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New Dunedin Hospital
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Southern Health
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Southern District Health Board
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MINISTRY OF HEALTH
MANATŪ HAUORA

Final Detailed Business Case

New Dunedin Hospital

March 2021 (Issued 22 March 2021)

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Document preparation

This document was prepared by Sapere Research Group working alongside the Health Infrastructure Unit of the Ministry of Health and Southern DHB.

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HIU	Mike Barns, NDH Programme Director		
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Executive summary

This Final Detailed Business Case (Final DBC) applies the standards and requirements set out under the Treasury's Better Business Case guidelines and the standards and requirements advanced by the New Zealand Infrastructure Commission.

On 24 August 2020 Cabinet approved Option 5 as the preferred option for the New Dunedin Hospital Project (NDH) – an Inpatient Building on the former Cadbury factory site and an Outpatient Building on the adjacent former Wilson Parking Building site. The Initial Detailed Business Case (Initial DBC) was approved in principle. In Option 5, the Outpatient Building is completed by 2025, much improving system resilience by providing much-needed day surgery theatre suites [CAB-20-MIN-0413 refers].

Cabinet noted that the total budget for the NDH could exceed $1.4 billion, directed that a Final DBC be submitted on completion of a concept design and revised costing by February 2021, and directed that separate implementation business cases be submitted for each of the Outpatient Building (May 2021) and Inpatient Building (November 2021).

The size of the hospital has transitioned from just under 93,000m^2 in the 2017 Indicative Business Case (IBC) to now just under 91,000m^2 as measured at the end of Concept Design.[1] 100 per cent Concept Design for the preferred option was signed off by the Director-General of Health in December 2020.

This Final DBC seeks Cabinet approval to increase the capital envelope of $1.4 billion to $1.47 billion.

Southern DHB needs a new hospital in Dunedin

The Ministry and Southern DHB have highlighted the parlous state of the existing Clinical Services Block (CSB) and Ward Block that currently house Dunedin's hospital. The CSB is beyond repair, out of date and may fail operationally due to:

- a deteriorating environment that is eroding quality of care, creating safety risks and potential harm, and causing distress to patients and staff
- inflexible and inappropriate care facilities that restrict service capacity, cause delays and increase outsourcing costs
- care facilities that cannot absorb innovations, preventing efficiency gains and care improvements.

Southern DHB requires a hospital in Dunedin able to support acute and elective services with appropriate physical infrastructure, to support modern flexible models of care, greater accessibility, and standardisation. The hospital will be built to modern building codes and offers considerable resilience including IL4 for critical areas. The hospital will include 421 beds, 16 theatres (expandable to 20 theatres) and 30 ICU or high dependency beds (expandable to 40), with associated spaces to support greater delivery of ambulatory care.

[1] Based on Schedule of Accommodation 5.6

Future demand reflects an ageing population

The Southern health system is beginning to feel the pressure of increasing demand in age-related services. The increase in discharges across the current hospital service is substantial at 28 per cent by 2042/43, but increases in caseweights and bed days are greater, even after moderating demand interventions. These high growth rates reflect the current age distribution of the more complex inpatient events, the length of patients' stays, and the impact that the ageing population will have upon the need for services if current models of care continue.

Transformation of Southern DHB's health system

The DHB's response to these transformation challenges is set out in a Change Management Programme that has Investment Objectives requiring system-wide change. That system-wide change requires integration of primary and secondary care and optimisation of patient pathways, as well as supporting enablers such as facilities and IT. This comprehensive plan and its associated Change Management Plan need to be successfully executed to meet the design assumptions underpinning the New Dunedin Hospital, which are a substantial reduction in medical admissions, reduced lengths of stay and increased theatre productivity.

The five investment objectives for the DBC are:

- ability to adapt – to create responsive infrastructure and capability that supports disruptive health system change
- to optimise use of total health system resources
- to reduce non-value-added time by 80 per cent to create a seamless patient journey
- to improve the patient and staff experience
- to reduce the risk of harm to 'acceptable standards'.

There are three critical dependencies for Southern DHB in achieving the system-wide benefits, including implementing the NDH successfully:

- A Primary and Community Care Strategy and Action Plan, ensuring the objective of reducing medical admissions is achieved.
- A Digital Blueprint and programme of investment has been developed. Detailing and implementing this blueprint is imperative for the success of NDH. The hospital is predicated on continuing efficiencies in treating patients in the right place, at the right time, as well as continuing improvements in staff productivity. A digital hospital is a design assumption and must be implemented.
- A Workforce Strategy and Action Plan to ensure that all clinicians work to the top of their scope, deliver care in the right place, to the level that the health system needs, and support implementation of new models of care.

The signed-off costs or benefits of achieving these dependencies are part of other business cases and plans.

Progress to date

A fourth critical dependency is the ability of the Ministry to staff up, on the ground, with the requisite design and construction expertise. This expertise is now established with a series of appointments of staff and contractors. The Ministry (and Southern DHB's) joint project office is now in place, working alongside and co-located with the Southern DHB's PMO for the wider health system change.

There has been considerable progress to date:

- The required land has been acquired. Site works, including demolition and foundations, are well underway.
- Design and construction directors in the Ministry's Project Team have been appointed, as is the supplier of project management and hospital design services.
- Concept plans are at 100 per cent, and further design activity is underway.
- There is an application to the Minister for the Environment for fast-tracking of the resource consent.
- An Early Contractor Engagement Request for Proposals for a main contractor to contribute to design is in the market.

There has been further engagement with the supplier market, including a further round of supplier meetings and on-going dialogue through the procurement process. The feedback from those meetings strongly supports the two procurement approaches:

- Construction Management for the Outpatient Building. This traditional approach provides for a combination of rapid progress and cost control and is also a familiar approach in the NZ construction market.
- The more collaborative Early Contractor Engagement (ECE) as the contractual strategy for the more complex and larger Inpatient Building. The construction contractor and important sub-trades will be selected and paid for input into the design phase.

A close focus on risk and benefits realisation

A quantity surveyor has costed the NBH at 9(2)(b)(ii) [redacted]

A close examination of construction risk suggests there is a 85 per cent chance that the contingency included within the construction cost will be sufficient. The contingency also makes allowance for potential design and scope changes that are likely over the long period of design and construction.

Table 1 QRA model results and comparison with QS estimates

Source	Value of construction costs	Cost estimate
Quantity surveyor	Cost excluding all contingencies	9(2)(b)(ii) [redacted]
Quantitative risk assessment	P85 construction cost (an 85 percent chance that costs will be below, if no changes to design or scope)	
Quantity surveyor	Cost including construction risk contingencies, but *excluding* design and scope contingencies	
Quantity surveyor	Cost *including* all contingencies (construction risk, design and scope contingencies)	

We have also measured the cost of delay. We calculate a one-year delay would cost 9(2)(b)(ii) [redacted], and a three-year delay would cost in the order 9(2)(b)(ii) [redacted]. This calculation excludes Southern DHB costs, which might include the cost of outsourcing surgical operations to the private sector.

There is a database of risks, and analysis of that database suggests that delays due to decision making, late design process or other hold-ups, such as lack of workforce, could be as impactful as construction price and quantity risk. Further, the risk of scope changes is identified as a very material and likely risk, with high impact.

The contingency that has been made for design and scope changes is very likely to be fully committed as the project progresses over the next 10 years but is expected to be sufficient.

There is a considerable focus on reducing risk. The Ministry has closely reviewed past New Zealand health and other construction experience and has received in-depth comment from our Technical Reference Group. A series of other improvements have been implemented:

- Time will be taken to complete *full design* before proceeding to pricing so full documentation will be available to bid on.
- The construction contractor will be paid to participate in the collaborative design phase.
- Key design risk areas – such as those of earthquake restraint, passive fire safety and integration of decisions about clinical equipment – are recognised and included in the construction programming, with responsibilities assigned within the construction team.
- There will be a great deal of focus on standardisation of design, and the jump-off point for the Outpatient Building will be the plans for the now complete Canterbury DHB Outpatient Building.
- Contracts will be based on industry standards, technical clauses kept to a minimum, and with a fair risk allocation in line with the Construction Accord.

A suitably broad sweep of measures to monitor the benefit realisation of the NDH project have been identified and peer reviewed, and they were endorsed by the Southern DHB's Executive Leadership Team (ELT) in November 2020. Benefits reporting will begin for ELT in early 2021.

The Benefits Realisation Plan covers the full ambit of both the design and construction of NDH and the system-wide benefits from the wider Southern DHB Change Management Programme.

Financial implications

Against the backdrop of ongoing operating deficits, Southern DHB will become substantially more efficient. The new hospital enables the DHB to increase capacity to serve its population and their health needs while delivering efficiency gains in the form of reduced staff-to-patient ratios and a reduced growth path in operating costs. Complementary initiatives in digital programme and primary care will transform the financial outlook for the DHB.

Governance and management

Project governance mechanisms have evolved with the project. The new Executive Steering Group commenced in 2021. A Local Advisory Group including the Dunedin City Council, Southern DHB, Otago Regional Council, University of Otago and NZTA (Waka Kotahi) continues to operate to ensure the wider opportunities from the hospital project are realised.

Responsibility for the successful execution of the construction project sits with the Senior Officer Responsible in the Health Infrastructure Unit of the Ministry of Health, who is also Deputy Director-General, Infrastructure. A strategic governance group, the Executive Steering Group, sits alongside to ensure close alignment of the Ministry and the Southern DHB.

The Ministry's Project Team seeks advice as appropriate from a Technical Reference Group and the Southern DHB's Clinical Leadership Group.

The Board of the Southern DHB oversees the whole of the Transformation Programme and there is a co-located Project Management Office sitting alongside the Ministry's Project Team. The Ministry of Health will monitor overall progress as part of the portfolio of the Deputy Chief Executive Sector Support & Infrastructure.

1. Introduction

The NDH is a large and complex vertical health infrastructure project that supports the achievement of one of the Government's main health priorities: better population health outcomes supported by a strong and equitable public health and disability system. When complete, the NDH will be a key enabler for the Southern DHB's continued provision of high-quality health services throughout the Southern health system, which operates across the lower South Island, and will be a key urban landmark for Dunedin that supports the city's long-standing relationship with health and health education.

1.1 Project title

The project title is "**New Dunedin Hospital**" and in acronym form "**NDH**".

1.2 Project background

The need for a new hospital was thoroughly tested and agreed.

The business case process to date has established the strategic context, finding a compelling case for change based on the condition of existing hospital buildings:

- The Clinical Services Block (CSB) has reached the end of its serviceable life.
- The Ward Block has significant maintenance issues and impedes the delivery of efficient and effective services.
- Neither building is economic to repair or refurbish.
- The structure and layout of the CSB and Ward Block are hindering modern and efficient service delivery.

The IBC also highlighted the challenge that Southern DHB faces with an ageing population and the associated forecast unsustainable service demand. Population ageing means a rapid growth in complex patients, bed-day requirements and other resourcing unless the system is reorganised.

1.3 Key decisions to date

The Government has taken several decisions supporting progression of the NDH:

- selecting a central Dunedin site and purchasing the necessary land April 2018 (CBC- 18- Min – 0052)
- commencing demolition of the Cadbury site in February 2020
- in Budget 2019, Cabinet included a tagged contingency for the NDH Project based on a budget of $1.4 billion, subject to the approval of a detailed business case (CAB–19-MIN-0174.19)
- exempting the Ministry of Health from the requirement to consider a public-private partnership as part of the procurement options for the New Dunedin Hospital, April 2018 (CBC- 18- Min – 0052)

- approving a preferred option: an Inpatient Building on the Cadbury site and an Outpatient Building on the former Wilson Parking site, August 2020 (CAB-20-Min-0413)
- releasing $127 million to progress the project throughout 2021, including preliminary design work, demolition, piling, project management and appointment of a main contractor as part of early contractor engagement, August 2020 (CAB-20-Min-0413).

1.4 Services in and out of scope remain constant

Southern DHB requires a hospital in Dunedin able to support acute and elective services with appropriate physical infrastructure, to support modern flexible models of care, greater accessibility, and standardization. The hospital will be built to modern building codes and offers considerable resilience including IL4 for critical areas. The hospital will include 421 beds, 16 theatres (expandable to 20 theatres) and 30 ICU or high dependency beds (expandable to 40), with associated spaces to support greater delivery of ambulatory care. The scope of work also includes demolition of buildings currently on-site including demolition of the Cadbury factory.[2]

The decisions of what to include or exclude from the NDH construction programme have remained stable since 2019 and include all the services need for acute and elective care across medical and surgical services with an expansion plan. The level of care is tertiary level and includes neonatal services, for instance, and services for trauma.

The table below summarises the scope of the NDH, from front-of-house services such as outpatients, to inpatient units, to back-of-house services such as security.

Table 2 Departments included in the NDH project

Inpatient Building (77,591m² including links and Ancillary Building)	
Patients Areas Medical/Surgical Inpatient Unit High Acuity Inpatient Unit Rehabilitation Inpatient Unit Mental Health Services Older Persons Children's Inpatient & Paediatric Assessment Day Unit Intensive Care Unit (10 Shelled Bays) Acute Renal Dialysis Unit Neonatal Intensive Care Unit Maternity Unit + Interventional Suite Primary Birthing Unit Haematology & Oncology Inpatient Unit **Interventional Areas** Operating + Interventional Suite (4 Shelled Theatres) 23 Hour Ward Emergency Department including & Satellite Radiology Emergency Psychiatric Service (EPS) Assessment Planning Unit Acute Radiology	**Labs & Processing Areas** Medical Physiology Labs Pathology Laboratory *(Shell only)* NZBS - Blood Bank *(Shell only)* **Supplementary Services** Pharmacy CETES: Clinical Engineering Sterile Services Unit Security Information Services Building & Property Integrated Operations Centre Staff Amenities Heliport Collaborative Workspace *(Shell only)*

[2] The accommodation schedule is set out as Appendix A.

Nuclear Medicine Mortuary Day Surgical Unit Cardiac Interventional Suite **Public & Community Areas** Front of House Retail (*Shell Only)* Multi-Faith Centre Whānau Spaces	**Ancillary Building** (linked to Inpatients) **Supplementary Services** Back of House - Linen, Waste, Mail & Support Food Services (*Shell Only)* Procurement & Supply

Outpatient Building (13,391 m²)

Clinical Areas Day Procedures Unit Planned Radiology Specialist Clinics Day Medical Unit **Public & Community Areas** Front of House Retail *(Shell only)*	**Labs & Processing Areas** Transit Care Unit Pathology Collection *(Shell only)* Supplementary Services Back of House - Linen, Waste & Support Satellite Security Satellite CETES

Out-of-scope services are services at Southern DHB's second major site, Wakari, such as mental health buildings, or services housed in facilities close by but not in the existing CSB or Ward Block. The cancer service will continue to operate in its current facility and will be relocated in time. Orthotics and Prosthetics will be located off-site but nearby. A Master Site Plan is being developed to understand where these services might be housed in future and how they might relate to a planned tertiary education and research precinct. Services such as community mental health and intellectual disability services are tentatively proposed to be in community care hubs and are out of scope of the new build project.

Table 3 NDH services out of scope

Service	Status at 22/10/19 (Project Steering Group records)	Suitable location for medium term outlook
Ambulatory		
Breast Care including BreastScreen Aotearoa	Off-site Pacific Radiology Service (third- party provider) -Supported by CLG but to be agreed	Currently has accommodation to 2028 and beyond
Community Care Hub based Ambulatory services	Off-site – Agreed	Currently has accommodation to 2028 and beyond
Sexual Health	Off-site – Agreed	Currently has accommodation to 2028 and beyond
Urgent Care Centre	Off-site – Agreed	Not currently provided by the DHB and is not part of an accommodation plan
Orthotics and Prosthetics	Out of Scope – Agreed	Currently has accommodation to 2028 and beyond
NZ Artificial Limb Service	Out of Scope – Agreed	Currently has accommodation to 2028 and beyond; a third party, and currently provided space

Renal Home Training Unit	Out of Scope – Agreed	Currently has accommodation but being reviewed for a better patient experience
Administration		
Clinical and Corporate Information Management	Off-site – Agreed	Currently has accommodation to 2028 and beyond
Central Intake Service (ref. FDB C 24.14.3)	Off-site – Agreed	Currently has accommodation to 2028 and beyond
Information Services	Partially off-site – Agreed	Currently has accommodation to 2028 and beyond
Transport	Off-site – Agreed	Currently has accommodation to 2028 and beyond
Building and Property	Partially off-site – Agreed	Currently has accommodation to 2028 and beyond
Procurement & Supply	Partially off-site – Agreed	Currently has accommodation to 2028 and beyond
Additional carparking	Southern DHB to develop transport plan	250 car parks are in the scope of the new hospital. Further car parking is being explored separately
Creche	Southern DHB to develop childcare plan	Agreed to 2028, provided by a third party not-for-profit
Mental health services		
Gibson Day Unit (Older persons' mental health)	Out of scope - Agreed	Is being looked at in a mental health review

Source: Revised SoA and Capacity, SPG and Project Steering Group, October 2019

1.5 Additional elements in the Final DBC

This Final DBC reflects further work as follows:

- update of the Financial Case
- confirmation and refinement of the procurement approach
- an update of governance arrangements
- consideration of risks, including a Quantitative Risk Assessment
- a Benefits Realisation Plan
- a description of Southern DHB's Change Management Plan is out of scope but is a critical dependency of the NDH project.

2. Strategic Case

The Strategic Case has been stable and has not changed since the 2017 IBC found a case for change based on the poor condition of existing clinical facilities and projected unsustainable service demand associated with an ageing population.

Updated modelling confirms future service demand will be both clinically and financially unsustainable using the current set of facilities. A well-designed, fit-for-purpose hospital is one of many enablers required to deliver more modern models of care and improve the effectiveness and efficiency of services across the local health care system. The existing hospital is not fit for purpose, and the CSB is well past its use-by date.

2.1 The problem definition

The problem is:

- a deteriorating environment is eroding quality of care, creating safety risks and potential harm, causing distress to patients and staff
- inflexible and inappropriate care facilities restrict service capacity, cause delays and increase outsourcing costs
- care facilities cannot absorb innovations, preventing efficiency gains and care improvements.

2.2 Strategic objectives

The investment objectives have been reconsidered but not changed since the 2017 IBC and are those used in the Initial DBC approved in principle in August 2020.

The five investment objectives for the DBC are:

- ability to adapt – to create responsive infrastructure and capability that supports disruptive health system change
- optimise use of total health system resources
- to reduce non-value-added time by 80 per cent to create a seamless patient journey
- to improve the patient and staff experience
- to reduce the risk of harm to 'acceptable standards'.

While changes to hospital demand will, to a significant extent, be driven through changes in the way the workforce is organised and services delivered (including the setting), the state and layout of existing facilities clearly impedes the introduction of new, more efficient and effective patient-centred models of care. Moreover, COVID-19 has given impetus to changes in practice, such as telehealth, which are ill-supported in current facilities. All these changes will be underpinned by digital technologies and IT.

2.3 Strategic context

The Strategic Case for building a hospital is to provide a secondary/tertiary component to the health system for the local population. This strategic rationale is outlined below.

2.3.1 The hospital is an essential part of the region's health system

Dunedin Hospital is not only important for Dunedin, it is important for the region. The hospital provides tertiary services for the whole of the Southern DHB population. In 2016/17, one-third of inpatient events were patients from outside Dunedin City. This proportion has not changed since the IBC and is a key aspect underpinning the service demand forecast (Sapere, 2018).

Although there is a network of rural hospitals throughout the Southern district, Dunedin Hospital provided the majority of inpatient events for people living in Clutha (64 per cent of Clutha volumes), Central Otago (58 per cent), and Waitaki (51 per cent). Thirty per cent of inpatient volumes for Queenstown-Lakes residents were provided by Dunedin Hospital.

2.3.2 The hospital's buildings are uneconomic to renovate or refurbish

The critical clinical buildings are not economic to renovate or refurbish. The CSB cannot be repaired and is at serious risk of failure.

The design and configuration of the hospital's existing clinical buildings impede the delivery of efficient, patient-centred models of care. The IBC provided numerous examples relating to design, layout and flow of the CSB and Ward Block that directly impact on service delivery. Services have also lost training accreditation due, in part, to the condition of the facilities.

The IBC concluded that the inflexible and constrained nature of the current facilities directly leads to increased costs, reduced service capacity, reduced productivity and poorer patient outcomes. The IBC also describes how the condition, design and layout of the buildings pose safety risks to both staff and patients in the form of adverse events relating to delirium, infections and falls.

A Clinical Services Block at or beyond end of life

The CSB is at the end of serviceable life and is uneconomic to repair or refurbish compared to the cost of a new facility. The CSB is the most critical clinical building on the Dunedin City campus and houses critical interventional and clinical support spaces.

The poor condition of the CSB is problematic.

- It is not IL4 compliant – in a significant earthquake, the hospital may be damaged to the point it would be unusable.
- Numerous areas and building components have asbestos, which would incur increased costs to remove for a refurbishment.
- The building has concrete spalling and water ingress through the roof and walls.
- Windows, floors and ceilings need replacing.

- The building needs a general refurbishment throughout.
- The building layout, configuration, and inability to run new services means that it is not suited to modern models of care either as an acute services building or a ward block.

Given the CSB is at the end of its serviceable life, ongoing repair and maintenance costs will continue to escalate if it is kept in service. The practical logistics of decanting the CSB to renovate it would be difficult ("possibly impractical") and would add significant expense.

The Ward Block is safe but has numerous performance issues

The Ward Block is regarded as being relatively solid and seismically safe, yet the 2017 Beca report raised numerous issues with its performance and composition. Issues include asbestos, concrete spalling and general maintenance issues. The Ward Block's layout and configuration hinders efficient and modern models of care.

Like the CSB, renovation and refurbishment of the Ward Block would cause significant disruption to services (e.g. relocating stairwells to outside the building). The Ward Block would be nearing 50 years old at the time of any development. The Ward Block is uneconomic to renovate and would likely cost more than a new build.

2.3.3 Unsustainable demand for hospital services in Dunedin

Forecasts of activity by department across the Dunedin and Wakari hospitals provide a picture of what future discharges, caseweights, bed days and outpatient volumes in Dunedin and Wakari would look like if services are delivered under the current model of care, at current intervention rates, as the population changes.

> The average complexity of a case will increase across the hospital, and there will be substantial pressure upon bed capacity if current models are continued.
>
> Without new hospital beds, there is unsustainable demand for hospital services in Dunedin.
>
> Dunedin Hospital currently has 364 physical overnight beds. If the services continued to be provided as they currently are, the hospital would need 451 beds by 2033, and 513 by 2043 (Jacobs, Johnstaff, CCM Architects, 2018).

Modelling has been updated, and service demand from ageing remains high

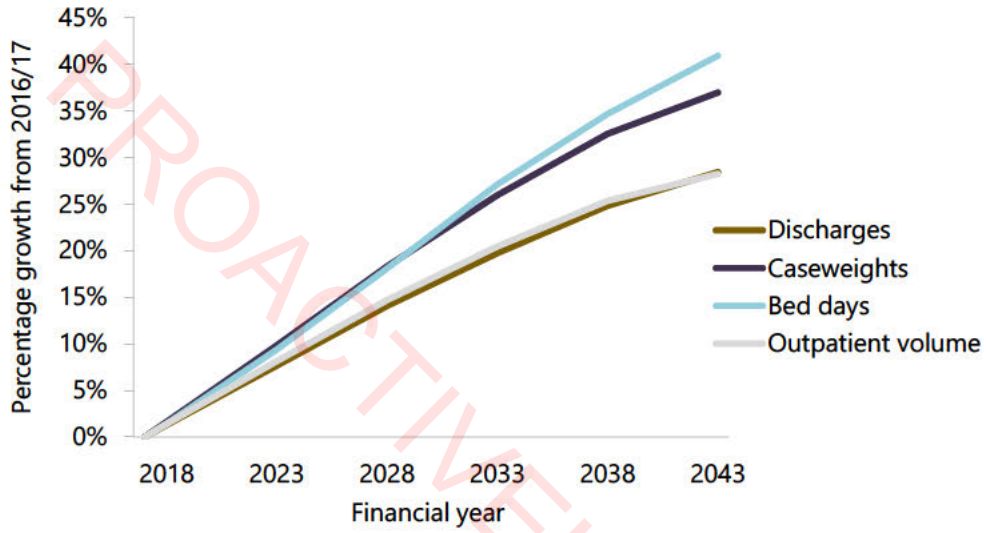
The IBC forecasts applied 2014/15 baseline data, and forecasts were updated for the Initial DBC (2018) to reflect the latest year of hospital activity (2016/17) and latest population projections available. The result of changing the baseline was an approximate 7 per cent bed day saving.

This is due to a decrease in medical bed days as planned under the bed day saving programme, and fewer elective cases than planned (electives were adjusted in the modified forecast to account for this). The demographic growth path in the base forecast is essentially the same as the IBC (i.e.

~35 per cent bed day growth between FY17 and FY38), meaning the updated population projections made little difference.

The graph below shows (revised figures for) the increase in service demand as a result of demographic change. The increase in demand is shown as a percentage from the 2016/17 baseline, with discharges, caseweights, bed days and outpatient volumes modelled.

Figure 1 Percentage increase in services driven by demographic change



Source: Sapere

The increase in discharges remains substantial at 28 per cent by 2042/43, but increases in caseweights and bed days are greater. These reflect the current age distribution of the more complex, higher caseweight inpatient events, the length of stay, and the impact that the ageing population will have upon the need for services if current models of care continue.

As outlined in the IBC, the clear message is that the average complexity of patients will increase across the hospital and there will be substantial pressure upon bed capacity under existing models of care.

High efficiency assumptions in the service demand model

The Southern DHB is changing the current environment for service delivery. These changes will reduce avoidable hospital admissions and length of stay, improve patient flows and provide care for people in the community where appropriate. Several scenarios with low and high efficiency assumptions agreed through Southern DHB engagement modelled the impact that these improvements would have on demand for the NDH's services and beds.

The projection of bed demand—with the high efficiency assumption—was considered in detail in 2018 and 2019 and is the basis of the service design parameters for the number of beds and theatres. An expansion strategy for acute areas is factored into the Schedule of Accommodation. There is the risk that demand may exceed what is forecast, or that efficiency assumptions are not achieved, and there is some room for expansion in key areas such as ICU beds and theatres if that is so.

Table 4 Modified service demand assumptions

Specialty	Low efficiency assumption	High efficiency assumption
Emergency Department (ED)	Hold attendances flat for 10 years	
Medicine (excluding cardiology, renal, oncology and elective gastro)	15% lower intervention rate 20% lower ALOS; or 30% lower intervention rate with no ALOS reduction	30% lower intervention rate 20% lower ALOS
Rehabilitation	Halve the forecast growth	Hold bed days flat
Surgical specialties	Originally, 3% p.a. growth in elective discharges in Orthopaedic and General Surgery, subsequently modified with clinical engagement and regional benchmarks	
	10% lower ALOS	15% lower ALOS
Theatre	A 10-14% increase in time required by 2043 due to modelled 'growth in care' for elderly patients (from a base driven off the modified surgical discharge forecast) Throughput of 1,000 operations per operating room per year (from the current average of 770 per operating room per annum)	
Intensive Care Unit (ICU)	4% p.a. increase in ICU hours over 10 years	
Radiology	10% p.a. increase in magnetic resonance imaging (MRI) and computed tomography (CT) over 10 years	

Source: Jacobs, Johnstaff, CCM Architects. 2018. The New Dunedin Hospital Project DBC Bed Modelling Report (August 2018).

2.4 A unique opportunity to respond to future health needs

Dunedin Hospital will continue to provide tertiary and secondary services to support a range of health needs for neonates, infants, children, adults and older persons. Dunedin Hospital will accommodate patients on a planned and unplanned basis requiring access to complex assessment, diagnostic and interventional technology.

Patients who can be safely treated in the community setting will be supported through a shift towards better integration of tertiary, secondary, primary and community services and increased uptake of technologies such as telehealth. This will be of particular benefit to care coordination for the older person.

For patients requiring access to typical clinical services, discussions to date have been centred around the patient journey, the relationships among the services and how, as a collective, care can be delivered in the right place at the right time by the right people. The hospital as a facility needs to provide adequate space to support administration, teaching and research by Southern DHB staff. Strong ties with the university will be maintained.

NDH is based on industry good practice. The gross floor area for the NDH is based on the Australasian Health Facility Guidelines (AHFG).[3] Its gross floor area is based on benchmarks comparing other health infrastructure projects in Australia and New Zealand (Christchurch Acute Service Building and Burwood). There is tighter spatial planning, more purposeful accommodation arrangements and better adjacencies to reduce wasted staff and patient travel time. There are more shared areas between units and reduced duplication of space, equipment and building services. The hospital uses new approaches to storage, workspace design, staff stations and staff amenities. Evidence-based design principles will mean there is more natural light, external views and the inclusion of nature through planning and organising interiors to create a positive experience for patients and staff.

2.4.1 A hospital precinct

Dunedin Hospital is a university teaching and clinical training hospital with strong links to the University of Otago and the Otago Polytechnic Schools of Nursing, Midwifery and Health Sciences. Southern DHB also partners with the University in health research activities and has established a Health Research Office to facilitate interdisciplinary research by its staff and partners.

The University and Polytechnic have indicated their interest in collocating future infrastructure around the NDH to enhance Dunedin's heath precinct. The NDH includes an allocation of $17 million for an Interprofessional Learning Centre (ILC) with the preferred scenario being consolidation of interprofessional learning and collocation with the University and the Polytechnic. This ILC is being developed as a separate business case. Without the ILC, the hospital needs to provide adequate space to support ongoing training needs.

Over time, the health precinct will also include a Translational Research Centre.

2.5 COVID-19 has changed the landscape of health service provision

Southern DHB established a working group to review learnings from the local/international COVID-19 response and make recommendations as to how these could be applied to Pandemic Readiness Planning for the NDH. A functional brief was prepared based on three overriding principles for healthcare provision:

- maintain staff safety (freedom from infection)
- maintain non-infected patient, whānau and public safety (freedom from infection and ongoing access to appropriate investigation and treatment)
- provide infected patients appropriate treatment with the intention of recovery or palliation based around individual assessment.

This also presented an opportunity to change behaviours, systems and cultures across the Southern health system. It affects planning for the NDH as there is some reliance on increased telehealth usage.

[3] The AHFG briefing documents are not prescriptive and ask planners to apply the guidelines within the context of a project and the occupants of the facility. The latest revisions make reference to local jurisdictional requirements and models of care which may provide the same space but planned differently across projects.

The Southern DHB has a telehealth steering group and has commissioned a report on the opportunity COVID-19 has provided. Telehealth features prominently in the Southern DHB and WellSouth's primary and community strategy as a tool to improve equity of access to health services, especially for rural communities and the elderly.

2.6 The expected benefits of the NDH component of the Change Management Programme

Southern DHB is undertaking a Change Management Programme (CMP) of which NDH and other facility developments are only one part, making the CMP a critical dependency for the NDH. Southern DHB is taking the opportunity to modernise its models of care and enable infrastructure to achieve the efficiencies identified above.

There are benefits that can be directly attributed to an investment in a new hospital development in Dunedin, such as theatre productivity improvements, while other benefits such as reduced admissions will largely depend on wider system improvements and investment in primary and community care. There is a complex interplay of hospital-based clinical services, particularly services for the frail elderly, and the organisation and management of community and primary care. For example, shorter length of stay may arise in part because of improved discharge processes, but also because better theatre design and flow results in patients spending less time waiting in beds for surgery.

The benefits framework comprises five categories of benefit.

