

Memorandum

Project	New Dunedin Hospital	Date	7 September 2022
To	Tony Lloyd	Revision	5
From	RCP	Status	FINAL
Subject	Inpatient Building & Logistics Building Design Optimisation Recommendation		

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1 Purpose

This paper:

- a) provides the New Dunedin Hospital Executive Steering Group (ESG) with a summary of the Inpatient Building and Logistics Building design optimisation study, and
- b) seeks endorsement of the Recommended Scheme and approval to commence redesign.

2 Background

2.1 Project Benefits and Fundamental Requirements

The approved Final Detailed Business Case (Business Case) for delivery of the New Dunedin Hospital (NDH) was issued 22 March 2021.

The Business Case confirmed the project fundamental requirements for clinical services and capacities based on a two-building site plan (Inpatient Building on the former Cadbury site and Outpatient Building on the former Wilson site) and a 90,982m² concept design comprising:

- Inpatient Building (including Links and Ancillary Building): 77,591 m²
- Outpatient Building: 13,391 m²

In addition, the concept design included precinct expansion and development opportunities to the south of the Inpatient Building and to the north of the Outpatient Building.

While the Business Case identified a two-building site plan as the preferred option, it is noted that the Concept Design was in fact a three-building site plan comprising:

- Inpatient Building on the Cadbury site
- Ancillary Building (Logistics Building) on the Bow Lane site
- Outpatient Building on the Wilson site

The Business Case outlines the investment objectives with the following associated benefits sought:

- **Better health outcomes:** patient care being delivered more efficiently, improved quality and an improved experience for patients, families/whānau and staff.
- **Improved efficiency:** better clinical planning improving resource efficiency and productivity.
- **Improved patient safety and experience:** patients and their families have an improved experience of care, contributing to more engagement and improved patient recovery.
- **Improved experience for staff:** improved workplace experience, contributing to more engagement, fewer absences and improved staff retention rates, lower turnover and better staff recruitment.
- **A more resilient system:** a new hospital with digital infrastructure and systems bringing benefit in the form of greater resilience to the local health system.

The Business Case identifies clinical service capacity requirements out to year 2043 based on a high efficiency service demand model. It does, however, acknowledge a risk that demand may exceed forecast, or that efficiency assumptions may not be achieved, and it therefore highlights the need for expansion capacity in key areas such as ICU beds and theatres. The modelling confirmed the clinical services and capacities as detailed in Section 1.4 and Appendix A respectively of the Business Case (refer **Attachment A**). Of note the hospital was to include:

- 410 Beds (note: Business Case count error for beds at 421, should be 410)
- 16 Acute, Elective and Same Day Theatres (expandable to 20)
- 30 ICU or high dependency beds (expandable to 40)

In addition to the above fundamental requirements, the Business Case also commits to:

- Design future proofing for flexibility and immediate easy expansion based on the principle of 'long life, loose fit'

- A carbon neutrality programme and a 5 Star Greenstar accreditation target
- Pandemic readiness planning

2.2 Design Development

Design scope parameters were issued to the Design Team in the form of a two page Scope Parameter Memo dated 11 March 2020 (refer **Attachment B**) which confirmed construction budget, required clinical services and capacities, maximum gross floor area and target design efficiencies for travel (18%) and engineering (21%).

Underpinned by the Australasian Health Facility Guidelines (AusHFG), the clinical and technical design briefs were developed with input from the clinical and operational users. These briefs define the functional and future re-fit / expansion requirements and resulted in the current developed design efficiencies in Table 1 below.

Table 1 – Current design efficiency

	Outpatient Building	Inpatient Building	Logistics Building	Total
Gross Floor Area (GFA)	15,425m ²	73,485m ²	6,119m ²	95,029m ²
Gross Departmental Area (GDA)	9,281m ²	48,765m ²	2,217m ²	60,263m ²
Engineering % GDA	40.4%	31.5%	143.6%	-
Travel % GDA	11.9%	17.9%	10.6%	-

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2.3 Forecast Construction Cost and Programme

The forecast construction cost and key programme milestones for the current developed design is provided in Table 2 and 3 below.

Table 2 – Current cost position¹

	Construction Budget (Excluding contingency)	Estimated Construction Cost	Variance
Outpatients Building	S9(2)(b)(ii)		
Inpatient Building & Logistics Building			

Table 3 – Developed design programme milestones²

	Detailed Design Completion	Construction Start (Piling)	Opening "Go Live"
Outpatient Building	4 April 2022	19 April 2022	19 January 2025
Inpatient Building	3 August 2023	19 April 2023	8 June 2028
Logistics Building	21 April 2023	2 May 2023	8 June 2028

2.4 Ministerial Direction in Response to Cost Escalation Pressures

In March 2022, in response to the forecast \$200 million cost escalation over and above the project budget (\$1.47 billion), the Ministry of Health provided a briefing to Ministers of Health and Finance (joint Ministers) on options to achieve savings and bring forecast project costs closer to budget. Joint Ministers indicated support of an option (option 2c), with potential to achieve up to \$100 million in savings. Option 2c had the following key features:

- Removal of the Pavilion Building
- Third party financing of the Interprofessional Learning Centre (ILC) – *Noted to no longer be an option*
- Value engineering of the facade
- Reduction of the Major Medical Equipment (MME) budget
- Retention of the "red" link bridge for clinical services between Inpatients and Outpatients
- Delivery of the Mental Health Services of Older People IPU service in the community
- Relocation of pathology to the Logistics Building and re-purposing of the vacated space
- A reduction in engineering and select clinical areas, backfilled within staff workspace, which could be converted back to clinical spaces in the future when required.

In May 2022, the project team were directed to undertake a detailed design optimisation study to further develop and refine the above option, with a target of realising a net \$100 million saving.

¹ Figures based on RLB Memo 'New Dunedin Hospital Inpatients Building Optimisation Estimated' dated 30 August 2022

² Programme dates based on Master Programme Rev 4, not current actuals for Outpatient Building. Inpatient Building dates are now subject to delay due to the design optimisation study (3 months sunk time to date)

3 Optimisation Study

3.1 Approach

The optimisation study was led by RCP and Warren & Mahoney and has drawn on the expertise and input of the full project team, including the ECE Contractor.

A project team briefing workshop was held with client representatives on 17-18 May 2022 which confirmed the following design optimisation study key constraints:

- Business Case benefits sought and fundamental requirements to be realised, or able to be realised at 'end state'
- 'Day one' clinical impact to be minimised
- Pavilion Building to be removed (northern section of the Inpatient Building)
- Outpatients Building to be retained in its current design form
- Red bridge connection to the Outpatient Building to be retained
- Future site expansion and flexibility to be retained
- Building excavation depth not to be increased
- Pandemic Response design intent and capacity to be retained
- 5 Star Greenstar accreditation target to be retained

3.2 Design Optimisation

The project team explored and tested various design schemes as part of the optimisation study with an aim to achieve the required savings by:

- Improving building efficiency through bulk and form
- Refining building systems and materiality
- Maximising building spatial use and efficiency
- Minimising the required reduction of day-one clinical services and capacities
- Minimising the extent of clinical replanning
- Utilising collaborative workspace flexibility (by taking a distributed approach)
- Minimising loss of building resilience and energy efficiency
- Minimising any adverse impact to building maintenance and operation

Another key issue was the need to minimise programme impact both in terms of redesign and Inpatient Building opening date, as offsetting associated time related costs significantly increases the building savings required to be achieved.

Design exploration and associated clinical / operational user engagement resulted in an iterative design process and development of a single Recommended Scheme, this being referred to as Option 4.3 (refer **Attachment C**).

The Recommended Scheme maximises the Inpatient Building spatial use and absorbs both the Pavilion Building café, staff amenities and collaborative workspace, and the Logistics Building loading dock, back-of-house and main kitchen facilities. Displaced building services plant from the Pavilion Building (heat pump chillers) and the Logistics Building (generators) remain to be located on the Bow Lane site and housed or mounted using cost-effective on grade design solutions. Noting the generator facility is proposed to supply both the Inpatient Building and Outpatient Building.

Future precinct expansion and development opportunities are achieved to the north (as designated) and south (Diary Building or above the Loading Dock) with the Inpatient Building Level 1 planning retaining the ability to create the required link connections. Furthermore, it is noted that the project team continues to investigate the feasibility of locating the heat pump chillers on the Inpatient Building site in order to create a future development opportunity on the Bow Lane site (discussed further below).

The Recommended Scheme realises the Business Case benefits sought and fundamental requirements subject to the day-one departures detailed in Table 4 below. Refer to **Attachment C** for a full

compliance and departure comparison with the Business Case for both the Recommended Scheme and current design.

Table 4 – Day-one Business Case departures

	Business Case	Current Hospital	Recommended Scheme
Inpatient Beds	410 ³	352	354 (Expandable to 386 ⁴)
Acute, Elective and Same Day Theatres	16 (Expandable to 20)	11	15 (Expandable to 18)
DSA / Angiography	2	2	2 ⁵ (Including Hybrid tbc)
Cardiac Catheter Laboratory	2	2	2 ⁵ (Including Hybrid tbc)
PET CT Scanner	1	-	-
MRIs	3	2 ⁶	2 (Expandable to 3)
General X-Ray	8	6	6 (Expandable to 8)
Pathology Laboratory	1 (1,300m ² shell)	1 (1,500m ²)	Reduced to Acute 24hr 'hot lab' / collection shell

The recommended scheme design efficiency and a summary of the scheme changes from the current developed design is provided in Table 5 and 6 below.

Table 5 – Recommended Scheme design efficiency

	Current Design (Inpatient + Logistics Building)	Recommended Scheme ⁷	Change
Gross Floor Area (GFA)	79,604m ²	71,428m ²	(8176m ²)
Gross Departmental Area (GDA)	50,982m ²	51,826m ²	844m ²
Engineering % GDA	36.4%	26.9%	(9.5%)
Travel % GDA	17.6%	15.9%	(1.7%)

³ Business Case noted to have a count error for beds at 421, should be 410.

⁴ Expandable via shelled 32-bed IPU on Level 8. Also see discussion in Section 4.3 regarding opportunity to reinstate Level 6 south as 24-bed MHSOP or a 32-bed IPU which would reinstate the full Business Case bed capacity.

⁵ The SoA included modifying one of each of the DSA and Cath Labs to Hybrid Theatres. Southern has agreed to down-graded one Hybrid Theatre to a standard DSA or Cath Lab (which tbc).

⁶ Business Case noted 1 x MRI, however Southern have recently installed a second MRI.

⁷ Recommended Scheme figures are estimates due to the scheme being at a feasibility / concept design stage (reference Warren & Mahoney email dated 2 September 2022).

Table 6 – Recommended Scheme key changes from the current developed design

Site Planning / Bulk and Location		
Cadbury Site		
<ul style="list-style-type: none"> Pavilion Building removed (Inpatient Building north of Grid 19) Inpatient Building repositioned to enable Loading Dock (south) and future 1734m² development site (north) Southern Ambulance Bay undercroft infilled Central Courtyard partially infilled on Level 1, 2 and 3 Public 'blue link' to Outpatient Building removed Car parking reduced 		
Bow Lane Site		
<ul style="list-style-type: none"> Logistics Building removed Generator and Heat Pump Chiller facility created 		
Wilson's Site		
<ul style="list-style-type: none"> No change to Outpatient Building 		
Departmental Block and Stack (excluding Collaborative Space)		[Changes in Red]
Current Design	Recommended Scheme	
Level 0 – ED, EPS, APU, Stat Radiology, BOH Stores, Retail, Staff Amenities, Cafe	Level 0 – ED, EPS, APU, Stat Radiology, BOH Stores, Retail, Loading Dock and associated BOH	
Level 1 – Radiology, Nuc Med, Mortuary, Spiritual Centre, Mana Whenua, Pathology Lab, Pharmacy, NZ Blood	Level 1 – Radiology, Nuc Med, Mortuary, Spiritual Centre, Mana Whenua, Pathology 'Hot Lab' / Collection, NZ Blood, Staff Amenities, Main Kitchen, Café, BOH	
Level 2 – CIS, ICU, CETES, IOC / Security	Level 2 – Theatre Suite, PACU / DOSA, 23hr Ward	
Level 3 – Theatre Suite, PACU / DOSA, 23hr Ward	Level 3 – Pharmacy, CSSD, Plant Room	
Level 4 – Plant Room, CSSD	Level 4 – CIS, ICU	
Level 5 – Maternity, NICU, Paeds	Level 5 – Maternity, NICU, Paeds	
Level 6 – MHSOP, Rehab IPU	Level 6 – IOC, CETES, Rehab IPU	
Level 7 – Haem/Onc IPU, Med High Acuity IPU, Dialysis	Level 7 – Haem/Onc IPU, Med High Acuity IPU, Dialysis	
Level 8 – Medical / Surgical IPU, Cardiac High Acuity IPU	Level 8 – Medical / Surgical IPU (cold shell), Cardiac High Acuity IPU	
Level 9 – Medical / Surgical IPU x 2	Level 9 – Medical / Surgical IPU x 2	
Clinical Services and Capacities		
	Current Design	Recommended Scheme
Acute, Elective and Same Day Theatres	16 + 4 shell	15 + 3 shell
ICU Bays	30 x ICU Bays + 10 Bays shelled	20 x ICU Bays + 10 x HDU Bays + 10 x Bays shelled
Hybrid Theatres	2	1 x Hybrid + 1 down-graded DAS or Cath Lab
Pathology	1300m ² Laboratory	180m ² 24 hour 'Hot Lab' / Collection Point
Mental Health of Services of Older People	21-Bed Mental Health + 3-Bed Medical IPU	IPU removed, Acute Mental Health Beds provided in Rehabilitation IPU (bed numbers TBC)
Level 8 Med / Surg IPU	32-Bed IPU	32-Bed IPU cold shell
Haem/Onc IPU and Med/Surg IPUs	Single bedroom ratio of 75% or 4 Doubles : 24 Singles	Single bedroom ratio reduced to 62%, or 6 Doubles : 20 Singles
MRIs	3	2 + 1 x cold shell
General X-Ray	8	6 + 2 x cold shell

PET CT Scanner	1	0 (180m ² removed from Nuclear Med)
Pharmacy Production Unit	1	0 (139m ² removed from Pharmacy)
Collaborative Workspace	3472m ² – all fitted out	3153m ² (10% reduction), including 741m ² cold shell

Back of House and Logistics

- Loading Dock dedicated Food Truck dock removed
- Red Core Logistics Lifts reduced to 3 lifts + 1 shelled core (change from 4 fitted out).

Building Services

- Heat pump chillers relocated from Pavilion roof to Bow Lane site.
- Generators housed in a dedicated enclosed facility on Bow Lane site
- Multi-zone air handling units (AHUs) changed to variable air volume (VAV) systems to reduce AHU quantities
- Return air systems removed from AHUs and changed to in line fans.
- Ventilation heat recovery systems reduced as required to enable air handler unit (AHU) double stacking (efficiency reduction)
- Isolation Room ventilation systems combined introducing in-ceiling HEPA filtration requirement
- Heat pump chiller redundancy removed (rely solely on back-up diesel boiler)
- Thermostatic mixing valve (TMVs) reduced in quantity by serving multiple rooms and changed from in-wall to in-ceiling

Structural Solution

- No change. The Inpatient Building remains a based isolated steel moment resisting frame (Importance Level 4, low damage design solution)

Figure 2 – Recommended Scheme Image



Note:

- Preliminary impression only (not accurate).
- Inpatient Building Loading Dock and Ambulance Bay changes not updated.
- Bow Lane site generator and heat pump chiller plant facility not indicated.

4 Impact Assessment

4.1 Delivery Impacts

The Recommended Scheme is at a feasibility / concept design stage and will require the project to revisit preliminary design for the new and significantly impacted design elements. With respect to the existing Inpatient Building design, significant changes include spatial replanning for Level 0, 1, 2, 3 and 6, and the Level 3 and 10 plant rooms.

Therefore, there is a level of design development required to fully verify the scheme both technically and functionally with users', and in terms of understanding and quantifying the delivery impacts.

Based on the current level of design, the project team's initial assessment of the impacts and the associated risks of the Recommended Scheme are outlined below.

4.1.1 Programme

The Inpatient Building critical path in simple terms tracks through structure design, superstructure steel procurement, superstructure erection to circa Level 6, podium fitout, and commissioning. It is noted that the Pavilion Building and Logistics Building did not appear on the critical path, and therefore, their removal serves only to de-risk programme in terms of resourcing. It is acknowledged however, that there are possible efficiencies for steel procurement and erection, and potential preliminary & general savings that need to be further assessed with CPB (no allowance has been made at this stage).

