ONTARIO POWER GENERATION

Records File Information:
See Guidance Section

OPG-FORM-0076-R003*

Type 3 Business Case Summary

Final Security Classification of the BCS: **OPG Confidential**

To be used for investments/projects meeting Type 3 criteria in OPG-STD-0076.

Executive Summary and Recommendations				
Project #:	16-25619	**Title:**	Operations Support Building (OSB) Refurbishment Project	
Phase:	Definition		**Release:**	Full
Facility:	Darlington		**Records File:**	NK38-BCS-28110-10001
Class:	Capital and OMA		**Investment Type:**	Sustaining

Project Overview

We recommend the release of $1,975 k ($[redacted] base costs plus [redacted].

This funding will support the following deliverables:

- Detailed design phase of Engineering, Procure, Construct (EPC) Contract, including constructability reviews and installation planning
- Development of detailed employee relocation plan
- Execution-Full release Business Case Summary (BCS) and estimate

The Operations Support Building (OSB) is an important building on the Darlington Nuclear Generating Station (DNGS) site that houses technical services essential to the business operations of DNGS, including Local Area Network (LAN) servers, telephone network hubs and security systems. It also houses 375 employees who provide daily support to station and control room staff.

The business objective of the project is to:

- Provide a secure facility for the essential technical services located on the first floor and basement of the OSB.
- Provide a viable office facility with enough space to accommodate the DNGS support staff located in the OSB.

Completing these business objectives will ensure that the OSB remains operational for the next 25 years to support the ongoing operations of DNGS post-refurbishment.

A building condition assessment documented deficiencies with most building systems and highlighted equipment that is at or near the end of their service life. The project will refurbish or replace mechanical, electrical, controls and civil systems located on all floors of the building as well in the cafeteria, the roof and the exterior cladding and windows. A value engineering workshop was completed to confirm the necessary refurbishment activities.

*Associated with OPG-STD-0076, Developing and Documenting Business Cases

Type 3 Business Case Summary

Project Cash Flows									
k$	LTD	2012	2013	2014	2015	2016	2017	Future	Total
Currently Released	1,888	513							2,401
Requested Now	-	247	1,728						1,975
Future Required	-		3,590	23,896	14,369	563			42,418
Total Project Cost	1,888	760	5,318	23,896	14,369	563			46,794
Ongoing Costs	-		854	2,048	2,343	1,351	1,373	787	8,754
Grand Total	1,888	760	6,172	25,944	16,712	1,914	1,373	787	55,548

Estimate Class:	Class 4	**Estimate at Completion:**	46,795k
NPV:	$23,236 k	**OAR Approval Amount:**	4,376k

Additional Information on Project Cash Flows (optional):

The total requested now of $1,975k is capital.

The total project cost of $46,794k consists of $44,006k in capital expenditures and $2,788k in project OM&A for furniture and other non-fixed assets.

The ongoing costs of $8,754k are base OM&A costs to support the relocation of employees ($476k) and to support the lease and operating costs of swing space between 2014 and 2018 ($8,728k).

Approvals			
	Signature	**Comments**	**Date**
This BCS represents the best option to meet the validated business need in a cost effective manner.			
Recommended by: Don Seedman Project Sponsor			
I concur with the business decision as documented in this BCS.			
Finance Approval: Randy Leavitt Vice President, Nuclear Finance			
I confirm this project will address the business need, is of sufficient priority to proceed, and provides value for money.			
Approved by: Deitmar Reiner Senior Vice President, Nuclear Refurbishment, per OAR 1.1			

ONTARIO POWER GENERATION

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OPG-FORM-0076-R003

Type 3 Business Case Summary

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Business Case Summary

Part A: Business Need

Business Need:

The purpose of this investment is to extend the life of the OSB by 25 years to support the ongoing operations of the refurbished Darlington station.

The OSB is an important facility at DNGS as it houses technical services that are essential to the business operations of DNGS. These technical services include: Security systems, site IT and telephone network hubs, quality assurance vault, station domestic water piping and radiological public domain access to the powerhouse via the bridge. This facility also provides office and conference room space for 375 employees and various speciality groups inside the DNGS protected area.

An assessment performed by an external engineering firm found that many of the existing building systems are currently, or will be, life expired by 2015. Several systems need to be replaced such as the cladding and windows, roof membrane, HVAC system (equipment and ducting), elevator, plumbing, electrical distribution, IT and telephone, cafeteria, furniture, interior furnishings including the carpet and ceiling tiles. Other systems need to be installed such as a sprinkler system and interior overhead lighting.