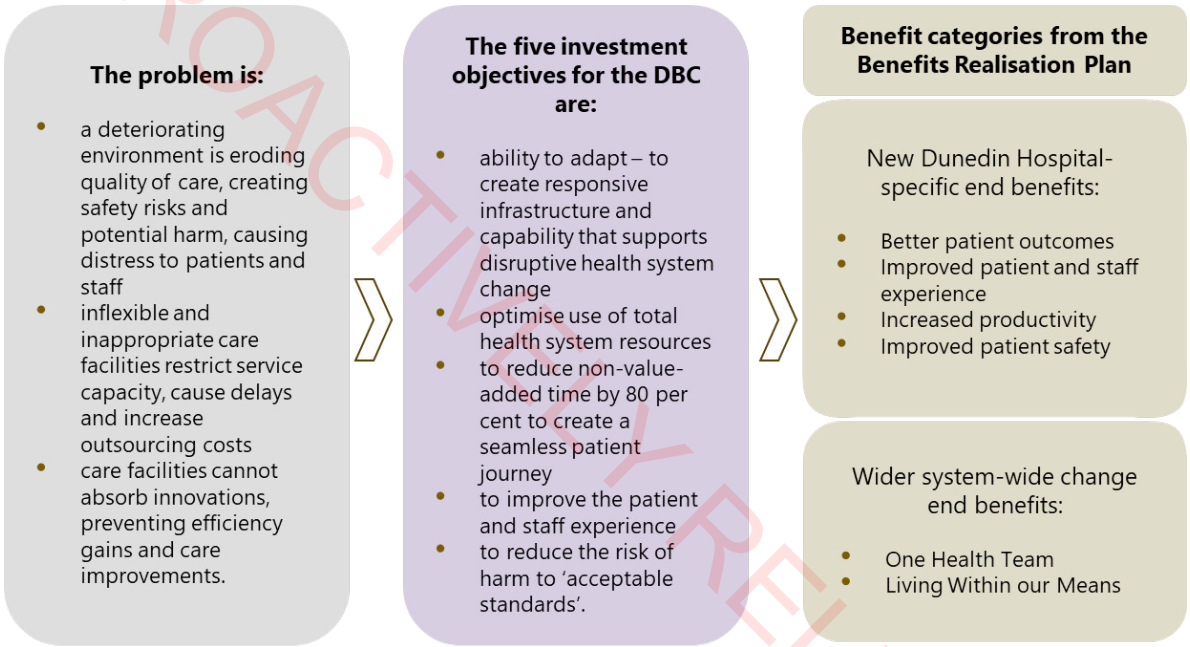
- **Better health outcomes:** better health outcomes for patients is the overarching benefit to the other categories of benefit – i.e. more care being delivered more efficiently, improved quality and an improved experience for patients, families/whānau and staff – which, while important, collectively contribute to improved health outcomes.
- **Improved efficiency:** a better internal layout (adjacencies and sizing of spaces), a reduction in unnecessary delays and a shorter average length of stay mean more can be done with a given amount of resources than would otherwise be the case, enabling more services to be delivered in a given period and better health outcomes.
- **Improved patient safety and experience:** reductions in avoidable patient harm (e.g. via better ward design) improve patient safety and contribute to patients having better health outcomes. Patients and their families have an improved experience of care in the new hospital, contributing to more engagement and improved patient recovery.
- **Improved experience for staff:** staff have an improved experience of their workplace, contributing to more engagement, fewer absences and improved staff retention rates, lower turnover and better staff recruitment, thereby supporting the delivery of care.
- **A more resilient system:** a new hospital with digital infrastructure and systems brings benefit in the form of greater resilience to the local health system, allowing the above benefits to be realised. Resilience means many of the risks inherent in the current building and through the short-to-medium term during the base case 'do minimum' option would be avoided. There would also be better connectivity, including digital connectivity, with the wider Southern DHB health system.

These benefits are explored in the Economic Case. Consideration was given to the education and research benefits, but this was not seen as material to discriminating between options – with the focus of all options now being on a central site, rather than an option of a geographically separate site.

2.6.1 Investment objectives and change management dependencies

The Change Management Programme is discussed in the Management Case together with the Investment Logic Map. The investment objectives are outlined below, including the Change Management Programme dependencies. The Benefits Realisation Map is also set out in the Management Case and is a more full and formal expression of the measures.

Figure 2 NDH problem, objectives and benefits



Source: Sapere

Table 5 Investment objective 1

Investment Objective 1	Ability to adapt – to create responsive infrastructure and capability that supports disruptive health system change
Existing Arrangements	There are a number of factors that hinder the rollout of more modern models of care required to improve efficiencies and the effectiveness of hospital services. These include the design, configuration and condition of the existing infrastructure. Further, due to the current state of the buildings, the hospital system has limited resilience to major events.
Business Needs	Need to design hospital infrastructure that can flex to accommodate future changes in technology, service models and capacity. Hospitals need to be patient-centric in design (human design) and resilient to future changes and events, including pandemic outbreaks in disease and catastrophic disasters.
NDH	Improved efficiencies and the capacity to deliver more health care services
Change Management Programme	Digital systems and workforce transformation

Table 6 Investment objective 2

Investment Objective 2	**Optimise use of total health system resources**
Existing Arrangements	For a number of reasons, patient flows through the hospital are largely inefficient, with inconsistent, high-variability processes and pathways, interrupted care, and repetitive and duplicated effort, all resulting in delays to providing timely access to quality health services. Services are not always provided in a timely manner, leading to increased lengths of stay. There are recognised workforce capacity constraints, e.g. across many allied health specialities. There is inadequate investment in innovative models and tools to optimise use of resources, and there is insufficient uptake of tools where these have been introduced (e.g. HealthPathways).
Business Needs	Encourage and reward staff innovation and flexibility as a mindset. Introduce lean methodology into service design and extend where this has been implemented (e.g. Productive Series) to increase efficiencies over time. Implementation/extension of HealthPathways and other similar tools. Workforce planning – looking for roster efficiencies, extending workforce to work under full scopes and possible labour substitution (e.g. Nurse Practitioner). Enable an aspirational zero-cancellation target for procedures. Co-ordination of surgical lists and theatre capacity, with ICU and bed capacity. Live within our means.
NDH	Design and configuration enable the delivery of efficient, contemporary, patient-centred models of care
Southern DHB Transformation Programme	Implementation of Change Management Programme

Table 7 Investment objective 3

Investment Objective 3	**To reduce non-value-added time by 80% to create a seamless patient journey by 2027**
Existing Arrangements	Poor flows are constrained by current layouts, resulting in interrupted care. There is unnecessary and repeated testing. Inadequate systems and facilities mean staff need to use work-arounds. Split-site hospitals result in duplication and inefficiencies. Referrals in from rural providers poorly co-ordinated, leading to inefficiencies.
Business Needs	24/7, 365 days a year services where appropriate. Lean productivity concepts used as a model to reduce process delays and handovers. The right person gets right services at right time and the right place. Efficient flow from admission to discharge.
NDH	Design and configuration enable the delivery of efficient, patient-centred models of care.
Change Management Programme	Digital systems enhance deliver of care and drive efficiency.

Table 8 Investment objective 4

Investment Objective 4	To improve the patient and staff experience
Existing Arrangements	Poor staff morale and engagement. Poor working environments. Lack of privacy for patients. Cancellations, delays and unnecessary testing. Unnecessary steps/ interrupted patient flows.
Business Needs	Enhanced community confidence in the Southern DHB. Staff experience is improved. A hospital consistently scoring either at, or above, the national average on patient experience surveys. Enhanced patient, family and staff satisfaction.
NDH	Better environment, allowing access to care sooner, improved working conditions and the return of accreditation for services lost due to condition of facilities.
Change Management Programme	Workforce transformation project, including shift to generalism and utilisation of other workforces. Gaps in workforce identified opportunity to work differently.

Table 9 Investment objective 5

Investment Objective 5	To reduce the risk of harm to 'acceptable standards'
Existing Arrangements	Delays and interruptions in timely care. Workarounds with the potential for additional risk of harm. Physical facilities and building services that are neither fit for purpose nor compliant.
Business Needs	Enable the elimination of 'never' events of harm (events that have the potential to cause serious harm that is wholly preventable, e.g. wrong site surgery). Zero falls (with harm).
NDH	Fit-for-purpose buildings.
Change Management Programme	New models of care, workforce transformation and enabling digital systems.

2.7 Dependencies

The most significant dependency of this Final DBC is clearly the Southern DHB's Change Management Programme. Within that programme, the three main dependencies are:

- the Digital Strategy
- the Primary and Community Healthcare Strategy
- the Workforce Strategy.

All these dependencies are the responsibility of Southern DHB and sit under the DHB's Change Management Programme.

Of these, implementation of the Primary and Community Healthcare Strategy is underway, and Southern DHB is progressing work on the Digital Strategy Programme Business Case and Workforce Strategy. Each of these is critical to the success of the Southern health system, let alone the successful commissioning and operation of the NDH.

Table 10 NDH constraint management

Dependency	Management strategy
Digital Strategy Southern DHB is investing in information technology to enable implementation of a digital hospital and innovations to support modern healthcare delivery (e.g. patient portals, telehealth). IT is a key enabler of benefits from the Dunedin Hospital redevelopment and expected productivity gains will not be achieved without the success of this strategy.	The Digital Strategy for Southern DHB is the subject of a separate business case. The Programme Business Case Southern DHB is progressing has been reviewed by central agencies.
Primary and Community Healthcare strategy The Southern DHB is embarking on a primary care strategy that will see primary care and secondary care working proactively to manage patients in their homes rather than in the hospital.	This strategy is being implemented and is managed as part of business as usual for the Southern DHB.
Workforce strategy and action plan Southern DHB has developed a workforce strategy indicating the types of changes that it might need to make with its workforces.	This strategy is being implemented progressively, and the Southern DHB recognises that it needs more focus on this work and appointed a project manager to its project management office (PMO).

Key constraints for successfully delivering on the Final DBC are set out in the table below.

Table 11 NDH constraint management

Constraint	Management strategy
Budget A capital investment budget cap of $1.4 billion upper limit was set by Cabinet when the Indicative Business Case was approved.	Trade off requirements with budget constraints. Where no alternatives available, seek increase to budget.
Building site A central building site has been purchased (Cadbury Factory and Wilson's Parking Building).	Design hospital to suit available land. The site risks are evaluated in the Commercial Case and Quantitative Risk Assessment (QRA). All the Southern block was acquired, allowing room for future development of the hospital campus including development of a health precinct.
Expertise Availability of construction expertise at critical points of the redevelopment.	The expertise risks are evaluated in the Commercial Case and QRA. There has been considerable investment in the Ministry of Health team and its advisors.

<table>
<tr><th>Constraint</th><th>Management strategy</th></tr>
<tr><td></td><td>
<table>
<tr><th>Role</th><th>Consultant</th></tr>
<tr><td>Project Manager</td><td>Resource Co-ordination Partnership Limited (RCP)</td></tr>
<tr><td>Design Manager</td><td>RCP</td></tr>
<tr><td>Architect & Health Planner</td><td>Warren & Mahoney/HDR</td></tr>
<tr><td>Building Services Engineer</td><td>Beca Limited</td></tr>
<tr><td>Fire Engineering and Fire Protection</td><td>Beca Limited</td></tr>
<tr><td>Structural & Civil Engineer</td><td>Holmes Consulting</td></tr>
<tr><td>Traffic Engineer</td><td>Novo</td></tr>
<tr><td>Town Planner</td><td>Boffa Miskell</td></tr>
<tr><td>Property & Building Survey Services</td><td>WSP Opus</td></tr>
<tr><td>Site Clearance and Demolition Works</td><td>Ceres NZ LLC</td></tr>
</table>
</td></tr>
<tr><td>Business as usual
The hospital must continue to deliver full clinical services while the NDH and new models of care are built and introduced.</td><td>A separate and distinct site was chosen rather than cause disruption by decanting services and renovating the existing facilities floor-by-floor over a period of years.</td></tr>
<tr><td>Constraints on Southern DHB staff and leadership
The Southern DHB will be expected to deliver transformational change. There will need to be both funding and workforce capacity to support new models of care.</td><td>The Southern DHB board has been asked to set up a Transformation Board to oversee the Change Management Programme. Discussions on this approach are continuing.</td></tr>
</table>

3. Economic Case

Cabinet has already approved Option 5 as the preferred option: an Inpatient Building on Cadbury block and an Outpatient Building on former Wilson Parking site (CAB-20-Min-0413). This section recaps how the preferred option was selected and the expected benefits.

3.1 Purpose of the Economic Case

The DBC includes the following sections.

- *an overview of the short-listed options*
- *an economic cost benefit analysis, with an assessment of non-monetary benefits*
- *an assessment of risk and uncertainty.*

3.2 Recap of the path to the preferred option

This section summarises the development of the short-listed options. The DBC provided to Cabinet in August 2020 for agreement in principle covers in more detail the options assessment process and evaluation that led to Cabinet selecting Option 5 as the preferred option.

3.2.1 Indicative Business Case

The IBC for NDH identified the base case as being a 'do minimum' rather than a 'do nothing' approach, as the critical condition of the CSB meant that it is at the end of its serviceable life. The 'do minimum' scenario provided for the replacement of the CSB, using existing facilities on campus and minimising capital expenditure so that the Dunedin Hospital facilities are kept at a point at which it is just serviceable.

The IBC considered a long list of options against the agreed investment objectives and critical success factors and short-listed two options to be taken through to a DBC:

- a new hospital on a new site, and
- a new hospital on the Wakari site.

At the time of the IBC no site had been selected, with the existing Wakari campus one of the short-listed options. A notional amount of $10 million was included in the IBC cost estimate. Since the selection of the new hospital site in May 2018, land acquisition costs have totalled 9(2)(b)(ii) with a further 9(2)(b)(ii) allocated for demolition works. Additional resourcing has also been required to support the ECE approach used for the Inpatient Building with the Ministry taking responsibility for management of design risk.

3.2.2 Initial Detailed Business Case

The Government announced in May 2018 that a central city site had been purchased (the former Cadbury site), effectively ruling out a new hospital on the Wakari site. Two sub-options were identified with respect to the configuration of the new hospital:

- a single building to house all facilities and services, or
- two buildings, with most services housed in an Inpatient Building (and small ancillary building) on the Cadbury site and an Outpatient Building on the adjacent Wilson's block. At that time, a shared energy centre with the University and the Council was considered but later deleted.

The 'do minimum' base case was updated to include a major programme of refurbishment for the Ward Block as well as the CSB. This was in response to building assessments identifying numerous issues that would require significant ongoing expenditure—for example, concrete spalling and the presence of asbestos. The IBC analysis focused on comparing the option of a new hospital on a new central city site with the 'do minimum' base case, while noting reservations about feasibility of that counterfactual, given the difficulties of decanting from buildings while rebuilding on a constrained site. The results of the cost benefit analysis indicated that a new hospital build would be preferable over the base case.

3.3 Five short-listed master planning and design options

The Initial DBC focused on the option of a new hospital on a new site, following the Government announcement that a central city site had been purchased, which effectively ruled out a new hospital on the Wakari site. The central city site is, like some of Dunedin, prone to flood risk, and all plant will be on the first floor. All options are on the same site and all have the same site risk profile.

Five design options were developed as outlined below. They are essentially variations on two design options:

- a single building integrating acute and ambulatory services, but sited on different locations across the two city blocks (referred to as "Cadbury" and "Wilson")
- two buildings where there is a separation of ambulatory and acute services.

All the options have the same functional specification and provide the same monetary and non-monetary benefits.

Baseline option – Two buildings – Inpatient on Cadbury's site, Outpatient (incl. Day Procedures) on Wilson's site

The NDH Preliminary Site Masterplan Report publicly released 4 February 2019[4] was used as a baseline option for comparative purposes. In that report the first building to be delivered would be the **Outpatient Building at the southern end of the Wilson's site**. Day Procedures would be fitted out to enable earliest delivery of day procedures, while Outpatient would be left as cold shell initially. The **Inpatient Building would be completed last on the northern end of the Cadbury site**, including two bridge links across St Andrew Street at two levels.

Under the masterplan, areas for the development of future buildings as part of a wider health precinct are earmarked at the northern end of the Wilson's block and staged in a more open, campus-like

[4] This is currently being updated with a Tertiary Precinct Plan due in the first quarter of 2021 for review.

environment. This could include a Southern Blood & Cancer Centre (SBCC), a Translational Research Centre (TRC) and Inter-professional Learning Centre (ILC).

Option 1 – Single building on Cadbury's site with early Day Procedures at northern end

The option first delivers an **Outpatient Building at the northern end of the Cadbury site**. Day Procedures would be fitted out to enable earliest delivery of day procedures, while Outpatients would be left as cold shell initially. The Inpatient Building would be completed last with large floor plate connections to Day Procedures/Outpatients at three levels.

Option 2 – Two building – Early Day Procedures integrated with Inpatient on Cadbury's site and Outpatient Building on Wilson's site.

This option first delivers a Day Procedures building at the northern end of Cadbury site. The Outpatient Building would follow on the Wilson's site with bridge links across St Andrew Street to Day Procedures. The Inpatient Building would be built last on the Cadbury site, with large floor plate connections to Day Procedures at 3-4 levels.

Option 3 – Single site on Wilson's Block, early Day Procedures at southern end

The option involves the delivery of an Outpatient Building at the southern end of the Wilson's site. Day Procedures would be fitted out to enable earliest delivery of day procedures, while Outpatient Building would be left as cold shell. Inpatient would be completed last, with large floor plate connections to Day Procedures/Outpatients at three levels.

The Cadbury site would instead be retained for future buildings with link bridges across St Andrew Street.

Option 4 – Single building straddling St Andrew Street, early Day Procedures on Wilson's Block

The option has the Outpatient Building being delivered first at the southern end of the Wilson's site to enable earliest delivery of Day Procedures, while Outpatient would be left as cold shell initially. The Inpatient Building would be completed last, with large floor plate connections to Day Procedures/Outpatient at three levels across St Andrew Street.

The top two thirds (approximately) of the Wilson's block and southern half (approximately) of the Cadbury block is left available as a future development area.

Option 5 – Baseline option, but "appropriately" reduced, consistent with the alternative SOA

This option is the same as the NDH Preliminary Site Masterplan option in terms of building configuration, location and staging, but was scaled appropriately to the latest updated SoA. It results in gross floor area (GFA) reduction of approximately 12,000m^2, but an increase of approximately 3,000m^2 relative to the one-building options. Subsequent fine-tuning of adjacencies and spaces reduced GFA from 93,000 to just under 91,000m^2.

The layout of these five options, together with the baseline (masterplan) option, are illustrated in the diagrams over the page. In each case, the Cadbury block is to the south (left-hand block) and the Wilson's block is to the north (right-hand block).

The project includes the carparks and landscaping shown in the figure below but not the dotted buildings planned as part of future expansion and development of the health precinct.

Figure 3 Layout of NDH options across Cadbury and Wilson blocks

Baseline – Inpatients on Cadbury, Outpatients (including Day Procedures) on Wilson's Block

Option 1. Single site on Cadbury's Block, early Day Procedures at northern end

Option 2. Early Day Procedures integrated with Inpatients on Cadbury's Block; Outpatients building on Wilson's Block

Option 3. Single site on Wilson's Block, early Day Procedures at southern end

Option 4. Single building straddling St Andrew Street, early Day Procedures on Wilson's Block

Option 5. Baseline option, but "appropriately" reduced, consistent with the alternative SOA

3.4 A preferred option emerged

Option 5 was identified as the option that provides best value for money when consideration and weight is given to wider impacts, namely urban context, project certainty and timeliness for delivery of service capacity. Option 5 provides for the best future expansion and precinct integration.

ICT and other costs are the same for all options.

Following Cabinet approval, the design team has progressed Option 5 to 100 per cent concept design. The total estimated project cost for Option 5, as prepared by quantity surveyors in April 2020, is $1.47 billion, or 5 per cent higher than the $1.4 billion construction cost cap.

3.4.1 Option 5 scope

The central Dunedin site chosen for NDH in 2018 has been designed to be as compact as practicable, and with adjacencies that ensure operational efficiency. A smaller hospital would not meet the foreseeable needs of the district; a larger hospital would represent a misallocation of capital.

Importantly, the NDH will be designed for flexibility and for some easy and immediate expansion within Dunedin's designated Tertiary Health Precinct. It has been positioned for ready expansion on the Wilson block later in the century if necessary. Further, the Outpatient Building will provide early access to additional theatre space; space that will then transition to the Inpatient Building when complete.

The design of the buildings will ensure they are suitably 'future-proofed' for potential future expansions and changes in function. The principle of 'long life, loose fit' means the design and scope of the buildings will create a durable and pliable space that can accommodate future changing scenarios.

3.4.2 Factors contributing to a higher cost

The quantity surveyors benchmarked the total estimated project cost for Option 5 against three major health facility projects recently delivered in the South Island, namely Burwood Hospital and the Christchurch Hospital Outpatient Building and Acute Services Building. This benchmarking exercise concluded that NDH would be relatively more expensive than those projects on a cost per square metre basis. The following factors were identified as contributing to NDH having a higher cost per square metre (Rider Levett Bucknall, 2020):

- NDH is essentially a campus project and so has a higher requirement for central plant, whereas the benchmark projects relied on existing or separately procured boiler plant and other site infrastructure.
- The ground conditions are considerably worse at the Dunedin site, and the associated piling and flood mitigation requirements for NDH are considerably higher than those of the benchmark projects.
- The disposal of excavated contaminated ground in Dunedin is an expensive issue.

- There is a commitment to achieving a 5 Green Star rating for NDH, which, for example, means additional investment in facades, although this may potentially be offset with lower operating costs over the long term.

3.4.3 A carbon neutrality programme

The Ministry of Health and the Southern DHB are committed to delivering a sustainable and wellness-focused built environment for the NDH. The project is targeting a 5 Star Green Star accreditation and will be benchmarked against several internationally sustainability rating tools.5

This means that design and product specifications for the build require a reduced carbon response, for example for cement and steel. The design of facades and windows supports thermal efficiency; for example, through use of low-e double glazing. Low-energy intelligent lighting systems will use smart occupancy and daylight sensors to prioritise daylight over artificial lighting.

Waste reduction is a key objective throughout the project, and contractors will be required to comply with waste minimisation plans. The NDH will include end-of-trip facilities and secure bike parking for staff, and fleet car parking will include electric vehicle charging points.

Building to a Green Star Rating

The building is targeting a 5-star rating for the building using the New Zealand Green Building Council 'Green Star Design and As Built' certification. This means that the project will:

- develop a Climate Adaption Plan to inform what modifications are required for the project to adapt and mitigate predicted climate change effects
- design to specifications for cement and sustainable steel that reduce embodied carbon content
- implement a Contractor Environmental Management Plan and Environment Management Systems
- ensure design of facades and windows provides views and daylight appropriate for the space
- build to a thermal envelope specification that will assist thermal comfort
- provide priority spaces for fuel efficient vehicles, and infrastructure and chargers for electric vehicles.
- provide staff and visitor cycle parks and shower/locker facilities
- select water-efficient washing machines, dishwashers, and equipment as part of fit-out.

There are also several better-known global ranking systems that the NDH may qualify for at little or no extra cost which may be advantageous when attempting to recruit clinical specialists from offshore.

[5] Leadership in Energy and Environmental Design (LEED), US Green Building Council; Building Research Establishment Environmental Assessment Method (BREEAM), a UK based environmental assessment rating system; International WELL Building Institute Standard.

3.5 Economic assessment

The economic assessment takes the form of a cost benefit analysis of the preferred option, identifying the incremental costs and benefits relative to the "do minimum" base case. These impacts are quantified in monetary terms, to the extent possible, to determine the net benefit of a new hospital. The focus is on the preferred option because the information that informs the estimation of benefits is not sufficiently granular to support a comparison among the short-listed options. Details of the assumptions and approach used in the cost benefit analysis are contained in Appendix C. NDH construction is likely to offer a net benefit.

The cost benefit analysis suggests that the preferred Option 5 for NDH would deliver a net benefit to society, relative to the 'do minimum' base case in which the existing hospital campus is retained with the replacement of the CSB and a major programme of refurbishment for the Ward Block.

The central scenario is designed to be realistic about costs and is conservative in relation to the expected benefits. The central scenario offers a net benefit (present value basis) of $70 million. The benefit-cost ratio is 1.5, which means the incremental benefits are 1.5 times the incremental costs (i.e. 50 per cent higher). These results are shown in Table 12. The costs and benefits shown are incremental, relative to what would occur in the base case (in present value terms).

Table 12 Cost benefit analysis – results by option with low and high assumptions

Measure (present value basis)	Central scenario	Higher cost scenario	Lower benefit scenario
Incremental costs ($m)[1]	137	259	137
Incremental benefits ($m)[2]	207	207	115
Net benefit ($m)	70	-52	-22
Benefit-cost ratio	1.5	0.8	0.8

Source: Sapere

Notes:

[1] The incremental costs are based on the difference between the total costs of the preferred option and the total costs that would be incurred under the "do minimum" base case. The categories of cost are: capital expenditure (along with any residual asset value), operating expense impacts, life-cycle asset maintenance, and the economic cost of taxation.

[2] The incremental benefits represent the positive resource impacts of the preferred option, relative to the "do minimum" base case. Drawing on the benefits framework in the Strategic Case, the approach is to identify the material categories of benefit that can be readily quantified and attributed to the new hospital. The medium-term service forecasts for the new hospital have been analysed and compared with the service forecast for the base case and three categories of benefit have been estimated: efficiency gains, additional capacity, and patient time savings. These benefits are outlined in the text box below.

Two additional modelling scenarios have also been presented to test the impact of costs being higher or benefits being lower than in the central scenario:

- The 'higher cost' modelling scenario allows for the cost of the new hospital to be 10 per cent higher than the estimate used in the central scenario, as a sensitivity test. Under this assumption, the benefit-cost ratio for this scenario would be 0.8, which means that the incremental benefits would be equal to 80 per cent of the incremental costs.
- The 'lower benefit' modelling scenario uses the low assumptions with respect to the expected benefits being attributable to the new hospital. The logic is that more of the benefits, arguably, might be achieved through a combination of other projects, such as changes to models of care and ICT improvements projects. The benefit-cost ratio for this scenario is 0.8, which means that the modelled incremental benefits would be equal to 80 per cent of the incremental costs under these more conservative assumptions.

Overall, it is not unreasonable to conclude that the option of a new hospital would bring a material net benefit to society. While the results of scenarios tested here show a benefit-cost ratio ranging from 0.8 to 1.5, it must be acknowledged that there are considerable benefits that do not readily lend themselves to being monetised and included in this analysis. These non-monetised benefits, such as patient safety, staff satisfaction and the benefit of improved system resilience, with an associated reduction in the risk of service failure, are explored below.

More detail on the assumptions and approach to estimating these values can be found in Appendix C.

Categories of benefit included in the cost benefit analysis

The following benefits have been estimated and monetised for inclusion.

- Efficiency gains – the forecast reductions in the average length of stay, that will allow a given volume services to be delivered for fewer resources than would otherwise be the case. This frees up capacity to allow more services to be delivered. These efficiency gains result from a better internal layout, including adjacencies and sizing of spaces, leading to a reduction in unnecessary delays. In effect, this benefit represents an avoided cost to Southern DHB.
- Additional capacity – significantly more elective surgery is forecast to be delivered over the medium-to-long term as a result of the additional capacity in terms of theatres and beds. The additional services delivered are in addition to those enabled by efficiency gains, representing services that patients would not otherwise receive.
- Patient time savings – the value of avoided patient time in hospital, from a shorter stay, as a result of efficiency gains reducing the average length of stay for patients. This means that patients have "time savings" in their hospital experience, which they can use for personal use outside of hospital.

3.6 Some expected benefits not readily monetised

The modelling in the cost benefit analysis focused on the benefit category of improved efficiencies and the capacity to deliver more health care services than otherwise. However, there are likely to be

other material benefits arising from a new hospital, and these are arranged in the benefits framework, developed with internal stakeholders in workshops for the Initial DBC (see the Strategic Case). There is a sound basis for expecting benefits to flow from a new hospital, with respect to improved patient safety and experience, improved experience for staff and better health outcomes, although these are not readily monetised. Table 13 sets out the rationale for these expected benefits.

Table 13 Non-monetised benefits and rationale approach

Benefit category	Elements and rationale
Improved patient safety and experience	• Lower rate of patient falls – design improvements in the facility reduce the risk of falls and fall-related injuries (e.g. type of flooring, design around the bed and the way to patient bathroom). Enabling equipment and procedural changes also contribute. • Lower rate of hospital-acquired infections – infection reductions may be where some of biggest quality gains are. In terms of attribution, a move to more single-patient rooms would contribute up to 50% of the gain, or even higher. • Lower rate of pressure injuries – pressure injuries are affected by having sufficient space around beds to enable staff and hoists to move the patient. The right beds need to be purchased too. • Improved satisfaction survey results from patients and families/whānau – new facility design that provides for more space for families to visit patients, including more single-stay rooms available to patients (social and therapeutic outcomes). Other environmental benefits could include more suitable lighting and reduced noise. These benefits could also occur via other changes to services and staff culture which in turn were enabled by the new facility.
Improved experience for staff	• Improved satisfaction survey results from staff and a lower rate of staff turnover – arising from new facility design that provides better working conditions that enable staff to do their job. These changes increase staff satisfaction and lead to staff being more likely to stay (reduced turnover). The culture survey results generally point to the building as being important. • The fact that Dunedin Hospital has lost accreditation on a number of services is significant and has implications for attracting and retaining staff.
Better health outcomes	• Shorter waiting times – significantly more elective surgery can be delivered, thereby improved access and reducing waiting times, all else being equal. • Lower 28-day acute readmission rate, where the patient has an emergency readmission within 28 days of original discharge. There has been material improvement, as MoH performance reporting shows Southern DHB's result for 2018/2019 is 11.8% below the national average. • Lower in-hospital mortality rates – some improvement in in-hospital mortality rates, comparatively, would be expected. ICU data may be one area to benefit.

Source: adapted from the Initial DBC (2018)

3.7 System resilience may be the most significant benefit

Significant service failures generally arise through some combination of limits to workforce capacity, funding constraints and inadequate facilities interacting with growing demand.

3.7.1 Service failure is a risk under current conditions

One of these factors – inadequate facilities in the form of space constraints, inefficient layout, and poor working conditions – is clearly already present at Dunedin Hospital. In turn, the poor condition of the buildings results in pressures on the other factors of workforce capacity (e.g. a struggle to retain or attract staff) and funding (e.g. financial pressures from maintaining aged buildings).

The base case option of a 'do minimum' involves a major refurbishment of the Ward Block and the demolition and new build of the CSB. This would involve a period of change in terms of the location and delivery of all hospital services. There would be some on-going uncertainty with progressive and phased decanting of the Ward Block and the CSB and almost certainly some disruption to service delivery with increased reliance on outsourcing to ensure service continuity.

The costs of a service failure could include direct financial costs to Southern DHB to find alternatives for patients needing treatment, costs to patient wellbeing, the opportunity cost from resources used to respond to immediate crises, a loss of accreditation status and reputational harm.

3.7.2 A new hospital means a more resilient local health system

A new hospital could be expected to significantly reduce the risk of service failure – by addressing the key risk factor of the inadequate facilities. Much of the service failure risk inherent in the current buildings at Dunedin Hospital, and through the short-to-medium term during the base case 'do minimum' option, would be avoided. In turn, this means that the risk of flow-on costs to the wider health system would be avoided.

A new hospital also offers greater resilience to the Southern DHB health system. This means the Southern DHB health system is better able to respond to future growth in demand forecast and to any sudden shocks to the system, such as the additional burden from a pandemic. This will be achieved through the design of standardised, flexible spaces that can adapt to surges and different clinical uses, with the building being adaptable to the separation of flows and modern flexible ventilation systems.

Finally, system resilience would be improved because a new hospital offers more flexibility in its design, and so is better able to adapt to new technologies and innovations in the delivery of care.

3.7.3 Mapping benefits to wellbeing domains

The benefits included in the cost benefit analysis and qualitative narrative can also be viewed from a wellbeing perspective and mapped to relevant domains in the Treasury's Living Standards Framework.

Health is the primary wellbeing domain, with the benefits identified above largely being about more people getting access to care, or sooner than otherwise would be the case.

Important secondary wellbeing domains are **Time Use** and **Jobs and Earnings**. The positive impacts are from patients (and their families) spending less time in hospital, on average, to receive an episode of care than otherwise, because of efficiency gains that enable a shorter (or avoided) length of stay. This means a reduced loss of leisure time for patients and family and, for those in employment, a reduction in the loss of work time and productivity.

3.8 Acknowledging wider impacts from a local perspective

Indirect or wider impacts include opportunities for workforce development, economic impetus from construction spend and related activity, including spending by workers, and other amenity benefits to the city. These catalytic effects are dramatically more important in the recovery phase post COVID-19, and the project timetable and construction approach has been amended substantially with those benefits in mind.

