Nanaimo Regional General Hospital
Intensive Care Unit
Replacement Project
Business Case

Submitted to the Nanaimo Regional Hospital District
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Part A: Planning Future Service Delivery

Executive Summary

This business case substantiates the need for a replacement Intensive Care Unit (ICU) at Nanaimo Regional General Hospital (NRGH) in order to address the hospital's significant critical care service deficiencies.

The business case is based around a May 2013 Critical Care Service Review prepared for Island Health which highlights the current ICU deficiences, as well as the impact those deficiencies are having on patients and staff.

Through a comparison study with other BC hospitals, the Review also substantiates NRGH's need for additional ICU beds.

Three options are assessed in this business case, including the recommended replacement option.

The following additional information has also been included on the replacement option: an estimate of the capital project costs, as well as the incremental operating costs; a site location plan and floor plan; a project schedule; and, a project scope of work.

Introduction and Background

NRGH currently has a 10-bed ICU which was built in 1970.

In May 2013, an external review of the three Island Health tertiary ICUs at NRGH, Victoria General Hospital (VGH) and Royal Jubilee Hospital (RJH) was completed to assist in quality improvement initiatives. The reviewers identified the physical plant of the NRGH ICU as being in extreme need of updating and they described it as "by far the worst ICU we have seen in Canada".

Resulting patient and staff impacts include:

- High risk of infections due to inadequate space, and the lack of separation of beds, sinks, and dirty/clean utility spaces;
- Inadequate patient family consult and quiet space;
- Safety issues due to the current limited room sizes/layouts, lack of storage space and clutter, and difficulties moving patients into and out of the ICU as well as within the unit;
- High risk and staff stress of having high acuity patients on general wards which should be in the ICU which is unable to accommodate due to capacity issues;
- Lack of ICU/High Acuity Unit (HAU) adjacency makes staff workload management difficult, and can often translate into a risky misalignment of nursing care/skill and patient need (this issue would be resolved with a future HAU build-out after the ICU project);

- Lack of natural lighting negatively impacts patient recovery as well as staff morale/ effectiveness;
- Inadequate storage and management of medications; and
- Significant distance to get to and from the Operating Rooms, Emergency Department, and Radiology.

The primary difference between an ICU bed and a HAU bed is the nursing ratio for a HAU would be lower. In the event of an overflow situation, ICU staff/equipment would be added, such as nurses and ventilators, to meet the need without impacting other clinical areas such as the Emergency Department, Post-Anasthetic Recovery Room, etc. Patients in the ICU would be the sickest, often on ventilators, while HAU patients are too high need to be in a general ward with one nurse looking after 4 to 5 patients, but not in need of the higher level of care offered in the ICU. ICU patients that are getting better but not ward ready could be transferred to the HAU.

The new ICU will be built in an existing parking lot between the Perinatal/Renal and Emergency Department buildings. The ICU building addition will be a concrete framed 2-storey building plus a basement level, shelled in space on the main floor for a future 12-bed HAU, and a 12-bed ICU on the second floor. Each floor will be approximately 1,131 gross square meters.

	Existing ICU	New ICU
# of ICU beds	10	12
ICU staffing (RNs)	8	13
Gross square meters	400*	1,131

*Estimate based on 332 component gross square meters with a 20% gross up.

The current ICU does not meet current industry standards and best practices.

The schematic design of the new ICU, prepared by Stantec Architecture, does meet current industry standards and practices.

Service Need

It is expected that the NRGH ICU demand will increase in the next 10-15 years due to an increase in population and the elderly (60% of ICU patients are greater than 60 years of age). The Regional District of Nanaimo forecasts population growth to increase at a slower rate over the next two decades, as compared to the 3 to 5% annual growth in previous decades. However, the average age of the population will continue to grow older (i.e. the median age increased from 46.6 to 49.3 between 2006 and 2011. The additional 2 ICU beds, combined with the future HAU beds will be needed to manage this future increased demand.

The following table provides a projection of ICU patients admitted to NRGH. The actual admission rate is subject to the intensivists adjusting their admission threshold based on the number of patients already admitted. That is, a patient may be admitted from a community hospital when the ICU census is low. If the ICU census is high, new ICU patients may have to

be accommodated in the less than ideal Post-Anesthetic Care Unit (PACU). To avoid this overcapacity issue, the intensivists may direct ICU patients from a community hospital to RJH or VGH. The growth in ICU patients is also based on a conservative population growth of 1% per year.

