- The proposed team structure will ensure the project is able to adhere to CHS construction on campus process and procedures.
- The proposed team structure supports the capacity to address unforeseen challenges promptly and maintain project timelines with minimal disruption to hospital services.
- The project requires a diverse team with specialised skills – including clinical infrastructure planning and delivery experience within the context of brownfield hospital projects– to support effective design and delivery, which is crucial for compliance with healthcare standards and CHS infrastructure standards.
- The proposed team will support engagement with diverse stakeholders, community and end- users, during design and delivery of the project, to ensure a patient-centric build.
- A governance team will ensure decision -making processes are transparent, supporting overall risk management of the project, ensuring a robust quality assurance process, providing ongoing monitoring as well as reporting to executives and the Minister.

9.5 Summary Assessment

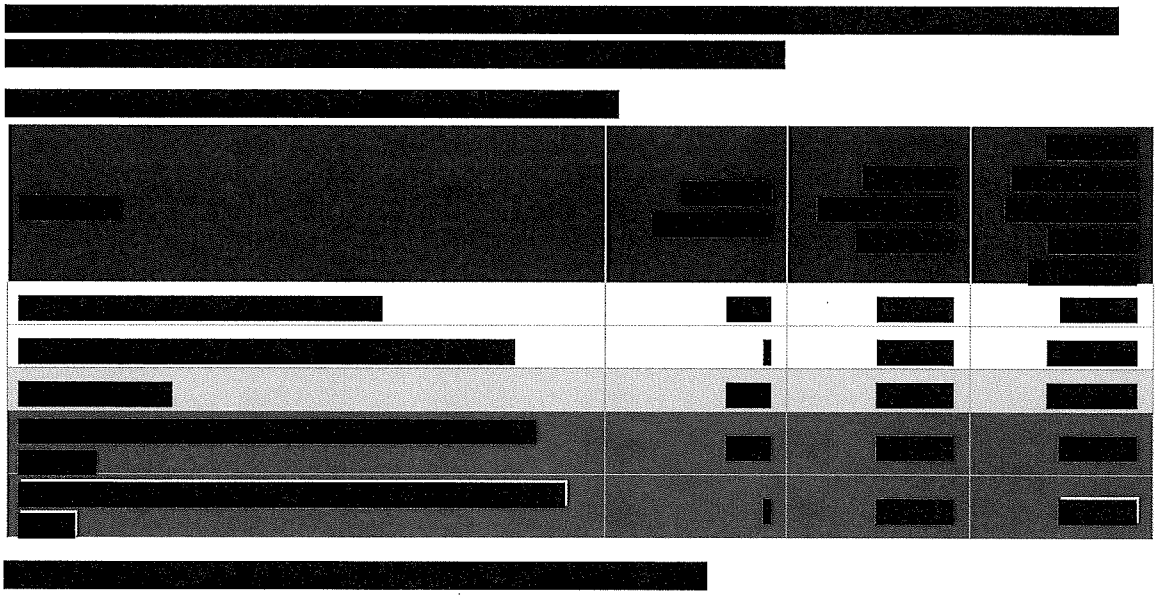
9.5.1. Methodology

To produce a summary assessment of total NPV cashflows, all future estimated project capital costs and WoL cashflows are discounted to FY24. The discount rate used in calculation is equal to the current yield (4.11%) of the 10-year Australian Government Bond.

The projection period when summarising all costs spans from FY24 (the first year in which capital costs are incurred) to FY53 (the last financial year of WoL costs assumed for the Inpatient and Outpatient building). This 29-year period captures all projected capital and WoL costs under each of the proposed options.

Future estimated project capital costs include all works proposed under each option. For a breakdown of capital works, please refer to Chapter 6 – Project Scope and for more detail on WoL cost items, please refer to Section 9.2 of the Financial Analysis chapter.

9.5.2. Net Present Value



- [redacted]
- [redacted]
- [redacted]

9.6 Indicative Budget Implications

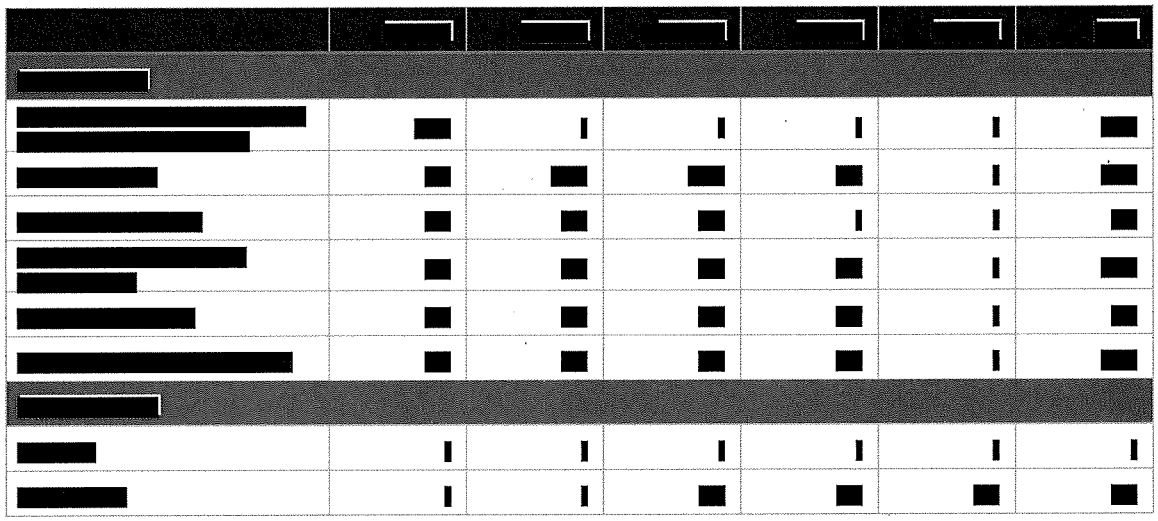
The Project's indicative impact on the ACT Budget will be a payment over the design and construction period for the ACT Government for the estimated Project Capital Costs, and ongoing WoL expenditure operations as per the WoL requirements.

The tables below provide an overview of the indicative budget impact of the Project over the forward estimates for each of the options. In considering the table below it should be noted that costs are in line with the Project's anticipated delivery timeline.

The Project's Capital Cost and WoL estimates will be refined following detailed designs and consequently, the budget impact will need to be revised.

9.6.1. Option 1: Base Case – Do Minimum

[redacted]

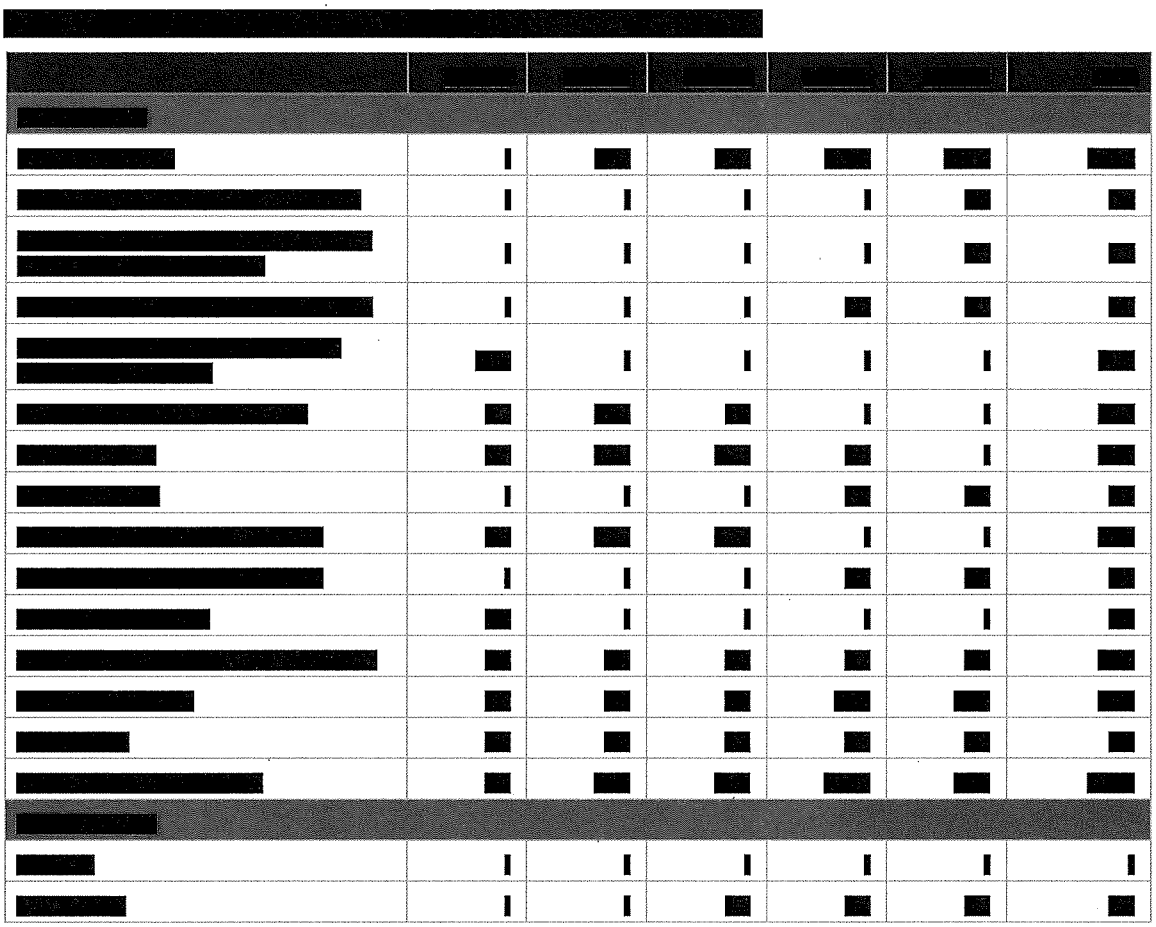


Analysis of the above financial impact summary highlights the following:

- The capital impacts under Option 1 reflect the capital costs of the Building 2 Western Entry Bus Stop and other associated works, Extension of Life activities, the lease of a medical records facility, planning and development resource costs, MPC RRFOC Fee and other associated capital costs to be incurred over the forward estimates. Only the Building 2 Western Entry Bus Stop and other associated works is anticipated to be completed during the forward estimates.
- Other associated capital impacts include escalation costs and contingencies.
- Under Option 1, no incremental expenses are expected from WoL cashflows. The hospital is assumed to continue business as usual operations.

- It is assumed that depreciation only occurs after construction is completed. Since only the Building 2 Western Entry Bus Stop and other associated works is anticipated to be completed in the forward estimates, the depreciation impact is solely driven by this factor. The Building 2 Western Entry Bus Stop and other associated works is assumed to have a useful life of 20 years and straight-line depreciation has been applied starting in FY26.

9.6.2. Option 2: Replace and Upgrade



Analysis of the above financial impact summary highlights the following:

- The capital impacts under Option 2 reflect the full capital costs of the Building 2 Western Entry Bus Stop and other associated works, decanting and demolition of Building 7 and the Precinct Wide Energy Node – Stage 1.
- Partial capital costs are also reflected for the decanting and decommissioning of the existing Inpatients and Outpatients Building, initial extension of life activities, and other related capital impacts.
- While the new PCSS Building, the new Inpatients and Outpatients Building and other assets form Option 2, their construction commences after the forward estimates and their capital costs are therefore not visible in the above table.
- Only the Building 2 Western Entry Bus Stop and other associated works and the Precinct Wide Energy Node – Stage 1 is expected to be completed during the forward estimates.
- Other associated capital impacts include escalation costs and contingencies.

- Expenses are assumed to relate to WoL cashflows and occur after building construction is completed. Since neither the PCSS nor the Inpatient and Outpatient building is expected to be completed within the projected budget impact periods, no expense impact is observed.
- It is assumed that depreciation only occurs after construction is completed. Since only the Building 2 Western Entry Bus Stop and other associated works and Precinct Wide Energy Node – Stage 1 is anticipated to be completed in the forward estimates, the depreciation impact is driven by these two factors. Depreciation assumptions are detailed below:
  - Building 2 Western Entry Bus Stop and other associated works: Useful life of 20 years, straight-line depreciation applied starting in FY26.
  - Precinct Wide Energy Node – Stage 1: Useful life of 20 years and straight-line depreciation has been applied starting in FY28.

9.6.3. Option 3: Capacity to meet future demand (FY41)

[redacted]

Analysis of the above financial impact summary highlights the following:

- The observations of the capital impacts under Option 3 are largely the same as Option 2. Key differences are the inclusion of Building 4 works, and Precinct Wide Energy Node – Stages 3 and 4. Construction works on both of these projects is expected to commence

after the forward estimates and as such, their capital costs are not reflected in the above table.

- Expenses are assumed to relate to WoL cashflows and occur after building construction is completed. Since neither the PCSS nor the Inpatient and Outpatient building is expected to be completed within the projected budget impact periods, no expense impact is observed.
- It is assumed that depreciation only occurs after construction is completed. Since only the Building 2 Western Entry Bus Stop and other associated works and Precinct Wide Energy Node – Stage 1 is anticipated to be completed in the forward estimates, the depreciation impact is driven by these two factors. Depreciation assumptions are detailed below:
  - Building 2 Western Entry Bus Stop and other associated works: Useful life of 20 years, straight-line depreciation applied starting in FY26.
  - Precinct Wide Energy Node – Stage 1: Useful life of 20 years and straight-line depreciation has been applied starting in FY28.

9.7 Funding and Financing Strategy

In addition to the budget implications outlined in the above section, the following should be noted:

- As the new developments under Cost Plan B will provide important pathology, inpatient and outpatient services for the broader region, not just the Territory, opportunities for funding from the Australian Government should be explored, potentially through Australian Government Department of Health agreements such as the five-year Heads of Agreement for public hospital funding and health reform.
- Funding opportunities from tertiary education partners in the Territory (i.e., ANU, University of Canberra, Australian Catholic University and Canberra Institute of Technology) should be explored. These partners may leverage the facilities to train their students.
- Operating revenue opportunities (e.g., retain space) will be considered following the assessment of this Business Case and more detailed design development.
- ACT Government may, in its discretion, consider the provisions of partial bid cost reimbursements for shortlisted consortia. As a default policy position, the ACT Partnerships Framework states partial bid cost reimbursements will generally not be paid by the ACT Government.

10. Economic Analysis

Key messages

- The economic merits of this Project have been assessed through a socio-economic and wider economic benefit analysis. The benefits have been informed by the ILM.
- The social economic analysis identified the following benefits of this Project:
  - Improved asset efficiency and sustainability will be supported through the replacement of ageing facilities with modern, more efficient, and sustainable facilities. Modern hospital facilities are built with the latest sustainable technologies, including more durable materials which are easier to maintain and more resistant to wear and tear.
  - An improved workforce environment, including investment in digitally enabled health infrastructure, will streamline workflows and operations, increasing the efficiency and effectiveness of care delivered.
  - Improved safety and amenity of site will be achieved through the redevelopment of existing facilities in line with contemporary safety and building standards that prioritise the safety, comfort and experience of staff and patients alike. Extension of life investments will ensure that ageing assets are kept operational and safe before services can be decanted into the new buildings. The clearing of the existing Building 4 site and the subsequent transformation of the site into open green space presents an opportunity to enhance overall amenity offering of the campus.
  - Improved patient health outcomes, site access and flow, and satisfaction through a range of project features, including:
    - Improving capacity to reduce current waitlists and accommodate future growth;
    - Future proofing the Canberra Hospital by developing flexible spaces that can adapt to changes in demand over time;
    - Supporting person-centric care by creating more clinical adjacencies which seek to minimise patient travel and maximise the timeliness of care delivered;
    - Improving site accessibility and patient flow by providing linkways between high traffic areas and more building access points to mitigate bottlenecks;
    - Enabling the CH to incorporate more service innovations, including automation of workflows to provide quicker and more effective care; and
    - Supporting research and teaching activities to promote the development of new clinical policies and practices.
- Investment in the construction of CHMPP2 (preferred Option 2) is estimated to deliver 1,898 additional jobs (FTE per year over the construction period) and $2,865m of additional economic output across the ACT.
- A distributional analysis of costs and benefits has been undertaken across the CH workforce, ACT Government, ACT Health, their patients, and the broader community.
- The economic appraisal is supported by the Wellbeing Impact Assessment in line with ACT Treasury guidelines. This can be found in Appendix C.

10.1 Approach

This chapter presents the approach and key findings of the economic analysis undertaken as part of the CHMPP2 project. The aim of the economic analysis is to assess the anticipated social, economic, and environmental benefits and beneficiaries of each project option described in the Chapter 5 – Options Analysis in order to inform the options assessment.

The economic merits of this Project have been assessed using two types of analysis:

- **Socio-economic analysis** provides a qualitative and quantitative assessment of the economic, social, and environmental benefits anticipated to be realised as a result of each project option; and
- **Wider economic benefit analysis** identifies the expected economic impacts. These include direct economic impacts (e.g., additional jobs and output) and indirect economic impacts on industries and consumption, resulting from the capital investment into the Territory that occurs during the construction stage of the project. The economic impacts of each project option are estimated using REMPLAN – an economic analysis and planning tool which uses a range of data sources to forecast the regional economic impact of a proposed investment.[116]

The approach to the economic analysis aligns with common practice in the assessment of health and social infrastructure projects and is in line with the requirements of the ACT Treasury Capital Framework.[117] Due to the inherent difficulties in monetising the benefits of health care infrastructure projects, a Cost Benefit Analysis (CBA) has not been undertaken for this Project. Instead, a qualitative assessment of the expected socio-economic benefits has been undertaken, supplemented by analysis of the wider economic benefits of the project.

The expected impacts and benefits of each project option have been assessed relative to status quo. The Base Case assumes the continuation of the existing services of the CH within existing buildings and includes ongoing funds for repairs and essential maintenance required for campus buildings.

In line with the ACT Treasury guidelines,[118] the economic analysis has been supported by the Wellbeing Impact Assessment. This is included in Appendix C.

The following sections provide an overview of the benefits framework, key assumptions and outlines the results of the economic analysis.

10.1.1. Overview of Benefits Framework

Benefits considered in the economic analysis relied on four strategic benefit categories, informed by the ILM, and presented in Figure 66. The benefits are arranged into the following categories:

- Asset Efficiency and Sustainability;
- Workforce;
- Safety and Amenity; and
- Health and Wellbeing.

The benefits framework has been developed around five key beneficiaries:

1. Canberra Hospital Workforce;

116 Base data source: REMPLAN, Australian Capital Territory (State) (2023 Release 1) – all figures, data and commentary presented in this software are based on data sourced from the Australian Bureau of Statistics (ABS), most of which relates to the 2021, 2016, 2011, 2006 and 2001 Censuses.

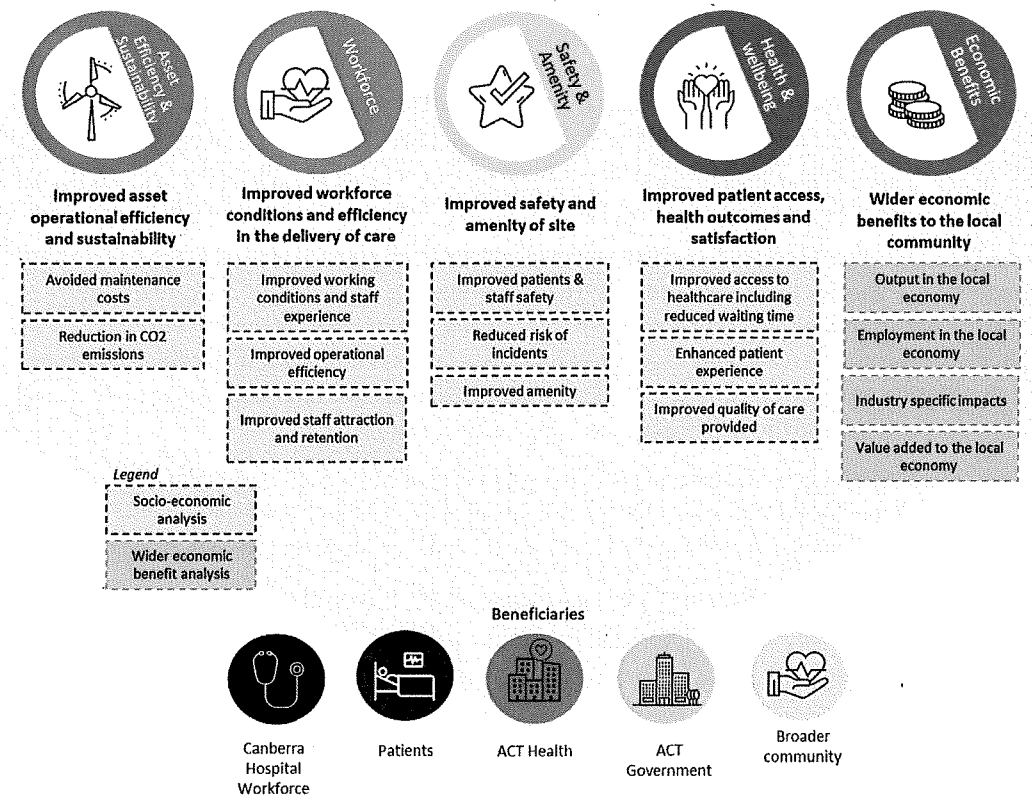
117 ACT Government(n.d.) Capital Framework – Detailed Technical Guidance – Economic Appraisal. Retrieved from https://www.treasury.act.gov.au/capital-framework/prove/business-case/economic-appraisal on 14 Nov 2023.

118 ACT Government(n.d.) ACT Wellbeing. Retrieved from https://www.act.gov.au/wellbeing/wellbeing-framework/embedding-wellbeing on 14 Nov 2023.

2. Patients;
3. ACT Health;
4. ACT Government; and
5. The broader community.

Depending on the type of analysis, benefits have been further categorised as either benefits identified in the socio-economic analysis (highlighted in grey) or in the wider economic benefit analysis (highlighted in blue).

Figure 66: CHMPP2 benefits framework



The following table provides a more detailed overview of the CHMPP2 benefits framework including examples of key performance indicators (KPIs) to monitor and track the realisation of desired benefits over time.

Table 63: CHMPP2 Benefits Realisation Framework

Strategic benefit	Benefit	Example benefit measures/(KPIs)
Improved asset operational efficiency and sustainability	Avoided maintenance costs.	• Reduction in number of breakdowns and reactive maintenance costs.
	Reduction in CO2 emissions.	• Utility consumption per m^2. • Reduced electricity consumption per m^2 compared to respective 2023 period. • Quantity of waste reduction in line with CHR sustainability initiatives target.
Improved working conditions and efficiency in the delivery of clinical care	Improved working conditions and staff experience.	• WHS indicators. • Higher reported satisfaction with working condition.
	Improved operational efficiency.	• Reduced pathology response times. • First dose initiation time.

Strategic benefit	Benefit	Example benefit measures/(KPIs)
		• Reduced time to medication administration. • Reduced time to ED response. • Reduced bed block. • Improvement in admitted national emergency access target.
	Improved staff attraction and retention.	• Reduced staff turnover. • Reduced time to recruitment. • Reduced recruitment costs.
Improved safety and amenity of site	Improved patient and staff safety.	• Reduced number of preventable incidents on campus.
	Reduced risk of incidents.	
	Improved amenity.	• Staff, patient and visitor reported satisfaction with the "look and feel" of and amenity provided by the new buildings. • Staff, patient and visitor reported satisfaction with the landscape and urban design of the new developments and the surrounding area.
Improved patient access, health outcomes and satisfaction	Improved access to healthcare.	• Reduced waitlist for endoscopy, gastroenterology and hepatology services. • Reduced waiting time for elective inpatient and outpatient procedures.
	Improved quality of care provided.	• Reduced average length of stay for surgical inpatient services. • Increase in number of procedures/tests offered and/or performed.
	Enhanced patient experience.	• Reported patient experience.

The benefits framework and identified benefits are subject to the following key assumptions outlined in Table 64.

Table 64: Key assumptions

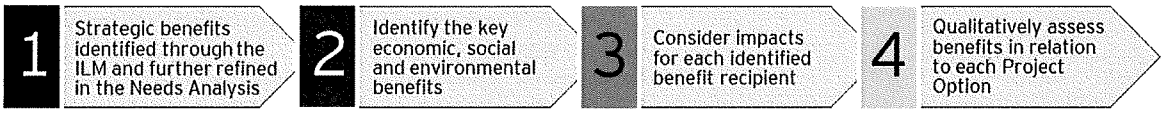
Assumption	Detail
Base Case Assumption	A minimum investment is made to extend the life of key assets across the Canberra Hospital including faced remediation works on Buildings 1, 3 and 12. This investment will also include the ongoing lease costs for HIS temporarily relocated to an off-site location. The hospital will otherwise continue to operate under its existing parameters.
Analysis period for Wider Economic Benefit Analysis	For the period of construction to deliver the parameters of Option 2: • PCSS – Aug-25 to Jul-29 • Inpatient and Outpatient Services Building – Apr-29 to Jul-33 • Energy Node Stage 1 – Jan-26 to Jun-26 • Energy Node Stage 2 – Jan-30 to Jun-30
Base Year	FY26
Discount Rate	[redacted]
CAPEX Profile	[redacted]

10.2 Socioeconomic Analysis

The socio-economic analysis described in this section includes a qualitative assessment of the economic, social, and environmental benefits that are expected to be realised as a result of investment in the project. All benefits have been assessed against Option 1: 'Do Minimum – Base Case' to evaluate the incremental impact realised as a result of investment in either Option 2 or 3.

The approach to the socio-economic analysis is shown the figure below. The assessment of benefits relies on CHS data and research gathered through publicly available sources. Where possible, quantitative evidence has been used to demonstrate the extent of and likelihood of benefits realised.

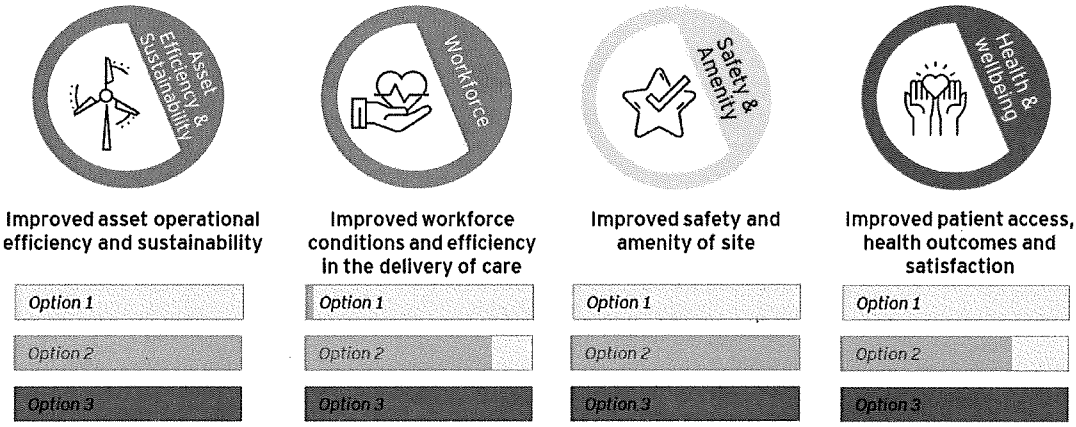
Figure 67: Approach to the socio-economic analysis



summarises the anticipated economic, environmental, and social benefits expected to be realised by Option 2 and 3. Further detail on each benefit is provided in the following sections.

Figure 68 summarises the anticipated economic, environmental, and social benefits expected to be realised by Option 2 and 3. Further detail on each benefit is provided in the following sections.

Figure 68: Overview of the qualitative assessment of benefits



10.2.1. Benefit 1: Improved asset operational efficiency and sustainability

As identified in the Needs Analysis, much of the Canberra Hospital infrastructure in the Project's scope (i.e., Buildings 1, 3, 6, 23, 7, 10 and 12) is nearing the end of its useful life. This has resulted in services being delivered in sub-optimal settings, which is impacting the asset's operational efficiency. The CHMPP2 Options 2 and 3 seek to replace these assets with modern and fit-for-purpose facilities designed to sustain CH's operations into the future.

10.2.1.1. Improved Asset Efficiency

The buildings in-scope for the CHMPP2 project are between 14 and 50 years old and for most are approaching the end of their useful life. It is projected that the cost to maintain ageing assets will [redacted] Along with increasing costs, aged assets pose an increased risk of disruption where an identified building fault could present an unacceptable safety risk, forcing temporary closure. However, given known capacity constraints across the CH campus, closures are not an option, and the time to act is now.

Modern facilities are built using more durable materials which can be easier and cheaper to maintain over time. [redacted] This will also result in improved safety outcomes (Benefit 3) and reduced risk of service disruption (Benefit 4).

Given the building design is similar for Option 2 and Option 3 (where size is the key differentiator), it is expected that the asset efficiency improvements will be commensurate across these options.

10.2.1.2. Improved Asset Sustainability

The project has been developed in accordance with the *ACT Climate Strategy 2025* which focuses on asset longevity and resilience. This includes:

- Developing sustainable, adaptable and durable buildings, spaces and systems;
- Delivering futureproofed building assets that have considered and integrated efficient growth strategies;
- Transitioning the campus to all-electric power sources via the upgrade of the sites to high voltage (HV) infrastructure; and
- Utilising a range of sustainable design features, such as the integration of natural ventilation which improves indoor air quality, enhances the overall comfort and wellbeing of occupants, reduces the feeling of confinement and saves energy by using mixed mode systems. The provisioning of natural ventilation systems could also allow for more flexible and adaptable building designs, accommodating changing healthcare and research requirements.

The electrification initiative will result in a significant reduction in carbon emissions. The carbon emissions produced from natural gas used to power Buildings 1, 10 and 12 alone equated to 3,890 tonnes in 2019, which accounts for 0.24% of the ACT's total emissions.[119,120]

By comparison, the new CSB is entirely electric powered and has achieved a four-star Green Star rating – while an improved five-star Green Star rating is being sought from the Green Building Council of Australia.[121] It is expected that the CHMPP2 Project will incorporate similar sustainable design principles as the new CSB including:

- Façade design and orientation (i.e., double glazed units) which minimise cooling required in summer and heating required in winter;
- Intelligent heating, ventilation, and cooling systems as well as bespoke acoustic systems which support more energy efficient indoor environments through the regulation of building humidity, temperature, air quality and lighting quality. Together, these systems have the ability to reduce the risk of Hospital Acquired Infections; and
- A holistic Building Management and Control System, which monitors and controls all systems in the building. This allows more real time system monitoring, providing rapid point-in-time feedback about the nature and location of issues as they arise, which has the potential to improve overall operating efficiency.

Identifying, analysing and implementing lessons learnt from the development of the CSB, enables this project to realise even better outcomes, including (but not limited to):

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119 Silver Thomas Hanley (2021). Canberra Hospital Master Plan – Zero Emissions Strategy – Building Services Design Report. Accessed on 1 December 2023, retrieved from https://www.health.act.gov.au/sites/default/files/2021-12/Canberra%20Hospital%20Master%20Plan%20-%20Zero%20Emissions%20Strategy.pdf.

120 Point Advisory an ERM Group Company (2022). ACT Greenhouse gas inventory for 2021-22. Published by ACT Government. Accessed on 22 January 2023, retrieved from https://www.climatechoices.act.gov.au/__data/assets/pdf_file/0006/2122872/ACT-Greenhouse-Gas-Inventory-Report-2021-22.pdf

121 ACT Government. (2023 June). Australia's first all-electric hospital building. Accessed on 14 December 2023, Retrieved from https://www.act.gov.au/our-canberra/latest-news/2023/june/australias-first-all-electric-hospital-building.

