each party’s scope to ensure the proportions of the risk-sharing were reasonable (i.e. with the construction scope tied to most of the DNNP costs, the construction contractor has a higher share of the risk pool). The incentive to the IPA partners is if they are able to collaborate to successfully deliver SMR1 without expending

³⁹ Manata, B., Miller, V. D., Mollaoglu, S., & Garcia, A. J. (2022). Documenting the Interactive Effects of Project Manager and Team-Level Communication Behaviors in Integrated Project Delivery Teams. *Project Management Journal*, 53(1), 33–48. doi: <https://doi.org/10.1177/87569728211047296>

all of the reward pool, it will be distributed to the parties; while similarly, if they are not able to successfully deliver SMR1 and expend all of the reward pool, the risk pool funds will be used to provide additional contingency funding for the DNNP (taking away a portion of the profits and overheads from the IPA partners). This approach provides a very transparent view of contingency and risks to each major entity involved in the DNNP and encourages a collaborative approach to help other partners towards a common goal of successful project delivery without a single party solely bearing the burden of negative project impacts in this risk/reward pool commercial arrangement.

Q. What are your overall conclusions about OPG’s contracting approach for the DNNP?

A. I conclude that OPG followed a well-thought-out and disciplined process in evaluating various contracting and project delivery options, including benchmarking of recently completed nuclear projects which faced significant challenges and delays. The selection of the IPD model, formalized through the IPA, is a reasonable and prudent choice due to its inherent ability to align stakeholder interests and maximize project outcomes. Unlike traditional delivery methods that often foster adversarial relationships and information silos (particularly on more challenging projects), the IPD model mandates a high level of collaboration, transparency, and shared risk and reward among the owner, architect, and contractor from the project's inception. This single, multi-party contract structure ensures participants are financially incentivized to achieve common goals, which supports overall project performance and minimizes the parties solely prioritizing and focusing on their individual scopes of work. The resulting early collaboration facilitates proactive problem-solving, which significantly reduces the likelihood of costly change orders, rework, and disputes that commonly cause delays and budget overruns in conventional projects.

Furthermore, by leveraging the combined expertise of key team members throughout the design and construction phases, the project benefits from increased innovation, improved efficiency, and a stronger focus on delivering the best possible outcome to the owner, ultimately resulting in superior project performance.

OPG determined that IPD was the right approach for the DNNP. This approach supported early integration and joint planning amongst the IPD partners, which reduces risks on the Project and enables a more controlled transition to execution with improved delivery predictability.

D. LESSONS LEARNED TO DATE

Q. How did Pegasus-Global review lessons learned?

A. Pegasus-Global considered two aspects of “lessons learned”:

- How OPG incorporated lessons learned from its previous projects as well as external projects that could serve as lessons learned for the DNNP
- The “lessons learned” process established for the DNNP

I will address the first topic here and the second in the discussion on the execution phase assessment.

Q. How has OPG considered lessons learned and information from other projects?

A. OPG benchmarked a number of projects, incorporating lessons learned from these projects, into the DNNP Project planning. The benchmarking metrics from past projects were used to compare estimated productivity such as hours per quantity, construction labor to construction equipment costs, construction indirect to construction costs, project

management to trade labor ratios, and scaffold labor to construction labor percentage.⁴⁰

OPG conducted benchmarking in 2021 with a focus on lessons learned on megaproject construction. OPG's benchmarking included reviews of recent nuclear projects including Hinkley Point C in the UK and Vogtle Nuclear Plant Units 3 & 4 in Georgia, USA. OPG also has a technology collaboration agreement with TVA, Orlen Synthos Green Energy, and GE Verona to share information and lessons learned.

In addition, the BWRX-300 technology has benefited from lessons learned through nine previous generations of BWR technology.⁴¹ GEH has also established a process to gather and disseminate lessons learned.⁴² Because the BWRX-300 plant is a first-of-a-kind unit, the benchmarking was based on breaking the BWRX-300 into common building and system components with specific adjustments for the BWRX-300. Regarding system and components, the BWRX-300 equipment and pipe sizes are consistent with those used at new conventional plants in the industry (oil & gas and power plants).

Q. What are some examples of “lessons learned” has OPG incorporated into the Project to date?

A. Arguably the most impactful application of lessons learned is use of the IPD model for the Project. As noted above, OPG has used certain elements of an IPD model in the DRP as well as the Otto Holden Generating Station refurbishment. The IPD model was chosen by OPG to maximize integration and collaboration with the supporting contract partners.⁴³

⁴⁰ *DNNP Integrated Basis of Estimate for Unit 1 Release Quality Estimate (RQE), DAI-OPG-NN-NN-TREP-PS-0003*, p. 259 (2 March 2025)

⁴¹ *Application for a Licence to Construct a Reactor Facility*, p.4 (Oct 2022)

⁴² *Ibid.*, p.127

⁴³ *Ibid.*, p. 73

The core Project team has been established with representation from across the IPD parties, with the execution teams in place to manage SMR1 construction.⁴⁴

In discussions with OPG personnel, other examples of lessons learned were raised as examples that have been incorporated into the processes on the DNNP and include the Project's use of a common risk register and a single schedule as opposed to each partner having their own, improving coordination amongst the partners and supporting a collaborative approach to risk and schedule management.

Q. What were your conclusions relative to incorporation of lessons learned to date?

A. I found that OPG diligently sought out and identified lessons learned and took appropriate actions to evaluate and integrate these lessons learned into the DNNP. These efforts are consistent with what I would expect to see on a project of this size.

V. EXECUTION PHASE READINESS

A. GOVERNANCE

i. Governance Processes and Structure

Q. What are the industry standards related to project governance?

A. The Project was evaluated using the *PMI PMBOK*, *AACE International Recommended Practices*, *CSA N286-12 (Management System Requirements for Nuclear Facilities)*, and

⁴⁴ *OPG Unit 1 Execution Phase Funding Release and Units 2-4 Definition Phase Funding Release*. p.3 (06 Mar 2025)

the Treasury Board of Canada's *Project Management Policy Suite*.⁴⁵ In addition, the Project was evaluated using *REGDOC 2.1.2* and *INPO 14-004 (R3)*.⁴⁶

Strong governance, established before execution, provides the framework for a megaproject to begin with defined authority, clear decision pathways, and approved baselines for scope, cost, and schedule. It establishes critical controls—such as risk management, change control, and assurance reviews—to be in place before significant financial or contractual commitments are authorized. A strong governance structure that aligns with PMI, AACE, and CNSC practices and supports the traceability and accountability needed to manage complexity, maintain regulatory compliance, and achieve predictable, well-controlled results across the project lifecycle.

Q. How did Pegasus-Global assess the governance structure?

A. Pegasus-Global began its evaluation by examining the policies and procedures implemented by OPG to provide governance of the Project. The evaluations were supplemented by interviews with key Project personnel. The documents reviewed included the *DNNP Project Charter (R001)*, *DNNP Project Execution Plan ("PEP") (C003)*, and multiple policies and procedures related to all areas of governance such as engineering, construction, commissioning, safety and security, environmental stewardship, supply chain, and training.⁴⁷ The observations gleaned from this review were assessed against

⁴⁵ PMI PMBOK (6th ed. 2017), CNSC Regulatory document *REGDOC-2.1.1, Management System*, Treasury Board of Canada. *Directive on the Management of Projects and Programmes*. pp. 2-5 (2019-00-11) https://publications.gc.ca/collections/collection_2019/sct-tbs/BT53-34-2019-eng.pdf

⁴⁶ CNSC Regulatory document *REGDOC-2.1.2, Safety Culture* and Institute of Nuclear Power Operations, *Conduct of Performance Improvement*. INPO 14--004, (2020), INPO. *Conduct of Performance Improvement*. 14-004 (Aug 2024),

⁴⁷ *Darlington New Nuclear Project Charter, NK054-PCH-01210-00002*. (11 Jan 2024), *DNNP Project Execution Plan (PEP), DA1-IPD-NN-NN-TPVS-PM-0001*. (14 Jan 2025), *DNNP Engineering Program Management Plan, NK054-PLAN-01210-00100-0004*. (19 Apr 2024), *DNNP Construction and Quality Program Management Plan, NK054-PLAN-01210-00100-0009*. (30 Apr 2024), *DNNP Turnover and Commissioning Program Management Plan,*

industry standards to ensure the policies and procedures in place are effective tools to plan and manage the Project.

Specifically, Pegasus-Global evaluated the *Darlington New Nuclear Project Charter (R001)* and supporting governance documents that define the project's authorization, objectives, and oversight framework.⁴⁸ The *Project Charter* serves as the formal approval document that establishes the Project's existence, links it to OPG's strategic and regulatory objectives, and delegates authority to the Project Leadership Team ("PLT") under the IPD model.

Pegasus-Global also evaluated the *DNNP PEP (C03)* which presents the top-level management plan for the framework for project execution.⁴⁹ It outlines the plans, resources, mechanisms, and procedures expected to be implemented for project success. We also evaluated other policies and procedures that define how OPG measures cost, schedule, risk, and change performance, ensuring traceability between baseline data, phase-gate approvals, and executive reporting.⁵⁰ Pegasus-Global evaluated plans and procedures that provide the framework that governs how design requirements are developed, verified, and translated into executable construction work.⁵¹ We evaluated plans and procedures related to construction, commissioning and turnover for the Project, as well

NK054-PLAN-01210-00100-0019. (01 Mar 2024), *DNNP Nuclear Security Management Plan, NK054-PLAN-00100-01210-00020*. (21 Mar 2025), *DNNP Environmental Program Management Plan, NK054-PLAN-01210-00100-0014*. (26 Jun 2025), *DNNP Supply Chain Program Management Plan, NK054-PLAN-01210-00100-017*. (15 Jun 2023), and *DNNP Training Program Management Plan, NK054-PLAN-01210-00100-0007*. (10 Apr 2024)

⁴⁸ *Darlington New Nuclear Project Charter, NK054-PCH-01210-00002*. (11 Jan 2024)

⁴⁹ *DNNP Project Execution Plan (PEP), DA1-IPD-NN-NN-TPVS-PM-0001*. (14 Jan 2025)

⁵⁰ *DNNP Program Management Plan, NK054-PLAN-01210-00008*. (30 Nov 2023); *DNNP Functional Plan – Project Controls (PCP), DA1-IPD-NN-NN-TPLN-M-0004*. (30 Jul 2025)

⁵¹ *DNNP Engineering Program Management Plan, NK054-PLAN-01210-00100-004*. (19 Apr 2024); *DNNP Construction and Quality Program Management Plan, NK054-PLAN-01210-00100-009*. (30 Apr 2024); *DNNP Estimate Plan, NK054-PLAN-01210-00108*. (15 Jun 2023); *DNNP Decommissioning Management Plan, NK054-PLAN-01210-00100*. (27 Jun 2023)

as those related to safety, security, and emergency preparedness.⁵² Pegasus-Global evaluated plans related to environmental protection, regulatory compliance, and stakeholder or Indigenous engagements for the Project.⁵³ We also evaluated OPG's plans related to resource management, supply chain oversight, and commercial controls, as well as training, human performance and organizational readiness.⁵⁴

Q. Does OPG have experience with governing nuclear projects?

A. Yes. OPG has extensive experience governing complex nuclear projects under a mature and well-established management system. OPG built and owns one of the largest nuclear fleets in North America—Darlington, Pickering, and the Western Waste Management Facility—and operates Darlington and Pickering. OPG is nearing completion of the DRP, a similarly large-scale, multi-year nuclear initiative, with it tracking to be completed under budget and on schedule.