The project is working with the Local Advisory Group to ensure that the wider social and economic benefits are captured, with a close focus on construction workforce development, job creation, integration with city planning and decarbonisation efforts.

3.8.1 Wellbeing initiatives

The project is premised on achieving broader outcomes. Key initiatives with linkages into the NDH that are already underway include:

Tertiary training expanded
A postgraduate diploma of Health Design to be introduced – hosted probably by the Otago Polytechnic and University of Otago. The diploma embraces elements of design, health planning, engineering, quantity surveying, project management, etc.

Building workforce connections from schools
Dunedin Hill Schools Project Based Learning Programme - a primary and intermediate level initiative to induct students into project-based approaches.

Environment restoration for wellness
Linkages to be established with the Orokonui Ecosanctuary to assist the journey to wellness.

Sustainability
The NDH Project is targeting 5 Star Green Star accreditation and has been assessed using the newly released Green Star NZ Design and As-Built tool.

Access and equity
Mana whenua integration into the hospital design and implementation of models of care.

Social housing
Use the opportunity to resolve worker accommodation with an expansion of social housing.

Workforce development opportunity
Workforce Central - a skills hub co-located with the Southern DHB Project Management Office and the Ministry design and construction team has opened. This team is engaging with young people, Māori and Pasifika peoples, women entering construction, people wishing to re-engage or retrain post-COVID, people exiting jail or serving probation, people with disabilities, people returning from out of region or from offshore, and will facilitate relevant construction industry vocational training.

3.8.2 Dunedin's GDP boosted by up to $100 million per year

Over the build period Dunedin will benefit from:

- Higher construction sector activity. This is known as the direct effect.

- An increase in revenue for businesses that supply inputs to the construction sector. This includes, for example, steel manufacturers. This is the indirect effect.
- An increase in spending by construction workers who have earned wages because of the redevelopment. This is known as the induced effect.

Table 14 summarises the accumulated impact of the construction spend over 10 years. No discounting has been included in this estimate. Figures are real as at June 2020. The table shows that the peak annual GDP (value-added) impact is around $100 million, which is 1.6 per cent of Dunedin's GDP. This is a maximum boost, not an average over the period. Over the 10-year construction period, the accumulated total impact of the build is $424.9 million of new GDP for Dunedin, $246 million of additional household income. At the project's peak, 914 FTE jobs will be supported.

Table 14 Summary of impacts from NDH capital spend of $1.3 billion

		Total
GDP (value-added) effects		
	Direct impacts, accumulated	$193.8m
	Indirect and induced impacts, accumulated	$231.1m
	Total accumulated value-added impacts for Dunedin	**$424.9m**
Household earnings effects		
	Direct household earnings impacts, accumulated	$139.8m
	Indirect and induced household earnings impacts, accumulated	$106.1m
	Total accumulated incremental household income impacts for Dunedin	**$246.0m**
Employment effects (# of jobs)		
	Estimated number working on NDH-related projects, including design and IT	827
	Impact of construction spend on total employment in Dunedin at peak of construction	**914**

Peak impact (value-added) from construction spend		$99.4m
	Dunedin annual GDP, 2019[6]	$6.200b
	Hospital spend as a % of total GDP	1.6%

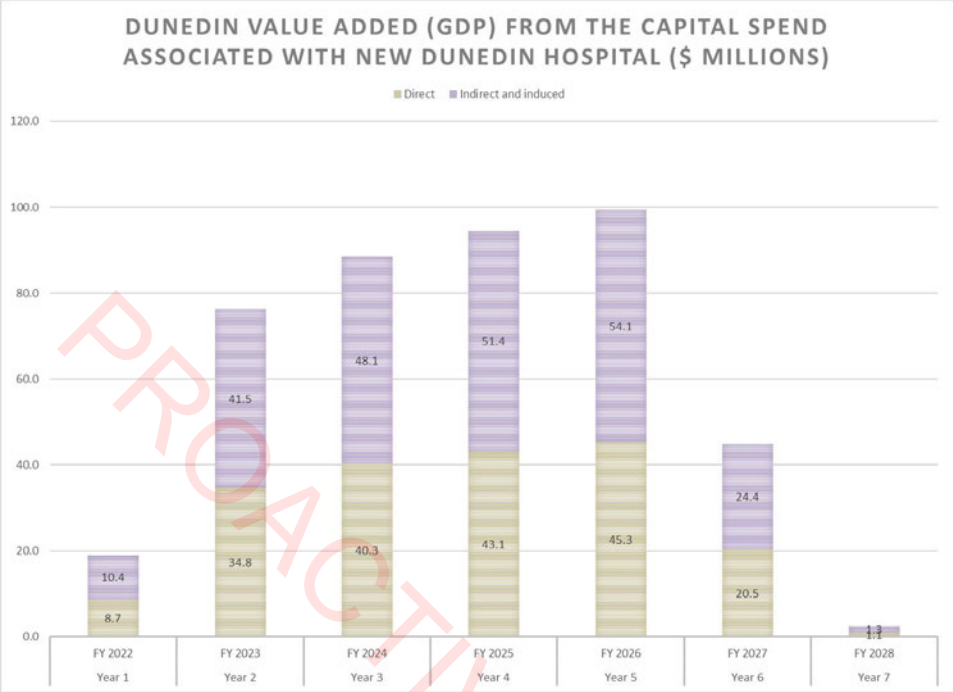
Source: Sapere

3.8.3 Timing of impacts

Figure 4 illustrates how the direct, indirect and induced impacts are spread over time. The assumption is that most of the impact is felt in the year of the spend. This assumption is consistent with modelling by the Reserve Bank of New Zealand of the economic impacts of government investment. The construction spend flows through the economy and into Dunedin workers' pockets. The workforce will be a mix of Dunedin residents and others from around other parts of the South Island in particular. Approximately half of the design and non-construction workforce will be Dunedin residents.

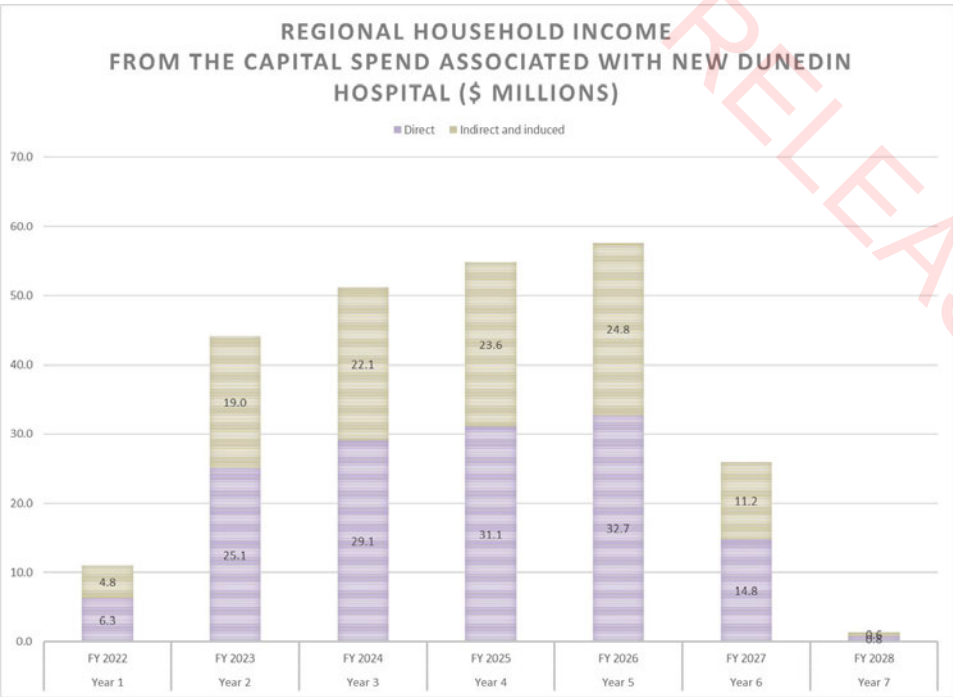
[6] Infometrics (2020)

Figure 4 Economic impact from NDH capital spend on Dunedin



The household income figure below illustrates the accumulated impact of the capital spend on the NDH on Dunedin's household incomes. The direct figure represents wages for the people in Dunedin working on the construction project.

Figure 5 Household income impacts from NDH



4. Commercial Case

This expression of the Commercial Case builds on the previous Initial DBC and provides further and updated detail around the benefits and risks of the procurement strategy created for the NDH.

Procurement planning is well advanced with procurements completed and in market as summarised in the figure below.

Figure 6 NDH project substantive procurement work streams

Source: NDH ESG Memo 16 February 2021

4.1 There is substantial pressure on our national construction sector

New Zealand is expected to see an unprecedented level of infrastructure investment over the next decade. Many projects are expected that are larger and more complex than previously seen in New Zealand.[7] The health sector is making significant capital investment in facilities. 9(2)(f)(iv) [redacted]

The construction industry plays a major role in New Zealand's economy, but there are common incidences of skills and labour shortages, inappropriate and/or unclear risk allocations and a lack of co-ordinated leadership. The increase in construction activity has seen the construction sector

[7] Forecasts from the Infrastructure Pipeline (captures non-building construction including: roading, rail, and other land transport; ports and airports; electricity generation, electricity transmission, and electricity distribution; irrigation; and local council spending on the three waters), retrieved https://infracom.govt.nz/projects/pipeline/

stretched and struggling to keep pace with project pipeline growth. The construction sector and government acknowledge a shared responsibility to improve the way major projects are procured and delivered across New Zealand and have stated this joint commitment in the Construction Sector Accord. Further, the Infrastructure Commission Te Waihanga is established with a formal role.

4.1.1 Construction in Dunedin presents challenges

There are specific challenges for Dunedin which will arise from delivering a project of this scale and complexity:

- A large labour force will need to be recruited and accommodated without disrupting the housing market and the environment.
- The local construction market is currently constrained – there appears to be a lack of depth in some specialist subcontractor markets (both in the workforce size and the apprenticeship pipeline) and a general shortage of supervisory resources with the experience to manage teams on a large project.

Several notable market events have happened. The timing of construction with other major South Island projects, notably the Canterbury Multi-Use Arena, reduces construction sector capacity to deliver the NDH. In Dunedin, Otago University is proceeding with construction of a 450-bed residential college. ACC announced it is building an 8,000 square metre building in a joint venture with Ngāi Tahu. These two Dunedin construction projects may impact on capacity to build the Outpatient Building.

The Arena is first into market before the NDH, which will likely raise the issue if there are dual awards due to contractor capacity.

4.1.2 Long-term COVID-19 impacts remain uncertain

COVID-19 impacts have been less significant than first feared but the long-term outlook remains uncertain. Construction companies managed to adapt - for some longer lead times was the extent of the disruption, while others had to pursue alternative supply chains to ensure continuity of product delivery. The full impacts on the economy and international supply chain costs may still be coming. There could be availability constraints and delays with significant cost implications for materials and labour.

It will likely take some years for supply chains and air travel to fully adjust and that may hinder some aspects of the project.

4.1.3 Learning from the past, from health and other experience

The Ministry has recent experience on large public-sector vertical projects in the South Island and, through the project team, has significant experience wider than just health. The lessons from this experience will be incorporated into the Inpatient Building approach and are set out in table found in Appendix D. In short:

- Contractors will be invested in the design process and the ECE process will be longer.

- The contractor will contribute to buildability and will help to ensure that design is considered from a construction perspective and is complete before construction is commissioned.
- Furniture, fixtures, and equipment (FF&E) will be addressed early in the ECE process to ensure the Inpatient Building is suited to the choice of clinical equipment, such as MRIs, etc.

4.2 Market engagement used to inform best collaborative strategy

Market engagement restarted in May 2020 for both the Inpatient and Outpatient Buildings following earlier market engagement in mid-2019. The Ministry tested parts of the procurement strategy with the construction industry for feedback. Market engagement included Tier 1, 2 and 3 contractors as well as key sub-trades to confirm their appetite to respond to the requests for proposals (RFPs). Local Dunedin-based firms were included in the market engagement. The Ministry sought comments on the procurement strategy, including:

- the impact of COVID-19 on domestic and international contractors and their appetite to bid
- the current pipeline of other construction projects
- procurement phase duration
- bidders' deliverables at the RFP phase
- subcontractor requirements (including extent of subcontractor commitment at each phase and how these will be assessed within the procurement process)
- intended contract form (including subcontracts)
- risk allocation
- the proposed process for the Inpatient Building, including the length of design collaboration.

9(2)(f)(iv) [redacted]

4.2.1 Market re-engagement outcomes

Through the feedback received via the market re-engagement, the Ministry took the opportunity to reconsider and adjust its proposed approach in a few areas. Participants' feedback confirmed ECE as the most suitable approach for the Inpatient Building and provided feedback on several areas now included in the procurement strategy:

- Require the main construction contractor to demonstrate how it will allocate portions of the ECE renumeration to key sub-contractors.
- Confirm the Ministry establishes an independent Building Information Management (BIM) Co-ordinator role separate from the Ministry's Design Consultants.
- Prescribe the form and terms of contract for sub-contractors to be used by the main construction contractor.

Details available in Appendix E.

4.3 Informed procurement approach

The procurement approach and packaging for the two buildings found market consensus as suitable and appropriate given the complexity, scale and duration of the project. There was general agreement by main construction contractors and some of the key sub-contractors that the proposed form of contract was appropriate.

4.3.1 Engage best-of-breed team and peer review plan

The procurement strategy was developed through a series of workshops including the Ministry of Health, MBIE, Infrastructure New Zealand and construction experts from the NDH Project Technical Reference Group.

4.3.2 Ministry takes design risk

Design risk is the potential for design to fail to satisfy the requirements of a project. This includes designs that are fundamentally flawed, infeasible, inefficient, unstable or don't deliver on the investment objectives. Design risk may manifest in unforeseen hurdles to development that impede project progress and increase costs or numerous, later, changes to plans, alterations to scope or a tail of post implementation changes or workarounds.

The Ministry will hold design risk, and consequently will manage the design process. With the desire for a collaborative process and avoiding adversarial relationships developing, design risk is best maintained by the Ministry, who is the party that can control design risk alongside the DHB.

Design documentation quality responsibility remains with the Ministry. The Ministry has procured an independent design management service to mitigate this risk. The importance of high-quality design management is key to successful delivery of an ECE process. The ECE contractor does not take on any design risk but gives input that informs that risk. The exception would be should the contractor propose a design & build for any subset of the build. This can be common practice for facades. This becomes a case-by-case transfer of design risk based on who is most appropriately placed to manage the risk.

4.3.3 Ground works managed separately

The Ministry has taken the risk on the most uncertain element of the construction activities. These activities are the removal of existing buildings, site rectification and groundworks. These works commenced in January 2020 and the post award of a demolition contract can be extended to include foundation works at the Ministry's discretion.

4.3.4 Standardisation to reduce cost and error

The opportunity to incorporate standard design is apparent. The Ministry team is looking actively at opportunities to standardise, modularise and prefabricate a large range of standard plan spaces, such as theatres, wards, ensuites, procedure rooms and consultant rooms.

Lessons learnt from other hospitals in standardising design are being incorporated into the procurement process. Including early subtrade participation in the design process that will enhance innovative use of prefabrication and modularisation. Previous plans are being developed and adjusted rather than starting from scratch to enable a higher degree of standardisation than has been incorporated into previous hospital builds.

4.3.5 Streamlining contractual arrangements

Prior to the collaborative development phase, the Ministry will complete most of the work to streamline contractual arrangements in response to the construction industry's desire to move away from excessive special conditions-to-contract that have been prevalent in New Zealand in recent years. 9(2)(f)(iv)

9(2)(f)(iv)

4.4 Two procurement models for two buildings

The Ministry's preferred procurement strategy for each building's construction contract reflects the individual characteristics of each building and the complexity (and therefore risk) of the building.

The Initial DBC considered a range of procurement options and different approaches came out on top reflecting the individual characteristics of each building and the complexity (and therefore risk) of the building. The Outpatient Building is a more traditional construction management procurement whereas the more complex Inpatient Building requires significant involvement from the construction contractor to facilitate better design and buildability. ECE is the preferred option for the Inpatients building.

Table 15 Procurement approaches for the Outpatient and Inpatient Buildings

Outpatients **13,391 m² – 3 year construction**	**Inpatients** **77,591 m²* – 6 year construction**
Construction Management – Preliminary General, Margin, select key trades @ Developed Design Status. • Relatively simple design has less scope for design innovation • Attractive to local market • Ability to advance programme to provide early capacity to Southern DHB • Allows early certainty for select key trades, and subsequent trades will be fully designed, coordinated, and scheduled. • One stage RFP September 2021 with contract award Feb 2022	**Early Contractor Engagement** • Large and complex building will need a large and experienced contractor • Maximise contractor/subcontractor involvement in collaborative design phase • Incorporates and element of price certainty • Fair and transparent risk allocation • Design collaboration July 2021 to June 2023 • All contracts awarded by November 2023

Source: MOH/Sapere *Note this includes links and ancillary building

4.4.1 Outpatient Building (circa 13,391 m^2) procured through Construction Management approach

The Outpatient Building is smaller and less complex with a likely construction period of three years. This building has been built before in New Zealand and it follows, to a large extent, the design of the outpatient building in Christchurch. There is less scope for innovation and fewer potential delivery challenges. Industry appetite is expected to be stronger for delivering a smaller building in the local and domestic market. The procurement minimises any market and delivery constraints between the two buildings. The proposed procurement approach achieves the objective of delivering the Southern DHB early day surgery capacity to mitigate challenges in the existing Dunedin Hospital. The key aspects of the proposed procurement approach are:

- Procurement will be delivered through a construction management plus select developed design trades contract familiar to the construction market.
- A one-stage RFP for the construction management contract will be issued in September 2021 and a contract awarded in February 2022.
- As design progresses, the main contractor will (under Ministry's QS supervision) progressively openly tender work packages that are fully or nearly fully designed and scheduled.

4.4.2 Inpatient Building (circa 77,591m^2)[8] procured through Early Contractor Engagement approach

The Ministry has continued to detail the ECE approach. As a reminder of previous work in the Initial DBC, ECE was chosen as an evolution of Early Contractor Involvement (ECI) approach as it reduces design risk through a collaborative arrangement requiring commitment through engagement with the main contractor and key select trades into the process and design outcomes. It has a progressive sub-trade negotiation / tender process built-in that will allow select trades to advance at Developed design and the balance once the Inpatient Building has been fully designed and scheduled. A non-competitive form has been adopted to provide certainty to the contractor and build relationships and collaboration, with an exit provision if the anticipated ECE deliverables are not being achieved to the Ministry's satisfaction. A non-competitive form was adopted on the advice of the Technical Reference Group and aligns with the intent of the 2019 Construction Accord.

The division of the contract into Separable Portions means the Ministry provides itself with a great deal more flexibility in awarding contracts. The Ministry reserves at its absolute discretion the right to delay award or not award at all Separable Portions 1, 2 and/or 3 until the end of the Detailed Design Stage and final pricing. The Separable Portions split provides a critical tension in the procurement and allows the Ministry to potentially award contracts for Separable Portions 1, 2 and/or 3 independent of each other to another party or parties.

[8] Including an ancillary building (comprising kitchen, laundry and loading docks) connected to the Inpatient Building

The Ministry will appoint a main contractor together with its specialist sub-contractors. The approach is summarised as:

- A one-stage RFP for the collaborative design phase has been issued (in November 2020) to identify the preferred contractor(s), including specialist sub-trades.
- The ECE contractor is expected to be identified **in May 2021**.
- The preferred contractor(s) and key specialist subcontractors collaborate with the Ministry and the Ministry's design team to complete detailed design **by June 2023**.
- Structural (steel, bearings) and façade packages (substructure and superstructure), and possibly lifts will be progressively tendered/negotiated in **October 2022** or thereabouts. Key risks will be identified and quantified prior to the letting of each package. Risk quantification relies on suitable design progress including indications of physical quantities, construction details and anticipated programme duration.
- Other key sub-trade contractors (mechanical, electrical, hydraulics, lifts and ICT) will be negotiated / tendered under an open book / closed tender, and bids will be benchmarked by the Quantity Surveyor **by June 2023**.
- The balance of the trades will follow detailed design and scheduling, so there will likely be three tender processes **starting late 2023 and the first quarter 2024**.

4.4.3 Benefits of procurement approach

The two buildings are procured and staged separately due to the different levels of complexity to reflect limited number of main contractors that could manage the two buildings as a single build (winner takes all). This also make the smaller building more attractive to the lower Tier contractors. Southern DHB will have the Outpatients Building available early in the programme.

- The time period for the ECE (mid Preliminary Design to the end of Detailed Design and completion of design and fully scheduled as best as possible with documents in a form for tendering) allows suitable time and consideration for inputs into design and enables the main contractor to develop a robust methodology, programme, resourcing and price.
- The ECE contractor will be engaged earlier (ideally halfway through the Preliminary Design stage) so the contractor will know what it must build and will help to ensure that design is complete before construction is commissioned.
- The contractor will bring knowledge from experienced specialist services subcontractors to inform the design with industry best practice and explore innovations. This will also give subcontractors the ability to understand the likely resourcing requirements of the overall design, and to prepare to invest in their workforce and supply chain accordingly.
- Opportunities will exist to extend design innovation from the Outpatient building to the Inpatient Building, with a focus on standardisation of design and materials, such as bathrooms.
- Through a process of progressively awarding separable portions (for example the award of substructure and base isolators), construction will be able start during the ECE process.

4.4.4 Broader outcomes

The NDH Project procurement process is based on the Construction Sector Accord 2019 and updated Government Procurement Rules – 4th Edition (2019).

> **Objective One:** To deliver a fit-for-purpose hospital that meets the needs of the required models of care, safely, on budget, to schedule and to a desired quality.
>
> *This will be achieved by a combination of the extended and collaborative iterative ECE process that allows for innovation to be considered and incorporated into the design as it develops and the incorporation of lessons learnt that suggests modulization and prefabrication will benefit the project.*
>
> **Objective Two:** Support the Government's desire for infrastructure projects to act as an economic stimulus, and to support the construction industry through job creation.
>
> *This will be achieved through an accelerated design and construction programme, in particular for the Outpatients Building.*
>
> **Objective Three:** Promote and incorporate collaboration and early involvement with the construction sector, particularly in the design stages.
>
> *Through an extensive ECE process the Main Contractor and Key subcontractors can contribute around buildability to the hospital design as it progresses. The involvement starts early (mid-late Preliminary Design) and continues through to the completion of Detailed Design.*

The achievement of broader outcomes will be reflected in the Ministry's procurement and delivery of the new hospital, from the procurement strategy, through to tender evaluation, the collaborative development and during construction.

Table 16 Achievement of broader outcomes

Outcome	How the Ministry will achieve this outcome in procuring the New Dunedin Hospital
Broader outcomes	
The secondary social, environmental, cultural or economic benefits that are generated through procurement, and will deliver long term public value for New Zealand. They will reflect not only the whole-of-life cost of the procurement, but also the costs and benefits to society, the environment and the economy.	Subject to available funding, a range of wider public outcomes (e.g. in the social housing, education and transport sectors, among others) may be able to be delivered by the project, and will be actively considered through the procurement phase and the collaborative development phase as follows: • During market engagement and procurement documentation, the Ministry will clearly communicate to bidders its expectations around the role of the construction industry in supporting the delivery of broader outcomes. • During the collaborative development phase, establish a dedicated workstream focusing solely on the planning and delivery of broader outcomes. The Ministry will work with contractors to determine how delivery of the new hospital can also facilitate investment in additional works (e.g. accommodation construction) that would not have otherwise occurred. • During construction, establish dedicated management roles to focus on monitoring the delivery of the broader outcomes, including to act as a liaison between the contractor(s), the Ministry and other relevant agencies.

Priority Outcomes	
Increase the size and skill level of the domestic construction sector workforce	• Require contractors and subcontractors to demonstrate how they will invest in growing their workforce to meet the significant labour demands for the project, including to create new apprenticeships, on-the-job training, better job retention and skills development. This will be included with the Ministry's evaluation criteria during the RFP stage of the procurement process and is likely to form part of a dedicated workstream during the collaborative development phase. • By requiring major services subcontractors to participate directly in the collaborative development phase, these firms will benefit from high exposure to large-scale public-sector procurement processes. • Working together with the University of Otago, Otago Polytechnic and other secondary/tertiary education providers to encourage participation in construction sector-specific courses. • Sub-contractors involved in the Outpatient building will have increased scale and experience that likely will be an advantage to the Inpatient building contractor. These benefits will extend beyond the New Dunedin Hospital into other upcoming hospital construction projects.
Increase New Zealand businesses' access to Government procurement	• Engage with the local construction industry to ensure they have opportunity to: (a) provide feedback and contributions to the procurement process, and (b) allow enough time to invest in ramping up their workforce. • Contract directly with large contractors and their choice of specified major services subcontractors as part of a single bidding consortium, which allows many of these suppliers' access to direct Government contracting for the first time.
Improve conditions for workers and future-proof the ability of New Zealand businesses to trade	• Explicitly consider all contractors' health and safety credentials in its procurement process. • Include specific KPIs (e.g. worker wellbeing, safety-in-design) relating to the contractor's/subcontractor's Health & Safety outcomes in the performance framework to be implemented during the delivery phase.
Net zero emissions and waste reduction	• Explicitly consider environmental sustainability in its procurement and design process.[9] • Include specific KPIs (e.g. reduced or zero emissions, reduced waste as a result of design, reuse and recycling, diversion from landfill, etc.) relating to the contractor's/subcontractor's environmental outcomes in the performance framework to be implemented during the delivery phase.

4.5 Risk allocation

Risks will be held by the party that is best positioned to manage, understand and price each risk. Risks are assigned to the party who can most effectively reduce the likelihood of each risk or reduce the adverse impact of that risk should it occur.

The proposed key risk allocation for both Inpatient and Outpatient Buildings is summarised below. The risks will be quantified and negotiated in detail with the contractors prior to contract award.

[9] The NDH Project is targeting 5 Star Green Star accreditation and has been assessed using the newly released Green Star NZ Design and As-Built tool

Specific attention will be given to risks in relation to programme, cost and design conformance given their impacts on Southern DHB and the Ministry.

Table 17 Proposed construction risk allocation

Risk Category	Types of Risk	Allocation
Site	9(2)(b)(ii)	
Design		
Construction		
Operational		
Financial		
General		

Source: MOH/Southern DHB/Sapere

4.5.1 Risk mitigation strategies for ECE

The main contractor will likely progress through the design stage, to construction and then to completion and commissioning. However, there are some checks and balances to ensure the main contractor remains active.

Off-ramps

The Ministry will retain a credible option to go back to market with the in-progress or completed design throughout the collaborative development phase. A framework will be put in place (including independent design and cost reviews, Disputes Advisory Board, etc.) to regularly confirm that both the Ministry and the contractor are meeting their obligations during the collaborative development phase. This provides a consistent incentive for the contractor to provide high quality services and to operate in good faith. The Ministry's off-ramps will be most credible at the key milestones of Preliminary Design, Developed Design and Detailed Design completion (which will also be supported by price estimates and design commentary from the contractor).

The Ministry understands that the use of off-ramps will be balanced with providing the contractor confidence that, if required services are provided, they are likely to be awarded the contract.

Maintaining competitive tension

A non-competitive ECE process represents a trade-off between achieving a genuine price tension available under a competitive ECE, and the benefits of providing early certainty in the market and stronger relationship building.

Evidence from Australia provided by the Infrastructure Commission suggests that a premium in the range of 5-10 per cent is likely to be paid by the client when a non-competitive process is used (Department of Treasury and Finance, Victoria, 2019).

There are countervailing interventions that maintain some competitive tension while retaining the benefits from collaboration:

- The ECE contractor's services scope and deliverables are clearly delineated.
- Tenders will be overseen and supervised by the quantity surveyor.
- All tenders will be open-book.
- There is an ability to not proceed with the non-competitive process, if behaviours, performance, and outputs do not meet MOH's expectations.
- 9(2)(b)(ii)
- [redacted]

Managing sub-trades

9(2)(b)(ii) [redacted]

A Deed of Continuity Arrangement will be entered into between the Ministry and all sub-trades to protect the Ministry in the event of termination for any reason of the ECE contractor during the ECE process or post award of a construction contract.

The Ministry has the option of going back to the market for all or part of the sub-trade contract:

- 9(2)(f)(iv)
- [redacted]

To encourage a fairer and more transparent risk allocation, the Ministry will require contractors to use standard form subcontracts for engaging their key suppliers and sub-trades and may consider implementing additional security measures such as project bank accounts and retention trust auditing.

These subcontracts will be reviewed and approved by the Ministry in advance and will ensure consistent treatment of subcontractors for risk transfer, payment terms, security regime, labour/workforce development, etc.

9(2)(b)(ii)

4.6 Project timetable

Figure 7 High-level programme timetable

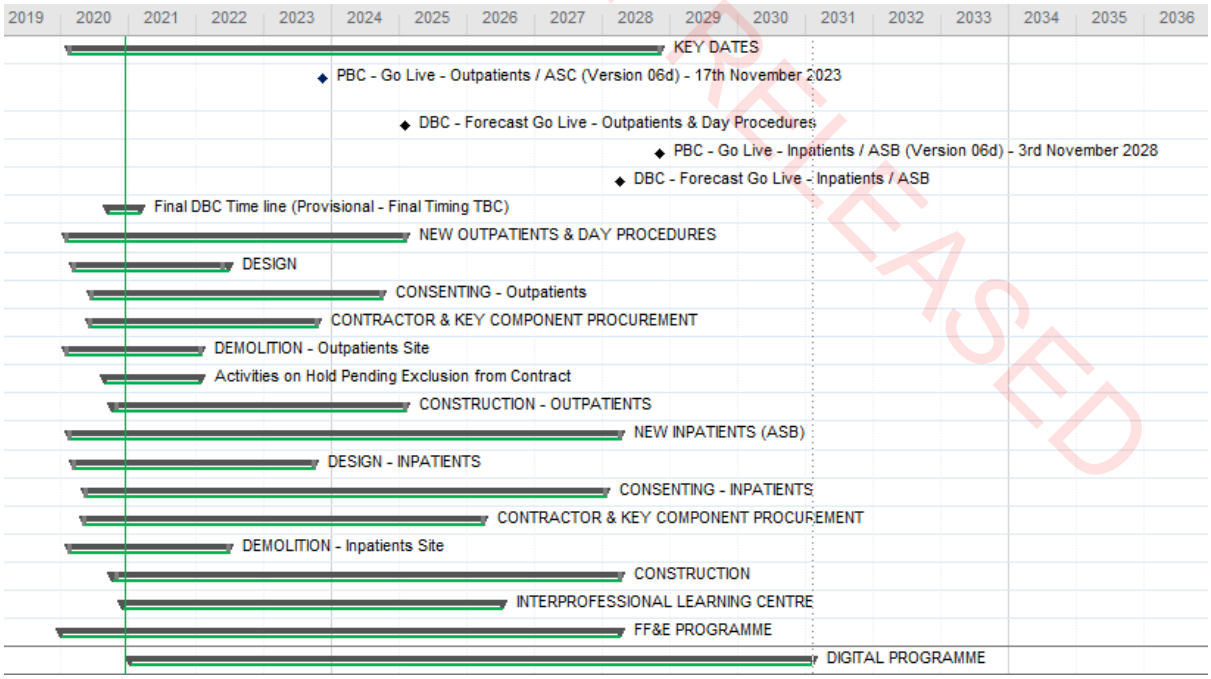


Table 18 Key project dates

Activity / Milestone	Master Programme (A2.5)
FINAL DETAILED BUSINESS CASE	April 2021
DEMOLITION (including slab and foundation removal)	June 2020 – June 2022
Outpatients Site	June 20 – Feb 21
Inpatients Site	Jan 20 – Jun 22
RESOURCE CONSENTS – Both sites	May 2020 – Nov 2021
Demolition consents (above ground) (Complete)	May 20 – Dec 20
Below ground	Nov 20 – Nov 21
Fast Track Resource Consent (lodged Sept 21)	Dec 21 Expected
OUTPATIENTS & DAY SURGERY BUILDING	JANUARY 2025
Design (including approvals)[10]	
Concept Design (Complete)	Mar 20 – Oct 20
Preliminary Design	Oct 20 – April 21
Developed Design	April 21 – Sept 21
Detailed Design	Sept 21 – April 22
Procurement (Outpatients Main Contractor)	
RFP Release	Sept 21
Evaluation Complete	Dec 21
Implementation Business Case and Contract Award	Feb 22
Construction	
Early Works	Jan 22- Dec 22
Main Build	Oct 22 – July 24
Comm FF&E, Op Readiness	Mar 24 – Jan 25
Go Live	Jan 25
INPATIENTS BUILDING	APRIL 2028
Design (including approvals)	
Concept Design (Complete)	Mar 20 – Oct 20

[11] Note that this estimate was reported with a range of +/-10%, that is between $1,181m and $1,443m. The Ancillary Building is counted as part of the Inpatient Building.