The continued degradation of the OSB will increase the likelihood of additional mould growth, worsened employee engagement and increased corrective maintenance to repair failing equipment, which will cause poor environmental conditions for the essential technical services and building occupants.

Part B: Preferred Alternative

Description of Preferred Alternative: Refurbish OSB while unoccupied

This alternative provides for the refurbishment of the OSB including the temporary relocation of approximately 375 employees to the ESSB/MSB buildings at DNGS and approximately 375 employees to an off-site leased facility until the end of the project in 2015.

This is considered the recommended solution for the following reasons:

- Satisfies the business objectives while providing the best value for money
- Technical services essential to DNGS business operations are maintained in a cost effective manner
- Returns the building to operation in the shortest amount of time.
- Provides office space within the protected area for approximately 375 employees for the next 25 years
- Utilizes the structure of the OSB, which is an asset of considerable value

Deliverables:	Associated Milestones (if any):	Target Date:
Current Release (Definition-Full):	**Current Release (Definition-Full):**	
• Execution-Full Release estimate and associated BCS	Execution-Full Release Funding Approved	05-SEP-2013
• Completion of detailed design	Design Complete	03-DEC-2013
Future Release (Execution-Full):	**Future Release (Execution-Full):**	
• Completion of construction, commissioning and Available for Service (AFS)	Available for Service and/or Ready for Service Completed	09-SEP-2015
• Project close out	Plan Complete Milestone	04-NOV-2016

ONTARIO POWER GENERATION

Records File Information:
See Guidance Section

OPG-FORM-0076-R003*

Type 3 Business Case Summary

Part C: Other Alternatives

Alternative 2: Base Case - Permanently relocate OSB employees to an off-site leased facility until 2062, refurbish first floor and basement and demolish second and third floors

This alternative includes the *permanent* relocation of approximately 375 staff currently occupying the OSB to an off-site leased facility until the end of Darlington life (2062). This alternative also includes:

- The refurbishment of the first floor and basement, to maintain the operation of the essential technical services.
- Demolition of the second and third floors of the OSB as the condition of the non-refurbished space will not be suitable for use but will still need to be maintained over the long term

The base case does not provide the best value for money and is not recommended for the following reasons:

- Requires significant work to be completed to OSB in order to maintain the technical services and demolish unuseable space.
- Subsequent loss of 54,000 sq.ft of useable space within the protected area.
- Real estate risk due to changing market conditions, availability of leasable space, and uncertainty of lease costs
- Loss of valuable building work space within the protected area

Loss of productivity due to increased travel time for off-site staff requiring occasional or frequent access to the protected area

Alternative 3: Refurbish basement and first floor, demolish second and third floor, construct a new off-site facility on OPG owned property

This alternative includes:

- Refurbishment of the basement and first floor to maintain the essential technical services that currently exist in the OSB
- Demolition of the second and third floors of the OSB as the condition of the non-refurbished space will not be suitable for use but will still need to be maintained over the long term
- Construction of a new *off-site* facility to house approximately 375 employees currently accommodated in the OSB

Although this alternative satisfies the business objectives for this project, it is not recommended for the following reasons:

- Does not provide the best value for money
- Requires significant work to be completed to OSB in order to maintain the technical services and demolish unuseable space.
- Loss of valuable building work space within the protected area
- Loss of productivity due to increased travel time for off-site staff requiring occasional or frequent access to the protected area
- Reduces space efficiency – functions currently housed in the OSB will be separated into two buildings

Two other locations were considered for the construction of a new facility. The locations included constructing a new facility inside the protected area, or constructing a new facility outside the protected area on the DNGS campus. Upon analysis of these locations, both of these locations provided less value for money than a new facility off-site. In addition, the DNGS campus plan does not indicate space available for this new facility.

Alternative 4: Relocate OSB essential technical services, demolish OSB and construct a new facility in the same location

This alternative includes the relocation of all essential technical services currently housed in the OSB to a new location on the Darlington campus, complete demolition of the OSB, and construction of a new building on the OSB site.