Each of these projects has been managed within OPG's Nuclear Management System, which is compliant with CNSC regulatory requirements.⁵⁵ This governance model

⁵² *DNNP Construction and Quality Program Management Plan, NK054-PLAN-01210-00100-0009*. (30 Apr 2024); *DNNP Turnover and Commissioning Program Management Plan, NK054-PLAN-01210-00100-0019*. (01 Mar 2024); *DNNP Operations and Maintenance Program Management Plan, NK054-PLAN-01210-00100-0005*. (06 May 2025); *DNNP Health and Safety Program Management Plan, NK054-PLAN-01210-00100-0012*. (18 Apr 2024); *DNNP Nuclear Security Management Plan, NK054-PLAN-00100-01210*. (21 Mar 2025); *DNNP Emergency Management Program Management Plan, NK054-PLAN-01210-00100-0011*. (31 Jul 2025); *OPG Nuclear Safety & Security Policy, N-POL-0001*. (13 May 2020); *OPG Safe Operations Policy, OPG-POL-0032*. (15 Nov 2023)

⁵³ *DNNP Environmental Program Management Plan, NK054-PLAN-01210-00100-0014*. (26 Jun 2025); *DNNP Stakeholder Relations Program Management Plan, NK054-PLAN-01210-00100-0013*. (01 Apr 2025); *DNNP Licensing Program Management Plan, NK054-PLAN-01210-00100-0008*. (26 Apr 2024); *OPG Environmental Policy, OPG-POL-0021*. (06 Dec 2024); *OPG Environment Health and Safety Managed Systems, OPG-PROG-0005*. (03 Jun 2021)

⁵⁴ *DNNP Supply Chain Program Management Plan, NK054-PLAN-01210-00100-0017*. (15 Jun 2023); *OPG Standard Contract Management, OPG-STD-0153*. (09 Feb 2018); *DNNP Document Management Plan, NK054-PLAN-01210-00100-0018*. (30 Apr 2024); *DNNP Training Program Management Plan, NK054-PLAN-01210-00100-0007*. (10 Apr 2024); *DNNP Operations and Maintenance Program Management Plan, NK054-PLAN-01210-00100-0005*. (06 May 2025); *OPG Performance Improvement, N-PROG-RA-0003*. (16 Jan 2025); *OPG Use of Contractor Corrective Action Programs VS. OPG CAP, N-GUID-00120-10012*. (31 Oct 2023)

⁵⁵ *OPG Nuclear Program - Independent Assessment, N-PROG-RA-0010*. (Jun 27, 2025) and *CNSC Regulatory document REGDOC-2.1.1, Management System*

incorporates clearly defined accountabilities, independent oversight, and integrated assurance functions that are routinely audited by internal and external bodies. Through this framework, OPG has demonstrated sustained capability in areas such as project controls, engineering assurance, licensing, safety culture, and regulatory compliance—core competencies that directly support the DNNP.

Q. What are Pegasus-Global’s findings relative to governance structure?

A. Pegasus-Global found OPG’s governance structure to be well-organized and supported by strong processes and procedures. The structure and content of these plans reflect a strong culture of accountability and continuous improvement, supported by well-defined review mechanisms, phase-gate approvals, and cross-functional oversight. The overall framework provides confidence that the project is governed under robust, auditable, and transparent controls, consistent with the expectations of a leading nuclear operator.

The governance framework applied to the DNNP draws on the same principles of nuclear safety, disciplined project execution, transparency, and continuous improvement that have guided OPG’s previous major initiatives. These principles are embedded throughout the current governance structure, providing a consistent basis for effective oversight, accountability, and informed decision-making across the Project.

Q. What are your conclusions relative to the governance of DNNP?

A. Based on our review of the Project’s governance framework, supporting policies, and program management plans, I conclude that OPG’s extensive experience in governing nuclear projects provides a strong foundation for the DNNP. OPG has established a comprehensive and disciplined governance structure for the DNNP that is consistent with leading nuclear and project-management standards such as *CSA N286-12*, *PMI’s PMBOK*,

and AACE International practices. The documentation reflects a mature governance model that integrates industry best practices, regulatory requirements, and internal accountability across every major function of project delivery.

The structure and content of OPG's Project Charter are consistent with the principles outlined in several recognized standards and frameworks, including the *PMI's PMBOK*, the AACE International Recommended Practices, *CSA N286-12 (Management System Requirements for Nuclear Facilities)*, and the Treasury Board of Canada's *Project Management Policy Suite*. It reflects both industry best practices and nuclear regulatory expectations, ensuring that the DNNP proceeds under a well-defined mandate with transparent accountability and effective oversight.

In our assessment, OPG's framework for training and organizational readiness is comprehensive, mature, and aligns with leading nuclear industry standards such as *CSA N286-12*, *REGDOC 2.1.2*, and *INPO 14-004*. These elements collectively show that OPG's governance integrates human performance, training, quality assurance, and continuous improvement into a unified management system. The approach is proactive, data-driven, and emphasizes learning from experience—hallmarks of a strong nuclear safety culture. Overall, the evidence supports that OPG has implemented a robust and forward-looking organizational readiness framework designed to maintain a highly trained, safety-focused, and performance-driven workforce for Canada's first SMR deployment.

The workforce management processes established under the IPD model and Information Management Plan ("IMP") reinforce the effectiveness of OPG's training and readiness programs. As noted earlier, the human resources framework applies the "Best Athlete" approach, enabling OPG and its alliance partners to staff the project with the most

qualified individuals regardless of company affiliation. It establishes consistent processes for recruitment, onboarding, development, and succession planning, while promoting inclusion, collaboration, and cultural alignment across the multi-partner workforce.

Collectively, these governance documents show that OPG has built an integrated and scalable management framework encompassing the full project lifecycle from early design and licensing through construction, commissioning, and operations. Each functional area – including engineering, construction, project controls, training, and stakeholder engagement – operates within a defined governance boundary that specifies roles, responsibilities, and performance expectations.

ii. Organizational Structure

Q. What are the industry standards related to organizational structures?

A. PMI provides in its PMBOK Guide that:⁵⁶

Organizational structures are any arrangement of or relation between the elements of project work and organizational processes.

These structures can be based on roles, functions, or authority. They can be defined as being external to the project, tailored to fit the project context, or newly designed to meet a unique project need.

PMI adds that project teams can tailor their structure to best accomplish the project objectives and, by fostering inclusive and collaborative environments, it facilitates a better exchange of knowledge and expertise, which in turn enables better project outcomes.

Q. How did Pegasus-Global assess the organizational structure of the DNNP?

A. Pegasus-Global reviewed the DNNP governance documentation that defined the Project's organizational structure and approach. Specifically, Pegasus-Global examined the *DNNP*

⁵⁶ PMI PMBOK, page 29, (7th ed. 2021)

PEP (C01), Program Assurance Program Management Plan (R004), DNNP Contractor/Owner Interface Agreement (C02), which were supported by organizational charts and defined roles and responsibilities.⁵⁷

Q. What are Pegasus-Global’s findings relative to organizational structure?

A. The DNNP organizational structure establishes overall authority on the Project within the Executive Board (“EB”) and PLT. The EB is composed of one executive from each partner to the IPA and has responsibility for the strategic oversight of the DNNP. The EB decisions are made by majority vote, with OPG maintaining the right to direct changes as the Owner. The PLT sits below the EB. The PLT is composed of one member from each party to the IPA. The PLT is responsible for project oversight, strategic project decisions, project staffing, dispute resolution and overall accountability for the IPD model. The PLT provides management level guidance to the DNNP. PLT decisions must be approved by unanimous vote, otherwise they are escalated to the EB for review.

A Quality Project Management Team (“QPMT”) was established with one representative from each party to the IPA that ensures the quality assurance programs are aligned with the integrated project approach and in compliance with associated requirements. The QPMT reports directly to the PLT.

An Execution Director for SMR1 has overall accountability for the engineering, procurement, and construction of SMR1, including completing the project on time and on budget. The Execution Director reports to the PLT and provides direction to the Execution

⁵⁷ *DNNP Project Execution Plan (PEP), DAI-IPD-NN-NN-TPVS-PM-0001. (Jan 2025), DNNP Project Assurance Program Management Plan, D-PLAN-NK054-PLAN-01210-00100-0002-00. (Apr 2025), DNNP Contractor/Owner Interface Agreement, DAI-IPD-NN-NN-TPLN-PM-0017_COIR. (20 Apr 2024), DNNP IPD Organization Chart, DAI-IPD-NN-NN-TPLN-PM-0010 (P03). (2 Sept 2025), DNNP Roles and Responsibilities, DAI-NN-NN-TPLN-PM-0003 (C01). (8 Sep 2025).*

Bundles that in turn have responsibility for maintaining the overall safety, quality, budget, and schedule of their respective bundles, with bundles established for the major scope elements of the DNNP (Design Engineering, Nuclear Island, Conventional Island, and Balance of Plant).⁵⁸ The matrixed organizational structure established for the Project includes Functional Management Groups that support the execution of the Project and provide resources and strategic direction for their associated functions (e.g. project controls, quality, procurement, etc.). These groups are supported by a Project Integration Team that establishes the overall integration of the project execution and functional teams, including integration between bundles and functions to ensure consistency in approach, governance, and providing oversight on functions and supporting activities.

Q. How has OPG prepared for resource turnover during execution?

A. A concern in a long duration project is loss of resources over the course of the Project. At an enterprise level, OPG has robust succession planning and knowledge management processes in place to ensure that the required knowledge, skills, and qualifications (“KSQs”) are identified within the organization to mitigate risks associated with resource turnover. The risks associated with KSQs are assessed for safety, financial, reputational, and operational consequences, including how critical the KSQ is and how difficult it would be to re-acquire it if lost. The assessment of the KSQs informs the development of Knowledge Management Plans that help organize, capture, store, and share important information to address current and future challenges with workforce transitions and knowledge retention.

⁵⁸ *DNNP – Project Execution Plan, DAI-IPD-NN-NN-TPVS-PM-0001 (C03)*. p. 15, 16 (14 Jan 2025)

For OPG's Projects Organization, which leads major project initiatives, the succession planning process is structured around the major project milestones. OPG and its IPA partners also jointly carry an IPD succession plan, which is regularly reviewed by OPG and its counterparts in the IPA to understand current succession planning and to discuss potential resource-related risks. This ensures that OPG has identified and prepared for workforce transitions to ensure knowledge is retained and minimizes the project risk.

Q. What are your conclusions related to the DNNP's organizational structure?

A. I conclude that OPG has established an appropriate organizational structure for the execution of the DNNP. This organizational structure incorporates practices that PMI has identified as supporting improved collaboration, including defined roles and responsibilities, allocation of internal and partner employees into project teams, formal committees tasked with specific objectives, and standings meetings for regular review of project topics.⁵⁹ As the "one-team" environment is a key element to the Project's organizational structure, having these collaborative supporting processes in place should assist in supporting the project culture and integrated execution approach.

B. CONTRACT MANAGEMENT

Q. What are the industry standards related to contract management during the execution phase?

A. *PMI's PMBOK* explains that:⁶⁰

Control Procurements includes application of the appropriate project management processes to the contractual relationship(s) and integration of the outputs from these processes into the overall management of the project.

⁵⁹ *PMI PMBOK*, p. 29 (7th ed. 2021)

⁶⁰ *PMI PMBOK*, p. 494 (6th ed. 2017)

It further provides that because of the uniqueness of each project, the procurement management processes may need to be tailored to adapt to the project-specific characteristics.

Q. How did Pegasus-Global assess DNNP's contract management?

A. Pegasus-Global began its evaluation by examining the policies and procedures implemented by OPG to provide contract management for the Project. The evaluations were supplemented by interviews with key Project personnel. Pegasus-Global focused its assessment of DNNP's contract management on a review of the *DNNP Contract Program Management Plan (R001)*.⁶¹ The observations from this review were assessed against industry standards to ensure the policies and procedures in place are effective tools to plan and manage the Project.

Q. What are Pegasus-Global's findings relative to OPG's contract management?

A. The *DNNP Contract Program Management Plan (R001)* defines how the major contracts within the DNNP will be defined, managed, and controlled, including roles and responsibilities of OPG's Commercial Management Organization that manages all commercial aspects for OPG's strategic projects (including the DNNP). The contracting process is defined across five primary contract lifecycle phases described as follows:

1. Planning: preparation of the contracting strategy, which takes into consideration various factors including nature and scope of the work, vendor marketplace, contracting structure, pricing mechanism, and similar factors.
2. Selection: sourcing and awarding the contracts based on the contracting strategy developed. In this phase, contract terms are negotiated, key milestones established, and the contract ultimately is awarded.
3. Post-Award: involves vendor mobilization and execution planning. The contract management processes are established to provide the systems and

⁶¹ *DNNP Contract Program Management Plan*, NK054-PLAN-01210-000100-00016. (21 Jun 2023)

principles that ensure the vendor complies with the terms and conditions through the performance of the contract.