- **Rooftop solar systems** providing a renewable power source to offset increasing electricity consumption due to the expanded buildings and rising utility costs. Building guidelines recommend a minimum 60% of total roof area dedicated to solar photovoltaics as best practice for a sustainable healthcare facility.
- **Innovative materials** to better insulate buildings from thermal resistance, which can reduce overall energy usage and the impacts of urban heat islands.
    - Canberra has hot summers and cold winters, and it is important to strike a balance between minimising heat retention in the summer and the amount of heating required in the winter.
    - Integrating insulation and thermal resistance strategies can support this outcome and reduce energy demands, for example through high solar reflectance and high emittance roofing materials, with appropriate insulation in roofing and exterior walls (zero ozone depletion potential and no volatile organic compounds).
- **Innovative façade design** such as photovoltaic or thermochromic materials or kinetic façade design.
    - Photovoltaic facades generate solar power similar to photovoltaic roof systems. This has been used in a number of projects across New South Wales and Victoria, however, they appear at present to be untested on a health facility.
    - Thermochromic materials involve the application of a glazing film between two panes of treated glass. The product automatically adjusts the level of tint on the glass throughout the day to optimise natural light, and control temperature and glare.
    - Kinetic facades utilise movement to adjust to changes in the environment and regulate building thermal performance and ventilation, regulate light levels and reduce energy consumption.

The sustainability strategies proposed will realise downstream cost benefits and are expected to lead to a decrease in the operational costs required to run the new buildings. [redacted]

Given the building design is similar for Option 2 and Option 3 (where size is the key differentiator), it is expected that the sustainability of the assets will be commensurate across these options.

10.2.2. Benefit 2: Improved workforce conditions and efficiency in the delivery of clinical care

Purpose-built and tech-ready facilities will enable a reduction in manual processes allowing CH staff to dedicate more of their time to delivering quality patient care. A well-designed physical environment with improved amenity, wayfinding, carparking and accessibility, will also improve the overall staff experience increasing retention and attracting new talent to develop and build the next generation health workforce.[122][123]

122 Brook et al., (2019). Characteristics of successful interventions to reduce turnover and increase retention of early career nurses: A systematic review. International Journal of Nursing Studies 91. 47-59.

123 Lock, K. F. (2022). Factors affecting the UK junior doctor workforce retention crisis: an integrated review. CMJ Open 12: e059397.

10.2.2.1. Increased operational efficiency through new health technologies

CHMPP2 will ensure facilities are tech ready. This includes investments in:

- Robotic automation systems (e.g., the Pharmacy PillPick Automated Packaging and Dispensing System) to reduce manual handling and the risk of human error, increase output volumes, and decrease turnaround times.
- Modern ICT systems to support the development of a Command Centre intended to enable remote monitoring capabilities, and to increase the delivery of at-home care reducing the burden on face-to-face services delivered inside the hospital walls.

These initiatives have the ability to significantly increase efficiency and worker productivity as well as enabling the adoption of newer contemporary service delivery models built around patient centric care (as discussed under Benefit 4).

Modern ICT will also aid the Pathology Unit to expand its clinical capability. While ACT Pathology currently utilises the latest technology for internal testing (thereby maintaining existing testing turnaround times), the new infrastructure will enable the service to expand the range of testing it performs, which would reduce the number of tests that are currently referred externally. This would have a positive impact on the turnaround times for a wider range of pathology testing services improving the speed with which clinicians can diagnose and treat their patients.

Case Study – *PillPick Automated Packaging and Dispensing System*

Utilising robotic technology, PillPick systems automate various aspects of medication dispensing, distribution, and management, improving efficiency, accuracy, and safety in the medication dispensing process. This will enable a more efficient allocation of resources and allow pharmacy staff to use their time on higher value activities.

The current CH Model of Service requires three pharmacists working each day in a checking role for inpatient medication. The automated unit dose dispensing system would reduce this requirement to one pharmacist per day and enable the other two pharmacists to redirect their time to other higher-value tasks such as medication history reviews, medication management and counselling, ultimately streamlining the overall workflow of the pharmacy. This is estimated to realise workforce efficiencies of $8.3m over 20 years.

In addition, automated medication dispensing would reduce the risk of human error compared to traditional ward stock systems, contributing to an improvement in patient safety. It has been documented that medication administration related errors occur somewhere between 2% and 3% of Australian hospital patients. * These errors can lead to an increased length of stay associated with an adverse drug event of 2.2 days and an estimated post event cost of $4,700 per preventable event, on average. **

**Roughead, E. E. et al (2016). The extent of medication errors and adverse drug reaction throughout the patient journey in acute care in Australia. Int J Evid Based Health 14(3):113-122.*

***Bates, D. W. et al (1997). The Costs of Adverse Drug Events in Hospitalized Patients. JAMA 277(4):307-311.*

State-of-the art facilities will also support the latest in health technologies such as genome sequencing, genomics technologies, and targeted therapies. This will over time present further opportunities to enhance the efficacy of the treatments delivered through CH, which contributes to Benefit 4.

10.2.2.2. Improved operational efficiencies from purpose-built facilities

Facilities under the project will be purpose-built, reflecting contemporary service delivery models. Workforce productivity and efficiency will be enabled through design that supports workflows within short travel distances (horizontal and vertical) and more direct patient flows.

The new facilities will be built around the workforce and clinical needs of each functional area, including the integration of more clinical adjacencies to ensure patients are able to receive a comprehensive service while minimising the need for internal travel. For example:

1. Consolidating all pathology services on a single floor in the new PCSS building (currently distributed across multiple floors) will reduce the time required to transfer samples and enable more collaboration across testing and other clinical functionalities.
2. The colocation of Endoscopy Services and the GEHU provides patients referred for endoscopies with direct access to the testing areas which would otherwise require significant travel between buildings.
3. Redesigned clinical areas within the new Inpatient and Outpatient Services Building enable operational flexibility to scale up or down different services depending on the demand and needs.

The new buildings will also enhance patient transfer pathways through improved linkways between buildings. For example:

- Consolidating both Surgical and Medical Outpatients in the proposed Inpatient and Outpatient Services Building will improve access to Medical Imaging as well as improving the resourcing requirements where many outpatients staff are shared across both Surgical and Medical Outpatient disciplines;
- A dedicated linkage connecting the new CSB (set to open in 2024) to the new PCSS Building will enable rapid emergency patient transfers from the Endoscopy suites in the new PCSS to the Operating Theatres located in the new CSB.; or
- Co-locating clinical support services in close proximity to the new CSB will also reduce the distance between clinical and clinical support services, reducing transit times between clinical and administrative areas releasing more time to deliver patient care.

10.2.3. Benefit 3: Improved safety and amenity

The development of modern facilities will address existing safety issues including critical assets deemed non-compliant and/or in a current state that is not in line with existing building standards. The new facilities will also consider design and amenity features which promote comfort and wellness. These benefits are expected to be realised by both project options, with some additional benefit realised in Option 3 via the delivery of a large green space due to the demolition and clearing of the existing B4 structure.

10.2.3.1. Improved safety of patients and staff

Built for the safety standards of their day, aged facilities on the CH Campus are no longer compliant with modern safety standards. The redevelopment of Buildings 6/23/7 and Building 10 in line modern safety and building standards – including emergency, fire safety, safe work, ventilation, and filtration standards – will reduce the risk to both patients and staff. For example, improved ventilation and filtration systems will play a key role in maintaining healthy air quality levels, reducing the transmission of infections within the hospital environment.

The redevelopment would also address the risk of harm to staff and patients resulting from unintentional contact with either contaminated ground materials (e.g., soil, ground water etc.) or hazardous building materials (e.g., asbestos). It has been noted by the Pharmacy Unit, currently housed in Building 1, that there are existing concerns about internal contamination and dust coating hard to reach areas which if disrupted can create an active airborne hazard. The challenge is that there is no easy access to these areas without requiring a temporary closure of the facility which would cause significant disruption to clinical services and has therefore been deemed an

unacceptable outcome. New facilities would include easy to reach and easy to clean surfaces that can be routinely decontaminated, ensuring a safer and more hygienic work environment for staff.

The new facilities will be built to separate public and non-public foot traffic with a specific focus on providing private access to sensitive patients. For example:

- A discreet linkway connecting the Women's Maternity services in Building 11 with theatres in the Perioperative Unit in Building 10 would enable the rapid transfer of emergency birthing patients between buildings with an emphasis on maintaining the patient's privacy and dignity. This will require additional doorways to be built along the existing East-West corridor to block public access and maintain the discreet linkage needed for this purpose;
- Additional non-public doorways on the southern end of Building 10's ground floor to separate public access in Building 10 from the Children's in Building 11;
- A dedicated non-public linkway through a service tunnel and clinical lifts will connect the new CSB to the Mortuary to allow for the discreet transfer of the deceased while minimising the risk of infection transmission; or
- A linkway connecting the rear of the new CSB to the new PCSS Building will enable the direct transfer of emergency cases from the Endoscopy Unit in the PCSS to the adjacent Operating Theatres in the CSB.

Finally, the CHMPP2 includes critical extension of life activities – including façade remediation works to Buildings 1, 3 and 12 – to make safe the ageing and deteriorating facilities. This Business Case also includes an allowance for additional planning and development funding to (1) undertake new building audits to establish the scope of additional extension of life works needed to maintain these assets, and (2) develop a business case to request further to deliver the required works.

10.2.3.2. Improved site amenity

The CHMPP2 includes several approaches to improve the overall site amenity, including (but not limited to):

- Demolition of Building 4 for Green Space Creation. The clearing of the existing Building 4 site and the subsequent transformation of the site into open green space presents an opportunity to enhance amenity immediately north of the new CSB Welcome Hall. This initiative significantly improves the overall amenity offering of the campus.
- Development of vertical green and amenity space in Building 10 (refer to Figure 69:), including open terraces providing patients with access to fresh air, views of the surrounding environment and greenery to enhance the sense of healing and wellbeing. Patients tend to associate a sense of healing and wellbeing with their surrounding environment.[124] A positive correlation has been shown in the literature between a patient's interaction with green space and their ability to reduce stress, anxiety and depression.[125]

124 Douglas, C.H. and Douglas M.R (2004) Patient-friendly hospital environments: exploring the patients' perspective. Health Expectations 7 (1) p.61-73.

125 Marcus, C.C. (2007) Healing gardens in Hospitals. Interdisciplinary Design and Research 1(1).

Figure 69: Artists impression of the vertical amenity in B10

Several other design features will contribute to the improvement of the staff and patient experience. For example:

- New and intuitive wayfinding systems to help staff, patients, carers, and visitors orient themselves and effectively navigate the campus. Wayfinding will be considered as part of the physical design and configuration of the campus to create logical and simple connections and pathways that intuitively guide users from point to point. Over and above the configuration of the site, wayfinding should also comprise a combination of static wayfinding (e.g., signage and maps), dynamic wayfinding (e.g., using digital systems to present more real-time updates), interactive wayfinding (e.g., enabling users to engage with an app, kiosk or other physical system to generate personalised guidance) and auditory and sensory wayfinding (e.g., to accommodate users with auditory or visual impairments).
- The design of each building considers ways to create a sense of wellbeing for all users by maximising natural light, green space, views of the surrounding environment, integrating art and culturally sensitive design features into the building design, and improving acoustics and climate control to provide a more comfortable experience.
- Landscape and urban spaces within and around the new buildings will include apolitical and culturally safe spaces.[126]
- The new PCSS Building will accommodate end-of-trip facilities including bike storage, showers and lockers, promoting the use of sustainable transport, which will support reductions in parking demand and have positive impact on the proposed CAPEX for multi-storey basement parking solutions.
- The CH will also be more accessible via public transport following the delivery of the new Building 2 Western Entry Bus Stop and other associated works which will provide a new central access point located adjacent to the new Welcome Hall and will provide more equitable access to services for all hospital users.

126 Note: This Business Case also requests additional funding to develop a more comprehensive art and cultural framework will be developed as a separate project to inform the development of culturally sensitive infrastructure.

10.2.4. Benefit 4: Improved patient access, flow and health outcomes

Numerous research studies have highlighted the substantial connection between the physical environment and patient health outcomes.[127] The project will deliver purpose-built, state-of-the-art hospital facilities to improve patient health and wellbeing by:

- **Improving capacity to reduce current waitlists and accommodate future growth:** The new PCSS building will support growth to meet demand and reduce patient waiting times. Capacity uplifts will be enhanced through investments in strategically designed spaces and ICT fostering improved care coordination, efficient patient flows as well as improved workforce productivity and efficiency, reducing pressures on hospital resources and capacity.[128]
- **Future proofing the Canberra Hospital to adapt more easily to change over time**: Delivering flexible infrastructure is at the core of CHMPP2 redevelopment. This would enable areas designed for today's requirements to be easily adapted to meet future changes in the provision and delivery of care. This includes the provision of shell space for the pathology unit to enable it to quickly expand to meet projected demand to 2041. This will enable the department to adopt either a vertically or horizontally integrated service. While the former would collocate all laboratory services on one floor and administration on another, the latter would split laboratory and administrative spaces equally across two floors for enhanced accessibility. Under Option 2, the fit-out of the pathology unit would be staged over time, delivering capacity in line with demand. This will allow ACT Health to stagger its investment, while also maximising the utilisation and operating efficiency of assets delivered.
- **Creating more clinical adjacencies to enhance the experience and delivery of care:** In line with patient centric models of care, CHMPP2 will collocate complementary services to reduce the distance and travel time between services.
- **Improving patient flow through linkways and access points:** where the creation of a clinical adjacency is not possible, the provision of dedicated linkways would provide patients and staff with the most efficient and direct pathway between high traffic areas. This is particularly important for (1) emergency patients requiring rapid transit between services, and (2) in some cases, a discreet and private linkway for emergency birthing patients transiting to theatres in the Inpatient and Outpatient Services Building. For the latter, it has been shown that increased transit times for patients requiring non-elective caesarean sections, can have a significant impact on neonatal condition at birth.[129]
- **Integrating ICT to promote service innovation:** As discussed under Benefit 2, CHMPP2 will include sizeable investments in ICT enabling health technologies such as a prototype laboratory, digital pathology research, DNA extraction and amplification, and enhanced cryogenic services. These investments aim to advance laboratory and medical capabilities through the integration of technological innovations, digitisation of processes, improvements in genetic analysis, and enhanced cryogenic preservation of biological samples. The outcome would be improved patient outcomes, and reduced risk for re-admission, in turn reducing pressure on hospital resources and capacity.
- **Supporting research and teaching activities across the campus:** the new PCSS building will include a dedicated research, teaching and learning precinct which consolidates these areas into a single central hub to transform the CH into a destination for the brightest research

127 Reiling J, Hughes RG, Murphy MR (2008). The Impact of Facility Design on Patient Safety. In: Hughes RG, editor. Patient Safety and Quality: An Evidence-Based Handbook for Nurses. Rockville (MD): Agency for Healthcare Research and Quality (US). Chapter 28.

128 LaPointe, J. (2018 November). Optimizing Healthcare Workforce Management for High-Value Care. News article. Retrieved on 23 January 2024 from https://revcycleintelligence.com/features/optimizing-healthcare-workforce-management-for-high-value-care

129 Mackenzie, I. Z. and Cooke, I. (2003). What is a reasonable time from decision-to-delivery by caesarean section? Evidence from 415 deliveries. BJOG 109(5): 498-504

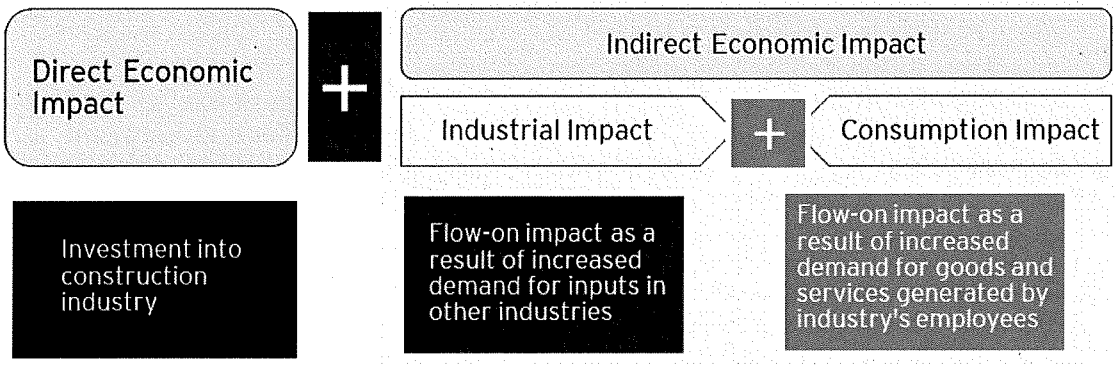
minds. The provision of continual learning and training in state-of-the-art facilities would also support the retention and attraction of the next generation clinical and non-clinical workforce.

10.3 Wider Economic Benefit Analysis

It is expected that the redevelopment of the CH campus will provide a wide range economic benefits for the Territory, stimulating the economy of Woden Valley, and surrounding areas. Wider economic benefits will accrue as a result of the direct investment in the construction industry which will provide a boost in jobs and overall economic output across the region.

The economic benefits have been assessed using an input-output model of the regional economy outlined in Figure 70: .

Figure 70: Approach to Wider Economic Benefit Analysis



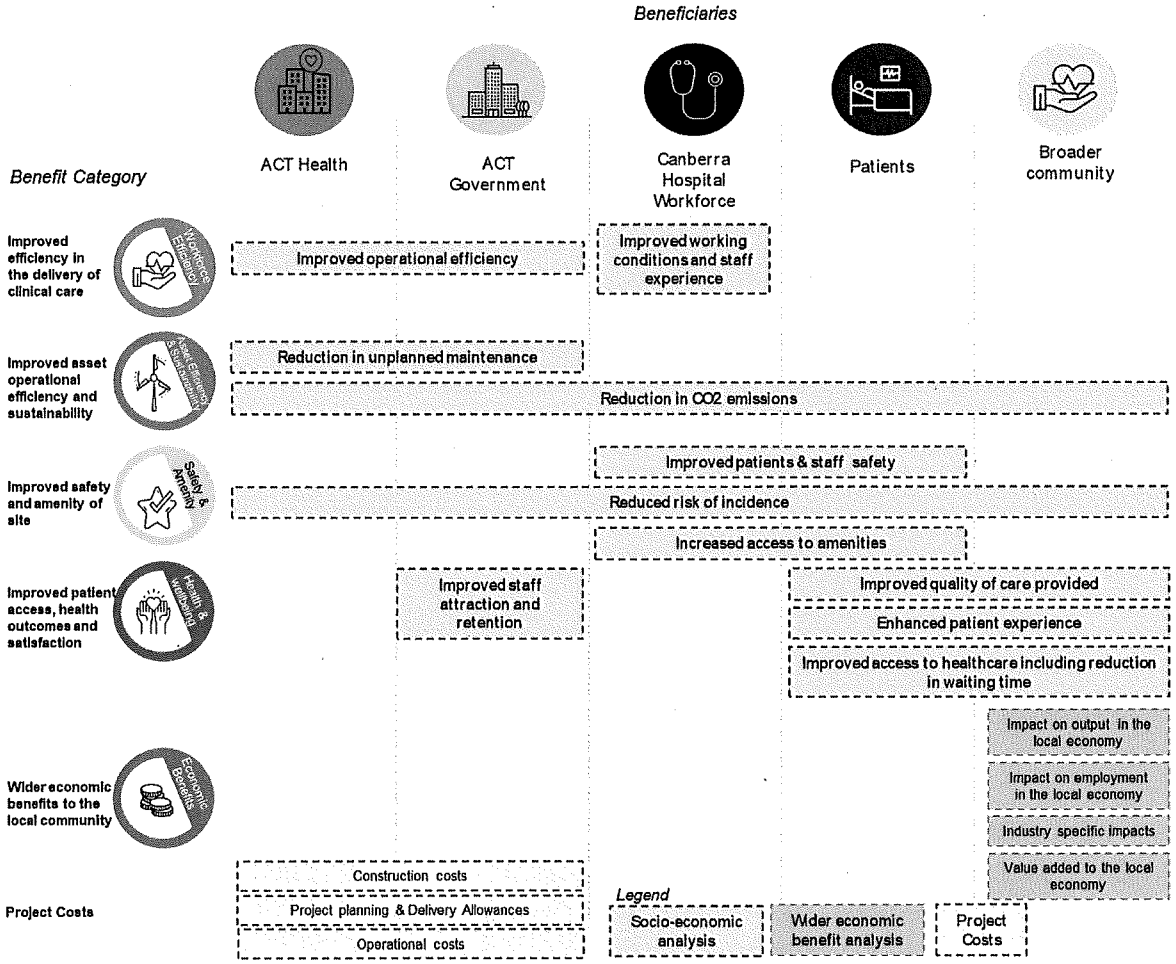
The results of the analysis are presented in Table 65.The Preferred Option (2) will address the problems outlined in the needs analysis and deliver economic benefits through increased construction activity and job creation. The incremental benefits to the Territory, compared to the Base Case, are estimated below:

Base data source: *REMPLAN, Australian Capital Territory (State) (2023 Release 1) – all figures, data and commentary presented in this software are based on data sourced from the Australian Bureau of Statistics (ABS), most of which relates to the 2021, 2016, 2011, 2006 and 2001 Censuses.*

10.3.1. Distributional analysis

The Project will deliver benefits to the Canberra hospital workforce, their patients, ACT Health and ACT Government as well as the broader community. Figure 71: outlines how benefits are expected to be distributed across these groups.

Figure 71: Distributional Analysis



11. Project Governance, Stakeholder Engagement Plan and Advisor Engagement Plan

Key messages

- During the development of the Business Case, stakeholders were extensively consulted to articulate a clear case for change, test viable delivery models and undertake a robust assessment of project options to enable informed government decision-making ahead of detailed delivery planning post this Business Case. Design and technical advisors were engaged to co-develop key project inputs, such as Service Models, FDB's, SOA's, and Concept Design.
- After the Business Case phase, ACT Government remains committed to working closely with the community, stakeholders, consumers, and our workforce to ensure health facilities are designed to meet the needs of Canberrans now and into the future. Feedback will be considered and used during this phase to contribute to the development of facilities and services for the people of Canberra and the surrounding regions.
- Community and stakeholder involvement in the delivery of the *CHMP* will enable improved healthcare infrastructure outcomes, including optimal performance for healthcare workers, alignment with First Nations cultural values, better patient treatment and recovery, and more supportive spaces for families.
- Post-Business Case, a new governance framework will be established. This framework will include cross-directorate executive leadership from ACT Health, CHS, MPC, and ACT Treasury. The Executive Steering Committee will function as the key decision-making body. MPC will lead implementation.

11.1 Overview to stakeholder and advisors engagement

As Canberra's largest public hospital, developments at CH are of significant community and stakeholder interest. With a range of stakeholders impacted by the CHMPP2 project, a strong and coordinated approach is essential to ensure that their insights are incorporated into the Business Case and all stakeholders are well informed about the benefits of CHMPP2 and its progress.

This section outlines the stakeholder and advisor engagement conducted to date during the development of the Business Case.

The ACT Health Infrastructure Communication and Engagement is including at Appendix R1 - Overarching communication and engagement strategy. This has been developed to provide the overarching approach to stakeholder engagement on CHMPP2, NH and Community Health Infrastructure. The who the ACT Government will engage with and how this will be achieved to ensure that the engagement is targeted and appropriate.

The proposed approach post-Business Case is included at Appendix R2 - Communications and Strategy Overview – Canberra Hospital Masterplan Implementation – Phase 2.

11.2 Stakeholder Identification and Assessment

In order to identify key stakeholders and determine an appropriate approach for engagement, a communication and engagement framework has been developed around four key activities tailored to each key stakeholder, as summarised in Table 66.

- **Inform** – community and stakeholders will be informed of the scope and benefits and be kept up to date on the project's progress.
- **Consult** – community and stakeholder feedback will be sought to inform key elements of the program, while being kept updated about how their feedback has been considered.
- **Involve** – testing ideas and options with stakeholder and working together on a solution.
- **Collaborate** – working with key stakeholders to identify solutions for some key aspects of the program.
- **Empower** – Internal government decision makers.

Table 66: Stakeholder and Advisor Matrix

Stakeholder Category	Stakeholders	Engagement Approach
Government and Central Agencies	ACT Health Directorate	Collaborate
	Canberra Health Services	Collaborate
	Major Projects Canberra	Collaborate
	ACT Treasury	Collaborate
	Environment, Planning and Sustainable Development Directorate	Involve
	Digital Solutions Division	Involve
	Environment Protection Authority	Consult
	ACT Emergency Services Agency	Consult
	Transport Canberra and City Services ACT	Consult
	Justice and Community Safety Directorate	Involve
	WorkSafe ACT	Consult
External to Government	Health Care Consumers Association	Involve
Canberra Hospital Expansion (CHE), Campus and Community	Aboriginal & Torres Strait Islander Liaison	Involve
	Disability Reference Group	Involve
	ACT Community Councils	Consult
	ACT Ministerial Advisory Councils	Consult
	Telco & Energy companies servicing site	Consult
	CHE Local Community Reference Group and Community Reference Group	Consult
	Canberra Hospital staff and volunteers (including ANU medical students and staff)	Consult
	Campus tenants	Consult
	Near neighbours - (neighbouring residents and businesses within 500m)	Consult
	Broader ACT Community	Inform / Consult
	Patients and visitors	Inform / Consult
Design and Technical Advisors	Technical advisors	Collaborate

11.3 Stakeholder and Advisors Engagement

11.3.1. Stakeholder and advisors' engagement to date

Engagement to date has been focused around articulating a clear case for change, testing viable delivery models and undertaking a robust assessment of project options to enable informed government decision making ahead of detailed delivery planning post this Business Case.

The project has brought design and technical advisors together with government agencies (including ACT Health, Treasury, CHS and MPC) to gather, test and validate key inputs into the Business Case including service models, SOA's, FDB's and concept design. There has been a high level of frequent engagement to date with the design and technical advisors, which was used to co-design and co-develop business case outputs. This has been an iterative process and input has been directly implemented in the Business Case and accompanying technical reports.

The extent of stakeholder engagement to date and the impact on the development of the Business Case and other outputs has been provided in Table 67.

Table 67: Business Case Stakeholder engagement

Stakeholder	Stakeholder activity	Purpose	Key Business Case output
Design and Technical Advisors	Regular engagement	To assist with the development of project options and inputs into the business case. Activities included co-design and co-development of the service models, FBDs, SOA's and proof of concept design. Continuous consultation throughout the development of the inputs to occur between the Consortium and Government and Central Agencies on the design of the products and business case outputs.	Development of the following products: • Service Models, FDB's and SOA's • Proof of Concept Design • Demolition and construction feasibility strategy • Decanting and accommodation planning for affected buildings • Whole of site engineering planning to facilitate the Master Plan • Cost planning • Delivery program.
Government and Central Agencies	Executive Planning Workshops	To review and critique design proposals developed by the project design team.	Finalisation of Service Models, FDB's, and SOA's.
	Specialist Planning Team	To manage consultation with specialist technical subcontractors.	
	Options Workshops	To co-design options and Multi-Criteria Analysis to assess options.	Development of Options and MCA – Chapter 5 – Options Analysis.
	Delivery Model Workshops	To determine the preferred delivery model for the project.	Preferred Delivery Model – Chapter 8 – Delivery Model Analysis.
	Risk Workshops	To identify, classify and quantify potential risk events and develop an accompanying risk register and mitigations plan.	Development of Risk Register and Mitigations Plan – Chapter 7 – Risk Analysis.
	Financial Workshops	To present the financial model framework, validate the proposed approach and present draft model outputs.	Finalisation of Financial Model Framework – Chapter 9.

11.3.2. Planned stakeholder and advisor engagement

In line with the ACT Health Infrastructure Communication and Engagement Strategy, seven engagement principles have been adopted:

- Timely;
- Regular frequency;

- Open and transparent;
- Inclusive;
- Respectful;
- Sensitive; and
- First Nations principles.

The Strategy outlines how feedback received during the post business case phase of engagement will be used. It will contribute to developing facilities and services for the people of Canberra and surrounding regions by the people of Canberra and surrounding regions.

Ongoing community and stakeholder engagement will be pivotal in the planning, design and construction of the new facilities at the CH campus. Following this Business Case, ACT Health will engage with stakeholders, health consumers, clinicians and local communities to ensure the next phase of the CHMP is designed to meet the needs of Canberrans now and into the future. Input will be sought in the detailed planning and development of the preferred option to assist the finalisation of project scope, revised reference design, program, and costs prior to investment submission.

The Strategy makes working with First Nations peoples a priority, significant planning will go into how the government can best consulate and involve this community, including through Aboriginal Elders, community leaders and traditional owners.

Ongoing communications will be provided to campus and community stakeholders to keep them informed of the project's progress. As the project progresses into delivery phase a detailed communications strategy will be developed to address operational issues that may arise during the construction phase and inform staff on the changes to Model of Care and / or service delivery, decanting strategies, and temporary access requirements.

Pending a successful investment decision, Design and Technical Advisors will play a crucial role in ensuring the Project's seamless progress through procurement, tendering, contract award, and project delivery. In particular, a Commercial Advisor will lead procurement activities, a Project Management Advisor will oversee project implementation and Legal Advisors will support contract negotiations and finalisation.

The NH project is likely to have an impact on the delivery approach for CHMPP2 and accordingly, there may be opportunities to align procurements and programs or test innovative approaches with the market across both campuses. Following finalisation of scoping and concept design for both sites, a targeted market sounding process is recommended supported by a coordinated approach to delivery (where appropriate).

The detailed framework for planned stakeholder engagement is outlined in Table 68. Also refer to Appendix R3 – Community and Stakeholder Communications and Engagements Framework.

Table 68: Planned Stakeholder and Advisors Engagement

Stakeholder Category	Stakeholder	Phase consulted			Consultation activity and objectives
		Planning and development	Post-investment decision: Procurement	Post-investment decision: Implementation	
Government and Central Agencies	Digital Solutions Division	✓			Workshop(s) to confirm Services Models, FDB's and SOA's and impact of digital health capabilities (telehealth, digital health record etc).
	Transport and City Services ACT	✓			Workshop(s) to confirm services plan for Canberra Hospital redevelopment and site transport accessibility options.
	Environment, Planning and Sustainable Development Directorate	✓	✓		Workshop(s) to refine and confirm revised reference design in consideration of planning requirements (e.g., zoning, overlays, overshadowing etc). Further workshop(s) to refine EOI / RFT documentation in consideration of planning and environmental requirements and support statutory planning applications.
	Environment Protection Authority	✓		✓	Workshop(s) to confirm revised reference design in consideration of environmental impact.
	ACT Emergency Services Agency	✓			Workshop(s) to confirm revised reference design regarding Ambulance access requirements to Canberra Hospital Emergency.
	Transport and City Services ACT	✓	✓		Workshop(s) to confirm revised reference design and alignment to services plan and refine EOI / RFT documentation in consideration of service requirements to site.
	WorkSafe ACT			✓	Frequent meetings throughout construction of Canberra Hospital redevelopment to ensure alignment with WorkSafe protocols.
CHE, Campus and Community	CHE Local Community Reference Group and Community Reference Health Infrastructure Consumer Reference Group	✓	✓	✓	Monthly meetings throughout the detailed planning phase of the project to generate and prioritise ideas. Meetings will include site visits to the Canberra Hospital campus.
	HCCA	✓	✓		To raise awareness of the project, including scope and to enable HCCA to provide input on the proposed services to be delivered by the Project. Additional workshop(s) to refine EOI / RFT documentation in consideration of service requirements to site.
	ACT Ministerial Advisory Councils / ACT Community Councils	✓	✓		Workshop(s) to provide input in revised reference design and ensure alignment with ACT government policies and initiatives around various areas, such as ageing, LGBTQ+, multiculturalism etc. Online consultation to ensure procurement strategy considers ministerial requirements.
	Telco & Energy companies servicing site	✓			Workshop(s) to provide input in revised reference design.