In order to mitigate the redesign delays, the project team have focused on the structure both in terms of alternative solutions and design acceleration. Alternative solutions included consideration of change of materiality and removal of the base isolation system. However, these alternatives were discounted due to the construction efficiency benefits being out-weighed by redesign delay and associated time-related costs. It is therefore proposed to accelerate the design for the existing structure solution and associated deliverables for piling indent and design, substructure design, and primary steel indent and design. This proposal (refer **Attachment D**) comes with design coordination risk as the structure design will be developed to some extent in isolation and out of sync with the traditional design phases. This risk will need to be carefully managed to ensure coordination is as complete as possible, but acknowledging that some coordination redesign may eventuate.

In addition, the project team also proposes to incorporate a fast track 'key user' engagement and design review and approvals processes for the revisited Preliminary Design and Developed Design phases. Enabling a seamless redesign will be essential for minimising programme impact.

Based on the above, an elemental redesign programme has been developed by Woods Harris (refer **Attachment E**) with the delivery impacts summarised in Table 7 below. It is noted that the design and delivery programmes will require further development and refinement to verify impacts following endorsement of the Recommended Scheme.

Table 7 – Programme impact

	Current Programme Rev 4.	Optimisation Programme	Delay Impact
Design (prolongation to 100% Detailed Design Completion)	August 2023	September 2024	12 months
Inpatient Building Construction Start (piling)	April 2023	January 2024	9 months
Inpatient Building Opening "Go Live"	June 2028	March 2029	9 months

Note:

- The above dates are forecast on Te Whatu Ora approval to commence redesign as of 16 September 2022
- Programme 'Delay Impact' is not cumulative.

4.1.2 Financial

RLB has provided a high-level feasibility estimate of the net saving achieved for the Recommended Scheme (refer **Attachment F**).

It is noted that the saving target of \$100 million has not been achieved and that the project team continue to seek further savings via value management and programme delay mitigation opportunities as the design progresses. These future potential saving opportunities will continue to be explored with the ECE Contractor and key subcontractors.

Estimated Cost Saving

Building Cost Saving:	\$ 117,000,000
Less:	
Consultant Fees:	\$ 12,000,000
Escalation:	\$ 15,000,000
Estimated Net Project Saving:	\$ 90,000,000

Actual savings achieved will not be confidently known until the design is redeveloped through the Preliminary Design and Developed Design phases which are forecast to extend out to December 2023. Cost checks will be undertaken at the conclusion of each phase given their short durations of 5 months and 6 months respectively.

With respect to the accelerated structure design, which will develop out of sync with the traditional design phases, cost estimates will be undertaken as the design progresses, i.e. there will be no design hold points.

Other financial risks include:

- a. Redesign programme not being achieved or enabled due to consenting, stakeholder engagement, approval processes, and ability to progress early procurement of critical trades
- b. Escalation rates applied being exceeded
- c. Interior design replanning impacted by unforeseen obstructions (e.g. new risers) or clinical requirements
- d. Building services value management savings not obtaining final agreement
- e. Consultant fee variations exceed budget allowance
- f. Unanticipated urban design requirements

4.2 Clinical and Operational Engagement and Impact Assessment

Te Whatu Ora Southern Management and Project Management Office (PMO) leads have been actively consulted and engaged throughout the design optimisation study.

Further clinical, operational and building & property user engagement meetings were undertaken during late August 2022. This consisted of a full presentation and overview of the Recommended Scheme, followed by focused building & property and impacted departmental feedback sessions.

Te Whatu Ora Southern have subsequently provided a Clinical and Operational Impact Statement (refer **Attachment G**) which has identified both matters for Te Wahtu Ora consideration and design team consideration – some such key matters being discussed in the 'design refinement opportunities' section below.

4.3 Design Refinement Opportunities

The Recommended Scheme is continuing to be refined and opportunities are being explored to address the loss of clinical services and capacities and to enable a future expansion opportunity on the Bow Lane site. These opportunities are discussed below.

Mental Health Services of Older People (MHSOP)

The Recommended Scheme removes the MHSOP IPU and utilises the space for CETES (491m²), IOC / Security (470m²) and Collaborative Workspace(465m²). These departments have been allocated to this space given their 'soft fitout' nature and ability to be relocated in the future, allowing the space to be repurposed as 24-Bed MHSOP IPU or a 32-Bed Med/ Surg IPU.

Strengthening and repurposing the Dairy Building could present an opportunity to enable the relocation of these spaces (or other services) to enable replanning efficiencies, with a Ground Floor area of circa 1200m² plus mezzanine which could provide a further 1000m² if desired. The Dairy Building is suitable for departments or spaces that are not required to be located either within the Inpatient Building or within an Importance Level 4 facility. Therefore, this may present an opportunity to house the Main Kitchen (1000m²), Staff Amenities (230m²) and Collaborative Workspace for administration services (say 300m²). This could free up 1458m² on Level 1 and potentially enable the full relocation of CETES, IOC / Security and Collaborative Workspace from Level 6. Note IOC / Security requires adjacent collaborative workspace for emergency scenarios.

This opportunity is currently prohibited due to cost. However, the project team will continue to explore this with the ECE Contractor as the design progresses to better define the likely cost impact.

Nuclear Medicine PET-CT Scanner

The PET-CT scanner and associated support space (180m²) has been permanently removed in the Recommended Scheme. Its removal was proposed due to this service generally being provided by the private sector, and in the knowledge of Pacific Radiology planning to open a private PET-CT in Dunedin by 2023.

However, there is an opportunity being explored with Aukaha to relocate the Level 1 Mana Whenua space to one of the Ground Floor retail units. This would free up circa 210m² of space on Level 1 potentially allowing the Spiritual Centre (currently adjoining Nuclear Medicine) to be relocated and a 'cold' or 'soft' shell created for a future PET-CT Scanner.

This is feasible within the current savings estimate and continues to be explored with stakeholders. The negative impact would be the permanent loss of one retail space leaving the hospital with an absolute minimum public convenience offering.

Pharmacy Production Unit

The Pharmacy Production Unit (180m²) has been permanently removed in the Recommended Scheme. This service being proposed to remain in its existing location and incorporated into the future Southern Blood and Cancer Centre (due 2030-2040).

However, with the Pharmacy located on the Level 3 Plant Room floor plate, the design team are exploring and challenging plant spatial requirements to enable additional space for use as collaborative workspace / future Production Unit shell space. This requires maximising the Level 10 Plant Room, and therefore, would need to be explored during the revisited Preliminary Design phase.

Pathology Laboratory

The Recommended Scheme currently reduces the currently designed 1300m² Pathology Lab to a 180m² 24-hour Collection Point / 'Hot Lab' for acute clinical functions. This area has been advised by Southern Community Laboratories to be less than their considered minimum 500m² for acute clinical functions.

As discussed above for the Pharmacy Production Unit, there may be opportunity to enable this extent of additional space within the Level 3 Plant Room. This will be challenging to realise, as can be seen in scale on the Recommended Scheme plans, and would require a collection point to be maintained on Level 0 or 1.

Bow Lane Site Future Development Opportunity

There is potential to create a future development opportunity on the Bow Lane site should the design enable relocation of the heat pump chillers to the Inpatient Building site.

Level 10 of the Inpatient Building would be the most cost-effective solution, however it is currently not feasible due to proximity to the Helipad (concerns with heat inversion in an emergency landing situation) and the desire to minimise plant room space on Level 3 preventing the required size reduction of the Level 10 plant rooms. In addition, there is concern with maintenance and replacement access.

Other locations, such as the chillers being elevated over the Loading Dock, have increased costs and urban design and acoustic issues to be worked through. Noting there are 14 no. large chillers requiring a circa 1000m² footprint.

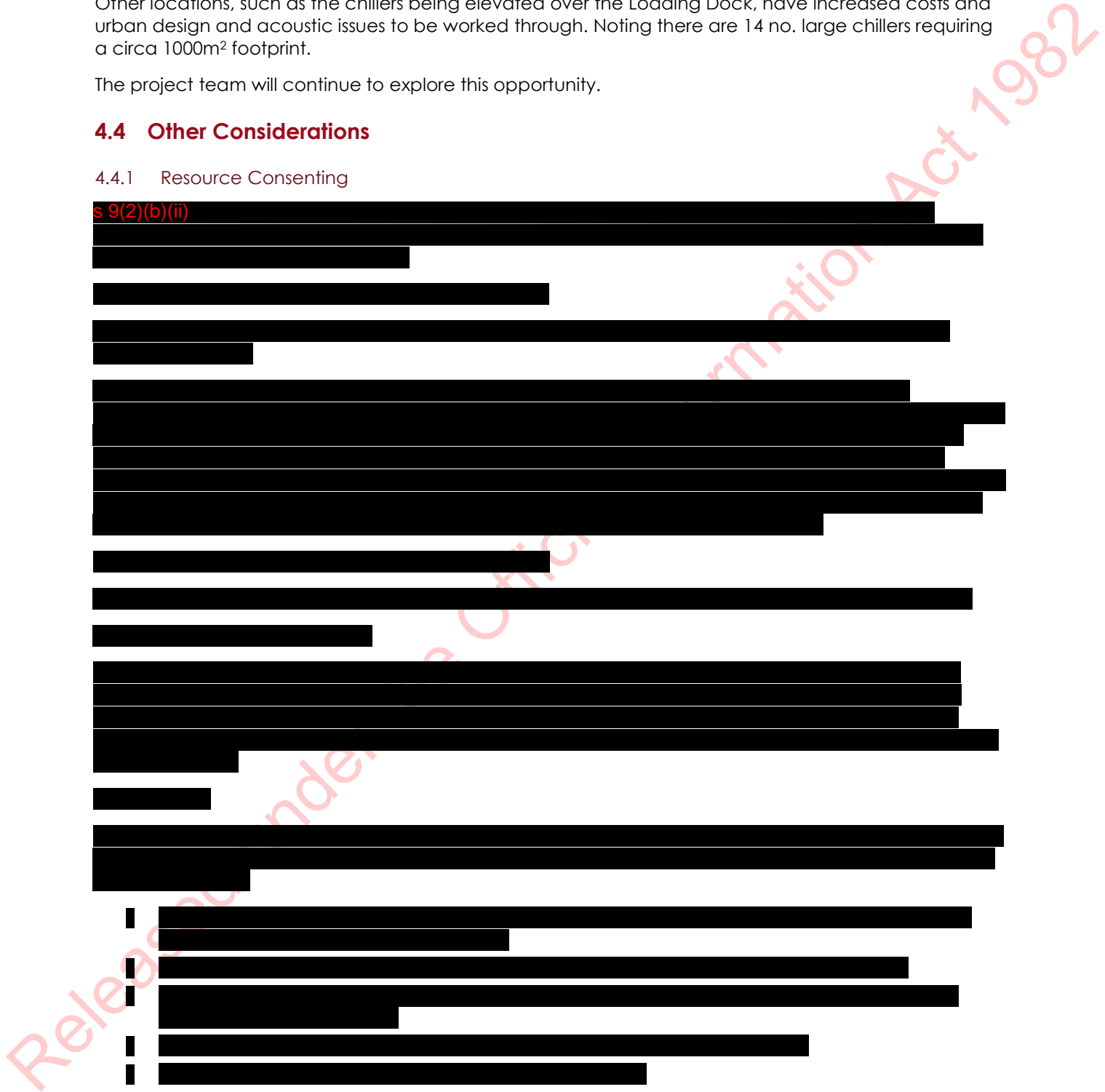
The project team will continue to explore this opportunity.

4.4 Other Considerations

4.4.1 Resource Consenting

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4.4.2 Traffic

An initial traffic assessment has been undertaken as part of the Recommended Scheme development (refer **Attachment I**). This has validated the scheme layout for transportation matters. In addition, the following vehicle parking capacity is noted:

- Pick-up / Drop-off: 16
- Emergency Department Car Park: 22 (including 5 mobility)

While car parking has reduced, it is noted that recent legislation change has removed the requirement for hospital car parking from the District Plan (previously the requirement was 184 parks).

The previous agreement with Southern to provide 250 car parks (inclusive of ambulance bays, truck docks, etc) will require revisiting. Noting alternative car parking has not been allowed for in the Recommended Scheme feasibility cost estimate.

Bike parking provision is unchanged from the current design. However, there is opportunity to relocate Inpatient Building bike store to the northern side of the Inpatient Building to provide improved safer access.

4.4.3 Greenstar Accreditation

Based on an initial assessment, Beca has advised that the project will likely still have sufficient points for 5 Star accreditation. However, the loss of some points under the Recommended Scheme increases the need to ensure all targeted points are achieved through the course of the redesign (refer **Attachment J**).

4.4.4 Pandemic Response Planning

As established in the key constraints for the design optimisation study, the previously developed Pandemic Response design intent and capacity has been retained in the Recommended Scheme. Noting however, that the pandemic design will need to be redeveloped due to changes to spatial planning and building services during the preliminary design phase.

In particular, it is noted that Loading Dock capacity will be halved in a pandemic scenario and will require further development for pandemic access and flows. Reduced dock capacity would be supplemented by the Outpatient Building Loading Dock in a pandemic scenario, as the Outpatient Building Loading Dock has ample capacity.

4.4.5 Mana Whenua

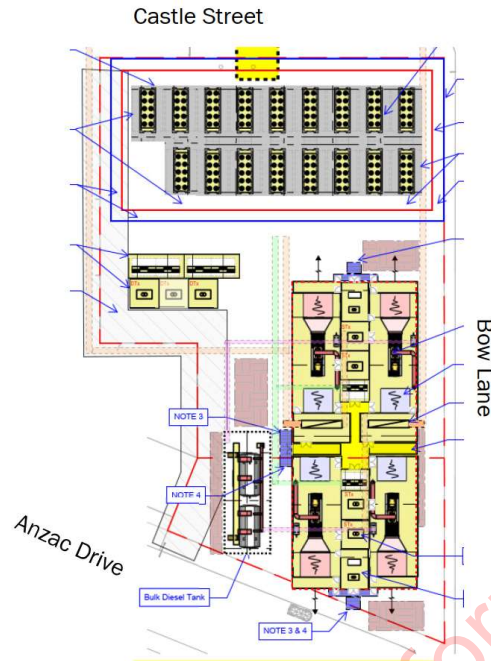
There have been several briefing and follow-up co-design workshops held with Aukaha and Mana Whenua representatives on the optimisation process and resultant options. Whilst the loss of the Pavilion Building and 'cloak' façade has been disappointing, there has been understanding of the context and need for savings in the discussions to date.

The Mana Whenua panel continue to discuss whether the interim project name of "Whakatuputupu" will remain or be withdrawn. It is envisaged that all other aspects of the Māori Models of Care and the Cultural Narrative can continue to be represented appropriately in the Recommended Scheme. It should be noted that sufficient time and budget fee allowance needs to be made to allow for the future co-design process with Aukaha and mana-whenua, to achieve the appropriate expressions of the cultural narrative in the Inpatients Building and landscape design.

4.4.6 Acoustics

Acoustics Engineering Services (AES) have undertaken a preliminary assessment of the proposed Bow Lane Site generator and open air heat pump chiller plant facility (see figure 3) and have confirmed that boundary noise limits can be achieved subject to appropriate acoustic treatments.

Figure 3 – Proposed Bow Lane Site



4.4.7 Seismic Design Code Changes

The redesign programme for the Inpatient Building requires reassessment of the pending seismic design code changes which will now likely come into effect during the design phase.

The National Seismic Hazard Model (NSHM) is currently being revised with a planned public release by September 2022. Other broader reviews of seismic risk settings are also taking place - collectively referred to as the Seismic Risk Work Programme. There are currently two Building Code updates proposed in relation to this work, one in the 2023 cycle and one in the 2025 cycle. MBIE have communicated to the industry that the 2023 changes are likely to be applied largely within the current structure the loading and design standards. The second updated in 2025 would be a broader change to the standards framework as a whole.

The update to occur in the 2023 cycle will relate to the Probabilistic Seismic Hazard Analysis (PSHA) and will likely come into effect November 2023 with a 12 month transition period during which time both the prior revision and the new revision of the design standard can be used.

As outlined in Section 4.1.1 above, Inpatient Building design programme is anticipated to conclude in mid-2024 prior to the 2023 cycle change becoming mandatory in November 2024. Therefore, the accelerated structure design and building consent programme will straddle the design code update.

As per previous ESG direction, the Inpatient Building is to be designed to the current PSHA(1) and check to PSHA(2) using nominal properties (as per an existing building assessment). This direction will be reassessed during the redesign programme September – October 2022 'Mobilisation / Prestart' phase utilising the September 2022 NSHM release to determine the potential impact and risks for further ESG consideration, if required.