4. Execution: OPG and its vendor partners seek to continuously work in an open and collaborative environment within the guiding principles developed in the post award stage to further support integration and transparency, remove organizational silos, optimize processes, and streamline redundant functions/positions. OPG's Commercial Management Organization provides the overall management of the contract during this phase, including management of contract changes and disputes, while the DNNP Project Team primarily focuses on monitoring vendor performance, verification of milestone completion certificates, and review of sub-vendor contracts.
5. Closeout: ensures all products and services have been delivered and accepted, contract requirements fulfilled, and any deficiencies and claims have been resolved. This phase includes the capture of any commercial lessons learned for implementation on future OPG programs and projects.

Q. What are your conclusions regarding on-going contract management?

- A. The DNNP contract management process is in alignment with industry standards and is consistent with what we would expect for a project of this size. Members of the OPG Commercial Management team who are dedicated full-time to supporting the DNNP have participated in the creation and negotiation of the IPA. Their extensive knowledge of the IPA will be beneficial during the project's implementation. The OPG Contract Program Management Plan has been designed to align with the IPA, ensuring effective commercial management support throughout the Project and compliance with OPG's corporate policies.

C. PROJECT CONTROLS

Q. What are project controls?

- A. Project controls is a general term used in the construction industry to describe the systems used by project management to measure progress towards an objective, evaluate the work

remaining to be completed to achieve that objective, and report the status of progress to stakeholders in a timely manner. As noted in *Construction Project Management*:⁶²

... project control is an action-based process that encourages continual monitoring of operations. To be successful, the actual work with its cost and duration must be completely and accurately documented.

The process also needs to ensure that feedback loops are established to allow the project team to monitor the status of the Project and adjust to circumstances.⁶³ In the construction industry, the key project controls are schedule, cost, risk, change, and reporting. These are discussed individually below. Both cost and schedule controls are aligned with risk controls because realized risks generally have a cost and/or schedule impact. Project changes in scope can also have cost and/or schedule impacts and associated risks. The accurate reporting of cost, schedule, and risk is necessary to allow project management to make decisions regarding changes.

Project controls also enable project management to take corrective action if necessary to ensure an objective is achieved on time and on budget. Depending on the specific conditions of a given project, the project controls are typically customized to meet the needs of the project's owner and each individual project. PMI recommends that projects design the project development approach for each project based on its governance, stakeholders, and the environment.⁶⁴ The typical long durations of construction projects lead to them being executed in dynamic environments, where events or issues that arise during execution can influence or impact the project. Revising the project controls as

⁶² Gould, F., and Joyce, N., *Construction Project Management*. p. 241 (3rd ed. 2009)

⁶³ Ibid.

⁶⁴ *PMI PMBOK*. p. 44, (7th ed. 2021)

needed allows project management to improve them as new information and needs are discovered.

Q. How did Pegasus-Global assess DNNP’s project control processes?

A. Pegasus-Global evaluated the DNNP’s project controls as compared to the industry standards published by AACE, PMI, and CMMA, and other relevant industry publications. Pegasus-Global began its evaluation by examining the policies and procedures implemented by OPG related to project controls for the Project. The evaluations were supplemented by interviews with key Project personnel. For the purposes of this evaluation, Pegasus-Global examined a number of control processes, including the *DNNP Functional Plan – Project Controls (RC04)*, *Project Risk Management Process (R0005)*, *the Issues Management Policy (C03)*, along with a number of other documents related to project controls.⁶⁵ The observations from this review were assessed against industry standards to ensure the policies and procedures in place are effective tools to plan and manage the Project.

Q. What are Pegasus-Global’s findings relative to project controls?

A. Pegasus-Global found that as a sophisticated utility, OPG has developed and implemented policies and procedures at its corporate or enterprise level that provide guidance on a

⁶⁵ *DNNP Functional Plan – Project Controls (PCP)*, DAI-IPD-NN-NN-TPLN-PM-004. (Jul 30, 2025); *Project Risk Management*, OPG-MAN-00120-0015. (28 Oct 2024); *DNNP Issues Management Policy*, DAI-IPD-NN-NN-TPRO-PM-001. (08 Sep 2025); *DNNP Basis of Schedule*, DAI-OPG-NN-NN-TREP-PS-0001. (Jan 2025); *DNNP Scheduling Guide*, DAI-IPD-NN-NN-TPRO-PM-0005. (11 Apr 2024); *Project Schedule Management*, OPG-MAN-00120-0014. (02 Mar 2025); *DNNP – Desktop Guide 001- Earned Value Management*, SCH-DTG-001. (Jun 2025); *Project Controls EcoSys End User Training Manual*, OPG-CMT-77678-00000. (25 Aug 2023); *DNNP Desktop Guide 003 – Trend Management*, TRD-DTG-DNNP. (May 2025); *DNNP Estimate Plan*, DAI-IPD-NN-NN-TPLN-CE-0001. (03 Oct 2024); *DNNP Scope Change Management Instruction*, DAI-IPD-NN-NN-TPRO-PM-0004. (18 Jun 2025); *DNNP Functional Plan – Integrated Communication Framework*, DAI-IPD-NN-NN-TPLN-PM-0007. (18 Apr 2024); *OPG Desktop Guide 002 – Cost Management – Gating*, COST-DTG-002. (Feb 2023); *OPG Project Phase-Gate Management*, OPG-MAN-00120-0019. (11 Apr 2024); and *DNNP Levels of Authority (LOA)*, DAI-IPD-NN-NN-TPLN-PM-0012. (24 Sep 2025)

variety of functions, including project management and project controls. The enterprise level procedures provide guidance that informs the project-specific procedures developed for the DNNP. The majority of the project-specific procedures developed specifically for the DNNP are the result of a collaborative effort amongst the IPD partners. I discuss the individual key project controls below.

Q. What are your conclusions regarding DNNP’s project control processes?

A. I conclude that DNNP’s project control processes used to govern the Project often match or exceed industry standards and best practices in their thoroughness and are appropriate for a project of this size and magnitude. The robust project controls will support OPG to accurately plan, control, and monitor the execution of the Project.

i. Schedule

Q. What are the industry standards related to schedule management?

A. Pegasus-Global assessed the schedule management for the Project using industry standards such as the *PMI PMBOK* and Recommended Practices issued by AACE.⁶⁶ As explained by PMI, plan schedule management is the process of establishing the policies, procedures, and documentation for planning, developing, managing, executing, and controlling the project schedule.⁶⁷ The general objectives of schedule controls are to identify what activities are of a critical nature to the project, how those activities relate to one another, and to track progress of activities to ensure that the project meets certain key milestones as planned. The detail in the schedule typically evolves over the course of delivering a project. It is even more common and typical in megaprojects like the DNNP for the schedule to be

⁶⁶ *PMI PMBOK*. (6th ed. 2017), *AACE International Recommended Practice No. 61R-10: Schedule Design – As Applied in Engineering, Procurement, and Construction*, p. 2 (11 October 2013)

⁶⁷ *PMI PMBOK*, p. 179 (6th ed. 2017)

improved and become more detailed as additional information becomes available, such as the advancement of engineering and procurement to provide more detail to specific construction installation activities.

AACE's Recommended Practice 53R-06 "Schedule Update Review – As Applied in Engineering, Procurement and Construction" offers guidance for creating schedule updates and assessing the reasonableness of changes made in the schedule due to a change in project status and progress. This *AACE Recommended Practice 53R-06* provides that:⁶⁸

The schedule update should be evaluated using the following criteria:

- *Requirements included in the contract specifications*
- *Physical dimensioning and instructions found in the contract plans*
- *Resource availability*
- *Professional scheduling practices and guidelines generally accepted for use by professional scheduling practitioners.*

Industry standard practice calls for the use of an Integrated Project Schedule ("IPS") that models the entire project work scope over time, and includes activities from engineering, procurement, construction and commissioning, as applicable. An IPS includes all trades, whether direct hire or subcontracted. These schedules are based on the CPM; whereby related activities are linked together.

For a schedule on an engineering, procurement and construction project to be realistic, it needs to be planned interactively by the project team members involved in these aspects of the project. In doing so, these team members use their expertise to predict the project's schedule of performance and agree to execute their portion of the project in accordance with the schedule, while monitoring performance and providing statuses on a regular basis to inform schedule updates.

⁶⁸ *AACE International Recommended Practice No. 53R-06, Schedule Update Review – As Applied in Engineering, Procurement, and Construction*, p. 11. (14 August 2008)

Q. How did Pegasus-Global assess DNNP’s schedule management?

A. Pegasus-Global began its evaluation by examining the policies and procedures implemented by OPG related to schedule management for the Project. The evaluations were supplemented by interviews with key Project personnel. Pegasus-Global reviewed several schedule management policies and procedures to guide and control the scheduling objectives, including the *DNNP Basis of Schedule (P01)*, the *DNNP Scheduling Guide (C01)*, and the *Project Schedule Management (R004)*.⁶⁹ Additionally, the *DNNP Desktop Guide 001 – Earned Value Management (Rev 1)* for Earned Value Management manages how the project schedule and the earned value system interact.⁷⁰ The observations from this review were assessed against industry standards to ensure the policies and procedures in place are effective tools to plan and manage the Project.

Q. What are Pegasus-Global’s findings relative to schedule management?

A. Pegasus-Global found that OPG has implemented a robust schedule management program that includes an appropriately detailed integrated project schedule. The schedule’s sequence was developed interactively by the project team through dividing the overall DNNP scope into bundles and projects and utilizing a standard Work Breakdown Structure (“WBS”) that resulted in a level 3 schedule with an identified critical path. The schedule currently has approximately 50,000 activities that are managed by approximately 25 schedulers. The *DNNP Scheduling Guide (C01)* details the requirements for the IPD team on schedule management, including providing details on the daily, weekly, and monthly schedule review and updating processes and requirements and the criteria applied to ensure

⁶⁹ *DNNP Basis of Schedule, DAI-OPG-NN-NN-TREP-PS-0001*. (03 Mar 2025), *DNNP Scheduling Guide, DAI-IPD-NN-NN-TPRO-PM-0005*. (19 Jun 2024), *Project Schedule Management, OPG-MAN-00120-0014*. (02 Mar 2025)

⁷⁰ *DNNP – Desktop Guide 001 – Earned Value Management, SCH-DTG-001*. (Jun 2025)

schedule quality. The critical path and near critical paths are analyzed at the end of each week.⁷¹ The results of this analysis are circulated to the project team for concurrence. Any actual or forecasted delays in the schedule's major milestones require the appropriate team to develop a recovery plan that must be reviewed and approved by senior management. In addition, planned scheduled hours for the week are compared to the weekly earned hours to determine the Schedule Performance Index ("SPI") value, which provides a view of the schedule efficiency on the Project, in addition to other earned value metrics tracked by the project team.

Q. What are your conclusions relative to schedule management?

A. Based on Pegasus-Global's review of the Project's schedule management, I conclude that OPG's processes are robust and support effective schedule management through consistent principles applied across the IPD partners, including use of a standard WBS structure, milestones, and activity naming conventions. The schedule quality checks and regular review and updating process provide further assurance that an accurate schedule is maintained during execution, providing project management with visibility on the progress being made and allowing informed decisions to be made.

ii. Cost

Q. What are the industry standards related to how owners apply cost management?

A. Pegasus-Global assessed the cost management process for the Project using the PMI PMBOK which provides standards for cost management.⁷² Cost management involves planning, managing, forecasting, and controlling costs to help facilitate a project being

⁷¹ *DNNP Scheduling Guide (DA1-IPD-NN-NN-TPRO-PM-0005)*. (19 June 2024)

⁷² *PMI PMBOK*. p. 235 (6th ed. 2017)

completed within its approved budget. The PMI PMBOK notes that cost management begins with development of the policies, procedures, and processes to be used during execution. Cost estimating allows the owner to identify the expected costs of the individual components of the project, based on the information known at the time of the estimate, and facilitates the establishment of a control or baseline budget.⁷³

During execution, cost management focuses on monitoring the status of the project relative to the budget. This is typically accomplished by comparing actuals to the estimate or plan, evaluating metrics (i.e. earned value), and trending and forecasting to predict future values based on current performance.⁷⁴ These tools provide management with necessary information as to the status of the project, allowing management to make informed decisions.