This alternative does not provide the best value for money and is not recommended for the following reasons:

- Significant operational and cost risks associated with the relocation of Darlington essential technical services
- Radiological public domain access to station via the powerhouse bridge will be significantly impacted by construction.
- Temporary loss of valuable building work space within the protected area and the subsequent loss of productivity due to increased travel time through security procedures into the protected area

*Associated with OPG-STD-0076, Developing and Documenting Business Cases

Type 3 Business Case Summary

Security and operational risks associated with moving the IT Wide and Local Area Server Room and related IT spaces outside of the protected area

Part D: Project Cash Flows

k$	LTD	2012	2013	2014	2015	2016	2017	Future	Total
Currently Released	1,888	513							2,401
Requested Now	-	247	1,728						1,975
Future Required	-		3,590	23,896	14,369	563			42,418
Total Project Cost	1,888	760	5,318	23,896	14,369	563			46,794
Ongoing Costs	-	0	854	2,048	2,343	1,351	1,373	787	8,754
Grand Total	1,888	760	6,172	25,944	16,712	1,914	1,373	787	55,548

Estimate Class:	Class 4	**Estimate at Completion:**	46,795k	**OAR Approval Amount:**	4,376k

Additional Information on Project Cash Flows (optional):

The total requested now of $1,975k is capital.

The total project cost of $46,794k consists of $44,006k in capital expenditures and $2,788k in project OM&A for furniture and other non-fixed assets.

The ongoing costs of $8,754k are base OM&A costs to support the relocation of employees ($476k) and to support the lease and operating costs of swing space between 2014 and 2018 ($8,728k).

Part E: Financial Evaluation

k$	Preferred Alternative	Alternative 2: Base Case	Alternative 3	Alternative 4	
Project Cost	46,795	38,528	52,322	145,334	
NPV (after tax)	23,236	N/A	(8,464)	(52,037)	
Other (e.g., LUEC)					

Summary of Financial Model Key Assumptions (see Guidance on this Type 3 BCS Form):

The financial model considers the capital costs to implement each alternative, swing space lease and operating costs where required, long-term capital improvement program costs, increase or decrease in operating and maintenance overtime costs, relocation costs and mileage costs. The costs were calculated until 2062 (assumed end of Darlington station life including safe storage activities).

Part F: Qualitative Factors

1. Maximizes the number of staff working in close proximity to the Darlington power house
2. Site infrastructure is already in place to support the refurbishment of the OSB and its continued operation
3. Essential technical services housed in the OSB will remain in place and be maintained throughout the construction period
4. Concerns over IT/LAN network performance, workstation ergonomics, task lighting, air quality, food services, and work place environment will be resolved as part of the refurbishment.
5. Resolution of issues raised in SCRs will improve staff productivity and engagement

Part G: Risk Assessment

Risk Class	Description of Risk	Risk Management Strategy	Post-Mitigation	
			Probability	Impact
Cost	Project cost estimates assumed that the EPC Contractor will be the constructor per OHSA. If OPG needs to become the constructor, there will be an increase in the overall project cost.	To be mitigated by the project team. The Contractor Safety Compliance department has confirmed that it is acceptable to manage this project with the EPC Contractor as the constructor.	Medium	Low
Scope	Refurbishment of the OSB has potential for scope increases due to discovery of hidden building systems as well as construction interferences. OSB is a 30 year old building located in a high traffic and congested part of the security protected area and has system connections to the nuclear station.	To be mitgated by the project team. Value engineering workshop was completed that validated the project scope. An architectural/engineering design agency has produced a Building Requirements document that details the modifications to be completed in each room of the building. During detailed design, the EPC Contractor will be required to complete thorough walk downs to uncover as many discovery issues as possible.	High	Medium
Schedule	The project schedule plans for the relocation of OSB employees to occur in the summer of 2013 (prior to the DNGS 2013 fall outage) and requires the Darlington Energy Complex to be available for occupancy prior to the end of June 2013,	Risk to be mitigated by Corporate Real Estate, who has the accountability to develop the project relocation strategy. Planned completion of Darlington Energy Complex is early July 2013.	Medium	Medium
Resources	The project may require dedicated security resources for compensatory measures due to construction activities in close proximity to the protected area fence.	Risk to be mitigated by the project team and Darlington Nuclear Security Operations. The project performed a walk down with a general contractor to identify alternative construction methods that will enable the safe completion of the work while eliminating the impact on security regulations and reducing the security resources required.	Medium	Medium
Quality/ Performance				
Technical	EPC Contractor installation plan does not properly protect one of the essential services, causing a disruption of services at the DNGS site, such as IT, telephone or security.	An exhaustive list of essential services has been documented in the EPC contract scope of work based on stakeholder feedback. The project will provide oversight to ensure the management of essential services is completed by the EPC Contractor.	Medium	Medium
Other	Swing space has not yet been officially secured; Without the swing space, the relocation of employees cannot proceed, which would significantly impact construction plans.	Risk will be mitigated by Corporate Real Estate, who is aware of the project swing space requirements and has a plan to secure the necessary space.	Low	High

Additional Risk Analysis:

An extensive risk identification and analysis was completed per OPG-STD-0062. A monte carlo simulation was completed to identify the required cost and schedule contingencies.