Refer to Holmes advice in **Attachment D**.

4.4.8 Delivery Model

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S9(2)(b)(ii)

5 Summary

The Recommended Scheme results in:

Estimated cost saving:	\$90,000,000
Programme delay:	9 Months

Business Case service and capacity departures:

Inpatient Beds:	354, expandable to 386 (reduction from 410)
General Theatres:	15, expandable to 18 (reduction from 16, expandable to 20)
DAS / Angiography:	2, including Hybrid tbc*
Cath Labs:	2, including Hybrid tbc*
PET Service:	Removed (reduction from 1 PET-CT scanner)
MRIs	2, expandable to 3 (reduction from 3 fitted out)
X-Ray	6, expandable to 8 (reduction from 8 fitted out)
Pathology Lab:	Acute 24hr 'hot lab' / connection shell (reduction from full lab shell)

Note: * One Hybrid Theatre is to revert to a DSA or Cath Lab by agreement with Southern.

Design efficiency improvements on current design:

Gross floor area (GFA) reduction:	(8,176m ²)
Gross Departmental Area (GDA) increase:	844m ²
Engineering % GDA reduction:	(9.5%)
Travel % GDA reduction :	(1.7%)

Risks Profile:

Financial:	Medium (savings realisation)
Programme:	Medium (accelerated redesign realisation)
Clinical outcomes:	Medium
Clinical capacity:	Medium-High (loss of beds capacity)
Building operations:	Low
Reputation:	Medium (public perception)
Resource consenting:	Low-Medium
Greenstar:	Low-Medium
Seismic Code Changes:	Low-Medium

6 Recommendation

It is recommended the ESG:

1. Endorse the Recommended Scheme noting the outlined impacts and risks.
2. s 9(2)(b)(ii) [REDACTED]
3. Endorse immediate commencement of the Recommended Scheme redesign, in full or part, while formal approvals are addressed.
4. Note that the Recommended Scheme is at feasibility / concept design and will need development as part of the normal design process.
5. Note the concurrency of the redesign programme and anticipated seismic design code changes.

Note: All financials in this memorandum are GST exclusive.

ATTACHMENTS

- A Final Detailed Business Case Clinical Services and Capacity Requirements
- B Design Team Briefing Memo dated 11 March 2020
- C Warren and Mahoney Memo 'NDH Optimisation Option 4.3 Summary' Rev C dated 5 September 2022
- D Holmes Memo 'Overview of the structural design pathway and acceleration dated 29 August 2022
- E Woods Harris Memo 'NDH – Inpatients Design Optimisation' dated 26 August 2022
- F RLB Memo 'NDH Inpatient Building Optimisation Estimates' dated 30 August 2022
- G Te Whatu Ora Southern 'Clinical and Operational Impact Statement' dated 2 September 2022
- H Greenwood Roche / Boff Miskell Memo 'Inpatient Building – amended design – updated consenting risk assessment' dated 30 August 2022
- I Novo Group Memo 'NDH – Inpatient Optimisation Transport Review' dated 29 August 2022
- J Beca Memo 'Design Reset Executive Summary Building Services and Fire Engineering' dated 31 August 2022

Attachment A Final Detailed Business Case Clinical Services and Capacity Requirements

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

1.4 Services in and out of scope remain constant

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

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

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

Table 2 Departments included in the NDH project

Inpatient Building (77,591m² including links and Ancillary Building)

Patients Areas

Medical/Surgical Inpatient Unit
 High Acuity Inpatient Unit
 Rehabilitation Inpatient Unit
 Mental Health Services Older Persons
 Children's Inpatient & Paediatric Assessment Day Unit
 Intensive Care Unit (10 Shelled Bays)
 Acute Renal Dialysis Unit
 Neonatal Intensive Care Unit
 Maternity Unit + Interventional Suite
 Primary Birthing Unit
 Haematology & Oncology Inpatient Unit

Interventional Areas

Operating + Interventional Suite (4 Shelled Theatres)
 23 Hour Ward
 Emergency Department including & Satellite Radiology
 Emergency Psychiatric Service (EPS)
 Assessment Planning Unit
 Acute Radiology

Labs & Processing Areas

Medical Physiology Labs
 Pathology Laboratory (*Shell only*)
 NZBS - Blood Bank (*Shell only*)

Supplementary Services

Pharmacy
 CETES: Clinical Engineering
 Sterile Services Unit
 Security
 Information Services
 Building & Property
 Integrated Operations Centre
 Staff Amenities
 Heliport
 Collaborative Workspace (*Shell only*)

² The accommodation schedule is set out as Appendix A.

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

Outpatient Building (13,391 m²)

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

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

Table 3 NDH services out of scope

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

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

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

1.5 Additional elements in the Final DBC

This Final DBC reflects further work as follows:

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

Appendix A Schedule of Accommodation

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

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

Table 41 Inpatient unit overnight bed supplied capacity

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

Table 42 Operating theatre requirements

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

Table 43 Same day and ambulatory rooms

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

Table 44 Imaging requirements

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

¹⁷ Southern DHB operates a world class home dialysis training model – this is community based (although currently at the hospital) and of a sufficient size so as to reduce the requirement for acute beds.

¹⁸ Dedicated day recovery is currently only provided in the Endoscopy suite. Dual clinic/interventional spaces are used by other services to support day procedures (e.g. radiology).

¹⁹ The 23 hour unit is a new model of care that will seek to get greater efficiency from operating theatres and inpatient beds

²⁰ Unable to determine current number of functioning clinic consult rooms and speciality clinic rooms as outpatient activity occurs in a variety of spaces including dedicated outpatient clinic rooms plus offices.

²¹ A second CT scanner is primarily used as a treatment planning scanner for Southern Blood & Cancer which is out of scope of NDH project.

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

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Attachment B Design Team Briefing Memo dated 11 March 2020

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Concept Design – Scope Parameter Memo

The purpose of this memo is to detail the New Dunedin Hospital Concept Design parameters, for which the Design Consultants are required to base their Concept Design fee.

Expectation that due credit is given to the client for previous work carried out that can be reused in the current Concept Design Period, the overall reduced size of the total building area and in particular the reduction in acuity, complexity and scale of the Outpatients building.

	Outpatient	Inpatient
Concept Design Period	24 Weeks – 17 March to 28 August	
CD Approval Period	4 Weeks - 9 September to 6 October	
Construction Budget total	S9(2)(b)(ii)	
Minimum Floor Level (incl 500mm of freeboard) TBC subject to review	<ul style="list-style-type: none"> General Open Space (1in10) 102.87m Habitable Floor (1 in 100) 103.38m Critical Floor (1 in 500) 103.67m 	
User Group Cycles	Three User Group Cycles for ASC, ASB (including Standard Rooms) the week of: <ul style="list-style-type: none"> 4 May 8 June 13 July 	
Maximum GFA	89,000m ²	
Current T&E allowance	T: 18% E: 21% (TBC)	T: 18% E: 21%
Approximate GFA per Building	Circa 12,000m ²	Circa 77,000m ²
Importance Level	IL3	IL4
Number of Overnight Beds	-	378 overnight beds (incl. 10 shell)
Number of Theatres	4 Endoscopy and 4 Procedure	5 pods x 4 Operating Rooms including a hybrid OR 1 pod x 4 Interventional Rooms.

Outpatient Department areas as understood currently are detailed in the table below.

Outpatient	Core Capacity	GDA m ²
Day Medical Unit	16 Bays	377
Day Procedures Unit	4 Endoscopy / Operating Rooms @ 42m ²	1610
Transit Care	4 beds/trolleys, 8 chairs/recliners	256
Satellite Radiology Unit	1 CT, 1 MRI, 2 Ultrasound, 4 General x-ray	504
Front of House	Drop off, lobby, display, reception, waiting, WCs	285
Front of House Retail	Café, community pharmacy, equip loan, ATM	440
Pathology Collection	Specimen unit with 2 Collection rooms	129
Specialist Clinics	81 Clinic Rooms includes 4 generic clinics of 16 consultant rooms (2 pods of 8 rooms) and adjoining 17 specialty clinic rooms	3406
Collaborative Workspaces	189 workstations	1166

Inpatient Departments areas as understood currently are detailed in the table below.

Inpatient	Core Capacity	GDA m ²
Medical/Surgical Inpatients	160 Beds – (5 x 32 @75% single beds)	6500
Cardiac Care Medical Inpatients Unit	32 Bed	1475
Medical/Surgical Ass. Unit	32 Bed	1112
Rehab. Inpat. Unit	48 Bed	2539

Older Persons MH / Inpat. Unit	24 Bed	1336
Child Inpat & Paed Ass. Day Unit	18 Bed plus 5 Day assessment & 4 procedure beds	1386
ICU	30 Bed plus 10 shell (incl. 2 bed outdoor access)	2951
Acute Renal	8 Treat. Bay (includes 2 isolation, one -ve pressure)	284
NICU	24 Bed (10 x Lev III, 10 x Lev II and 4 x transit care) plus 4 self-care and 4 boarder mums.	1487
Mat. Unit & Interventional Suite	24 Bed (includes 2 HDU), 5 birthing, 1 loss & 7 bay assessment	1950
Primary Birthing	4 birthing and 1 assessment	378
Operating and Interventional Suite	5 pods x 4 Operating Rooms including a hybrid OR 1 pod x 4 Interventional Rooms. 24 Preop, 32 PACU and 38 Postop	7329
23 Hour Inpatient	18 Acute Care Bays and 2 Isolation Rooms	511
Emergency Department inc. SSU	1 Decontamination, 4 Resus, 10 fast, 20 Acute, 10 Short Stay, 8 Paed fast/acute/short	2649
Emergency Psychiatric Service (EPS)	3 Interview and 4 Bedrooms	264
Radiology	3 MRI, 2 CT, 4 U/S, 1 Fluro, 1 Cone Beam, 6 General, 14 Hold/Recovery	2157
Nuclear Medicine	1 SPECT/CT, 1 Bone Density, 1 PET/CT	761
Medical Physiology Labs	16 Cardiac, 4 Resp, 6 Neuro, 6 Vascular	1329
Pathology Laboratory (shell only)	On-site core pathology – strategy to be determined	865
NZBS – Blood Bank	On site blood matching and processing	280
Pharmacy	12 Dispensing stations, clinical trials, 2 cleanrooms	919
CETES: Clinical Engineering	Biomed Workshops and Medical Equipment stores	580
Sterile Services Unit	4 Steam and 2 low temperature sterilisers	1076
Front of House	Drop off lobby, Reception, amenities, whanau	618
Front of House Retail (Shell only)	Café, Food Hall - strategy to be determined	220
Multifaith Centre	Multifaith Room and Prayer Room	146
Collaborative Workspace Admin	Interactive workspace based on Burwood	1889
Collaborative Workspace Acute	Allocated and non-allocated spaces	1065
Hospital Operations Centre	Allocated workspace for duty managers, patient flow, telephony, Emergency Operations etc	383
Information Services	Workspace for up to 12 Technicians	133
Mortuary	Viewing and whanau facilities with access to courtyard, body hold for 9 with autopsy room	311
Security	Security services	96
Building and Property	Coordination/BMS Workroom, Trades workshop, storage	137
Back of House – Linen, waste, Mail, support	Includes distributed interchange hubs, shared staff amenities, meeting and training room	1211
Procurement and Supply	4 Loading docks, stores, goods in and out, trolley parking	671
Food Services (Shell only)	Cook fresh kitchen, excluding loading dock	920
Staff Amenities (Centralised)	Central staff change rooms and end of trip facilities	434
Heliport	Capacity for 1 helicopter with a direct vertical "hot" lift	72

N.B.

Shell spaces may not require the same level of design.

**Attachment C Warren and Mahoney Memo 'NDH Optimisation Option 4.3 Summary'
Rev C dated 5 September 2022**

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FILE NOTE

WAM-FN-111-AR-0007

Project	8167.AR.01 New Dunedin Hospital – Inpatient Building
Report	NDH Optimisation Option 4.3 Summary
Document Number	WAM-FN-111-AR-0007
Document Revision	29 August 2022
Prepared	on behalf of Warren and Mahoney Architects New Zealand Ltd and HDR
Revision	C (05.09.2022)
Client	Te Whatu Ora, RCP.





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2.0 OPTIMISATION OPTION 4.3 5

3.0 APPENDIX A
OPTIMISATION COMPARISON TO BUSINESS CASE

4.0 APPENDIX B
OPTION 4.3 DRAWINGS.....

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Optimisation Summary

1. Site rationalisation:

The design team have been directed to examine a site rationalisation as part of the overall optimisation process for the NDH project across the Inpatient and Logistics Buildings.

2. Main site planning:

Pavilion building removed North of beyond Grid 19.

Inpatients building moved North to enable vehicle access at the required points across the Eastern and Western edges of the site.

Infill of undercroft space at Southern edge of ground floor to facilitate BoH and ED area.

Infill to the North zone of the central courtyard over 3 levels to allow theatre, radiology and plant infills into this void.

Future development site is provided to the North of the Inpatients Building with a 1734m² footprint.

Maintained red bridge connection at Level 1, to the Outpatient Building.

3. Bow Lane:

Logistics Building on Bow Lane is deleted and the BoH and Food Services area accommodated into the main frame of the Inpatients Building.

Plant previously accommodated in the Logistics Building (heat pumps and generators) are now located on the Bow Lane site, with a gantry connection over Castle Street into the Inpatients Building. This removes the future site development opportunity of Bow Lane.

4. Strategic reallocation of spaces and functions:

Pavilion functions rationalised and largely moved to locations within the main frame of the Inpatients Building fabric.

Collaborative workspaces, staff amenity areas and the staff café are relocated into locations with sensible relationships to red and blue circulation, and cost benefits.

Stacking of departments redistributed, with ICU/CIS moving to Level 4 to maintain perimeter and theatres moving to L02 and plant moving to L03 within the stack to allow the partial infill of void.

Nuclear medicine reduced by 180m² with the removal of PET CT and associated support spaces.

Nuclear Medicine moved into the main frame with replanning of Level 1 and the Spiritual Centre to accommodate these relocations.

Pathology area reduced to 180m²

Pharmacy relocated on L03, and the production unit is removed.

32 bed IPU on L08 shelled.

24 bed IPU on L06 accommodates support spaces.

Single bedroom ratio decreased from 75% to 62%.

Operating theatres reduced to 16 theatres (with 2 x future shell and support space) within Option 4.3.

Redistribution of plant space between Level 3 and Level 10 plantrooms.

5. Planning Options assessed and discounted:

Extended tails to the ward floors for collaborative workspace (North executed)

More collaborative workspace in plant floor(s)

More collaborative workspace in external recesses to the West face.

Rearrangement of blue core and the infill to recesses.

Rearrangement of level 1 – 3 West face zones for more retail and collaborative workspace.

Maternity cantilever flip.

Logistics Building located at the South end of the Cadbury site.

Heat pumps located on Level 10.

Generators accommodated within the Inpatients Building.

6. Summary of clinical space relocated removed:

Option 4.3

1 x 32 bed ward shelled on Level 8.

MHSOP – Removed. A proposal for a contained 4 bed pod for a partial Acute MHSOP is provided.

Alternate options to make up the service and for non-acute provision to be determined.

Theatres further reduced to 16 with 2 x future shell theatres (2 x future theatres deleted from scope).

Nuclear Medicine – PET CT and associated support spaces removed.



Pathology onsite provision reduced to 180m² for key acute clinical support functions (Area TBC by Southern).

Logistics Building functions incorporated into the Inpatients Building main frame.

Production unit removed from Pharmacy (139m² removed).

Collaborative workspace reduced to 90% of brief.

7. Collaborative Workspace summary:

Collaborative workspace of 3472m² required based on Business Case and current design.

Option 4.3:

Floor Level	Provision of Collaborative Workspace	Shell	Fixed	Total
Level 1	Adjacent staff cafe	0	228	
Level 2	Theatre shell (built within future theatre support space)	276	0	
Level 3	Area to be confirmed by Beca		633	Excl.
Level 4	55m ² meeting room and beverage bay	0	62	
	ICU shell (built within ICU future pod space)	545	0	
	Northern collab space	0	635	
Level 5	Structural slab infill behind red lift core	0	129	
Level 6	Shell – Built within future ward if Level 6 is displaced	465	0	
	Structural slab infill behind red lift core	0	143	
Level 7	62% single beds and structural slab infill behind red lift core	0	208	
Level 8	62% single beds and structural slab infill behind red lift core	0	208	
Level 9	62% single beds and structural slab infill behind red lift core	0	254	
		1286	1867	3153

Option 4.3 – 29 August 2022

Collaborative workspace summary, 3472m² required as current drawn area.