Q. How did Pegasus-Global assess DNNP's cost management?

A. Pegasus-Global began its evaluation by examining the policies and procedures implemented by OPG to provide cost management of the Project. The evaluations were supplemented by interviews with key Project personnel. The documents reviewed included the *DNNP Functional Plan—Project Controls (PCP) (Rev C04)*⁷⁵, the *Project Controls EcoSys End User Training Manual (Rev R002)*,⁷⁶ and *DNNP Desktop Guide 003 – Trend Management (Rev R0)*,⁷⁷ and *OPG Desktop Guide 002 – Cost Management Gating (Rev 01)*⁷⁸ The observations gleaned from this review were assessed against industry standards to ensure the processes and procedures in place are effective tools for cost management.

⁷³ PMI PMBOK, p. 231 (6th ed. 2017)

⁷⁴ PMI PMBOK, pp. 257-270 (6th ed. 2017)

⁷⁵ *DNNP Functional Plan – Project Controls (PCP), DAI-IPD-NN-NN-TPLN-PM-0004. (30 Jul 2025)*

⁷⁶ *Project Controls EcoSys End User Training Manual, OPG-CMT-77678-00000. (25 Aug 2023)*

⁷⁷ *DNNP Desktop Guide 003 – Trend Management, TRD-DTG-DNNP. (May 2025)*

⁷⁸ *OPG Desktop Guide 002 – Cost Management – Gating, COST-DTG-002. (Feb 2023)*

Q. What are Pegasus-Global’s findings regarding cost management for the Project?

A. The *Project Controls Plan* outlines the cost management processes, tools, roles, and responsibilities to plan, estimate, budget, and control costs to enable completion within the approved budget. The procedure also provides various metrics (i.e. Cost Performance Index (“CPI”), a measure of cost efficiency) for monitoring and analyzing work performance information compared to the cost baseline.

DNNP is using a stage gate process to ensure costs are managed effectively and efficiently. Checkpoints are provided at each major project phase to ensure the Project is on track with regard to scope, cost, quality, and schedule. The Gate Review Board has responsibility for the gated process and is made up of representatives from the relevant areas of the Project.

Costs are tracked through a WBS that provides the framework for the cost management plan and allows consistency between the estimate, budget, schedule, and control of costs based on the approved scope. Both schedule and costs utilize the common project WBS for easy integration of scope, schedule, and cost. All cost management on DNNP is administered through the enterprise cost management tool, EcoSys. Work packages within the WBS are rolled up to cost estimates to the appropriate point for analysis and reporting. Cost forecasting is performed each month. DNNP utilizes a Forecast Accuracy Factor key performance indicator to identify areas where forecasting accuracy may need to be improved. After the budget has been approved for funding, the individual projects are to be released from the overall program funding through the stage gate approval process. Prior to progression to the next gate, projects have to demonstrate completion of

specific deliverables and the required planning activities for the next phase to demonstrate readiness to progress and receive funding.

Q. What processes does DNNP have in place to calculate and manage contingency?

A. The assessment of DNNP's contingency development is discussed previously in conjunction with the RQE Cost Estimate. All Project contingency changes are documented and reflected in the Project risk register, which is discussed later in this report, and reviewed and dispositioned by the PMT, ELT, and BOD as needed for level of authorization. When a risk or trend cannot be fully mitigated, a drawdown of contingency will occur. For the DNNP, level of authority for contingency usage is established by the DNNP Level of Authority matrix. For example, the Execution Director is authorized to approve contingency draws up to \$1 million; amounts exceeding this limit require approval from either the PLT or EB, based on the total amount requested. For schedule delays, the Execution Director can approve up to one day of schedule impact, again with larger amounts being approved at higher levels.⁷⁹

Contingency amounts are reviewed and analyzed each month for trends and adequacy. A contingency waterfall analysis is performed each month to identify trends and forecasts for the functional areas to communicate potential pressures and opportunities for the remaining contingency. The Qualitative Risk Assessment ("QRA") is refreshed each quarter to ensure the remaining contingency amounts are within the bounds of the budget with appropriate reporting of results at the ELT and BOD levels.

Q. How is contingency typically managed and controlled on a megaproject?

⁷⁹ *DNNP Levels of Authority (LOA), DAI-IPD-NN-NN-TPLN-PM-0012. (24 Sep 2025)*

A. It is common practice for contingency to be both distributed to individual projects within a megaproject and to an overall program contingency. This is a reflection of acknowledging the identification of both project-specific risks and overall program risks. Use of contingency typically is approved by the project manager, senior management, or possibly the president/board of directors, depending on the amount needed and the thresholds for its use. A review of remaining contingency is made periodically and encompasses current risks and changes since the last review, progress on the project to date, and contingency expended to date. Contingency is included in the cost estimate and is expected to be expended over the course of the Project as risks are realized.

Q. What are your conclusions regarding the Project's Cost Management Process?

A. Based on Pegasus-Global's review of the Project's cost management, I conclude the DNNP's cost management processes are well-defined for the execution phase of DNNP. There are clear responsibilities, and the Project is organized similar to other megaprojects. The cost management procedures demonstrate alignment with industry standards for program financial monitoring and control, even exceeding industry standards in some instances.

The cost management processes have sufficient detail for effective cost monitoring, reporting, and responding to issues. It is my opinion that OPG has established appropriate processes and controls for management of contingency during the Project's execution. These activities align with the program financial monitoring and control activities prescribed by PMI in its *The Standard for Program Management*.⁸⁰ The OPG cost

⁸⁰ PMI, *The Standard for Program Management*. (3rd ed. 2013)

management process is in accordance with industry best practices and typical of what we have found on other megaprojects similar to the size and complexity of DNNP.

OPG has incorporated many best practices into their cost program. This includes items such as:

- Use of risk threats and trends in their forecasting process to identify potential impacts
- Use of a monthly calendar system to complete forecasts and projections for consistent reporting timeframes

With regard to the process for contingency management for the Project, I conclude that the DNNP process is in accordance with industry standards. OPG has established appropriate processes and controls for management of contingency during the Project's execution. Project contingency changes are monitored and tracked each month and changes documented and reflected in the risk register, which I discuss later in my testimony, and reviewed and dispositioned by the PMT, ELT, and EB as needed for level of authorization. When a risk or trend cannot be fully mitigated, a drawdown of contingency will occur. Contingency consumed is reported each month and analyzed for any trends or applicability to other areas of the Project.

iii. Risk

Q. What are the industry standards related to risk management?

A. The risk management of the Project was evaluated using PMI and AACE standards.⁸¹ Risk is an uncertain event or condition that, should it occur, would affect at least one project

⁸¹ *PMI PMBOK*, p. 395 (6th ed. 2017), *AACE International Recommended Practice No. 62R-11, Risk Assessment: Identification and Qualitative Analysis*. (18 Feb 2022); *ACCE International Recommended Practice No. 63R-11, Risk Treatment*. (23 Aug 2012)

objective either as a positive or negative effect. Risk is unpredictable and involves uncertainty, whether that is in the form of a threat or an opportunity. Risk is always in the future. However, based on experience, those involved in project execution and the risk assessments can predict what items or events may happen and their likely impact. Based on prior experience, an expected prediction of risks can be made based on items or events that have happened before but may not manifest on the particular project being assessed, what is called “known unknowns.”⁸² While “unknown unknowns” reflect risks that cannot be identified or recognized until they occur, another category of risks includes very high-impact, low-probability risks, commonly called “black swan events”, which due to their low probability nature are typically outside risk analyses. Proactive risk management practices continually assess new information on a project, which can lead to early warnings and identification on potential black swan events.

The general objectives of risk controls in a risk management program are to reduce the likelihood and impact of potential risks to an acceptable level. The key objectives are to reduce the probability of risk events occurring (or reduce their potential impact), ensure compliance with regulatory and legal requirements, protect assets (including human assets), maintain project operation during and after risk events, implement cost-effective controls that balance risk reduction and costs, and establish clear accountability for managing risk.

Effective risk management involves project teams seeking to maximize positive risks (opportunities) and decrease exposure to negative risks (threats). Threats may result in issues such as delay, cost overrun, technical failure, performance shortfall, or loss of

⁸² *National Science Foundation, Risk Management Guide for Large Projects.* (10 Feb 2012)

reputation. Opportunities can lead to benefits such as reduced time and cost, improved performance, or enhanced reputation.

There are typically five steps project management would undertake in development of a risk management program:

1. planning how risk will be approached for the project;
2. identifying the risks that would potentially emerge in the project;
3. assessing, quantifying, and prioritizing those risks;
4. developing a response to those risks; and,
5. monitoring and managing risk, both those identified and new emerging risks, during project execution.

The risk portion of risk management consists of addressing each high priority risk and developing a risk response (mitigation plan) or countermeasure (for threats) or an enhancement plan (for opportunities). Project teams also monitor the overall project risk which is the effect of uncertainty on the project as a whole. Management of overall project risk aims to keep project risk exposure within an acceptable range. Management strategies include reducing drivers of threats, promoting drivers of opportunities, and maximizing the probability of achieving overall project objectives.

Individual project risks are different from overall project risk. Overall project risk represents the effect of uncertainty on the project as a whole. It is more than the sum of the individual risks within a project, since it includes all sources of project uncertainty. It represents the exposure of stakeholders to the implications of variations in project outcome, both positive and negative.⁸³ As part of the cost estimating industry standard, it is important to conduct a risk and uncertainty analysis to identify the areas within the estimate with a significant risk or opportunity.⁸⁴

⁸³ *PMI PMBOK* p. 397 (6th ed. 2017)

⁸⁴ *AACE International Recommended Practice No. 34R-05, Basis of Estimate*. (05 Oct 2021)

Q. How did Pegasus-Global assess DNNP’s risk management?

A. Pegasus-Global began its evaluation by examining the policies and procedures implemented by OPG to provide risk management for the Project. The evaluations were supplemented by interviews with key Project personnel. The documents reviewed included the *DNNP Functional Plan—Project Controls (PCP) (Rev C04)*, the *DNNP Issues Management Policy (Rev C03)*, and the *OPG Project Risk Management (Rev R005)*.⁸⁵ The *Project Controls Plan* provides direction as to both the day-to-day risk management activities and the risk management preparations for authorization packages presented at funding gates/committees.

DNNP also uses a risk register to identify, categorize, and track risks.⁸⁶ The primary purpose of the risk register is to support the owner’s management decisions and actions and to avoid and/or minimize cost overruns and delays. The likelihood of occurrence and the nature and magnitude of the risks are used for prioritizing risk mitigation actions. The risk register is a tool for allocating managerial responsibility for specific tasks and for reporting and monitoring the status of the risks. A key facet of the DNNP risk management program is there is just one risk register for all IPA partners. On most projects, the owner will have a risk register for the project/program and contractors will have their own risk registers for their given risks. Given the contracting structure for DNNP, all project risks, whether a given IPA partner or the owner has a particular risk, are now captured in one register and the project risk is transparent to all participants and stakeholders.

⁸⁵ *DNNP Functional Plan – Project Controls (PCP)*, DAI-IPD-NN-NN-TPLN-PM-0004. (30 Jul 2025), *DNNP Issues Management Policy*, DAI-IPD-NN-NN-TPRO-PM-001. (08 Sep 2025), *Project Risk Management*, OPG-MAN-00120-0015. (28 Oct 2024)

⁸⁶ *SMR-X Team Risk Report with Associated Actions*. 0808A-UI New Nuclear. (17 Sep 2025)

Risk management on the DNNP utilizes a management tool that provides project managers with a platform to perform risk management activities for the projects. The tool was developed by OPG to consolidate various risk-related logs into one source to streamline workflows. It includes issues log, operating experience, lessons learned, oversight findings and plans, and new daily logs to establish a comprehensive resource for risk management.