Part H: Post Implementation Review (PIR) Plan

Type of PIR	Target Project In Service Date	Target PIR Completion Date
Comprehensive	09-SEP-2015	09-SEP-2016

Measurable Parameter	Current Baseline	Target Result	How will it be measured?	Who will measure it? (person/group)
Successful completion of commissioning specifications based on building requirements (NK38-TS-28110-10001).	OSB systems are at or near end of service life. Building Requirements (NK38-TS-28110-10001) document identifies required building improvements.	Building is occupied by employees and systems operate within building requirements.	OSB systems, structures and components are successfully commissioned and remain available for service throughout PIR period.	Nuclear East Facilities

Part I: Definitions and Acronyms

1) Building Requirements document: The document prepared by an external architect/engineering firm that describes the modifications to be completed in each room of the building, along with the performance specifications of those modifications.
2) EPC: Engineering, Procure, Construct
3) ES MSA Contractors: Extended Services Master Services Agreement between OPG and preferred contractors.
4) Essential Technical Services: Important equipment located in the OSB that facilitates business operations across the site including security systems, information technology LAN servers, telephone network hub, station domestic water piping and radiological public domain access to the station via the bridge.
5) OHSA: Occupational Health and Safety Act
6) OSB: Operations Support Building
7) Swing Space: Temporary office space for OSB employees while construction taking place.

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Type 3 Business Case Summary

For Internal Project Cost Control

Type 3 Business Case Summary

Appendix A: Summary of Estimate			
Project Number:	16-25619	**Facility:**	Darlington
Project Title:	Operations Support Building Refurbishment Project		

Estimated Cost in k$

	LTD	2012	2013	2014	2015	2016	2017	Future	Total	%
OPG Project Management	1,034	465	399	289	307	221			2,715	6
OPG Engineering	92	30	103	137	120	8			490	1
Permanent Materials										
Design and Construction	[redacted]									
Consultants										
Other Contracts/Costs										
Interest										
Subtotal										
Contingency										
Total	1,889	759	5,317	23,897	14,370	563			46,795	
Removal Costs Included			261	2,230	88				2,578	6

Notes			
Project Start Date	04-MAR-2009	**Project Completion or In-Service Date**	09-SEP-2015
Interest Rate	6%	**Escalation Rate**	3%
Definition Cost Included	$4,376 k	**Estimate at Completion**	$46,795 k

Prepared by:		Approved by:	
Chris Waugh Modification Team Leader	2012-09-18 YYYY-MM-DD	Stephanie Tham Manager, Design Projects	2012-09-18 YYYY-MM-DD

Type 3 Business Case Summary

Appendix B: Comparison of Total Project Estimates										
Phase	Release	Date (YYYY-MM-DD)	Total Project Estimate in k$ (by year including contingency)						Later	Total Project Estimate
			2011	2012	2013	2014	2015	2016		
Definition	Partial	2009-MAR-09	5,482	1,865	1,649	200				9,196
Definition	Partial	2010-NOV-08	3,094	1,081	6,885	31,613	4,336	413		47,395
Definition	Full	2012-OCT	1,889	759	5,317	23,897	14,370	563		46,795

Project Variance Analysis					
Estimated Cost in k$					
k$	LTD	Total Project		Variance	Comments
		Last BCS	This BCS		
OPG Project Management	1,034	5,807	2,715	(3,092)	Project will now utilize an ES MSA vendor to complete an EPC contract. Oversight requirements from OPG are reduced due to this change in strategy.
OPG Engineering	92	354	490	136	Previously, an external design agency was providing oversight of the general contractor. Now, OPG will be providing this oversight.
Permanent Materials	0	0	0	0	Material costs are included in the construction costs.
Design and Construction	[redacted]				Value engineering workshop was completed and a detailed building requirements document was prepared. The project cost estimates have taken into account the additional scope and construction activities that were not originally anticipated by the first estimate.
Consultants					
Other Contracts/Costs					
Interest					The previous BCS estimate had more OM&A costs forecasted than this BCS, thus less interest.
Subtotal					
Contingency					[redacted]
Total	**1,889**	**47,393**	**46,795**	**(598)**	
Removal Costs Included		2.527	2,578	51	

Appendix C: Financial Evaluation Assumptions

Key assumptions used in the financial model of the Project are (complete relevant assumptions only):

Project Cost:

(1) The project costs for the preferred alternative were calculated by the Projects and Modifications external cost estimator using the value engineering workshop results and the project scope documented in the Building Requirements prepared by the preliminary design architect/engineering services firm.