Stakeholder Category	Stakeholder	Phase consulted			Consultation activity and objectives
		Planning and development	Post-investment decision: Procurement	Post-investment decision: Implementation	
	Campus tenants	✓		✓	Drop-in information session(s) to keep stakeholders informed of Project vision, objectives, milestones, and future engagement opportunities. Print/digital updates provide information on the impact of the Project (including, operational issues such as anticipated traffic and noises) and wayfinding.
	Near neighbours (neighbouring residents and businesses within 500m)	✓		✓	Drop-in session(s) to allow stakeholders to voice concerns during project construction and ensure operational phase continues to meet the Project objectives.
	Canberra Hospital staff and volunteers (including ANU medical students and staff)	✓		✓	*As above* Additional drop-in information sessions to inform staff on the implementation of changes in Model of Care and / or service delivery. Session also provides information on decanting strategies and temporary access requirements. Print/digital updates provided on transition arrangements from existing facilities.
	Community and linguistically diverse (CALD) community	✓		✓	*As above.* Additionally, using communication channels and partners to better connect with these communities.
	Tertiary education facilities	✓		✓	Program of in-person activation and engagement activities including roadshows, pop-up kiosks, town hall sessions, workshops, forums, event pop-ups and community outreach activities.
	First Nations Peoples	✓		✓	Program of in-person activation and engagement activities – designed specifically with First Nations communities and representatives to be tailored to specific needs and desired delivery methods.
	People with disabilities	✓		✓	Program of in-person activation and engagement activities – designed specifically with people with disabilities and representatives to be tailored to specific needs and desired delivery methods.
	People with specific needs and seldom heard groups	✓		✓	Program of in-person activation and engagement activities including roadshows, pop-up kiosks, town hall sessions, workshops, forums, event pop-ups and community outreach activities.
	Broader ACT Community	✓		✓	Informed through print/digital updates on project information, YourSay platform, vision, objectives milestones and opportunity for community engagement. Community survey with a focus on healthcare service priorities and other facilities important to the community to confirm revised reference design based on community sentiment. Informed of the impact of the Project (including, operational issues such as anticipated traffic and noises) and wayfinding information through print/digital updates.

Stakeholder Category	Stakeholder	Phase consulted			Consultation activity and objectives
		Planning and development	Post-investment decision: Procurement	Post-investment decision: Implementation	
Design and Technical Advisors	Architects and urban planners	✓		✓	Work together to refine scope and confirm revised reference design is structurally feasible through working group sessions. During project implementation and monitoring, workshop(s) will be conducted to confirm project implementation aligns with specified requirements.
	Engineers	✓			Work together to refine scope through working group sessions.
	Clinical and functional planners	✓			Work together to confirm scope aligns with service requirements.
	Quantity surveyors	✓	✓		Work together to confirm revised reference design aligns with cost estimates. During contract award/financial close regular consultations will be held to assist with contact negotiations and finalisation. During implementation, workshop(s) will be held to confirm project delivery aligns with specified requirements.
	Land surveyors and town planners	✓			Work together to confirm revised reference design aligns with land requirements.
	Community and public relation advisors	✓		✓	Work together to ensure external feedback is incorporated in revised design. Workshop(s) to confirm project implementation aligns with specified requirements.
	Commercial/ financial advisor		✓		Work together throughout the procurement stages alongside ACT Health, CHS, MPC and ACT Treasury to ensure all key activities are successfully achieved. Commercial advisor will be engaged as the focal advisor during procurement.
	Legal professionals		✓		Regular consultations to assist with tender process. During contract award/financial close, regular consultations will be held to assist with contact negotiations and finalisation.
	Project managers			✓	Work together throughout the delivery stage alongside ACT Health, CHS, MPC and ACT Treasury to ensure all key activities are successfully achieved. Project management advisor will be engaged as the focal advisor during the implementation phase.
	Commissioning agent			✓	Workshop(s) to confirm project implementation aligns with specified requirements.
	Risk and change management adviser			✓	Workshop(s) to confirm project implementation aligns with specified requirements.

11.4 Additional Advisor Engagement

Pending a successful investment decision from ACT Treasury, the project will proceed to a final stage of feasibility to progress the proof-of-concept to a concept design in line with PSP guidelines. A provision of $5m of planning and development funding has been included in Option 2 to procure a commercial advisor and technical team to undertake these activities. This would enable the project to refine the scope, program and cost and move the project into the delivery phase.

11.5 Project Governance

The successful delivery of this project necessitated the establishment of strong governance and program management processes. During the development of the Business Case, ACT Health led delivery of the project with support from MPC and CHS. These stakeholders were engaged through the following mechanisms:

- ACT Health participated in weekly **project status meetings.** These meetings provided an update on each workstream, including key meetings held, issues or challenges which may be hindering progress, and next steps for the workstreams;
- ACT Health, MPC, CHS attended monthly **Project Control Group (PGC) meetings** which provided strategic oversight and direction. Attendees approved all project findings and recommendations made by the Executive Planning Team (EPT); and
- ACT Treasury, ACT Health, MPC and CHS attended monthly **Steering Committee meetings** to provide guidance and resolution on any project conflicts or matters that required escalation.

A new governance structure will be implemented during the post-Business Case planning and development stage of the preferred option.

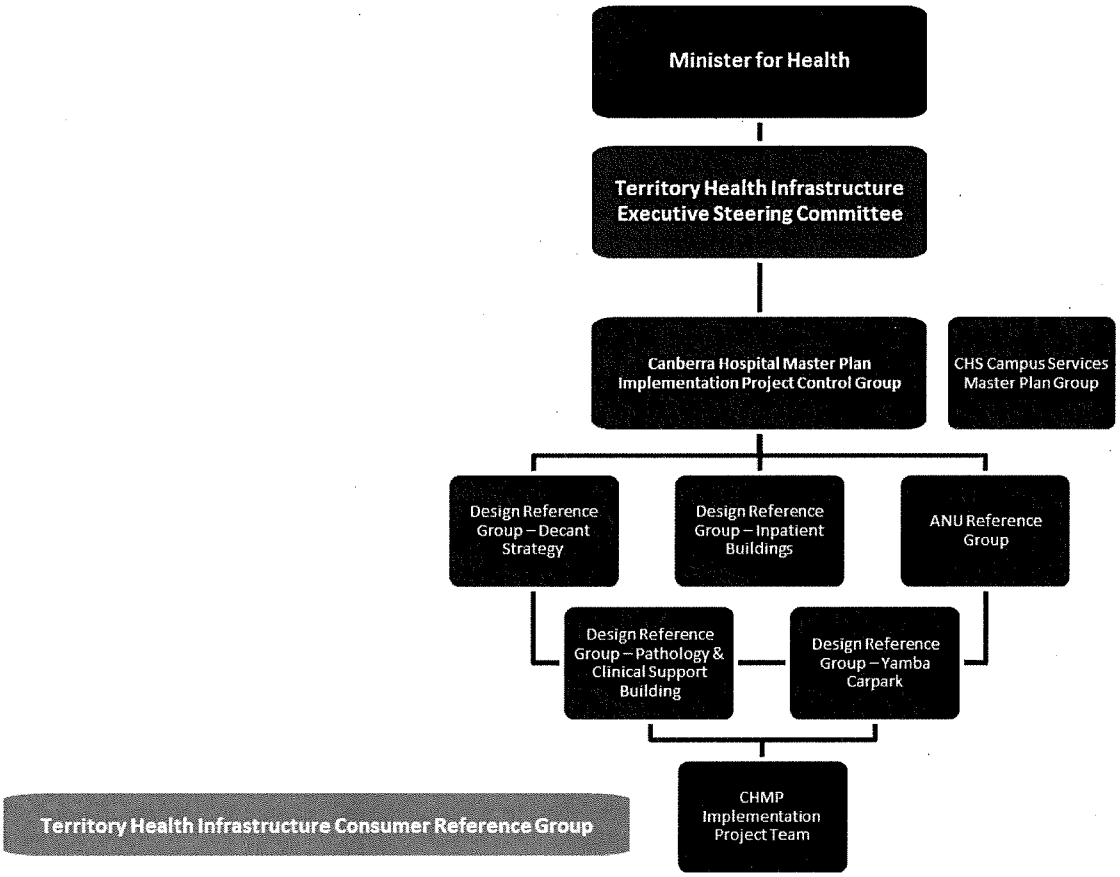
11.5.1. Recommended governance structure

The broader Territory Health Infrastructure Governance Framework is shown in Figure 72: . The framework ensures accountability and transparency throughout project planning and development of the preferred option and delivery (including planning, designer and contract procurement, construction, commissioning, and operations). It provides a whole-of-territory framework that enables collaborative decision making between CH, NH and Community Health infrastructure.

The governance framework allows cross-directorate executive leadership representation from ACT Health, CHS, MPC and ACT Treasury. The governance structure proposed is consistent with all metropolitan capital projects funded by the ACT Government and managed by ACT Health. MPC will lead the development and delivery of all phases of work.

Enabling the project to respond flexibly to uncertainties and make decisions based on up-to-date information, the Director-General of the ACT Health, will appoint a Programme Director who will oversee the delivery of a range of ACT Health Infrastructure Projects and establish various PCGs for decanting, demolition, early works and main works. The Executive Steering Committee will act as an accountable decision-making body for the CH.

Figure 72: Governance structure



11.5.2. Governance Roles and Responsibilities

Roles and responsibilities for the key components of the governance framework for Canberra Hospital are set out in the table below.

Table 69: Roles and responsibilities

Individual/group	Roles and responsibilities
Minister for Health	The Minister for Health is the head of the ACT Health Directorate and has ultimate responsibility for health policy, planning, regulation and public health services, hospitals and healthcare providers in the Territory.
Director-General of ACT Health Directorate	The Director-General will have reporting authority to the Cabinet (the peak-decision making body and approver of the project).
Territory Health Infrastructure Executive Steering Committee	The Executive Steering Committee will oversee and provide collective endorsements and/or approval as necessary for the development of the Project, as well as provide guidance and advice to the Director-General and Deputy Director-General of ACT Health. Responsibilities include: • Setting the strategic direction for the project (subject to Ministerial endorsement) consistent with meeting the Project Objectives and guidance to key individuals. • Assisting in communicating project requirements with the overarching CHS Executive and Board if required and Design and Technical Working Groups. • Ensuring that the project delivers a value-for-money solution that is effective, efficient, and consistent with Government priorities, probity and best practice. • Identifying and monitoring risk and issues management and assist in the establishment of mechanisms to effectively mitigate these. • Ensuring probity is maintained during the life of the Project.
Program Director	The Program Director will implement decisions made by the PCGs and Executive Steering Committee. Responsibilities include: • Overseeing the delivery of key workstreams (including technical, commercial, legal, as well as stakeholder and communication and project management).

Individual/group	Roles and responsibilities
[redacted]	• Managing interfaces and identify opportunities for efficiencies (e.g., reducing duplication of functions where appropriate). • Ensuring standardisation of processes were appropriate (e.g., reporting methods and templates). Enabling the efficient integration of ACT Health Infrastructure projects with the whole ACT health ecosystem.
Project Control Groups	PCGs will act as decision setting and monitoring bodies. They will oversee, lead, monitor, advise and coordinate all project deliverables in accordance with the desired project objectives. Responsibilities include: • Deliberating on each PCG's activities. • Overseeing and providing guidance on all tasks undertaken by the workstreams. • Escalating issues to the Executive Steering Committee as they arise.
Design Reference Group	The design reference groups comprise of a range of stakeholders including Government and Central Agency and design and technical advisors to provide consultation and feedback on the design and operation of the relevant components of Canberra Hospital.

12. Project Timeline

Key messages

- CHMPP2 Delivery Program is set out for the preferred option for the project scope for the business case which is Option 2 "Replace and Upgrade".
- CHMP2 Delivery Program is anticipated to have the following key milestones, with submission of business case scheduled to be on 16th February 2024:
  - Stage 0A: Final Planning and Development (inc. PSP Design) (FY24-35)
  - Stage 0B: Project Establishment (FY25)
  - Stage 1: Building 6 Enabling and Early Works (FY24-30)
  - Stage 2: New Pathology and Clinical Support Services Building (B6/23/7 Site) (FY24-30)
  - Stage 3: Building 10 and Building 4 Enabling and Early Works (FY28-31)
  - Stage 4: New in-patient building on site of Building 10 (FY29-34)
  - Stage 5: Building 1 and 12 Decanting (FY34)
- All indicative dates listed are subject to several factors, including submission of documentation to government and confirmation of funding release regarding the CHMPP2 project and delivery.

12.1 Project Timeline

The CHMPP2 *project* represents a significant step forward in the CHMP, underscoring the commitment of the ACT Government to enhance healthcare infrastructure at the Canberra Hospital. As detailed in Chapter 9 – Financial Analysis, CHMPP2 requests funding for further planning and development on Option 2. Following the CHMPP2 project, an investment decision will be made on the procurement and implementation of CHMPP2.

The proposed project timeline has been designed to align with this CHMPP2 investment process. A consistent focus of this project timeline will be placed on program and risk management activities due to the nature of the work being in a live hospital environment. The staged approach to the sequencing of work aims to minimise disruption to the operations of the hospital. The funding required for the next stage of development will be focused on extension of life activities and other enabling works to allow for the redevelopment.

12.1.1. Project Phases and Key Milestones

The CHMPP2 project comprises of several key phases of planning and development, each with its own set of milestones.

12.1.1.1. Stage 0A: Final Planning and Development (inc. Preliminary Sketch Plan (PSP) Design)

This stage will commence with final business case submission which is expected to be on 16th February 2024. The final planning and development phase is estimated to run from March 2024 to January 2025, over approximately ten months. This phase involves multiple steps which are outlined below:

- *Prepare technical consultants and commercial advisor brief* –to be completed within one month, from mid-March to early April 2024.
- *Procure technical consultants and commercial advisor* – to be completed in around two months, from early April to early June 2024.
- *Appoint and Mobilise technical consultants and commercial advisor* – to be completed within a week in early June 2024.
- *Capital Planning inc. SOA/FDB/PSP Design* – to be completed within approximately four months from mid-June to late September 2024.
- *Preparation of Revised Business Case* – to be undertaken concurrently with the capital planning works, commencing in early July and completing in early November 2024.
- A 6-week *Contingency* phase has been nominated to account for any potential roadblocks or delays encountered in prior stages.
- The *Submission of Documentation to Government* is estimated to occur in late December 2024 and is immediately followed by the *Review and Consideration of Documentation* phase, finishing in mid-January 2025, approximately.
- Once the documentation review is completed, the project reaches the *Confirmation of Funding Release* stage, happening in mid-2025, affirming that the necessary funds for the project are secured.
- Finally, *Project Commencement* is estimated to start in mid-late January 2025, officially marking the beginning of the project's execution.

12.1.1.2. Stage 0B: Project Establishment

- Initial phase for this milestone starts with the *ACTHD Team Recruitment and CHS Commissioning Team Recruitment* which is suggested to take two months from mid-late January 2025 to mid-March 2025, forming the skills and expertise necessary for the successful execution of the project.
- Based on ACTHD's advice, this phase could commence earlier alongside Stage 0A and that may accelerate the sequence of works planned for Stage 1.

12.1.1.3. Stage 1: B6 Enabling and Early Works

The B6 Enabling and Early Works phase includes several key steps, including Building 6 and 23 Decommissioning and Demolition, Building 7 Demolition, Extension of Life for Buildings 1, 12, 3 and 10, Development of Building 2 Western Entry Bus Stop and other associated works and Off-site relocation and storage of HIS at the temporary leased Mitchell site.

Building 6 and 23 Decommissioning and Demolition works

- Based on ACTHD's advice, the Demolition of Building 6 and 23 are underway and are expected to be completed in late September 2024.

Building 7 Demolition works

- *This phase* starts with the *Demolition Strategy and Planning* phase from early June 2024 to mid-late August 2024 for about 12 weeks. This phase will consider detailed planning for all key stages of the Building 7 demolition phase overall, including relocation of AOD to a new Gaunt Place facility.
- *Procurement and Appointment of Contractor (inc. Enabling Works and Demolition)* starts when the planning is completed in late August 2024 and is estimated to run to mid-November 2024.
- Once the head contractor is on board, the Building *7 Decanting Enabling Works (inc. Design & Refurbishment)* works can be undertaken. This work involves replacement of the existing asset at Gaunt Place with a new bespoke facility designed to meet the AOD services unique functional requirements. This is expected to take 12 months, from mid-November 2024 to mid-October 2025.
- Following this step, the *Decanting of Building 7* is set to begin immediately, with completion estimated in mid-December 2025. This stage generally requires about two months to ensure all occupants and functions of the building are relocated effectively.
- The *Demolition of Building 7* is estimated to be completed by the end of May 2026. The demolition process is estimated to take six months to complete, beginning immediately after the Decanting of B7 in mid-December 2025.
- A two-month *Demolition Contingency* period has been allowed for to account for an unforeseen latent conditions.

Extension of Life Works

The Extension of Life works would apply to Buildings 1, 12, 3 and 10 and forms part of *Stage 1: Building 6 Enabling and Early Works* which is scheduled to start in early March 2024 and complete in mid-January 2028. Detailed scope of works can be found in Chapter 6 – Project Scope.

Building 2 Western Entry Bus Stop and other associated works

The Building 2 Western Entry Bus Stop and other associated works is a commitment made to Disability Reference group to provide disability access to the Western Entry.

Development of Building 2 Western Entry Bus Stop and other associated works is considered to form part of *Stage 1: Building 6 Enabling and Early Works* which we have been advised by MPC to take approximately 6 months, commencing in late November 2024 and finishing by early May 2025.

HIS Relocation

Off-site relocation and storage of HIS at the temporary leased Mitchell site, forming part of *Stage 1: B6 Enabling and Early Works* is expected to start in early December 2024 and conclude in early September 2029. Detailed scope of works can be found in Chapter 6 – Project Scope.

- Based on ACTHD's advice, the relocation of HIS will be completed by Feb 2024.
- The release of funding for this work is expected to take up to two to three years to allow for the finalisation of the digitalisation of records project.
- Relocation of the remaining onsite records in Building 12 that can't be digitalised will be completed in the next stage of the Masterplan.

12.1.1.4. Stage 2: New Pathology and Clinical Support Services Building (Buildings 6/23/7 Site)

The construction of the New Pathology and Clinical Support Services Building, located at Buildings 6/23/7 Site consists of various stages that are outlined below.

- The first phase following the PSP design phase completed in Stage 0A is to procure an [redacted] contractor for the new pathology and clinical support services building. This stage, targeted for completion by early August 2025, entails managing a tender to bring on board an [redacted] contractor.
- The *Design Finalisation and Construction* stage is expected to be completed by early July 2029. This phase includes a comprehensive design finalisation period, and all the pre-construction works required before construction commencement at the end of March 2027. Following an estimated 24-month construction period, *Practical Completion* is expected in late January 2029. *CHS Operational Testing and Commissioning* and *Relocation of Staff from 'Interim Working Arrangements from Old 6-23* will take place after *Practical Completion* for about 5 months, from early February 2029 to early July 2029. The new pathology and clinical support services building is estimated to be fully operational in July 2029.
- Part of this overall stage also includes *Precinct Wide Energy Node - Stage 1* which includes construction of necessary infrastructure to support the project's energy needs. This sub-project is estimated to commence in early June 2024 and continues until mid-June 2026, spanning approximately two years.

12.1.1.5. Stage 3: Building 10 and Building 4 Enabling and Early Works

The Decommissioning and Demolition of Building 10 and Building 4 incorporates a series of processes, each with its individual timeline and objectives:

- The phase listed as *Decanting Planning and Enabling Works* is estimated to commence in late August 2028 and conclude in early June 2029, spanning approximately eight months.
- The *Decant Building 10 and Building 4* phase commences immediately after the earlier phase in June 2029 and is estimated to conclude in late August 2029. This phase lasting about three months, involves the physical relocation of existing teams from Building 10 and Building 4 to the newly prepared facility.
- The *Demolition Planning* phase is a critical milestone in this project, starting from mid-late December 2028 and running to mid-March 2029. For a period of roughly three months, this phase is dedicated to strategizing and outlining the safest and most efficient demolition procedure for Building 10 and Building 4.
- The project subsequently then transitions to the *Demolition Contractor Procurement* phase, from mid-March 2029 until late August 2029, approximately six months. It involves the end-to-end procurement process to select a suitable contractor to undertake the demolition of Building 10 and Building 4.
- The *demolition of Building 10* represents a significant operational milestone, running approximately twelve months, from late August 2029 to late July 2030.
- There is an approximate three-month *Contingency period for the demolition of Building 10.* This serves as a buffer to manage any unforeseen interruptions or complexities encountered during the demolition work.
- *Demolition of Building 4* is proposed to be undertaken concurrently with the demolition of Building 10, however over a shorter duration, from late August 2029 to mid-March 2030, approximately 7 months.

- A two-month *Contingency period for the Demolition of Building 4* has been included from the mid-March demolition date to the end of July 2030 to address any delay or latent conditions identified during the demolition process.
- Once demolition of Building 4 is completed, the *Construction of New Green Space on B4 Site* will take place for approximately three months, completing in late July 2030.
- Part of this stage will also include *Stage 2 of the Energy Precinct Node,* estimated to commence in early June 2028 and conclude in mid-June 2030. Spanning a duration of just over two years, this phase involves further development and enhancement of the energy infrastructure to support the expanding needs of the project.

12.1.1.6. Stage 4: New In-patient building on site of Building 10

The construction of the new in-patient building on the site of Building 10 is broken down into three fundamental phases.

- [redacted] This stage, beginning in June 2028, is targeted for completion by January 2029, entails managing a tender to bring on board an ECI contractor.
- [redacted] a comprehensive *Design Finalisation (inc. review of the PSP design originally developed in 2024)* is required. This design review and finalisation period is more comprehensive than that allowed for in the New Pathology and Clinical Support Services Building program given the five-year gap between when the original PSP design was completed and when the [redacted] contractor has been appointed. This design review and finalisation period is expected to take 12 months to complete, concluding in late 2029.
- After around 12 months of design finalisation, subsequent *Planning Application Approval* is expected to take 12 months, coming through in November 2030.
- The *Works Documentation* and *Procurement of Ealy Trades* will be completed prior to the Planning Approval coming through in late 2030, over a nine-month period from mid-March 2030 to mid-November 2030.
- *Early Works* will commence immediately after the *Planning Application Approval*, from early November 2030 to May 2031, with *Main Works* to take place from May 2031 to early March 2033, marking an overall construction timeline of 30 months or 2.5 years.
- *Practical Completion* is slated for early March 2033, with an additional four-month period for *CHS Operational Testing and Commissioning* to conclude in mid-July 2033, earmarking *B10 Operational Commencement.*

12.1.1.7. Stage 5: Building 1 and 12 Decanting

The decanting of Buildings 1 and 12 involves three main phases.

- The first phase is the *Decanting Planning and Contractor Procurement* which is scheduled to start in early December 2032 and end in mid-July 2033, spanning approximately eight months.
- The second phase will see the *Decanting of Building 1 into the new In-patient Building.* Set to be completed by early October 2033, this phase involves creating a detailed and strategic plan to shift personnel, patients, medical equipment, and other operational assets safely and effectively from Building 1 to the new in-patient building. Given the complicated nature of relocating medical facilities and patients, and ensuring minimal disruption of services, this process can take around three months.

- The *Decanting of Building 12* is also anticipated to be completed by early October 2033. This is anticipated to take three months.

12.1.2. Other Cost Items

Energy node – Stage 3 and Stage 4 have been categorised under *Other Cost Items* to be delivered as part of the CHMPP2 program.

- The *Precinct Wide Energy Node – Stage 3* phase is estimated to be undertaken between June 2032 and June 2034, approximately two years.
- The *Precinct Wide Energy Node – Stage 4* phase is estimated to be undertaken between June 2036 and June 2038, approximately two years.

Key milestones for each project phase are set out below in Table 70. For more detailed dates, see Appendix S – Project Schedule.

It should be noted that all dates are indicative and subject to several factors including Cabinet decisions regarding the Business Case and proceeding with project delivery. Actual timing will be subject to the completion of the procurement process, planning and environmental approvals and other risks.

Table 70: Implementation milestones and timeframes

Project Phases	Milestones	Anticipated Deadlines
Stage 0A: Final Planning and Development (inc. PSP Design)	Prepare Technical Consultants + Commercial Advisor Brief	April 2024
	Procure Technical Consultants + Commercial Advisor	June 2024
	Appoint Technical Consultants + Commercial Advisor	June 2024
	Mobilise Technical Consultants + Commercial Advisor	June 2024
	Capital Planning inc. SOA/FDB/PSP Design	September 2024
	Preparation of Revised Business Case (Report Back)	November 2024
	Contingency allowance	December 2024
	Draft Submission of Documentation to Government	December 2024
	Review and Consideration of Documentation	January 2025
	Final Submission of Documentation to Government	January 2025
	Confirmation of Funding Release	January 2025
	Project Commencement	January 2025
Stage 0B: Project Establishment	ACTHD Team and CHS Commissioning Team Recruitment	March 2025
Stage 1: B6 Enabling and Early Works	Building 7 Demolition Strategy and Planning	August 2024
	Procurement of Contractor	November 2024
	Building 7 Decanting Enabling Works (inc. development of the new Gaunt Place facility).	October 2025
	Building 7 Decanting	December 2025
	Building 7 Demolition	May 2026
	Extension of Life for Buildings 1, 12, 3 and 10	January 2028
	Development of Building 2 Western Entry Bus Stop and other associated works	May 2025
	Off-site relocation and storage of HIS at the temporary leased Mitchell site	September 2029
Stage 2: New Pathology and Clinical Support Services Building (B6-23-7 Site)	Procure New Building 6 [redacted] Contractor	August 2025
	Building 6 Design Finalisation and Planning Approval	March 2027
	Building 6 Construction Commencement	March 2027
	Building 6 Practical Completion	January 2029

Project Phases	Milestones	Anticipated Deadlines
	Building 6 Operational Commencement	July 2029
	Precinct Wide Energy Node – Stage 1	June 2026
Stage 3: Building 10 and Building 4 Enabling and Early Works	Decanting Planning and Enabling Works	June 2029
	Decant Building 10 and Building 4 inc. Relocation of Existing Teams	August 2029
	Demolition Planning	March 2029
	Demolition Contractor Procurement	August 2029
	Demolish Building 10	July 2030
	Demolition Contingency (Building 10)	October 2030
	Demolish Building 4	March 2030
	Demolition Contingency (Building 4)	May 2030
	Construction of New Green Space on Building 4 Site	July 2030
	Precinct Wide Energy Node – Stage 2	June 2030
Stage 4: New in-patient building on site of Building 10	Procure New B10 [redacted] Contractor	January 2029
	Building 10 Design Finalisation and Planning Approval	December 2029
	Building 10 Construction Commencement	November 2030
	Building 10 Practical Completion	March 2033
	Building 10 Operational Commencement	July 2033
Stage 5: Building 1 and 12 Decanting	Decanting Planning and Contractor Procurement	July 2033
	Decant Building 1 into new In-patient Building	October 2033
	Decanting Building 12	October 2033
Other cost items	Precinct Wide Energy Node – Stage 3	June 2034
	Precinct Wide Energy Node – Stage 4	June 2038

12.2 Project Decision Points

Following the review of this Business Case, key project decisions, including project and design approvals, will be carried out in accordance with the governance structure outlined in Chapter 11– Project Governance, Stakeholder Engagement Plan and Advisors Engagement Plan. Table 71 below provides a detailed overview of these decision points.

Table 71: Key project decision points

Project Phases	Approvals	Decision Makers	Anticipated Deadlines
Stage 0A: Final Planning and Development (inc. PSP Design)	Appoint Technical Consultants + Commercial Advisor	ACTHD Project Team	June 2024
	Review and Consideration of Capital Planning Documentation	ACTHD Executives	January 2025
	Endorsement of Capital Planning Documentation	ACTHD Executives	January 2025
	Confirmation of Funding Release	Treasury	January 2025
Stage 0B: Project Establishment	ACTHD Team and CHS Commissioning Team Recruitment	ACTHD Executives & CHS Executives	March 2025
Stage 1: B6 Enabling and Early Works	B7 Demolition Strategy and Planning Endorsement	ACTHD Project Team & MPC	August 2024
	Appointment of B7 Contractor and Contract Execution	MPC	November 2024
Stage 2: New Pathology and Clinical Support Services Building	New B6 [redacted] Contractor Appointment	ACTHD Project Team & MPC	August 2025
	B6 Design Endorsement	ACTHD Project Team, MPC & CHS	February 2026
	B6 Operational Testing and Commissioning	ACTHD Project Team, MPC & CHS	June 2029
	Precinct Wide Energy Node – Stage 1 Design Endorsement and Construction Contract Execution	ACTHD Project Team	June 2026
Stage 3: Building 10 and 4 Enabling and Early Works	Decanting Planning and Enabling Works Endorsement	ACTHD Project Team & MPC	June 2029
	Appointment of Demolition Contractor and Contract Execution	ACTHD Project Team & MPC	August 2029
	Precinct Wide Energy Node – Stage 2 Design Endorsement and Construction Contract Execution	ACTHD Project Team & MPC	June 2030
Stage 4: New in-patient building on site of Building 10	B10 [redacted] Contractor Contract Execution	ACTHD Project Team & MPC	January 2029
	B10 Design Endorsement	ACTHD Project Team, MPC & CHS	December 2029

Project Phases	Approvals	Decision Makers	Anticipated Deadlines
	B10 Operational Testing and Commissioning	ACTHD Project Team, MPC & CHS	July 2033
Stage 5: Building 1 and 12 Decanting	Decanting Planning Endorsement and Contractor Contract Execution	ACTHD Project Team & MPC	July 2033
Other cost items	Precinct Wide Energy Node – Stage 3 – Design Endorsement and Construction Contract Execution	ACTHD Project Team & MPC	June 2034
	Precinct Wide Energy Node – Stage 4 – Design Endorsement and Construction Contract Execution	ACTHD Project Team & MPC	June 2038

12.3 Recommended Float

Float has only been nominated for the required demolition phases. Otherwise, no explicit float has been introduced in the program, but a consistent amount of contingency has been implemented throughout each phase. A long delivery program that spans across the next 10 to 15 years has flexibility for adjustment throughout the implementation of the program.

12.4 Project timeline risks, dependencies, constraints and/or deadlines

The primary factors influencing, driving, and potentially constraining the CHMPP2 timeline include the following:

- Conclusion of design consultation activities with design and technical advisers and clinicians (as outlined in Chapter 11– Project Governance, Stakeholder Engagement Plan and Advisors Engagement Plan).
- Confirmation of funding release to enable project establishment and commence delivery of CHMPP2.
- Completion of the planning and DA process, noting separate approvals will be required for the early works and the main works package. Community consultation, and resolution of access requirements will also be key parts of this process.
- The progress of interdependent projects and other infrastructure projects currently and/or planned to be underway, including North Canberra Hospital (not in scope for this Business Case).
- Strategy for the packaging of capital work components, particularly early works, utilities protection and relocation and demolition.
- The recommended delivery model and the necessary procurement process timing.
- The timing and implementation of the proposed decanting strategies for the following:
    - Decanting Building 1 into new in-patient building.
    - Decanting Building 12.
    - Maintenance of logistics business continuity throughout campus during all works
- Time taken to undertake operational commissioning, particularly with respect to ICT systems, and the transition from existing facilities.

