Planning Proposal

Amendment to the Zoning and Height of Building Map for Lake Macquarie Private Hospital - Gateshead

Draft Amendment to *Lake Macquarie Local Environmental Plan 2014*

Post-Gateway version

Local Government Area:	Lake Macquarie City Council (Council)
Name of Draft LEP:	Draft Amendment to *Lake Macquarie Local Environment Plan 2014* – Lake Macquarie Private Hospital
Subject Land:	Lake Macquarie Private Hospital 3 Sydney Street, 2 & 4 Casey Street, 36 & 38 Pacific Highway, Gateshead
Land Owners:	Ramsay Health Care Australia Pty Ltd
Applicant:	Akalan Projects on behalf of Ramsay Health Care Australia Pty Ltd
Department of Planning, Industry and Environment Reference Number:	PP-2021-6648
Gateway Determination Date:	27/09/2022
Council Reference Number	RZ/13/2021
Document Date:	October 2022
Document Author:	Amber Stewart – Strategic Planner
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Version	Date	Details
1	June 2022	Council endorsement for Gateway Determination
2	October 2022	Post-Gateway Public Exhibition

INTRODUCTION

This planning proposal relates to Lake Macquarie Private Hospital (LMPH), 3 Sydney Street, 2 & 4 Casey Street, 36 & 38 Pacific Highway, Gateshead.

The hospital opened in 1973 with initially 36 beds, offering general surgery, orthopaedic, gynaecology and elective cosmetic surgery. The hospital has grown to 187 beds, expanded its services to include cardio-vascular, intensive care ward, emergency department, and a specialist radiology and pathology suite.

The hospital is now operating at or near capacity and requires additional space to provide services that meet the needs of the growing Lake Macquarie population and wider Hunter region. The proponent is undertaking a State Significant Development Application (SSD-38025700) with the NSW Department of Planning and Environment (The Department) to enable the development of a hospital expansion.

The proponents are seeking an amendment to the height of building map for the northern part of the site, from 10m to 37m to facilitate the expansion of the hospital. A building height limit of 37m (which equates to 10 storeys) was identified as the height required to contain the new theatres, beds, car parking and consulting suites needed to meet the projected demands.

Following Gateway Determination, The Department have proposed also applying an SP2 Infrastructure (Health Services Facilities) zoning to the site.

PART 1 – OBJECTIVES OR INTENDED OUTCOMES

The intended outcome of this planning proposal is to facilitate a State Significant Development (SSD) proposal for the expansion of LMPH, which will:

- deliver on identified strategic goals for Gateshead as a regionally significant health precinct;
- enable a hospital expansion that supports future healthcare needs of our community;
- encourage a cluster of medical facilities and services at Gateshead, including LMPH, which opens possibilities for an expanded, regionally significant health precinct. This precinct would complement the increased density and diversity of housing in surrounding areas such as Windale, Whitebridge and Kahibah;
- capture significant local, regional and state, social and economic benefits including substantial private financial investment, construction and operational employment and multiplier effects, improved healthcare product and other public benefits;
- facilitate delivery of public domain improvements, improved connectivity and activation;
  provide infrastructure and related uses, and prevent development that is not compatible with or that may detract from the provision of infrastructure, also provide land required for the development or expansion of major health, education and community facilities.

While this planning proposal seeks to enable an SSD through local provisions, the physical development is being considered separately through the SSD assessment process. It should be noted other applications could be made under the proposed planning controls should this specific development not proceed.

PART 2 – EXPLANATION OF PROVISIONS

The proposed objectives will be achieved by amending the LMLEP 2014 with the following changes*:*

Table 1: Proposed Changes to LMLEP 2014 Maps and Instrument		
Item No.	**Address**	**Explanation of provisions**
1	Part Lot 90 DP 1233497, Lot 6,7 and 8 DP 24268	Height increase from 10m to 37m Amend Height of Buildings Map from 10m to 37m (See sites identified on the Height of Buildings Maps as shown in PART 6).
2	Lot 90 DP 1233497, Lot 2 DP 1223084, Lot 4,6,7 and 8 DP 24268	Rezone from R3 Medium Density Residential to SP2 Infrastructure (Health Services Facilities).