Floor Level	Provision of Collaborative Workspace	Shell	Fixed	Total
Level 1	Adjacent staff cafe	0	228	
Level 2	Theatre shell (built within future theatre support space)	276	0	
Level 3	Area to be confirmed by Beca		633	Excl.
Level 4	55m ² meeting room and beverage bay	0	62	
	ICU shell (built within ICU future pod space)	545	0	
	Northern collab space	0	635	
Level 5	Structural slab infill behind red lift core	0	129	
Level 6	Shell – Built within future ward if Level 6 is displaced	465	0	
	Structural slab infill behind red lift core	0	143	
Level 7	62% single beds and structural slab infill behind red lift core	0	208	
Level 8	62% single beds and structural slab infill behind red lift core	0	208	
Level 9	62% single beds and structural slab infill behind red lift core	0	254	
		1286	1867	3153

Excludes IOC, Information Services and Security provided in Level 6 – 470m² built within future ward if Level 6 is displaced.

Item	Functional Change	Option 4.3	Comments
1.0	Business Case - Non-specific Requirements		
1.1	Remove Pavilion.	Yes	
1.2	Removal of Blue Bridge.	Yes (Future proofed)	
1.3	MHSOP deleted	Yes	Future ward footprint maintained if Level 6 infill functions are relocated.
1.4	Relocate Logistics Building functions into IB main frame.	Yes	
1.5	Northern future expansion space.	Yes	1734m ² future site.
1.6	Logistic Lift reductions.	2 x Logistics lifts shelled	Future proofed with 4 x shafts to be built. 2 x logistics lifts to be installed.
1.7	Staff Café Location	Moved to Level 1	Staff café connected to main kitchen at Level 1 deleting satellite kitchen previously associated with staff café.
1.8	ICU / HDU Surgical ratio (40 including 10 x shell required)	20 x ICU + 10 x HDU + 10 Shell (Pod) for Collab	Pods 1 and 2 to have 5 x HDU each.
1.9	Multifaith location	Level 1 Courtyard	Multifaith maintains blue and red corridor access.
1.10	Single: Double bed ratio change	62% singles to allow collab and infill of structural slab.	SDHB agreeable to 62%.
1.11	Collaborative workspace	Included as noted above.	SDHB revised workforce modelling with 10% buffer on current design workstation allowance (with no corporate). CPB report required before Dairy Building considered as an option.
1.12	External Courtyards deleted	MHSOP 3 x Deleted	
2.0	Business Case - Specific Requirements		
2.1	MHSOP (21 + 3 Beds)	Level 6 infilled with support functions.	Note Level 6 has capacity for 32 bed unit.
2.2	IPU Ward (32 beds)	Shelled	Level 8
2.3	PET CT + support space	Deleted	180m ² reduction including support space associated with PET CT
2.4	Level 3 Theatres	16 built + 2 x future shell	Collab infill into shell support space.
2.5	Hybrid x 1 down spec (MME saving only)	Yes	Theatre and details to be confirmed.
2.6	Radiology - MRI (3)	Cold Shell x 1 in Acute	

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2.7	Radiology General X-ray (8)	Shell x 2	Note Southern wish to shell 1 x OB and 1 x IB.
2.8	Pathology (shell only no specified area)	Reduced to 180m ² on Level 1.	Function and area to be confirmed by Southern.
2.9	Pharmacy	Production unit removed.	

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Optimisation Comparison to Business Case

Appendix A

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**NEW DUNEDIN HOSPITAL
DETAILED FINAL BUSINESS CASE VERSION 4**

Revision C - 05 September 2022

Section 1.4 Services in and out of Scope

Inpatient Building		
Service Requirement	Current Designed Area	Option 4.3
Patients Areas		
Medical/Surgical Inpatient Unit	4330	Includes shell spaces
High Acuity Inpatient Unit	3513	3513
Rehabilitation Inpatient Unit	2681	2681
Mental Health Services Older Persons	1518	Infilled with CETES, IOC/Info/Sec and Collab.
Children's Inpatient & Paediatric Assessment Day Unit	1343	1343
Intensive Care Unit (10 Shelled Bays)	30 Beds (+580 shell) 2815	30 Beds (+580 shell) 2815
Acute Renal Dialysis Unit	236	236
Neonatal Intensive Care Unit	1695	1695
Maternity Unit + Interventional Suite	2321	2321
Primary Birthing Unit	481	481
Haematology & Oncology Inpatient Unit	1689	1689
Interventional Areas		
Operating + Interventional Suite (4 Shelled Theatres)	6091	Reduced shell capacity
23 Hour Ward	540	540
Emergency Department including & Satellite Radiology	3226	3226
Emergency Psychiatric Service (EPS)	240	240
Assessment Planning Unit	1163	1163
Acute Radiology	1803	1803
Nuclear Medicine	728	(Delete PET - 180 total) 548
Mortuary	314	314
Day Surgical Unit	426 Included in OIS	426 Included in OIS
Cardiac Interventional Suite	2206	2206
Public & Community Areas		
Front of House including Mana whenua and Public Amenities	1002	1002
Retail (Shell Only) Staff café 405. Retail 174. Staff café reduced in option 4.3 with kitchen removed.	Includes Staff Café 579	Includes Staff Café at 350 524
Multi-Faith Centre	152	152
Whānau Spaces	(180) Included in Front of house	No change
Labs & Processing Areas		
Pathology Laboratory (Shell only)	1291	Reduced to 180m ²
NZBS - Blood Bank (Shell only)	217	240 required
Supplementary Services		
Pharmacy	939	800
CETES: Clinical Engineering	470	491
Sterile Services Unit	1167	Reduced to 1100
Security	75	75
Information Services	108	108
Back of House - Linen, Waste, Mail & Support, Procurement and supply	(GF - ED shell space) 367	(GF - ED shell space) 367
Building & Property (Included in Back of House)	0	Included below
Integrated Operations Centre	286	286
Staff Amenities including bike store	355	230
Heliport	114	114
Collab - Support services	894	2332
Collab - Clinical acute	1593	
Collab - ICU Shell	580	545
Collab - Operating theatre shell	407	276
Collaborative workspace total	3474	3153
Excludes courtyards	*	*
Ancillary Building (linked to Inpatients)		
Supplementary Services		
Back of House - Linen, Waste, Mail & Support	1130	1358
Food Services (Shell Only)	1157	1000
Bridges	617	Reduced to red bridge only
Outpatient Building		
Service Requirement	Current Design	Option 4.3
Clinical Areas		
Day Procedures Unit	1836	
Planned Radiology	988	
Specialist Clinics	3810	
Day Medical Unit	452	
Medical Physiology Labs	474	
Public & Community Areas		
Front of House Includes Mana whenua and public amenity	523	
Retail (Shell only)	103	
Labs & Processing Areas		
	0	No change in area

Transit Care Unit	256
Pathology Collection (Shell only)	131
Supplementary Services	0
Back of House - Linen, Waste & Support	374
Satellite Security	0
Satellite CETES	0
Collab workspace	881

Appendix A - Capacity Requirements (IB + OB)

Service	Required Capacity	Current Design Capacity	Option 4.3
Inpatient unit overnight bed supplied capacity	Business case (Corrected bed numbers)		
Maternity	24	24	24
Neonatal	22	22	22
Self-care, transitional beds	12	12	12
Paediatric	16	16	16
Medical / Surgical (includes Medical HDU) (235 - 11 = 224)	224	224	192 (+32 shell on Level 8)
Mental health services of older people (21 + 3 = 24)	24	24	0
Rehabilitation (40 + 8 = 48)	48	48	48
Intensive care, HDU surgical	40 (incl 10 shell)	40 (incl 10 shell)	40 (incl 10 shell)
Total bed numbers	410	410	354 (+32 bed shell on Level 8)
Operating Theatre Requirements (OB, IB Level 02 + 04)			
Acute and elective	15 (incl 4 shell)	16 (incl 3 shell)	13 (incl 3 shell)
Same day	5	5	5
DSA / angiography	2	1	2 (including 1 x Hybrid)
Cardiac catheter laboratory	2	2 (incl 1 shell)	2 (including 1 x Hybrid)
Endoscopy rooms	4	2 + 2 Gen (OB)	2 + 2 Gen (OB)
Total interventional spaces	28	28 (incl 4 shell)	26 (incl 3 shell)
Same day and ambulatory rooms			
Same day/bed equiv.			
Acute dialysis unit	8 (2+2 treatment bays)	2 + 2 (bays)	No change
Day medical	16	16 (OB)	OB - No change
Day surgical	27	30 + 15 recliners DOSA	No change
Day recovery	22	21 + 14 recliners (OB)	OB - No change
23-hour unit	20	20	No change
Birth rooms	10	5 + 3 (natural) + 3 (patient rooms) + 1 (loss)	No change
Maternity assessment unit	7	7	No change
Paediatric assessment unit	4	4 (L05)	No change
Paediatric day unit	4	2 + 6 recliners (DOSA)	No change
ED bays	53	53	No change
Emergency psychiatric	5	5	No change
Ambulatory rooms			
Clinic consult rooms	64	OB - No change	OB - No change
Specialty clinic rooms	20	OB - No change	OB - No change
Procedure rooms	4	OB - No change	OB - No change
Medical physiology labs	29	OB - No change	OB - No change
Transit care	12	OB - No change	OB - No change
Imaging requirements			
MRI	3	2 + 1 (OB)	2 + 1 (IB shell)
CT	3	2 + 1 (OB)	No change
Ultrasound	6	4 + 2 (OB)	No change
Fluoroscopy	1	1	No change
OPG/cone	1	1	No change
General x-ray	8	4 + 4 (OB)	No change
Mobile x-ray	6	No change	No change
Mobile image intensifiers	4	No change	No change
Mammography	0	No change	No change
SPECT CT	1	1	No change
DEXA	1	1	No change
PET CT	1	1	0

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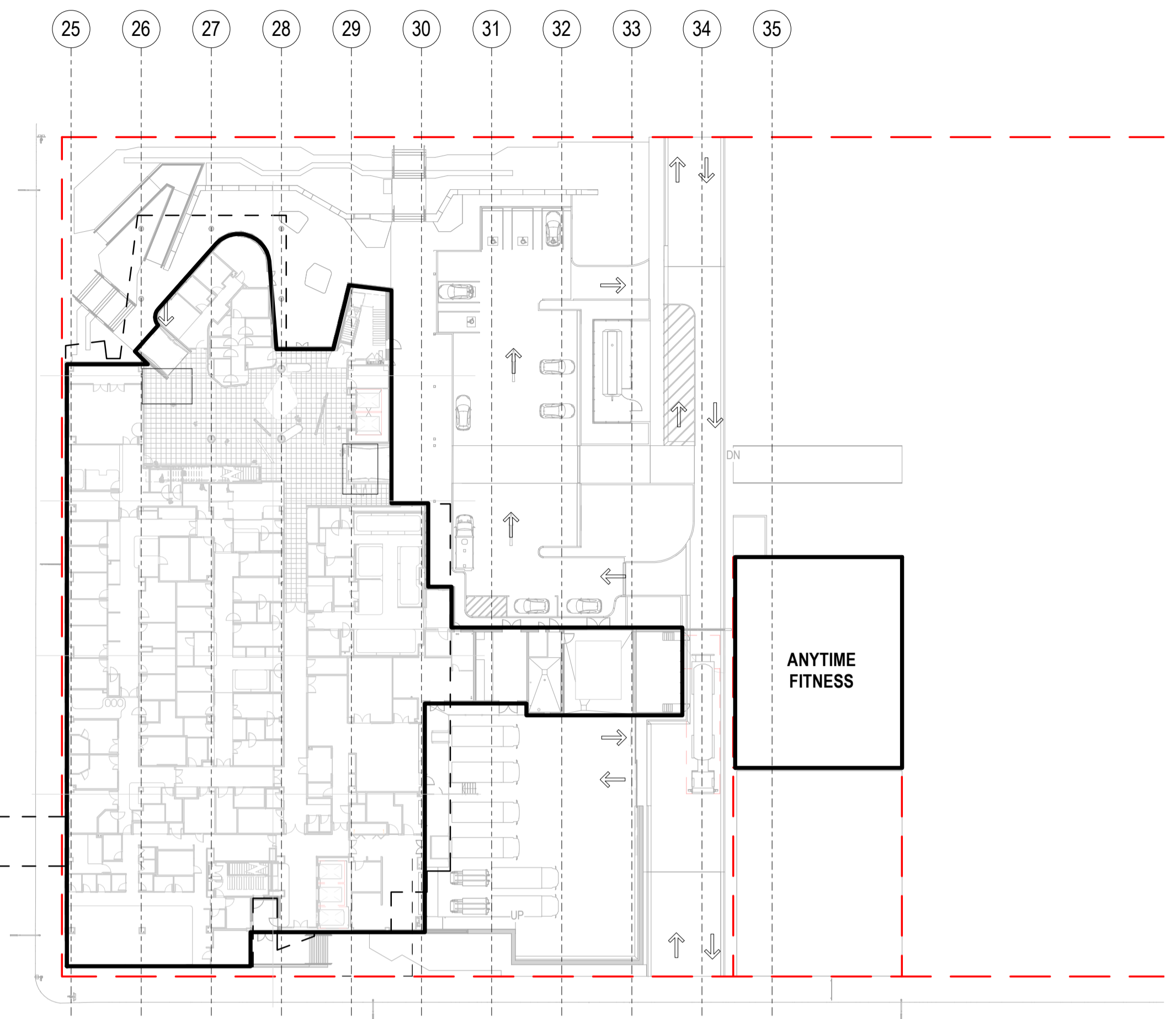
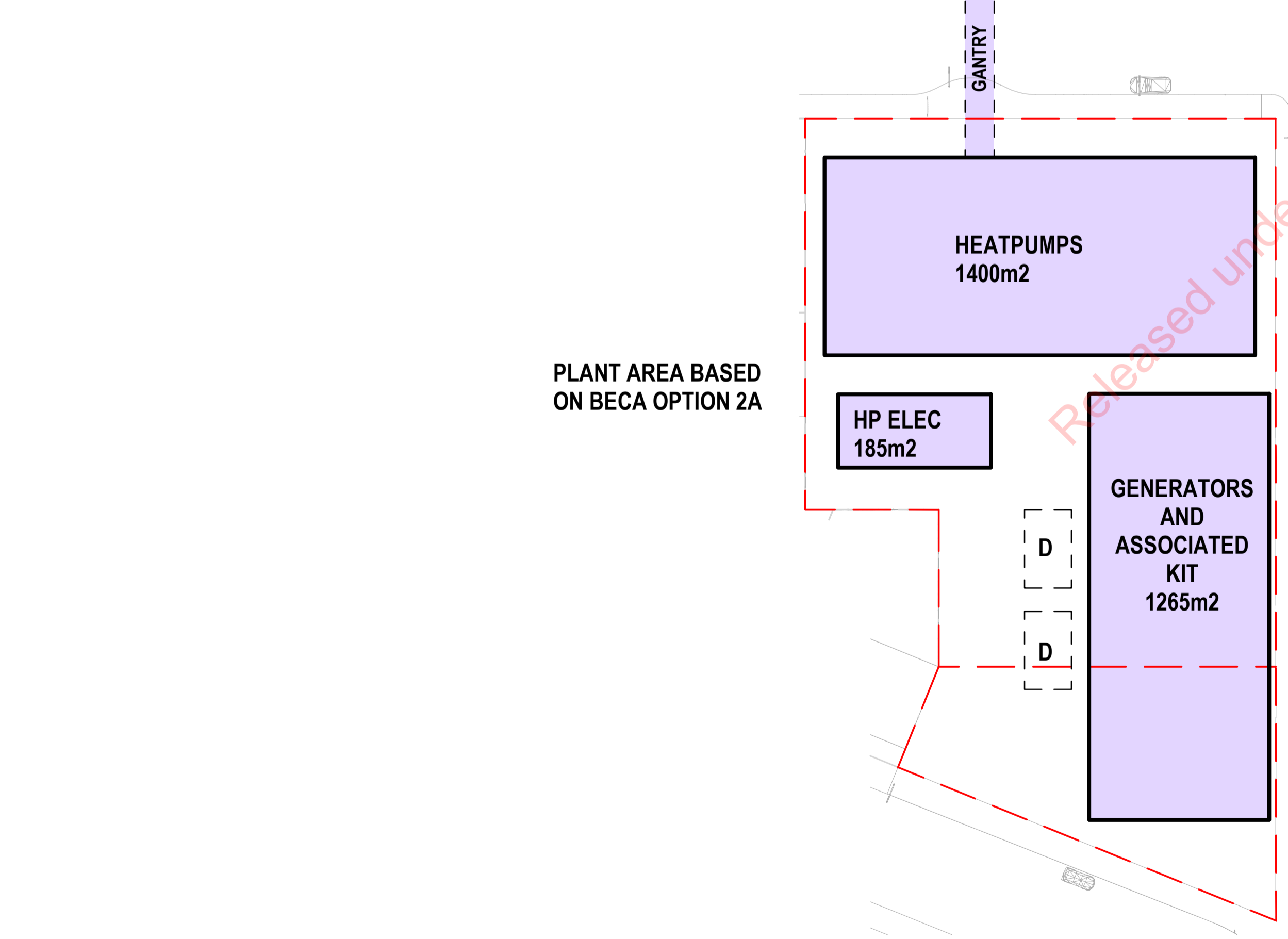
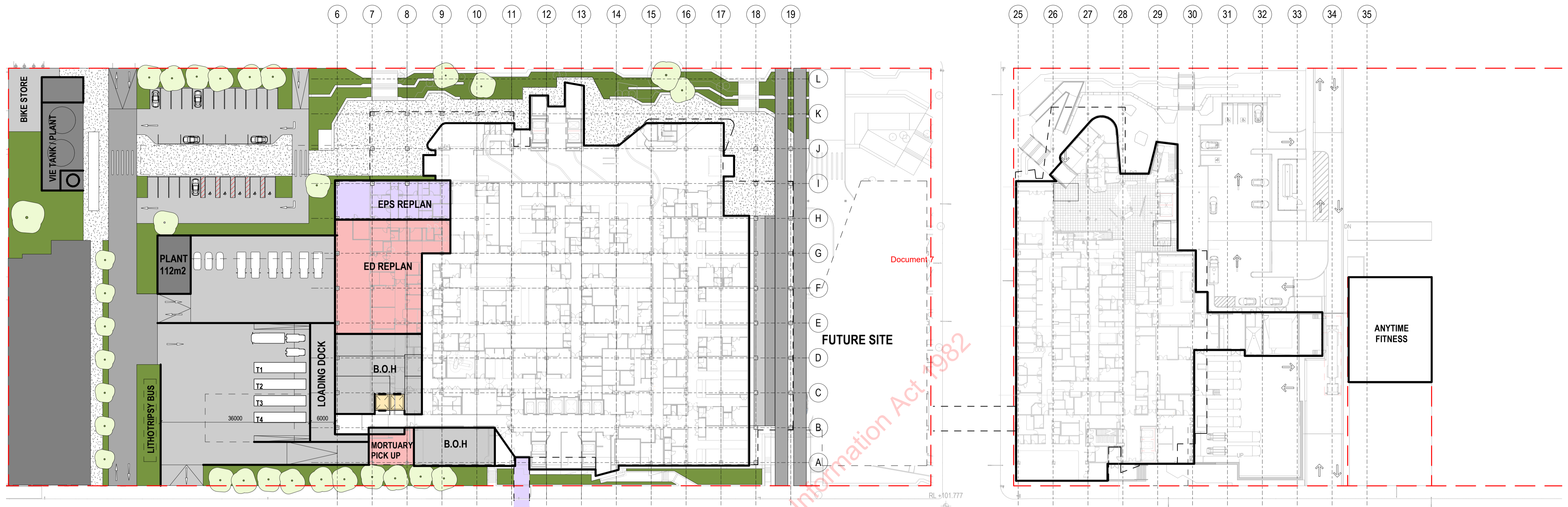
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ARCHITECTS