Other risks to the project timeline are outlined in the Risk Register (see Appendix N).

12.5 Project Timeline Assumptions

The key assumptions that shape our project's proposed timeline set out below:

a. Submission of final Business Case occurs in February 2024.

b. Funding approval announcement in November 2024 with project commencement occurring thereafter (20 days' buffer noted in program for any delay in funding announcement).

c. ACTHD project team recruitment phase to commence right after confirmation of funding release to establish Project Directors and Senior Leadership.

d. Building 6 and 23 decanting and demolition is currently underway, forecast to complete in September 2024.

e. If approved, demolition of Building 7 is assumed to commence following funding approval and completion of the existing 6 and 23 demolition program.

f. [redacted].

g. Similarly, construction timeframes have been estimated with reference to previous D&C hospital projects of a comparable scale and complexity in ACT and interstate.

h. With respect to decanting and relocation into completed facilities, we have assumed new facilities are fully completed and fit for purpose with the intention of cut-over from existing operational facilities – to reduce the operational downtime required. Any transition is assumed to be staff oriented only – and may include minor non-critical operational equipment and does not pertain to major medical equipment etc.

Appendices

Ref.	Item	File Name	Issue Date	Version Number	Prepared By
A	ILM Supporting Documentation	Appendix A_ILM Supporting Documentation.pdf	February 2024	1.0	EY
B	Investment Logic Map	Appendix B_Investment Logic Map.pdf	June 2023	4.0	EY
C	Wellbeing Impact Assessment	Appendix C_Wellbeing Impact Assessment.pdf	February 2024	1.0	EY
D	B6 Functional Design Brief	Appendix D_FDB_Building6_ V1.5_25Jan2024.pdf	January 2024	1.5	Aspex Consulting
E	B10 Functional Design Brief	Appendix E_FDB_Building10_v1.3_25Jan2024.pdf	January 2024	1.3	Aspex Consulting
F	New B6 Schedule of Accommodation	Appendix F_SOA_V6_NewB6_25Jan24.pdf	January 2024	6.0	Aspex Consulting
G	New B10 Schedule of Accommodation	Appendix G_SOA_V6_NewB10_25Jan24.pdf	January 2024	6.0	Aspex Consulting
H	Clinical Support Services Service Model	Appendix H_Clinical Support Services_SM_V4_25Jan24.pdf	January 2024	4.0	Aspex Consulting
I	Medical Specialties Service Model	Appendix I_Medical Specialties_SM_V4_25Jan24.pdf	January 2024	4.0	Aspex Consulting
J	Surgery Service Model	Appendix J_Surgery_SM V4_25Jan24.pdf	January 2024	4.0	Aspex Consulting
K	Pathology Service Model	Appendix K_Pathology_SM V5_24Jan24.pdf	January 2024	5.0	Aspex Consulting
L	Proof of Concept Design Reporting	Appendix L_Proof of Concept Design Reporting.pdf	January 2024	2.0	Silver Thomas Hanley (STH) (including sub-appendices collated by STH, but prepared by other providers)
M	HV Network Summary	Appendix M_The Canberra Hospital HV Network Summary 2023.pdf	December 2023	1.0	LCI Consulting
N	Risk Register	Appendix N_Risk Register Final.pdf	February 2024	5.0	EY
O1	MBM Capex Cash Flow	Appendix O1 MBM Capex_Cash_Flow February 2024.pdf	February 2024	8.0	MBM Pty. Ltd.

Ref.	Item	File Name	Issue Date	Version Number	Prepared By
O2	MBM Capex Cost Plan	Appendix O1 MBM Capex_Cost_Plan February 2024.pdf	February 2024	8.0	MBM Pty. Ltd.
P	Detailed Annual Cashflow Profile	Appendix P – Detailed Annual Cashflow Profile.pdf	February 2024	1.0	EY
Q1	Treasury Cost Templated completed for Option 1	Appendix Q1 – Treasury Cost Template (Option 1).pdf	February 2024	1.0	EY
Q2	Treasury Cost Templated completed for Option 2	Appendix Q2 – Treasury Cost Template (Option 2).pdf	February 2024	1.0	EY
Q3	Treasury Cost Templated completed for Option 3	Appendix Q3– Treasury Cost Template (Option 3).pdf	February 2024	1.0	EY
R1	ACT Health Infrastructure Communications and Engagement Strategy	Appendix R3 - ACT Health Infrastructure Communications and Engagement Strategy	February 2024	1.0	ACTHD
R2	Communications and Strategy Overview	Appendix R2_Communications and Strategy Overview-CHMP Phase 2.pdf	February 2024	1.0	ACTHD
R3	Community and Stakeholder Communications and Engagement Framework	Appendix R1_Community_and_Stakeholder_Communications_and_Engagement_Framework_October 2023_DRAFTv2.pdf	October 2023 – Revised February 2024	2.0	EY
S	Project Schedule	Appendix S_Canberra Hospital_Project Schedule.pdf	February 2024	1.0	EY

Appendix A – ILM Supporting Documentation

ILM Workshop attendees

Organisation	Attendees	
ACT Health	• David Jones • Erica Nixon • John Catanzariti	• Phil Burns • Johan Louw
ACT Treasury	• Radovan Dragojlovic	
Canberra Health Services	• Colm Mooney	• Dave Gilbert
Major Projects Canberra	• Simon Webber • Douglas Paul • Spencer Wright	• Swarupa Lathi • David Oliver
[redacted]	[redacted]	[redacted]

Risk Workshop 1 attendees

Organisation	Attendees	
ACT Health	• Phil Burns • Susu El-Husseini • Samuel Griffiths	• Debbie Fleischer
Canberra Health Services	• Reuben Pellizzer • Colm Mooney	• Dave Gilbert • Myles Trew • Elliot Fraval
Major Projects Canberra	• Spencer Wright • Swarupa Lathi	• David Oliver
STH	• David Collins	• Steph Antonopoulus
[redacted]	[redacted]	[redacted]

Risk Workshop 2 attendees

Organisation	Attendees	
ACT Health	• Susu El-Husseini • Samuel Griffiths	• Debbie Fleischer
Canberra Health Services	• Reuben Pellizzer	• Dave Gilbert
Major Projects Canberra	• Spencer Wright • Swarupa Lathi	• David Oliver
[redacted]	[redacted]	[redacted]

CABINET

WELLBEING IMPACT ASSESSMENT

Canberra Hospital Master Plan Phase 2 — ACTHD

Purpose of proposal

As part of the Canberra Hospital Master Plan, the purpose of this Tier 1 Business Case is to provide a robust basis for the ACT government to make an informed decision about investing in the Canberra Hospital Master Plan Phase 2 Project (CHMPP2). The proposal for the CHMPP2 project includes the planning and development of a new Pathology and Clinical Support Services Building and a new Inpatient and Outpatient Building alongside with extension of life activities to maintain service continuity during the delivery of the project as well as enabling works for the CHMPP2. The CHMPP2 aims to upgrade ageing and deteriorating buildings that are increasingly unfit-for-purpose, costly to maintain and unable to meet the growing needs across the Territory and neighbouring catchment areas in the NSW region.

Impact description

Key Wellbeing Impacts of this proposal:

The key aim of the CHMPP2 project is to replace ageing facilities with modern, more efficient, and sustainable facilities. Informed by the social economic analysis, the CHMPP2 project will deliver the following wellbeing impacts to hospital staff, patients, visitors and the broader community across the ACT catchment areas:

- Improved patient access, health outcomes and satisfaction supported through a number of project features including:
    - Additional capacity to reduce current wait times and accommodate future growth.
    - Built-in flexibility to future-proof the CH campus to shifts in demand.
    - Affording the opportunity for the CH to pursue service innovations.
    - Improved synergies between clinical adjacencies, supporting patient-centric care.
    - Supporting research and teaching activities across the CH campus.
- Improved workforce conditions enabled through the provision of purpose-built facilities, built around the workforce requirements and workflows of each department, resulting in a healthier and happier workforce expected to improve the retention of existing staff and attraction of new staff.
- Additional significant impacts on staff and patient wellbeing through improved safety and amenity of site, ensuring the compliance with modern safety standards, improved hospital's physical amenities and overall environment including additional green space.

Expected Negative Impacts:

During the construction period from August 2025 to July 2029 for the new PCSS Building and from March 2031 to January 2033 for the new Inpatient and Outpatient Building, it is expected that the CHMPP2 project may cause short-term disruptions with noise, vibration, dust and accessibility impacts and patients and staff with compromised immune systems and who are sensitive to dust, and fibres generated from construction activities may experience some negative impacts. ACTHD would seek to keep such impacts to a minimum and have appropriate engagement strategies and responses in place with CHS.

Such negative impacts are expected to be temporary, and all necessary precautions will be taken into account during the decanting and redevelopment activities to reduce any adverse effects on health and wellbeing. During the design process, it was noted that the new PCSS and the current traffic management arrangements around Palmer St and Hospital Rd may impact the residential are around Palmer Street. To ensure that the new PCSS Building does not dominate the views of the horizon for people residing and traveling along Palmer Street additional considerations in landscape and urban design.

Magnitude of Impact

- **Positive Wellbeing Impacts**: The impacts described above are direct and would be felt across the Territory and neighbouring catchment areas in the NSW region. The CHMPP2 Project is required to maintain service continuity of health services and meet current and future demand to FY31 (Option 2) and FY41 (Option 3). In this context, the impacts are major and sustained.
- **Negative Wellbeing Impacts**: The impacts described above are direct and temporary and, to the extent possible, would be remediated through sequenced decanting, demolition and construction activities as well as best practice construction techniques.

Will the proposal have an impact on climate change?

By incorporating facilities with modern sustainability design features, the CHMPP2 Project will deliver improved asset sustainability alongside with environmental benefits in the form of emissions reductions and reduction in utility costs. The key features will include electrification of facilities, provision of enabling infrastructure (e.g., larger power plants) and modern systems (e.g., upgraded heating, ventilation, and air conditioning systems). New buildings will also be constructed using more sustainable and long-wearing materials and using contemporary construction techniques to improve the resilience of the buildings to climate and other environmental events.

It is expected that the delivery of the CHMPP2 project will result in significant reductions in carbon emissions that amounted to nearly 4,000 tonnes in 2019 in Buildings 1, 10 and 12 alone (that are in scope for upgrade and modernisation). Driven by the increase in efficiency from electrification of Buildings, it is expected that the utility cost savings will be approximately $2.7m over 20-year period. The addition of a precinct energy node will support the electrification needs of the buildings and broader precinct.

Option 3 includes the demolition of Building 4 to provide for additional green space, supporting the campus to mitigate the effects of climate change for patients, workers, and other visitors.

- A Climate Change checklist is not required for this submission (Program does not form part of any new legislation).

WELLBEING IMPACT ASSESSMENT

- ACTHD acknowledges this proposal will have climate related-risks and continues to keep sustainability as a core principle for all infrastructure projects as we are committed to meet the target of being a zero-emissions ACT health sector by 2040.
- This proposal ensures the facilities are built in alignment with all relevant ACT targets, legislation, policy and *Australasian Health Facility Guidelines (AusHFG)* standards.
- ACTHD further welcomes the recently released *National Health and Climate Strategy* which sets the direction for adaptation toward net zero emissions. This all electric asset will contribute toward that direction.

Who is affected?

The CHMPP2 project is expected to impact the Canberra hospital workforce including approx. 7000 staff members, their patients with the annual admission of over 90,000 patients and the broader community, particularly residing in the local community at the Woden Valley site and the broader hospital catchment area in the territory and the surrounding NSW region. It is expected that the project will positively impact around 500,000 people living in those areas who receive trauma and major medical and subspecialty services from the Canberra Hospital. The impact is expected to be equally distributed across different groups of population including elderly, children, Aboriginal and Torres Strait Islander people and people from culturally diverse backgrounds who receive services from the Canberra Hospital.

Will the proposal have a disproportionate impact (positive or negative) on specific groups?

Being a public hospital, the impact from redevelopment of the Canberra Hospital campus is expected to be equally distributed across different groups of population including elderly, children, Aboriginal and Torres Strait Islander people and people from culturally diverse backgrounds who receive services from the Canberra Hospital.

Across gender	Aboriginal and Torres Strait Islander people	Carers	Children and young people	Culturally and linguistically diverse people	LGBTIQ+ people	Older Canberrans	People with disability
☒	☒	☒	☒	☒	☒	☒	☒

Please provide additional information below on the impact of the proposal across the community.

In assessing gender impacts consider cisgender, transgender and non-binary experiences.

See the Drafting Guide for definitions and further information around gender, age, education and income levels.

Gender – will your proposal impact:		Age – will your proposal impact:		Education – will your proposal impact:	
Predominantly women (≥80%)	☐	0 – 4 years	☒	Lower-educated individuals	☒
Women (60-79%)	☐	5 – 17 years	☒	Higher-educated individuals	☒
Gender balanced	☒	18 – 29 years	☒	**Income – will your proposal impact:**	
Men (60-79%)	☐	30 – 49 years	☒	Lower income	☒
Predominantly men (≥80%)	☐	50 – 64 years	☒	Middle income	☒
	☐	65+ years	☒	Higher income	☒

Impacts on Aboriginal and Torres Strait Islander people

Impacts from redevelopment of the Canberra Hospital campus are expected to be equally distributed across different population groups.

Impacts on future generations

Redeveloped buildings have an asset life of approximately 20 years, supporting the demand and health needs of future generations. There are no negative long-term impacts expected from the CHMPP2 Project.

Wellbeing domain

Health

Health domain – most closely related to the impact of this proposal

Among a range of benefits delivered through the CHMPP2 project, the key impact is expected to be on health and wellbeing of hospital staff, patients, and the broader community. Enabled by purpose-built modern facilities compliant with modern safety standards, the Project will contribute to improved patient access, health outcomes, safety and amenity of site and working conditions for hospital staff through a number of project features mentioned in section 'Impact Description'.

Other relevant domains include:

- **Safety domain**: With each year, the risk of failure for ageing assets, some approaching end of life, increases. Building 6 and Building 10 will be redeveloped to comply with contemporary safety standards. Extension of life activities will ensure buildings remain operational/safe during the implementation phase of the Project.
- **Environment and Climate domain:** Discussed above: 'Will the proposal have an impact on climate change?

Timeframe

Five years plus

The CHMPP2 project will be delivered over the course of 14 years from April, 2024 to June 2038 with benefits

delivered until beyond this period and expected to last until the end of useful life of the new modern facilities

Evidence base and data

What do we know now?

The wellbeing impact analysis is informed by a number of additional investigations performed to assess the condition and functionality of the existing facilities. These include:

- Canberra Hospital Master Plan 2021 listing the rationale and proposed option for planning and redevelopment of the Canberra Hospital, summary of community consultations as well as building services design reports.
- The Canberra Hospital Strategic Asset Management Plan 2017 that provides a comprehensive assessment of all Canberra Hospital Buildings, including the condition, functionality, and aspects across spatial relationships (scale, layout), amenity, environmental comfort, legislative compliance, aesthetics and adaptability.
- Building façade inspection reports performed by independent building inspector ARUP, informing about the external safety of buildings.

Moreover, a range of research evidence to inform about potential impacts on health and wellbeing through improved safety and amenity of facilities and improved working conditions:

- Brook et al., (2019). Characteristics of successful interventions to reduce turnover and increase retention of early career nurses: A systematic review. International Journal of Nursing Studies 91. 47-59.
- Lock, K. F. (2022). Factors affecting the UK junior doctor workforce retention crisis: an integrated review. CMJ Open 12: e059397.
- Douglas, C.H. and Douglas M.R (2004) Patient-friendly hospital environments: exploring the patients' perspective. Health Expectations 7 (1) p.61-73.
- Marcus, C.C. (2007) Healing gardens in Hospitals. Interdisciplinary Design and Research 1(1).
- Reiling J, Hughes RG, Murphy MR (2008). The Impact of Facility Design on Patient Safety. In: Hughes RG, editor. Patient Safety and Quality: An Evidence-Based Handbook for Nurses. Rockville (MD): Agency for Healthcare Research and Quality (US). Chapter 28.

Additional data and information collected through targeted stakeholder consultations including representatives from ACT Treasury, ACT Health, Canberra Health Services (CHS), and Major Projects Canberra (MPC).

What do we need to know?

Investment Logic Mapping undertaken with ACT Health, CHS, MPC and Treasury identified a number of Key Performance Indicators (KPIs) relevant to wellbeing including for patients (e.g., reduced wait times and patient satisfaction) and for the hospital workforce (e.g., reduced turnover and staff satisfaction).

A list of these KPIs can be found below: Measures of Success. Data to inform these measures can be collected through the implementation process. However, it is frequently difficult to disentangle the impact of the CHMPP2 on this project from broader external factors.

Collaboration and Engagement

Engaged Stakeholders

As part of the CHMPP2 project, a number of stakeholder consultations were undertaken to inform planning and development of the preferred project option. These include the ACT Health Directorate, Canberra Health Services, Major Projects Canberra, and ACT Treasury.

The technical and clinical aspects of the CHMPP2 Project were informed through the engagement with external stakeholders including design and technical advisers.

Results of Engagement

The engagement has led to a comprehensive understanding of project scope, requirements for planning and redevelopment activities and anticipated costs and benefits of the project. Feedback from stakeholders, particularly from ACT Health, Canberra Health Services and Major Projects Canberra has been instrumental in shaping the project's direction.

Engagement Process

The stakeholder engagement process involved a range of methods, including executive planning workshops, specialist planning teams, options workshops, risk workshops, and financial workshops.

A tailored approach was used for different stakeholder groups, categorized into 'Work together', 'Involve', 'Consult', and 'Keep informed', depending on their level of influence and interest.

Future Stakeholder Engagement

Future engagements will involve consultation with stakeholders like the Aboriginal and Torres Strait Islander Liaison and the Environment, Planning and Sustainable Development Directorate.

The engagement will focus on detailed planning and development post-Business Case. This will likely include consultations, co-design sessions, and targeted workshops to finalize the project scope, design, program, and cost.

Barriers to Engagement

Potential barriers may include differing priorities or concerns among stakeholders, logistical challenges in organising engagement sessions, and ensuring effective communication and consensus-building among diverse groups. These barriers will be addressed through advanced

planning and communication with the relevant parties.

Consultation with Aboriginal and Torres Strait Islander Representative Bodies

While specific details on consultations with the ACT Aboriginal and Torres Strait Islander Elected Body or other representative bodies are not explicitly mentioned, the plan includes future engagement with the Aboriginal and Torres Strait Islander Liaison. This engagement will be crucial in ensuring that the project aligns with the needs and priorities of these communities and addresses any specific concerns they may have.

Measures of Success

How will Government know this proposal has been successful?

To determine the success of the CHMPP2 project, a list of KPIs have been identified during the Investment Logic Map Workshop. These KPIs will be monitored to provide measurable outcomes to assess whether the objectives of the proposal have been met and to what extent they are impacting the wellbeing of people, places, and institutions. The list of KPIs identified to monitor the progress and success of the CHMPP2 Project is provided below:

1. Improved patient access, health outcomes and satisfaction
   - KPI 1: Reduced total list times
   - KPI 2: Reduced length of stay
2. Improved safety and amenity of site.
   - KPI 1: Reduced total recordable incident rate
   - KPI 2: Increased satisfaction with environment score
   - KPI 3: Increased patient satisfaction
3. Staff retention, attraction and wellbeing
   - KPI 1: Reduced turnover
   - KPI 2: Staff satisfaction (people survey)
   - KPI 3: Reduced average time to recruit new staff
4. Improved operational efficiency and sustainability
   - KPI 1: % decrease in number of instances of unplanned maintenance
   - KPI 2: % reduction in CO2 emissions

In line with the ACT Aboriginal and Torres Strait Islander Agreement 2019-2028, the CHMPP2 supports the achievement of target focused on community leadership. During the next stage of planning and development of the CHMPP2 Project, it is expected to engage with the Aboriginal and Torres Strait Islander Liaison as per Stakeholder Engagement Plan to ensure the alignment with the needs and priorities of these communities.

How will Government know this proposal has achieved the anticipated wellbeing impacts?

See section above.

Planned Evaluation

Information about evaluation, including how to identify whether your proposal should have an evaluation plan, is available through the wellbeing toolkit resource: Evaluation in Wellbeing Impact Assessments

The proposal does not include the detailed evaluation plan. This Business Case is in the initial planning and development stage with further planning and development to be undertaken later to inform the detailed designs. As part of this detailed design phase, further consideration will be taken to prepare for the data collection and establish the key evaluation design elements and approaches which is expected to be carried out as part of the broader CHMP Program Evaluation.

As part of the Planned Evaluation, it is expected that KPIs will measure the success and contribute to a part of the evaluation/monitoring of benefits. KPIs will be monitored by the Territory Health Infrastructure Executive Steering Committee as outlined in the Stakeholder Engagement Plan included in this Business Case. but how these will be collected and who will be responsible for monitoring? Territory Health Infrastructure Executive Steering Committee as per SEP. As part of the evaluation the detail design will outline the approach to risk monitoring during the construction period as well as beyond to ensure the expected outcomes and benefits as outlined in this Business Case are achieved

aspex consulting

Functional Design Brief - Building 6

CANBERRA HOSPITAL
CAPITAL REDEVELOPMENT

Version 1.5

25 January 2024

TABLE OF CONTENTS

INDEX OF FIGURES

INDEX OF TABLES

Version Control

VERSION	ISSUED TO	CHANGES MADE	ISSUED BY	DATE OF ISSUE
1.0	Internal Use Only	Initial FDB Draft by Building	Aspex Consulting	12 October 2023
1.1	Internal Use Only	Draft FDB by Building	Aspex Consulting	23 November 2023
1.2	ACT Pathology	Second draft FDB by building (with edits)	Aspex Consulting	9 January 2024
1.3	Canberra Health Services	Second draft FDB by building (clean)	Aspex Consulting	9 January 2024
1.4	Internal Use Only	Draft FDB Refinement	Aspex Consulting	16 January 2024
1.5	Canberra Health Services	Draft Final FDB	Aspex Consulting	25 January 2024

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LIST OF ABBREVIATIONS

ACH	Air Changes per Hour
ACT	Australian Capital Territory
ADC	Automated Dispensing Cabinets
AED	Automated External Defibrillator
AFER	Automated Endoscope Reprocessor
AI	Artificial Intelligence
AIDS	Acquired Immune Deficiency Syndrome
AMS	Antimicrobial Stewardship
ANU	Australian National University
AP	Anatomical Pathology
ARCBS	Australian Red Cross Blood Service
AusHFG	Australasian Health Facility Guidelines
B	Building
BMT	Bone Marrow Transplant
BOH	Back of House
BSC	Biological Safety Cabinets
CCTV	Closed Circuit Television
CH	Canberra Hospital
CHS	Canberra Health Services
CJD	Creutzfeldt-Jakob Disease
COVID	Coronavirus Disease
CRI	Colour Rendering Index
CSB	Critical Services Building
DG	Diagnostic Genomics
DHR	Digital Health Record
DNA	Deoxyribonucleic Acid
DOSA	Day of Surgery Admission
ED	Emergency Department
EM	Electron Microscopy
ERCP	Endoscopic Retrograde Cholangiopancreatography
EUS	Endoscopic Ultrasound
FBC	Full Blood Count
FDB	Functional Design Brief
FFP	Fresh Frozen Plasma
FFPE	Formalin Fixed Paraffin Embedded
FISH	Fluorescence In-Situ Hybridisation
FM	Facility Management
FNA	Fine Needle Aspirate
FOH	Front of House
FRD	Functional Relationship Diagram
FTE	Full-Time Equivalent
GDA	Gross Departmental Area
GEHU	Gastroenterology & Hepatology Unit
GI	Gastrointestinal
GP	General Practitioner
HCV	Hepatitis C
HEPA	High Efficiency Particulate Absorbing (filter)
HIV	Human Immunodeficiency Virus
HLA	Human Leukocyte Antigen
HPU	Health Planning Unit
HSC	Hematopoietic Stem Cell
HSCT	Hematopoietic Stem Cell HSP Health Services Plan
HSP	Health Service Plan
HTM	Healthcare Technology Management
HVAC	Heating Ventilation and Cooling
ICT	Information Communication Technology
IHC	Immunohistochemistry
IPU	Inpatient Unit
IVF	In Vitro Fertilization
LIS	Laboratory Information System

LN2	Liquid Nitrogen
MALDI	Matrix-Assisted Laser Desorption/ Ionisation
MALDI-TOF	Matrix-Assisted Laser Desorption/ Ionisation – Time Of Flight
MDT	Multi-Disciplinary Team
MHSSU	Mental Health Short Stay Unit
NAT	Nucleic Acid Test
NATA	National Association of Testing Authorities
NGS	New Generation Sequencing
NPAAC	National Pathology Accreditation Advisory Committee
NSW	New South Wales
OBGYN	Obstetrician and Gynaecologist
OPU	Outpatient Unit
PC2	Physical Containment Level 2
PC3	Physical Containment Level 3
PCR	Polymerase Chain Reaction
PEG	Percutaneous Endoscopic Gastrostomy
POC	Points of Care
POCT	Point of Care Testing
PPE	Personal Protection Equipment
PPMS	Peri-Natal Post-Mortem Service
RBC	Red Blood Cell
RCPA	Royal College of Pathologists of Australasia
RSI	Repetitive Strain Injury
SNP	Special Nucleotide Polymorphism
SoA	Schedule of Accommodation
SOP	Standard Operating Procedures
SQM	Square Meter
SSBA	Security Sensitive Biological Agent
TLA	Total Laboratory Automation
UCH	University of Canberra Hospital
UPS	Uninterruptible Power Source
UV	Ultraviolet
VMO	Visiting Medical Officers
VOC	Volatile Organic Compounds
WSI	Whole Slide Imaging
WYC	Women Youth and Children

1. Overview

1.1. BACKGROUND

Canberra Hospital (CH) is the main tertiary hospital for the Australian Capital Territory (ACT) and for South-Eastern parts of rural NSW. CH is a 600-bed hospital providing trauma services and most major medical and surgical sub-specialty services.

Considerable capital redevelopment is underway, with the current construction of a new Critical Services Building (CSB) in Building 5 (Phase 1) and planning underway for Phase 2 of the redevelopment, which is the focus of this Functional Design Brief (FDB).

1.2. PURPOSE

This FDB for Phase 2 Redevelopment focuses on all services that are planned to be relocated to the new Building 6, namely:

- **Pathology;**
- **Procedural Suites, including endoscopy, bronchoscopy, and fluoroscopy;**
- **Gastroenterology and Hepatology Unit (GEHU) Outpatients;**
- **Pre-admission Clinic and Surgical Bookings;**
- **Pharmacy;**
- **Staff Administration;**
- **Mental Health Short Stay Unit (MHSSU);**
- **Learning and Teaching;**
- **Research;**
- **Front of House (FOH) for Building 6; and**
- **Back of House (BOH) for Building 6.**

This FDB translates the Service Model into design requirements, which in turn will inform the architect's concept designs, and eventually – business case.

This document describes the functions, operational requirements, design elements, and defines important relationships and adjacencies for each service (listed above) as described in the *Canberra Hospital Surgical Specialities Service Model, Canberra Hospital Medical Specialities Service Model, Canberra Hospital Pathology Service Model, and the Canberra Hospital Clinical Support Services Service Model.*

The existing points of care (POC) will be transitioned into the Phase 2 Redevelopment in a like-for-like functional capacity, adopting contemporary standards according to the Australasian Health Facility Guidelines (AusHFG)[1] and considering efficient configuration of POC.

There is an additional FDB for Phase 2 Redevelopment that is separately provided for the new Building 10, which incorporates medical and surgical inpatient services, medical and surgical outpatient services (except GEHU outpatients), sleep disorders unit, discharge/transit lounge, hospital in the home, dialysis, perioperative services (i.e. women youth and children

1. Australasian Health Facility Guidelines, updated 2023. Available: https://healthfacilityguidelines.com.au/

obstetric theatres), medical imaging (Core Medical Imaging for CH), staff administration (for Building 6 related functions), Building 10 BOH and Building 10 BOH.

1.3. APPROACH

This FDB has been developed in partnership with the Canberra Health Services (CHS) Clinical Liaison and Health Facility Planning team in the Capital Project Delivery, Infrastructure and Health Support Services Division.

1.4. OVERALL POINTS OF CARE

A POC breakdown for all services in new Building 6 is in Table 1-1 below:

Table 1-1: Canberra Hospital Phrase 2 Redevelopment New Building 6 POC Summary

Outpatient Specialty Service	POC (Phase 2 Redevelopment)
Endoscopy	
Bronchoscopy Procedure Room	2
Endoscopy Procedure Rooms	5
Fluoroscopy Room	1
Stage 1 Recovery Bays	8
Stage 2 Recovery Bays	10
Endoscopy Total	**26**
Outpatient Units	
GEHU Outpatients	14
Pre-admission Clinic and Surgical Bookings	8
Outpatient Unit (OPU) Total	**22**
Mental Health Short Stay Unit	
Mental Health Short Stay Unit Total	**12**
Clinical Support Services	
Pathology	7
Pharmacy	4
Clinical Support Services Total	**11**
Total POC (Building 6) = 71	

1.5. FUNCTIONAL RELATIONSHIPS

The functional relationships for Canberra Hospital Phase 2 of the redevelopment, are outlined in Figure 1-1 below.

The relative importance of functional relationships between departments is provided in the matrix in Figure 1-2.

The most important functional adjacencies for the Phase 2 redevelopment include:

- Inpatient Units (IPUs) – medical and surgical, in the same building (Building 10);
- Outpatients in the same building as the respective IPUs;
- Medical Imaging easily accessible to inpatients and outpatients;
- Pharmacy in the same building as Pathology to enable synergy in relation to the set-up of pneumatic tubes;
- Outpatients accessible to carparking;
- Obstetric theatres directly adjacent to the birthing suite in B11;
- Endoscopy easily accessible to the operating theatres in B5; and
- Administration for B5 clinical services to be located in B6.