PART 3 – JUSTIFICATION

A. NEED FOR THE PLANNING PROPOSAL

1. Is the planning proposal a result of any strategic study or report?

No. The proposal was put forward by the applicant to facilitate the expansion of the existing hospital as it is operating at near capacity.

2. Is the planning proposal the best means of achieving the objectives or intended outcomes, or is there a better way?

Yes, a planning proposal to amend the LMLEP 2014 is considered the most appropriate means of achieving the identified objectives and intended outcomes.

A building height limit of 37m (which equates to 10 storeys) was identified as the height required to contain the new theatres, beds, car parking and consulting suites needed to meet the projected demands.

B. RELATIONSHIP TO STRATEGIC PLANNING FRAMEWORK

3. Is the planning proposal consistent with the objectives and actions contained within the applicable regional or sub-regional strategy (including the Sydney Metropolitan Strategy and exhibited draft strategies)?

Hunter Regional Plan 2036 (HRP)

The planning proposal supports the Hunter Regional Plan's (HRP) aim of growing the region's economy and supporting the growth of local communities. The expansion of the hospital supports increased demands as the Lake Macquarie and Hunter populations grow. It also provides a number of new jobs through both the initial construction and ongoing operation of the hospital.

The site is located within the Greater Newcastle area. The HRP 2036 recognises that this area is a growing area for health services with an aim to develop a national Centre of Excellence for Health and Education.

Direction 8: Promote innovative small business and growth in the service sectors

The planning proposal seeks to support the expansion of the existing hospital. As the hospital is located adjacent to the Pacific Highway the expansion of the hospital meets the goals of this direction as it will expand opportunities for health services to use the hospital.

Direction 26: Deliver infrastructure to support growth and communities

This direction speaks to supporting growing communities through the expansion of infrastructure, including health services. This proposal is consistent with this direction as it will support the expansion of the hospital and its services, supporting expected demand from the growing and aging population that is forecast for Lake Macquarie and the Greater Hunter region.

Draft Hunter Regional Plan 2041 (DHRP 2041)

The existing Hunter Regional Plan includes a commitment for its regular review. The review provides an opportunity to consider the changes in the last 5 years that affect the region, the challenges and opportunities ahead, and update the plan to respond.

The draft Hunter Regional Plan 2041 (the draft Plan) builds on the previous plan which was finalised in October 2016 and resets the regional plan priorities to ensure it continues to respond to the region's needs for the next 20 years.

Objective 7: Plan for businesses and services at the heart of healthy, prosperous and innovative communities

Objective 7 speaks to the need to have services, including health care readily accessible to the growing population. This proposal is consistent with this direction as it will facilitate the expansion of the hospital. Expanding the hospital will provide new services to support the current and future population of the region.

In summary, the planning proposal is considered to be consistent with the draft Hunter Regional Plan 2041, as it will contribute to supporting the growing and aging population that the region will experience. It is also located in a geographically advantageous position that is not at risk to flooding or bushfire with easy access to the Pacific Highway. This is important for ensuring the ongoing resilience for the region.

Greater Newcastle Metropolitan Plan 2036 (GNMP)

The planning proposal is consistent with and supports the objectives of Greater Newcastle Metropolitan Plan 2036 (GNMP) specifically Strategy 4: Grow health precincts and connect the health network. The GNMP identifies the site as being part of a major health precinct (Figure 17 from the GNMP), which has the ability to provide additional job opportunities and support an aging population.

1. Cessnock
2. Kurri Kurri
3. East Maitland
4. Raymond Terrace
5. John Hunter
6. Calvary Mater Waratah
7. Lingard Merewether
8. Warners Bay
9. Charlestown
10. Toronto and Gateshead
11. Belmont
12 Morisset

Figure 1 – Major Health Precincts in Greater Newcastle – Figure 17 from GNMP

4. Is the planning proposal consistent with the local council's Community Strategic plan or other local strategic plan?

Community Strategic Plan 2017-2027 (CSP)

The Lake Macquarie City Community Strategic Plan 2017-2027 has been developed with the people of Lake Macquarie outlining the vision and values of the community and providing clear strategies to achieve this. The Proposal is consistent with the vision for a diverse economy as well as lifestyle and wellbeing. The planning proposal will support a sustainable and diverse economy whilst providing the community with access to adaptable and inclusive community and health services.