Preliminary Design	Oct 20 – Sept 21
Developed Design	Sept 21 –July 22
Detailed Design	July 22 – June 23
Procurement (ECE – Main Contractor input into Design)	
RFP Release	Dec 20
Contract Award	May 21
Procurement (Main Contractor – Separable Portions)	
SP 1. Substructure including Base Isolator	Oct 22 – May 23
SP2. Superstructure, Façade and Roof (Base-build)	March 23 – Oct 23
SP 3. Clinical and Non-clinical Internal Fitout	June 23 - Dec 23
Construction	
Early Works	Jan 23 – March 24
Main Build	Dec 23 – May 27
Comm FF&E, Op Readiness	Mar 27- April 28
Go Live	April 28

Source: Programme Key Dates (vA2.5) 25 Feb 2021

5. Construction cost and contingencies

There is a high degree of uncertainty in major projects and it is therefore a Treasury requirement for large government projects to ensure that planning focuses on understanding project risks, particularly the impact on project costs, and undertaking quantitative risk analysis (New Zealand Treasury, 2019).

9(2)(b)(ii) [redacted]

This section examines those costs in more detail and outlines the quantitative risk analysis undertaken.

9(2)(b)(ii) [redacted]

5.1 Hospital cost components and spend to date

The total cost of the hospital and its components including contingencies is 9(2)(b)(ii) [redacted]

- 9(2)(b)(ii) [redacted]

5.1.1 NDH capital assumptions are provided by the quantity surveyor

The construction cost estimate has been developed by Rider Levett Bucknall. The Schedule of Accommodation that this Financial Case is based on is for a gross floor area (GFA) measured at 90,982 square metres. The components of this build and the associated expected useful life of the components are detailed in Table 19.

Table 19 Cost components of new build – nominal dollars (millions) - includes margins, escalation, and contingencies

Component	Outpatient Building ($m)	Inpatient Building ($m)	Ancillary Building ($m)	Total ($m)	Useful life (years)	Depreciation (annual %)
Site preparation and planning	9(2)(b)(ii)					
Substructure						
Structural frame						
Envelope						
Hard fitouts						
Central and services distribution/plant						
External works						
Demolition						
Land						
FF&E						
Helipad						
Total						

Source: Rider Levett Bucknall, Southern DHB and Sapere analysis

Project fees have been capitalised as part of the project cost.

Table 20 shows how the cost estimate has evolved since the IBC was issued in 2017.

Table 20 Evolution of the cost estimate

Date	April 2017	November 2020
	Core option F Greenfields/brownfields	Final concept design estimate
	9(2)(b)(ii)	
Inpatients (Acute Building)		
Outpatients (Ambulatory)		
Other build (link, non-clinical support, central plantroom)		
Other items (infrastructure, health hub, FF&E, Helipad, Carparking, External works)		
Land		
Design fees and consents		
MOH staff, governance and site costs, procurement		
Escalation		
Contingency		
Total		

[11] 9(2)(b)(ii) .

To date, 9(2)(b)(ii) has been spent, with a further 9(2)(b)(ii) committed. Table 21 shows details of expenditure by cost item.

Table 21 Expenditure to date versus budget as of 31 January 2021

	Total budget ($m)	Committed cost ($m)	Paid to date ($m)	Budget remaining net of committed expenditure ($m)
Construction costs	9(2)(b)(ii)			
FF&E				
Professional fees				
Other developments costs				
Land costs and demolition				
Contingencies				
MOH direct costs				
Total				

Source: RLB Cost report no. 9

5.2 Contingencies provided by quantity surveyor

The quantity surveyor has allowed for contingencies for both construction risk, and design and scope risks. The full set of contingencies total 9(2)(b)(ii) and are broken down in the table below.

Table 22 Quantity surveyor contingency estimates

Contingency	Basis of quantity surveyor's estimate	Value ($m)
Design	9(2)(b)(ii)	
Piling[12]		
Construction		
Project[13]		
FF&E Integration		
Design Fees		
Time / Programme		
Total		

9(2)(b)(ii)

5.3 Quantitative Risk Analysis was also undertaken

There has been ongoing consideration of risk in this business case process. The first phase involved qualitative analysis including risk identification, optimism bias and lessons from comparable NZ builds (Sapere Research Group, 9 July 2020).

The second phase is the required quantitative risk analysis, which supported Sapere's quantitative modelling. The modelling draws on experts to determine the model parameters, to review model outcomes and to prioritise major project risks for further scenario analysis. Sapere's modelling is reported in full (Sapere Research Group, 2021), and has been peer reviewed by Rawlinsons (Rawlinsons, February 2021).

Two quantitative risk workshops were facilitated by Sapere involving key project stakeholders from government (Southern DHB, Ministry of Health, Infracom) and project consultants (Rider Levett Bucknall, RCP, Warren & Mahoney, Holmes Consulting, Beca, Contra Consulting).

The results of the modelling indicate the contingency provided by the quantity surveyor 9(2)(b)(ii) is sufficient as long as there is close control of design and scope changes.

5.3.1 Risk-based estimation

The model of construction costs developed by Sapere is based on risk-based estimation that builds on the Better Business Case Guidance for risk modelling with the 'risk-factor' approach recommended by the Australian Government (Department of Infrastructure, Regional Development and Cities, 2018).

The model is a different and complementary approach to that of the quantity surveyor's point-based estimation:

- Modelling focuses on risk factors that vary the cost of construction to a known plan and *does not include* cost changes arising from design or scope changes.
- The quantity surveyor's costs and contingency estimates *include* cost changes arising from design or scope changes, 9(2)(b)(ii) [redacted]

The range of values produced by the modelling overlap with the surveyor's estimates including construction contingencies and are further extended by the quantity surveyor's design or scope change contingencies.

5.3.2 Lack of a meaningful distribution for design risk

The difference in approach to modelling design risks reflects both differences in international guidance (which is dominated by horizontal rather than vertical infrastructure) and the difficulty estimating a meaningful risk distribution for the design risks in the current project. The total project cost outcomes are reported below as a hybrid of the probabilistic outcomes for construction costs plus the quantity surveyor's 9(2)(b)(ii) [redacted] estimate for design contingencies.

5.4 Modelling results suggest the estimated construction contingency is sufficient

The model output is a description of the simulated future scenarios and must be read with a probabilistic rather than deterministic interpretation. Figure 8 highlights the 10th, 50th and 90th percentile cost estimates (called P10, P50 and P90 respectively) as the optimistic, likely and pessimistic outcomes (see fuller description in the Initial DBC (Sapere Research Group, 9 July 2020)).

Figure 8 Principal risk cost estimate S curve

The 'likely' cost outcome is $1.28 billion, with the P85 Treasury threshold outcome being $1.332 billion. Once an allowance is made to include the quantity surveyor's estimate for a design and scope contingency ($104 million), the P50 and P85 estimates increase to $1.384 and $1.436 billion respectively. These results are consistent with the quantity surveyor's estimates, as demonstrated by the overlap in Table 23 and graphically in Figure 9.[14]

[14] Note that there is a small difference that is due to different treatments of escalation.

Table 23 Model results and comparison with quantity surveyor's estimates

Source	Value of construction costs	Cost estimate
Model	9(2)(b)(ii)	
Model+QS		
Model		
Quantity surveyor		
Model+QS		
Model		
Model+QS		
Model		
Model+QS		
Quantity surveyor		
Quantity surveyor		

Figure 9 Model results and comparison with quantity surveyor's estimates

The quantity surveyor's estimate including all contingencies is 9(2)(b)(ii). Of note, the expected cost risk from variations in construction costs is approximately 9(2)(b)(ii) (comparing P50 to P90), compared to the contingency estimate for design and scope changes of 9(2)(b)(ii) (which is shown separately in

Figure 9). This reinforces the importance of prudent management of design and scope change risks (discussed in the management case).

5.4.1 Building component analysis and parameter uncertainties

It is relevant to note that adjustments to the risk distributions of the modelling parameters have only a limited effect on the overall distribution outcome. For example, two significant parameter changes still produced only a 9(2)(b)(ii) scenario, when:

- 9(2)(b)(ii)
-

The component analysis provides some guide whether there are any offsetting effects between Inpatient, Outpatient, escalation and "other" project components.[15] Nonetheless, there is consistency between the base cost and contingency and QRA approaches, highlighting the variation in the approach to escalation where there is a 9(2)(b)(ii) difference. What the escalation difference reveals is a cautionary approach by the quantity surveyor to price escalation that is comparable with the "worst-case" for cost elements in the QRA. The two approaches essentially come to the same answer in different ways.

Figure 10 illustrates the contribution of the top ten model parameters with the largest P10-P90 range excluding escalation. Excluding the margins for the inpatients building (which is indirectly estimated by the quantity surveyor), the inpatients building structural frame has the highest P10-P90 range. It is the largest individual cost category, so even with a relatively small risk distribution (-10 to +5), it comes close to the top.

9(2)(b)(ii)

[15] Note that interpretation of probabilistic simulations should be careful - the sum of outcomes for independent components is not equivalent to the total outcome.

Similarly, none of the Outpatients Building items appear in the top 10, reflecting the fundamental difference in the base level of cost for each risk group. A similar chart for Outpatient will be similar as the risk distributions are similar; only the value of the risk range will be different.

5.5 Scenario analysis for significant risks

The model was used to measure construction risk in the section above, focussing on price and quantity risk. In this section, the model is used to give some estimate of the potential impact on construction costs from the project risks prioritised by risk workshop stakeholders, that is:

- constraints on on-site workforce due, for example, by pandemic controls
- delays in starting construction
- difficulty contracting the Inpatient Building construction.

These risks are simulated by two scenarios each for constrained workforce and delayed inception, each combined with a scenario for inpatient contracting. The workforce and delay scenarios are implemented as variations in the quarterly schedule of project cost timing employed for escalation calculations:

- Constrained 1 – changes in construction phasing when the on-site construction workforce is limited to 600, limiting the quarterly maximum allocation.
- Constrained 2 – stretching 50 per cent of each task across four quarters of next year, effectively both imposing a cap and delaying the final completion of construction an additional year.
- Delay 1 – a one-year delay in commencing construction.
- Delay 2 – a three-year delay in commencing construction.

These attempts to quantify the potential impact of delays are only indicative as there are a range of characteristics of actual delay events that influence the impact of those events on project costs.

- The potential causes of delay vary, and some have effectively been included in the quantity surveyor's contingencies and modelling, such as the piling risk that accounts for the additional time required when encountering difficult subterranean conditions (but not any subsequent project delay).
- The cost impact of delays can vary significantly at different points of construction. For example, the daily cost of tower cranes during early structural construction phases increases the daily cost of delay by four to six times relative to delays during the final fitout stages of construction.
- The cost of delay risk may be allocated to the supplier rather than the Ministry through capped prices in the construction contract where the delays relate to construction activities rather than client changes, but likely some cost will fall to the Ministry, even if just the cost of retaining the project management team for longer.

Project delay and inpatient contracting are each significant drivers of shifts in the cost curve

Table 24 provides indicative results drawn from the model for each of the scenarios defined above, shown graphically in Figure 11 below.

Table 24 Indicative change in model outcomes due to scenario analysis

QRA Scenario	P50 likely outcome ($b)	P85 Treasury pessimistic outcome ($b)	P90 pessimistic outcome ($b)
Base scenario	9(2)(b)(ii)		
Constrained 1			
Constrained 2			
Delay 1			
Delay 2			
IP contracting			
Constrained 1 & IP			
Constrained 2 & IP			
Delay 1 & IP			
Delay 2 & IP			

Compared with the Base scenario, the results in Table 24 indicate that:

- 9(2)(b)(ii)
-
-

Figure 11 Additional costs risks from scenario analysis

9(2)(a), 9(2)(b)(ii)

9(2)(b)(ii)

There are additional and material costs to delay that would fall on Southern DHB. Those costs include the need to procure elective surgery from other providers including the private sector.

These indicative scenarios reinforce the risk workshop stakeholders' focus on delay and inpatient contracting as key project risks to be managed.

6. Affordability of NDH for Southern DHB

This Financial Case addresses the question of affordability of the construction of the NDH for Southern DHB. Against the backdrop of ongoing operating deficits, Southern DHB will become substantially more efficient. The new hospital enables the DHB to increase capacity to serve its population and their health needs while delivering efficiency gains in the form of reduced staff-to-patient ratios and a reduced growth path in operating costs. Complementary initiatives in digital and primary care will be needed to transform the financial outlook for the DHB.

The total cost of the hospital and its components is 9(2)(b)(ii). There is also, in parallel, an indicative business case being prepared for ICT developments, which are a necessary feature of NDH with an estimated cost of 9(2)(b)(ii) Funding will be shared between the Crown and the DHB.

Over the 10 years from 2020/21 to 2029/30, there will be net total operating expenditure of 9(2)(b)(ii):

9(2)(b)(ii)

More details of the effects on Southern DHB's financial position can be found in Appendix F.

The Financial Case shows that the DHB will have enough financial headroom to cover the spending required over the lifetime of the project. However, we note that there will be other projects that will need funding, including a redevelopment of mental health services. Also, the final details of the digital programme will need to be worked through.

Work is ongoing to bring greater certainty to the results as follows:

- confirm the project costs based on outcome of Inpatient Building ECE Process and the Outpatient Building procurement
- make an explicit allowance for the DHB commissioning costs of the new hospital
- confirm efficiency proposals
- develop the workforce model further and align explicitly with Change Management Programme
- account for the most recent estimates for the digital programme
- account for any sector changes that could occur following the submission of this document.

6.1 Key modelling assumptions

This section details those assumptions which, if they were to change, would have a significant effect on the affordability of the new hospital.

Key macroeconomic forecast data (including CPI inflation and wage inflation) are used for cost and funding escalation. The capital charge rate has been used to estimate the financing costs.

6.1.1 The wider economy needs to be considered

The common assumptions are those that apply across different parts of the model and are then used to develop the whole-of-life costs.

The period modelled is up to 2042/43. This time period makes it possible to model Southern DHB's performance between now and the commissioning of the building, and an estimated financial position at commissioning.

At this stage changes that may occur in the health sector as a result of COVID-19 have not been considered. This risk, and others, are discussed in the QRA section of the Economic case.

Table 25 Macroeconomic assumptions

Assumption	Driver/value	Source
Period of analysis	From 2019/20 to 2042/43	Southern DHB
Inflation (CPI)	Forecast until 2020/21 then 2%	Budget economic and fiscal update 2018
Wage increases	3% per annum	Southern DHB

Source: Southern DHB/Sapere

6.1.2 Revenue assumptions are based on Treasury advice

Southern DHB revenue is consistent with the long-term investment plan. This plan considers population growth, including the effects of an ageing population. Forecast revenue growth over the period of analysis averages 3.7 per cent on a compound annual growth rate (CAGR) basis and takes into account the recent increase in funding to DHBs.

The most material assumption is that there will be matching funding for the additional capital charge levied once NDH is complete, which will be recorded as capital charge relief revenue. This is the consequence of a decision that the Crown will fund the capital charge of major health investments.

6.1.3 Other capital is included in the capital programme

Southern DHB will continue to make capital investments in other areas to ensure that it is able to continue to provide services. There are material areas of spending on clinical equipment, IT and other

buildings that are assumed in this business case but for which funding will be sought in other business cases. A proportion of the spending in ICT will be necessary for NDH to deliver on its promise as a digital hospital. Southern DHB will likely be seeking around 9(2)(b)(ii) in funding from the Crown for ICT projects.

The main items and value of capital expenditure not within the scope of this business case but included in the financial forecast include (costs are nominal dollars, not discounted):

Table 26 Capital expenditure expected between 2020/21 and 2039/40 (not in this BC)

Item	Nominal amount ($m)
Buildings	9(2)(b)(ii)
ICT	
Other asset categories	
Total	

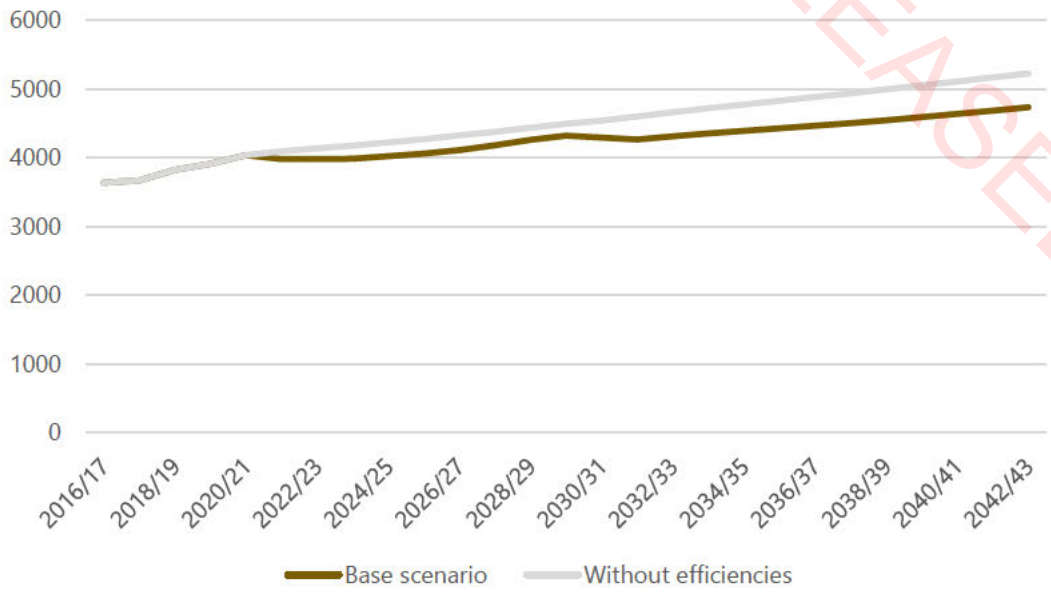
Source: Southern DHB/Sapere

6.1.4 Workforce modelling assumptions are complex

We note that more work is needed to translate service volumes into workforce numbers. This section provides a general overview of the workforce modelling, the results of which are contingent on achieving efficiency targets and are set forth in the next section.

Workforce expense for Southern DHB is currently 69 per cent of total provider arm operational expenditure (i.e. excluding asset-related costs). It is expected to rise to 74 per cent in 2039/40. The workforce assumptions, which are contingent on the new digital hospital, are therefore particularly important.

Figure 12 Workforce growth under the efficiency scenario



Source: Data provided by Southern DHB, Sapere analysis

The efficiency assumption makes a material difference to workforce numbers. Once the Inpatient Building is completed, there is a two-year period of adjustment where efficiencies are realised (estimated at 2.5 per cent per annum) after which growth resumes but at a slower pace. The net result is that 4,778 employees are needed in 2040/41, 334 fewer than will be the case if no efficiencies are achieved.

The average workforce efficiency factor assumed between 2020/21 and 2040/41 is 0.42 per cent per annum. The effects of this assumption can be seen in Table 27, where growth in the medical workforce will increase around 18 per cent over the next 20 years. Growth is lower in the support staff and management and administration category (labelled as "other" in the table), where staff numbers will increase just over 17 per cent over the same period.

Table 27 Number of employees by category at five-year intervals

	2020/21	2025/26	2030/31	2035/36	2040/41	% growth across period
SMOs	318	328	348	359	376	18.4%
Registrars	338	349	369	381	399	18.0%
Nurses	1,815	1,874	1,981	2,046	2,143	18.1%
Allied health	735	759	803	829	869	18.1%
Other	844	872	919	946	991	17.4%
Total	**4050**	**4182**	**4420**	**4561**	**4778**	**18.0%**

Source: Sapere/Southern DHB

6.1.5 Other operating costs assumptions

Efficiencies of 0.24 per cent (funder) and 0.42 per cent (provider other costs) are applied to non-workforce costs between 2020/21 and 2040/41. The compounding effect of these efficiencies reduces spending by 4.7 per cent and 8.1 per cent compared to current growth levels respectively in 2040/41.

Table 28 Cost efficiency assumptions

Assumption	Driver/value	Source
Funder arm	0.24% per annum between 2020/21 and 2040/41	Southern DHB
Other costs (provider arm excluding personnel)	0.42% per annum between 2020/21 and 2040/41	Southern DHB

Source: Southern DHB

The underlying drivers of the cost categories are detailed in Table 29.

Table 29 Cost drivers – other operating costs

Expenditure item	Cost driver (volume)	Inflation driver (price)
Outsourced clinical services	Inpatient caseweights	Wage inflation
Other outsourced services	No driver	Wage inflation
Treatment disposables	Inpatient caseweights	CPI
Instruments & equipment	Inpatient caseweights	CPI
Diagnostic supplies & other clinical supplies	Inpatient caseweights	CPI
Pharmaceuticals	Inpatient caseweights	CPI
Other clinical supplies	Inpatient caseweights/ inpatient bed days/ outpatient volumes	CPI
Patient appliances	Inpatient caseweights	CPI
Implants & prostheses	Inpatient caseweights	CPI
Other operating expenses	No driver	CPI
Hotel services, laundry & cleaning	Inpatient bed days/ clinical FTE growth	CPI
Transport	No driver	CPI
Facilities	No driver	CPI
IT systems & telecommunications	No driver	CPI
Professional Fees and Expenses	No driver	CPI

Source: Southern DHB

6.1.6 Other assumptions or exclusions

We note modelling assumptions that are either implied or not considered:

- no sale of surplus land
- no modelling of old ward block demolition costs – assumes that any demolition costs will be offset by the sale of land

- no specific modelling of Invercargill and other areas outside of Dunedin; any capital expenditure required for Invercargill will be considered on its own merits outside of this business case
- any holding costs (i.e. interest incurred on work paid for during construction) relating to the build will be incurred and expensed by the Crown.

We also 9(2)(b)(ii) [redacted] of Crown-funded capital expenditure relating to IT projects for NDH has been included in the financials. This expenditure, although integral to the successful completion of the NDH, has been the subject of a separate business case.

6.1.7 Funding is through Crown equity

In practice, DHBs are limited in how they can finance projects such as these. In 2017, DHBs were required to convert long-term debt into Crown equity, removing borrowing as an option. Government policy is for public-private partnerships not to be considered for health projects.

The only viable financing options are financing from accumulated funds or equity financing. Given the scale of the project, financing from accumulated funds is not possible, which leaves Crown equity financing as the remaining option.

Crown equity financing will operate as follows:

- The Crown will hold the asset for the duration of the construction period on its books and will expense any holding costs (modelling assumption until confirmation).
- Upon completion (being completion of construction, attaining a building warrant of fitness and on completion of commissioning and DHB acceptance), the asset will be transferred to Southern DHB in the form of a capital injection to its books.
- The increase in equity generates a higher capital charge which is levied on the DHB by the Treasury.

A recent Cabinet decision provides for the DHB to be provided additional funding to offset the increase in capital charge.

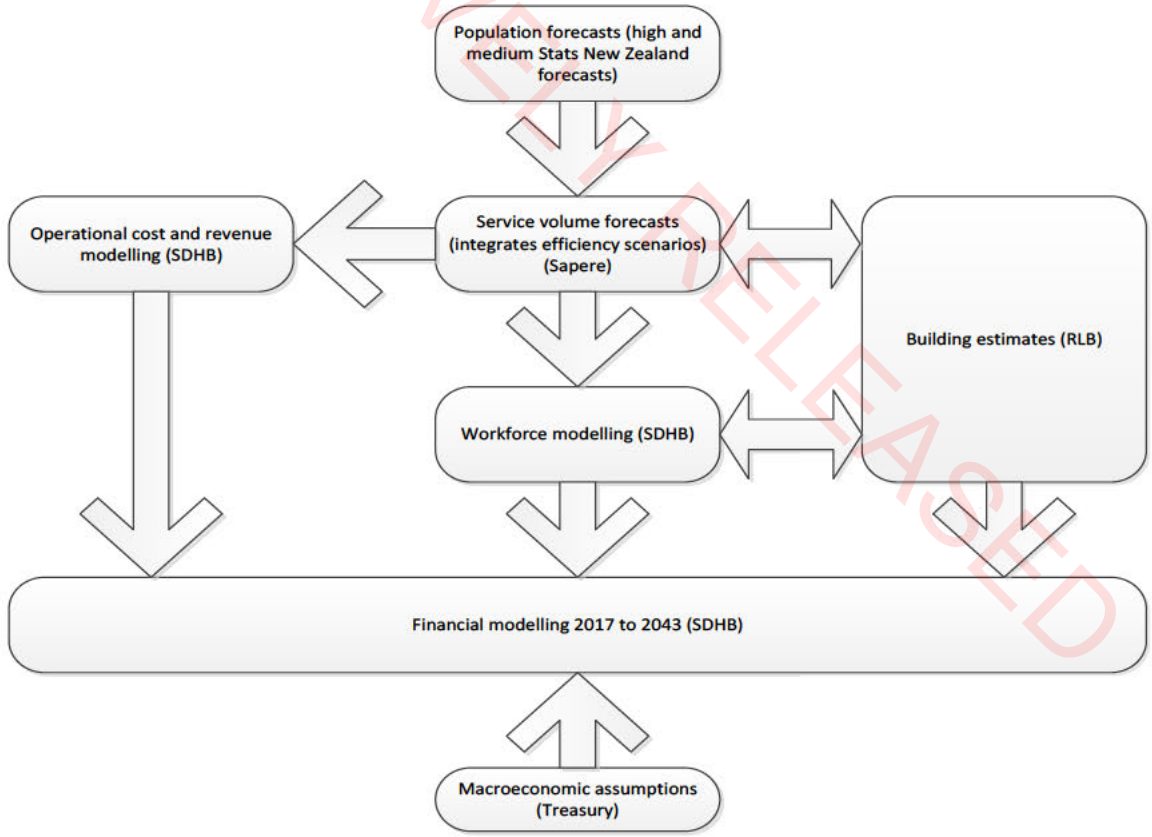
6.1.8 The Southern DHB financial model brings all the assumptions together

We model the cost of the preferred option, revenue, employee costs, other operating costs, finance costs, capital expenditure and depreciation. The Southern DHB financial model is the basis for the results. This financial model is a consolidation of other models, including an important workforce model. The consolidated model produces a financial forecast with statements of comprehensive income, a statement of cash flow and a balance sheet. The key subsidiary models and their dependencies are set out below. Table 30 shows the structure of the model, and Figure 13 shows how the model components fit together.

Table 30 Elements of the financial model

Model title	Source	Dependent models
Population forecast	Statistics New Zealand	Service forecast Revenue
Service forecasts	Sapere	Workforce model Operating costs of consolidated model
Macroeconomic assumptions	Treasury	Revenue Other operating costs of consolidated model
Capital costs of new hospital	Rider Levett Bucknall	Capital plan of consolidated model
Workforce model	Southern DHB / Ministry of Health / Sapere	Workforce costs of consolidated model
Efficiency assumptions	Southern DHB	Workforce costs and other operating costs in consolidated model; assumes that digital programme successfully delivered
Capital plan	Southern DHB	Financial forecast in consolidated model

Figure 13 Modelling approach



6.2 Modelling results of this significant capital infrastructure project

The summary of funding required is shown in the table below:

Table 31 Funding requirements ($ thousands)

	2020/21 to 2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	Total
Total capital expenditure	9(2)(b)(ii)							
Operating expenditure								
Additional costs for two buildings								
Reduction in outsourcing costs								
Capital charge								
Depreciation								
Total operating expenditure								
Revenue								
Capital charge relief								
Net operating expenditure required								

Source: Sapere analysis

For more details see the appendix, where the detailed financial statements are provided.

6.2.1 Operating spending increases by 9(2)(b)(ii)

Depreciation and financing costs increase when the construction cost is transferred on to the DHB balance sheet. Other operational expenditure items associated with the new build, such as utilities and maintenance, are assumed to continue as per the status quo. The direct impacts on building operational spending are shown in Table 32. Note that the cash effects are close to zero once capital charge relief (equal to the capital charge) is factored in.

Table 32 Additional operating spending from 2025/26 to 2042/43

	Average per annum (nominal $m)
Depreciation	9(2)(b)(ii)
Capital charge	
Additional costs for two buildings	
Reduction in outsourcing costs	
Total	

Source: Southern DHB/Sapere

Figure 14 shows the total spending on asset related costs from 2012/13 through to the end of the forecast period.

Figure 14 Financing charges (interest, depreciation, capital charge) 2020/21-2042/43

9(2)(i)

6.2.2 The DHB is working to reduce its deficit

9(2)(i)

9(2)(i)

Southern DHB has struggled to generate positive operating cash flow. 9(2)(i) [redacted] it has continued to receive deficit support payments. However, the DHB is now forecast to generate a positive cash balance. Figure 16 shows that Southern DHB is forecast to generate a positive free cash flow and be able to self-finance other elements of its capital plan.

Figure 16 Free cash flow ($thousands) 2020/21 to 2042/43

9(2)(i)

6.2.3 Operational efficiencies will need to be enabled post-construction

We have considered several scenarios to try to determine the major factors that could prevent the Southern DHB from reducing its deficit, and from being able to cover the operating costs of the new building.

1. The first was population risk, i.e. if a larger population than the medium scenario from Statistics New Zealand requires the services performed at Dunedin Hospital. There are two aspects to consider regarding population:
   - The new hospital provides additional capacity that is otherwise not available under the current arrangements. In that sense, the risk lies with the existing setup rather than the new hospital.
   - Whether operating costs rise faster than available funding. However, previous analysis shows that the population-based funding formula provides Dunedin Hospital with enough revenue in a higher population scenario. Population risks have not been examined further.
2. The next area of risk relates to the construction project, including risks such as workforce and delay in decision-making. These risks are considered in the QRA, which is part of the Economic Case.
3. Another area of risk is with respect to possible events (e.g. an earthquake, a severe weather event, a pandemic) that could change the way services are provided and which services are

needed. Such a scenario is not analysed here because there is too much uncertainty over timing, interventions and mitigation actions from central government.

4. Failure to achieve expected efficiencies is analysed. The modelling that has been undertaken started by forecasting financial results based on service volume forecasts. After that first round of analysis, three scenarios are constructed to show what will happen if those efficiencies fail to materialise. Our scenarios relate to variation of the following:
    - funder arm outsourced expenditure
    - personnel employed by the DHB
    - other expenses (non-personnel) incurred by the provider.

We summarise the scenarios in Figure 17 below.

Figure 17 Southern DHB net result comparison - all efficiency scenarios ($ thousands)

9(2)(i)

Source: Sapere

The results show that the scenario with the greatest effect on the final result is failing to achieve efficiency gains in personnel. This is unsurprising given that personnel costs represent at least 69 per cent of total provider arm operational costs.

7. Management Case

The Management Case describes the arrangements required to ensure the successful build, , to manage risks and to realise the benefits of the NDH. There are five parts to this Management Case as detailed below.

1. The governance and management arrangements for the construction and commission of the NDH
2. The Southern DHB's Change Management Programme
3. Benefits Management Planning
4. Risk Management Planning
5. Plan project assurance.

The Management Case has progressed substantially since the IBC was approved in 2017. The following are the major points of revision in this Final DBC:

- Updated governance arrangements with establishment of a new Executive Steering Group.
- Procurement has moved in line with international and New Zealand best practice guidance.
- The Southern DHB's Change Management Programme reflects further progress, particularly in its digital programme.
- Southern DHB's proposed benefit indicators have been peer reviewed externally. Southern DHB has developed a full Benefits Realisation Plan that was approved by its Executive Leadership Team in December 2020.
- Risk management has progressed and there is an extensive risk register.