Figure 1-1: Complete Functional Adjacencies, Phase 2 redevelopment

	Relationship Matrix 22.08.2023	Bulding 5					Clinical Support					Inpatients										Outpatients					TT&R		WYC
		Emergency Depatment	B5 Med Imaging	Critical Care (ICU/CCU)	Operating Theatres/Cath Lab	Sterilisation Services	Medical Imaging - New Core	Pathology	Pharmacy	Health Information Services	Cardiology Diagnostics	Specialist Medicine	MAPU	Palliative Care	Day Medical Unit	Addiction Medicine	Specialist Surgery	Day Surgery Unit	Endoscopy	Mental Health SSU	HITH	Medical Outpatients	Cardiology/Cardiothoracic Outpatients	Surgical Outpatients	Interventional Radiology	Addiction Medicine Outpatients	Learning & Teaching	Research	WYC Emergency Caeasarean Theatres
Building 5	Emergency Depatment	x	1	1	1	5	5	5	5	5	5	4	4	5	5	5	4	5	5	2	5	5	5	5	5	5			
	B5 Med Imaging		x	1	1	5	3	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5			
	Critical Care (ICU/CCU)			x	1	5	5	5	5	5	4	3	3	3	5	5	3	4	4	5	5	5	5	5	5	5			
	Operating Theatres/Cath Lab				x	1	5	5	5	5	5	3	3	3	5	5	3	4	4	5	5	5	3	5	5	5			
	Sterilisation Services					x	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5			
Clinical Support	Medical Imaging - New Core MI						x	5	5	5	3	3	3	3	3	5	3	5	4	5	5	3	3	3	3	5			
	Pathology							x	5	5	3	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5			
	Pharmacy								x	5	5	3	5	3	3	3	5	5	5	5	5	5	5	5	5	3			
	Health Information Services									x	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5			
	Cardiology Diagnostics										x	5	5	5	5	5	5	5	5	5	5	3	1	3	3	5			
Inpatients	Specialist Medicine											x	1	1	2	5	4	4	5	5	2	3	3	4	5	5			
	MAPU												x	4	5	5	5	5	5	5	5	5	5	5	5	5			
	Palliative Care													x	5	5	5	5	5	5	5	5	5	5	5	5			
	Day Medical Unit														x	5	5	5	5	5	5	5	5	5	5	5			
	Addiction Medicine															x	5	5	5	5	5	5	5	5	5	2			
	Specialist Surgery																x	4	5	5	5	5	5	3	5	5			
	Day Surgery Unit																	x	3	5	5	5	5	5	5	5			
	Endoscopy																		x	5	5	5	5	5	3	5			
	Mental Health SSU																			x	5	5	5	5	5	5			
	HITH																				x	5	5	5	5	5			
Outpatients	Medical Outpatients																					x	5	5	5	5			
	Cardiology/Cardiothoracic Outpatients																						x	5	5	5			
	Surgical Outpatients																							x	5	5			
	Interventional Radiology																								x	5			
	Addiction Medicine Outpatients																									x			
TT&R	Learning and Teaching																										x		
	Research																											x	
WYC	Emergency Caesarean Theatres	Adjacency is with WYC Birthing Suite																											1

Legend
1 Directly adjacent (Horizontal / Vertical)
2 Easily accessible (less than 3 minutes)
3 Accessible 3 to 5 minutes
4 Accessible 6 to 10 minutes
5 Accessible 10 minutes plus

Figure 1-2: Functional Relationships Adjacency Matrix for Medical IPUs and Outpatients

Relationship Matrix	Medical Imaging - building 5	Pathology	Pharmacy	Health Information Services	Cardiology Diagnostics	Dermatology	Respiratory and Sleep	Infectious Diseases	Endocrinology and Diabetes	Gastroenterology	Hepatology	Palliative Care	Renal Medicine (incl Dialysis)	Rheumatology	Neurology and Stroke	General Medicine	Day Medical (& HITH)	Addiction Medicine	Clinical Trials	General Surgery	Endoscopy	Orthopaedics	Ophthalmology	Otolaryngology Head and Neck	Maxillofacial surgery	Mental Health Short Stay Unit	Plastic Surgery	Outpatient clinics (med and surg)	Teaching, training and research
Medical Imaging - New Core In-Scope MI	3	-	-	-	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	1
Pathology		x	-	-	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	1
Pharmacy			x	-	-	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	2	2	-
Health Information Services				x	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cardiology Diagnostics					x	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	3
Dermatology						x	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	2	3
Respiratory and Sleep							x	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	3
Infectious Diseases								x	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	3
Endocrinology and Diabetes									x	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	3
Gastroenterology										x	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	3
Hepatology											x	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	3
Palliative Care												x	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
Renal Medicine (incl Haemodialysis)													x	-	-	-	1	-	-	-	-	-	-	-	-	-	-	2	3
Rheumatology														x	-	-	-	-	-	-	-	-	-	-	-	-	-	2	3
Neurology and Stroke															x	-	-	-	-	-	-	-	-	-	-	-	-	2	3
General Medicine																x	1	-	-	-	-	-	-	-	-	-	-	2	3
Day Medical (& HITH)																	x	-	-	-	-	-	-	-	-	-	-	2	3
Clinical Trials																			x	-	-	-	-	-	-	-	-	-	1
General Surgery																				x	-	-	-	-	-	-	-	2	3
Endoscopy																					x	-	-	-	-	-	-	2	3
Orthopaedics																						x	-	-	-	-	-	2	3
Ophthalmology																							x	-	-	-	-	2	3
Otolaryngology Head and Neck																								x	1	-	2	2	3
Maxillofacial surgery																									x	-	-	2	3
Mental Health Short Stay Unit																											-	3	3
Plastic Surgery																											x	2	3
Outpatient clinics (med and surg)																												x	3
Teaching, Traning and Research																													x

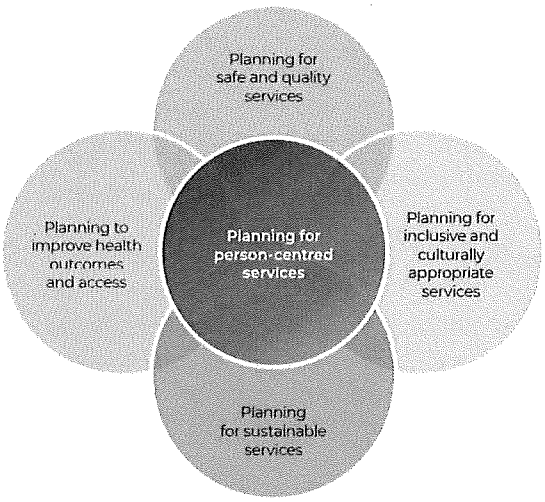
Legend 1 directly adjacent (Horizontal / Vertical) 2 easily accessible (less than 3 minutes) 3 accessible (3 - 5 minutes)

2. Context

2.1. ACT PLANNING PRINCIPLES

The following principles underpin the ACT Health Services Plan 2022-2030[2]. These principles also accord with the development of the previously developed Medicine Service Model.

Figure 2-1: ACT Health Service Planning Principles



Person-centred services - The ACT Government consults with consumer and carers so that services are planned to treat consumers with dignity and respect; the ACT Government makes it easier for people to access services equitably, to move between services across the health system, and to partner with health professionals to participate in decisions about the services provided to them.

Inclusive and culturally appropriate services - The ACT Government consults with groups underrepresented in the healthcare system so that services are planned to be inclusive and culturally appropriate and targeted to specific health needs where necessary.

Safe and quality services - Planning is guided by evidence-informed policy directions, and the ACT Government continually strives to plan for services that improve health outcomes, experiences of receiving care, experiences of providing care, and effectiveness and efficiency of care.

Health outcomes and access - Planning is guided by evidence-informed policy directions, with specific focus on at-risk and priority population groups, planning the right service, at the right time, in the right place, by the right team, every time.

Sustainable services - The ACT Government maximises the use and efficient allocation of limited resources by taking a Territory-wide approach to planning services across the ACT public health system, guided by clear role delineations, service levels, and evidence informed policy directions: service planning activities are prioritised based on need.

2. ACT Government, Health, *ACT Health Services Plan 2022-2030,* available https://www.health.act.gov.au/about-our-health-system/planning-future/act-health-services-plan-2022-2030#:~:text=The%20ACT's%20population%20is%20growing,and%20effective%20care%20for%20everyone.

2.2. CANBERRA HEALTH SERVICE VISION AND SERVICE DIRECTION

CHS' vision is to ***'Create exceptional health care together'***. Improving the quality of healthcare across the ACT is a key priority for CHS as it aims to be the safest healthcare system in Australia, delivering high-quality, person-centred care that is effective and efficient.

Specifically, CHS will provide health care that is:

- Person-centred: providing care that is respectful, responsive, and focused on the patient's needs;
- Safe: avoiding harm to patients from care that is intended to help them;
- Effective: providing services based on scientific knowledge and which produce a clear benefit;
- Timely: reducing waits and sometimes harmful delays;
- Efficient: avoiding waste and reducing unit costs; and
- Equitable: providing care based on clinical need, and that does not vary in quality because of a person's personal circumstances.

2.2.1. Consumer Principles

A fundamental component of patient-centred care is recognising and understanding the consumer perspective of the service. Central to patient-centred care are the themes of Participation, Communication, Experience and Support. These themes form the basis for Consumer Care Principles, the guiding principles for this FDB. The Consumer Care Principles are:

- Participation: consumers (and where appropriate their family members and carers) will be equal partners within the multidisciplinary care team, enabling them to be actively involved in their own care;
- Communication: embedding frequent and meaningful communication with consumers, their family members, and carers, about their care for their entire hospital journey, including discharge;
- Experience: care is delivered in a way that supports the consumers' experience of safety and fosters trust; and
- Support: recognising the importance of involving family and carers in the consumer's care and recovery throughout their health journey.

2.2.2. CHS Future Directions

CHS' future service directions are set out in the *ACT Health Services Plan*, 2022–2030.[3] The desired outcomes from each of the directions are also articulated. These are outlined below.

Addressing key areas of service demand and reform

- Improve health outcomes and access to care, with a particular focus on priority population groups.
- Support access to the services experiencing most significant demand pressures.
- Ensure our services are flexible and inclusive to respond to individual needs and circumstances.

3. ACT Government, Health, *ACT Health Services Plan 2022-2030,* available https://www.health.act.gov.au/about-our-health-system/planning-future/act-health-services-plan-2022-2030#:~:text=The%20ACT's%20population%20is%20growing,and%20effective%20care%20for%20everyone.

Transitions of care

- Improve health outcomes and access to care.
- Make it easier for patients, families, and service providers to navigate the service system.
- Address issues of patients 'falling through the gaps' as they move between services and care settings such as between hospital and the community.
- Break down the barriers and silos between services.

The ACT's role as a local, Territory and regional service provider

- Improve access to care closer to home in a safe and sustainable way.
- Reduce unwarranted variation between services.
- Maximise the efficient use of health resources to meet the needs of the community.

Strengthening core ACT Government funded clinical support services

- Improve patient outcomes and reduce length of stay in hospital.
- Ensure that our clinical support services have the appropriate capacity and capability to support new and expanded clinical services.
- Optimise clinical decision making in determining the most appropriate treatment and care for patients.

2.2.3. Learning, Teaching and Research

CHS' *'Clinical Learning and Teaching Strategy 2023 – 2027'*[4] provides the overarching vision, goals and strategic commitments to clinical learning and teaching. The six Strategic Commitments are:

- Strengthen governance and processes to prioritise and enable learning and teaching.
- Prepare and support the clinical workforce to work safely and effectively at the leading edge of their practice.
- Develop and support the clinical workforce to deliver effective, innovative, evidence-based teaching and point of care clinical supervision.
- Establish collaborative environments that maximise and enable effective, innovative, and efficient learning and teaching.
- Foster and strengthen strategic partnerships for learning and teaching with clinicians, consumers and carers, communities, and academia.
- Promote, share, and celebrate learning and teaching.

To achieve these strategic commitments, and to develop a contemporary health precinct, a holistic approach to integrated education, training and research activities into the clinical areas will be key. For clinicians, access to teaching and learning will be built into the flow of their day. This means rooms available on each unit or a shared area readily accessible to clinical (patient) areas, as well as the necessary audiovisual equipment to record and transmit the education and training. To complement the integrated clinical spaces, a teaching and learning hub would provide greater opportunities for education.

Refer to the Clinical Support Service Model for more information on Learning, Teaching and Research.

4. ACT Government, *Clinical Learning and Teaching Strategy 2023 – 2027'*. Available: https://www.canberrahealthservices.act.gov.au/__data/assets/pdf_file/0012/2222040/69e04bc4df49dfd4a9ff49375fe0a3bcfd9dd628.pdf

2.3. OVERARCHING DRIVERS FOR CHANGE

The above strategic and policy positions articulated by ACT Health and CHS are underpinned by a range of drivers for change. The Territory, like other jurisdictions, are facing increasing challenges that are forcing changes in the way people seek and access services. Some of these challenges which are driving change are described below.

The ACT Health Services Plan (2022 to 2030) provides context within which the FDB needs to be considered. The *ACT Health Services Plan* indicates that the Territory's population increased by 14% between 2016-2021 and is projected to increase by 9.7% over the decade to 2030. It is also ageing with those in the 70+ age category increased 34% between 2016-21 and is forecast to rise a further 22.7% by 2030, more than doubling the growth rate for the total population. In addition to population growth and ageing, there are important factors that drive change for the Territory:

Ageing population and increasing chronic disease – the demand for health services is increasing as people live longer with more chronic and multi-morbid conditions. The aged population are high users of health services;

Access for vulnerable population groups – some population groups in Australia experience health inequalities. Aboriginal and Torres Strait Islanders and people from low socioeconomic areas are likely to have poorer health compared to the general population;

Increasing service demand – for planned and emergency surgery, chronic disease, cancer services, and mental health. These have been exacerbated due to the COVID-19 pandemic;

Climate change – has been causing more extreme weather events, such as bushfires and floods. Instances of heat stress, smoke inhalation, food insecurity, and mental health and wellbeing issues are increased for people experiencing extreme weather events; and

COVID-19 – the delivery of healthcare has rapidly changed since the beginning of the COVID-19 pandemic, especially in terms of how and where care is delivered, with a virtual and care closer to home becoming the norm. COVID-19 patients have caused greater pressure on health system capacity, especially in general IPUs and for multidisciplinary teams treating people experiencing the effects of 'long COVID'. Additionally, workforce availability has been significantly impacted, with burnt out staff choosing to leave their professions and with the usual immigrant workforces being unavailable.

3. Design principles of the patient environment

This section outlines the facility wide design principles. Design elements that are specific to specialties are identified in the relevant sections.

3.1. OUTPATIENT CLINICS

The overarching planning principles for outpatient clinics are derived from the AusHFG for Ambulatory Care and Community Health - HPU 0155.[5]

The outpatient clinics in B6 are pre-admission clinic & surgical bookings and GEHU outpatients. This provides close access to the gastroenterologists working in the endoscopy suites in B6. The remaining outpatient clinics are located in B10.

Patient drop-off zones should be present to enable easy patient access.

The outpatient services require:

- Reception / Waiting area(s);
- Consumer amenities (for example public toilets);
- Patient areas with consult, interview, and treatment rooms, and patient toilets, and height/weight bays;
- Clinical support services including clean and dirty utility rooms and general stores;
- Staff areas, including offices, workstations, meeting rooms, file stores, photocopy stores beverage bays, staff rooms, property bays and staff toilets; and
- Potentially, learning and teaching spaces.

Clinical Support Services such as pathology collection, medical imaging and pharmacy should also be accessible to the outpatient service.

Configuration

The reception / waiting area is the main visitor entry point to the unit. This should be well sign-posted to assist with wayfinding.

The reception should oversee the waiting area and should control access to the patient treatment areas.

Seating in waiting areas should be arranged to allow for separation of groups in an informal way. Rows of seating should be avoided. Views to nature or televisions should be provided for entertainment. Seating should also consider the needs of elderly, children, bariatric patients, and those with a disability.

Standardised rooms may include consult rooms supported by interview rooms and/or treatment rooms.

5. Australasian Health Facility Guidelines, HPU 0155 Ambulatory Care and Community Health. Revision 7.0. Date published: September 2020. Available: https://aushfg-prod-com-au.s3.amazonaws.com/HPU_B.0155_7%202.pdf

3.2. ALLIED HEALTH

Allied Health professionals are integral to the multidisciplinary care of outpatients.

A multi-purpose gymnasium will also be available for therapy with Allied Health practitioners, focusing on mobility, strength, and activities of daily living.

Sufficient space is required for safe assessment of mobilisation and activities of daily living, including stairs. Depending on the service mix, a shared therapy unit may be required with plinths and therapy tables, interview rooms, large storage areas for equipment and mobility aids, and a larger therapy area. Many patients attending allied health therapy are physically incapacitated to some extent, and areas are required to accommodate patients using walkers, wheelchairs, and motorised scooters.

3.3. ELDERLY PATIENTS

The elderly population often present with multiple comorbidities and frailty. Services should support the maintenance and restoration of these patients. Spaces for assessment, such as cognitive assessment, and in-unit therapy is important. They can also be prone to falls, therefore, non-slip surfaces should be considered for all patient areas, hi-lo beds should be available for patients who are at risk of falling, and consideration could also be made to having bed alarms installed.

Access close to where patients are being treated is also important for those who are non-ambulant. Patient drop-off zones in front of buildings will be important, as well as consideration of additional building entrances, especially for day-stay services.

3.4. FAMILY / CARERS

Family and carers who are visiting, or staying overnight with patients, will require a fold out chair to bed in the patient's room, somewhere to sit away from the unit, a quiet room for groups of relatives, a beverage bay and access to bathroom facilities. Interview rooms need to be available for private family meetings.

An environment that is considerate of patients and families from culturally and linguistically diverse backgrounds, including Aboriginal and Torres Strait Islander people, is an important consideration. A multi-faith spaces need to be available on the campus.

3.5. BARIATRIC PATIENTS

A patient would be considered a bariatric patient if they weigh over 150kgs, whilst super bariatric patients are those that weigh 250kg to 400kgs. In In the procedural suites and the outpatient areas, the equipment to support safe staff handling of bariatric and super bariatric patients will include ceiling mounted hoists, and either floor scales long enough to take the bed, or specialised beds with built-in scales.

Areas accommodating bariatric or super bariatric patients will need to have provision for wider doorways, larger space for turning, lift access and the storage of beds, electric bed movers, chairs, and wheelchairs.

Sufficient storage space is required for all bariatric equipment.

3.6. PATIENTS WITH BEHAVIOURS OF CONCERN

As in many other health services across Australia, CHS has experienced an increase in the number of incidents of violence directed to staff by patients, consumers, and visitors. The design of the built environment is important to minimise the risk of occupational violence and aggression occurring. Specifically, the design should incorporate:

- Low stimulation rooms;
- Comprehensive CCTV;
- Access controls and duress alarms (fixed and mobile);
- Dual egress in a proportion of clinical consultation rooms and interview rooms;
- Line of sight from nurse's stations to the rooms allocated with higher-risk patients;
- Reception in waiting areas; and
- Interview rooms to undertake screening.

3.7. STAFF

Staff require secure areas and amenities that are not accessible to patients. Staff also require offices and workstations within clinical zones. Meeting or education rooms, staff rooms with kitchenettes and handover rooms are also required.

The number of offices, workstations, break-out bays, and meeting rooms are outlined in the Schedule of Accommodation. The allocation of work areas is based on:

- Activity based working environment aligned with contemporary workplace design standards;
- The number of staff on-site who require a desk space, but do not have either a permanent or workflow related place within a department;
- Shared Meeting Rooms;
- Future COVID working arrangements; and
- Whole of facility shared functions (staff tea rooms, toilets, showers, and end of trip facilities).

Staff offices/workspaces should:

- Collocate workspaces for related services, where possible. Support areas such as tutorial rooms, beverage areas, central printing, and staff toilets should be shared, when office spaces are collocated;
- Collocation should consider identifying and grouping staff and services who might be handling similar confidential information, and should also consider the acoustics and noise levels within shared workspaces;
- Include activity-based workstations that are flexibly designed, reflecting changing patterns of work including employment hours, type of work undertaken, job share and multi-site appointments;
- Small meeting rooms for private meetings / confidential conversations;
- Support increased collaboration between health professionals and a focus on multidisciplinary teamwork, including integration, collaboration, and multidisciplinary interaction;
- Be easy to reconfigure to meet changing needs;
- Ensure adequate storage space for both work related and employee personal items; and

- Include staff only, 'patient free' break out areas, providing a sanctuary away from the work environment.

The area allocations will be consistent with the CHS Staff Accommodation Policy.

The specific configuration of staff and skills mix for the services provided in B6 will be determined closer to the commencement of the services through the development of a comprehensive workforce strategy. General workforce requirements are outlined below.

Medical staff:

Full-time staff or Visiting Medical Officers, Fellows, Registers and Residents will typically carry out day-to-day management of patients.

Nursing staff:

As per a Level 5/6 Clinical services there are specific requirements for the nursing workforce in relation to skill mix, clinical supervision, education, and expertise. Workforce and skill level of the nurses required to provided day to day care should be based on the patient number and care acuity within each unit and adhere to the minimum Nursing Hours per Patient Day as set out in the ACT Public Sector Nursing and Midwifery Enterprise Agreement and ACORN standards. Roles include Registered Nurses, Enrolled Nurses, and Assistants in Nursing.

Allied Health professionals:

The range of allied health professionals may include but not be limited to: Pharmacists, Physiotherapists, Occupational therapists, Social Workers, Speech Pathologists, Medical Physicists and Allied Health assistants.

Executive and Administrative staff:

Clinical support staff consisting of Medical, Nursing, Allied Health positions in managerial roles who are closely integrated with service provision and clinical day-to day activities. Administrative staff vary from clerical to managerial roles.

Clinical and non-clinical support staff:

Clinical support persons will assist with service operations and patient flow such as manual handling, patient transfers, medical equipment and imprest supply management, cleaning, waste management and specimen couriers.

Refer to Section 14 for the design principles of all Front of House areas, and to Section 15 for Back of House services.

4. Surgery Classification

Although surgery is a relatively small component of the relocating services (endoscopy is the only surgical service relocating to B6), the classification of the surgery influences the patient pathway, and therefore capacity and supporting allied health functions.

Surgery may be classified as planned, emergency, or other surgery. Planned surgery can be booked in advance. A GP will refer a patient to a surgeon who will determine whether a patient requires planned surgery, and then place the patient on the Planned Surgery Waiting List.

People on the Planned Surgery Waiting List will be assigned an urgency category (1, 2 or 3) depending on the seriousness of their condition. These are defined as:[6]

- Category 1: Procedures that are clinically indicated within 30 days.
- Category 2: Procedures that are clinically indicated within 90 days.
- Category 3: Procedures that are clinically indicated within 365 days.

Emergency surgery is required to treat trauma or acute illness after a presentation at the emergency department (ED) or by helicopter transfer. Surgery may be required immediately, or later. Emergency surgery also includes unplanned surgery if someone on the Planned Surgery Waiting List has deteriorated in condition.[7]

Surgery takes place in Building 5, with the exception of the endoscopy suites in new Building 6 (as detailed below) and the WYC obstetric theatres in B10 (as detailed in the B10 FDB).

6. ACT Government, Health, *Waiting Time, and Elective Surgery Access Policy: Managing Elective Surgery patients in ACT public Hospitals*, July 2016. Available: https://health.act.gov.au/sites/default/files/2019-02/Waiting%20Time%20and%20Elective%20Surgery%20Access%20Policy.docx
7. ACT Government, Health, *Waiting Time and Elective Surgery Access Policy: Managing Elective Surgery patients in ACT public Hospitals*, July 2016. Available: https://health.act.gov.au/sites/default/files/2019-02/Waiting%20Time%20and%20Elective%20Surgery%20Access%20Policy.docx

5. Gastroenterology and Hepatology

The *Gastroenterology and Hepatology unit (GEHU)* will perform endoscopies and outpatient services.[8] Endoscopy is used for screening and treating disease. The endoscopy procedures include:

- Gastroscopy - an endoscope (a long, thin flexible tube with a video camera at the tip) is passed through the mouth, the oesophagus, the stomach and the first part of the small bowel.
- Colonoscopy – an endoscope is passed through the rectum, the large bowel and part of the small bowel.
- Flexible sigmoidoscopy - an endoscope is passed through the rectum and the lower part of the large bowel.
- Endoscopic Retrograde Cholangial-Pancreatography (ERCP) - an endoscope is passed through the mouth, the oesophagus, the stomach and the first part of the small intestine where the bile duct and pancreatic duct connect.
- Endoscopic Ultrasound (EUS) – a special endoscope with a built-in ultrasound probe is passed through the mouth, the oesophagus, the stomach and the first part of the small bowel. It can be used to help diagnose certain conditions.
- Percutaneous Endoscopic Gastrostomy (PEG) insertion, replacement and trouble shooting. A PEG tube is a feeding tube that goes through the abdominal wall and into the stomach.
- Fibroscan - a scan that measures the stiffness of the Liver.
- Ascitic taps.

There are also two Bronchoscopy suites in which endobronchial ultrasound, radial probe and endobronchial ultrasound will be performed. There is also one fluoroscopy suite. All these procedures would typically be undertaken as day procedures.

The GEHU outpatient clinics will be collocated or proximal to the procedural suites and provide care for people with problems with the liver, people who have Inflammatory Bowel Disease, pancreato-biliary disorders, and post-procedural patients. The main functions of the outpatient clinics are:

- Specialist consultation and examination;
- Clinics for patients with hepatitis, liver disease, inflammatory bowel disease, inherited gastrointestinal cancer and complex gastrointestinal disorders;
- Support and follow up for participants in the National Bowel Cancer Screening Program;
- Endoscopic service (gastroscopy, colonoscopy), colon cancer screening, GI bleeding, and interventional endoscopy for early gastrointestinal cancers *(refer to the Surgical Service Model for more information)*;
- Endoscopic ultrasound and ERCP for examination of the duodenum (beginning of small bowel), gallbladder, liver, and pancreas for the selection of patients for day case treatment or in-patient procedures;
- Pre-operative / procedural assessment;
- Follow up and monitoring the condition of patients after day case procedures; and

8. Victoria State Government Department of Health and General Surgeons Australia, Better Health Channel, *Endoscopy*, updated 2014. Available: https://www.betterhealth.vic.gov.au/health/conditionsandtreatments/endoscopy

- Discharging patients from the care of the hospital with referral, if necessary, to other health care providers.

5.1. SPECIFIC DESIGN REQUIREMENTS

The Endoscopy suites are based on the AusHFG HPU B.0270 Day Surgery / Procedure Unit and the HPU 0190 – Sterilising Services and Endoscope Reprocessing Unit. There are several functional zones within the unit, as described below.

5.1.1. Main entry, admissions and waiting area

On the day of surgery, patients will be clerically and clinically admitted via a Day of Surgery Admission (DOSA). Facilities will include a reception, waiting area, interview/consultation rooms, and change areas (including toilets) for patients to change out of their street clothes and into a hospital gown.

Patients then proceed to the anaesthetic prep room. Ambulant patients will be walked, and a wheelchair / trolley will be provided to those who require additional support.

Procedural preparation within the anaesthetic prep room will involve assessment by an anaesthetist and the proceduralist. Anaesthesia for the procedure may be local, regional, conscious sedation or general anaesthesia. All procedure rooms should be capable of supporting patients having a range of anaesthesia.

The unit will provide visual and acoustic privacy between clerical / waiting, pre-surgical and family waiting zones.

5.1.2. Procedure rooms

There will be seven procedure rooms, with five for endoscopy and two for Bronchoscopy (which will be used by Respiratory physicians, noting one of the two bronchoscopy procedure rooms will be negative pressured). There will also be one fluoroscopy room which will be shielded. Each procedure room will require a standard design meeting the requirements of the AusHFG. A standard design will allow for future flexibility in function for each room. Each procedure room will require specialist air handling, provision of contemporary surgical and anaesthetic pendants and access to surgical gases and air.

The procedure rooms will be supported by shared Sterile Stock and a scrub-up room. An Endoscopy Reprocessing area will also be adjacent to the procedure rooms which will allow rapid reprocessing of equipment. The reprocessing area will have:

- A clean-up room for high level disinfection;
- A dirty reprocessing room where scopes are received, leak tested and manually pre-cleaned in a height adjustable cleaning sink, prior to loading into a pass-through automated endoscope reprocessor (AFER);
- A clean room where processed scopes are unloaded from the AFER and stored in a Controlled Environment Endoscope Storage Cabinet, or an equivalent system; and
- A chemical store.

A general guide is that one procedure room will require the capacity to process at least two endoscopes at a time and requires storage sufficient to accommodate the number of endoscopes in the fleet. This will vary based on projected caseload, with the expected caseload being 10,000 to 12,000 procedures per year.

There should be a linkway connecting the rear of B5 to endoscopy in B6 to enable fast transfer of emergency cases to theatre, and for the rapid response of additional anaesthetists or proceduralists to the endoscopy suites when required.

5.1.3. Recovery

Following the procedure, the recovery stages used will routinely include:

- Stage 1 recovery is a dedicated area where post-procedure patients are recovered from anaesthesia under 1:1 supervision.
- Combined Stage 2 recovery is used to manage patients who are transferred from Stage 1, or those patients who have had little or no sedation and bypass Stage 1 recovery.

Patients return to their IPU from Stage 1 or are discharged home from Stage 2.

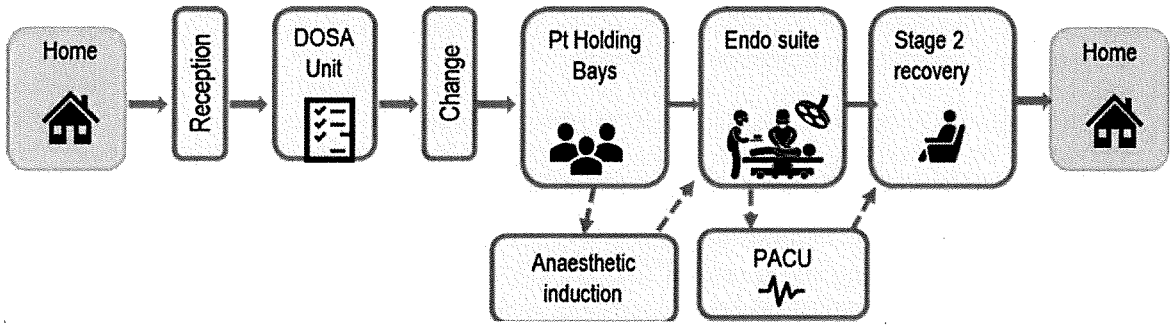
5.2. OPERATIONAL MANAGEMENT

5.2.1. Hours of operation

The GEHU outpatient and procedural service routinely operates Monday to Friday from 09:00am - 5:00pm for outpatient clinics and from 06:30am to admit and prepare procedural patients. Procedure lists will generally be conducted between 08:00am and 5:00pm. Patient recovery services might extend to 9:00pm at night.

5.2.2. Patient pathway

The patient pathway for endoscopy / bronchoscopy is outlined below.



5.2.3. Clinical support services

Clinical support services for the Phase 2 redevelopment incorporates the following services, which are split between the two new buildings (building 6 and building 10):

- Pharmacy;
- Medical Imaging;

- Pathology;
- Health Information Services;
- Learning and Teaching; and
- Research.

Pathology, Learning & Teaching and Research are relevant for building 6, and will be detailed in section 7 11 and 12 of this document. Remaining clinical support services will be detailed in a separate FDB (for building 10).

Refer to Sections 14 and 14 for Front of House and Back of House Services.

5.2.4. Family and carer support

Refer to Section 3.4 for the general requirements for family and carer support.

5.2.5. Staff support

Refer to Section 3.7 for the general requirements for staff.

In the Endoscopy / Bronchoscopy suite there is also a requirement for male/female change rooms which will include toilets, showers, and lockers; a staff room; a meeting / tutorial room; and staff work areas to support the service. Staff work areas will need to consider training and education requirements.

5.3. FUNCTIONAL CONTENT

The GEHU procedure unit has 32 POC, including recovery. There are also 14 outpatient clinic spaces.

6. Pre-admission Clinic and Surgical Bookings

6.1. DESCRIPTION OF SERVICE

Pre-Admission Clinic is an ambulatory space for the assessment of a patient's suitability for surgery, and the key risks that CH would anticipate for patients. The Service Model at CH is that all planned surgical admissions will attend a preadmission appointment prior to the surgery date.