(2) The project costs for the other alternatives were calculated by the external architectural firm who prepared the project alternatives analysis report.

Financial:

(1) The project alternatives analysis report identified yearly capital costs to replace/upgrade building systems throughout the entire life cycle analysis for each alternative. These costs have been included in the net present value calculations.

(2) Swing space and relocation costs have been included in the net present value calculations for each alternative as necessary but not in the project costs.

(3) Mileage costs have been assumed for each alternative for employees traveling between the Darlington site and the planned swing space location in Oshawa, ON.

Project Life:

(1) The life cycle analysis for this project forecasts costs until 2062. This assumes the need for the OSB until the end of Darlington station life including safe storage of the nuclear units.

Energy Production:

(1) This project will not have any impact on the energy production of the Darlington units.

(2) This project will not have any impact on the successful completion of the Darlington station containment outage in 2015.

Operating Cost:

(1) For alternatives 1, 2 and 4, it was assumed that there will be a decrease in the operation and maintenance staff overtime requirements due to improved building systems or minimized building space being maintained by OPG staff; this has been reflected in the net present value calculations.

(2) For alternative 3, it was assumed that there will be an increase in operations and maintenance staff overtime requirements because there will be a new facility in addition to the existing OSB first floor and basement remaining in service.

Other:

Attach further detail as appropriate from the Financial Evaluation spreadsheet.

Appendix D: References

1) D-PCH-15000-10009 – Project Charter
2) D-BCS-15000-10002 – Developmental BCS (Initiation-Full)
3) D-BCS-28100-10001 – Developmental 2 BCS (Definition-Partial)
4) NK38-PEP-28100-0366501 – OSB Refurbishment Developmental 2 Project Execution Plan
5) NK38-REP-28110-0322001 – Operations Support Building - Building Condition Assessment Report
6) NK38-REP-28110-0394044 – OSB Refurbishment Project Alternatives Analysis

OSB Refurbishment
25619

Summary of Alternatives

$000's	Base Case	Alt 1 (Recommended)		Alt 2	Alt 3	Alt 4	Alt 5
		Full Cost	Incremental Cost				
PNGSB Unit 5	0	0	0	0	0	0	0
PNGSB Unit 6	0	0	0	0	0	0	0
PNGSB Unit 7	0	0	0	0	0	0	0
PNGSB Unit 8	0	0	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**
DNGS Unit 1	0	0	0	0	0	0	0
DNGS Unit 2	0	0	0	0	0	0	0
DNGS Unit 3	0	0	0	0	0	0	0
DNGS Unit 4	0	0	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**
PNGSA Unit 1	0	0	0	0	0	0	0
PNGSA Unit 2	0	0	0	0	0	0	0
PNGSA Unit 3	0	0	0	0	0	0	0
PNGSA Unit 4	0	0	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Total Revenue	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Base OM&A	(201,241)	641	641	0	(97,527)	643	0
Outage OM&A	0	0	0	0	0	0	0
Project OM&A	(2,981)	(2,788)	(2,788)	0	(2,981)	0	0
Total OM&A	**(204,222)**	**(2,147)**	**(2,147)**	**0**	**(100,508)**	**643**	**0**
Provision	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Capital Expenditures	**(44,875)**	**(49,328)**	**(47,126)**	**0**	**(87,053)**	**(142,735)**	**0**
Present Value (PV)	**(61,476)**	**(38,240)**	**(36,252)**	**0**	**(69,939)**	**(113,512)**	**0**
Net Present Value (NPV)	**N/A**	**23,236**	**25,224**	**0**	**(8,464)**	**(52,037)**	**0**
IRR%	**N/A**	**8.3%**	**10.4%**	**N/A**	**N/A**	**N/A**	**N/A**
Discounted Payback (Yrs)	**N/A**	**7.58**	**6.65**	**N/A**	**N/A**	**N/A**	**N/A**