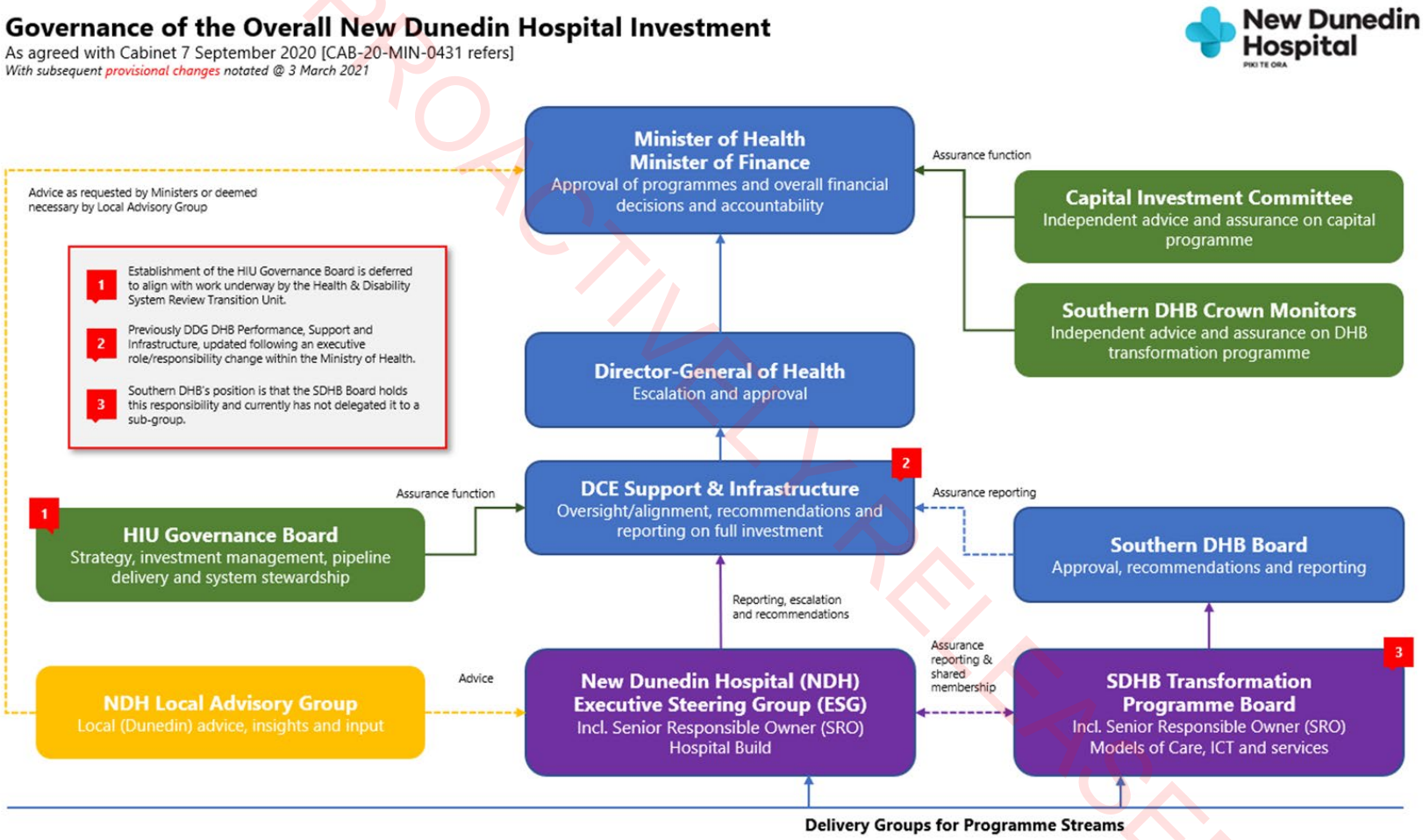
The Director-General of Health has requested Southern DHB implement a Transformation Change Board. Southern DHB recognises there is further work to do:

- The need to refresh its Strategic Plan and to review and align its various planning documents as action plans that will sit under a revised system-wide strategic plan.
- To build an integrated change programme and platform, to monitor and track all key projects and programmes that contribute to the benefits expected from this investment.
- Southern DHB manages its own risks and currently lacks a process to report Southern DHB related risks to its governance groups.

7.1 Integrated project governance and management

The overall NDH governance structure is illustrated in Figure 18 below.

Figure 18 NDH Governance structure



The following table further articulates the role of each group or individual within this overall governance structure.

Table 33 NDH Governance structure, roles and reporting

Group/Role	Scope	Role	Reporting line
Ministers of Health and Finance	Overall investment	Oversight • Has final decision-making rights and accountability for the overall New Dunedin Hospital investment as per the existing delegation arrangements. • Provides oversight of the full investment on behalf of Cabinet.	Cabinet
Director General of Health	Overall investment	Oversight • Ensures the alignment and maintains oversight of the overall New Dunedin Hospital investment, with delegated authority from joint Ministers to make decisions and deliver the NDH Project to achieve the objectives, outcomes and benefits. • To be kept informed of the status of the overall New Dunedin Hospital investment by the Deputy Director-General, DHB PSI.	Ministers of Health and Finance
Deputy Director-General DHB PSI	Overall investment	Oversight • Responsible for the oversight, monitoring and management function of overall DHB performance, including capital infrastructure, financial and service performance. • Provides assurance, accountability reporting against progress milestones and opportunity for risk mitigation. • Ensures the alignment of the overall New Dunedin Hospital investment on behalf of the Director-General.	Director-General of Health

Group/Role	Scope	Role	Reporting line
NDH Senior Responsible Owner (SRO)	NDH Project	Governance/Oversight • Single point of accountability for the NDH Project and primary contact between Ministers and the ESG. • Acts as agent of the Crown and represents the Crown's investment interest and be the liaison with the Transformation Programme. • Maintains the linkage between the ESG and the Ministry's Delegated Financial Authority controls for the NDH Project (to be agreed). • Works in concert with the ESG at all times. Assurance • To provide assurance to the Crown that the NDH Project is on track to successfully delivering the Project objectives, outcomes and benefits. • Required to liaise with the DHB Transformation Programme SRO to ensure alignment with the NDH Project. • Will advise both the Deputy Director-General, DHB PSI and the ESG.	Deputy Director-General, DHB PSI
NDH Executive Steering Group (ESG)	NDH Project	Governance • Accountable for the successful delivery and outcomes of the NDH Project, working in concert with the SRO. • The key strategic decision-making body providing governance over the NDH Project and the teams that work at an operational level. • Is empowered with the appropriate level of authority to govern and make decisions. • Will exchange reporting information with the DHB Transformation Programme Board to maintain alignment of these workstreams and allow for shared learnings.	Deputy Director-General, DHB PSI.
Southern DHB Board	DHB Transformation Project	Governance • Responsible for governing the DHB Transformation Programme.	Board Chair
DHB Transformation Programme Senior Responsible Owner (SRO)	DHB Transformation Project	Governance/Oversight • Equivalent role to the NDH Project SRO, for the DHB Transformation Programme. • Required to liaise with the SRO NDH Project to maintain alignment with the DHB Transformation Programme. • Will advise both the Southern DHB Board and the DHB Transformation Programme Board.	Southern DHB Board

Group/Role	Scope	Role	Reporting line
DHB Transformation Programme Board[16]	DHB Transformation Project	Governance • Accountable for the successful delivery and outcomes of the DHB Transformation Programme. • Has operational oversight and accountability for the programme delivery, reporting and escalating to the DHB Board as appropriate. • Is empowered with the appropriate level of authority to govern and make decisions. • Will exchange reporting information with the ESG to ensure alignment of these workstreams and allow for shared learnings	Southern DHB Board
Capital Investment Committee	NDH Project	Assurance • Provides independent assurance advice on the prioritisation and allocation of funding for capital investment and health infrastructure to joint Ministers. Observer • Observer at ESG	Ministers of Health and Finance
Southern DHB Crown Monitors	DHB Transformation Project	Assurance • Provides independent assurance advice and oversight on the DHB overall performance with a focus on the DHB Transformation Programme to joint Ministers.	Ministers of Health and Finance
Health Infrastructure Unit Governance Board	NDH Project	Assurance • Accountable for overseeing capital investment and infrastructure delivery by the Health Infrastructure Unit and serve as an internal governance and assurance function for the Ministry of Health but not directly responsible for the NDH Project. • Will assist and provide technical advice to joint Ministers as part of the approved assurance framework.	Deputy Director-General, DHB PSI Director-General of Health
Local Advisory Group	NDH Project	Advisors • Provides local advice, visibility and community input to the NDH Project and to joint Ministers. A representative from the Local Advisory Group will, as required, meet with joint Ministers to provide visibility on local matters relevant to the NDH Project. Observer • Observer at ESG.	NDH ESG with line to Ministers of Health and Finance
DHB Clinical Leadership Group	NDH Project DHB Transformation Project	Advisors • CLG provide advice to support the clinical planning of the NDH and advise to support SDHB ELT to align MoC changes with NDH project.	DHB ELT, NDH Programme Director

[16] The Transformation Programme Board structure is in discussion

7.2 Southern Partnership Group replaced by Executive Steering Group

In June 2020, a Gateway Review identified governance as the most pressing risk to the successful delivery of NDH. In December 2020 the Southern Partnership Group (SPG) was disestablished and the membership of a new Executive Steering Group endorsed by Cabinet (CBC-20-MIN-0131).

The Terms of Reference state the Executive Steering Group is to achieve the following objectives in relation to the NDH Project:

- ensure the Project is successfully delivered on time and within budget
- ensure the NDH contribution to the shared investment objectives are achieved
- execute the Project in accordance with any approved Business Case
- maintain a clear direction, provide effective leadership and make clear and effective decisions
- ensure the advice of the Health Infrastructure Unit Governance Board, Local Advisory Group, Capital Investment Committee and other assurance functions is considered in the development of the Project
- ensure other governance groups and roles for the overall New Dunedin Hospital investment are informed of progress and have sufficient information to effectively perform their roles and functions
- maintain alignment with the DHB Transformation Programme.

7.3 Membership of the Executive Steering Group

The ESG membership provides a depth of experience and capability on health infrastructure project governance and delivery, risk management and clinical design.

Table 34 Executive Steering Group structure

Members	• Independent Chair	• Evan Davies
	• External infrastructure delivery expertise	• Dr Tony Lanigan
	• International infrastructure expertise	• *To be subsequently nominated*
	• External clinical expertise	• Dr Nick Baker
	• External clinical & governance expertise	• Dr Margaret Wilsher
	• Local iwi representative	• *To be nominated by local iwi*
	• Senior Responsible Owner	• Karen Mitchell (ex officio)
	• Southern DHB's Board Chair	• Pete Hodgson (ex officio)
	• Director, Health Infrastructure Unit	• Karl Wilkinson (ex officio)
	• Southern DHB CEO	• Chris Fleming (ex officio)
Attendees	• NDH Programme Director	• Mike Barns
	• Southern DHB Programme Director	• Hamish Brown
Observers	• The Treasury	• Sebastian Doelle or delegate
	• Infrastructure Commission	• Blake Lepper or delegate
	• Capital Investment Committee	• *To be subsequently nominated*
	• Local Advisory Group	• *To be subsequently nominated*

A member with international expertise, drawn from an overseas health infrastructure body such as Health Infrastructure New South Wales, will be appointed. This brings further depth of experience, fresh eyes and learnings from other jurisdictions that have recently delivered large-scale hospital builds.

The newly established governance structure complies with the NZ Infrastructure Commission – Major Infrastructure Project Governance Guidance and reflects the nature of the Ministry and Southern DHB relationship (as the client) in a devolved system.

7.4 Other advisory groups

The ESG is supported by several other advisory groups:

- Southern DHB's Clinical Leadership Group (CLG), which will facilitate clinical inputs and provide clinical comment.
- A Technical Reference Group (TRG) of construction experts has been established, providing regular advice to the Programme Director (and the ESG) on all aspects of the project.
- To ensure the wider opportunities from the hospital project are realised, a Local Advisory Group was established to support ESG on matters of collective interest, including but not limited to:
    - central business district strategic planning
    - cityscape and landscape issues
    - transport issues including public transport
    - workforce issues (including accommodation)
    - energy issues
    - economic development issues and opportunities.

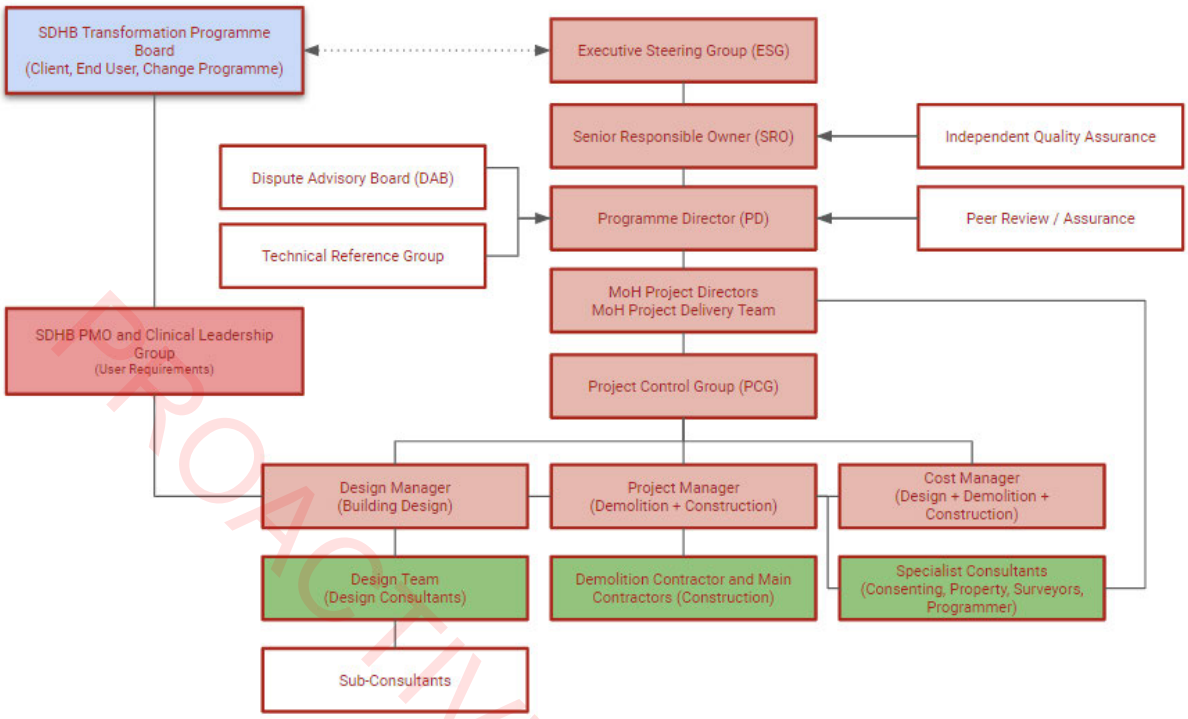
7.5 The NDH Programme Director and the Design Team

The NDH Programme Director has full responsibility for construction of both the Outpatient Building and the Inpatient Building, working closely on all design and construction matters with the Southern DHB's Programme Director and CLG.

The Ministry has considerably increased the capacity and capability of its Dunedin-based project team. The Ministry has:

- ensured there is a seamless and collaborative working relationship between the respective project offices of the Ministry and Southern DHB, with the two project groups sharing a project office
- appointed key roles such as design director and construction director as part of the client delivery team
- appointed design manager and project manager
- appointed a demolition contractor
- appointed all key consultants required for the design phase of the project.

Figure 19 Project team structure



The arrangements also link operationally with Southern DHB to ensure there is smooth commissioning and decanting of services from the current facilities to, first, the Outpatient Building, and then also to the Inpatient Building. This process of commissioning is eased by the buildings being new ones, with no existing services, but will be made complex by services operating in old buildings and a new Outpatient Building. Planning for this is the responsibility of the Southern DHB PMO.

7.6 Management of cost contingencies

Contingencies will be closely managed with a mix of independent reporting on costs, a record of contingency movements, delegated authorities and periodic review, as follows:

- The QS will produce a monthly cost report for the NDH SRO and ESG that will include spend to date and forecast spend against the cost baseline including the following contingency line items:
  - Design Contingency (issues arising during design development up to and including the award of construction packages).
  - Construction Contingency (issues identified during the construction phase including unknowns and documentation errors and final claims).
  - Project Contingency (items expended exclusively at the client's discretion to cover changes in project scope, regulation and consent changes, force majeure events).
- The QS will keep a complete list of all contingency movements, including drawn down and reallocation between budgets or packages. Drawdown on contingency will be formally managed through change control processes which are aligned to the delegated financial authorities for the NDH Project. ESG will monitor the 'burn rate' of contingency against projections provided by the QS.

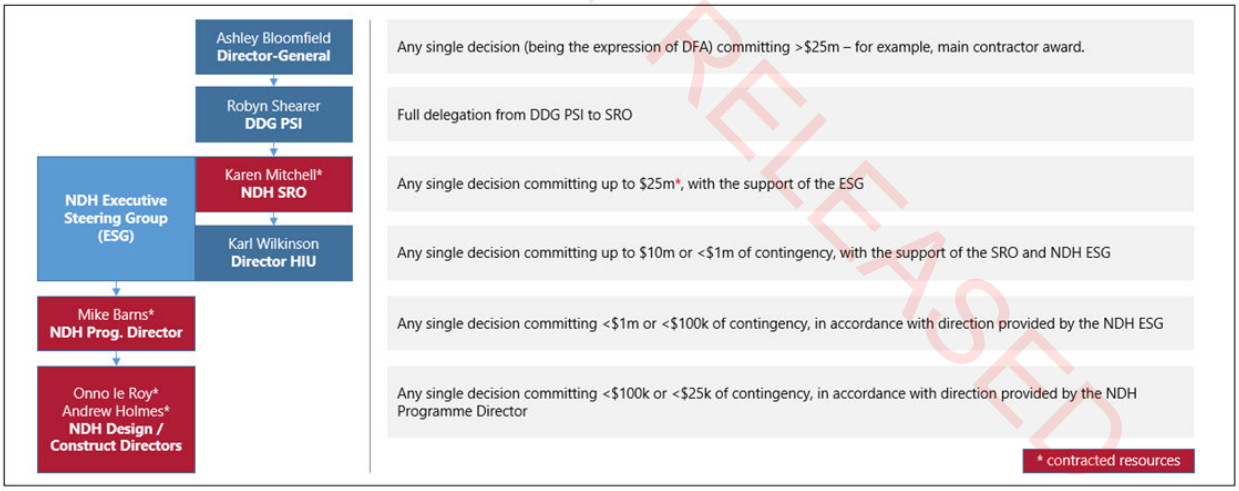
- Requests for contingency that fall within the agreed 'burn rate' projection can be approved by the SRO, HIU Director, Programme Director or Project Directors within their delegations and ESG informed via regular reporting. ESG will be asked to *endorse* significant items (that require SRO approval) and any requests for use of project contingency.
- Levels of contingency will be periodically reviewed at key project milestones including
    - completion of design stage cost plans
    - completion of tender estimate
    - implementation Business Cases (award of contract)
    - all major contract completion milestones.

Should the project be at risk of exceeding agreed 'burn rate' projections, ESG will determine if more stringent governance controls need to be instigated.

7.7 Revised delegations

Revised delegations were approved by the Director-General of Health in November 2020, allowing for quicker decision-making and clearer accountabilities. The SRO has delegation of up to $25 million with the support of ESG. The delegation to the NDH Programme Manager is $1 million. Work has commenced with the MoH's Chief Financial Officer, NDH SRO and Independent Chair of the NDH Executive Steering Group to confirm how the revised delegations are enacted in respect of current approved budgets and committed expenditure.

Figure 20 NDH project Delegated Financial Authorisations flow



7.8 Project management approach

The key project management risks to be managed for the NDH are addressed in the risk section and include:

- ensuring that there is the capability and capacity in place for managing a large-scale project of this nature

- ensuring the management structure, roles and responsibilities across the project team are effective and well defined
- establishing and operating a project management approach.

Some key risks to be managed in the construction phase of the Inpatient Building are as follows:

- The working relationship during the ECE phase requires cooperation between contractor and client in a collaborative environment (whereas the Design and Build phase is regulated by the conditions of the contract).
- Interaction between the project participants, internal stakeholders and external stakeholders is significantly greater compared to conventional procurement methods, and the information exchange between them is significant.
- Ensuring there is a joint leadership team including the key decision makers who have enough authority across and within project teams is critical for successful collaborative procurement arrangements.

7.9 The commissioning phase requires dedicated and skilled management

The two stages of commissioning are:

- Cold commissioning, including testing of medical gases, certification of building and user acceptance, and certification of the hospital by the Ministry of Health in its regulatory role. This is the responsibility of the NDH Programme Director.
- Operational commissioning, including training of surgical of teams, decanting wards, staff and patients and establishment of logistic services. At this point, responsibility transfers from the NDH Programme Director to the Southern DHB PMO.

Careful planning will be required in the lead up to the commissioning to ensure that staff, systems and processes are ready for the in-service date. Southern DHB and the Ministry recognise this stage is easy to underestimate, and a commissioning manager will be appointed one year before the commissioning process starts.

The Southern DHB will need to ensure business as usual operations at the same time as moving into a new facility, including changes to ways of working.

7.10 Southern DHB Transformation

The Southern DHB has been on the path of change for several years, starting with the merger of the Southland and Otago DHBs in 2010. While not part of the NDH business case, it is a risk as the Southern DHB is fully responsible for operational readiness for the successful commissioning and implementation of NDH.

Readiness for the commissioning phase will depend on the Digital programme's progress and understanding the requirements of the workforce in the NDH, details on which can be found in Appendix G.

8. Measuring and monitoring the benefits

A suitably broad sweep of measures to monitor the benefit realisation of the NDH project have been identified and peer-reviewed, and the measures were endorsed by the ELT in November 2020. Benefits reporting will begin for ELT in early 2021. There is a Cabinet report back within 12 months of the in-service date for the Outpatient Building on the actual level of benefits achieved compared with those outlined in the Cabinet-approved Final DBC.

Officials suggest simplifying reporting on NDH to commissioning of a facility providing the Schedule of Accommodation in Appendix A, with the required building performance measures such as Greenstar Rating. That is certainly an intermediate output and one which ESG could monitor directly.

8.1 Benefits monitoring separated into two streams

The Benefits Realisation Plan covers the full gamut of both the design and construction of NDH and the system-wide benefits from the wider Southern DHB Change Management programme.

Benefits have been attached to:

- the NDH (Benefits Stream 1), or
- to system-wide change facilitated by the NDH investment (Benefits Stream 2).

Some benefits, such as patient flow improvements, are applicable to both streams. For example, patient flow improvements require both the process improvement to ensure staff time is used well, as well as an efficient facility with functional spaces that support rather than hinder clinical care.

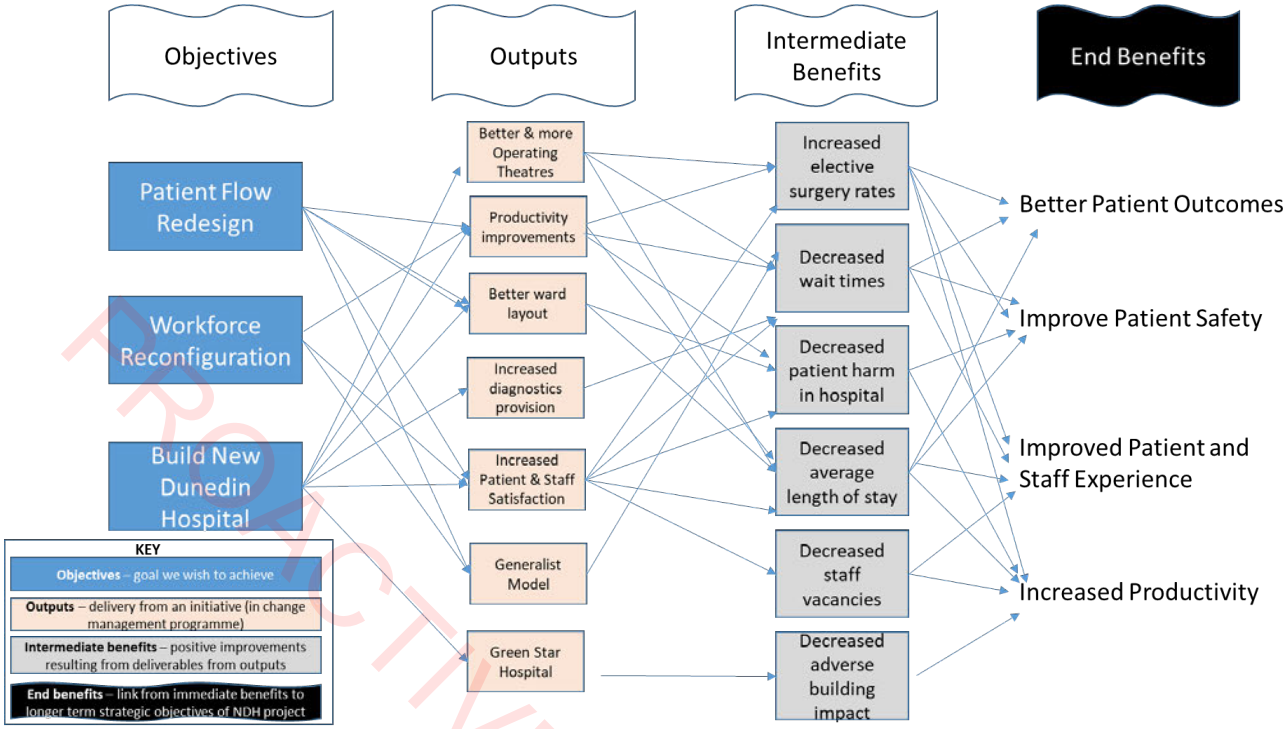
Given difficulty in attribution, choosing appropriate benefit indicators is not a precise science. Most benefits depend on the Transformation Programme, with the NDH a catalyst for change at most, but many of which could proceed independently of the NDH.

Priority was given to those metrics already being reported on across Southern DHB to reduce administrative burden.

Clearly, benefits related to the physical build of the NDH cannot be realised until the buildings are operational. Other benefits can be realised earlier, such as service efficiency improvements enabled by the Digital Programme's outputs. Digital benefits provide background solution and information architecture that, when delivered, underpin the successful realisation of many Stream 1 and Stream 2 benefits.

The NDH specific benefits are set out in the graphic below.

Figure 21 NDH specific benefits map



8.2 Material dependencies

The NDH is nested in the Southern DHB's Change Management Programme. The NDH is a critical part of the facilities but has critical design dependencies such as a models of care change, workforce strategy, performance optimisation systems, digital strategy and a digital hospital programme, as well as "facilities for the future" including NDH.

8.3 Structure of the Benefits Realisation Plan

The Benefits Realisation Plan identifies key measures to describe how we would know if a benefit was realised. Those benefits have been identified through the ILM, Benefits Maps and Benefit Profiles.

Table 35 Benefit Realisation Plan content

Benefit Realisation Plan Heading	Description/Explanation
ID	Reference number
Intermediate Benefit & Owner	Positive improvements resulting from deliverables from outputs. Benefit Owners are ELT members accountable for the realisation of the benefit. Southern DHB's Clinical Leads will play a key, contributory role across most of the benefit categories.
Key measure(s)	Description about how the benefit will be measured. Given difficulty in attribution, choosing appropriate benefit indicators was not a precise science. Priority was given to those metrics already being reported on across Southern DHB in order to reduce administrative burden. We acknowledge that a further review and refinement of benefit indicators is required in order to agree

	those final indicators that will reported to Treasury – for the next decade – as part of our ongoing monitoring.
Baseline Measure (year)	Original data point and year from which progress will be measured. In time, bandwidths (e.g. High, Medium and Low) targets will be introduced. Some measures won't be developed until later in design (e.g. building-specific/"Green Star" measures).
Target	Desired end point for realisation of a benefit
Quantifiable saving ($) and/or improvement	Only initial cost estimates of savings arising from the realisation of benefits have been attempted to date. Costing work continues.
Quantifiable, non-financial benefit	Those benefits that can be quantified, but are difficult to value in monetary terms
Qualitative benefits through delivery of this benefit	Those benefits that cannot be counted, or are too costly or unreliable to count
Realisation Date	Final date by which the benefit will be realised. For example, after the Inpatient Building is commissioned, or after the Outpatient Building is operational;
End Benefit(s)	Contribution to end benefits as determined by the Investment Logic Map. Most benefits will be dependent on activity across a number of workstreams presented in the ILM.
Workstreams aligned to delivery of this benefit	Those workstreams, which are included in the Change Management Programme, that will help contribute to the realisation of the benefit. In several cases there is significant overlap. Some rationale for why these projects are included is provided in these sections (in italics). Note that direct attribution to a project is sometimes difficult.
Dependencies, Challenges, notes	Explanatory descriptions to help the reader understand the context for, and description of, each benefit
Reporting frequency	How often ELT will receive a report detailing progress towards the realisation of a benefit (including recommendations for management attention, where necessary)
Rating	Progress towards realisation of the benefit

8.4 Benefits to be monitored

The table below identifies the critical benefits related to Stream 1. A substantial benefit of NDH will be the ability of the hospital to deliver many more operations; over time, there will be considerable outsourcing of electives, and NDH allows for those operations to be delivered in the hospital. Productivity and patient flow will improve. Quality of care, including reduction in falls, will improve.

A depth and breadth of activity is underway around improving equity of health care for Māori. Work to better align this activity with the Benefits Realisation Plan – and inclusion of metrics, as appropriate – will shortly take place, in collaboration with the Māori Health Directorate.