Surgical bookings manage all planned surgery bookings and is the best point of contact if a patient's condition has changed or if they are no longer ready for surgery. Surgical bookings are an administrative service.

6.2. SPECIFIC DESIGN REQUIREMENTS

The specific design for pre-admission is for sufficient clinic spaces to undertake efficient assessments by anaesthetists and nurses. The assessment spaces are equivalent to a consultation room in outpatients. Surgical bookings should be collocated with the preadmission clinics.

6.3. OPERATIONAL MANAGEMENT

6.3.1. Hours of operation

The preadmission clinic will operate on certain days of the week, during business hours. Surgical bookings will also operate during business hours.

6.3.2. Patient pathway

As preadmission is an ambulatory service, patients will arrive, have their consultation, and return home.

6.3.3. Clinical support services

Clinical support services for the Phase 2 redevelopment incorporates the following services, which are split between the two new buildings (building 6 and building 10):

- Pharmacy;
- Medical Imaging;
- Pathology;
- Health Information Services;
- Learning and Teaching; and
- Research.

Pathology, Learning & Teaching and Research are relevant for building 6, and will be detailed in section 7 11 and 12 of this document. Remaining clinical support services will be detailed in a separate FDB (for building 10).

Refer to Sections 14 and 16 for Front of House and Back of House Services.

6.3.4. Family and carer support

Refer to Section 3.4 for the general requirements for family and carer support.

6.3.5. Staff support

Refer to Section 3.7 for the general requirements for staff.

6.4. FUNCTIONAL CONTENT

There are 8 POC for preadmission clinics on a like-for-like basis as well as the administrative area for Surgical Bookings.

7. Pathology

7.1. INTRODUCTION

The Phase 2 Redevelopment Project involves developing like-for-like services into new facilities. However, this will not necessarily be like-for-like space for Pathology services, as new evidence, new technologies, changes in clinical practice, more efficient or innovative ways of working may result in contemporary like-for-like services.

These two sections (7 and 8) will include input from ACT Pathology and incorporate key elements of a high-level FDB prepared for ACT Pathology by L2D Architects.

The sections will also describe each of the main pathology services. In doing so, they incorporate the scope and clinical level of service, specimen pathway, functional relationships and adjacencies, integration and work processes necessary for articulating a functional brief.

7.2. CONTEXT

ACT Pathology is expected to continue to operate at the highest clinical level (Level 6) and will also need to operate in a particularly dynamic environment, with important considerations in relation to:

- The inadequacies of the current facility to meet acceptable, contemporary standards;
- Operational efficiency and design considerations to deliver on its core functions; and
- The rapid pace of the convergence and emergence of technologies that will need to be embedded into a future pathology service. Future capacity and capability will be driven by technology developments.

Therefore, this section describes the potential impact of the changes to pathology services that can be expected in the future. *This is a critically important consideration for the FDB as it will underpin ACT Pathology's strategic direction and its propensity to thrive* in a dynamic, *technology driven environment.*

7.3. OVERARCHING DESIGN ELEMENTS

There are several overarching design elements for pathology. The new facility needs to:

- Incorporate a 'Core Lab' as a major component of the new facility. The Core Lab will be a large open space, highly automated, capable of expansion and can operate 24/7. The Core Lab is designed to be at the heart of the clinical operations for pathology services;
- Incorporate as many diagnostic pathology functions as possible to be on the same floor as the Core Lab to improve coordination and collaboration between specialties, enable the greater use and flexibility of equipment, and reduce unnecessary movement of specimens as well as the need for multiple support facilities. Ideally, the Core Laboratory, Diagnostic Genomics, Microbiology & Molecular Pathology need to be located on the same floor as each other due to the close functional connectivity;
- Designing for the future includes, amongst other things, introducing digital pathology and a prototype laboratory;

- Contemporary overarching design elements that emphasise safety, quality and the value of the workforce; and
- Incorporate support areas, noting the following support functions may be located on a different level to the Core Laboratory if needed:
  - Pathology Administration (e.g. Exec area, admin support [including AP admin], Quality team, and meeting rooms);
  - Staff room;
  - Interaction space – shared space e.g. large screens, microscope teaching. showcase, education;
  - Training Room/seminar space;
  - Digital Pathology research space;
  - Staff utilities e.g. lockers, showers, change rooms;
  - Pathology reception;
  - Mortuary;
  - Pathology Museum;
  - Collection centre;
  - Central consumable stored e.g. bulk stores e.g. RT, 4C, -20C, -80C;
  - Freezer Farm Biobank;
  - Chemical stores;
  - Cryogenic processing and storage facility[9]; and
  - Digital Pathology Support.

A feature of the design is to **maximise the connectivity between functional clinical units**, meaning as many clinical services (that require testing and assessments) being contiguous with each other as possible, ideally over a minimum number of floors without compromising functional capability.

The extent that ACT Pathology is accommodated over multiple levels, is to perpetuate fragmentation and inefficient practices that currently exist. Maximising the area of the 'floor plates' of the new facility footprint will be important to the new site.

7.4. SCHEDULE OF ACCOMMODATION

The areas specified in the schedule of accommodation (SoA) are summarised below. Pathology's FDB and SOA have been based on the assessed area required by L2D Architects, with some adjustments. These areas may be further refined as part of a more detailed examination based on:

- Agreed functions of a contemporary pathology laboratory;
- Building yields and available area; and
- Capital budget.

All of which have the potential to impact the scale of the proposed pathology facility. Therefore, the area requirements for Pathology in this table remain indicative.

The net usable areas for pathology have been grossed up to include internal circulation at different rates, ranging from 20% to 40%, with a total estimated Gross Departmental Area

9. In the event the cryogenics facility is on a different level, specialised considerations for liquid nitrogen supply to lab must be considered when determining location, distance and height from potential liquid nitrogen source vessel as pressure is critical.

(GDA) of 8,355sqm, detailed breakdowns are provided in Table 7-1. The current area for pathology is 6,589 sqm GDA.

Table 7-1: Indicative Area Requirements (Gross Departmental Area in Sqm)

SERVICE TYPE	L2D PROPOSED	PROPOSED	GROSSING (PROPOSED) %
Pathology Administration	612	553	6.6%
Centralised Storage and Support	528	408	4.9%
Digital Informatics	192	36	0.4%
Core Laboratory	2,709	2,523	30.2%
Collections	582	389	4.7%
Anatomical Pathology	1,486	1,603	19.2%
Diagnostic Genomics	871	789	9.4%
Microbiology & Molecular Path	1,538	1,283	15.4%
Pathology Museum	270	0[10]	0.0%
Mortuary	749	675	8.1%
Autopsy	108	96	1.1%
Total GDA Sqm	**9,645**	**8,355**	**100.0%**

The proposed estimates, although reduced from the L2D estimates, nevertheless include:

- A Core Lab area that can provide for further growth of automation;
- New space for digital informatics, a prototype lab, and interaction spaces;
- Provision for pandemic response;
- Substantially enhanced diagnostic genomics and new DNA amplification spaces; and
- Contemporary laboratory standards, including enhanced Physical Containment Level 2 (PC2) and Physical Containment Level 3 (PC3) facilities, amongst others.

As a frame of reference, if modifications are required to the proposed area below, adjustments would be considered in the following cascading order of importance:

1. Having sufficient space;
2. Core Laboratory, Microbiology & Molecular Pathology, and Diagnostic Genomics collocated on the same floor;
3. Laboratory space takes precedence over administrative space; and
4. Having amenity and support but not as important as all the above.

7.5. PATHOLOGY SERVICES VISION AND DRIVERS FOR CHANGE

ACT Pathology aspires to be a leading tertiary pathology service with a national reputation for excellence.

The environment within which pathology services operate, offer both significant opportunities and challenges in achieving this vision. This is summarised below.

10. Moved into "Learning and Teaching"

"The next decade will see a profound transformation in Pathology. Several major drivers of change, including total automation, genomics, precision medicine, informatics and digital pathology – as well as a consumer-led revolution in healthcare leadership – are converging to reshape the way that Pathology services are designed, delivered and governed.

This has major implications for ACT Pathology, for Canberra Health Services, and for the community. In particular, the Pathology service model will see a significant shift towards convergent diagnostic technologies, genomics and personalised medicine, digital enablers, a focus on the value of data and shared clinical decision making, collaboration, and consumer-led co-design.

A key challenge is to embrace these new service models, whilst ensuring that we retain our leadership role – our trusted voice - in diagnostic excellence. This is especially true for our leadership and expertise with emerging diseases such as COVID-19, in which the ACT community has placed its trust"[11].

In turn, then, designs for a new Pathology building at the Canberra Hospital site must be sufficiently agile to cater for this future. Agility to provide workspaces that support new diagnostic technology and automation, new digital systems and infrastructure, and new ways of working with others – while at the same time supporting modern practices in infectious disease diagnosis and pandemic management to keep the ACT community safe into the future.

Pathology services will operate at the highest level of clinical capability[12] for pathology (Level 6) and service the ACT and south-eastern NSW catchment. ACT Pathology *will continue to offer an extensive range of pathology services, be agile and adjust to new areas of pathology testing regimes, embrace current and emerging opportunities to innovate, and deliver the highest quality across all service types.* As noted, this will include embracing:

- Converging and Emerging Technologies;
- Workforce Co-Design, Flexibility and Planning for Uncertainty;
- Teaching and Research; and
- Consumer and Community Engagement.

7.5.1. Converging Technologies

Laboratory workflows, human tasks and governance are being fundamentally reshaped and standardised; driven by converging technologies. This is the clear trend in the pathology sector and endorsed by ACT Pathology staff[13].

Manual diagnostic methods are replaced with automation, which improves reliability, reduces and standardises turnaround time, and reduces error. More recently, more radical automation of workflows (such as sample "track" systems) and standardisation of instrumentation and IT connectivity are breaking down traditional laboratory structures and transforming the way that laboratories function.

11. Glenn Edwards, 'Future State Issues Impacting Building Design for Pathology', July 2023, unpublished.
12. NSW Role Delineation of Clinical Services,(2021). The NSW Role Delineation of Clinical Service is used as the default clinical capability framework for NSW, Victoria and ACT, unless there is a specific jurisdictional capability framework
13. Glenn Edwards, op.cit.

> This trend is well established in core laboratories such as Chemistry and Haematology. However more and more diagnostic equipment systems in these departments will be connected to automated track systems. This underscores the need for a strict approach to "open plan", since the expansion plans of many laboratories have been thwarted by under-estimating this requirement, with office and load -bearing structures limited the opportunity for extension of automated tracks. With increased automation comes more sophisticated integrated IT solutions which allows for increased workplace flexibility i.e., scientists can perform extensive work remotely.
>
> Microbiology and Molecular Pathology is also being transformed by automation, which in turn is in part enabled by digital technology (e.g. plate reading via digital images). This trend will continue across all diagnostic areas, and laboratory design must allow for flexibility and expansion within a relatively short period of time.

Thus, laboratory workflows, human tasks and governance are being fundamentally reshaped and standardised. The design of new laboratory spaces is evolving to exploit this convergence of technology and workflow and ensure that the consequent value of these new models can be fully enabled.

7.5.2. Emerging Technologies

Increased application of emerging technologies is particularly relevant to the rapidly developing fields of **genomics** and the broader use of **artificial intelligence** (AI) and digital pathology for diagnosis, and patient treatment/management.

> Genomic technologies are evolving to bring new insights into disease and diagnosis – and enabling a new era of personalised medicine. This revolution is still relatively new, and yet laboratories are already evolving the way we work. This includes a much deeper collaboration with clinicians, with consumers and with technology partners. Genomic technologies are also breaking down traditional boundaries within Pathology laboratories, with new collaborations between genomic experts and haematologists, anatomical pathologists, microbiologists, and infectious disease experts – and this collaborative approach is growing, as it makes traditional boundaries within laboratory workplaces increasingly redundant14.

Digital technologies, using AI, are driving transformation within pathology laboratories, most notably for Whole Slide Imaging (WSI) in Anatomical Pathology, Haematology, Immunology and Diagnostic Genomics, which enables workforce flexibility and greater collaboration with interstate clinical experts. There is now an National Pathology Accreditation Advisory Committee (NPAAC) standard for validating WSI use by Pathologists, and many Australian laboratories are rapidly gearing up for this.

WSI is shaping as a game changer for the workforce shortage in healthcare and pathology, and potentially allowing CHS to provide more effective diagnosis and timely care for people in the ACT and neighbouring regions during workforce shortages. "second opinion" reviews are able to be referred simply including to overseas expert services.

WSI also enables a new generation of AI tools as aids for the pathologists in their diagnostic task, with likely benefits for both task efficiency and diagnostic accuracy.

14. Ibid.

WSI has significant implications for digital technology infrastructure, including extensive image storage and transmission. Digital infrastructure is therefore a key design element for a new Pathology laboratory build.

AI and data analytics are also enabling a new approach to delivering clinical value across all of Pathology. In addition to internal real-time monitoring of laboratory processes, enhanced analytics and AI-driven decision making will enable a new generation of clinical diagnostics informaticians. These roles will work collaboratively together, across CHS and beyond, to drive new models of clinical decision making, audit and evidence-based policy. This approach will allow greater transparency, greater collaboration, and greater value – and also provide a powerful platform for CHS researchers, including a growing research opportunity in clinical decision science.

Thus, with the recent implementation of the Epic digital heath record (DHR), and a suite of other analytical and AI tools, CHS Pathology is well-placed to drive this new approach to clinical decision support. IT infrastructure and spaces for collaboration (physical and virtual) will be critical enablers of success.

A summary of the above technologies as well as other potential innovative service developments are described below in Table 7-2. Many of the innovations are inter-related and capable of being developed independently, or inter-dependently in driving innovation.

Table 7-2: Innovations Identified from Specialty Sections are Described Below

FUTURE TREND/ INNOVATION	DESCRIPTION
Next Generation (Genome) Sequencing (NGS)	▪ NGS is a parallel or deep (DNA) sequencing technology which has revolutionised disease diagnostics and screening over the recent years. Using this technology, NGS has become a part of routine clinical practice, as it helps to detect oncogenic and disease-causing genetic variants and enables a deeper understanding of complex diseases. This translates into diagnosis with genetic changes incorporated into essential criteria for classification of disease, prognosis, identification of targetable chemotherapies, disease monitoring, and screening This revolution will reduce morbidity and will prolong survival in the population of the ACT and surrounds. ▪ Expansion of NGS into multiple areas of healthcare is an immediate next step in the future direction, especially to support CH oncologists and haematologists who are actively seeking for ACT Pathology to develop this technology.
Omics Technologies and Integration	Similar to the way that multidisciplinary teams approach works in healthcare, the multi-omics approach (including technologies such as genomics, transcriptomics, epigenomics, proteomics, and metabolomics) will provide a much more holistic view of disease mechanisms, which not only works to enhance the accuracy of diagnosis, but also enables personalised treatment strategies based on individual patient profiles. The drive towards individually targeted therapies is compelling, it is expected to continue to increase the level of testing, workforce expertise and need for individualised reports, particularly in cancer treatments. *It is likely that in the not-so-distant future, the 'omics revolution' for personalised diagnoses and treatments could become core business for ACT Pathology*[15]
Biomarkers and Predictive Models	Support that predicts disease progression, treatment response, and patient outcomes. It is an important area of research in haematology and has the potential to make a massive difference to patient outcomes alongside other technologies such as the omics revolution.

15. Noting ACT Pathology already does gene assessment, epigenetics and protein expression as part of standard cancer reporting at the time this report was prepared.

FUTURE TREND/ INNOVATION	DESCRIPTION
Immuno and Targeted Therapies	CAR T-cell therapy and immune checkpoint inhibitors are new treatment options for patients with haematological disorders (including malignancies). ACT residents who are currently candidates for CAR-T cell therapies currently have to travel interstate to undergo a cell collection procedure and return 2-3 weeks later for infusion and post-therapy care. Patients must live within 30 minutes of the hospital for 4-5 weeks. Availability of this service in ACT will support patient-centred and value-based care models and improve timely access to novel treatments.
Artificial Intelligence (AI) [and Whole Slide Imaging]	In all facets of pathology, it is expected that AI will mark its presence. AI and machine learning will help automate processes (analysing big data sets), provide decision support information and security checks that are not systematically built into day-to-day processes. These developments are not expected to reduce staff or the footprint of the Pathology facility but instead give ACT Pathology more capacity to increase the range and level of services offered. "WSI is shaping as a game changer for the workforce shortage in healthcare and pathology, and potentially allowing CHS to provide more effective diagnosis and timely care for people in the ACT and neighbouring regions. AI and data analytics are also enabling a new approach to delivering clinical value across all of Pathology. In addition to internal real-time monitoring of laboratory processes, enhanced analytics and AI-driven decision making will enable a new generation of clinical diagnostics informaticians"[16].
Automation of Current Manual Steps in Processes	These innovations are to incrementally acquire technology that automates some steps in the process as part of a longer-term plan to automate all steps. This will progressively occupy existing workstations. The Pathology facility will need to design flexible core spaces for automated equipment and sensitively design workstations adjacent to automated equipment in the same specialty. In some instances, there will be cross over periods where both new automated technologies and existing manual processes are retained before phasing out.
Development of a Core Laboratory	Urgent testing on existing instruments is likely to shift to a Core Laboratory operating 24/7 and operated by multi-disciplinary pathology staff. Robotics will be extended to accommodate more of the high-volume testing of a Core Laboratory. Further details are provided in section 7.8.
Robotic Extensions taking on more Volume	As more technology moves into the Core Laboratory, so too will be the opportunity to extend the robotics to fully automate the routine testing.
Urgent Testing on Instruments Moved to the Core Laboratory.	The Core Laboratory concept will focus on 24/7 service delivery centralised to an area of the laboratory adjacent to specimen reception. Technologies and tests will move into the Core Lab (as per GeneXpert COVID and Flu A/B urgent testing) from various disciplines.
Recycling and Sustainability	Each Department will have equipment and technology designed to help recycle, particularly plastics and reagents/solvents. It will be a necessary development for Pathology services to demonstrate their 'green credentials'. Manufacturers will focus on reducing heat output and power consumption (e.g. Abbott Alinity i), which will help laboratories manage excess heat in the laboratory and the architectural designs for air conditioning/flow in the location of the equipment.
Point of Care Testing (POCT) Innovation	Enabling increasingly more rapid and accurate testing at the patient's bedside or in remote settings.
Liquid Biopsies	Liquid Biopsies have emerged as a non-invasive cancer diagnostic tool, which may assist in the early detection, residual disease monitoring, and treatment response.

16. Ibid.

FUTURE TREND/ INNOVATION	DESCRIPTION
Screening Opportunities	There will be opportunities to support community screening programs and personalised wellness testing expanding the range of services from predominantly diagnostic (i.e. HbA1C testing on microsamples self-collected from the community and microbiome analysis).
Quality Assurance and Standardised Practices/Processes	A growing focus to ensure high-quality laboratory testing and harmonisation across different laboratories, including the standardisation of reference intervals, establishment of proficiency testing programs, and implementation of quality management systems to enhance the accuracy and reliability of laboratory results.

7.5.3. Workforce Co-Design, Flexibility and Planning for Uncertainty

The convergence of technologies and the consequential convergence of workforce collaboration, means that the design of facilities will change to reflect this convergence.

The design of facilities will necessarily have two major elements:

- Integrated design that requires a higher level of functional adjacencies than was previously the case in laboratories; and
- Flexible design of space, which translates to more open spaces.

7.5.4. Teaching and Research

As noted above, CHS has articulated 'CHS' *'Clinical Learning and Teaching Strategy 2023 – 2027'*, and a *Research Strategy 2021-2025*. Learning & Teaching, and Research are outlined in detail in sections 11 and 12. These strategies underpin the approach for pathology and align in important respects including:

- Embedding a research ethos is facilitated by the use of multi-purpose spaces including flexible laboratories and real and virtual research; and
- Research will increasingly be informed and facilitated by digital technologies. Indeed, it is likely that several informatics-based activities will form the core of research in Pathology, including Artificial Intelligence and clinical decision support science (whilst supported and/or confirmed by manual testing).

7.5.5. Consumer and Community Engagement

Consistent with the broader service delivery principles consumers and the community will become more active participants in their health care. This will be manifest in:

- Individually tailored treatments. New technology and tools that enable pathology the opportunity to develop a genuine consumer-led co-design model, that will be in the vanguard of its kind in Australia;
- Care closer to home is now the preferred model of care for any chronic, non-urgent care. This has been made possible via the widespread adoption of telehealth and telemonitoring, particularly for diabetes, chronic obstructive pulmonary disease, and renal medicine. Telemonitoring is performed using sensors, other wearable devices, or apps to record data which is relayed to the healthcare team;

  Changes in condition outside set parameters will also alert healthcare providers in real time. Pathology too will need to adapt to remote patient pathology testing;

- Consumers empowerment is transforming service models for Pathology. In the ACT there are already an overwhelmingly positive response to the direct-to-consumer test result reporting via MyDHR. Consumers are also actively driving discussions on genomics, cancer testing, pre-natal diagnosis, and others. This will only continue. We will require real and virtual spaces with public access to facilitate this engagement; and
- Services developed and delivered will need to be increasingly designed around the principles of Value-Based Health Care (Better Value Care). This is a contemporary service model designed to develop patient-focused care in a meaningful (structured) way to create enhanced outcomes (value) to the patient and value to the funder. This is a potentially important, albeit radical model to consider in the development of (a selected number of) clinical services that can be 'clustered to deliver end to end' outcomes for patients. The model transcends current structures that are not designed to deliver value to the patient and where there are only very blunt outcome indicators.

All these trends are inter-related and can have a major impact on the organisation, service options available, and how services are delivered.

7.6. GENERAL CONTEXT

7.6.1. ACT Pathology

ACT Pathology operates as a tertiary (Level 6) pathology laboratory, and includes the (specialist) disciplines of:

1. Pre-Analytics (collection services, and specimen reception);
2. Anatomical Pathology (including Histology, Immunohistochemistry and Cytology);
3. Chemical Pathology (Routine Chemistry, Endocrinology, Special Chemistry and POCT);
4. Diagnostic Genomics;
5. Haematology (including General Haematology, Haemostasis, Blood Product Transfusion Service, Immunophenotyping, and Bone Marrow Transplantation);
6. Immunopathology and Infectious Immunoassay;
7. Microbiology (including Bacteriology, Mycobacteriology, Mycology, Parasitology and Virology);
8. Molecular Pathology; and
9. Mortuary Services (see section 8).

Support departments include Pathology Administration, Information & Communication Technology (ICT), Quality, Pathology Museum (gross anatomical teaching), and Pathology Research. ACT Pathology employs more than three hundred personnel.

The role of ACT Pathology is to deliver routine and specialist pathology service to all CHS services, private hospitals, and community GPs and medical specialists with accurate, reliable and timely information obtained from scientific tests, investigations and examinations.

As is usual with tertiary-level pathology services that it also provides consultative services regarding the correct interpretation of test reports, and actively participates (or can lead) multi-disciplinary care team patient reviews.

ACT Pathology also provides important teaching functions for the ANU. Indeed, ACT Pathology is a leading provider of candidates seeking Registrar places in pathology owing to the positive experience in pathology by undergraduates.

7.6.2. Service Principles

As a clinical support service, operating at the highest clinical capability, ACT Pathology can be expected to:

- Be accessible and responsive to all clinical areas requiring the reporting of pathology results;
- Deliver specialised pathology services across the full spectrum of pathology types, including new and emerging pathology specialties/branches;
- Ensure contemporary practices and the application of leading-edge technologies that materially improves patient diagnoses, treatment and outcomes;
- Operate efficiently and sustainably;
- Actively participate in multi-disciplinary care models to deliver holistic patient treatment regimes;
- Develop a clinically capable workforce across the specialty areas, including through teaching and training as a core part of the role of pathology; and
- Actively participate in learning, teaching and research.

7.6.3. Testing Panel Volumes

ACT Pathology perform approximately 2.5 to 2.6 million testing panels annually[17] based on testing panel volumes since FY19-20, which demonstrates that the overall testing volume has been steady with a tendency toward a modest upward trend, as detailed in Table 7-3 below.

The pathology subspecialities with the highest percentage of testing volumes (excluding COVID Polymerase Chain Reaction [PCR]) are Chemical Pathology, Immunopathology & Infectious Immunoassay (55% in FY21-22), Haematology & Transfusion (19%), and Microbiology (4%), with all remaining subspecialities each contributing to approximately 1% or less of total testing volumes (noting that the number of tests does not correlate with test complexity).

It is difficult to assess ACT Pathology's trends relative to maintaining market share due to COVID "Refer Out" services, that is, potential activity foregone, has increased by 5% over the period. It may nevertheless reflect ACT Pathology's current services are not keeping pace with referrer demand at the high end of the testing spectrum, particularly diagnostic genomics.

Table 7-3: Pathology Testing Panel Volumes By Subspecialty, By Year[18]

Pathology Subspecialty	2019-20	2020-21	2021-22	Raw Change 19-20 to 2021-22	% Change 19-20 to 2021-22	% of total 21-22 Excl. COVID
Chemical Pathology, Immunopathology & Infectious Immunoassay	1,661,806	1,756,151	1,748,351	86,545	5%	67.8%
Haematology	523,564	537,756	531,487	7923	2%	20.6%
Microbiology	127,840	124,093	121,327	-6513	-5%	4.7%

17. Excluding COVID effect. If we include COVID effect the numbers would be 2.5 – 3.2 million tests annually between FY19-22.
18. Note testing numbers are significantly underestimated due to data reporting panels, not individual tests. For example, a Liver Function test is counted as 1, but may be made up of 6 individual tests.

Pathology Subspecialty	2019-20	2020-21	2021-22	Raw Change 19-20 to 2021-22	% Change 19-20 to 2021-22	% of total 21-22 Excl. COVID
Transfusion	53,448	56,472	56,021	2573	5%	2.2%
Molecular Pathology (excl. COVID PCR)	39,980	40,304	34,491	-5,489	-14%	1.3%
Research	34,650	34,094	32,427	-2,223	-6%	1.3%
Anatomical Pathology	34,265	33,157	30,221	-4,044	-12%	1.2%
Diagnostic Genomics	2,131	2,45219	1,97820	-153	-7%	0.1%
Refer out	19,766	20,312	20,695	929	5%	0.8%
Total Excluding COVID PCR	**2,497,450**	2,604,791	2,576,998	79,548	3%	100.0%
Coronavirus PCR	*31,821*	201,101	579,791	547,970	1722%	N/A
Grand Total	**2,529,271**	2,805,892	3,156,789	627,518	25%	N/A

7.6.4. Future Demand

Forecasting the future volume of pathology specimens if fraught with complexities, not least of which is changing practice and development of new services.

Outlined below are estimates of future demand:

- For Anatomical Pathology, demand growth is based on the current ratio of specimens to total operating theatre procedures, including endoscopes. By 2035/36, there is expected to be an additional 33.7% surgical/procedural separations, resulting in an additional 7,973 AP examinations.
- For pathology tests other than for Anatomical Pathology:
  - Applying current rates of tests for hospital services only and extrapolate for the growth in hospital activity, excluding operating theatres, is expected to result in 37.7% growth in demand, or 631,990 additional testing panels; and
  - For other more routine tests, the expected demand is based on the relative utilisation of medical services of an ageing population, applied against expected community referral rates, would see demand growth of 28.3%, or 259,665 tests.
- An important part of the ACT Pathology work is also new types of tests, such as Genomics. The test volumes have been increasing steadily, and substantial growth is expected in the emerging area of diagnostics; and
- The provision of novel cell therapy products would increase the service demand on ACT Pathology's BMT/cell processing facility in the coming years. The manufacturing and storage of specialised therapies such as CAR-T cells will increase the regulatory, facility and operational demands of Haematology's BMT Laboratory. Although numbers are expected to be small initially (~10% growth), the complexity of processing would increase over time.

19. Plus 2,145 send outs.
20. Plus 2,603 send outs.

7.6.5. Referral Services

ACT Pathology is able to deliver all testing expected of a tertiary pathology laboratory or is able to refer out. For those tests that are not actually performed by ACT Pathology, the tests are referred to specialist referral interstate laboratories. ACT Pathology endeavours to use referral laboratories that provide the best quality testing for the respective test in an efficient manner and that have NATA accreditation to perform the respective test. Over time, ACT Pathology is looking to be able to undertake all tests in house.

7.7. FUNCTIONAL RELATIONSHIPS AND SCALE

This section provides information on the functional relationships between the different pathology departments and support services. These relationships are becoming increasingly complex due to converging and emerging technologies and the need for enhanced operational efficiencies.

A future state Pathology service impacts significantly on Building Functional Design. It is a major consideration, particularly in the context of the futureproofing of the laboratory.

Functional Relationship Diagrams (FRDs) were developed by ACT Pathology and L2D Architects as subject matter experts. Figure 7-1 diagrammatically shows the functional relationships and the associated complexities for a contemporary pathology laboratory. The diagram provides an overview. The existing departments considered in this design are:

- Collection Services;
- Specimen Reception;
- Anatomical Pathology;
- Chemical Pathology;
- Diagnostic Genomics;
- Haematology & Transfusion;
- Immunopathology & Infectious Immunoassay;
- Microbiology;
- Molecular Pathology; and
- Mortuary.

Other diagrams relating to specific service functions are incorporated into the relevant specialist descriptions below. There are specific L2D Architect FRDs in most of the specific specialty sections below, including mortuary (**Error! Reference source not found.**), diagnostic genomics (Figure 7-6), microbiology & molecular pathology (Figure 7-4), and anatomical pathology (Figure 7-5).