Year	Number of Admitted NRGH ICU Patients		
	In ICU	**In PACU**	**Total**
2016	2,287	162	2,449
2017	2,316	99	2,415
2018 Projection			2,494
2019 Projection			2,544
2020 Projection			2,594
2021 Projection			2,644
2023 Projection			2,744
2028 Projection			2,994
2033 Projection			3,244

Comparison With Other Hospitals in BC

The table below shows the critical care beds in other BC hospitals and the current and proposed beds in Nanaimo. The proposal calls for 8.5 critical care beds per 100 acute hospital beds for Nanaimo (including ICU and HAU beds). Based on a 2014 analysis by Island Health, this ratio is slightly higher than the beds operational in other BC hospitals and with the new North Island Hospital in Comox Valley and Campbell River.

Hospital	ICU Beds Only	Total Critical Care Beds (ICU + HAU)	Acute Hospital Beds	Critical Care Beds/100 Acute Hospital Beds
NRGH (Proposed)	12	24	284	8.5
NRGH (Current)	10	13*	284	4.5
Surrey Memorial	26	52	650	8.0
Royal Columbian	18	30	412	7.3
Abbotsford Regional	8	16	300	5.3
Kelowna General	11	19	300	6.3
Campbell River (new)	6	6	95	6.3
Comox (new)	8	8	153	5.2

*Includes 3 close observation cardiac telemetry beds located in a medical ward. These beds do not meet an ICU standard.

Comparison With ICU Beds in Canada

Canada on average has approximately 15 critical care beds per 100,000 population (*Can J Anesth/J Can Anesth (2009) 56:291–29 and Crit Care Med 2008; 36:2787–2793*). Island Health has 8 critical care beds per 100,000 population so Island Health hospitals such as Nanaimo are currently significantly under resourced for ICU beds.

An External Review of ICU capacity conducted by an experienced ICU physician and manager from Ontario concluded that Island Health *"is woefully under resourced for critical care beds".* The Reviewers made a number of recommendations including that "*the number of critical care beds should be increased at the three tertiary hospitals in VIHA*" and that "*the Health Authority, in conjunction with each of the three hospitals should establish HAUs*".

Strategic Alignment

One of Island Health's key strategic mandates is the continual quality improvement of critical care services.

As noted in the introduction, in May 2013 Island Health executive requested an external review of the three Island Health tertiary ICUs at NRGH, Victoria General Hospital and Royal Jubilee Hospital to assist in Island Health's quality improvement initiatives.

The top recommendation from the Review was a new ICU at NRGH.

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Part B: Service Delivery Options Analysis

Project Objectives and Scope

Objectives

- Staff & patient safety
- Patient privacy/family confidentiality
- Care team communication
- Care process efficiency
- Learning/mentoring
- Healing space

Scope

- Concrete framed 2-storey building plus a basement level, shelled in space on the main floor for a future 12-bed HAU, and a 12-bed ICU on the second floor.
- Each floor approximately 1,031 m2.
- Key components of the ICUfunctional program:
    - 12 ICU beds which includes 1 bariatric bed and 4 isolation beds
    - Hybrid of two 4-bed patient room pods plus 4 beds along the central corridor
    - Patient toilet and bed pan washer for each bed
    - Articulating ceiling mounted service booms and gantry type overhead patient lifts
    - Medication room
    - Clean and soiled utility rooms
    - Family zone which includes waiting/lobby, two consult rooms, kitchenette and washrooms
    - Staff breakroom and washrooms
    - Patient observation alcoves
    - Care centre workspaces
    - Equipment storage
    - Intensivist/physician sleep room
    - Meeting room
    - Offices for clinical nurse leader and clinical nurse educator
- See Appendix B for floor plan of new ICU.