Q. What are Pegasus-Global's findings relative to risk management?

A. OPG has developed a robust risk management program for identifying, assessing, quantifying, monitoring, and managing risks. Having one risk register for the project that captures not only the owner's risks but also the IPA partners' risks is a best practice. The risk management process establishes clear lines of accountability.

Risks are identified through a number of sources, including operating experience and external lessons learned, meetings with subject matter experts, risk management meetings, project status meetings, project manager direction, and through the Project Controls Risk Department proactively seeking input and providing oversight support. Specific activities that were performed included: facilitated risk workshops by DNNP risk management team and OPG's Enterprise Project Risk Management team; BOE and contingency development reviews; and project schedule reviews. Risk owners are assigned to each risk with actions created based on risk responses and any co-relations of risks to each other were recorded. Risks are then qualitatively assessed for schedule and cost impact using a defined project risk assessment matrix for the DNNP. In addition to the qualitative assessment, the risks are assessed quantitatively, using a QRA methodology.⁸⁷

⁸⁷ DNNP Functional Plan – Project Controls (PCP), DAI-IPD-NN-NN-TPLN-PM-0004. pp. 30-31 (30 Jul 2025)

Pegasus-Global determined through its review that risks are reported as part of the monthly reporting cycle, including top risks from each bundle and function and key DNNP risks. Additional risk reporting is provided through a Risk Oversight Committee, Project and board reports, and stakeholder reports and reviews. DNNP also uses other reporting and analysis tools in risk management. DNNP is using a Risk Dashboard to assist the PLT with a top-down review of risks. The type of information included in the risk reporting includes a description of the risk, response strategy and status, current risk score, post-risk response risk score, and target date for reaching post-risk response score. The risk scores measure the probability of occurrence, schedule impact, and financial impact of a given risk and assist those inside and outside the project in quickly identifying the biggest risks to the project at a given point in time.

The team has also developed a Design FOAK risk curve to report on burndown of key FOAK risks in design. The risk register lists several items related to FOAK issues.⁸⁸ The Project approach is to identify the individual FOAK aspects of the Project and then address those as opposed to a general FOAK risk. Pegasus-Global found that the execution of FOAK work has been elevated as a key risk and has been factored into the probabilistic modeling for the cost estimate for the Project. The DNNP will benefit from the studies and prototyping planned or underway, including mock-up demonstrations.⁸⁹ The Project Team summarizes key project risks, including FOAK risks, in regular reports to the Board.⁹⁰

⁸⁸ *SMR-X Team Risk Report with Associated Actions. 0808A-U1 New Nuclear.* (17 Sep 2025)

⁸⁹ *DNNP Risk Report with Associated Actions. Item No. 61114* (17 Sep 2025)

⁹⁰ *DNNP Monthly Program Performance Meeting Power Point Deck* (30 Oct 2025)

OPG evaluated risks and uncertainties for each segment of the DNNP, leading to the development of schedule and estimate contingency and the basis for the high-confidence (P90) schedule and estimate. In addition, the cost teams use the identified risks in their forecast meetings each month to better understand potential trends.

Q. What are your conclusions regarding the Project’s risk management process?

A. Based on Pegasus-Global’s review of the Project’s risk management, I conclude that DNNP’s risk management processes are consistent with industry standards. The risk management process provides OPG with the necessary guidance and direction to ensure risks are closely monitored and managed to minimize threats to the \$7.7B RQE. DNNP’s risk management processes utilize the fundamental steps of: planning; identification; assessment; treatment; and, monitoring and control, which align with industry standard practices such as those prescribed by PMI and AACE.⁹¹ This alignment ensures that the risk management processes established and utilized by OPG on the DNNP encompass the industry standard practices that support robust risk management. With regard to FOAK risks, I conclude that OPG has established a robust process for identifying, tracking, and communicating FOAK risks and actively seeks to mitigate the risks.

OPG’s risk management process provides the authority that ties together all the activities that are described earlier in this report – i.e., risk identification, analysis, and mitigation – with a functional complete perspective. The process is an integral part of the overall planning that informs members of the DNNP of the risks to the Project, how they will be managed, and who will manage them through execution. OPG’s risk management

⁹¹ *PMI PMBOK*, p. 397 (6th ed. 2017), *AACE International Recommended Practice No. 62R-11, Risk Assessment: Identification and Qualitative Analysis*. (18 Feb 2022); *ACCE International Recommended Practice No. 63R-11, Risk Treatment*. (23 Aug 2012)

process is also supported through the incorporation of risk management plans into the individual project management plans.

Q. In your opinion, will OPG’s risk management process assist OPG in maintaining confidence that the Project can be executed within the \$7.7B estimate?

A. Yes. OPG has, through a reasonable and prudent process, identified those risks that could potentially affect the Project’s cost and schedule based on the information currently known and has instituted practices to manage those risks in accordance with industry standards. These practices will allow OPG and its IPA partners to identify risks as they emerge, allowing OPG to quickly implement mitigation plans, thereby either avoiding or minimizing the impact of that risk. Further, OPG established, through its Monte Carlo risk simulation modeling, the necessary risk contingency to address such risks, thereby providing a high degree of confidence that the Project can be executed within the \$7.7B RQE. However, given that this is a FOAK megaproject, the unknown risks that may occur and the impact of known risks and QRA input assumptions beyond what was contemplated in the risk assessments could potentially influence the on-time and on-budget completion of the Project.

iv. Scope / Change

Q. What are the industry standards related to how owners apply scope and change controls?

A. Pegasus-Global evaluated the scope and change controls for the Project using PMI standards. As explained by PMI:⁹²

Change control is the process of reviewing all change requests; approving changes and managing changes to deliverables, project documents, and the

⁹² PMI PMBOK, p. 113 (6th ed. 2017)

project management plan; and communicating the decisions. This process reviews all requests for changes to project documents, deliverables, or the project management plan and determines the resolution of the change requests. The key benefit of this process is that it allows for documented changes within the project to be considered in an integrated manner while addressing overall project risk, which often arises from changes made without consideration of the overall project objectives or plans.

Q. How did Pegasus-Global assess the change/scope management process?

A. Pegasus-Global began its evaluation by examining the policies and procedures implemented by OPG to provide scope and change management of the Project. The evaluations were supplemented by interviews with key Project personnel. Pegasus-Global reviewed the *Functional Plan – Project Controls (PCP) (Rev C04)* procedure which provides a high-level overview of change management on the DNNP.⁹³ We also reviewed the *DNNP Scope Change Management Instruction (Rev C03)* procedure which provides a more detailed guide to how change management will be performed on the DNNP.⁹⁴ The observations gleaned from this review were assessed against industry standards to ensure the policies and procedures in place are effective tools to plan and manage the Project.

Q. What are Pegasus-Global’s findings relative to change / scope management for the Project?

A. As detailed in the functional project controls plan, changes to the three project performance baselines (scope, schedule, cost) are approved through the formal change control process. Engineering and technical changes follow the engineering governance to review, approve, and implement engineering changes.

⁹³ *DNNP Functional Plan – Project Controls (PCP), DAI-IPD-NN-NN-TPLN-PM-0004.* (30 Jul 2025)

⁹⁴ *DNNP Scope Change Management Instruction, DAI-IPD-NN-NN-TPRO-PM-0004.* (18 Jun 2025)

The project change control process begins with identifying a potential change and then initiating a Project Baseline Change Request (“PBCR”). The PBCRs are required to demonstrate that:⁹⁵

- Change is prudent and aligned with the stakeholder and sponsor requirements.
- Impact of changes on scope, schedule and/or cost are understood and accepted.
- Drawdowns of contingency are detailed by risk category (discrete risk, cost uncertainty, schedule uncertainty) and include a discrete risk ID where applicable.

The DNNP has three decision types/levels that correlate to the Level of Authority required to approve the changes which range from changes with minimal cost impact to changes that impact critical path and have significant cost impacts. Based on the costs and schedule impacts of the potential change, the change would be reviewed by appropriate individual or group as designated by the Level of Authority required to approve the change.⁹⁶ Changes with moderate to high impacts would first proceed to the PMT, which requires unanimous consent to approve the change. If there is no unanimous consent, the potential change then goes to the PLT, which again requires a unanimous decision. The decision finally goes to the EB which requires a majority vote for approval. If OPG is not in the majority position, OPG can issue an Owner’s Directive.

Q. What are your conclusions relative to scope and change management?

A. I conclude that DNNP’s approach to change and scope management is consistent with the expectations outlined by PMI. The change management procedure is sound and clearly lays out the process flow for changes from initiation to review and approval.

⁹⁵ DNNP Functional Plan – Project Controls (PCP), DAI-IPD-NN-NN-TPLN-PM-0004, pp. 46-47 (30 Jul 2025)

⁹⁶ DNNP Levels of Authority (LOA) Policy, DAI-IPD-NN-NN-TPLN-PM-0012. (24 Sep 2025)

v. Reporting

Q. What are the industry standards related to reporting on megaprojects?

A. Pegasus-Global assessed the reporting process for the Project using PMI standards. As explained by PMI:⁹⁷

Establishing effective measures helps to ensure that the right things are measured and reported to stakeholders. Effective measures allow for tracking, evaluating, and reporting information that can communicate project status, help improve project performance, and reduce the likelihood of performance deterioration. These measures allow the project team to use information to make timely decisions and take effective actions.

Q. How did Pegasus-Global assess DNNP's reporting process?

A. Pegasus-Global began its evaluation by examining the policies and procedures implemented by OPG to address the reporting process for the Project. The evaluations were supplemented by interviews with key Project personnel. Pegasus-Global reviewed the *Functional Plan – Project Controls (PCP) (Rev C04)* procedure which provides a high-level overview of the monitoring and performance metrics on the DNNP.⁹⁸ We also reviewed the *Functional Plan – Integrated Communication Framework (Rev C02)* which provides a high-level overview of the integrated approach to communications for the IPD.⁹⁹ The observations gleaned from this review were assessed against industry standards to ensure the policies and procedures in place are effective tools to plan and manage the Project.

Q. What are Pegasus-Global's findings relative to reporting?

A. The Project Controls team has the responsibility for providing accurate measurement of the physical progress of the DNNP compared to the baseline plan, including assessments

⁹⁷ PMI PMBOK p. 95, (7th ed. 2021)

⁹⁸ DNNP Functional Plan – Project Controls (PCP), DAI-IPD-NN-NN-TPLN-PM-0004. (30 Jul 2025)

⁹⁹ DNNP Functional Plan – Integrated Communication Framework, DAI-IPD-NN-NN-TPLN-PM-0007. (18 Apr 2024)

of cost and schedule performance and timely reporting of the progress to stakeholders. The DNNP utilizes an Integrated Database (“IDB”) for maintaining the metrics and reporting data. The SMR-X web portal maintains and stores all reports that are generated on the DNNP. Examples of DNNP generated reports include:

- Weekly Critical Path Schedule Report
- Biweekly 4-week Lookahead Report
- Biweekly 3-month Lookahead Report
- Quarterly Risk Report
- Monthly Cost Forecast
- Bundle Performance Report

The IPD utilizes the integrated communications framework to ensure that the partners’ messaging is consistent.¹⁰⁰ The integrated communications framework is designed to be flexible and to evolve as needed as the Project progresses through the execution phase.

Q. What are your conclusions relative to reporting?

A. I conclude that the reporting controls are consistent with what we have seen on other projects of a similar size and magnitude and align with industry standards and best practices. The controls will enable accurate information to be reported in a timely manner to the stakeholders. The IDB will enable data fidelity to be maintained and project data to be hosted on a common platform. The software tools and systems selected are well known and utilized throughout the construction industry.