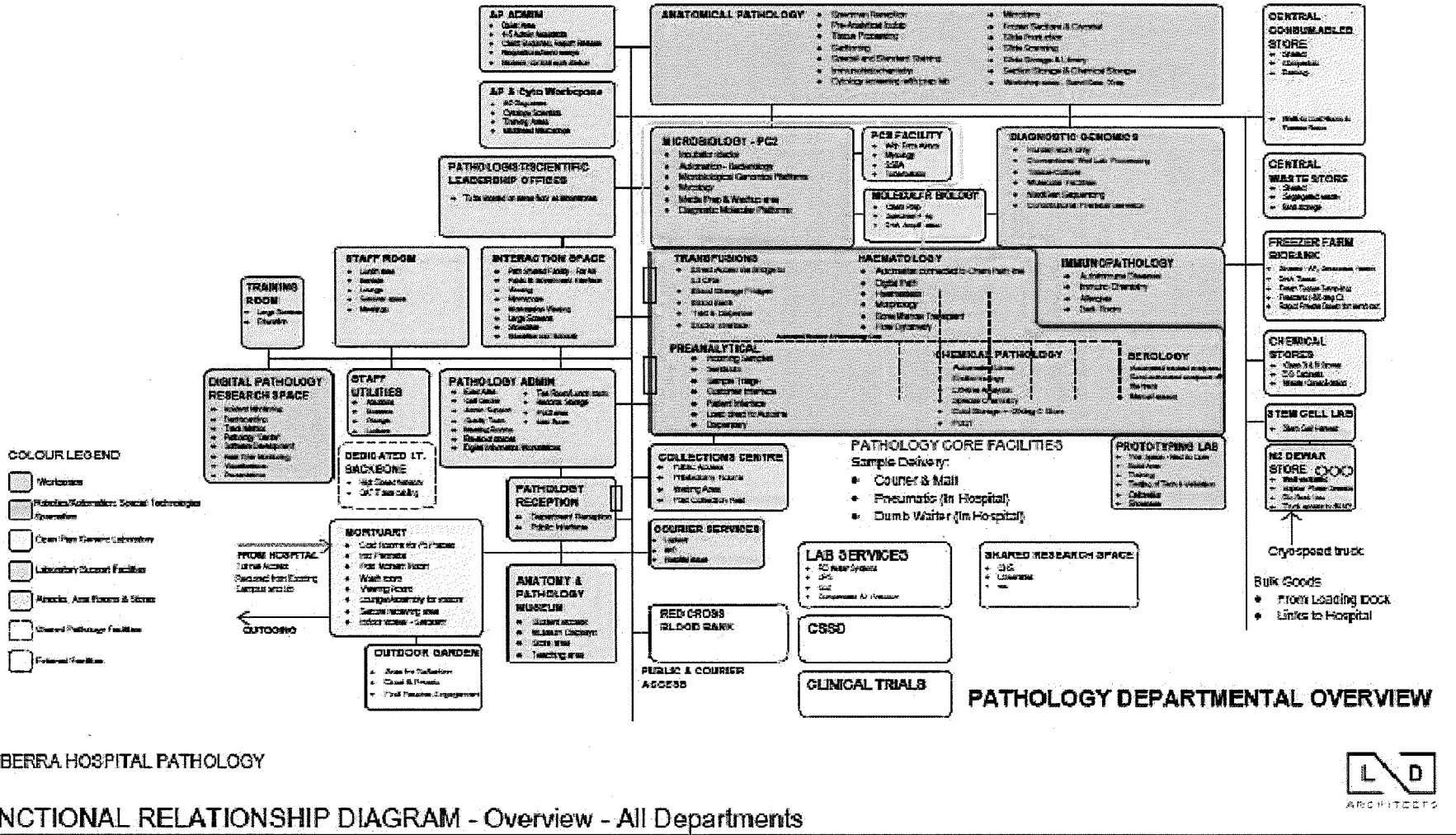
Key overarching relationships in the design include:

- A Core Lab;
- The further development of highly automated processes for core subspecialties;
- Administrative support functions;
- Laboratory support functions; and
- Centralised supplies, waste and refrigeration spaces.

The FRDs also include new (expanded) functions, comprising:

- A prototype laboratory;

Figure 7-1: Pathology Functional Relationships (Department Overview) – by L2D Architects



- Digital Pathology Research;
- DNA Extraction and Amplification, and enhanced cryogenic services; and
- An 'interaction space'.

Historically, the above disciplines have functioned as independent silos, with minimal cross collaboration. It is clear, that the future of Pathology requires significant integration, convergence and cross collaboration of departments.

As a first step departments are more consolidated, forming larger integrated 'Groups', including:

- Collection Services and Specimen Reception (Pre-Analytics);
- Core Laboratory departments (Haematology[21], Chemical Pathology, Immunopathology & Infectious Immunoassay and Specimen Reception), and noting that these department functions may also have components that are not necessarily part of the Core Lab;
- Microbiology and Molecular Pathology;
- Anatomical Pathology and Diagnostic Genomics; and
- Mortuary and Autopsies.

Notwithstanding, the above, there are some (non-testing) functions that are potentially able to be separated. Essentially, these are the non-clinical testing area, such as:

- Pathology Administration (e.g., executive area, administrative support including, Quality Team, meeting rooms etc);
- Staff Amenities (except for those required in the 24/7 lab)
- Interaction Space – shared space (e.g., large screens, microscope teaching, showcase, education);
- Training Room;
- Digital Pathology Research Space;
- Pathology Reception;
- Mortuary;
- Pathology Museum;
- Collection Services;
- Central Consumable Storage (e.g. bulk stores, Walk-in Cold Room and Freezer Room)
- Central Waste Store;
- Chemical Stores;
- Freezer Farm Biobank;
- Cryogenic processing and storage facility; and
- Courier Services.

Figure 7-2 shows functional adjacencies for pathology services. These are similar to the relationships described within the FRDs, except expressed in terms of the relative importance of proximity.

There are critically important adjacencies relating to the Core Lab and, very close proximity for the other diagnostic pathology services, with easy access to clinical support functions.

21. Including BMT/Cell Processing Laboratory.

Figure 7-2: Functional Adjacencies Matrix

Relationship Matrix		Pathology Core																						
		Specimen Reception (Preanalytics)	Haematology and Transfusions	Chemical Pathology	Immunopathology - Serology, Infectious Immunoassay (automated)	Immunopathology - Other	Haematology - Bone Marrow Transplant	Chemical Pathology - Special Chem, POCT	Anatomical Pathology	Diagnostic Genomics	Microbiology and Molecular Pathology	Pathology administration	Collections Centre	Mortuary services	Prototyping Lab	Digital Informatics	Centralised Storage and Waste	Liquid Nitrogen Dewar	Freezer Farm and Biobank	ACT Pathology Research	Mortuary and Loading Dock Access	Courier Services	Slides and blocks storage
Pathology Core	Specimen Reception (Preanalytics)	x	1	1	1	1	1	1	2	1	1	3	2	-	1	3	3	3	2	-	-	1	-
	Haematology and Transfusions (automated)		x	1	1	1	1	1	2	1	1	3	2	-	1	3	3	3	1	-	-	-	-
	Chemical Pathology (automated)			x	1	1	1	1	2	1	1	3	2	-	1	3	3	3	2	-	-	-	-
	Immunopathology - Serology, Infectious Immunoassay (automated)				x	1	1	1	2	1	1	3	2	-	1	3	3	3	2	-	-	-	-
	Immunopathology - Other					x	1	2	2	2	2	3	2	-	2	3	3	3	2	-	-	-	-
	Haematology - Bone Marrow Transplant						x	1	2	2	2	3	2	-	2	3	3	3	2	-	-	-	-
	Chemical Pathology - Special Chem, POCT							x	2	2	2	3	2	-	2	3	3	3	2	-	-	-	-
	Anatomical Pathology								x	1	2	3	2	-	2	3	3	3	1	-	-	-	-
	Diagnostic Genomics									x	1	3	2	-	2	3	3	3	1	-	-	-	-
	Microbiology and Molecular Pathology										x	3	2	-	2	3	3	-	1	-	-	-	-
	Pathology administration											x	-	-	-	-	-	-	-	-	-	-	-
	Collections Centre												x	-	-	-	-	-	-	-	-	-	-
	Mortuary services													x	-	-	-	-	-	-	1	-	-
	Prototyping Lab														x	-	-	-	-	-	-	-	-
	Digital Informatics															x	-	-	-	-	-	-	-
	Centralised Storage and Waste																x	-	-	-	-	-	-
	Liquid Nitrogen Dewar																	x	-	2	-	-	-
	Freezer Farm and Biobank																		x	-	-	-	-
	ACT Pathology Research																			x	-	-	-
	Mortuary and Loading Dock Access																				x	1	-
	Courier Services																					x	-
	Slides and blocks storage																						x

Legend
1 directly adjacent (Horizontal / Vertical)
2 easily accessible (less than 3 minutes)
3 accessible (3 - 5 minutes)

7.7.1. Pre-Analytics

Pre-Analytics is the 'front door' to pathology. It maintains the pathology test register, manages distribution of test results and is responsible for patient care in collection areas. Pre-Analytics is custodian of patient specimens up to handover to other specialist departments. The functional relationships around Pre-Analytics is demonstrated in the Core Laboratory FRD in Figure 7-3.

Pre-Analytics department comprises two distinct services:

- **Collection Services**.
  - Customer engagement;
  - Phlebotomy/specimen collection to support CH and non-CH services;
  - Glucose Tolerance Testing;
  - Electrocardiogram;
  - Fine Needle Aspiration;
  - Home Collection Service;

- Couriers;
- Client and service advocacy;
- Dispatch of tests to specialist labs for testing;
- Patient and client enquiries;

- **Specimen Reception**.
  - Pre-analytical request registration;
  - Specimen receipt;
  - Receipt of samples via the (Lampson) Pneumatic tube system from connected ward locations;
  - Specimen processing;
  - Loading, unloading and monitoring of the specimen tracking system;
  - Delivery of test results and reports;
  - Management of clinical trial samples; and
  - Referral of samples.

7.7.2. The Core Laboratory

The concept of a centralised laboratory has been progressively evolving since the late 19th Century. Contemporary laboratories have the Core Lab at the 'heart' of its operations as automation and quality control become more important.

The future Pathology facility will employ the Core Lab concept with a 24/7 service delivery. The Core Lab includes Specimen Reception, Haematology & Transfusion, Chemical Pathology, Immunopathology & Infectious Immunoassay. It is critical for these departments to be collocated for:

- Efficient triage of patient samples;
- Connection of analysers to core laboratory track system;
- Growth space to allow for the track to expand with additional instrumentation connected;
- Sharing of like technology;
- Sharing of generic workspaces e.g. centrifuges, storage spaces;
- Cross training of technical staff in the use of similar technology; and
- Centralise 24/7 critical services.

Technologies and tests will move into this space from various disciplines, as well as extended robotics to accommodate more of the high-volume testing of a Core Laboratory. Analysers which can be connected to an automated track system, will be connected to it as much as possible.

The Core Lab comprises four main departments:

- Specimen Reception;
- Haematology & Transfusion;
- Chemical Pathology; and
- Immunopathology & Infectious Immunoassay.

It is critical that the Core Lab departments are adjacent to each other in the Core Lab area.

The Core Lab has several critical design features, including:

- A large open space that can:
  - Accommodate an automated track system. With this comes the connection of the analysers to the Core Lab track system.
  - Accommodate infrastructure to allow a single sample transport system ('Tempus') to connect from critical locations e.g. ED, directly into the automated track system to allow for minimal touch points and optimal turnaround time of urgent samples, facilitating triage of patients.
  - Enable reasonable expected growth in robotics and other automated instrumentation.

  Shared spaces for automation (robotics) creates a unique place to design. The robotic lines require structured and ordered space that is expandable and interchangeable. The "track" configuration (typically along a central spine with 'arms') is critical to the interconnectivities of the robotic stations that connect to the track. It is essential to design the space with direct and clear access in order to gain the most benefit from the expensive robotic lines.
- A reception space that receives and efficiently triages patient samples/ specimens (from multiple collection sources);
- Sharing of like technology, and generic workspaces (such as biosafety cabinets, centrifuges, storage);
- Cross training of technical staff in the use of similar technology; and
- Centralise core 24/7 critical services;
- Scientific staff will remain specialised within a particular department, instead of being cross trained.

There are other important components of each individual department described in sections below.

The Core Lab FRD is as illustrated in Figure 7-3.

7.7.3. Microbiology and Molecular Pathology

Microbiology and Molecular Pathology are combined as a single operational discipline due to the significant clinical overlap, shared specimens, movement of traditional microbiology to molecular based staff and ability to cross train staff.

Both Microbiology and Molecular pathology are moving to an increased level of robotics and the FRD (Figure 7-4) is based around some key principles:

- Molecular Pathology must be adjacent to Diagnostic Genomics to allow shared laboratory space and equipment e.g. PCR Clean Preparation, Specimen Preparation, DNA Amplification.

  If not co-located with Diagnostic Genomics, then shared areas would need to be duplicated on the other floor, including, PCR set up, specimen preparation and DNA amplification;
- Molecular Pathology should also be adjacent to the core laboratory.

  More instrumentation is being enabled to connect to track systems, with Molecular Pathology robotics likely able to connect to a track system when the Pathology building is opened – this is already possible with Roche instrumentation;

Figure 7-3: Functional Relationships for Pathology Department – Core Facilities and Immunopathology

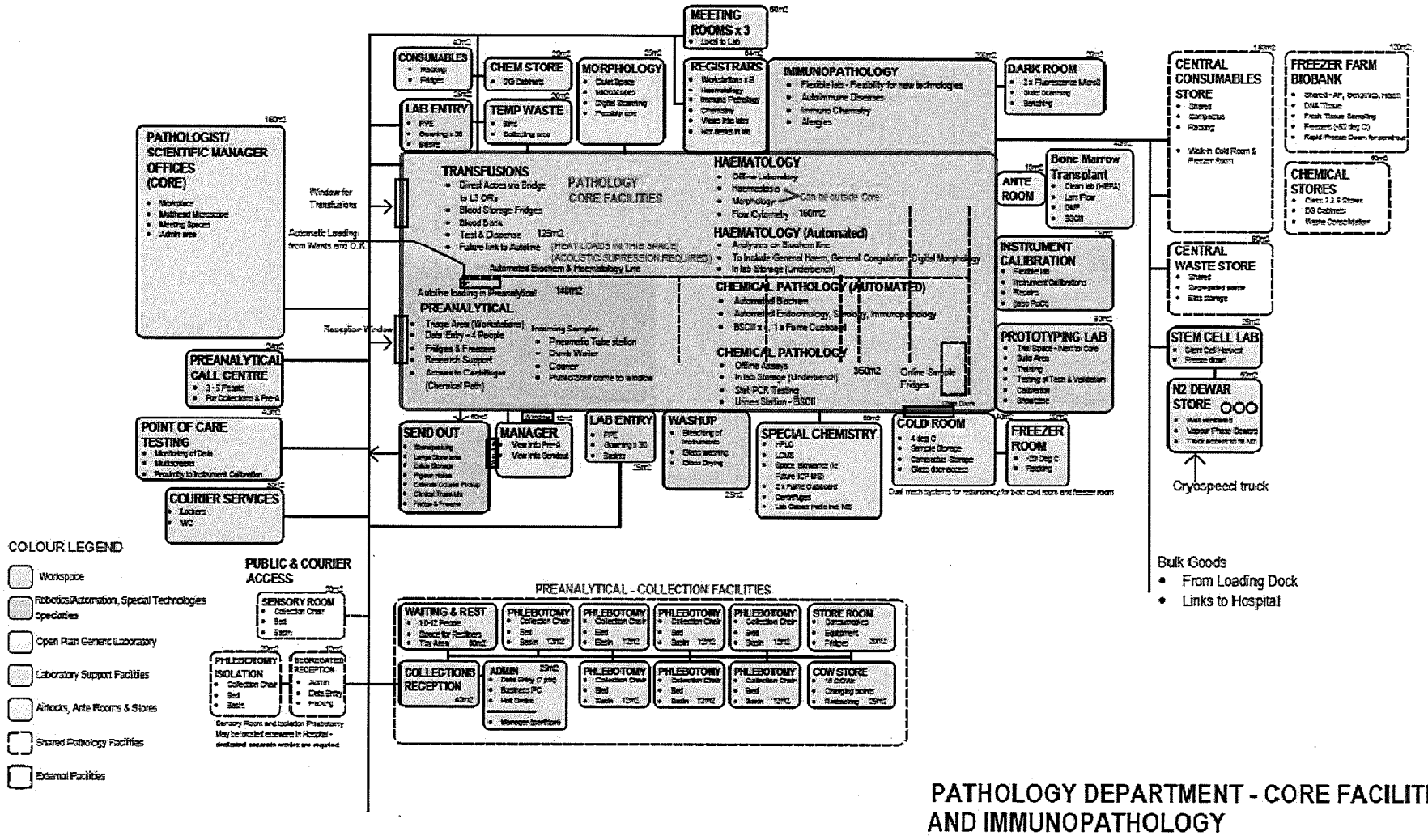
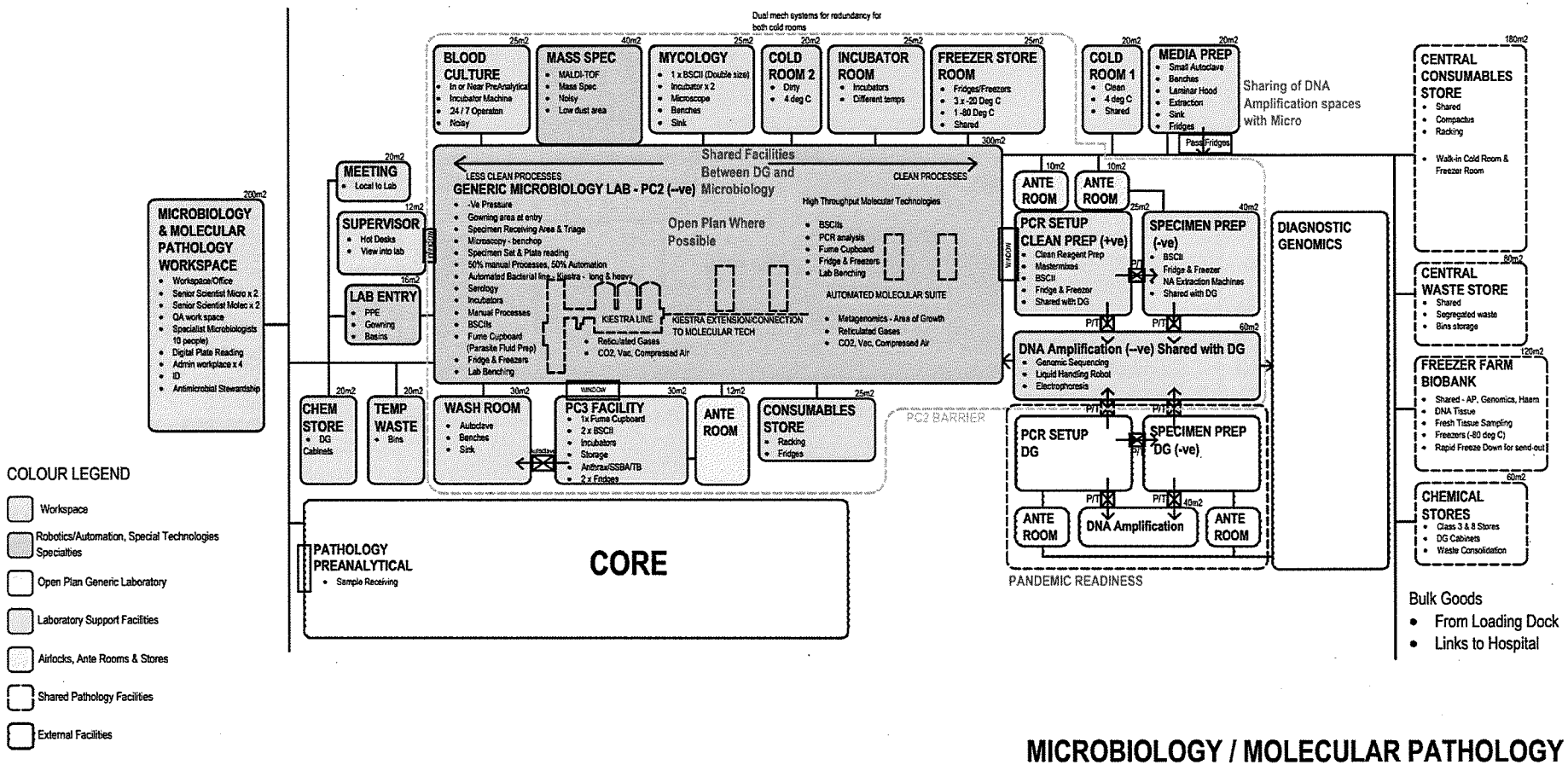


Figure 7-4: Microbiology / Molecular Pathology



- Much microbiology testing will move to tracked robotics, which has an increased floor print e.g. Kiestra;
- Molecular Pathology has moved and will further embrace increased robotics e.g. Roche 6800;
- The spaces will be open plan wherever possible, with some exceptions including the PC3 facility; and
- Provision of sufficient space to allow fast scale up of services e.g. pandemic.

7.7.4. Anatomical Pathology & Diagnostic Genomics

In the future DG will be performing tests obtained from Haematology, Oncology (through AP) and from other departments through pre-analytical specimen reception.

There will be significant expansions within Diagnostic Genomics in the near future, taking advantage of new technologies such as cell free Deoxyribonucleic Acid (DNA)/Ribonucleic Acid (RNA), liquid oncology, and NGS – hence an expansion in the floor space to accommodate this would be critical.

Diagnostic Genomics utilises similar technologies and laboratory equipment as Molecular Pathology, so rather than duplicating laboratory space, Diagnostic Genomics and Molecular Pathology should be collocated to allow for the sharing of laboratory facilities and optimisation of space usage.

The area proposed to be shared are the DNA Amplification laboratory with separate PCR set up and specimen preparation areas for both departments.

If Diagnostic Genomics is not co-located with Molecular Pathology, then shared areas would need to be duplicated on the other floor, including DNA amplification.

The Diagnostics Laboratory will need to have close relationships with, and to have sample workflows established from Anatomical Pathology, Haematology, Immunopathology and specimen reception.

Anatomical Pathology site visits demonstrated that, new laboratories, even after a relatively short period of time e.g. 5 years, outgrow the space. This is due to the high level of manual labour, especially in areas such as cut up grossing. As workload increase, space requirements also increase due to additional staff a workplace. It is therefore critical to over spec the anatomical Pathology laboratory to ensure ACT Pathology can keep pace with future clinical requirements.

AP registrars will be located in a dedicated space to allow for their workstations/microscope, as well as registrars of other departments.

There is no requirement for Mortuary Services or the Pathology Museum to be collocated with the other AP units, but there will be a strong association between these services.

Anatomical Pathology and Diagnostic Genomics' FRDs are as illustrated in Figure 7-5 and Figure 7-6.

Figure 7-5: Anatomical Pathology

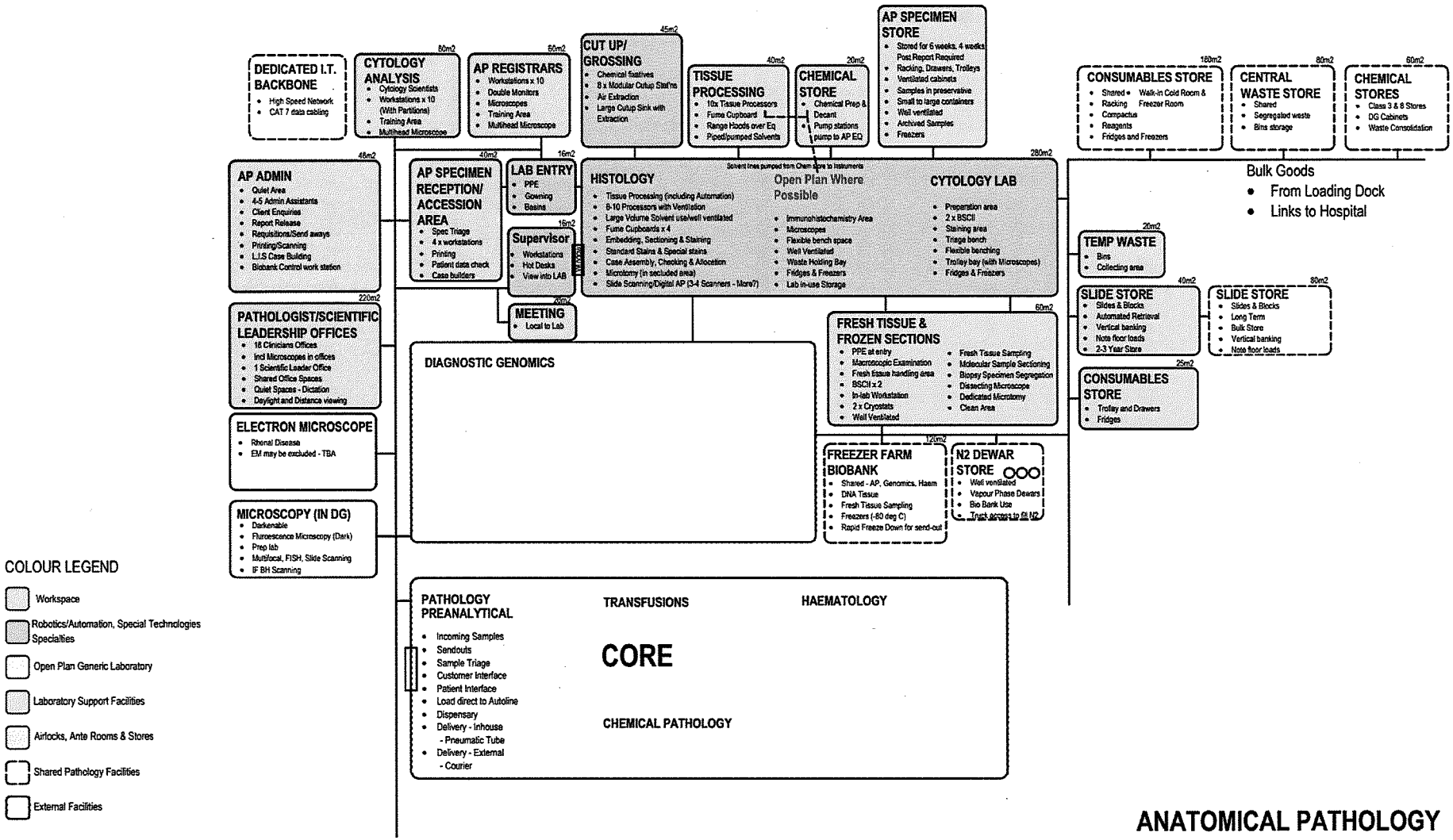
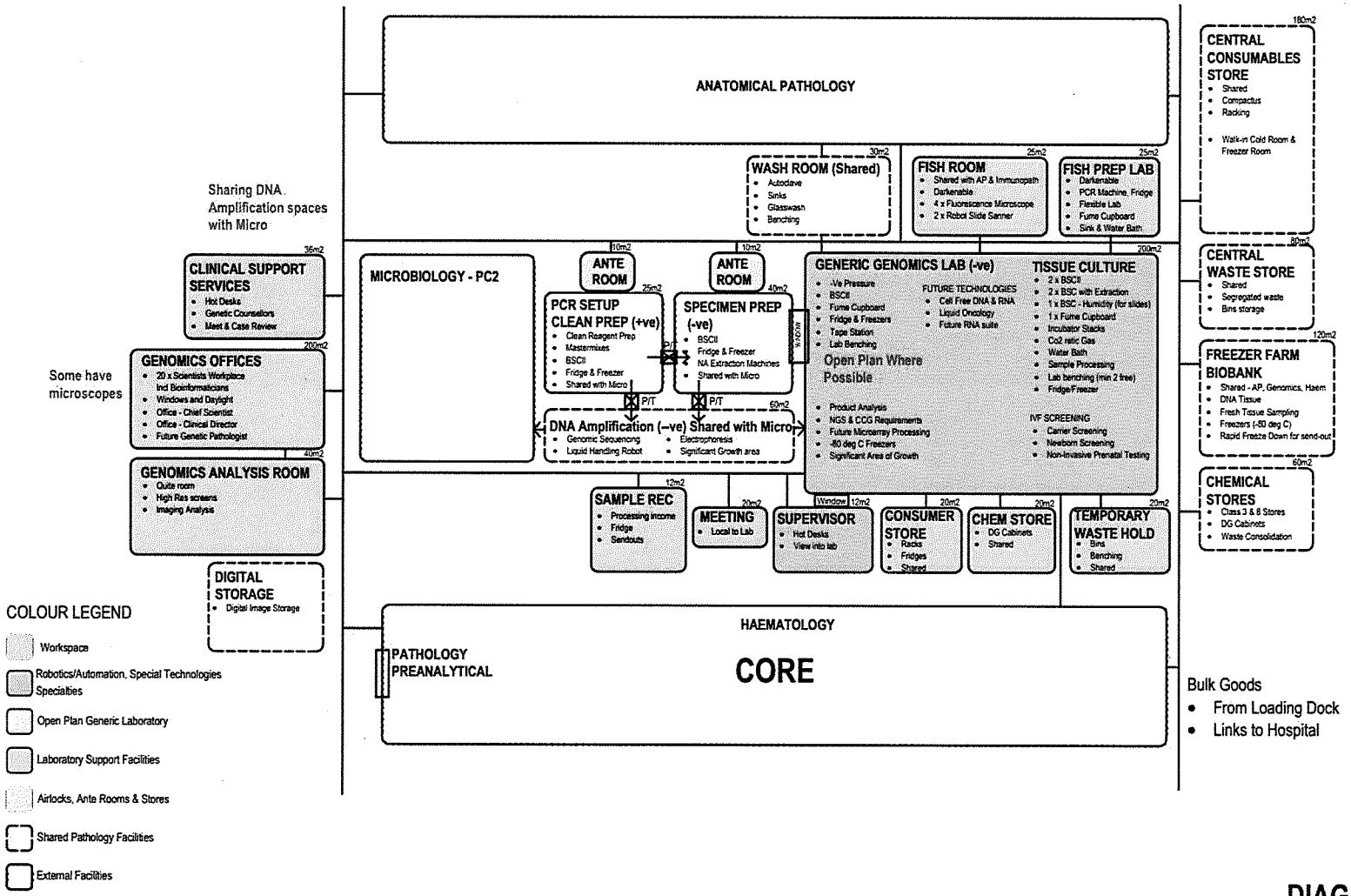


Figure 7-6: Diagnostic Genomics



7.7.5. Mortuary

The Mortuary Service includes:

- **The acceptance and safe repository** of bodies during and after business hours[22] for persons who have died at CH (and other sites as required), as well as potentially other deceased persons depending on the capacity for storing at the Forensic Medical Centre.

  Non-autopsy services, including *Body Release*: CH's services involve the release of bodies to appropriate Funeral Homes/Transport Companies/Religious Organisations[23], including the management of relevant/necessary paperwork.

- **Perinatal post-mortem service** (PPMS)[24]: autopsy procedures conducted on deceased perinatal bodies where deaths occurred during pregnancy, or during and (just) after birth, at CH.

  Perinatal anatomical pathology is highly specialised, with the quality and clinical utility of reports requiring a higher degree of expertise/experience of the pathologist, scientist and technical staff.

  Perinatal post-mortems and limited adult autopsies are the main types of post-mortem examinations undertaken at ACT Pathology - a recognised centre of excellence for the provision of this service.

  The PPMS Care Coordinator also supports families during a difficult and sensitive time by providing family-focused care and consultation with relevant health care teams to identify the cause of death, providing answers to the families.

It is important that the design caters for sufficient body storage of the projected population growth in Canberra (noting that a dedicated mortuary has not yet been confirmed for the new North Canberra Hospital) as well as providing sufficient capacity for pandemic response.

The FRD for Mortuary Service is as illustrated in Figure 7-7.