Warren and Mahoney | HDR

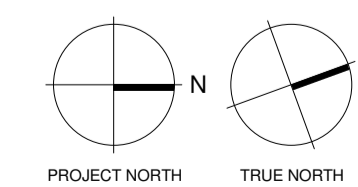
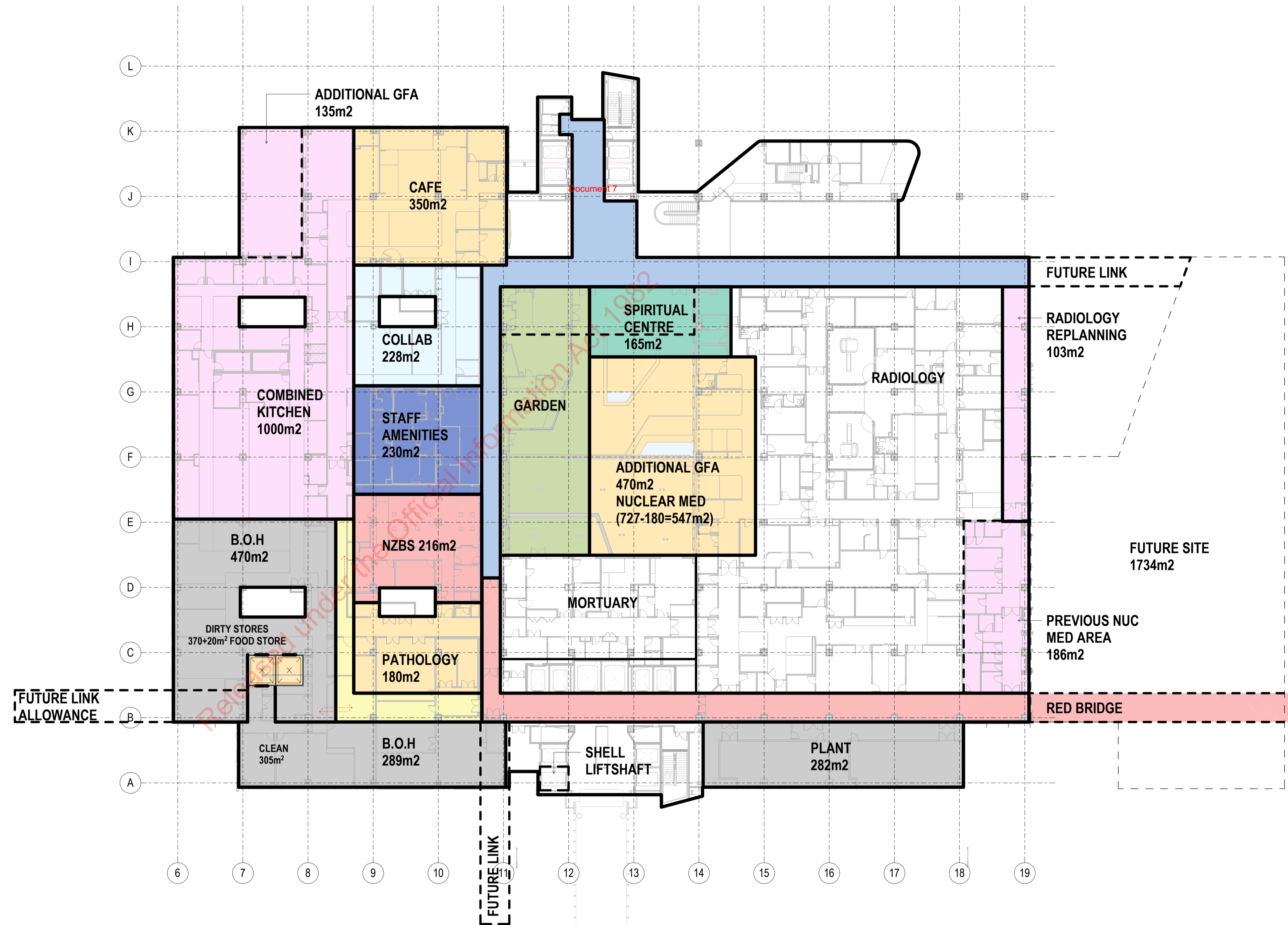
Option 4.3 Drawings

Appendix B

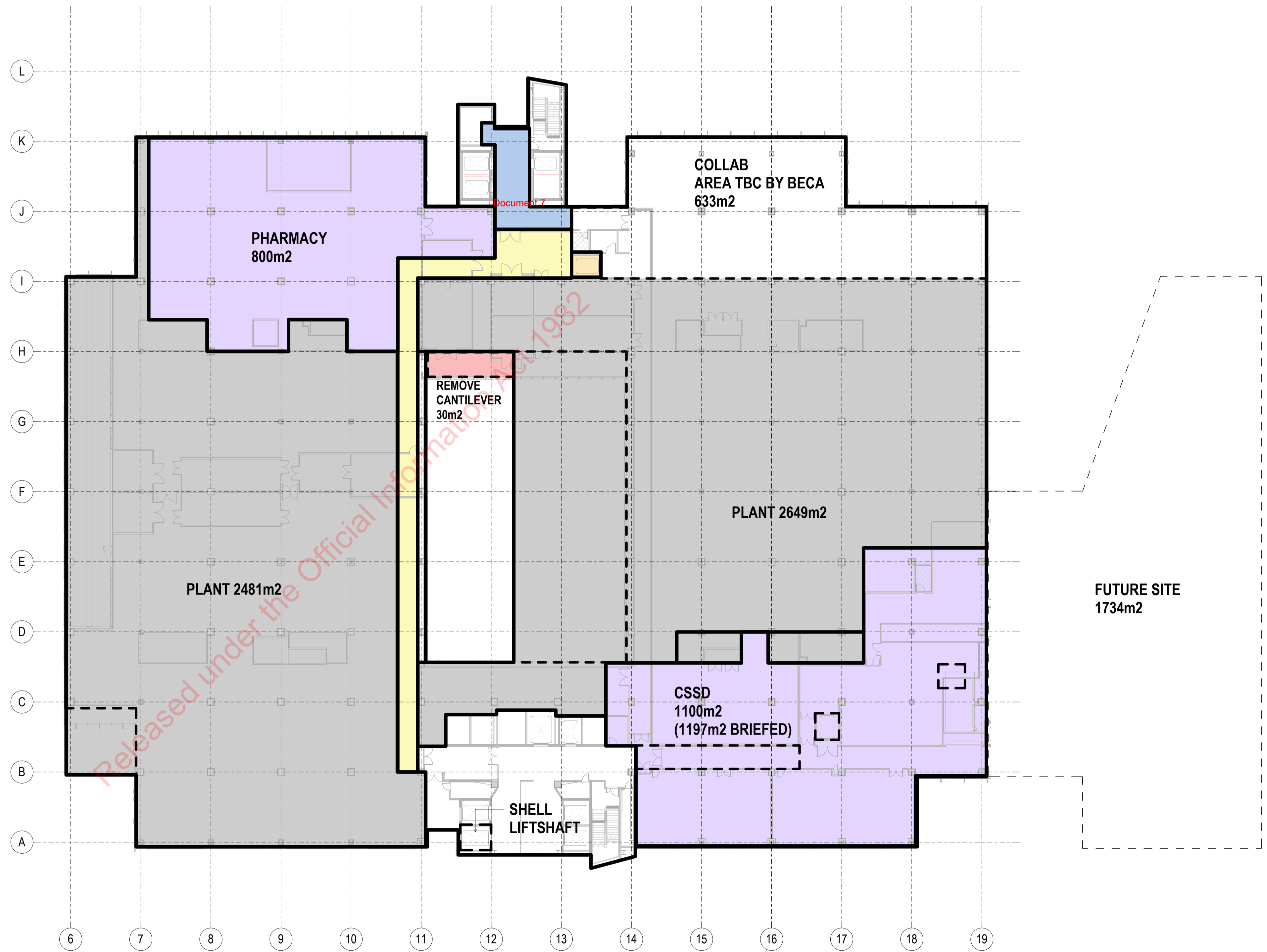
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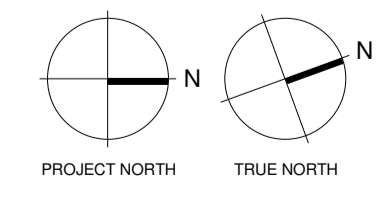


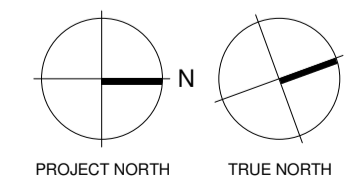
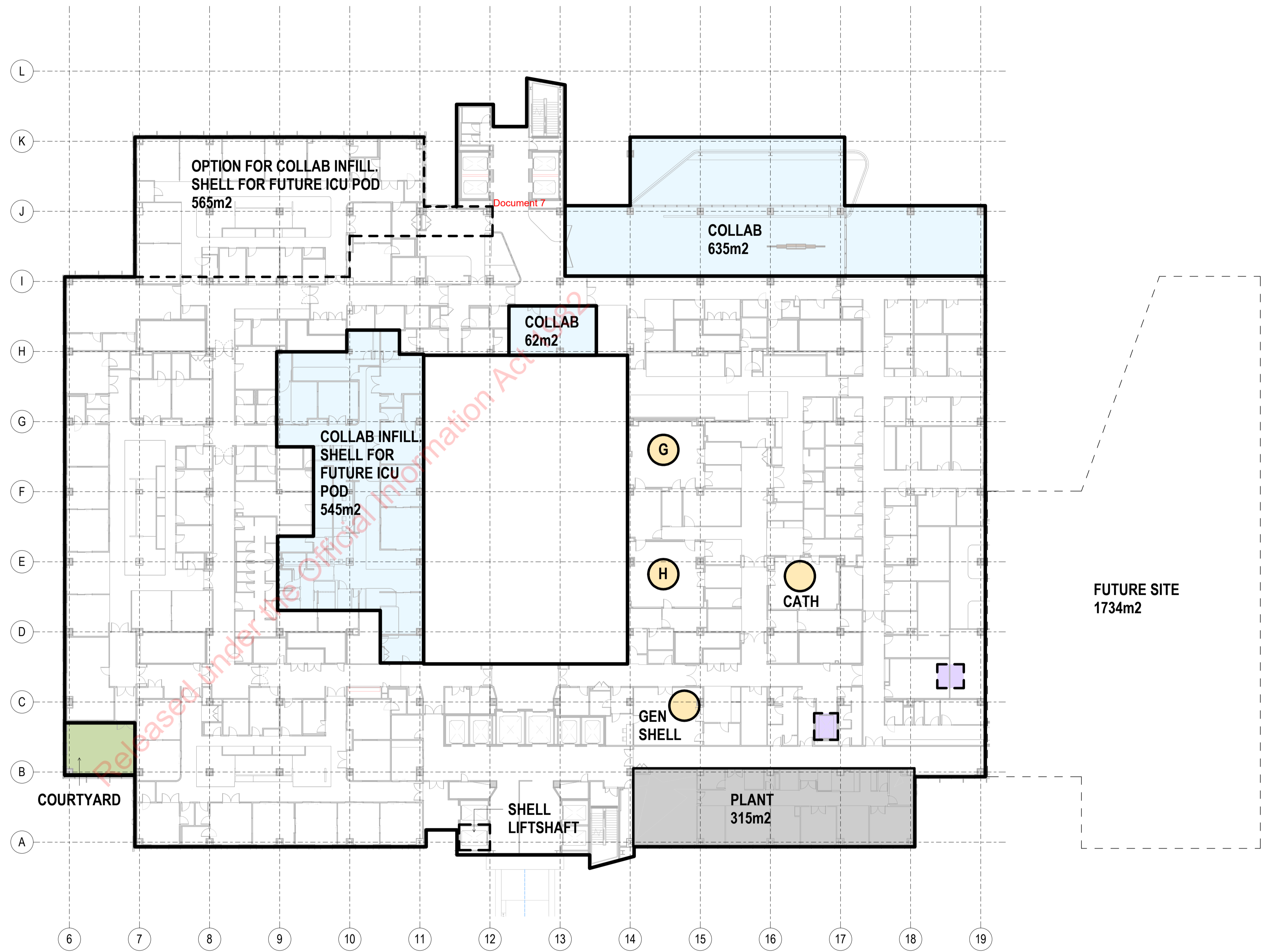