D. LESSONS LEARNED PROCESS

Q. What are the industry standards related to lessons learned?

¹⁰⁰ *DNNP Functional Plan – Integrated Communication Framework, DAI-IPD-NN-NN-TPLN-PM-0007.* (18 Apr 2024)

A. Industry standards, such as PMI's *PMBOK* or AACE's *Project Planning* recommended practice, recognize the importance of lessons learned, but generally limit their discussion to recommending organizations maintain a lessons learned register.¹⁰¹

Q. How did Pegasus-Global assess the lessons learned process for DNNP?

A. Pegasus-Global began its evaluation by examining the policies and procedures implemented by OPG to direct the lessons learned process for the Project. The evaluations were supplemented by interviews with key Project personnel. We evaluated the *DNNP Lessons Learned Guide (C02)* which serves as a guide that details the lessons learned process OPG has implemented on the Project.¹⁰² We also evaluated other documents that were related to lessons learned, including *DNNP's Issues Management Policy (C03)*, *Performance Improvement Process (R013)*, and *Roles and Responsibilities (C01)*.¹⁰³ The observations gleaned from this review were assessed against industry standards to ensure the policies and procedures in place are effective tools to plan and manage the Project.

Q. What are Pegasus-Global's findings related to the DNNP lessons learned process?

A. The *DNNP Lessons Learned Guide (C02)* establishes a process that uses a three-phased approach: identification and documentation; validation and analyzation; and retrieval and incorporation, which I found to be consistent with lesson learned practices used in other large and complex programs.¹⁰⁴ The identification and documentation phase encourages capture of lessons learned in real time and throughout the Project and offers an extensive

¹⁰¹ *Project Management Institute, Governance of Portfolios, Programs, and Projects*. (2016); *PMI PMBOK*, (5th ed. 2013); *AACE International, Recommended Practice No. 39R-06, Project Planning – As Applied in Engineering and Construction for Capital Projects* (08 Dec 2011)

¹⁰² *DNNP Lessons Learned Guide, DAI-IPD-ZZ-TPRO-PG-0001* (9 May 2025)

¹⁰³ *DNNP Issues Management Policy, DAI-IPD-NN-NN-TPRO-PM-0001*. (08 Sep 2025); *Performance Improvement, N-PROG-RA-0003*. (16 Jan 2025); *DNNP Roles and Responsibilities, DAI-NN-NN-TPLN-PM-0003*. p. 13 (09 Sep 2025)

¹⁰⁴ *DNNP Lessons Learned Guide, DAI-IPD-ZZ-TPRO-PG-0001*, p. 6 (9 May 2025)

list of key sources of lessons learned. The process also recognizes lessons learned workshops as a significant source of lessons learned. The process establishes a single repository for Project lessons learned. In the validation and analyzation phase, lessons learned are divided into a priority tiering system. Tier 1 (highest priority) includes lessons learned that have FOAK elements. Tier 1 lessons learned require formal action tracking. In the retrieval and incorporation phase, the Project Team is encouraged to access and incorporate lessons learned into the Project.¹⁰⁵

In addition, *DNNP's Issues Management Policy (C03)* and *Performance Improvement (R013)* process are structured to identify, assess, and resolve issues and challenges and then identify lessons learned for incorporation into the Project.¹⁰⁶ In addition, other processes explicitly identify the accountability for incorporating lessons learned. The Project Integration Team is charged with developing and managing the lessons learned process and specific personnel have accountability for lessons learned. The DNNP Senior Manager, BWR Expert is tasked with bringing lessons learned from the Finnish new build projects.¹⁰⁷ In addition, Bundle Leads and Area Leads have accountability for lessons learned, and a “rapid lessons learned” process is being implemented to quickly facilitate identification and incorporation of lessons learned from SMR Unit 1 to Units 2-4.¹⁰⁸

Q. What are your conclusions regarding lessons learned on the DNNP Project?

A. I found that the lessons learned process, as detailed in the *DNNP Lessons Learned Guide (C02)*, is a robust guide for effectively identifying, evaluating, incorporating, and verifying

¹⁰⁵ *DNNP Lessons Learned Guide, DAI-IPD-ZZ-TPRO-PG-0001*, pp. 6-11 (9 May 2025)

¹⁰⁶ *DNNP Issues Management Policy, DAI-IPD-NN-NN-TPRO-PM-0001*. (25 Sep 2025) and *OPG Performance Improvement, N-PROG-RA-0003*. (16 Jan 2025)

¹⁰⁷ *DNNP Engineering Program Management Plan, NK054-PLAN-01210-00100-0004*. p. 11(19 Apr 2024)

¹⁰⁸ *DNNP Roles and Responsibilities, DAI-NN-NN-TPLN-PM-0003*. pp. 9-11 (04 Sep 2025)

lessons learned on the Project. I found OPG's lessons learned process goes beyond industry standards by establishing a process that ensures effective capture, documentation, evaluation, and incorporation and verification of lessons learned. Further, I found that OPG's strategic incorporation of lessons learned such as use of the IPD concept and single risk register and schedule platform indicate a history of successfully incorporating lessons learned.

VI. CONCLUSION

Q. What is your conclusion regarding your assessment of the DNNP?

A. Based on Pegasus-Global's evaluation of the pre-execution planning, project governance, and project controls in comparison to generally accepted industry standards and practices, I conclude that OPG is ready to execute a project of this size and complexity.

Q. Does this conclude your report?

A. Yes, this concludes my report.



Joseph Miller

President & Chief Executive Officer

Pegasus-Global
Holdings, Inc.



Contact

Phone

+1-513-312-1641

Email

j.miller@pegasus-global.com

Address

964 Wessington Manor Lane, Fort Mill, SC 29715

Website

www.pegasus-global.com

Education

University of North Carolina at Chapel Hill

Strategic Leadership Program, 2009

Indiana State University

Business Administration Coursework
(12 of 16 MBA courses completed), 1997

Purdue University

Bachelor Degree in Mechanical
Engineering, 1991

Areas of Expertise

- Energy Transition
- Engineering
- Environmental Compliance Planning
- Expert Witnessing
- Financial Analysis
- Generation and Regulatory Strategy
- Mergers & Acquisitions
- Operations Management

Career Summary

- **2022 - present**
President & Chief Executive Officer, Pegasus-Global Holdings, Inc.
- **2019 - 2022**
Executive Consultant, Pegasus-Global Holdings, Inc.
- **2014 - 2019**
Vice President/Central Services & Compliance, Charlotte, NC,
Duke Energy Corporation
- **2012 - 2014**
General Manager/Strategic Engineering, Charlotte, NC,
Duke Energy Corporation
- **2010 - 2012**
General Manager/Generation Support, Charlotte, NC,
Duke Energy Corporation
- **2006 - 2010**
Station Manager/Power Operations, Zimmer Station, OH,
Duke Energy Corporation
- **2002 - 2006**
Station Manager/ Power Operations, East Bend Station, KY,
Duke Energy Corporation
- **2000 - 2002**
Group Manager/Power Operations, Cincinnati, OH,
Duke Energy Corporation
- **1997 - 2000**
Support Team Group Leader/Power Operations, Cayuga Station, IN,
Duke Energy Corporation
- **1991 - 1997**
Staff Engineer/Power Operations, Cayuga Station, IN,
Duke Energy Corporation

Profile

Mr. Miller is an accomplished energy executive valued for leadership in operations, engineering, generation fleet modernization, and both generation and regulatory strategy. His experience includes sponsoring testimony before utility commissions in 58 regulatory proceedings, including base rate, fuel, CPCN, plant abandonment and environmental cases in multiple states. He has held several leadership positions at power plant and corporate levels, including managing both regulated and merchant power plants. Mr. Miller has proven to be a strong, effective communicator and problem solver who thrives in environments that require the capacity to prioritize concurrent projects both calmly and efficiently. Mr. Miller is a sought-after keynote speaker, panelist, and industry conference presenter.

Prior to joining Pegasus-Global, Mr. Miller provided leadership and regulatory support in modernizing one of the largest generation fleets in the United States. Mr. Miller led the analysis and program development for fleet compliance with complex environmental regulations, including MATS, CSAPR, 316(b), ELG and CCR. He generated the idea and strategy to convert three coal plants to also burn natural gas, significantly reducing fuel cost and carbon emissions. He has had significant involvement in acquisition and divestiture due diligence, evaluation and negotiations.

Experience

Pegasus-Global Holdings, Inc.

President & Chief Executive Officer, 2022-Present
Executive Consultant, 2019-2022

Leading a firm that is globally recognized for providing expert technical, strategic and dispute services to the energy and infrastructure sectors.

Duke Energy Corporation

Vice President/Central Services & Compliance, Charlotte, NC, 2014-2019

- Provided oversight of 550 employees, engineering, environmental compliance planning, generation and regulatory strategy, NERC and regulatory compliance, technical services and maintenance services for the company's fleet of approximately 100 fossil and renewable power plants in North Carolina, South Carolina, Ohio, Indiana, Kentucky and Florida.
- Chaired enterprise engineering council.

General Manager/Strategic Engineering, Charlotte, NC, 2012-2014

- Negotiated agreement with Indiana Office of Utility Consumer Counselor on \$400 million environmental filing.
- Led multi-department initiative resulting in early retirement of fossil plants.
- Identified unique compliance method that allowed Crystal River units 1 & 2 (900MW) to comply with BART and MATS rules, reducing grid reliability concerns and avoiding \$200 million in transmission projects.
- Implemented plant retrofits to improve fuel flexibility to achieve \$168 million in savings and maintain reliability.
- Led the evaluation and negotiation of generation asset purchase.
- Represented company in numerous regulatory proceedings.

Experience

General Manager/Generation Support, Charlotte, NC, 2010-2012

- Headed up financial and engineering analysis of capital projects and project controls responsibility for the company's fleet of nuclear, fossil and hydroelectric plants.
- Facilitated and carried out all facets of environmental compliance planning and strategy.
- Served as Merger Integration Team Leader of Fossil Hydro Generation Operations Services Team (2011).

Station Manager/Power Operations, Zimmer Station, OH, 2006-2010

- Personally surpassed 13 years and 2.75 million worked-hours leading employees without a lost-time injury.
- Introduced improvements to gypsum processing and scrubber waste operations, saving \$5 million per year.
- Facilitated and executed needed modifications to allow station to burn lower cost coal from the Illinois Basin.
- Served on the management committee during labor negotiations with IBEW 1347 (2006).

Station Manager/Power Operations, East Bend Station, KY, 2002-2006

- Led efficiency-improvement effort allowing station to achieve its second-best heat rate in 25-year history.
- Improved SO₂ scrubbing and fuel cost to become the cheapest plant in the Cincinnati region.
- Led corporate Human Resources and Benefits teams through a continuous improvement process resulting in annual cost savings of \$10 million.