Benefit	Key measure(s)	Baseline measure	Target	Quantifiable saving ($) and/or improvement
1.1 Increased Elective Surgery Rates	1.1.1 Increased number of elective surgical services case-weights (CWDs) delivered	13,112(2022/23)	2028: 14,650 2033: 16,266 2043: 19,675	• Reduced net occupied bed days for patients waiting for a procedure • Reduced outsourcing of procedures because of capacity issues • Enables more services to be delivered in a given period
	1.1.2 Number of elective surgical service discharges	11,179(2019/20)	>12,588 (2020/21)	• Enables more services to be delivered in a given period
	1.1.3 % of elective and arranged surgery undertaken on a day case	57% (2019/20)	>60%	• Day cases enable more services to be delivered in a given period • Reduced net occupied bed days
	1.1.4 % of people receiving their elective and arranged surgery on day of admission	88% (2019/20)	>95%	• Enables more services to be delivered in a given period • Reduced net occupied bed days
	1.1.5 Reduction in outsourced surgery	$8m(2020/21)	$0(from FY 2029/30)	• Costs incurred for outsourcing lists to private providers (over and above in-house costs for same procedures)

1.2 Decreased average length of stay	1.2.1 Reduction in wait times to access diagnostics and imaging	2019/20 data	Rolling average for 2021/22 and 2022/23	• Increased access to diagnostics (number) in NDH
	1.2.2 Reduced net occupied bed days	Rolling average for 2021/22 and 2022/23	331 Standardised Acute Hospital Bed Days per 1000 Capita (2020/21)	• Reduced bed block/improved patient flow by increased day cases and improved elective surgery efficiency
	1.2.3 Reduced time taken to discharge	2019/20 data (Average Length of Stay (ALOS) (Acute and Elective))	Stay below the MOH target (2.35) for Inpatient Average Length of Stay (ALOS) for acute admissions	• An increase in the rate of people discharged home from hospital, with appropriate support (fewer bed days) • Increased community capacity for Needs Assessment and Service Coordination services (NASC))
1.3 Improved Productivity	1.3.1 Reduced Medical SMO FTE per case weight	2020/21 data	Year-on-year improvement from 2019/20	• Increase in patient satisfaction metrics due to improved efficiency and productivity (fewer delays) • Lower staff to case weight discharge ratio
	1.3.2 Increased % of people receiving their specialist assessment (ESPI 2) or agreed treatment (ESPI 5) in <4mths	65% (2019/20)	100%	

	1.3.3 Reduction in cancelled cardiac surgery	2019/20 instances	Year on year improvement from 2019/20 instances	• Reduction of cancellation on day of surgery • Increase in first case on time starts • Increased theatre utilisation • Reduction of number of cancelled surgical procedures • Forecast reductions in the Average Length of Stay that will allow more service volume to be delivered for fewer resources than would otherwise be the case.
1.4 Improved Patient Flow	1.4.1 % of people presenting at ED who are admitted, discharged or transferred within 6 hours	81% (2019/20)	95%	• Reduced time to referral • Reduced time to bed allocation
	1.4.2 Increase in % discharged before noon	8week rolling average (2019/20)	Year on year improvement	• Reduced time taken to Allied Health assessment • Reduced time to NASC referral • NDH Target Occupancy achieved
	1.4.3 Reduction in LOS >7 days. Med-Surg& Rehab	8week rolling average (2019/20)	Year on year improvement	• Reduced bed days • Reduced bed block

1.5 Decreased Patient Harm in Hospital	1.5.1 Reduction in hospital falls	Rolling average for 2021/22 and 2022/23	Year-on-year improvement	• 10% reduction in falls - $0.66m (333 incidents pa) • 20% reduction in falls - $1.3m (296 incidents pa) • 30% reduction in falls - $2.0m (259 incidents pa)Based on average cost per bed day of $1,125
	1.5.2 Reduction in # of hospital acquired pressure injuries	Health Round Table shows a score of 9.9 cases of Pressure Injuries per 10,000 episodes	Reducing instances to meet (or exceed) Southern DHB's peer group median of 3 2 pressure Injuries per 10,000 episodes	• Reduction in Average Length of Stay due to hospital-acquired pressure injuries
	1.5.3 Reduction in medication errors	Rolling average for 2021/22 and 2022/23	Year-on-year improvement	• Reduction in bed nights due to medication errors • Increased automatic dispensing (NDH vs Dunedin Hospital)
	1.5.4 Reduction in hospital acquired infections	Rolling average for 2021/22 and 2022/23	Year-on-year improvement	• Reduction in bed nights due to hospital acquired infections
1.6 Improved Logistics Flow+ + NOTE: Logistics Benefits will be worked up through	1.6.1 Reduction in lift delays	Rolling average of instances for 2021/22 and 2022/23	Year on year improvement/ reduced number of lift delays	• Increased number of logistics movements completed on time due to reduced lift delays (dedicated logistics lifts in operation)

Preliminary Design as the project progresses	1.6.2 Reduced FTE per 10,000 logistics movements	Rolling average of instances for 2021/22 and 2022/23	Year on year improvement	• Increase in working hours (lower indirect HR costs) due to use of AGVs (i.e. operating 24/7, 365) means fewer FTE per logistics movement • Reduction in time taken for manual movements (reduction in staff costs)
	1.6.3 Year-on-year reduction in unplanned/reactive building maintenance	Rolling average of instances for 2021/22 and 2022/23	Year on year improvement	• Lower, unplanned reactive building maintenance expenditure compared to existing hospital • Fewer unplanned lift maintenance call-outs
1.7 Decreased adverse building impact	1.7.1 Building Metering Energy Strategy delivered	To be developed later in design	To be developed later in design	• Real-time building analytics delivered (water usage, energy) • Development of stormwater management and treatment strategy (use of swales, etc)
	1.7.2 Reduction in carbon emissions (non-clinical use)	Metrics to follow as design progresses	Targets to follow	• Reduction in non-clinical carbon emissions (versus current hospital)
	1.7.3 Improved Seismic Resilience	Metrics to follow as design progresses	Targets to follow	• NDH able to function at least 48hrs following a major seismic event

8.5 Benefits reporting

Benefits monitoring will be a continuous process over the next decade. Reporting begins in early 2021. Southern DHB's Programme Director, via PMO, provides day-to-day management of the Benefits Realisation Plan, working closely with Benefit Owners. Quarterly updates will be provided to ELT on both Stream 1 and 2, and Stream 1 benefits will be reported to ESG.

The PMO will work to weave benefits reporting in with regular quarterly change management reporting templates, wherever possible. Some indicators will report quarterly; others bi-annually; some annually. Reporting frequencies are noted on the Benefits Realisation Plan.

If a benefit is not progressing as predicted, mitigation actions will be taken.

9. Managing risk

The purpose of this section is to outline the arrangements for the on-going identification and allocation of responsibility and mitigation of risk. Robust, effective and on-going risk management disciplines are critical, particularly for a project of this size and complexity.

9.1 The Crown holds most of the risk

The table below sets out a general statement of who holds which risks. The Crown ends up holding most of the risk either through the Ministry of Health not containing and managing risks related to the construction of NDH or through the Southern DHB not achieving its wider transformation programme. In this section, we address the risks that the Ministry of Health will have to directly manage, which include design risk, construction risk, errors and omissions and the risk of regulations changing over time.

Risk spans conception, design and construction into operational readiness, migration, and change implementation. The nature of risk and who holds and manages that risk changes as the project reaches completion. Initially, the project risk is shared by the Southern DHB and the Crown. Subsequently, risk is carried partially by design and construction contractors. Southern DHB needs to be in a position to operate the hospital, including taking responsibility for critical dependencies such as successful IT enablement.

The Ministry's scope is the NDH design and construction, and we focus on risk and uncertainty that might impact project success. Many of these uncertainties will sit outside the Ministry's scope and include the Southern DHB's sphere of influence. Both risk areas will appear on the Risk Register but may be subject to different responsibilities for control or influence.

Table 36 Risk allocation

Risk Description	Ministry	SDHB	Design Team Contractors	Main Construction Contractor
9(2)(b)(ii)				

Source: Ministry of Health

9.2 The approach to risk management

The Ministry's Project Team and the Southern DHB Team meet monthly to review and moderate their cumulative risks, acknowledging that those risks inevitably overlap the two organisations. This ensures there are "no surprises".

9.2.1 A comprehensive Risk Management Plan

The NDH Project Risk Management Plan provides a clear statement of the nature of each individual risk, the way the risks are managed or mitigated, the potential impact on the project's success if the risk arises and the likely cost of mitigation strategies.

The Ministry and Southern DHB are jointly responsible for ensuring details of the risk are recorded in the CAMMS Risk Register, with the Southern DHB's NDH PMO ensuring the Southern DHB-risks are also recorded.

The Project Risk Management Plan has been developed to ensure levels of risk and uncertainty are properly managed, so any potential threat to the delivery of outputs (level of resourcing, time, cost and quality) and the realisation of outcomes/benefits is appropriately managed to ensure the project is completed successfully.

The Plan is structured into two sub-documents:

- Part 1: Project Risk Management: Specific risk management processes employed by the New Dunedin Hospital Project Team to identify, assess and mitigate risks (where possible) and to continually monitor identified risks.
- Part 2: Project Issue Management: Specific issue management processes employed by the New Dunedin Hospital Project Team to identify, document, prioritise and resolve issues within the project.

The Risk Management Plan relates specifically to the responsibilities of the Project Team and the Southern DHB PMO, who are tasked with managing the delivery of the NDH. The Southern DHB may maintain its own risk register in respect to those activities that fall under its responsibility, although the Ministry's CAMMS Risk System has the functionality to incorporate all DHB risks.

The following details are included in the Risk Management Plan.

Table 37 Risk Management Plan – key components

Risk Management	Description
Risk identification	Risks will be identified and filtered to determine which identified risks: 1) are best left, as the likelihood and impact would be so low that mitigation strategies are not required; 2) need monitoring, but no proactive mitigation strategies required at this stage; 3) need planned mitigation strategies, as detailed in the Risk Register; 4) are avoided by changing scope of the work of the project, with appropriate sign-off; 5) are transferred, if possible, to another party to manage;

Risk Management	Description
	6) escalated for the attention of the Project Sponsor and other Senior Managers within the organisation (and where relevant to the Southern DHB Executive) as a risk to the overall project.
Risk analysis and evaluation	Analysis will be undertaken of the likelihood that risk will be realised and the level of seriousness/impact they will have if they occur. Risks that pose the highest threat will be further evaluated.
Risk mitigation	This will identify the actions to be taken to remove or reduce the likelihood a risk will be realised, or to maximise opportunities.
Monitor and review	This will identify how often the Risk Register will be formally reviewed. Current risks which are Very High or High will be escalated to the Ministry's Southern Steering Group (and where relevant to the ESG) as considered appropriate. The overall project risk rating is reported bi-monthly to the ELT Risk Sub-Committee.
Communication and consultation	The project will communicate and consult with internal and external stakeholders as appropriate at each stage of the risk management process and concerning the process as a whole.

Source: New Dunedin Hospital Project Risk Management Plan v 2.3 (8 December 2020).

9.2.2 Risk ownership

The Project Director has overall responsibility for the management and resolution of risks within the Project. Risk portfolio managers appoint a risk owner who is best placed to deal with each risk. The risk owner is responsible for:

- identifying and assigning appropriate actions or strategies to reduce, avoid or mitigate an assigned risk
- ensuring identified actions are completed by target dates
- on-going assessment of the likelihood and impact rating for each assigned risk
- ensuring updated information pertaining to an assigned risk is passed to the project's PMO Manager for recording in the risk register. It is recognised that risk ownership may change during the project and there will be overlap of risks on the Southern DHB's risk register that are elevated to "project" risks. For this reason, the representatives from both the Ministry's Project Team and the Southern DHB Team will meet monthly to share and review their respective risk registers to ensure alignment; to agree risks that should be escalated for management review; and to ensure a "no surprises" approach is maintained between the partners.

The NDH Programme Director and the Southern DHB Programme Manager are respectively accountable for ensuring there is the detailed evaluation of each Ministry and DHB risk.

9.2.3 Risk reporting

Risk reporting is not formalised at present. From this month, risks will be reported to ESG and the SRO monthly where they relate to the construction of NDH. The management of those risks and the

mitigation strategy is part of the role of ESG. One of ESG's first jobs will be to receive and review the risk register.

Risks are presented to Southern DHB's ELT on at least a monthly basis for review, discussion and direction and will be reported through to its governance mechanisms once a system has been worked out.

9.2.4 Escalation

Any risks causing concern at a project level are discussed promptly with the Project Director to allow a decision on whether the risk should be escalated in accordance with the risk escalation process. Any material risks will be notified to ESG. There is a risk management position at a senior level that is responsible for ensuring that risks are appropriately evaluated and acted on.

Risk escalation will not necessarily result in a change of risk ownership. In many cases the risk will be escalated to the relevant manager of the NDH Programme Manager, who will then work with the risk owner to devise a suitable response that the risk owner will then implement.

9.2.5 Risks updated regularly

The Ministry and Southern DHB are jointly responsible for ensuring details of the risk are recorded in the CAMMS risk register, with the Southern DHB's NDH PMO ensuring the Southern DHB risks are also recorded and presented to the ELT on a monthly basis for review, discussion and direction. Southern DHB is merging its risk streams so there is an integrated view of risk.

The risk register has been in place for some months. Now that the register has been migrated from Excel spreadsheets to a risk database tool, the CAMMS system in November, the level of detail to risk management and risk mitigation is still being developed.

There are some identified areas for development. The risks in FF&E and, importantly, in the Southern DHB change need to be developed further.

9.3 Risk overview

There is detailed and continuing work on risk management.

9.3.1 Risks span a decade

The long duration (eight years remaining) means that some matters that are significant risks now will disappear, while many future significant risks lie over the horizon. At a high level, the risk horizon for the project can be described as:

Short term

e.g. Detailed Business Case approval, consenting, procurement

Medium term

e.g. Delivery of Inpatient Building, construction workforce and suppliers

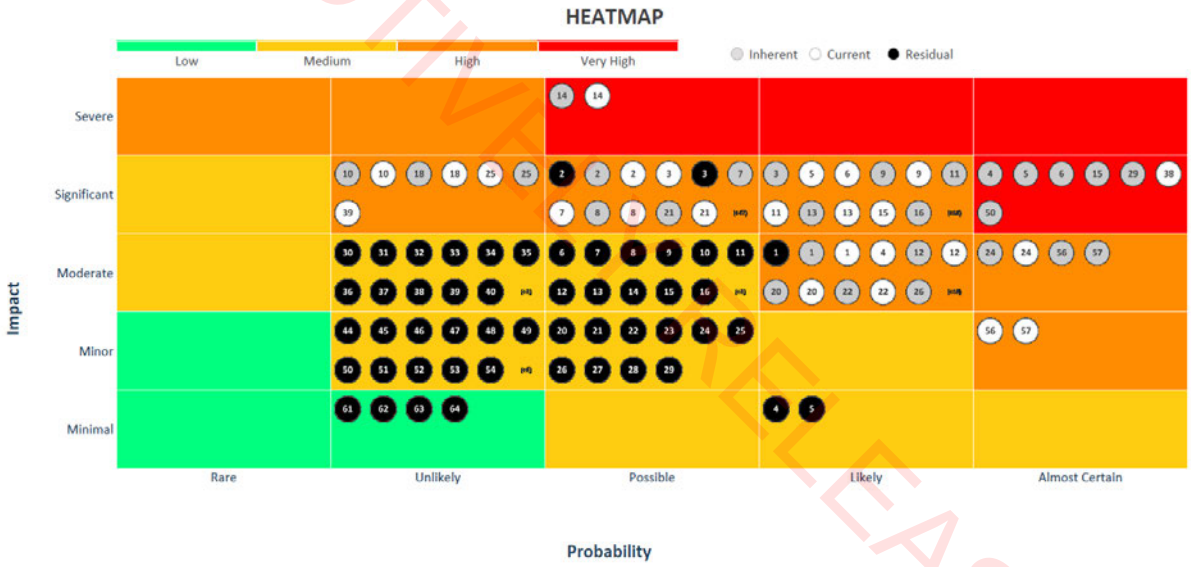
Long term

e.g. Commissioning, building acceptance, operational readiness

9.3.2 Risks in the risk heat map

The risk heat map shows how 170 risks have been assessed as having a combination of probability and impact that require them to be given special attention. Overall risk is currently high/red as there are more than four red indicators.

Figure 22 Risk heat map report, CAMMS report December 2020



The current very high risks are:

- **Scope creep** – new leadership presents an opportunity to revisit design decisions that is compounded with any delays in approvals.
- **Workforce capacity** – attracting the right workforce is critical challenge, current focus is on generating sufficient responses from tendering process.

With inherent very high risk in:

- **Role clarity** – appropriate structures for escalation and process for resolution
- **Poor contractor management** – good documentation needs to be executed on
- **Project delegations** – appropriate levels and process adhered to
- **COVID-19 outbreak** – delay and resource constraints
- **COVID-19 design impact** – highlighted importance of pandemic planning in design
- **Lack of carparking** – functionality and valuing of staff and patient time.

9.3.3 Analysing and categorising the risks

The Ministry has clustered the risks into several categories and subjectively assessed each of those clusters. Two priority groupings have been identified:

- **Tier one** risks include the risk of delay to construction of NDH, and the ability of the Southern DHB to implement change management. Most of those risks are external to the NDH Project Team.
- **Tier two** risks are broadly assigned to design and construction and are largely controllable by the NDH Project Team.

Proximate causes come into sharp relief

There are several risks that mean action or inaction creates risk in the NDH construction programme:

- One example is lack of investor confidence leading to a longer approval time and therefore delay in the programme.
- Another example is the need for good relationships between the project partners, Southern DHB and the Ministry of Health, to avoid some of the co-ordination issues that beset the construction of Canterbury DHB's acute inpatient facility.

Cascading risk of delay

The risks are not independent of each other, and delay features in several risks' consequences. There may be risks in delay in project approvals, there may be delays in procurement, and there are likely to be labour supply shortages that need to be managed.

New Dunedin Hospital
PIKI TE ORA

Table 38 Risk cluster

Risk cluster	Explanation	Examples	Consequence
Tier one			
Delay in authorisation	Factors causing to delay to timetable	Failure of DBC to be approved, procurement process slow or insufficient interest	Time/cost/ deliverables, perception
Relationship issues	Relationship/personality conflicts may undermine the effectives of the project	MOH/Ministers; DHB/MOH; Neighbours/Project team; Users/project team	Political/public confidence
Tier two			
Alignment issues	One part of the project may not be well-aligned with another	FFE vs NDH design; Design "future-proofing"; ICT investment relative to current operational practices; MOH Capex/DHB OPEX trade-offs; ECE and design processes; workforce planning	Deliverables quality
Migration	When NDH is ready for occupation, the DHB needs to be ready to occupy it	Workforce planning & modelling; Staff resources; Changes to models of care; ICT implementation; Achievement of operational efficiencies	Deliverables quality
Ineffective project discipline	Project documents may not be properly followed	Lack of timely decisions; re-litigation of issues; political design interference; inadequate delegations	Time/cost
Workload/resources	If resources don't match workload, there may be delays &/or shortcuts taken	ECE/design process; user fatigue in design;	Time/cost
Bad up-front "technical" decisions	We may make well-intended decisions that ultimately prove to be wrong	Demolition disposal options, inadequate staging area; poor master-planning; theatre capacity, minimum flood levels; Ancillary plant location; Lack of public carparking	Time/cost Political/ public confidence
Human error	Capable persons may still take bad decisions/actions	H&S with electrical disconnections; Bad handling of hazardous materials; Contaminated water leaks	Political/public confidence
Poor execution of project delivery	We may make a good initial decision but execute it badly	Bad traffic/noise management; lack of effective VM; poor contractor manager; ineffective clinical input to VM	Political/public confidence
Inadequate documentation	Our project documents may be poorly completed	Functional specs; Digital Strategy; SOA	Deliverables quality
Project structures/roles	Our project documents may not be understood or agreed	User group roles; DHB vs MOH roles; Governance v management	Time/cost

9.4 The cost of significant risks

Scenarios developed to apply to the QRA model suggest that costs in delay of various sorts may add 9(2)(b)(ii) if mild, and could add 9(2)(b)(ii) if compounding across project delays, delays in contracting for the Inpatient Building and if there isn't sufficient workforce. These estimates of cost indicate that robust governance and management of the construction programme are imperative in reducing costs.

Additional changes to scope are, however, likely to be an unmeasurable but probable feature of a project of this length of time. For instance, in Canterbury, earthquake standards were refined. In the project to date, COVID-19 and sustainability issues have been considered more closely. Likely, in future, there are unknowns that will result in change to scope.

9.5 The response to risks

The Ministry has integrated lessons learned from other projects to ensure this project will proceed with as low a risk profile as is possible by:

- attending to key assurance points based on Canterbury experience, such as attention to passive fire safety and seismic restraint
- ensuring there is enough time for complete design drawings to be issued
- moving forward the timing of purchase of clinical equipment to ensure that the necessary steel and other structures can support that equipment
- greatly standardising design and exploring possibilities of prefabrication.

9.5.1 Strong clinical leadership

The Clinical Leadership Group (CLG) is the key clinical and service advisory group for the NDH project. The CLG reports through to the ELT with advice and recommendations on service redesign for the Change Management Programme and provides the clinical inputs into the design process. The CLG's Terms of Reference outline its existing functions and responsibilities, listed below:

- To provide clinical advice and act as a reference group for business cases and service planning.
- To provide advice on models of care to support enhanced patient-focused healthcare delivery, and the facilities to support this.
- To facilitate the required high-level clinical discussions and consultations to provide the support and direction for working groups and work streams (e.g. paediatrics, ophthalmology, care of the frail elder person, etc).
- To receive and review submissions from working groups, Project Management Office or planning consultants for decision-making or recommendation to the Southern DHB Chief Executive through ELT.
- To identify any issues/gaps in the process and decide or recommend the required investigations.
- To consider implications from a whole-of-health-system perspective.

Membership includes broad clinical representation from across the Southern DHB's clinical directorates, primary care and University of Otago. Because the CLG is large, a smaller Executive sub-group works with other stakeholders on behalf of the CLG.

The Southern DHB's Clinical Council, which spans the Southern DHB's entire district, will also be involved.

9.5.2 BIM – Building Information Management

Considerable effort has been made to increase the detail of design before it is put out for tender, for construction. There have been continual issues in poor documentation in hospital construction contracting and BIM allows the level of detail and sharing of that detail to improve greatly.

The construction industry is rapidly adopting digital design platforms (CAD, Revit, Techla, etc), and BIM platforms. These digital design platforms are used in an integrated manner, and BIM is a tool which provides greater confidence of buildability and improved recordkeeping for whole-of-life asset management.

NDH has adopted a consultant-led, fully-coordinated, fully-designed ethos, with the expectation that the main contractor will take over the use of the combined (federated) BIM models and use them as a tool to inform industry and also conclude end-of-project recordkeeping obligations. The BIM stages are termed LOD300+ (detail design plus, at which point the main contractor has responsibility), through to LOD500 (as built). Off-site fabrication (if appropriate) can proceed with greater levels of confidence because of the level of documentation and control available through the BIM systems.

The BIM management process has been tested with all industry parties and has been widely endorsed as a professional and appropriate manner to manage design and construction progression. Independent experts will review the BIM on periodic basis and inform the MOH in a timely manner if there are any issues with the management and use of the BIM systems.

9.6 Project issues management

An issue resolution process has been created to identify and resolve issues that could prevent the project from being successful.

Everyone involved in the project is responsible for identifying and communicating issues to the Programme Director. An issue may be raised by any project team member and must be documented and put on the agenda for the next Project Control Group meeting. If, because of the meeting, it is decided that this issue introduces a risk or required change to the project, then the corresponding management process will be initiated and documented. This issues management process provides another check that the risk register is current.

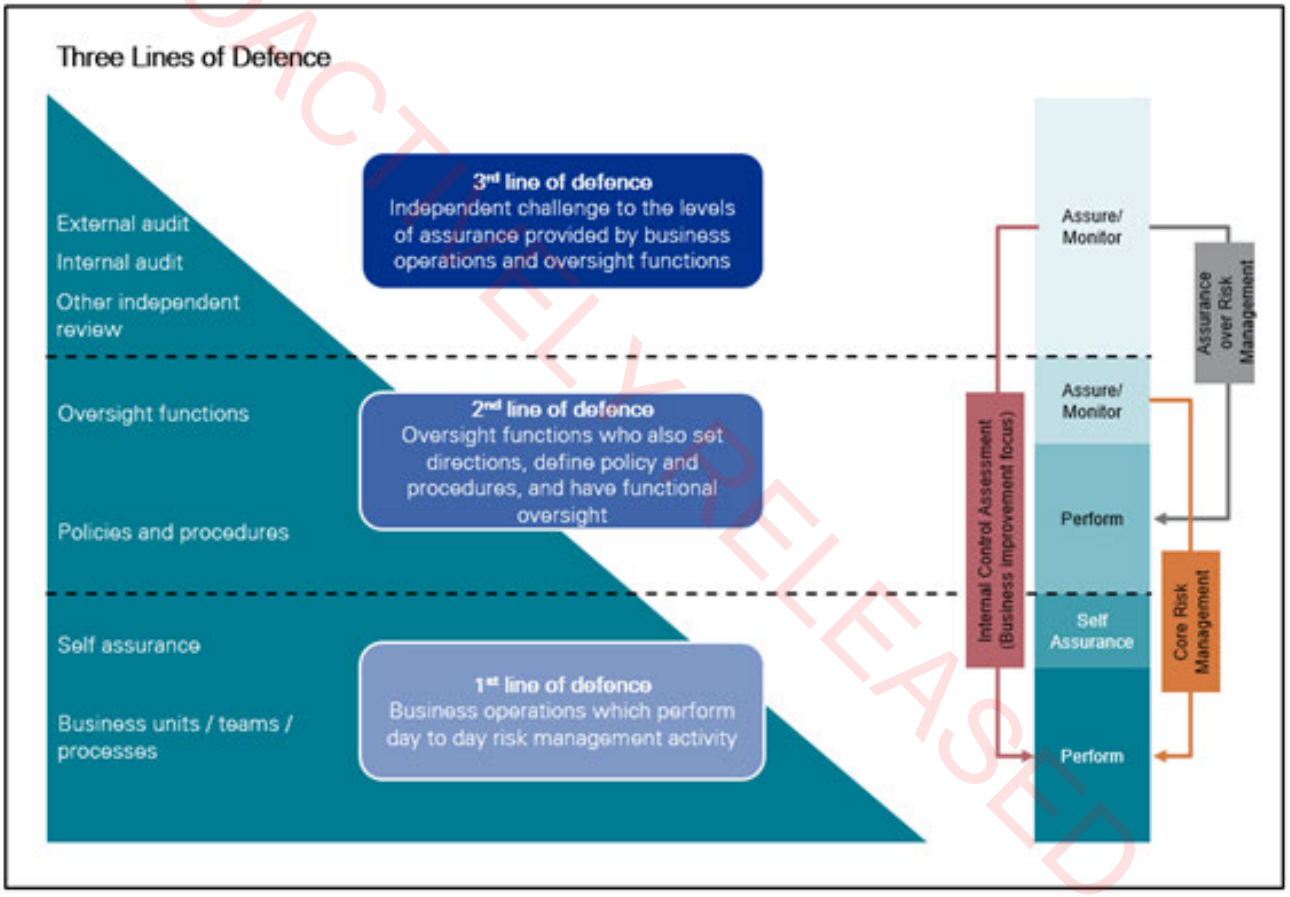
A summary of the top issues is included on the monthly progress report that is provided by the Project Director to the SRO, SPG (and in futures ESG) and to Southern DHB's ELT. The issue register is available to any project stakeholder upon request.

10. Assurance plan and activities

The NDH scores a **HIGH** risk rating from the Risk Profile Assessment. Because of the large scale of the project and its **HIGH** risk rating, Treasury guidance includes a range of assurance activities, which have been budgeted for.

The Assurance Plan details the quality assurance and quality control processes implemented which ensure the project's outputs and outcomes are fit for purpose, the governance and management aspects of the project are working appropriately, and the project stays on target to achieve its objectives. The Plan is consistent with the Office of the Auditor General's 'three lines of defence' model presented below.

Figure 23 Three lines of defence



Source: NDH Assurance Plan Draft

10.1 Key assurance activities

Key assurance activities are set out over the page.

Table 39 Key assurance activities

Assurance Activity	Purpose	Reporting to	Provider	Timing
Gateway™	Gateway is the New Zealand Government's major projects assistance and assurance review process. Each review lasts for a week and the primary review outputs are in-confidence discussions with the Project Sponsor (SRO) and a summary in-confidence report provided at the end of the review week.	Senior Responsible Owner	Treasury is the review provider, and charges a fee to the Ministry for each review. Review teams are comprised of highly independent reviewers selected and managed by Treasury.	At each of the major control gate points listed in Assurance Plan (Section 3). A follow-up review was completed in November 2020 (to review the outcomes from Gate 2 Delivery Strategy held in May 2020). New governance arrangements for the NDH Project were confirmed in December 2020.
Central Agency Clinics	While the primary Investment Review process is Gateway, Central Agency Clinics provide constructive feedback on Initial business case documentation	Senior Responsible Owner and Programme Director	The Treasury IMAP Team facilitate Central Agency Clinics.	Prior to the finalisation and submission of business case documents to the Executive Steering Group and Cabinet for approval
Probity Advice/audits	Probity advice/audits are required to provide independent assurance to the Sponsor that all procurement decision making processes are equitable and comply with prescribed practices and directions.	Senior Responsible Owner and Programme Director	HWL Ebsworth	Aligned to major procurement milestones.
Legal Reviews	Independent legal review and advice in respect to contractual documentation.	Programme Director	The Ministry's independent legal advisors.	Procurement stage and pre-contract signature.
Health Planning Reviews	Peer Review of capacity modelling and translation of user requirements into clinical space	Programme Director	Capacity Modelling - EY (Dec 2017) Schedule of Accommodation - Nelson and Associates (May 2019)	IBC Final DBC

Technical Peer Reviews	Independent technical peer reviews in respect to design (including VM), structural engineering (including seismic) and building services, and programme and cost estimates.	Programme Director	Independent external technical specialists.	Programme and cost estimate as part of developing the Final DBC. Design and construction stages.
Internal Peer Reviews	At a minimum all key project deliverables produced during the procurement phase will be subject to at least one level of peer review to ensure that deliverables are of an acceptable quality and comply with the relevant standards.	Programme Director	MoH Procurement Team – additional specialists as required.	Procurement stage, and as required.
Independent Quality Assurance (IQA)	IQA reviews are a central agency assurance requirement for high value, multi-year, high risk or complex projects. These reviews will occur at key project milestones and provide assurance of key process and knowledge areas and of the project's overall progress towards success.	Senior Responsible Owner with a direct copy being provided to Director-General, as per central agency monitoring requirements.	KPMG	Following approval of the final DBC. Aligned to major project milestones. (at least yearly). Initial focus areas will be on quality management, financial and cost management and stakeholder management and communications.
Clerk of Works reviews (construction phase)	The Clerk of Works will monitor the work of companies that carry out contracts on behalf of the client. It is the Clerk of Works' responsibility to make sure that work is carried out to the client's standards, specifications and schedule.	Project Director Construction	TBC	2021 Appointment
Post Implementation and Benefits Realisation Reviews	A Post Implementation Review will be performed no sooner than six months after the project's closure to assess Benefits Realisation effectiveness and review operational hand-over of the hospital facilities and other project outputs.	Senior Responsible Owner and Programme Director	To be confirmed.	Six months after project closure.

10.2 Independent assurance

The table below shows assurance activities planned for 2021. The assurance plan will be updated as each stage of the project is completed with additional assurance activities aligned to longer-term project delivery dates.

There are on-going Gateway reviews. These reviews will be used by the NDH Project as the primary control gates for quality assurance. A Gateway 2 (Delivery Strategy) has been undertaken and completed as part of the development of this Final DBC. The purpose of Gateway 2 was to ensure the acquisition and delivery strategy is appropriate. Further Gateway reviews will be held at appropriate points in the project.

Table 40 Assurance planning

#	Activity	Audience	Indicative Timing	Provider	Status
3	CIC review – Final DBC	Senior Responsible Officer	1st Quarter 2021	MoH HIU to facilitate	March 2021
5	Central Agency Clinic on Implementation Case	Programme Director, Senior Responsible Officer	1st Quarter 2022	Treasury IMAP Team	Will be aligned to the dates for onboarding of main contractor for Outpatients (currently being reviewed)
Outpatient Building					
6	Gateway Review 3 – Implementation Case – Outpatient Building	Senior Responsible Officer	1st Quarter 2022	Treasury Gateway Review Team	As above
7	Gateway 4 - Readiness for Service	Senior Responsible Officer	2024	Treasury Gateway Review Team	
8	Post Implementation and Benefits Realisation Reviews	Steering Group, Southern DHB, Joint Ministers	2025	Treasury Gateway Review Team	
Inpatient Building					
9	Gateway Review 3 – Implementation Case – Inpatient Building	Senior Responsible Officer	2023	Treasury Gateway Review Team	
10	Gateway 4 - Readiness for Service	Senior Responsible Officer	2028	Treasury Gateway Review Team	
11	Post Implementation and Benefits Realisation Reviews	Steering Group, Southern DHB, Joint Ministers	2029	Treasury Gateway Review Team	
12	Targeted Investment Review	Steering Group, Southern DHB, Joint Ministers	2029	Treasury Gateway Review Team	

Source: NDH Assurance Plan Draft V2.5 2020

10.3 Peer reviews

The table below indicates the peer review activities that have been completed so far.

#	Activity	Indicative Timing	Provider	Status
1.	Capacity Modelling Review	Dec 2017	EY	*Completed 7 Dec 2017*
2.	Schedule of Accommodation Peer Review	May 2019	Nelson and Associates	*Completed*
3.	Independent Review of Cost Estimate - IBC	July 2019	Rawlinson	*Completed*
4.	Procurement Plan Review	April 2020	EY	*Completed*
5.	Independent Review of Cost Estimate – Concept Design	Nov 2020	Rawlinsons	*Completed*
6.	Quantitative Risk Analysis Review	Feb 2021	Rawlinsons	*Completed*

The table below illustrates the peer review activities that have been scheduled for the next two years.