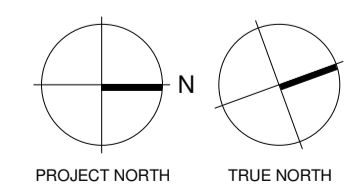


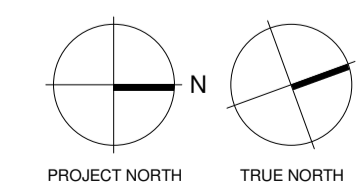
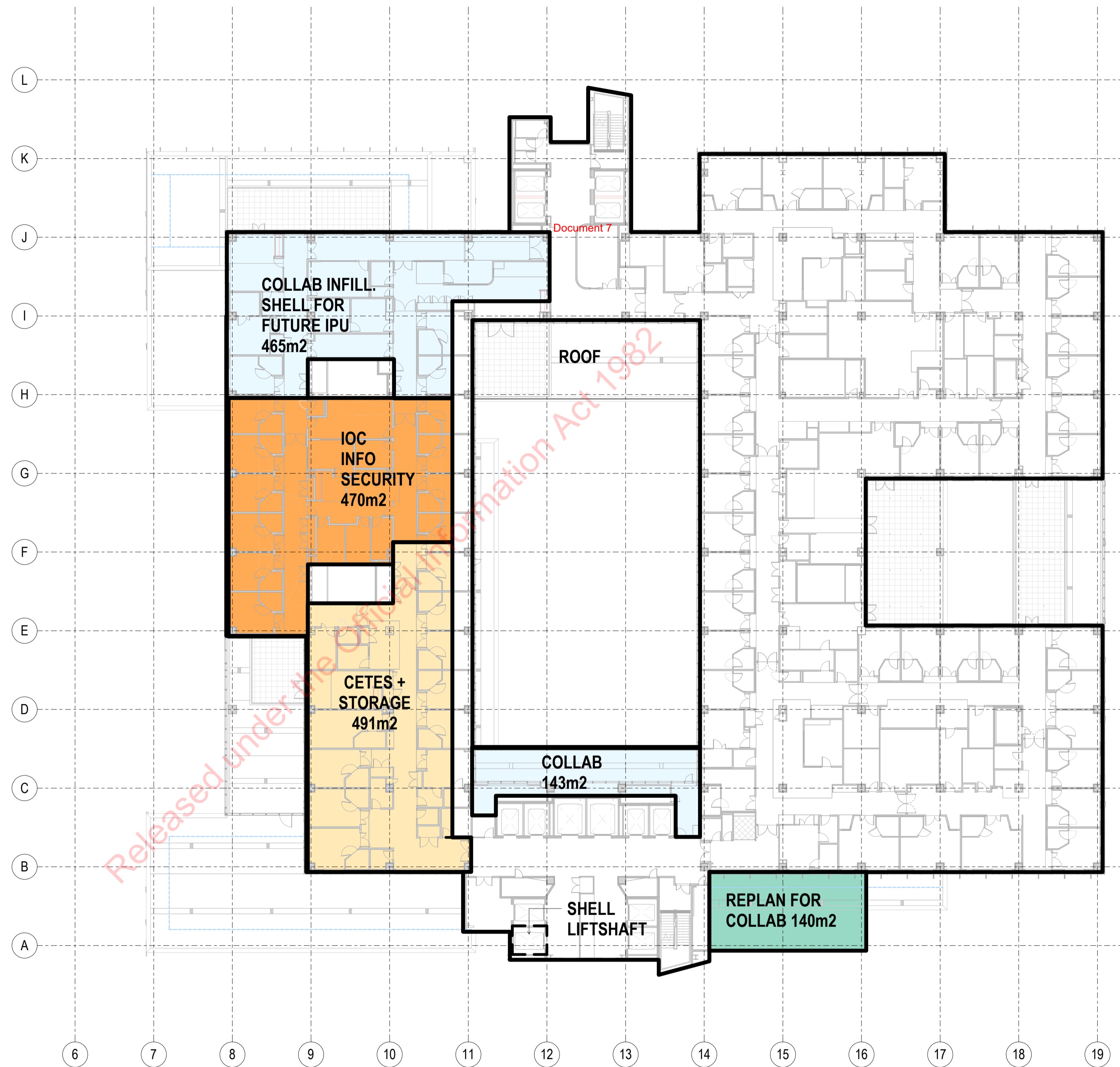
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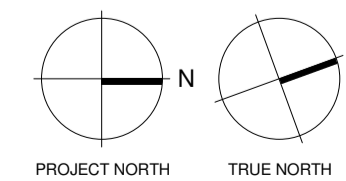
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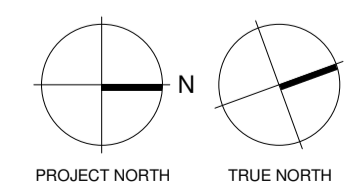


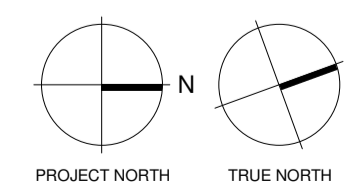
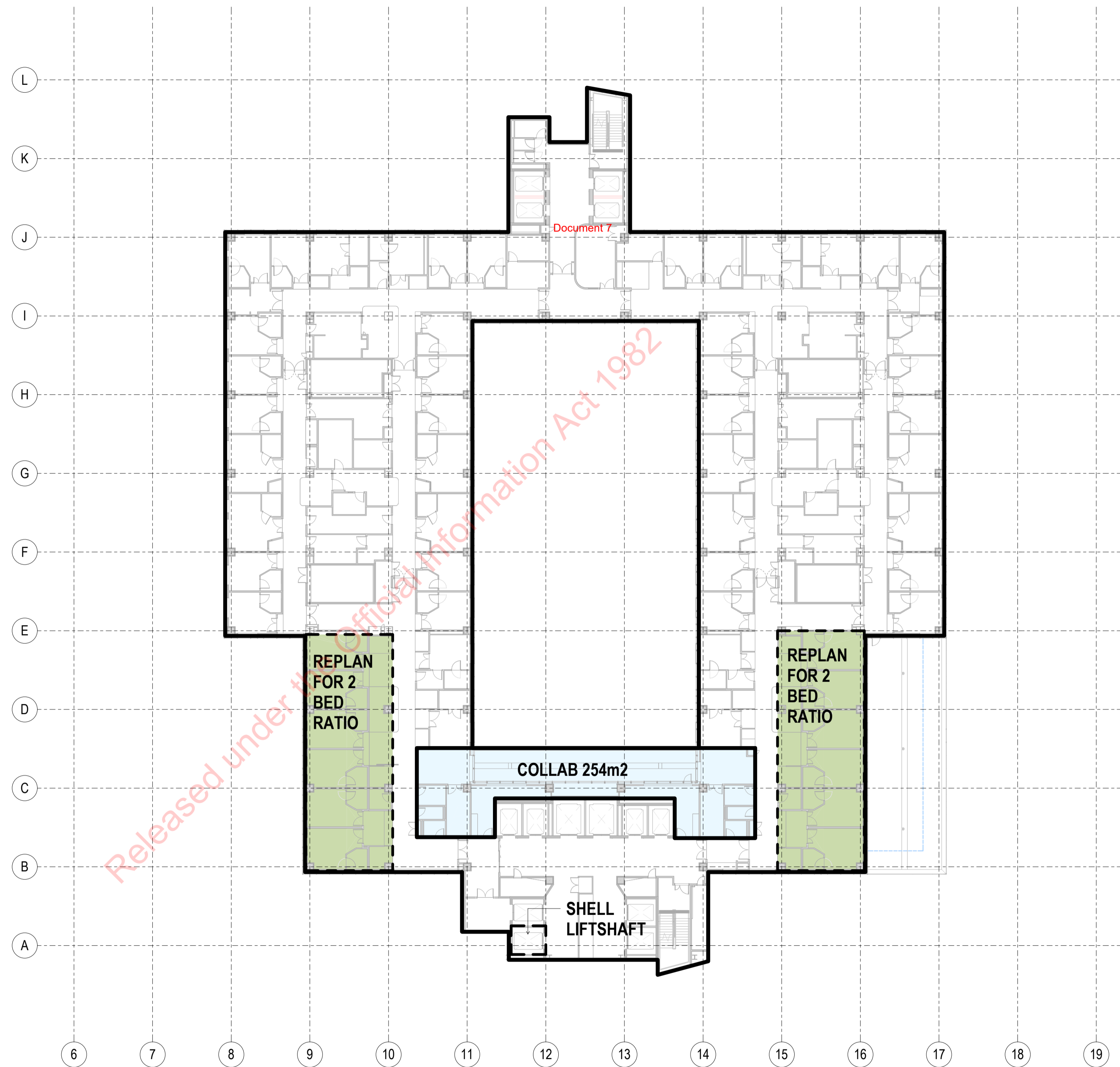


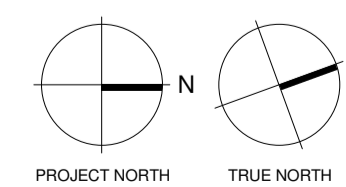
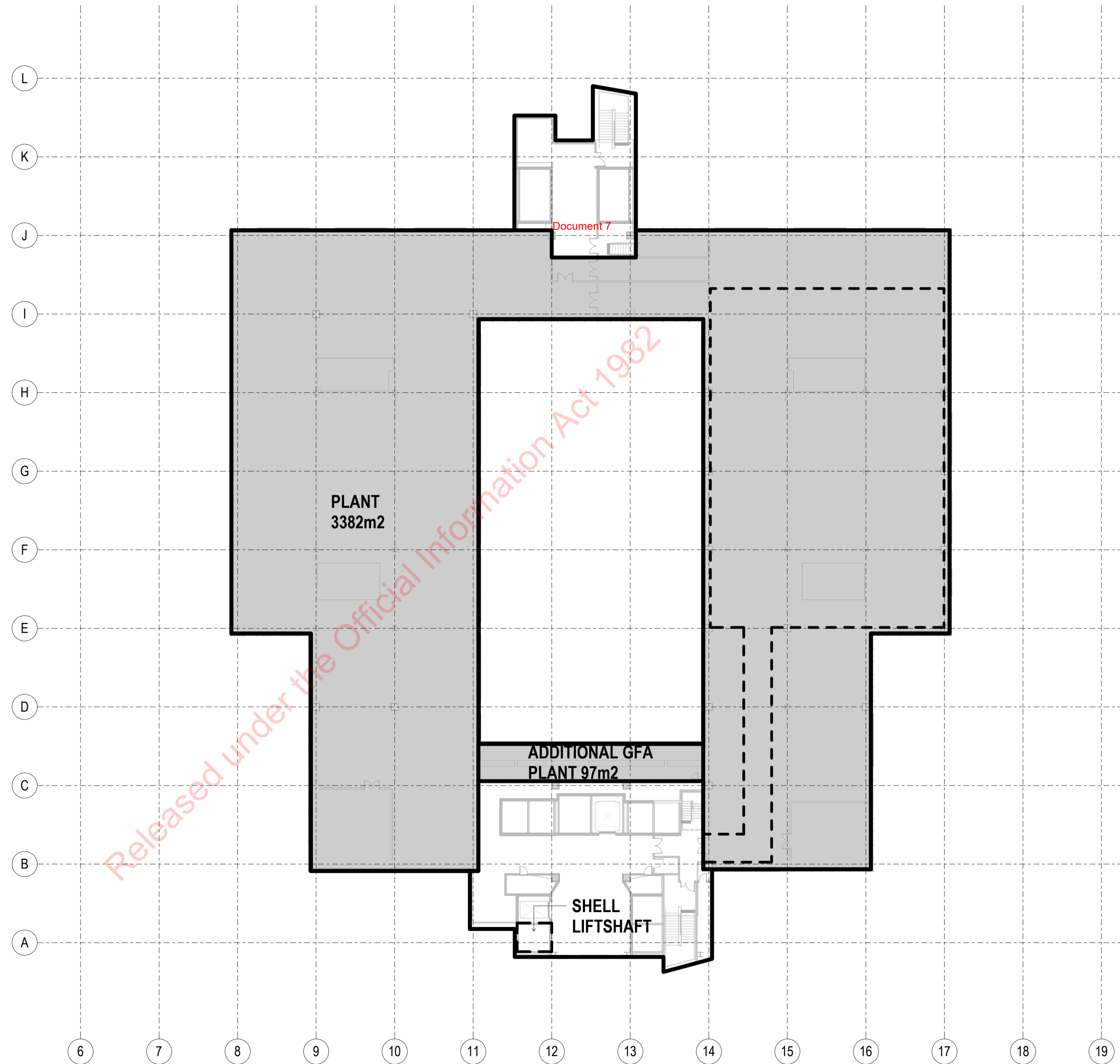


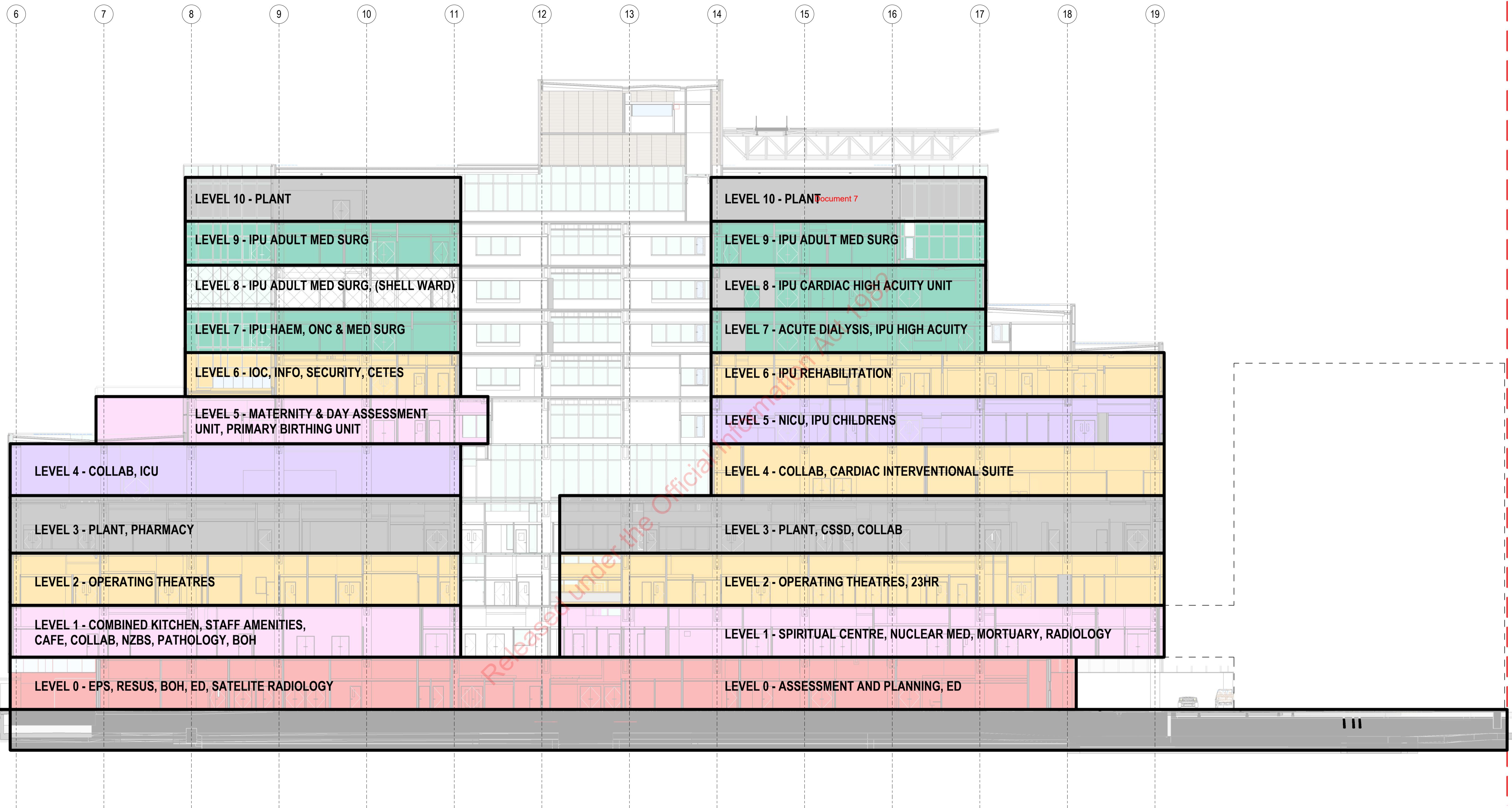












Attachment D Holmes Memo 'Overview of the structural design pathway and acceleration dated 29 August 2022

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Memorandum

To: Kris Thomas
Company: RCP
From: Jeff Matthews
Date: 29 August 2022
Subject: NDH Inpatient Building - Overview of the structural design pathway and acceleration

Project No: 138817.13

Dear Kris,

Options to accelerate the structural and geotechnical engineering design of the Inpatient Building have been investigated as part of the reset of the design of the building to mitigate some of the potential programme impact of the Design Optimisation Studies and the Design Reset. The options are outlined in the Holmes report titled *HCG-RPT-0110-ST-004 Holmes Inpatient Building Optimisation Study Report* dated 29 August 2022.