Group Manager/Power Operations, Cincinnati, OH, 2000-2002

Support Team Group Leader/Power Operations, Cayuga Station, IN, 1997-2000

Staff Engineer/Power Operations, Cayuga Station, IN, 1991-1997

Appendix

Nature of Proceeding	Petition Date	Company	Regulatory Body	Docket #
Ongoing Review of Edwardsport IGCC Project	1/27/2010	Duke Energy Indiana	IURC	43114
Fuel and Fuel-Related Cost Adjustment	10/18/2011	Duke Energy Carolinas	PSC of SC	2012-3-E
Fuel and Fuel-Related Cost Adjustment	3/7/2012	Duke Energy Carolinas	NCUC	E-7 Sub 1002
Environmental Cost Recovery	4/26/2012	Duke Energy Indiana	IURC	ECR - 19
CPCN for Pollution Control Equipment	6/28/2012	Duke Energy Indiana	IURC	44217
Fuel and Fuel-Related Cost Adjustment	10/23/2012	Duke Energy Progress	PSC of SC	2013-1-E
Environmental Cost Recovery	10/26/2012	Duke Energy Indiana	IURC	ECR - 20
Fuel and Fuel-Related Cost Adjustment	12/28/2012	Duke Energy Carolinas	PSC of SC	2013-3-E
Base Rate Adjustment	1/4/2013	Duke Energy Carolinas	NCUC	E-7 Sub 1026
Base Rate Adjustment	2/15/2013	Duke Energy Carolinas	PSC of SC	2013-59-E
Fuel and Fuel-Related Cost Adjustment	3/6/2013	Duke Energy Carolinas	NCUC	E-7 Sub 1033
Environmental Cost Recovery	4/29/2013	Duke Energy Indiana	IURC	ECR - 21
Fuel and Fuel-Related Cost Adjustment	6/12/2013	Duke Energy Progress	NCUC	E-7 Sub 1031
Fuel and Fuel-Related Cost Adjustment	10/8/2013	Duke Energy Progress	PSC of SC	2014-1-E
Fuel and Fuel-Related Cost Adjustment	10/8/2013	Duke Energy Carolinas	PSC of SC	2014-3-E
Environmental Cost Recovery	10/28/2013	Duke Energy Indiana	IURC	ECR - 22
CPCN for Pollution Control Equipment	11/7/2013	Duke Energy Indiana	IURC	44418
Fuel and Fuel-Related Cost Adjustment	2/24/2014	Duke Energy Carolinas	NCUC	E-7 Sub 1051
Environmental Cost Recovery	4/28/2014	Duke Energy Indiana	IURC	ECR - 23
Fuel and Fuel-Related Cost Adjustment	5/28/2014	Duke Energy Progress	NCUC	E-7 Sub 1045

Appendix

Nature of Proceeding	Petition Date	Company	Regulatory Body	Docket #
Fuel and Fuel-Related Cost Adjustment	10/7/2014	Duke Energy Progress	PSC of SC	2015-1-E
Fuel and Fuel-Related Cost Adjustment	10/7/2014	Duke Energy Carolinas	PSC of SC	2015-3-E
Environmental Cost Recovery	10/28/2014	Duke Energy Indiana	IURC	ECR - 24
Fuel and Fuel-Related Cost Adjustment	2/10/2015	Duke Energy Carolinas	NCUC	E-7 Sub 1072
Environmental Cost Recovery	4/28/2015	Duke Energy Indiana	IURC	ECR - 25
Fuel and Fuel-Related Cost Adjustment	4/29/2015	Duke Energy Progress	NCUC	E-7 Sub 1069
Fuel and Fuel-Related Cost Adjustment	10/1/2015	Duke Energy Progress	PSC of SC	2016-1-E
Fuel and Fuel-Related Cost Adjustment	10/1/2015	Duke Energy Carolinas	PSC of SC	2016-3-E
Environmental Cost Recovery	10/28/2015	Duke Energy Indiana	IURC	ECR - 26
Fuel and Fuel-Related Cost Adjustment	2/3/2016	Duke Energy Carolinas	NCUC	E-7 Sub 1104
Environmental Cost Recovery	4/28/2016	Duke Energy Indiana	IURC	ECR - 27
Fuel and Fuel-Related Cost Adjustment	5/17/2016	Duke Energy Progress	NCUC	E-7 Sub 1107
Base Rate Adjustment	6/2/2016	Duke Energy Progress	PSC of SC	2016-227-E
CPCN for Dry Bottom Ash Conversion	7/28/2016	Duke Energy Kentucky	KY PSC	2016-00268
Fuel and Fuel-Related Cost Adjustment	10/12/2016	Duke Energy Progress	PSC of SC	2017-1-E
Fuel and Fuel-Related Cost Adjustment	10/12/2016	Duke Energy Carolinas	PSC of SC	2017-3-E
Environmental Cost Recovery	10/28/2016	Duke Energy Indiana	IURC	ECR - 28
Fuel and Fuel-Related Cost Adjustment	1/5/2017	Duke Energy Carolinas	NCUC	E-7 Sub 1129
Base Rate Adjustment	4/18/2017	Duke Energy Progress	NCUC	E-2 Sub 1142
Environmental Cost Recovery	4/28/2017	Duke Energy Indiana	IURC	ECR - 29

Appendix

Nature of Proceeding	Petition Date	Company	Regulatory Body	Docket #
Fuel and Fuel-Related Cost Adjustment	5/3/2017	Duke Energy Progress	NCUC	E-7 Sub 1146
CPCN for Alternate Fuel Source	5/31/2017	Duke Energy Kentucky	KY PSC	2017-00186
Base Rate Adjustment	6/7/2017	Duke Energy Carolinas	NCUC	E-7 Sub 1146
Base Rate Adjustment	9/15/2017	Duke Energy Kentucky	KY PSC	2017-00321
Fuel and Fuel-Related Cost Adjustment	10/4/2017	Duke Energy Progress	PSC of SC	2018-1-E
Fuel and Fuel-Related Cost Adjustment	10/4/2017	Duke Energy Carolinas	PSC of SC	2018-3-E
Environmental Cost Recovery	10/25/2017	Duke Energy Indiana	IURC	ECR - 30
Fuel and Fuel-Related Cost Adjustment	1/4/2018	Duke Energy Carolinas	NCUC	E-7 Sub 1163
Fuel and Fuel-Related Cost Adjustment	3/16/2018	Duke Energy Progress	NCUC	E-7 Sub 1173
Environmental Cost Recovery	4/23/2018	Duke Energy Indiana	IURC	ECR - 31
CPCN for New Landfill	6/15/2018	Duke Energy Kentucky	KY PSC	2018-00156
Base Rate Adjustment	10/9/2018	Duke Energy Progress	PSC of SC	2018-318-E
Base Rate Adjustment	10/9/2018	Duke Energy Carolinas	PSC of SC	2018-319-E
Environmental Cost Recovery	10/22/2018	Duke Energy Indiana	IURC	ECR - 32
Environmental Cost Recovery	4/22/2019	Duke Energy Indiana	IURC	ECR - 33
Plant Decertification and Abandonment	4/2/2021	Public Service Co. of New Mexico	NM PRC	21-00083-UT
Base Rate Adjustment	12/5/2022	Public Service Co. of New Mexico	NM PRC	22-00270-UT
Vogle 3 & 4 Prudence Review and Rate Adjustment	8/30/2023	Georgia Power Co.	Ga PSC	29849

BY EMAIL

CONFIDENTIAL — PRIVILEGED

September 19, 2025

Pegasus-Global Holdings, Inc.
1750 Emerick Road
Cle Elum WA USA 98922

Attention: Mr. Joe Miller

Re: Retainer Letter Agreement – Ontario Power Generation – Darlington New Nuclear Project -Management Assessment

Dear Mr. Miller:

Torys LLP (“Torys” or “we”) represents Ontario Power Generation (“OPG”) in connection with its planned application to the Ontario Energy Board (the “Board”) for payment amounts in respect of its prescribed electricity generation facilities for a period starting in 2027 (the “Application”).

We confirm that, on behalf of and to assist us in providing legal advice to OPG in connection with the Application, Torys has agreed to retain Pegasus-Global Holdings, Inc. (the “Consultant” or “you”), effective as of the date first written above (the “Effective Date”), to provide consulting services as described in this letter. By signing back a copy of this letter, the Consultant agrees that this letter contains the agreed-upon terms and conditions of its retainer with Torys effective on the Effective Date, subject to amendment by written agreement between the parties (the “Retainer Agreement”).

1. No Conflict

The Consultant does not have any conflict of interest or other constraints on its ability to provide expert advice in connection with this Retainer Agreement. You confirm that you are free to provide your services to Torys in connection with Torys’ representation of OPG in the Application. You agree that during this engagement you will not provide, directly or indirectly, any services to any other party in connection with the matters at issue in the Application.

The Consultant acknowledges that the Chairman of its Board of Directors was previously employed at GE Vernova Hitachi Global Nuclear Fuel (“GNF”). GNF is not the GE entity co-

developing the Darlington New Nuclear Project. The Chairman has affirmed that while he was at GNF, he had no responsibility for the Darlington New Nuclear Project. The Consultant also confirms that its scope of work described in this Retainer Agreement does not involve GNF or its work in any way. For the avoidance of any doubt, the Consultant will establish an ethical wall to ensure that the Chairman: (i) does not discuss matters related to the Application with the Sponsors, as defined below; (ii) has no involvement or input in the Application or the engagement described in this Retainer Agreement; and (iii) has no access to any non-public information related to the Application or the engagement described in this Retainer Agreement.

2. **Consultant Expertise**

The Consultant has been selected to provide consulting services to Torys in connection with the Application as further described in Section 3 below. The sponsors of the work of the Consultant and the persons who have the relevant expertise will be:

- Joe Miller President and CEO
- Jeremy Clark Senior Vice President
- Glen Palmer Senior Executive Consultant
- Steve Owens Senior Executive Consultant
- David Oliver Senior Consultant
- Jacob Odiaga Senior Consultant
- Other experienced professionals from the Consultant, as may be required and agreed to by the parties in advance.

(collectively referred to as the “Sponsors”).

3. **Scope of Services and Work Product**

The Consultant will:

- (a) conduct an assessment of OPG’s project management and preparedness with respect to the Darlington New Nuclear Project (the “Study”);
- (b) if requested by Torys, produce a written report detailing the Study’s methodology, analysis performed and the Consultant’s findings and conclusions (the “Report”), which may be filed by Torys with the Board in connection with the Application; and
- (c) if requested by Torys, provide support during the hearing of the Application in connection with the scope of the services provided hereunder (“Application Support Services” and, together with the Study and any Report(s), the “Services”), which may include:
 - (i) assistance in responding to interrogatories applicable to the Report;
 - (ii) appearance at a technical conference to respond to oral questions on the Report;

- (iii) testifying about the Report as an expert witness either orally or in writing; and
- (iv) assisting in responding to undertakings (i.e., written questions during a hearing) on the Report.

4. Fees and Invoices

By entering into this Retainer Agreement, the Consultant acknowledges that:

- (a) the price for the Consultant to perform the Study, participate in the Discussion of Findings, and prepare and deliver a Report (if requested by Torys) shall be determined based on the actual time spent and the hourly rates set forth in paragraph (c) below and shall in no event exceed [REDACTED] (net of HST) without prior written approval from Torys or OPG; and
- (b) the price for the Consultant to provide Application Support Services (if requested by Torys) will be charged at the following hourly rates:
 - President and CEO [REDACTED]
 - Senior Vice President [REDACTED]
 - Senior Executive Consultant [REDACTED]
 - Senior Consultant [REDACTED]

All amounts stated herein are in Canadian dollars unless otherwise specified herein.

Any disbursements for additional incidentals incurred by the Consultant in relation to this Retainer Agreement must be pre-approved by Torys or OPG in writing and shall be in accordance with Schedule "C" (OPG's Business Expense Standards). In the event of conflict between any provisions of Schedule "C" and any policies or fee schedules of the Consultant relating to the charging of travel expenses or other incidentals, the relevant provisions of Schedule "C" shall prevail. Torys reserves the right to deduct any applicable non-resident withholding taxes from any amounts owing to the Consultant under this Retainer Agreement and remit such amounts to the applicable taxation authority.

The Consultant shall direct all invoices relating to Services performed by it under this Retainer Agreement to Torys, to the attention of:

Mr. Charles Keizer
Torys LLP
79 Wellington St. W., 30th Floor
Box 270, TD South Tower
Toronto, ON M5K 1N2
ckeizer@torys.com

with a copy to OPG, to the attention of:

Ms. Aimee Collier
Vice-President, Law Division
Ontario Power Generation

700 University Avenue, H18 E27.1
Toronto, ON M5G 1X6
aimee.collier@opg.com

Invoices shall include at least the following information:

- (a) identification of the billing period to which the account relates;
- (b) an itemized summary of the services that have been undertaken by you, including a brief description thereof, the date on which the services were rendered, the time spent on the services, the individual who performed the services, and the billing rate of such individual; and
- (c) an itemized and brief description of all expenses incurred during the billing period, with copies of supporting invoices.

Torys will send your invoice to OPG for its approval and if OPG does not approve your invoice, Torys will send it back to you for revision. Once OPG approves the invoice, Torys will submit the invoice to OPG's payment system. OPG pays invoices once per month (on the 25th of each month) and, for payment to be made on the 25th of a particular month, the invoice must have been approved in OPG's payment system by the 25th of the prior month. Once Torys receives the payment from OPG, Torys will send payment to you.