Risks

Risk	Likelihood	Consequence	Risk Mitigating Strategies
Policy Risk of change of government policy on capital projects	Low	High	Expedite approvals and procurement process
Design and Construction Risk of excessive pricing by bidders due to unforeseen conditions in a renovation	High	Med	Consider risk pricing in procurement analysis
Site/Property Potential for unforeseen site servicing costs	Med	Low	Communication with Municipal authority and contracted engineers
Cost, Economic Market Potential for cost escalation due to tight market for key sub trade	Med	Med	Thorough procurement analysis and consideration of construction management as a means to fix pricing for key sub trades earlier in the project
Ownership and Operations Risk of escalating operating cost	Low	Low	Operational mitigation strategies to increase efficiencies

Service Delivery Options Considered, Analysis and Recommendation

Option 1 (recommended option): New building addition

- **Description:**
  - Concrete framed 2-storey building plus a basement level, shelled in space on the main floor for a future 12-bed HAU, and a 12-bed ICU on the second floor.
  - Each floor approximately 1,031 m2.
- **Assumptions:** That funding will be requested in the future to complete the HAU shelled in space.
- **Context and Rationale:** This option would allow for the future addition of a 12-bed HAU which allows for better management of ICU/HAU staff and patients. This option also relocates the ICU closer to the ORs, ED and Radiology.
- **Cost Estimate:** $33.85 million
- **Specific Issues:** None identified.
- **Option Implications:** None identified.

Option 2: Relocate the whole ICU into all of the adjacent Telemetry/General Medicine Ward (100% of the Ward)

- **Description:**
  - 100 % of the adjacent Telemetry/General Medicine Ward renovated into an 11 bed ICU.
  - 31 Telemetry/General Medicine beds would be displaced and would need to be relocated elsewhere.
- **Assumptions:** None identified.
- **Context and Rationale:** Less expensive than a new building addition.
- **Cost Estimate:** $11.00 million
- **Specific Issues:** Space not ideally suited due to floor plate configuration and multiple columns and plumbing chases which restrict adequate bedroom size and site lines from staff to patients.
- **Option Implications:** The Telemetry/General Medicine Ward would need alternative space elsewhere.

Option 3: Expand the ICU as required into some of the adjacent Telemetry/General Medicine Ward (50% of the Ward)

- **Description:**
  - 50% of the adjacent Telemetry/General Medicine Ward renovated into an 12 bed ICU.
  - 17 Telemetry/General Medicine beds would be displaced and would need to be relocated elsewhere.
- **Assumptions:** None identified.
- **Context and Rationale:** Less expensive than a new building addition.
- **Cost Estimate:** $9.00 million
- **Specific Issues:** Space not ideally suited due to floor plate configuration and multiple columns and plumbing chases which restrict adequate bedroom size and site lines from staff to patients.
- **Option Implications:** The Telemetry/General Medicine Ward would need alternative space elsewhere.

Part C: Funding Analysis and Implementation Plan

Funding Analysis

Capital Expenditure

The total capital project cost is $33.85 million.

Capital Funding Sources ($millions)	18/19	19/20	20/21	21/22	Total
Nanaimo and District Hospital Foundation	0.00	0.00	0.00	5.00	5.00
Province	0.15	1.95	13.21	1.99	17.31
Nanaimo Regional Hospital District (NRHD)	0.10	1.30	8.81	1.33	11.54
Total Capital Costs	0.26	3.25	22.02	8.32	33.85

Operating Expenditures

The estimated net annual increase in operating expenditures is $1,191,617.

Operating Expenditures	Annually
Direct ICU Staffing Increase	$588,242
Operations and Support Services	$352,394
Pharmacy	$111,855
Lab	$108,516
Medical Imaging	$16,973
Other	$13,637
Total	**$1,191,617**

Preliminary Implementation Schedule

Event	Approximate Date
Design Consultants Retained	February 17, 2016
Schematic Design Report Complete	June 15, 2017
Approval to Proceed (MoH and RHD)	To be determined
Design Development	Four months
Construction Documents Complete	Six months
Tender Award	Two and a half months

Construction Start	Two weeks
Construction Complete	Eighteen months
Commissioning & Post-Construction Complete	Three months
New ICU Operational	

Implementation of this schedule is dependent on final approvals from the Ministry of Health and the NRHD.

Part E: Communications and Public Consultation

Communications and public consultation will be managed throughout the project, and will include input from all of the key stakeholders involved in this project: Island Health, the Ministry of Health, the NRHD, and the Nanaimo and District Hospital Foundation.

Appendix A: Site Location Plan

Appendix B: Floor Plan of New ICU