The structural and geotechnical engineering design is proposed to be accelerated to meet the requirements for the critical path activities – Pile Indent, Piling Detailed Design, Steel Structure Indent (beams and columns), Substructure Detailed Design and Primary Steelwork Detailed Design.

The programme for the redesign work is being developed by Woods and Associates. An overview of the structural design pathway and acceleration for the Inpatient Building as part of the New Dunedin Hospital Project is outlined herein. This memo focuses on Optimisation Option 4.3.

Proposed Programme for Acceleration of the Structural and Geotechnical Design

The proposed programme for the acceleration of the structural and geotechnical engineering design is attached to this memo. The assumptions on which the accelerated programme are based, the “Locked Information Points” and the contents of each structural package are outlined. The proposed programme represents the most optimistic outcome.

In determining the proposed structural design programme, a number of information points are needed to enable us to advance our design. Successful delivery of the structural and geotechnical engineering design to the accelerated programme relies on Health NZ providing various approvals and other members of the Design Team providing aspects of their design ahead of the design phase they are working in.

The proposed acceleration programme includes a “Prestart” period in which all the critical decisions for the basis of the design of the building are made to enable the analysis of the structure to commence.

Initial input has been received from Warren and Mahoney and Beca into the structural design programme. Further input is required.

Building Code Update Incorporation

The National Seismic Hazard Model (NSHM) is currently being revised with a planned public release by September 2022. This is only one scientific input. Other broader reviews of seismic risk settings are also taking place—collectively referred to as the Seismic Risk Work Programme. There are currently two Building Code updates for the design of buildings (Building Code reference is B1/VM1) proposed in relation to this work, one in the 2023 cycle and one in the 2025 cycle. MBIE have communicated to the industry that the 2023 changes are likely to be applied largely within the current structure of our loading and design

standards. The second updated in 2025 would be a broader change to the standards framework as a whole.

Typically, Building Code updates (such as the proposed updates to Verification Method B1/VM1 for Structure) follow an annual cycle. They are issued in April for public consultation – which would be the “first look”. Submissions are reviewed and edits made, and the document is then published in November of that year and is effective at that time. There is usually a minimum transition of 12 months, during which time both the prior revision and the new revision of the document can be used. This allows existing projects to be completed and changes to be incorporated in new projects. During the transition period either the new or the old provisions can be consented. Following this process, the 2023 cycle updates would become mandatory in November 2024, and the 2025 cycle in November 2026. The Seismic Risk Work Programme timeframes are proposals and so these dates are subject to change.

How the changes to the NSHM will be incorporated into the Building Code documents is not known – and the Seismic Risk Work Programme is tasked with preparing these recommendations over the coming years.

A detailed discussion on the pending Building Code Update and the options for incorporating the Building Code Update in the design of the Inpatient Building including the risks associated with each option are outlined in the Holmes report titled *HCG-RPT-0110-ST-004 Holmes Inpatient Building Optimisation Study Report* dated 29 August 2022.

The option that has been instructed to be included in the design of the Inpatient Building is designing the building to current PSHA(1) and check to PSHA(2) using nominal properties (as per an existing building assessment). This option includes some allowance for the pending Building Code Updates, however there is a residual risk that the building may not be compliant with the Building Code at the time of opening.

The accelerated programme does not include an allowance to update the PSHA to the revised NSHM or the draft update to Verification Method B1/VM1 for structure. We recommend that the PSHA is updated to the revised NSHM in parallel during the “Prestart” and analysis periods to determine the impact and then the cost and programme implications can be assessed if any changes are recommended.

The accelerated programme for the design of the Inpatient Building is such that the Building Consents are likely to straddle the Code Updates.

Accelerated Programme Assumptions

The assumptions on which the accelerated programme is based include:

- Option 4.3
- The structure is as per the current design philosophy (steel moment frame structure on base-isolators)
- Construction is not staged. If staging is required, is it achieved by shelling areas.
- Design the building to PSHA(1) and check to PHA(2) using nominal properties (as per an existing building assessment).
- The current structure is utilised – limited refinement of the structural sizes. The option to change to open section columns for the one-way columns in the seismic frames has been included (added three weeks to the programme)

- Modular bathrooms, if included, are instructed prior to the commencement of the mobilisation to enable the redesign associated with incorporating an 80mm setdown to be completed in the “Prestart” period.

Structural Deliverables Under an Accelerated Programme

The deliverables for structural engineering would not be in accordance with the NZ CIC Guidelines.

The proposed accelerated programme will have the following structural deliverables:

- Pile indent
- Piling Detailed Design
- Subfloor Detailed Design
- Primary Steel indent
- Primary Steel Detailed Design
- Remainder of Primary Structure Detailed Design
- Secondary Structure (aligns with the Detailed Design for the other disciplines)

Seismic Restraint will be delivered in the lag periods following Preliminary, Developed and Detailed Design, as per the current programme.

There are no clean Preliminary, Developed or Detailed Design delivery points. Aspects of the design will be at one or all of these phases at any one time. There will therefore be no Preliminary Design, Developed Design or Detailed Design overall milestone issues.

No Preliminary or Developed Design structural and geotechnical reports are proposed. Progressively through the design, key design decisions will be documented in memorandum for Health NZ sign-off. A Detailed Design report could be provided at the completion of the overall Detailed Design phase, if required.

No interim design issues or reporting have been included in the accelerated programme for the structural deliverables. These could be added in, if required, however this will impact the ability to accelerate the structural design and require the programme duration to be extended.

Information Requirements for the Accelerated Structural Programme

The structural design is delivered ahead of the other disciplines. Delivery of the structural packages is reliant on information being provided (and locked) by the Architect and Services Engineer. This information has been highlighted in the attached structural acceleration programme as “Locked Information Points”.

Some of the information required to be provided by the Architect and Services Engineer will require them to lock the information ahead of when the design is complete and require Health NZ sign-off in advance. Initial input has been received from Warren and Mahoney and Beca into the structural design programme. Further input is required.

The information supplied to us by others may need to be conservative given where their design is at relative to ours and could result in aspects of the structure being more expensive than if our programme was to align with the rest of the design team.

Risks of accelerating the structural design

Advancement of the structural design ahead of the rest of the design team is possible, however there are risks associated with the acceleration. Potential risks to both programme and cost include:

- Structural design is accelerated ahead of the design by the other disciplines. Early delivery of the structural packages is reliant on information being provided (and locked) by the Architect and Services Engineer. The Architect and Services Engineer will be required to lock elements of the design before their design is complete. No allowance has been included in the accelerated programme to reanalyse/check to see if any changes that occur, as the Architects and Services Engineer progress their design, can be incorporated. Late changes will not be able to be accommodated within the proposed programme. Late changes that require redesign will incur:
 - Additional fees/abortive costs
 - Additional time that may compromise the programme benefits from acceleration.

Prompt and early sign off of critical decisions will be required from Health NZ. Risk that delays in obtaining the required decisions will delay the structural design.

Additional Project/Design Management will be required to ensure that all information that is required to be locked, including Health NZ sign-off of key decisions, is provided on time to minimise the risk of programme delays.

- Risks that assumptions that are required to be made to enable the structural design to accelerate:
 - Will lead to increased cost of the structure due to conservatism required to be made due to status of the design of the other disciplines at the time elements have to be locked and to reduce risk of change
 - may result in suboptimal solutions.
- Structural design is not completed in accordance with the CIC Guidelines. There are no Preliminary Design or Developed Design reports, nor interim deliverables included in the programme. Progressively during the design, key design decisions will be documented in memorandum for Ministry sign-off. Risk that there are no combined design milestones or hold points for cost checks and Health NZ sign-off while the structure accelerates.

Documents will be issued at the key structural milestones (Pile indent, Pile Detailed Design, Steel Structure Indent etc). Although these documents will be available for cost checks and Health NZ review, there are no hold points in the programme for these reviews and no allowance is included in the programme to make any changes following these checks/reviews.

Risk that the structural design is progressed ahead of cost checks and any requirement to incorporate changes from Value Management Activities will have a cost and programme impact. If hold points are required for Ministry review or cost checks, the programme will be required to be extended to incorporate them.

- Due to the accelerated nature of the programme, design decisions will be forced to be made that may have implications with respect to cost, construction and the later design phases. The Quantity Survey and the ECE Contractor will need to be at the table during the design process to ensure that cost consequences or implications of design decisions are identified and to flag any cost or other issues.
- Risk that all the critical decisions required in the “Prestart” period are not made in time to enable the analysis of the structure to commence. Risk that the “Prestart” period may need to be extended.
- The decision to include modular bathrooms in the design is required to be made in time to allow the additional four weeks of design required for the redesign of the gravity structure of the tower floors to be completed in the “Prestart” period. Risk that the “Prestart” period and the overall programme duration may be increased.
- Some allowance has been included in the design for the pending Building Code Updates – residual risk that the building may not be compliant with the Building Code at the time of the opening.
- Building Consents will straddle the pending Building Code Updates. We recommend consultation with the Dunedin City Council to mitigate the risks associated with this.

The risks identified are those assessed by Holmes as the Structural Engineer only and will not be fully inclusive of all potential risks of adopting the acceleration of the structural design.

It is the responsibility of Health NZ, their Project Managers and Quantity Surveyors to further assess both those identified risks and other potential risks that may be subject to future variation. Allowance for additional fees associated with the design or programme risk implications of adopting an accelerated programme will need to be included. Redesign and programme risk and any associated contingencies are owned by the Health NZ.

Regards,



Jeff Matthews
PROJECT DIRECTOR
Holmes NZ LP

Attachment E Woods Harris Memo 'NDH – Inpatients Design Optimisation' dated 26 August 2022

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NDH – Inpatients Design Optimisation

26th August 2022

Programme development has been based on initial design deliverables options workshop in June 2022 and the subsequent refinement at programme development meetings over the July – August 2022 period. In addition, we have received direct feedback from the structure, architecture, and services consultants.

It must be recognised that the information (and programme developed and presented on its basis) remain elemental with a significant amount of detail that has yet to developed and integrated.

However, the team remain confident that the programme durations and logic presented are achievable; every effort will be made to ensure compliance with this timeline is achieved.

The revised architecture, in general terms being the removal of the “Pavilion” and reconfiguration several of the clinical areas, has had little impact on the structure design. However, because of the time lost during this “Optimisation” process we needed to consider an “acceleration” of the structure design process. The traditional process of the design disciplines working equally through each design phase is the most efficient and produces the least risk of “rework” at the shop-drawing/construction phase; however, if we were following this process the project likely forecast completion date would sit at the end of 2029. This would also incur a significant increase in costs due to consultant and contractor fee extensions and further escalation in build values.

It was for these reasons the team has pursued and developed the “accelerated structure design” model. It allows early issue of key procurement information including.

1. Pile tube indent specifications
2. Piling design
3. Structural steel indent specifications
4. Inground, sub and superstructure consent packages.

With this key information provided as soon as possible we can provide the contractors with a pathway to expedite early works packages. As noted above this comes at some risk, with coordination to the standard level not being achieved however with the involvement of the ECE contractor, this risk will be closely monitored and managed.

The team have considered and rejected a structure philosophy change (excluding base isolation and redesign of the steel frame) given the significant programme impact caused by the additional time needed to implement.

The programme presents with the Design Optimisation proposal is titled –

“NDH – IB Design Optimisation – Arch Option #4.3 (structure expedite) V01b 220826”.

Programme Impact

	Optimisation Programme	Current Programme Rev 4.	Delay Impact
Design (prolongation to 100% Detailed Design Completion)	16/9/24	3/8/23	12 months
Inpatient Building Construction Start (piing)	17/1/24	17/4/23	9 months
Inpatient Building Opening “Go Live”	14/3/29	8/6/28	9 months

Note: Programme ‘Impact’ is NOT cumulative.

Programme assumptions / provisions:

1. ESG endorsement at the 9th September 2022 meeting and subsequent HNZ approval by 15th September 2022
2. 6 week "mobilisation & pre-start period" to allow consultant teams to confirm deliverable, reengage their teams and agree contractual matters
3. Delivering the key information required by the structure team as noted on the milestone dates (lines 33-51)
4. UG meetings being limited to "key" staff and only for areas where endorsements have not already been provided.
5. 3 x UG in Prelim and Developed Design, no UG in Detailed design.
6. Provides for QS costing and peer review completion to allow approvals to proceed to the next phase of design whilst formal approvals are occurring concurrently.
7. Acceptance of the above process (as previously endorsed for this project) will likely see some change requests resulting from the final approvals/endorsement process.
8. Includes for a "generic" design sequence for the yet to be defined plant facility proposed for Bow Lane site.
9. Assumes an amendment to the ground Works Resource Consent to allow piling (as redesigned)
10. Allows for a Restricted Discretionary RC process for above ground works and therefore needs to be lodged prior to the end of January 2024 (programme target is 16th June 2023).
11. Assumes a progressive engagement of key trades (piling, structural steel, façade etc) for design input and procurement activities.
12. Construction durations and sequences are based on the latest ECI offering (issued Feb 2022).

WOODS HARRIS CONSULTING LIMITED



Paul Tonkin
Director

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Attachment F RLB Memo 'NDH Inpatient Building Optimisation Estimates' dated 30 August 2022

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MEMO

To: Resource Coordination Partnership – Kris Thomas

Cc: Te Whatu Ora - Tony Lloyd

From: Rider Levett Bucknall – Neil O'Donnell

Date: 30th August 2022

Re: New Dunedin Hospital Inpatients Building Optimisation Estimates

The Project Team has been tasked to identify design optimisation opportunities across the NDH Project so as to partially offset recent and ongoing extraordinary cost escalation impacts.

Further to recent Optimisation activities including numerous meetings, presentations and ad hoc discussions, attached is a summary for Optimisation Option 4.3. A number of previous options have been reviewed but subsequently discounted by the Project Team and are not repeated here. This is because they did not achieve acceptable estimated savings or clinical outcomes.

In addition, a number of Structural Alternatives have also been proposed and estimated, but subsequently discounted by the Project Team. This was due to extent of redesign required that would have caused a substantial delay to project delivery.

Clarifications:

The attached savings estimates are net of estimated escalation and redesign impacts. The basis is recent Woods Harris programme advice 29.08.22 and delay indications included therein – Hospital Go Live date of March 2029. This is a delay to Go Live of 9 months and is based on amended structural design processes to mitigate further delay.

Allowances have been made for professional fees to update the design; note that these fees have not yet been confirmed and may change upon receipt of any final fee variation claims. The basis is to have used the original fee values and adjust for prolongation taking into account perceived amount of change.

The FF&E allowances have been discussed at high level with the FF&E Manager and HNZ.

A number of miscellaneous Building Services items have been included in the estimates and vary in value from between \$200K and \$1.2m each and as such are not itemised individually, but instead are grouped together. We understand that they have been discussed with Te Whatu Ora Southern Property Department and have broad acceptance.

Current Cost Position:

S9(2)(b)(ii)

Estimated Cost Saving

Building Cost Saving:	\$117,000,000
Time Related Costs	
Consultant Fees:	\$12,000,000
Escalation:	\$15,000,000
Estimated Net Project Saving:	\$90,000,000

Savings Realisation Risk

As noted above, these estimates are high level since the optimization proposed is at a pre-concept level and estimates will be updated as design progresses with further design development.

Other specific risks that may alter estimated costs:

- Programme not being achieved
- Escalation rates applied being exceeded
- Further design of Bow Lane services support areas requiring additional structural requirements
- Replanning of areas in the altered areas of Inpatients Building causing knock-on effects to risers, etc
- Reduced areas of plantrooms being insufficient
- Services savings items do not get final agreement
- Professional Fee claims exceed budget allowance

Recommended Scheme Savings Breakdown

- Refer to the attached summary

Conclusion

Currently Optimisation Option 4.3 is estimated to achieve a net saving of approximately \$90m. The Project Team continue to work to identify further savings opportunities. It should be noted that the attached are based on high level feasibility type estimates and will require continued development as the final selected options are subject to further design.