7.7.6. Prototyping Laboratory

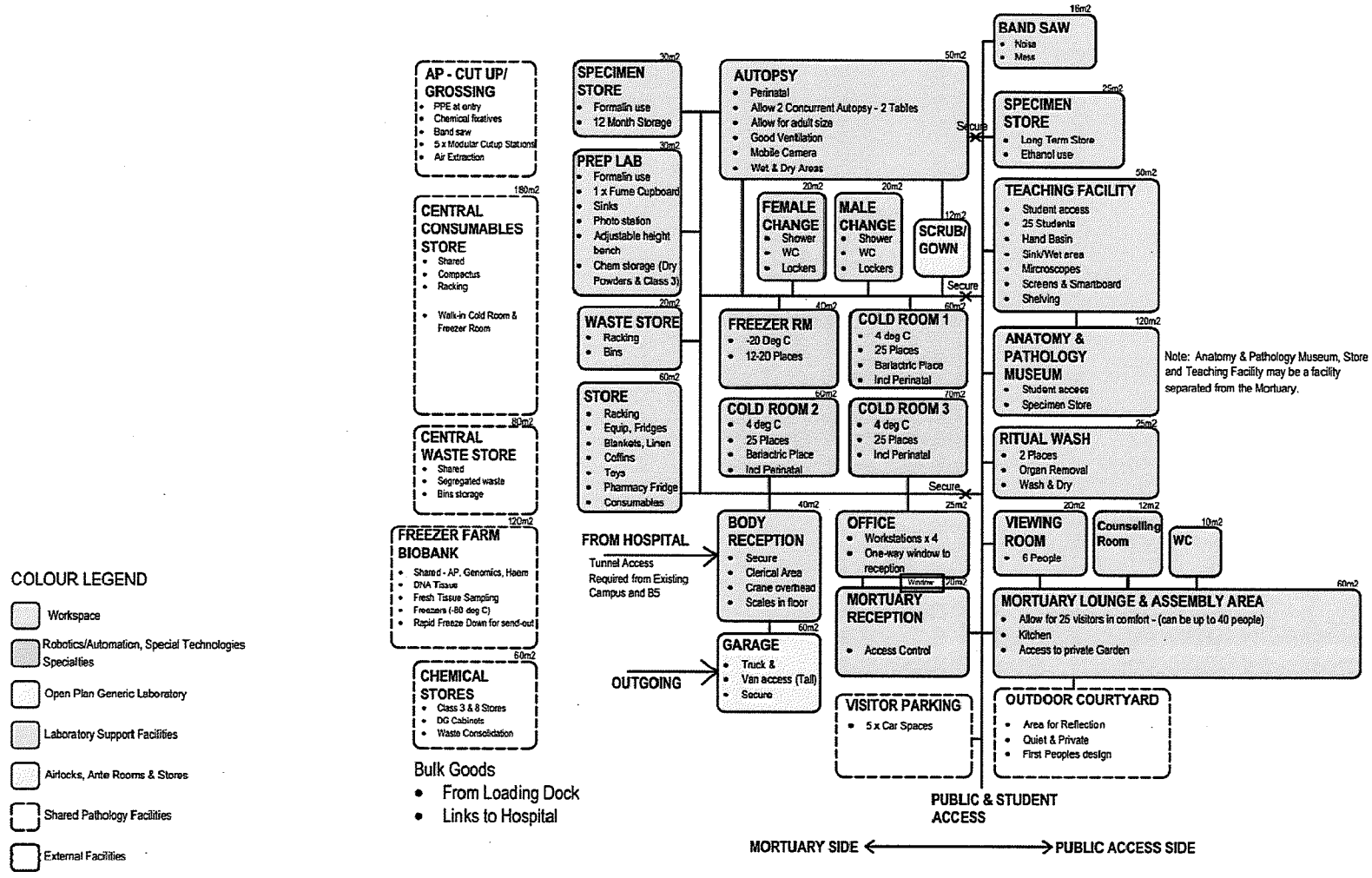
The concept of a Prototyping Laboratory would be implemented in the new Pathology facility. It is an important aspect of futureproofing. This is an initiative that expands on the current functional capacity. It is a practice that is increasingly being adopted by pathology services, which will allow space to:

- Prototype new equipment, or showcase and trial a supplier's technology;
- Be able to trial robotics before the expense of acquiring them, which is invaluable;
- Conduct early trials and testing/commissioning of new technology to speed up the compliance period; and
- Ultimately being able to be used as future expansion subject to priorities.

It is a single open plan area contiguous with the Core Lab.

22. ACT Pathology, Anatomical Pathology Introduction.
23. ACT Pathology, Anatomical Pathology Introduction.
24. NSW Health Pathology, Clinical Services Plan 2019 – 2025 Version 2:2021.

Figure 7-7: Mortuary



7.7.7. Digital Pathology

The concept of Digital Pathology will also be fully embedded into the new Pathology facility, including:

- A modular functional space;
- Management of current interfacing and IT connections with dashboards to manage offline problems;
- Data Centre (off site, could be digital reference library/storage); and
- Digital admin (to be with all other admin staff).

7.8. GENERAL DESIGN PRINCIPLES

General design principles apply to all pathology spaces unless otherwise indicated.

- **Collocated and contiguous specialist pathology functions**.

  The facility is to provide as much generic open plan laboratory space as possible, space must be open plan unless there is a specific reason to have a specialised room/facility. Maximising open space provides flexibility around inter-changeability of workstations and automated equipment, which will change over time.

  Space is defined based on technological similarities rather than traditional departmental silos. This accords with contemporary practice for pathology (as noted above).

  The layout is to be highly interactive, reflecting the strong interconnection, visibility and flows between the different Pathology subspecialities, between administration and laboratory, and between pathologists/registrars, scientists and technical staff. *Fewer walls are key to this project.*

  Labs with successful open plan models tend to employ an "office precinct" model – on the same floor as but not fully adjacent to wet lab spaces. Thus, there is an emphasis on hot-desking in flexible workstation spaces.

- Within the context of open plan laboratory space there will be a continuing need for **specialised rooms and equipment**.

- **Future proofing** would mean that:
  - The core facilities are built to AS2243.3, 2022 (Microbiological) standards for PC2 certification for the handling of Risk Group II Organisms even though the space is to be certified PC1 for most of the activities. In this context, a fully PC2 compliant core facility would be possible even though most spaces will not need to operate under PC2 controls. Designing to PC2 does not come at a financial impost, and is appropriate for health, safety and cleanability considerations.
  - The FRDs in section 7.7 indicate which functions are to be in PC2 containment, and the Briefing Record outlines this in more detail. The key areas of PC2 containment are Microbiology and parts of Molecular Pathology Biology; and
  - The PC3 facility is a high containment facility and is subject to decay testing to enable the required annual decontamination via fumigation.

- **Future proofing also means new functions**, including:
  - Digital support, data centre and digital storage, high resolution and high reliability digital capability;

- Prototype laboratory, as detailed above; and
- Workforce connection spaces.

- Provide a workplace that is planned to enable a combination of quiet spaces for focused work as well as rooms for group activities in order to **promote peak performance and outputs**. The design will *minimise the number of office spaces to maximise break out spaces and meeting rooms for private and collaborative discussions.*

- **Patient-centred care specimen collection**. Depending on the location of the pathology facility relative to outpatients, there may be a need to have a second collection centre to enable easy access for patients.

- Design for grieving families and for **cultural sensitivity and safety** in relation to mortuary services.

- From a service model perspective, decoupling mortuary and autopsy services from diagnostic pathology may need to be considered in the interests of **patient-centred care and operational efficiency** by locating the mortuary closer to where its services are likely to be of greater use, namely the medical inpatient building, in preference to long transport times of deceased persons, as well as creating discreet routes of travel for the deceased for privacy and dignity preservation. This includes National Capital Private Hospital patients;

- **Ventilation and Air Quality**
  - Heating, Ventilation, and Air Conditioning (HVAC) systems play a crucial role in maintaining air quality and temperature control in the laboratory;
  - The HVAC system should be properly designed, installed, and maintained to ensure effective air distribution, filtration, and removal of contaminants; and
  - The system should be equipped with high-efficiency particulate air (HEPA) filters to remove airborne particles, including microorganisms.

- **Lighting** is critical in all areas but more so in the open plan generic spaces with the robotic lines and technology.
  - Illumination Levels: the recommended illumination levels vary depending on the specific tasks performed in different areas of the laboratory. General working areas may require around 300-500 lux, while microscopy areas may need higher levels of illumination, typically between 1000 and 1500 lux;
  - Natural lighting is important for staff when reading culture and conversely Ultraviolet (UV) exposure on reagents/analysis can be detrimental;
  - Uniformity of Lighting: lighting should be uniform across the laboratory to minimise shadows and variations in visibility. Uneven lighting can lead to difficulties in accurately interpreting microscopic specimens or distinguishing subtle colour changes, potentially affecting the accuracy of results;
  - Colour Rendering Index (CRI) measures how accurately a light source represents colours compared to natural light. A higher CRI (ideally above 90) is desirable to ensure accurate identification and interpretation of colour changes in stained specimens or indicators;
  - Control of Glare and Reflections: the design should minimise glare and reflections on surfaces, such as microscope lenses, slides, and computer screens, to avoid visual discomfort and potential errors. Non-reflective surfaces, matte finishes, and proper positioning of lighting fixtures help control glare and reflections;

- Task Lighting: task lighting is essential in areas where specific visual tasks, such as microscopy or reading culture plates, are performed. Adjustable task lighting, such as adjustable arm lamps or gooseneck lamps, can be utilised to provide targeted illumination and enhance visual clarity for detailed work; and
- Emergency Lighting: emergency lighting systems should be in place to provide visibility and safety during power outages or other emergencies. Backup power sources, such as battery-powered lighting fixtures or emergency generators, should be installed to ensure adequate illumination for safe evacuation or continuation of critical task.

- **Temperature**

This section applies to all departments with a large number of equipment:

- HVAC systems play a crucial role in regulating temperature in laboratories and may include air conditioning units, heat exchangers, fans, and ductwork to distribute conditioned air effectively;
- It is recommended that heat load calculations are conducted for the department to determine the amount of heat generated by equipment and the required cooling capacity to ensure that HVAC systems are appropriately sized to handle the heat load and maintain optimal temperature conditions;
- The design might also consider dividing into zones to optimise temperature control and to place equipment generating significant heat in strategically placed locations to avoid localised heat buildup. Proper airflow management, such as supply and return air vents, can help direct cool air towards heat-generating equipment and remove hot air efficiently. The design could include ventilation strategies to remove heat from the space by increasing the air exchange rate or adjusting ventilation settings;
- Proper insulation of laboratory walls, ceilings, and equipment could also be included in the design to prevent heat transfer to the surrounding environment. Insulating materials with high thermal resistance reduce heat loss or gain, minimizing the impact on overall temperature control;
- Careful placement and spacing of equipment will be essential for effective heat management. Overcrowding or improper placement impeding airflow, leading to heat buildup should be avoided in the design; and
- The design could also include automated systems (with alarms and alerts) that can adjust HVAC settings based on preset parameters to maintain a comfortable temperature.

- **Acoustic control**
  - The design should consider noise control measures to allow scientists to concentrate, particularly during analytical processes including blood film reviews;
  - Consideration to be given to ceiling acoustic and wall treatment where applicable. Ceiling noise abatement has the added opportunity of designing that adds colour and form to the ceilings – noting that they will be expansive over the large generic laboratories.

- **Laboratory space.** Laboratories are serviced by power/data and gases and shelving suspended from the ceiling above the bench tops to free up space on the floor and to facilitate changeable and modular systems. laboratory benches are to be loose and removable.

- **Offices**
  - Pathologist and scientific leadership offices/workspaces are to be located on the same level as the corresponding laboratory space in an administration area of the floor, to ensure the laboratory space is open plan and not disrupted by office spaces.
  - Allocation of offices is to accord with the *CHS Accommodation Guidelines*.
  - Workspaces for all scientists and some registrars (including supervisory positions) will be in the form of open-plan desks based within laboratory spaces; quiet office/workspace will be provided for scientific leadership roles (in close proximity to the laboratory if possible) as per CHS accommodation policy; and
  - Anatomical Pathologists are an exception for office requirements where their microscopes are located inside their work point, which for many is in an office with natural light (direct or indirect) and long sightlines beyond the building. While this is not a regulatory requirement, it is highly relevant and practical for the type of work conducted. AP registrars also need a dedicated space.

- **Staff Spaces**
  - Creating a welcoming and comfortable work environment for staff can be challenging;
  - Team members need ready access to break-out spaces for local meetings with minimal disruption to work. Each core team requires access to small, functional meeting spaces with glass windows and AV facilities, located near laboratory spaces;
  - Common meeting areas should be spacious, comfortable and well-equipped. Where feasible these should be multi-purpose e.g. for teaching and "town hall" meeting purposes; and
  - Staff spaces should acknowledge the demands placed on overnight staff – including safety, rest areas and lighted access to vehicles and transport.

- **Centralised support facilities.** Laboratory level storage is via the Centralised Consumables Store (one per level if more than one level) to maximise usable laboratory space and operational efficiency. Same concept goes with the Centralised Waste Store, Centralised Chemical Store, Centralised Equipment Storage, Centralised Record Storage[25], Central Lab Services (e.g., Uninterrupted Power Source room, Compressed air, RO water system), Freezer Farm Biobank, and Centralised cryogenic processing and storage facility. Further details are provided in section 7.8.1.

- **Health and safety** as being at the forefront of all considerations – and during the further design stages it will become critical to the planning outcomes:
  - A logical layout that is ordered but yet expandable;
  - The workflow has key access points that need adequate space to allow operators to do their work unencumbered and not crowded by other activities or instruments;
  - Clearly articulated travel paths that are wide enough for ease of movement;
  - Sightlines and visual control will enhance safety;
  - Allows trolley-based movements;
  - On floor biological safety cabinets to provide easy access in event of a health or containment risk; and
  - Appropriate allocation of hygiene and safety stations clearly demarcated.

25. BMT cell processing records storage/retention requirements and secure access to BMT staff only (this could be a lockable cabinet in common space).

- **Building services reticulation and backbone to be flexible and adjustable**, and ordered to avoid "mess" but be serviceable and able to be upgraded and interchanged with new technologies and equipment.

- **Floor Loading**. All departments will likely have an increased number of analysers and equipment that is heavy and becoming heavier. The design should ensure that the floor load capacity and point loads are designed for current and future equipment.

- Ideally, design for the **"science on display" concept** that opens science to the broader community and population. This increasingly popular concept can greatly enhance the awareness and importance of a hospital pathology department and engage with the hospital staff and also the public where applicable. These could include accessible viewing of the functioning laboratory for the public with an extensive use of glass walls, glazing, and graphics on glass.

- **Sustainability.** It is likely that equipment to help recycle plastics, chemicals and other recyclables will be added to the future laboratory state and will require additional space and workstations.

7.8.1. Storage

Pathology storage is an extremely important consideration for a highly efficient laboratory. Storage is a crucial to the design of a pathology laboratory for several reasons:

- **Efficiency of Workflow**: organised storage ensures that equipment, specimens, and reagents are easily accessible, reducing the time technicians spend searching/gathering items;

- **Safety**: many substances used in pathology labs are hazardous. Correct storage reduces the risk of accidental exposure, spills, or other incidents. For example, chemicals need to be stored in specific cabinets, and sharps need their own designated disposal containers;

- **Preservation of Specimens**: many samples and specimens have specific storage requirements to ensure their integrity. Temperature-controlled storage is essential for certain biological samples, while others might need protection from light or moisture;

- **Optimal Use of Space**: laboratories often have a lot of equipment, samples, and reagents, but may not have a vast amount of space. Efficient storage solutions can maximise the available space, allowing labs to accommodate more resources, function more effectively and have the ability to reconfigure spaces as technology evolves;

- **Regulatory Compliance**: many jurisdictions have regulations regarding the storage of certain substances, especially biohazardous materials. Proper storage ensures that the laboratory remains compliant with these regulations, avoiding legal complications and potential shutdown;

- **Reduction of Cross-Contamination**: organised storage helps to prevent cross-contamination by ensuring that items are stored in designated areas, reducing the chance of samples or equipment coming into unintended contact. This is important for all laboratory spaces but even more so in disciplines where microorganisms are grown or replicated;

- **Inventory Management**: good storage practices, when paired with an efficient inventory management system, ensure that the lab is well-stocked but not over stocked. It can help

to track expiration dates, lot numbers, and ensure that perishable items are used before they degrade;

- **Protection of Equipment**: proper storage can extend the life of equipment by protecting it from environmental factors, accidental damage, or misuse;
- **Cost Savings**: efficient storage systems can lead to reduced waste (from expired or degraded reagents and samples) and fewer equipment damages. This can translate to substantial cost savings over time;
- **Aesthetic and Morale**: a well-organised space is more pleasant to work in and can boost staff morale. A tidy, organised lab can also present a more professional appearance to visitors or inspectors;
- **Flexibility and Scalability**: a well-designed storage system can adapt to the changing needs of the laboratory. As the lab grows, adopts new techniques, or phases out old ones, flexible storage can accommodate these changes without a complete redesign;
- **Proximity to Delivery Entry Points**: positioning storage locations close to delivery entry points ensures quick and efficient transfer of materials without interrupting the lab's main workflow. When deliveries are received, they can be promptly stored without having to move through active work zones, reducing potential disruptions, contamination risks, and the time taken for materials to reach their designated storage area; and
- **Redundancy in Storage Systems**: having backup or redundant storage systems especially for critical items like temperature-sensitive samples, ensures service continuity. If a primary fridge or freezer fails, the redundant system can act as an immediate backup, minimising downtime and potential loss of valuable samples or reagents.

  This not only ensures the safety and viability of stored products but also provides peace of mind for the laboratory staff, knowing that there's a safety net in place.

The main principles for the storage of pathology specimen include[26]:

- Specimens must be stored under appropriate storage conditions that permit reliable retrieval;
- Laboratories must demonstrate storage conditions are fit for purpose and retain supporting documentation, including records of storage temperatures;
  - Recommended general storage temperatures are as follows:
    - Refrigeration 2 to 8°C;
    - Freezer −20°C or lower; and
    - Deep freezer −70°C or lower.
  - Some types of refrigerators and freezers involve "freeze/thaw" cycles as part of their auto-defrost features. Specimens stored in these types of refrigerators/freezers should not be intended for later testing of analytes that are degraded by such freeze/thaw cycles.

26. Australian Commission on Safety and Quality in Health Care, Requirements for the Retention of Laboratory Records and Diagnostic Material, Tier 3B Document, Ninth Edition 2022, chapter 1, available at https://www.safetyandquality.gov.au/sites/default/files/2022-04/retention_standard_ninth_edition_2022.pdf.

- Storage of blood and blood products, including stem cells and cell therapy products, must be in accordance with AS 3864 Medical Refrigeration Equipment – for the storage of blood and blood products[27];
- Specimen refrigerators and freezers must not be used for storage of food or drink; and
- Use of specimen refrigerators and freezers for storage of tissue specimens intended for transplantation or use as a therapeutic device requires that the laboratory must comply with the regulatory requirements of the TGA[28] and other relevant regulatory codes.

The types of storage for the Pathology redesign include the following, a table of storage categories and icons can be found in the Appendix:

- **Room Temperature Storage**:
  - Paper/Stationery: ensure a dry, cool environment to prevent dampness, which might degrade paper quality;
  - Reagents:
    - Use chemical-resistant shelving units with adjustable shelves for varying bottle sizes; and
    - Spill trays or containment systems are essential to prevent spills from contaminating other products.
  - Chemicals:
    - Store in well-ventilated cabinets specifically designed for chemical storage. Flammable cabinets are required for certain solvents; and
    - Shelves must be clearly labelled based on the chemical class and use secondary containment systems.
  - Gas Supply
    - Reticulated gases from an external loading dock area are preferred, where possible, to minimise WHS issues and avoid requirements for extensive storage facilities within laboratory spaces.
    - Ideally Pathology will not be storing any gas cylinders within laboratory spaces; and
    - Reticulated supply of LN2 to cryogenic storage and cell processing laboratory
  - Records, Samples, Slides, Blocks:
    - Slides and blocks require specialised cabinets or drawers to protect from light, dust, and physical damage. This is typically an extremely heavy store with a cabinet designed to store 10,000 slides having a combined weight over 300kg (see Appendix A5 for calculations);
    - It is crucial to consider the floor load capacity, ensuring it can handle the weight of fully loaded storage units;
    - Ensure that units have durable and smooth sliding mechanisms, as the weight can make drawers challenging to open and/or close;

27. SAI Global. Australian Standard AS3684: Medical refrigeration equipment – For the storage of blood and blood products. Sydney (AU): Standards Australia; 1997
28. Therapeutic Goods Administration. Australian Regulatory Guidelines for Biologicals (ARGB) [Internet]. Canberra (AU): TGA; 2017 [viewed 17 January 2018]. Available from: https://www.tga.gov.au/publication/australian-regulatory-guidelines-biologicals-argb.

- Reinforce shelving or racking solutions to prevent sagging or potential collapse;
- Records can be stored in conventional filing cabinets. However, fire-resistant options should be considered for enhanced security; and
- Samples should be kept in labelled containers on open or closed shelving, away from direct sunlight, reagents and clean areas.

- Equipment:
  - Bulky equipment should be stored on sturdy tables or workbenches;
  - Smaller equipment can be stored in cabinets or on open shelves; and
  - Ensure electrical outlets are nearby for equipment requiring power.

- **Refrigeration (2-8°C):**
  - Reagents:
    - Use laboratory-grade refrigerators. Must not store with samples or food to prevent cross-contamination;
    - Store reagents on separate, labelled shelves;
    - Walk-in Refrigerator and Freezer Unit with glass doors offer a multitude of benefits in a pathology laboratory, especially when they are used for storing critical reagents (see Appendix A6 for Walk-in Refrigeration considerations); and
    - Blood and cell therapy products to meet relevant refrigeration, monitoring and security standards.
  - Samples:
    - Use laboratory refrigerators with adjustable shelving. Store samples in labelled containers or racks.
  - Food:
    - Should be kept separate from any lab materials. Use dedicated, clearly labelled refrigerators.
  - Bodies:
    - Walk-in refrigerators or cold rooms are necessary. Ensure they're easy to clean and maintain.

- **Frozen Storage (-20°C):**
  - Samples:
    - Use laboratory-grade freezers with adjustable shelves or racks;
    - Maintain a regular defrosting schedule; and
    - Walk-in Freezer component to be part of the Walk-in Refrigerator Unit (see Appendix A6 for Walk-in refrigeration considerations)
  - Bodies:
    - Specialised mortuary freezers are necessary. Consider systems with built-in alarms for temperature fluctuations.

- **Other Frozen Storage:**

- Use specialised freezers for temperatures other than -20°C, and ensure they have adjustable shelving; and
- For samples stored in liquid nitrogen (LN2), use cryogenic storage systems. These systems should be insulated and come with safety precautions for handling.

- **Incubated Storage:**
  - Laboratory incubators, predominantly set at 37°C, but adjustable for a range of temperatures. Ensure uniform temperature distribution.
- **Waste Storage:**
  - Chemical Waste: store in designated, well-labelled containers with tight-fitting lids to ensure containment in case of spills;
  - Biohazardous Waste: use biohazard bags and containers, ensure they're sealable and stored away from general waste;
  - Sharps: store in puncture-resistant sharps containers, and replace when ¾ full;
  - Liquid Laboratory Waste: store in leak-proof containers, preferably secondary containment systems;
  - General Laboratory Waste: Use labelled trash bins, with clear separation from biohazardous or chemical waste;
  - Other General Waste: use standard trash bins, placed conveniently around the laboratory; and
  - Recycling: use labelled bins for different recyclables (paper, plastic, glass), and ensure they are emptied regularly.

  Note, a separate lift is recommended to transport these waste products out of the building.

The design of the new Pathology facility will centralise as much stock and storage as possible in the Central Consumable stores. Smaller quantities of approximately 1 week of stock will be stored close to the laboratory areas.

The following types of storage will be employed:

- **Freezer Farm Biobank** with controlled freezing capability will be shared with AP, DG and Haematology;
- Cryopreservation of specimen will be done using **mobile LN2** within the laboratory, retrieved from the **cryogenic processing and storage facility** located next to loading dock (for LN2 deliveries);
- Stock will be retrieved from the dedicated **Central Consumables Store** with a location strategically placed to optimise workflow, note the Central Consumables Store contains a **Walk-in Cold Room & Freezer Room** for storage of stock, specimens and reagents that require temperature control;
- Sustainability and Waste management
  - General (non-chemical) waste will be disposed to the dedicated **Central Waste Store** next to the Central Consumables Store, where items are segregated into different types of bins, awaiting (efficient) collection by the waste disposal service; and
  - It is likely that equipment and consumables (such as plastics, chemicals and other recyclables) will be added to the future laboratory state and may require specifically designated space in waste collection and disposal.

- Chemical waste (i.e., used specimens) will be consolidated at the **Central Chemical Store** (containing Class 3 & 8 stores) for careful disposal/incineration;
- **Centralised Equipment Storage** will be used to store the laboratory equipment when it's not in use. This includes the analysers themselves, as well as smaller equipment and supplies like pipettes, tubes, and personal protective equipment. It may also include back-up technologies which are typically more like small Point of Care testing analysers; and
- There remains a need for other **Record Storage** even though the development of DHR is being rolled out across CHS. Record Storage is of particular consideration for the new facility.

7.8.2. Specimen Retention

The general minimum retention times are provided below in Table 7-4, with some variation from department to department specified in sections below[29].

Table 7-4: General Minimum Retention Times for Pathology

	RECORD/MATERIAL	MINIMUM RETENTION TIME
3-2-1	Personnel records	Period of employment + 4 years
3-2-2	All quality control, quality assurance and quality management records	4 years
3-2-3	Equipment maintenance	Life of equipment + 4 years
3-2-4	Laboratory methods/procedures (manuals)	4 years[30]
3-2-5	Referring doctor's request, laboratory records such as records of analysis, calculations and observations from which the result is derived	4 years[31]
3-2-6	Digital images or graphical output used in diagnosis[32]	4 years
3-2-7	All specimens, unless otherwise specified under the separate disciplines	7 days from date of receipt or until 2 days after the final report is issued (whichever date is later)
3-2-8	Copy of original report, or ability to reprint the information content of an original report unless a longer period is specified under the separate disciplines	7 years for adults 7 years from the age of majority for minors

7.8.3. Disposal

Laboratories must dispose of specimens and patient records in accordance with relevant state/territory legislative requirements as per Appendix A8.

- Documents with identifying patient details should be shredded or disposed of in another secure manner; and

29. Australian Commission on Safety and Quality in Health Care, Requirements for the Retention of Laboratory Records and Diagnostic Material, Tier 3B Document, Ninth Edition 2022, chapter 2, available at https://www.safetyandquality.gov.au/sites/default/files/2022-04/retention_standard_ninth_edition_2022.pdf.
30. The retention time of 4 years refers to the circumstance where a laboratory method/procedure/in-vitro diagnostic (IVD) device has been superseded or replaced by a new and unrelated methodology. However, where a laboratory method/procedure/IVD has simply been modified, the full history of all earlier versions/modifications of that particular IVD must continue to be retained.
31. Storage of scanned facsimile images and associated records of these intermediary documents is a satisfactory alternative to retention of the original document. For those areas where material is retained for longer than 4 years, the laboratory may wish to consider retaining the associated records for a corresponding period. Although there is no minimum retention time for paper request forms after validated scanning has been performed, it would be prudent to retain them for as longs as is necessary to exclude the possibility of scanning failure.
32. Except where specific guidelines for image retention are made.

- Any organs retained at autopsy with consent of next-of-kin, should be disposed of as outlined in the National Code of Ethical Autopsy Practice unless otherwise stipulated by the next-of-kin.

Laboratories must have a policy to address patient requests for returned specimens, including instructions for the disposal of specimens.

7.8.4. Safety

- There will be provision of clear signage that:
  - No food or drink may be brought into, or consumed in, the designated laboratory area;
  - Gowns must be worn at all times in the laboratory area;
  - Disposable gloves are recommended and must be worn if handling open specimens or potentially contaminated instrumentation;
  - Personal protective equipment must be removed and hands washed when exiting the laboratory into clean spaces.
- Hand wash basins, safety showers and eyewash stations will be made available and strategically dispersed throughout each laboratory floor;
- The handling of LN2 carries risks that must be managed, including:
  - Personal Protective Equipment (PPE): personnel working with LN2 should wear appropriate PPE, including insulated gloves, face shields or goggles, and cryogenic aprons or lab coats. PPE protects against the extreme cold temperatures and potential splashes or spills;
  - Handling and Transfer: LN2 should be handled and transferred using approved containers and equipment designed for cryogenic materials. Cryogenic gloves and tools, such as tongs or transfer vessels, should be used to prevent direct contact with LN2 and minimise the risk of injuries; and
  - Cryogenic Spills: In the event of a cryogenic spill or LN2 exposure, proper procedures should be followed. This may include evacuating the affected area, notifying appropriate personnel, and using absorbent materials specifically designed for cryogenic spills to contain and clean up the spill.

7.9. SPECIFIC DESIGN ELEMENTS BY DISCIPLINE

7.9.1. Pre-analytics

Scope of Service

Pre-Analytics is the 'front door' to pathology. It maintains the pathology test register, manages distribution of test results and is responsible for patient care in collection areas. Pre-analytics is custodian of patient specimens up to handover to other specialist departments.

Pre-Analytics department comprises two distinct services:

- **Collection Services**.
  - Customer engagement;

- Phlebotomy/specimen collection to support CH and non-CH services;
- Glucose Tolerance Testing;
- Electrocardiogram;
- Fine Needle Aspiration;
- Home Collection Service;
- Couriers;
- Client and service advocacy;
- Dispatch of tests to specialist labs for testing; and
- Patient and client enquiries.

- **Specimen Reception**. Pre-analytical request registration;
  - Pre-analytical request registration;
  - Specimen receipt;
  - Receipt of samples via the (Lampson) Pneumatic tube system from connected ward locations;
  - Specimen processing;
  - Loading, unloading and monitoring of the specimen tracking system;
  - Delivery of test results and reports;
  - Management of clinical trial samples; and
  - Referral of samples.

Specimen Pathway

Specimens are received from the following places:

- Inpatient and outpatient services at CH;
- Other public and private hospitals in the ACT and parts of NSW;
- Community medical practitioners; and
- Collection centres operated by ACT Pathology.

Upon receipt of the specimen and the checking of the specimen details, the specimen is registered in the Laboratory Information System (LIS). This becomes a critical step in the quality, tracking and risk management of pathology's work.

Collection Services

Collection services comprise:

- Patient arrival and registration - with referral and identification;
- The specimen is collected from the patient (by various methods depending on the specimen); and
- Once collected, the specimen is appropriately handled and transported to specimen reception.

Specimen Reception

Specimens are delivered to Reception by:

- Pneumatic Tube from some areas of the Hospital;
- Hospital staff;
- ACT Pathology couriers; and
- ACT Pathology staff including Anatomical Pathology staff who perform the collection (e.g., fine needle aspiration).

Specimen reception has two main functions: 'logging' the specimen into the laboratory's information management system with cross-checking of the requisite details and forwarding the specimen to the Core Laboratory for routine testing or other appropriate department for processing. Each of the specialty areas have their own process(es) and systems that are described below (sections 3.2 to 3.8).

Specific Design Elements for Pre-Analytics

The design of the Pre-analytics services must incorporate the following elements:

Space and Zoning;

- **Customer service:** part of the pathology administration/customer service space is for a customer support team that acts like a call centre. This area will be made up of a mix of:
  - Offices for key management staff; and
  - Open plan for the support team.

- **The Collection Area** requires:
  - Most importantly, to be located in an area that is easily accessible to patients;
  - Careful zonal planning to ensure visibility of the waiting room, and comfort for patients while waiting;
  - Space for a reception desk, computers, and patient registration. This should be designed to be the first part of the patient journey and also positioned to ensure the staff can supervise the waiting room;
  - Waiting areas to be comfortable and may include amenities such as water dispensers, magazines, televisions as well as play area for children;
  - Sufficient seating for patients, keeping in mind peak times but also access to reclining seating whether that be in a collection room or the waiting space;
  - Sufficient collection rooms to cope with peak demand, particularly early mornings where patients have been asked to fast or hold their bladder;
  - Sufficient space for a phlebotomy (reclining) chair or bed, a side table for equipment, and movement space for the phlebotomist. The room should be designed to ensure patient privacy and comfort;
  - A secure area for storing specimens before they are transported, even though the specimens will be delivered to the laboratory (presumably upstairs) promptly after collection;
  - Provision of space for supplies such as:
    - Needles, tubes, tourniquets, gloves, and other necessary items; and
    - Mobile collection trolleys. A dedicated storage space may be required for access to these trolleys (for both restocking and usage) such as internal trolley parking