5. Confidentiality

All work performed by the Consultant in connection with this Retainer Agreement, including all findings, opinions and conclusions the Consultant reaches in relation to this Retainer Agreement, and any communications relating thereto, are strictly privileged and confidential and shall not be disclosed to any other person or party without the prior written consent of Torys or OPG. The Consultant agrees to designate all written communications and material accordingly. The Consultant further agrees to promptly notify Torys in the event that the Consultant receives a request to disclose information relating to this matter, and agrees to cooperate with Torys, to the fullest extent permitted by law, to prevent or limit the disclosure of such material or otherwise preserve the privileged and confidential status of such material.

The Consultant agrees to hold in confidence: (a) all information provided to the Consultant, and (b) the Consultant's opinions to Torys and to OPG as they relate to the information, whether the information or opinions are documentary or oral (collectively, the "Confidential Information"). The Consultant will not disclose the Confidential Information to any person unless Torys or OPG authorizes you in writing to do so. All documents given to the Consultant in connection with this Retainer Agreement remain the property of Torys or of OPG and are held in trust by the Consultant as agent. The Consultant agrees to return these documents on request. During the engagement, the Confidential Information shall be segregated from other OPG data (including on electronic information systems) and shall not be accessible to individuals other than the Consultant, Torys, and OPG employees requiring access).

The Consultant will not refer to Torys or to OPG, directly or indirectly, in connection with the promotion of its services, without obtaining the prior written consent of Torys or OPG, as the case may be.

6. **Intellectual Property**

Nothing in this Retainer Agreement shall be deemed to transfer, license, assign, permit the use of, or otherwise convey an interest in whole or in part to the Consultant of any intellectual property belonging to OPG or any of its representatives or any third party whose intellectual property is in OPG's custody or control, and the use by the Consultant of any such intellectual property shall be subject to the prior written approval of OPG.

Torys and OPG shall at all times have full rights and title to all works prepared, generated or created by the Consultant pursuant to this Retainer Agreement, including without limitation any reports, presentations, status updates, or other documents created by the Consultant, and any related works, modifications or additions thereto (the "Work Product"), and may at all times take possession of or use any completed or partially completed Work Product, notwithstanding any provision, express or implied, to the contrary. Without limiting the generality of the foregoing, OPG shall own all intellectual property rights in all Work Product, and the Consultant hereby waives and assigns to OPG any such rights, and agrees to give OPG and its representatives all assistance as may be reasonably required to perfect such rights including, without limitation, obtaining waiver of moral rights from any of the Consultant's employees, partners or other representatives.

Notwithstanding the foregoing, the Consultant shall retain sole and exclusive ownership of any pre-existing Consultant tools, methodologies, proprietary research and data, together with all intellectual property rights therein (the "Consultant Property"). Consultant grants to Torys and OPG a fully paid up, irrevocable, perpetual, non-exclusive, royalty-free license to use the Consultant Property contained within the Work Product for the purposes intended in this Retainer Agreement.

7. **Intellectual Property Protection**

The Consultant expressly warrants that the delivery, sale or use of the Consultant's Services will not infringe any Canadian or foreign patents, trademarks, copyrights, industrial design or other intellectual property rights and the Consultant shall indemnify and save Torys and OPG harmless from all claims, judgments and decrees that may be entered against Torys, OPG or its representatives and against all damages, liability, costs and expenses (including legal fees and other attendant costs and expenses) Torys or OPG incurs by reason of any infringement or claim thereof.

8. **Controlled Nuclear Information**

The Consultant has been made aware of certain Canadian federal requirements relating to the import and export of controlled nuclear information, and recognizes that it is an offence for any person to export controlled nuclear information from Canada without an export permit issued for the purpose by the Canadian Nuclear Safety Commission. The Consultant agrees not to remove or cause to be removed from Canada any controlled nuclear information during the performance of the Services, and will promptly raise the issue with OPG where the Consultant is in doubt as to whether information to be removed from Canada as part of the Services may be – or contain – controlled nuclear information.

9. **Termination**

Torys may terminate this Retainer Agreement at any time on written notice to the Consultant. Torys will pay, or will cause OPG to pay, for work performed up to the date of the notice of termination. Upon the termination or expiration of this Retainer Agreement, the Consultant shall return to Torys or destroy any hard copies, and to return to Torys and delete any electronic copies the Consultant may have of all documents and materials in its possession relating to the Services or this Retainer Agreement, including all Confidential Information (defined above) and Work Product, whether completed or not. The Consultant shall, upon request, provide Torys with a certificate of an officer of the Consultant certifying such destruction of hard copies and deletion of electronic copies.

10. **Liability and Indemnification**

The Consultant shall be liable for and shall indemnify and hold harmless Torys and OPG from all claims, demands, actions, penalties, damages, losses, judgments and settlements, liabilities, costs, expenses, including legal fees and other related costs and expenses arising out of, related to, or incident to, the Consultant or any of its representatives' performance of the Services under this Retainer Agreement, including, without limitation:

- (a) any breach, violation or non-performance by the Consultant or any of its representatives of any terms, conditions, warranties, obligations or covenants contained in this Retainer Agreement;
- (b) any breach or violation by the Consultant or any of its representatives of any applicable laws; and
- (c) any actions, omissions, negligence or willful misconduct of the Consultant or any of its representatives.

11. **Limitation of Liability**

Except for breach of obligations under section 5 (Confidentiality), gross negligence, willful misconduct, fraud, breach of applicable laws, including but not limited to privacy laws, and the Consultant's obligation to indemnify under section 7 (Intellectual Property Protection), the Consultant's total liability for any claim arising out of the performance of the Services, regardless of the form of claim, will in no event exceed total fees paid to Consultant hereunder and under no circumstances will either party be liable for any damages in respect of any incidental, punitive, special, indirect or consequential loss, even if that party had been advised of the possibility of such damages including, but not limited to, loss of profits, loss of revenues, failure to realize expected savings, loss of data, loss of business opportunity, or similar losses of any kind.

12. **Insurance**

- (a) Unless otherwise specified in this Retainer Agreement, the Consultant shall, during the term of this Retainer Agreement, and at its own expense, maintain and keep in full force and effect:
 - (i) commercial general liability insurance on an occurrence basis having a minimum inclusive coverage limit, including personal injury and property

damage, of not less than one million dollars (\$1,000,000.00) per occurrence, which shall be extended to cover contractual liability, products and completed operations liability, owners/contractors protective liability and must also contain a cross liability clause and a severability of interest clause, and must name OPG and its affiliates as additional insureds; and

- (ii) errors and omissions insurance (professional liability) in the amount of not less than two million dollars (\$2,000,000.00);
- (b) All insurance coverages and limits required to be maintained by the Consultant shall be primary to any insurance maintained by OPG, which shall be excess and non-contributory. Prior to the commencement of the delivery of the Services, the Consultant shall deliver to OPG a certificate of insurance which evidences the Consultant's compliance with this Section, including the provision of a thirty (30) day prior written notice of cancellation, non-renewal or adverse material change, to OPG. The Consultant agrees that the insurance described herein does in no way limit the Consultant's liability pursuant to the indemnity provisions of this Retainer Agreement.

13. **Independence**

By entering into this Retainer Agreement, the Consultant acknowledges and agrees that the Sponsors have received a copy of Rule 13A of the Board's *Rules of Practice and Procedure* concerning expert evidence, and agree to accept the responsibilities that are or may be imposed on them by that rule with respect to testimony before the Board. A copy of the rule and the relevant form are attached as Schedules 'A' and 'B' hereto.

14. **Responsibility Statement**

The Consultant agrees that the Services provided for herein will be performed in a timely, competent, professional manner in accordance with recognized professional consulting standards for similar services to be performed by a leading consulting advisory firm, and that adequate qualified personnel will be assigned for that purpose. If, during the performance of the Services or prior to the Board's issuance of final, non-appealable order(s) disposing of all relevant relief sought in the Application, such Services prove to be faulty or defective by reason of a failure to meet such standards, the Consultant agrees that upon prompt written notification from Torys, such faulty or defective portion of the Services will be redone at no cost to Torys or OPG, up to a maximum amount equivalent to the cost of the Services rendered under this Retainer Agreement, or, at Torys' request, the Consultant will refund an amount equal to the amount paid for the faulty or defective portion of the Services.

15. **Entire Agreement**

This Retainer Agreement, together with all Schedules attached hereto and any agreements and other documents to be delivered pursuant to this Retainer Agreement, constitute the complete agreement between Torys and the Consultant or their respective agents with respect to the subject matter hereof and supersedes any and all prior agreements and understandings. This Retainer

Agreement may be amended only in a written agreement that refers to this Retainer Agreement and is signed by both parties.

16. **Governing Law**

This Retainer Agreement shall be construed and otherwise governed pursuant to the laws of the Province of Ontario and the federal laws of Canada applicable therein.

Sincerely,

TORYS LLP

Per: 
Name: Charles Keizer

Accepted and agreed to by Pegasus-Global Holdings, Inc.

Signed 
Name (please print) Joseph A. Miller
(I have the authority to bind the Consultant)

SCHEDULE “A”

Rule 13A of the Board’s Rules of Practice and Procedure

13A. Expert Evidence

13A.01 A party may engage, and two or more parties may jointly engage, one or more experts to give evidence in a proceeding on issues that are relevant to the expert’s area of expertise.

13A.02 An expert shall assist the Board impartially by giving evidence that is fair and objective.

13A.03 An expert’s evidence shall, at a minimum, include the following:

- the expert’s name, business name and address, and general area of expertise;
- the expert’s qualifications, including the expert’s relevant educational and professional experience in respect of each issue in the proceeding to which the expert’s evidence relates;
- the instructions provided to the expert in relation to the proceeding and, where applicable, to each issue in the proceeding to which the expert’s evidence relates;
- the specific information upon which the expert’s evidence is based, including a description of any factual assumptions made and research conducted, and a list of the documents relied on by the expert in preparing the evidence;
- in the case of evidence that is provided in response to another expert’s evidence, a summary of the points of agreement and disagreement with the other expert’s evidence; and
- an acknowledgement of the expert’s duty to the Board in **Form A** to these Rules, signed by the expert.

13A.04 In a proceeding where two or more parties have engaged experts, the Board may require two or more of the experts to:

- (a) in advance of the hearing, confer with each other for the purposes of, among others, narrowing issues, identifying the points on which their views differ and are in agreement, and preparing a joint written statement to be admissible as evidence at the hearing; and
- at the hearing, appear together as a concurrent expert panel for the purposes of, among others, answering questions from the Board and others as permitted by the Board, and providing comments on the views of another expert on the same panel.

13A.05 The activities referred to in **Rule 13A.04** shall be conducted in accordance with such directions as may be given by the Board, including as to:

- (b) scope and timing;
- the involvement of any expert engaged by the Board;
 - the costs associated with the conduct of the activities;
 - the attendance or non-attendance of counsel for the parties, or of other persons, in respect of the activities referred to in paragraph (a) of **Rule 13A.04**; and
 - any issues in relation to confidentiality.

13A.06 A party that engages an expert shall ensure that the expert is made aware of, and has agreed to accept, the responsibilities that are or may be imposed on the expert as set out in this **Rule 13A** and **Form A**¹.

¹ Attached as Schedule 'B' herein.

SCHEDULE "B"

FORM A

Proceeding:

ACKNOWLEDGMENT OF EXPERT'S DUTY

1. My name is(*name*). I live at (*city*), in the (*province/state*) of
2. I have been engaged by or on behalf of..... (*name of party/parties*) to provide evidence in relation to the above-noted proceeding before the Ontario Energy Board.
3. I acknowledge that it is my duty to provide evidence in relation to this proceeding as follows:
 - (a) to provide opinion evidence that is fair, objective and non-partisan;
 - (b) to provide opinion evidence that is related only to matters that are within my area of expertise; and
 - (c) to provide such additional assistance as the Board may reasonably require, to determine a matter in issue.
4. I acknowledge that the duty referred to above prevails over any obligation which I may owe to any party by whom or on whose behalf I am engaged.

Date.....

Signature