Discipline	Arch/ Health Planning	Cost	Programme	Fire	Structure	Services Building	Façade and Envelope	ESD Sustainability
Provider	**Klein & Obermeyer**	**Rawlinsons**	**Innovo**	**Cosgrove**	**Aurecon**	**WSP**	**Janus and Peddlethorpe**	**Jasmax**
IP/OP 100% Concept 10% PD Update 50% OP PD	20.01.2021	Complete	Complete	10.12.2020	10.12.2020	15.12.2020	20.01.2021	18.02.2021
OP 100% PD	29.03.2021			22.03.2021	22.03.2021	29.03.2021	22.03.2021	TBC
OP 100% DD	16.08.2021			9.08.2021	9.08.2021	16.08.2021	9.08 2021	TBC
IP 100% PD	16.08.2021			27.07.2021	27.07.2021	3.08.2021	22.07.2021	TBC
IP 100% DD/ Closeout Report	03.06.2022			20.06.2022	20.06.2022	27.06.2021	20.06.2022	TBC

Appendix A Schedule of Accommodation

We set out existing capacity and future capacity in the table below.

We caution against direct comparison as rooms and their uses will vary. For instance, an existing operating theatre is much smaller than a new one and has less and sometimes no perioperative space. Modern treatment focuses less on medical beds and more on patient flow, from the front door of the hospital if not beyond, with a different mix of rooms and beds on the patient's in-hospital journey.

Table 41 Inpatient unit overnight bed supplied capacity

Ward	Current	NDH
Maternity	21	24
Neonatal	19	22
Self-care, transitional beds	4	12
Paediatric	19	16
Medical / Surgical (includes Medical HDU)	227	246
Mental health services of older people	12	21
Rehabilitation	34	40
Intensive care, HDU surgical	16	40 (incl 10 built shell)
Total	**352**	**421**

Table 42 Operating theatre requirements

Operating theatres	Current	NDH
Acute and elective	9	15 (incl 4 built shell)
Same day	2	5
DSA / angiography	1	2
Cardiac catheter laboratory	1	2
Endoscopy rooms	3	4
Total	**16**	**28**

Table 43 Same day and ambulatory rooms

	Current	NDH
Same day/bed equiv.		
Acute dialysis unit	10[17]	8
Day medical	5	16
Day surgical	11	27
Day recovery	17[18]	22
23-hour unit	0[19]	20
Birthing rooms	7	10
Maternity assessment unit	4	7
Paediatric assessment unit	5	4
Paediatric day unit	2	4
ED bays	31	53
Emergency psychiatric	5	5
Ambulatory rooms		
Clinic consult rooms	n/a[20]	64
Specialty clinic rooms	n/a	20
Procedure rooms	1	4
Medical physiology labs	24	29
Transit care	0	12

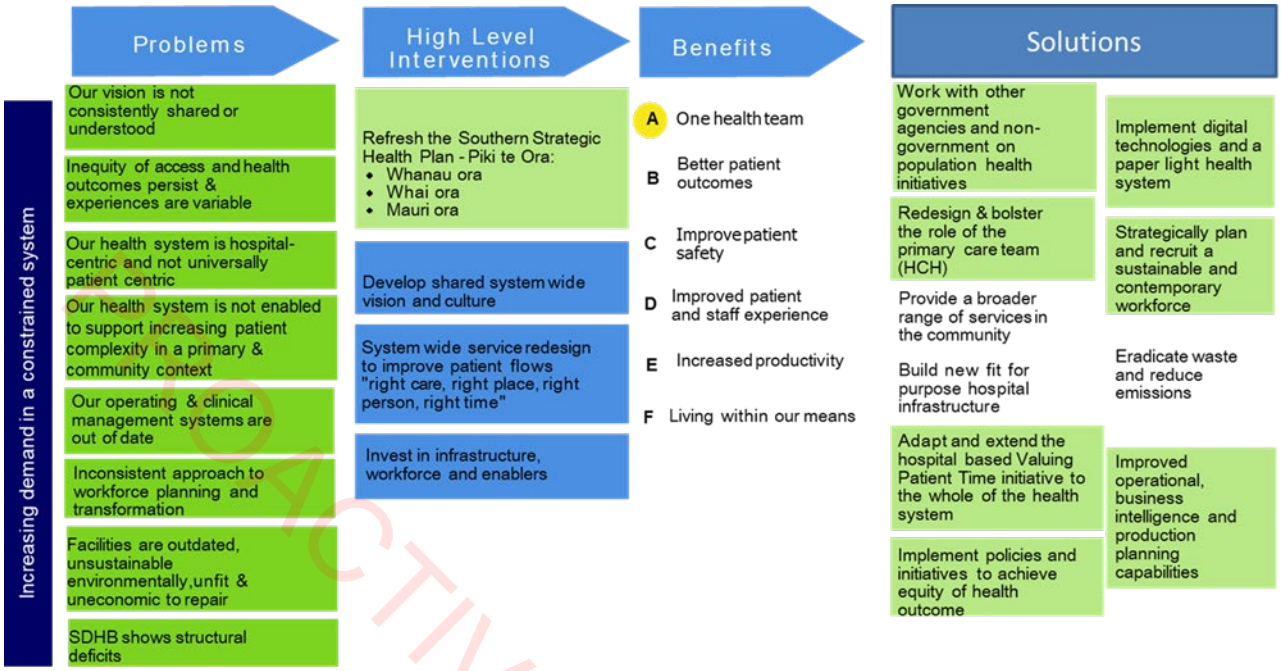
Table 44 Imaging requirements

Modality	Current	NDH
MRI	1	3
CT	1[21]	3
Ultrasound	4	6
Fluoroscopy	1	1
OPG/cone	0	1
General x-ray	6	8

[17] Southern DHB operates a world class home dialysis training model – this is community based (although currently at the hospital) and of a sufficient size so as to reduce the requirement for acute beds.
[18] Dedicated day recovery is currently only provided in the Endoscopy suite. Dual clinic/interventional spaces are used by other services to support day procedures (e.g. radiology).
[19] The 23 hour unit is a new model of care that will seek to get greater efficiency from operating theatres and inpatient beds
[20] Unable to determine current number of functioning clinic consult rooms and speciality clinic rooms as outpatient activity occurs in a variety of spaces including dedicated outpatient clinic rooms plus offices.
[21] A second CT scanner is primarily used as a treatment planning scanner for Southern Blood & Cancer which is out of scope of NDH project.

Mobile x-ray	7	6
Mobile image intensifiers	3	4
Mammography	3rd party	0
SPECT CT	1	1
DEXA	1	1
PET CT	0	1

Appendix B Investment Logic Map



Appendix C Cost benefit analysis details

This appendix provides additional detail on the cost benefit analysis in the Economic Case.

The cost benefit analysis identifies the incremental costs and benefits of the preferred option relative to the "do minimum" base case (i.e. the counterfactual). It is an economic cost benefit analysis in that the focus is on impacts on real resources. These impacts are quantified in monetary terms, to the extent possible, to determine the net benefit of a new hospital from a national perspective. The focus is on the preferred option (option 5); the information that informs the estimated benefits is not sufficiently fine grained to support a robust comparison among the short-listed options.

Table 45 outlines the assumptions that underpin the analysis, drawing on the Treasury's guidance.[22]

Table 45 Assumptions used in the cost benefit analysis

Issue	Assumption
Period of analysis	30 years, i.e. to 2021 to 2050. Any residual value of the building asset at the end of the period of analysis is factored into the analysis, to avoid over-estimating the economic cost of each option.
Discount rate	A public sector discount rate of 6 per cent has been used to determine the present value of the costs and benefits (as at 2020).
Exclusions	Depreciation is excluded to avoid double counting the investment, as the construction cost is already included. Capital charge and interest are excluded from the analysis. They are part of the cost of capital and are already taken into account in the discount rate. Escalation costs are excluded, being nominal rather than real resources. Costs already incurred are excluded, as these result from past decisions.
Deadweight cost of taxation	The economic cost of raising revenue through taxation is set at 20 per cent of publicly-funded expenditure.
Useful life of assets	The useful life of hospital building assets is set at 30 years.

[22] New Zealand Treasury (2015) *Guide to Social Cost Benefit Analysis* https://treasury.govt.nz/sites/default/files/2015-07/cba-guide-jul15.pdf

Estimating the costs

The incremental costs are based on the difference between the total costs of the preferred option and the total costs that would be incurred under the "do minimum" base case (i.e. the counterfactual). The categories of cost are: capital expenditure (and any residual asset value), operating expense impacts, life-cycle asset maintenance, and the economic cost of taxation. Table 47 outlines the key steps in estimating these costs for the base case and the preferred option.

The base case involves the Clinical Services Building being demolished and replaced and the Ward Block undergoing a major refurbishment. The logistics of decanting while continuing to safely operate the hospital would be difficult, and possibly impractical. The uncertainty of the costs involved may mean that the allowances here would be insufficient (i.e. the base case may be more costly).

Table 46 Detail informing the total cost of the base case and the preferred option

Assumption	Base case – the "do minimum"	Preferred option (Option 5)
Capital expenditure	9(2)(b)(ii) [redacted]	

Residual value of asset	Calculated at the end of the analysis period (2049/50) using the straight line depreciation method, under an assumption of 30 years of useful life. - Clinical Services Building is assumed to be completed by 2026, so that 6 years of useful life remain. - The Ward Block is assumed to be completed by 2029, so that 10 years of useful life remain.	Calculated at the end of the analysis period (2049/50) using the straight line depreciation method, under an assumption of 30 years of useful life. - Preferred option is assumed to be completed by 20209, so that 10 years of useful life remain.
Operating expenses	The expected efficiency gains of the new hospital are recognised in the benefits analysis. Otherwise, the simplifying assumption is that the operating expenses would be broadly similar, given the future budget constraints faced by SDHB.	
Life-cycle maintenance	Costs assumed to be 1% per annum of the value of the capital stock.	
Economic cost of taxation	An additional 20% applied to all costs, to recognise the deadweight cost of taxation for projects funded from general taxation.	

Sources: Southern DHB (2017) "25 Year Capital Plan"; Rider Levett Bucknell (2020) *NDH Detailed Business Case cost estimates*

The total cost of the base case and that of the preferred option are each summarised in Table 47. Cost benefit analysis uses the present value of future costs (i.e. discounted to a common year), however, the nominal values are included to show how these translate to present value terms. The incremental cost is the difference between the total cost of the preferred option and that of the base case.

Table 47 Summary of total cost components and the incremental cost

Cost item ($million, over 30 years)	**Nominal value**	**Present value**
Base case – the "do minimum"		
Capital expenditure	1,316	792
Life-cycle maintenance costs	271	102
Economic cost of taxation	263	158
less Residual value	- 215	- 38
Total cost	1,634	1,014
Preferred option (Option 5)		
Capital expenditure	1,241	911
Life-cycle maintenance costs	317	125
Economic cost of taxation	248	182
***less* Residual value**	- 386	- 67
Total cost	1,421	1,151
Incremental cost	-$213m	$137m

Note: A 'higher cost' scenario allows for the cost of the new hospital to be 10 per cent higher than in this central scenario, as a sensitivity test. This increases the incremental cost to $259 million (present value basis).

Due to the assumed timing of spending under the base case which is largely spread over 25 years discounting has a more material effect on the base case expenditure

Estimating the benefits

The incremental benefits represent the positive resource impacts of the preferred option, relative to what would occur under the counterfactual of the base case. The starting point is the benefits framework in the Strategic Case. The approach has been to identify the material categories of benefit that can be readily quantified and attributed to the new hospital.

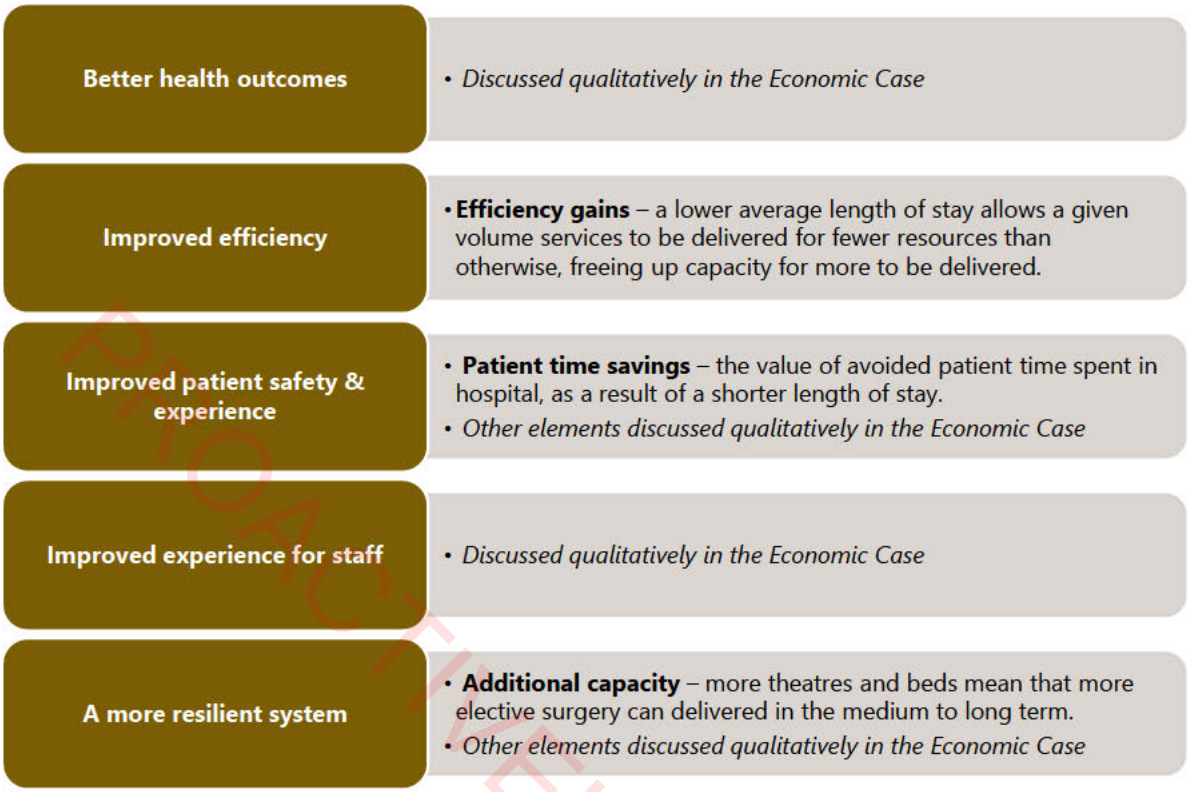
The medium-term service forecasts for the new hospital have been analysed and compared with the service forecast for the base case (i.e. in the absence of a new hospital). From that analysis, three categories of benefit have been estimated.

- **Efficiency gains** – the forecast reductions in the average length of stay, that will allow a given volume services to be delivered for fewer resources than would otherwise be the case. This frees up capacity to allow more services to be delivered. These efficiency gains result from a better internal layout, including adjacencies and sizing of spaces, leading to a reduction in unnecessary delays.
- **Additional capacity** – significantly more elective surgery is forecast to be delivered over the medium-to-long term as a result of the additional capacity in terms of theatres and beds. The additional services delivered are in addition to those enabled by efficiency gains.
- **Patient time savings** – the value of avoided patient time in hospital, from a shorter stay, as a result of efficiency gains reducing the average length of stay for patients. This means that patients have "time savings" in their hospital experience, which they can use for personal use outside of hospital.

Figure 24 maps these quantified benefits back to the relevant categories in the benefits framework. It should be noted that better health outcomes for patients is the overarching category of benefit – i.e. more care being delivered more efficiently, with improved quality and an improved experience for patients, families/whānau and staff – collectively contributes to improved health outcomes.

Some benefits are not readily quantified and monetised in this context and so these are described in qualitative terms in the Economic Case. These benefits need to be considered alongside the quantified results of the cost benefit analysis. Among those benefits, a more resilient local health system and the reduced risk of service failure may be the most important benefit of all, while the options value of the including space for future expansion is also likely to be of significant value in the longer term.

Figure 24 Mapping quantified benefits to the benefits framework



Attribution to the new facility is an important step in the analysis. There are interdependencies in the wider transformation programme at Southern DHB that will, collectively, enable the gains in the service forecasts. In particular, investment in digital solutions, the workforce strategy, and the primary and community health strategy. There is an element of judgment involved in the attribution of the forecast gains in service delivery to the new hospital build, and so the approach has been to select a conservative central attribution assumption and then to test sensitivity by using a lower assumption. The table below outlines these attribution assumptions for each category of benefit modelled.

Table 48 Attribution assumptions used for benefit categories

Benefit	Central assumption	Lower assumption
Efficiency gains – attribution to the new hospital		
Acute medical – avoided case weights	20% of the forecast intervention rate decrease and 80% of the forecast ALOS reductions are attributed to the new hospital.	10% of the forecast intervention rate decrease and 50% of the forecast ALOS reductions are attributed to the new hospital.
AT&R – avoided bed days	20% of the forecast bed day reduction is attributed to the new hospital.	10% of the forecast bed day reduction is attributed to the new hospital.
Elective and acute surgery – avoided case weights	80% of additional surgery being forecast is enabled by efficiency gains.	80% of additional surgery being forecast is enabled by efficiency gains.

	50% of these volume gains are attributed to the new hospital.	25% of these volume gains are attributed to the new hospital.
Additional capacity – attribution to the new hospital		
Elective surgery – additional services (value in exchange, based on case weight value)	20% of the additional surgery forecast is enabled by the capacity of the new hospital. 50% of these gains are attributed to the new hospital, acknowledging that private sector delivery is a factor.	20% of the additional surgery forecast is enabled by the capacity of the new hospital. 25% of these gains are attributed to the new hospital, acknowledging that private sector delivery is a factor.
Patient time savings – attribution to the new hospital		
Acute medical – bed days avoided	80% of the forecast bed day reduction is attributed to the new hospital.	50% of the forecast bed day reduction is attributed to the new hospital.
AT&R – bed days avoided	20% of the forecast bed day reduction is attributed to the new hospital.	10% of the forecast bed day reduction is attributed to the new hospital.
Elective and acute surgery – avoided bed days	80% of the forecast bed day reduction for current surgical services is attributed to the new hospital.	80% of the forecast bed day reduction for current surgical volumes is attributed to the new hospital.

Having estimated the incremental gains in service delivery that can be attributed to the new hospital, The next step is to monetise those gains into incremental benefits.

Efficiency gains – the focus is on the avoided volumes that would otherwise have to be delivered each year in the absence of the efficiency gains. This is represented by case weights for acute medical and surgical services, and by bed days for assessment, treatment and rehabilitation (AT&R). This freed up capacity is monetised by multiplying these service units by the relevant national unit price. In effect, this benefit represents an avoided cost to Southern DHB.

Additional capacity – the forecast increase in surgical case weights has been primarily apportioned, as above, to efficiency gains (i.e. a lower length of stay). The remainder of these additional volumes are attributed, as per the table above, to the additional capacity of the new hospital. These represent additional services that patients would not otherwise receive. The approach here is to monetise this benefit by multiplying these surgical case weights by the national unit price – in effect, representing the 'value in exchange'.

Patient time savings – valued using avoided bed days for acute medical, AT&R and acute and elective surgery services. This avoided time in hospital has value to patients because they can do other things. The estimation here uses a value from a 2013 study in the Netherlands, which found patients valued time waiting for treatment, on average, at €13.32 per hour or $24.71 in New Zealand dollars in

present day terms.[23] As context, this is lower than other values commonly used to value passenger time savings in New Zealand transport policy analyses, and so is arguably a conservative figure. This is applied to each bed day avoided, under the assumption of 16 waking hours per day.

The resulting incremental benefits are summarised in Table 49.

Table 49 Summary of incremental benefits

Benefit item (Present value, $million, over 30 years)	**Central assumption**	**Lower assumption**
Efficiency gains		
Surgical	101	51
Acute medical	23	11
AT&R	13	6
Total	137	68
Additional capacity (elective surgery)	25	13
Patient time savings		
Surgical	21	21
Acute medical	18	10
AT&R	6	3
Total	45	34
Total	**$207m**	**$115m**

The results of the cost benefit analysis are summarised in Table 50.

Table 50 Cost benefit analysis results

Measure (Present value basis)	**Central scenario**	**Higher cost scenario**	**Lower benefit scenario**
Incremental costs ($m)	137	259	137
Incremental benefits ($m)	207	207	115
Net benefit ($m)	70	-52	-22
Benefit-cost ratio	1.5	0.8	0.8

[23] van den Berg et al (2013) "Attributing a Monetary Value to Patients' Time: A Contingent Valuation Approach" University of York, Centre for Heath Economics, CHE Research Paper 90.

Appendix D Lessons from other construction projects

Table 51 Christchurch acute services building lessons learnt and proposed response

Issue	Explanation	Previous experience	Inpatient Building approach
Contractors are procured too late to add significant value	It is difficult for contractors to demonstrate value-add when they were included late in the design process. For example, there is little (or no) opportunity to influence major decisions around structural and façade system design.	Christchurch Hospital ASB saw the contractor appointed late in design and for a very short period (12 weeks).	Collaboration services start mid-way through Preliminary Design. This is reflected in procurement timelines and master programme.
The ECE process is ended part way through the design process which delivers a less than optimal result	Contractors will be reluctant to price the remaining design elements of detailed design without adding a premium or provisional sums. If it cannot be measured, then there is a corresponding risk to the party quoting to build.	Metro-Sports Facility saw the ECE process ended during the Developed Design Stage with 20-30% of design not designed or scheduled, creating risk to the main contractor and sub-trades.	The ECE process will span all design stages and exceed the final design stage by approximately three months to allow design and scheduling for all Separable Portions to be undertaken to deliver better price and programme certainty.
Contractors need to commit highly skilled technical staff to a process that does not produce revenue	Contractors have become reluctant to commit staff to design processes that do not contribute to revenue or risk management, where profit is generated. This is exacerbated in a tight construction market.	Christchurch Hospital ASB saw appointment of a contractor with few resources in Christchurch without local market knowledge and limited time between appointment and starting on site to mobilise key staff and expertise before works commenced.	The long collaboration period allows the contractor enough time to deploy the right level of skill and expertise. The project is sufficiently large to be an incentive, and the risks of under-performing are high for a contractor to commit the correct level of skill and expertise to the process.
Contractors win the contract without security for the building works contract	The sector is hesitant to invest expertise and time into a process with an uncertain outcome.	Christchurch has recently seen two major public-sector contracts let on an ECI basis to contractors that did not to convert to the construction phase. The contracts were let to other contractors.	It is intended to create a more collaborative partnering environment, though the Ministry will have appropriate protection if contractor performance is poor. If the contractor is successful in Dunedin, there is a future pipeline of large regional hospital construction contracts (Nelson, Whangarei, Palmerston North).

Source: Sapere/MOH

More general advice about common challenges with a collaborative process like ECE is summarised and specific mitigations are proposed below.

Table 52 Vertical construction lessons learnt and proposed response

Issue	Explanation	Inpatient Building approach
Contractors lower the price of their ECE services to win the work, then under-perform	ECE services are often procured with a price component attached. The incentive is the profit associated with winning the full construction contract. It has been observed that some contractors with less expertise (and cost) have lowered their proposal price to win the contract.	To capture the right level of expertise and service at the collaborative stage, the procurement team has a reasonable expectation of budgeted cost associated with capturing the right level of expertise and service. **Evaluation of price is at a lower priority level to emphasise the importance of value.**
Contractors inherit a transfer of design risk that is not reflected in the form of contract	An informal moral obligation can be wrongly framed by the Principal that the Contractor should not claim for design errors and omissions that they had the ability to influence before the design team produced the tender documentation. This inferred obligation may not be strictly reflected in the form of contract but has created dispute downstream in the negotiation of variations.	ECE services precede the tendering of a build-only contract. Design documentation quality responsibility remains with the Ministry. **The Ministry has procured an independent design management service to mitigate this risk.** The importance of high-quality design management is key to successful delivery of an ECE process
Contractor's expertise is diminishing with sub-contractors holding more expertise	It has been observed that more complex designs and main contractors increasingly become 'management contractors' (who further package up and pass risk and liability down the sub-contracting chain), and sub-contractors have strengthened their management resources and expertise. The main contractor's expertise is diluted and more weighted toward technical and financial co-ordination.	It is expected main contractors will respond to the RFP with preferred prime subcontractors so the project may understand their expertise. For example, a requirement for civil contracting capability was included in the Demolition Contractor RFP. This enabled a review of ground improvement technologies and design with the staged demolition to accelerate ground improvement works.
Contractor's financial exposure through bonds, LDs and construction liability	Contractors in the current market are risk-averse due to the experience of several New Zealand and overseas companies becoming insolvent during a construction build.	The Ministry has through its market re-engagement 2020 tested various levels of bond, LDs and other commercial devices with industry to create a fair and appropriate risk profile.

Source: Sapere/MOH

Appendix E Market engagement and re-engagement informed procurement plan

The Ministry undertook a formal market engagement process in 2019 and a further market re-engagement in 2020 to seek the views and expertise of the New Zealand and international construction sector. The market engagement process of 2019 was led by the Ministry and facilitated by EY, with participation from the Infrastructure Transactions Unit at the Treasury and Resource Coordination Partnership (RCP).

A further market reengagement of the market conducted May to July 2020 was used as a mechanism to qualify that the market sounding key themes remained relevant and was more focussed on testing the markets receptivity to the proposed procurement approach.

The market re-engagement also provided an opportunity for the participants to reflect on the Ministry's effort to incorporate the 2019 key themes into the approach to delivering the NDH Project. To ensure all participants had the same opportunity to discuss the key areas identified as important to the Project a standard agenda was used for all one-to-one Zoom meetings.

The two Market engagement allowed the market the opportunity to consider and provide comment on:

- the New Dunedin Hospital's scope
- the Ministry's objectives and the status of the delivery planning
- impacts of COVID-19
- interest in the NDH project
- proposed form of contract
- procurement packaging approach
- ECE process for Inpatients
- proposed programme
- procurement assumptions and risk mitigations
- BIM and digital information
- key international subcontractors
- local labour force
- Government's Broader Outcomes.

It increased the Ministry's understanding of current conditions and key risk areas in the main contractor and subcontractor markets and informed the procurement and delivery approach.

Feedback was sought from contractors/subcontractors based on the Ministry's design for the new hospital at that time, which was based on a single building. Ongoing design work since market engagement means certain aspects of the facility design and site masterplan has materially changed.

The industry participants in the market re-engagement were very positive to the Ministry's proposed procurement approaches for both buildings and were particularly pleased to see that the NDH Project aligned with the government's desire to 'fix' the construction sector and address historical construction sector pain points, including those highlighted in the earlier 2019 market sounding. Industry feedback

was to the effect that this was "refreshing" and "a very well thought through approach" and was considered appropriate to what was needed.

Procurement model considered over several years

The IBC, completed in June 2017, undertook a preliminary analysis of potential procurement options that considered risks, market appetite and other advantages and disadvantages of different procurement models against a set of objectives. The IBC concluded that, pending further decisions on the new hospital's location, size, programming and design, there was **'no recommendation at present'** for the procurement model. The IBC noted that several procurement models were viable, ranging from a traditional build to a Public Private Partnership (PPP).

A market sounding in August 2019 informed the further consideration of procurement models with a strong supplier preference for more collaborative models. In the DBC process potential delivery and risk transfer approaches were considered.

The Ministry updated the commercial objectives developed in the IBC. The IBC's commercial objectives for programme, cost, risk allocation and innovation are still considered to be relevant and remain largely unchanged. Six new objectives were introduced in response to the Ministry's desire to strengthen relationships between the private and public sector and for the New Dunedin Hospital to deliver a wider range of social, economic and environmental benefits.

Table 53 Commercial objectives

Objective	Procurement strategy contribution to commercial objective
Programme	Certainty that the project's delivery programme meets the Southern DHB's operational requirements, including with respect to ensuring clinical in-service dates are met.
Cost	Maximises public value to the Ministry by optimising whole-of-life outcomes and minimising the likelihood of cost overruns.
Risk allocation	Encourages a fair and transparent risk allocation to party best placed to manage risk.
Innovation & flexibility	Encourages innovation and flexibility in design & construction in order to achieve the Ministry's desired outcomes without unnecessary risk.
Governance	Requires the Ministry to be a competent counterparty, including establishing a project governance and management structure that enables transparent, optimal and efficient decision making.
Relationships	Encourages strong and trusting relationships between the Ministry and the construction sector in order to deliver successful outcomes for each party during project delivery.
Sustainability	Encourages positive environmental, social and sustainability outcomes.
Industry resilience	Encourages the construction sector to participate in the project in a way that builds industry capability and improves the overall resilience of the sector for future projects.
Labour productivity	Supports improved labour productivity by encouraging efficiency in design, creating skills and training development opportunities and building resilience in the local and national labour market.
Local impact	Supports positive outcomes for local people and businesses by minimising disruption, creating opportunities and building a legacy for Dunedin.

These were considered against the combined single Inpatient/Outpatient Building. The summary evaluation is set out below.

Table 54 New Dunedin Hospital long list assessment

Procurement Model		New Dunedin Hospital Not suitable / May be suitable / Suitable	
Traditional	Construct only		Market feedback was that the Construct Only model is unsuitable for a project with this scale and risk profile. This model was considered suitable for the smaller Outpatient building but not the larger and more complex Inpatient Building.
	Design and build		The D&B model is suitable because the risks of transferring design are outweighed by the benefits of design innovation/flexibility, potential programme efficiencies, and having a single point of accountability. That said, many participants expressed that traditional D&B (hard risk transfer) is not preferred due to recent negative experiences with this model on other projects. This model may be more suitable for the smaller, less complex Outpatient building.
	Design, build, maintain		A DBM model is expected to increase procurement complexity, may limit competition and may be inconsistent with Southern DHB's site-wide maintenance arrangements.
	Design, build, maintain, operate		Clinical operations will remain the responsibility of Southern DHB.
Collaborative	ECI (Construct Only or D&B)		Market feedback was that a well-run ECI process for the New Dunedin Hospital could provide significant benefits to the Ministry through design input, industry certainty, collaboration and innovation.
	Management contracting		Management contracting is most suitable where no single contractor can take on the lead role in project delivery. Market reflected appetite and capacity to take on the lead contractor role (including as a JV).
	Alliance		The size and complexity of the New Dunedin Hospital warrants consideration of an Alliance as a means of managing risks, addressing uncertainties in cost and programme and fostering positive relationships with the industry. There was strong positive market feedback. However, critical review suggested our lack of experience of such contracts would substantially increase risk.
PPP	Design, build, finance, maintain, (operate)		Does not align with Government policy

Three models were shortlisted: Design and Build (D&B), two versions of Early Contractor Involvement (Non-competitive and Competitive); and an Alliance.

Short-list evaluation

Shortlisted procurement models were assessed against the Ministry's agreed commercial objectives in a Commercial Case workshop to understand the advantages, disadvantages and trade-offs of each approach. The assessment was conducted using an equally weighted five-step scale (see below), that measured the extent to which each model meets these commercial objectives.

Table 55 Shortlisted procurement models

Objective	Design & Build	Early Contractor Engagement		Alliance
		Competitive	Non-competitive	
Programme				
Cost				
Governance				
Risk allocation				
Innovation and flexibility				
Relationships				
Sustainability				
Industry resilience				
Labour productivity				
Local impact				

Key: Impact on objective

Meets objective		Neutral		Does not meet objective

- For the Inpatient Building, Alliance was set aside because of a weaker showing against the two commercial objectives of Programme and Cost.
- Design & Build was set aside because of a range of concerns about Risk Allocation, Relationships, as well as loss of Innovation and flexibility and other issues highlighted in the Construction Accord.

Design and Build summary view

1. Design & Build (D&B) performs well against traditional commercial objectives of programme and cost certainty and allows public sector agencies to access private sector design innovation. However, the hard risk transfers inherent to this approach (where a design brief is handed to the contractor) means it can be less effective than other models at delivering the benefits of collaboration and encouraging the contractor to deliver broader public outcomes.

2. The theoretical benefits and practical success of D&B can differ. Anecdotal evidence from the construction industry suggests that some firms have had negative experiences with how the D&B model was implemented on previous projects, where an inappropriate risk allocation (including opaque design risk transfer), lack of early involvement of contractors and adversarial contracting relationships were seen as major issues. A D&B can extend the design period, which pushes out the completion date. There is the risk of not building the right design.