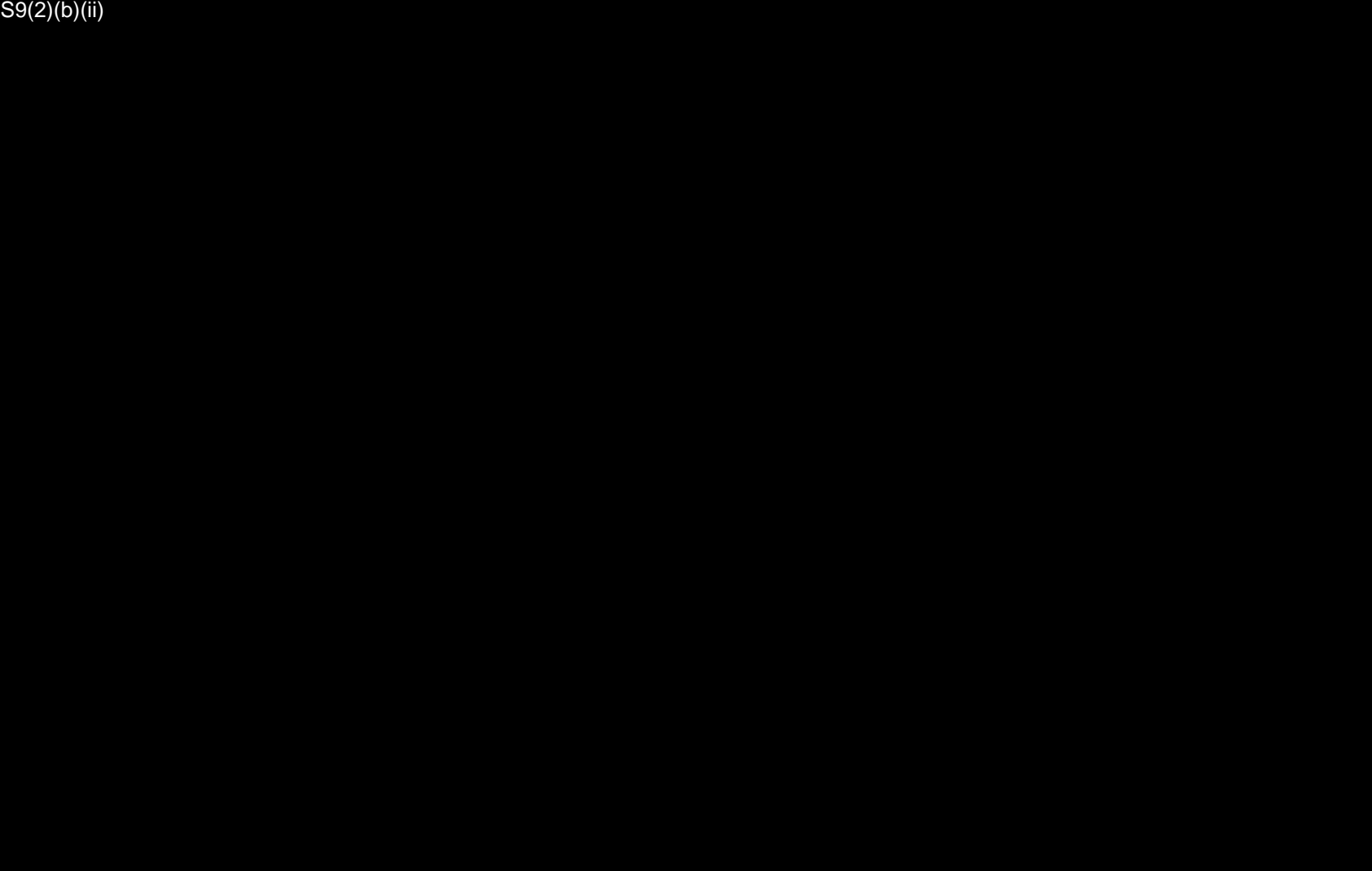
Should you require any further information, please do not hesitate to contact us,

Kind regards

Inpatients Optimisation
Option 4.3

30/08/2022

S9(2)(b)(ii)



Estimate based on:
Optimisation_Option -4.3 dated 26.08.2022.pdf
Woods Harris Programme - IB - Design Optimisation - Arch Option-#4.3 - V01b (Structure accelerate) 220829

Relo

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**Attachment G Te Whatu Ora Southern 'Clinical and Operational Impact Statement'
dated 2 September 2022**

Separately bound document.

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Attachment H Greenwood Roche / Boff Miskell Memo 'Inpatient Building – amended design – updated consenting risk assessment' dated 30 August 2022

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**Attachment I Novo Group Memo 'NDH – Inpatient Optimisation Transport Review'
dated 29 August 2022**

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29 August 2022

MEMO

TO: Kris Thomas – RCP

FROM: Nick Fuller, Senior Transport Engineer

PROJECT REF: 670-001 – TM010A

NEW DUNEDIN HOSPITAL: INPATIENT OPTIMISATION TRANSPORT REVIEW

1. This memo sets out our high level review of transport arrangements associated with the New Dunedin Hospital Inpatient Optimisation, accepting that further review and assessment will be required as the project progresses. The review undertaken is of Option 4.3.
2. As a brief overview, we consider that the layout is generally acceptable with outstanding matters to be resolved being of a minor nature that can be addressed in the next stages of design.

Access

3. The proposed access locations and their uses are illustrated in **Figure 1**.

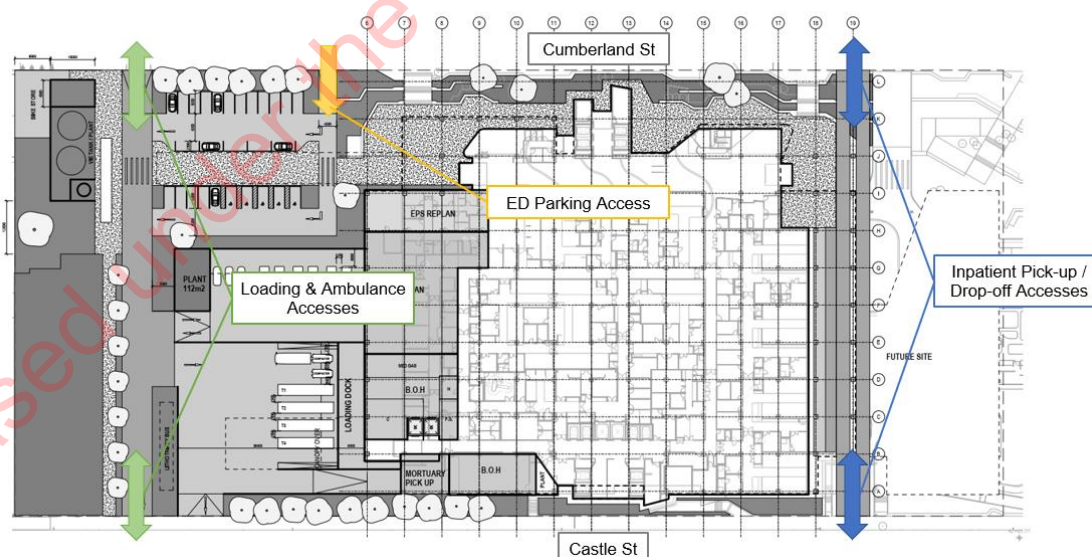


Figure 1: Site Accesses

4. The northern end of the site includes accesses to a pick-up / drop-off facility for Inpatients. These accesses are located at least 30m from the St Andrew Street intersections with

Cumberland and Castle Streets and therefore comply with the District Plan separation requirements. Previous traffic modelling (undertaken for earlier iterations of the site layout) indicate that these accesses should operate safely and efficiently, particularly with the existing one-way road network.

5. Loading and Ambulance access is provided at the southern end of the site. These accesses will also accommodate egress from the Emergency Department car parks. Although it is anticipated changes will be required to better accommodate vehicle tracking at these accesses, there is ample space to accommodate this as the design progresses.
6. Dedicated access is proposed to an Emergency Department pick-up / drop-off facility and car park. This Cumberland Street access is anticipated to operate satisfactorily and there is sufficient queue space provided to avoid vehicles affecting the State highway network. Sharing of egress with Ambulances and loading vehicles (as identified above) is considered to be able to occur safely, noting that vehicles exiting the car park will need to give-way to traffic on the southern east-west link.
7. Pedestrian and cycle access will be largely as per previous iterations of the design, which was considered satisfactory. An accessible link (for the mobility impaired) to the St Andrew Street / Cumberland Street will be required in the next stage of the design, although there is ample space for this to be provided.
8. Although we are yet to see updated designs from Waka Kotahi for potential two-way arrangements of Cumberland Street and Castle Street, we consider that the proposed access arrangements are likely to operate acceptably under a two-way road network (should that eventuate).

Parking & Loading Areas

9. The parking and loading areas are illustrated in **Figure 2**.

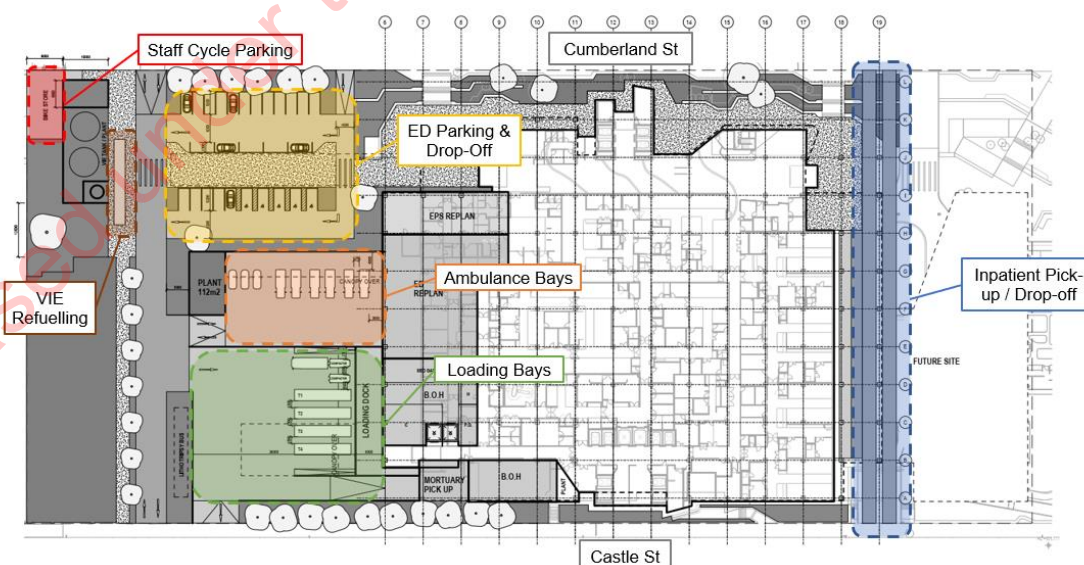


Figure 2: Parking & Loading Areas

10. Vehicle tracking has been undertaken of the loading dock which has been appropriately sized to accommodate truck manoeuvring. Sufficient space is also available to provide gates to make this a secure facility. The VIE refuelling location is as per previous iterations of the Inpatient Building design and this remains acceptable with the proposed layout.
11. Similarly, there is ample space within the Ambulance bay to accommodate parked and manoeuvring Ambulances. Again, there is also the potential for security gates to be installed without affecting through use of the east-west link by other vehicles.
12. The Emergency Department car parking layout complies with relevant standards and is therefore considered acceptable. It is noted this provides at least five mobility spaces, five pick-up / drop-off spaces plus 17 other (unallocated as yet) car parks.
13. The pick-up / drop-off arrangement at the northern end of the site has sufficient space to accommodate approximately 16 vehicles, in an 'airport style' arrangement. The dimensions of these spaces have been reviewed and they meet relevant design guidance.

Conclusion

14. The proposed site layout has been reviewed with regards to transport matters. It is considered that the layout is generally acceptable with outstanding matters being of a minor nature that can be resolved in the next stages of design.

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Attachment J **Beca Memo 'Design Reset Executive Summary Building Services and Fire Engineering' dated 31 August 2022**

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To: RCP **Date:** 31 August 2022
From: Richard Wager **Our Ref:** 5397839-
1601990802-10360
Copy: :
Subject: Design Reset Executive Summary Building Services and Fire Engineering

As part of the direction to undertake optimisation of the project with the goal of significant cost savings, four options have been identified. This review provides an initial assessment of the building services and fire engineering implications on the current design:

Option one retained all of the briefed services and functionality, with a lens towards engineering and travel efficiency.

Option two removed the pavilion building, cut the inpatient building back to grid 19, requiring some replanning of the podium floors, achieving an approximate 1450m² saving in engineering plant area over option 1. Central plant (generators and central heat pumps) were located within a 6 storey logistics building to the south of the site.

Option three built on option two with a two floor reduction of the south tower, reduced quantum of collab workstations, two less theatres on Level 3 and the MHSOP and Pathology removed entirely from the project, achieving an approximate additional 1650 m² saving in engineering plant area over option 2 above. The alongside logistics building was reduced by 2 floors.

Option Four now develops option 3 by bringing the logistics building into the main building form. Limited further engineering area savings have been realised. The emergency generators and heat pumps have been relocated to the Bow Lane site. To retain the heat pumps on the inpatient building will limit the ability to locate pharmacy at the plant level (now on level 3) or require alternate plant space. The introduction of the main kitchen (tenant fitout) brings with it a need for fire rated risers, or ductwork through the building.

Structural Options

Our options assessments have been based on the current structural design. The various structural options investigated have been discounted due to their major impact on the project programme.

These changes are described in more detail in the body of our report and attached sketches. To be able to assess these changes from a services perspective, some key assumptions have been made (section 2) that require validation/ acceptance by Ministry and SDHB.

Alternate plant locations

In reaching this point, we have investigated a number of alternate central plant locations. Study has identified the only viable standby electricity generator location to be on the Bow Lane site. Location of the central HVAC heat pumps on the Bow Lane site is also looking most favourable, albeit there are still acoustic challenges being worked through. The more challenging rooftop locations at levels 10 and 6 is still under review as an alternative at this time. s 9(2)(b)(ii)

[REDACTED]

Opportunities to Reduce Plant Space

As part of the optimisation work, we have reviewed opportunities to further reduce the plant space required. All these options compromise aspects of the agreed approach to date, with some discounted because the compromise is believed to be too great. Many have been adopted in option 4 to fit within the reduced engineering plant area. These are generally a deletion of AHU heat recovery where required, deletion of AHU return air sections in favour of double stacking supply AHUs, changing more areas to VAV systems and combining areas served by single AHUs. Whilst achieving greater area savings, this is at the cost of additional high level and ceiling void maintenance access requirements.

Some combining of plant serving parts of multiple ward levels has been incorporated to reduce plant area, however this does reduce fire engineering resilience and increase controls complexity along with increasing cross contamination risks. Further study will be needed to have confidence that this can be avoided.

Pandemic Provisions

We have reviewed the impact of system changes made on the previously agreed pandemic stage 1 to 3 responses and believe we can retain most of the agreed functionality. As the design is developed, some areas may however require a level of simplification in zoning, which will be discussed with HealthNZ following further study.

Green Star

With regards the 5 star Green Star target for the Inpatients Building, initial assessment at this stage is the potential points available to the project have reduced but the project should still have sufficient points for the 5 star target.

The loss of some target credits means the target credits will all have to be achieved, increasing the compliance risk on a complex build. It will be important to work through the credits targeted in more detail with the relevant disciplines, to confirm the credits are fully available and the project remains on track for the target rating.

Vertical Transport Summary

The key implications of the options for the proposed alterations to block and stack are similar for all options. These are seen as follows (in the absence of revised traffic flow data at this time):

- The main bank of lifts on the West side increase to 2m/s to allow for additional traffic.
- Logistics lifts move with the building (G to L1 only), with double sided access supporting proposed flow paths
- The suggested deletion of two main red core logistics lifts on the east side has been discounted in favour of shelling one lift core of the current four for future fitout. This minimises consequences for mixed use, wait times, functionality, pandemic use and resilience that have been previously briefed
- The introduction of distributed collab spaces will require review of wait times once their locations are agreed

Updated traffic flows for more detailed re-assessment will be required.

Building & Property Engagement

A high level overview of the reductions in plant configuration and system design changes has been provided in our design reset report and reviewed by Southern Building and Property. Their commentary is also summarised in this table. Accepting the need for cost saving, they are broadly

supportive of the changes proposed, noting impacts on energy use and increased maintenance within on floor areas and at high level in plant areas.

Programme

To minimise the impact of the optimisation on programme, the structural team have been asked to accelerate these critical path activities. Whilst splitting the design process comes with some risk, the Ministry is accepting of the risks and the design team will continue undertaking a more detailed programme review to understand its impact and consequences for other disciplines. To date we remain confident that a solution can be found with the assistance of design management support and oversight.

Fire Engineering

The options have had a high level fire engineering review and whilst some have increased the complexity of the engineering required, the team are confident that alternative solutions can be found to support option 4. Refer to the Beca Services impact report for further discussion.

Conclusion

Based on the feasibility work undertaken to date, the option 4.3 layouts enable the building to comply with the fundamental design requirements of the spaces. The changes made have impacted energy efficiency, resilience, flexibility and maintenance to some degree. Some preferences of the original technical brief have also been discounted. Work is required at the next design stage to validate the assumptions necessary during this reset period.

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