ECE summary view

1. Early industry involvement can be used to bring practical design elements into the professional design early - improving design, delivery planning, buildability and realisation of broader outcomes (e.g. environmental, construction sector resilience, etc.). The collaborative phase encourages the contractor(s) to drive innovation, but the Ministry must establish a robust decision-making framework so that contractor design proposals can be identified, assessed and included in the overall design. There are examples of hospital projects being successfully delivered under this model, e.g. the Fiona Stanley Hospital in Western Australia.

2. During the market engagement process, contractors and subcontractors viewed early involvement as a key mitigation to many of the delivery risks for the New Dunedin Hospital, including ramping up the workforce and supply chain capacity.

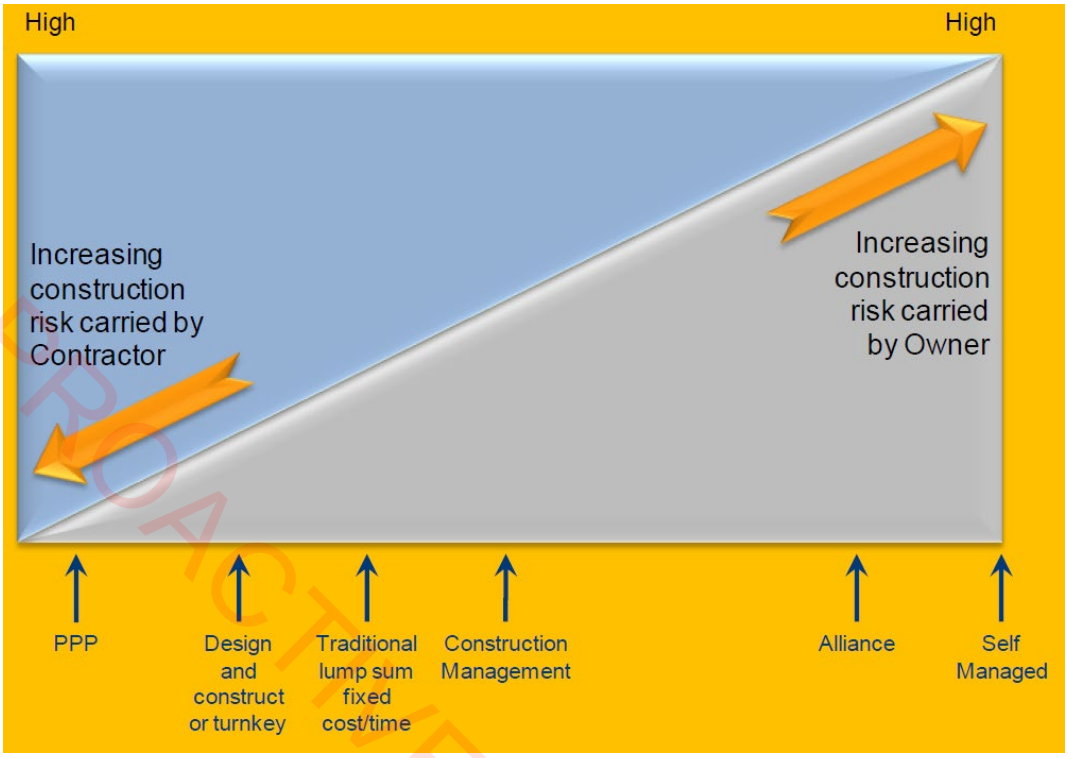
3. Appointment of a contractor occurs earlier than under a Construct Only/D&B model (to achieve the benefits of early involvement), therefore competitive price tension is reduced earlier. This is particularly true of non-competitive. However, a collaborative model would provide the Ministry greater price protection and certainty upon contract signing than an alliance model.

4. ECE provides greater cost certainty compared to the Alliance model. In the ECE process there is full transparency of costs as both the contractor/sub-contractor and client are involved in developing each package of work's cost as the design is detailed. The QS budget for each package is known and during the ECE process design solutions will be developed with the intention is that each package is within the QS budget. The alternatives of a full lump sum tender are not possible as the detailed design will not be ready for this to occur. In addition, a lump Sum would feature significant tags on the detailed design provided, leaving a large percentage of cost open ended. In an alliance model there is no obligation on the parties to work towards achieving the QS budget.

Alliance summary view:

1. An alliance fully embodies the principles of collaboration, predicated on the Ministry, its design team, contractors and subcontractors all working as a single team throughout project planning and delivery toward shared goals on a "best for project" basis. These goals include seeking opportunities for cost and programme savings, innovation and safety outcomes, and supporting broader outcomes for Dunedin, the construction sector, the environment for example. With appropriate governance and focus, this approach can generate innovative solutions that may be missed in traditional project delivery; however, it is important to regularly manage non-cost objectives to ensure those objectives do not become superseded by cost driven commercial imperatives.
2. In considering an alliance, it is assumed that due to the effort and cost associated with forming the Alliance model, that both the Inpatient and Outpatient buildings would be delivered by one alliance. This reduces the chance for a smaller organisation to deliver the Outpatient building, which in turn reduces the chance to meet the broader outcome of developing local market capacity and capability.
3. The key drawback of an alliance (which utilises a target out-turn cost mechanism where cost overruns/savings are shared between the Ministry and contractor(s)) is the reduced level of price certainty versus a fixed price contract model. The current project cost estimates do not include the additional cost of alliance contracting, or the cost risks involved. It is typical for an alliance contractor to cap their cost risk exposure to the value of their overhead and profit, leaving all the cost risk in a distressed project to the Owner. An alliance would mean the Ministry would be responsible for sharing and managing risks that a contractor could manage more effectively. The Australian Government (Australian Government, Department of Infrastructure and Regional Development, 2015) summarise the financial risk in comparison to other forms of contracting:

Figure 25 Financial exposure to construction risk



Source: Australian Government, Department of Infrastructure and Regional Development, 2015

4. Establishing an alliance can also be time-consuming and may challenge the Ministry's targeted in-service date for high-priority clinical functions (e.g. Day Surgery) versus other models. This could be at partially offset by the alliance developing programme innovations over the project duration. However, noting the concept design progress, this opportunity is lower. It is also noted that all key design and consultancy contracts have been executed on a more traditional approach and represent a significant existing liability that Ministry would be liable for, or vary to accommodate an alliance model.

5. The Ministry does not have experience with the alliance model. Competition for experienced resources to deliver major government projects may be increased if stimulus funding launches a significant volume of new projects. If the Ministry is unable to engage a suitably experienced management team it should not do an alliance. It is anticipated that under an alliance the Ministry would need double the resources it would need for a traditional or a design and construct approach.

6. Alliances are typically adopted for large, complex and risky projects that need flexibility during delivery – particularly where project scope and risks are highly uncertain. For the New Dunedin Hospital, a collaborative planning/design phase will provide certainty on most aspects of project scope and risks ahead of a final main works contract, enabling these to be effectively allocated to the party best placed to hold them. An alliance would mean the Ministry would be responsible for sharing and managing risks that a contractor is better able to manage.

7. With an alliance it is important to ensure a 'no blame and no disputes' culture does not translate to a 'no accountability and no disagreements' culture where the cost-plus mentality overtakes excellent project management discipline and risk management, driving up costs and reducing value for money. Other forms of contract can more clearly define accountability for downstream changes and construction risk management.

Contractors were interested in partnering to deliver

The initial market engagement process included:

- three market briefings (two in Dunedin, one in Sydney), attended by 37 organisations
- a written Questionnaire which received 25 responses
- one-to-one meetings in Auckland, Sydney, Christchurch and Dunedin with 20 contractors and subcontractors.

There was significant interest from contractors and subcontractors. Many of the market engagement participants noted their interest is conditional on the approach the Ministry takes for project delivery, including procurement, risk allocation and packaging. Note that the feedback discussed, and the market engagement report relates to the original design. The key themes presented below remain broadly relevant, however the international nature of the firms engaged may not reflect the likely construction counterparties:

- Most participants acknowledged the local workforce would need to be supplemented by labour resources imported from outside Dunedin (from within New Zealand and/or internationally) with Australian firms noting a need for supervisory staff to be imported.
- Availability of sufficient labour force was seen to be a surmountable challenge by most participants. Labour availability is a key constraint, this can be (at least partly) addressed by providing contractors and subcontractors with long lead times to mobilise and recruit their workforce, creating training opportunities within the project, and using prefabrication to spread the location of the workforce and minimise onsite labour requirements.
- Based on the level of market interest a competitive procurement process for the construction works is likely to be supported, however this may be at risk if multiple large contractors either partner or no-bid the project. The involvement of larger international contractors will also depend on the attractiveness of the project relative to the considerable pipeline of health and other infrastructure projects on the eastern seaboard of Australia, and the evolving nature of COVID-19.
- Participants emphasised the importance of collaboration in a project of this scale. Constructive collaborative relationships will need to include the client (the Ministry and its stakeholders), the design team and contractors/subcontractors working together to share risk, address challenges and make decisions on a "best for project" basis.
- Participants suggested that early engagement will be critical to delivering the project successfully. Early engagement will provide an opportunity for contractors and subcontractors to inform the design, influence buildability and maximise whole of life value. Early engagement will also give contractors and subcontractors sufficient lead time (and certainty) to, including to ramp up resourcing and establish supply chains.

Many participants acknowledged the value in combining the scale and experience of Tier 1 and/or Tier 2 contractors with the local experience and relationships of local contractors/subcontractors. Participants were clear that an imported workforce was no substitute for local expertise.

Appendix F Detailed financial statements

9(2)(i)

New Dunedin Hospital
PIKI TE ORA

Southern DHB											
9(2)(i)											

New Dunedin Hospital
PIKI TE ORA

Provider

Revenue $	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	2030/31
9(2)(i)	[redacted]										

FTE	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	2030/31
9(2)(i)	[redacted]										

Personnel Expenses $	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	2030/31
9(2)(i)	[redacted]										

New Dunedin Hospital
PIKI TE ORA

	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	2030/31
Operating Expenses $	9(2)(i)										

	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	2030/31
Asset Related Costs $	9(2)(i)										

New Dunedin Hospital
PIKI TE ORA

Funder

	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	2030/31
9(2)(i)											

Operating Expenses $	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	2030/31
9(2)(i)											

New Dunedin Hospital
PIKI TE ORA

DHB ID	Service Area Code	Account Code	Description	20/21	21/22	22/23	23/24	24/25	25/26	26/27	27/28	28/29	29/30	30/31
DHB Consolidated				Actual	Actual	Actual	Actual	Actual	Actual	Actual	Actual	Actual	Actual	Actual
Southern DHB														
ement of Cashflows				$'000's	$'000's	$'000's	$'000's	$'000's	$'000's	$'000's	$'000's	$'000's	$'000's	$'000's
			Operating Activities											
25	0	201	Government and Crown Agency Revenue Received	9(2)(i)										
25	0	213	Receipts from Other DHBs											
25	0	214	Receipts from Other Government Sources											
			Capital charge relief											
25	0	218	Other Revenue Received											
25	0	**219**	*Total Receipts*											
25	0	220	Payments for Personnel											
25	0	250	Payments for Supplies											
25	0	252	Capital Charge Paid											
25	0	292	GST Input/Output/Adjustments											
25	0	650	Payments to Providers											
25	0	**300**	*Total Payments*											
25	0	305	*Net Cashflow from Operating*											
			Investing Activities											
			Capital Expenditure											
			Baseline											
25	0	331	Land											
25	0	333	Buildings & Plant											
25	0	342	Clinical Equipment											
25	0	352	Other Equipment											
25	0	362	Information Technology											
25	0	372	Motor Vehicles											
			Strategic											
25	0	330	Purchase of Land											
25	0	335	Purchase of Buildings & Plant											
25	0	340	Purchase of Clinical Equipment											
25	0	350	Purchase of Other Equipment											
25	0	360	Purchase of Information Technology											
25	0	370	Purchase of Motor Vehicles											
25	0	378	Purchase of software											
			Total Capital Expenditure											
25	0	385	*Net Cashflow from Investing*											
			Financing Activities											
25	0	411	Equity Injections - Capital											
25	0	480	*Net Cashflow from Financing*											
			Total Cash In											
			Total Cash Out											
			Net Cashflow											
25	0	580	Plus: Cash (Opening)											
25	0	595	Net cash movements											
25	0	590	Cash (Closing)											

New Dunedin Hospital
PIKI TE ORA

	Description	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	2030/31
Current Assets		9(2)(i)										
	Cash											
	Prepayments											
	Accounts Receivable – Control Account											
	Provision for Doubtful Debts											
	Accrued Debtors											
	Inventory / Stock											
Current Assets Total												
Non Current Assets												
	Land - Owned											
	Non Residential Buildings, Improvements & Plant -Owned											
	Residential Buildings, Improvements & Plant - Owned											
	Clinical Equipment - Owned & Leased											
	Clinical Equipment - Leased (tfd to owned)											
	Other Equipment - Owned & Leased											
	Other Equipment - Leased (tfd to owned)											
	Information Technology - Owned											
	Intangible Assets (Software) Owned											
	Motor Vehicles - Owned											
	Provision Depreciation - Owned Non Residential Buildings, Improvements & Plant											
	Provision Depreciation - Owned Residential Buildings, Improvements and Plant											
	Provision Depreciation - Clinical Equipment (Owned or Leased)											
	Provision Depreciation - Other Equipment (Owned or Leased)											
	Provision Depreciation - Owned Information Technology											
	Provision Amortisation - Owned Intangibles (Software)											
	Provision Depreciation - Owned Motor Vehicles											
	WIP											
Non Current Assets Total												
	Total assets											

Appendix G Change Management Programme

The Southern DHB has confirmed that during 2021 it will refresh its overarching strategy to incorporate and integrate the principles and objectives of these strategies and plans into a single cohesive and clear Strategic Plan.

Some of the initiatives are critical to the NDH as follows:

- In 2017, the Southern DHB released its Primary and Community Care Strategy and Action Plan that sets out a very clear articulation of the future strategic directions and is critical to reducing the current level of medical and other attendances.
- The second key plank, Valuing Patients' Time, is a programme of patient flow and redesign to ensure that patient flows through the hospital are efficient and effective, which again is critical to inform treatment in the right place, and hospital design aspects.
- To implement these programmes Southern DHB is committed to developing a "whole-of-system culture based on shared values, collaboration and innovation", investing in business and IT systems and implementing its workforce and digital strategies (SDHB, 2019), ensuring the workforce is ready and IT-enabled. A design assumption is a digital hospital.

An environmental sustainability strategy, "Green Healthcare: creating an environment for health" (2019). The Southern DHB has recently completed a carbon footprint to gauge the impact that it is having on the environment related to energy use, transport, waste and procurement. NDH will make obsolete the coal boiler and will be accredited to Green Star 5. The DHB has embarked on a significant programme of work to align the clinical, management and support functions of the two former DHBs into one DHB, and to refresh and modernise models of care and hospital organisation. The Southern Strategic Health Plan Piki te Ora, 2014, laid the framework for realigning the DHB's work programmes.

Since 2014 the DHB has developed a number of strategies and plans that span the Southern health system:

- Primary and Community Health Strategy
- Raise Hope – Hāpai te Tūmanako & Next Steps
- Workforce Strategy
- Clinical Leaders Group Model of Care 2018
- Southern Health Workforce Plan 2014-2018.

	Description	Outcome
Primary and Community Strategy and Action Plan 2018	The Southern DHB recognises the need for – and has begun the process of – changing how we deliver health care services to better meet the needs of the people and communities we serve in the Southern health system. The Primary and Community Strategy and Action Plan 2018 is a blueprint for improving healthcare services across the Southern district over the next decade and beyond. It describes how we will make the best use of resources; provide care closer to people's homes; and promote more equal access to services for better health outcomes.	**Creating an environment for health** The environment and society we live in supports health and wellbeing. **Primary & Community Care** Care is more accessible, coordinated and closer to home. **Clinical service re-design** Primary and secondary/tertiary services are better connected and integrated. Patients experience high quality, efficient services and care pathways that value their time.
Workforce Strategy and Action Plan 2019	The Southern Health Workforce Strategy describes our vision and goals for transforming our workforce, within the context of the overall Southern Health System. The ultimate goal of the Workforce Strategy is to create a sustainable and contemporary workforce by developing workforce capacity and capabilities, as well as improving workplace culture.	**Enabling our people** Our workforce have the skills, support and passion to deliver the care our communities have asked for.
Digital Strategy and Action Plan 2019	The Southern Health Digital Strategy describes the vision and goals for transforming our digital capabilities within the context of the overall Southern health system. In so doing, we will articulate the strategic drivers, objectives, and actions that support our digital transformation towards the provision of modern, sustainable solutions that improve the quality of our care for our patients and their whānau.	**Systems for success** Our systems make it easy for our people to manage care, and to work together safely.

He Korowai Oranga: Māori Health Strategy	He Korowai Oranga: Māori Health Strategy sets the overarching framework that guides the provision and delivery of Māori health care and support services in New Zealand and within the Southern DHB, to achieve the best health outcomes for Māori.	 **Creating an environment for health** The environment and society we live in supports health and wellbeing.  **Primary & Community Care** Care is more accessible, coordinated and closer to home.  **Clinical service re-design** Primary and secondary/tertiary services are better connected and integrated. Patients experience high quality, efficient services and care pathways that value their time.
Whakamaua: Māori Health Action Plan 2020-2025	Whakamaua: Māori Health Action Plan 2020-2025 guides the Ministry, the whole health and disability system, and government to give effect to He Korowai Oranga. It sets out a suite of outcomes, objectives and priority areas for action that will contribute to the achievement of pae ora – healthy futures for Māori.	 **Enabling our people** Our workforce have the skills, support and passion to deliver the care our communities have asked for.

Southern DHB Disability Strategy (Draft) 2020	The draft Southern District Health Board Disability Strategy and Action Plan describes our vision, goals and the actions we will take to provide equitable health and disability services throughout the Southern District. The vision recognises the need to remove barriers for disabled people and provide well-integrated services that are responsive to them and their whānau, enabling them to live well and participate within their community.	
Raise Hope - Hāpai te Tūmanako Strategy 2019-2023	Raise Hope – Hāpai te Tūmanako Strategic Plan 2012-2015 provided Southern DHB Mental Health and Addictions Services with a direction to achieve better health outcomes for our population. This refreshed Raise Hope – Hāpai te Tūmanako Strategy 2019-2023 was updated to ensure it moves with the current environment and continues to provide a future focus on achieving equitable health outcomes for all. It emphasises a commitment to wellbeing with an expectation of whole-of-community participation. This is demonstrated by the focus on wellness and on the areas of tinana (physical), hinengaro (emotional/mental) and whānau (family). The strategy includes an action/work plan and workforce development plan providing a strong platform for mental health and addictions today and into the future and enables alliances with other initiatives such as the Southern Primary and Community Care Strategy.	

The Southern DHB has identified several overarching challenges

Inequity of access and health outcomes persist, and experiences are variable

Southern DHB has the largest geographical area of all DHBs. Much of the Southern DHB's population live in rural areas widely dispersed across the district. Rurality and distance can lead to inequitable access to health services and outcomes. Economic and demographic growth has been apparent in some parts (e.g. Central Otago) but not in others.

The health system is not universally patient-centric

The Southern DHB recognises that it needs to invest in service redesign that emphasises valuing patient time and experience, as well as providing high-quality health care. This service redesign is underway, and at its heart includes the provision of timely, efficient and effective hospital care when needed and services within the community, closer to people's homes whenever clinically appropriate.

The health system is not enabled to support increasing patient complexity in a primary and community context

The Southern DHB recognises that the health system is not currently enabled to support increasing patient complexity and demand in the community. Again, there are some exemplar models of care where secondary and tertiary services are integrated in primary care settings. For instance, the Southern DHB now provides a radiology service for people who reside in Te Anau through the Fiordland Medical Centre, whereas previously they would need to travel to a secondary centre. However, most of the specialist secondary and tertiary services still require patients to come to the hospital for their care.

An enabled system requires a clear and common vision for the Southern DHB's future, the development of good functional relationships between providers across the spectrum of care, the development of clinical and health pathways, workforce development and investment in infrastructure and technology such as telehealth. This is a core focus of the Primary and Community Strategy and Action Plan and the Southern DHB's Annual Plan 2018/19.

Operating and clinical management systems are out of date

Operating systems (e.g. HR, payroll, finance) are out of date and do not provide information in the manner that Southern DHB needs.

Focus needed on workforce transformation

The workforce needs to be able to meet the needs of the frail elderly patient as well as allowing all clinical staff to work to the top of their scope.

Facilities are outdated, unsustainable, unfit and uneconomic to repair

As outlined in the Strategic and Economic Cases, many facilities are unfit for contemporary models of care, create safety risks and potential harm, restrict service capacity, cause delays and increase outsourcing costs.

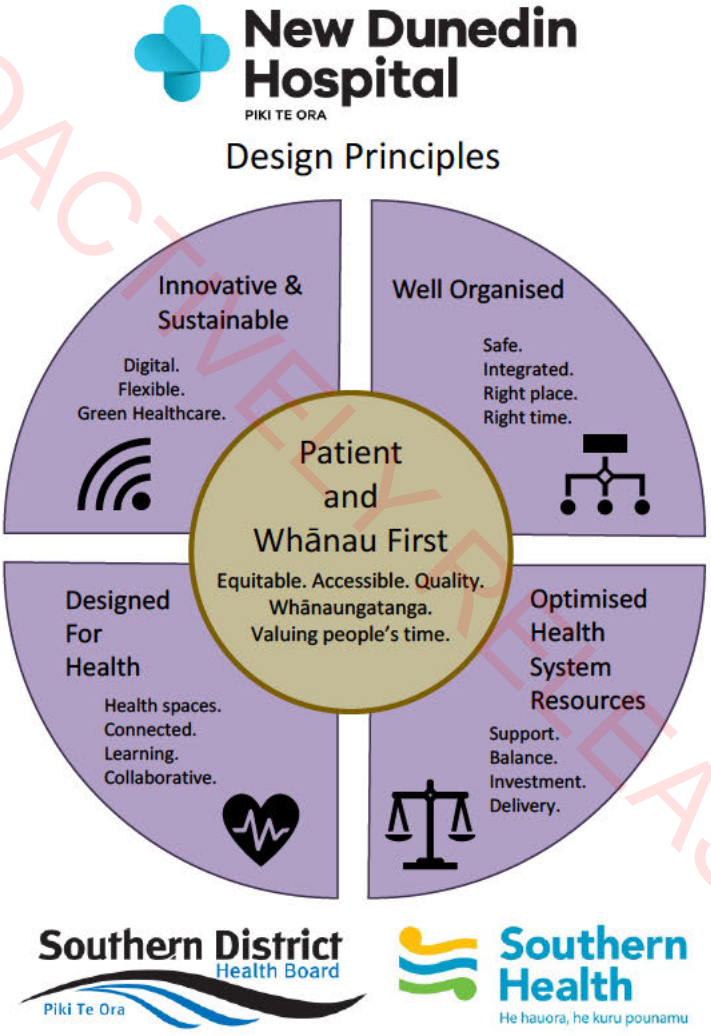
It will be difficult to reduce the deficit under the status quo

Southern DHB (and its predecessor organisations) has recorded persistent operating deficits for several years, as identified in the Financial Case.

Design principles for the NDH and the digital strategy

Design principles for NDH reflect the broader systems transformation and align with the design principles in the Digital Strategy.

Figure 26 NDH Design Principles



The NDH Digital Blueprint defines the target state (including data, systems, and infrastructure) which will be in place for "day 1" operations of the NDH (Southern DHB, July 2020). The Blueprint has been guided by the Southern Health Digital Strategy and identifies the following key design principles for digital infrastructure and systems for NDH.

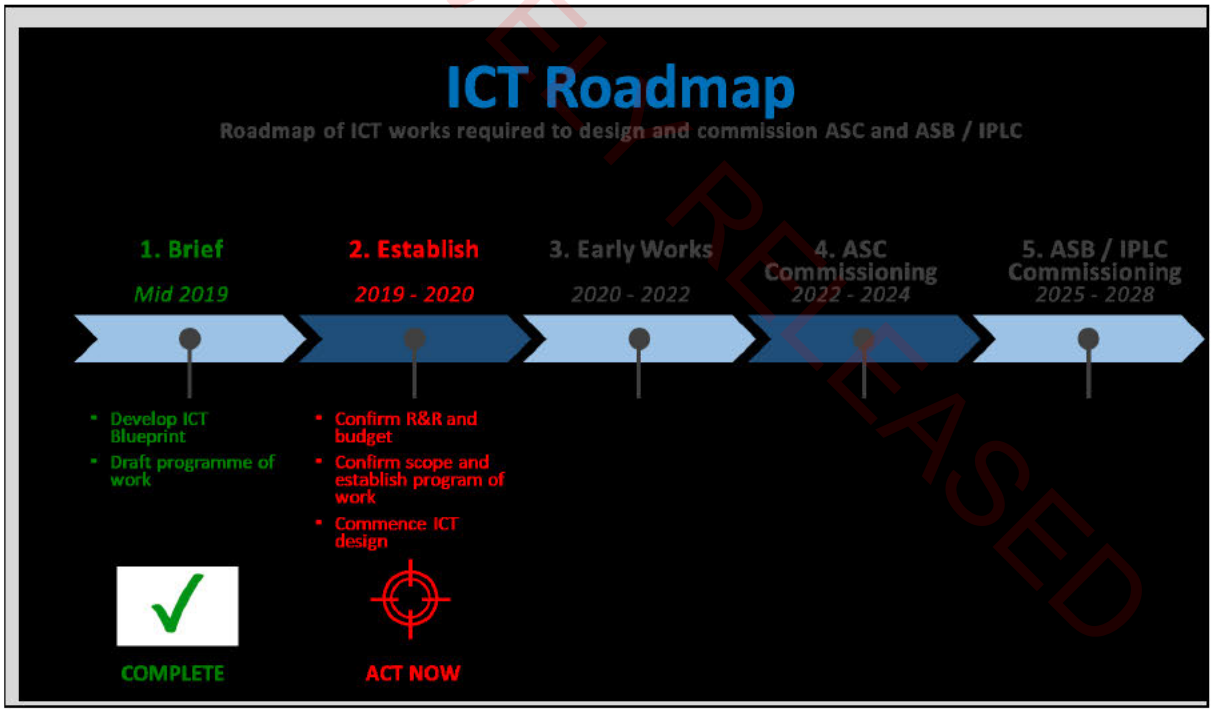
Design principles for digital infrastructure and systems for New Dunedin Hospital

Digitally capable – capable of supporting current and emerging technologies and trends.
Highly integrated – minimises manual data entry by being highly integrated on all levels.
Data hungry – stores all data generated throughout the facility for analysis and reporting.
Highly mobile – staff and devices are not tethered to locations.
Deeply interactive – all ICT is accessible, intuitive and encourages interaction.
Always available – all ICT infrastructure and systems are architected to be highly available.
Device agnostic – information is accessible from a broad range of device types.
Paper lite – an emphasis on a full digital health record and full digital corporate records.

Source: Southern DHB, *New Dunedin Hospital Digital Blueprint*

The Southern DHB is at the 'established' phase of the ICT Roadmap (below), with the ongoing development of a Programme Business Case to support the Digital Hospital programme with indicative costings and programme being discussed with the Ministry of Health (as at October 2019). New capital expenditure for the preferred option is estimated at 9(2)(i) over the 10 years between 2020/21 and 2029/30. The associated operating expenses for software system maintenance and support have been estimated at 9(2)(i) over the 10 years. Therefore, the estimated total cost of the preferred option is 9(2)(i) over the 10 years of the programme.

Figure 27 ICT Roadmap



Source: Southern DHB ICT Blueprint

Workforce transformation

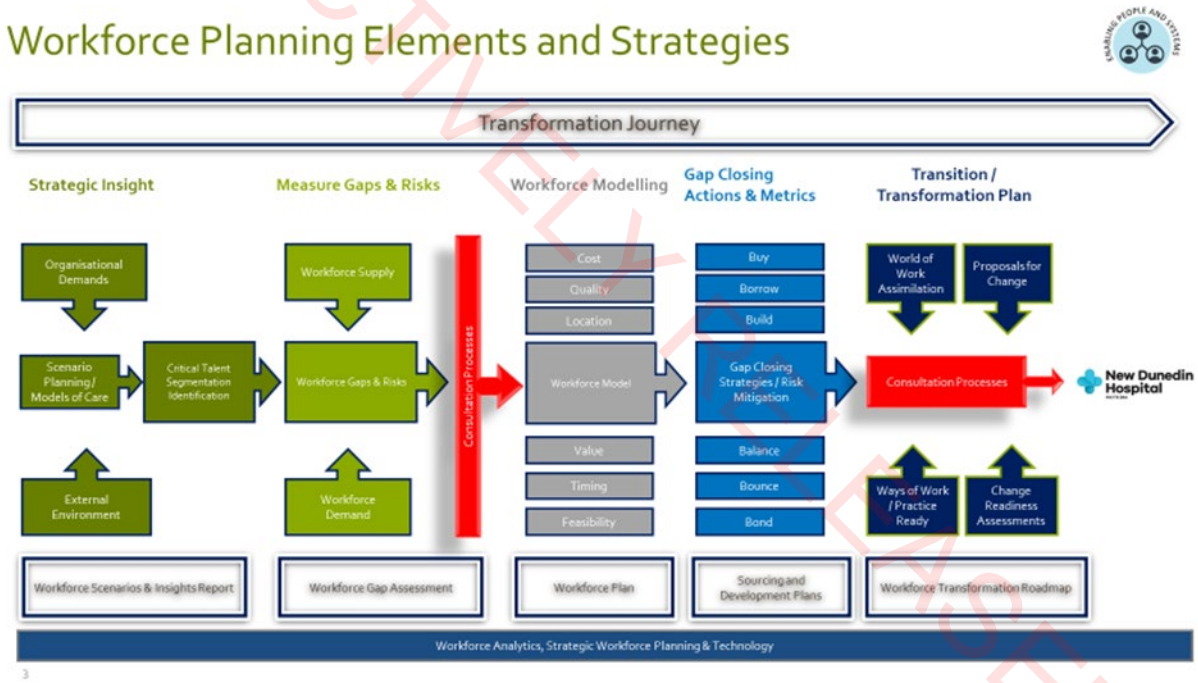
A workforce strategy has been developed, and the planning elements underpinning that strategy have been identified. The PMO has dedicated specialist Workforce Planning and Strategic Sourcing resource support by a Business Analyst.

The workforce needed for the new hospital

Working with Services (clinical and management), the initial focus has been to ensure a robust view of current state workforce. A gap analysis is required to understand how the future hospital workforce might be different so that we can engage with stakeholders, including training institutions, unions, and leaders, and further plan tactically and strategically how we might address any gaps.

Current salary information and historical movements are being modelled to inform likely future workforce costs based on the NDH concept design. Using DHB data from payroll that is regularly submitted to the Ministry, financial BA data on FTE, and considering volume projections informing any current business cases, we are refining the costing model. Employee costs for the past three financial years serve as a proxy to forecast future employee expenditure (including on costs such as professional fees, allowances, penalties, overtime, etc). This work, combined with the future workforce discussions outlined, will predict with greater certainty a picture of upcoming workforce changes and associated costs.

Figure 28 Workforce planning elements and strategies



Source: Workforce Strategy and Action Plan 2019

The focus of this work is for in-scope services for the NDH, issues such as succession planning, leadership development, attraction and retention, and career pathways have a connection to the Southern DHB's wider strategic work occurring via the Southern DHB Workforce Strategy & Action Plan. Themes are emerging around use of unregistered/assistant workforce in Allied Health and Nursing and the challenge of getting services to face into challenges and try different ways of working and delivering services now, rather than waiting for the new hospital. Ophthalmology is one example where opportunities exist right now with the use of technician resource. This work will require an iterative approach as more changes are implemented within the Southern Health system (such as community hubs and generalism).

A shift to generalism

The importance of generalism is recognised in several contexts, especially acute general medicine. Complexity of needs and multiple conditions are driving the trend towards generalism. There will be an increased focus on looking after patients with several conditions and, therefore, a need for much more generalism in the medical workforce. An Acute Services General will better support patient flow especially with enhanced allied health and nursing support. Management of the frail elderly will be occurring within General practice with support from Older person health, good management of long-term conditions, and other care or support pathways to avoid admission or to streamline the return to home. Geriatricians will work across the community and hospital rather than just the hospital. They will also work at the front door of the hospital and proactively across primary care, with primary care.