Local Strategic Planning Statement (LSPS)

The planning proposal is consistent with and supports the Lake Macquarie City LSPS, its planning priorities and actions for the City. The LSPS identifies that the hospital is part of the North East Growth Area and envisages the Gateshead health precinct to grow and expand (page 42). Specifically, the Proposal supports the principles of the LSPS that aim to respond to and encourage development of new education, health and innovation clusters especially Action 3.10 Prepare a Gateshead Medical Precinct concept plan to facilitate the orderly development of this medical precinct including allied health and other supporting businesses. This Proposal intends to support the expansion of the LMPH encouraging more employment opportunities and densities in the Gateshead Health Precinct. Therefore, it is

considered that this Planning Proposal aligns with the broad directions of the Lake Macquarie City LSPS.

C. Is the planning proposal consistent with State Environmental Planning Policies? (SEPPs)

An assessment of the planning proposal and its consistency with the applicable State Environmental Planning Policies is provided in Table 2 below.

Table 2: Planning proposal consistency with relevant SEPPs

SEPP and Relevance	Implications
State Environmental Planning Policy (Planning Systems) 2021	
Chapter 2 – State and regional development	The proposal is to facilitate the expansion of the hospital. This development will be facilitated through an SSD application. The proposal is consistent with this policy and will assist the assessment of the SSD for the expansion of the hospital.
State Environmental Planning Policy (Industry and Employment) 2021	
Chapter 3 – Advertising and signage	Any signage associated with future commercial premises on the Site would be assessed and approved in accordance with this SEPP.
State Environmental Planning Policy (Transport and Infrastructure) 2021	
Chapter 2 – Infrastructure The aim of the policy is to facilitate the expansion of the hospital.	This SEPP provides for certain proposals, known as Traffic Generating Development, to be referred to Transport for NSW for concurrence. Referral may be required for the expansion of the existing LMPH where the size or capacity satisfies certain thresholds. Schedule 3 lists the types of development that are defined as Traffic Generating Development. Details of the development would be confirmed at the development application stage following the planning proposal. The SEPP enables development for the purposes of Health Services Facilities within the SP2 zone and the proposed expansion of LMPH is permitted with consent on the site.

D. Is the proposal consistent with Ministerial Directions made under S 9.1?

An assessment of the planning proposal and its consistency with the applicable Ministerial Directions is provided in Table 3 below.

Table 3: Planning Proposal consistency with relevant Ministerial S 9.1 Directions

Relevant s9.1 Directions and Objectives	Consistency/Comment
Focus Area 1: Planning Systems	
1.1 Implementation of Regional Plans Give legal affect to the vision, land use strategy, goals, directions and actions contained in Regional Plans	**Consistent.** The proposal is consistent with the Greater Newcastle Metropolitan Plan 2036 and the overarching Hunter Regional Plan 2036 and draft Hunter Regional Plan 2041. The proposed zone will facilitate the expansion of the hospital and the availability of local jobs and health services.
1.3 Approval and Referral Requirements Ensure that LEP provisions encourage the efficient and appropriate assessment of development.	**Consistent.** The proposal is consistent with this direction as it does not seek to include provisions which require concurrence, consultation or referral of development applications to a Minister or public authority and will not identify development as designated development.
1.4 Site Specific Provisions Discourage unnecessarily restrictive site-specific planning controls.	**Consistent**. The proposed change to the height of building map and zone will allow the future expansion of the hospital. It is considered not restrictive. The detail of this development is subject to a separate SSD application.
Focus area 3: Biodiversity and Conservation	
3.1 Conservation Zones To protect and conserve environmentally sensitive areas.	**Consistent.** The proposed amendment does not impact any Conservation zoned land.
3.2 Heritage Conservation To conserve items, areas, objects and places of environmental heritage significance and indigenous heritage significance.	**Consistent:** There are no known, listed or identified items of indigenous heritage significance; or other areas, objects and environmental places of significance applicable to the site.
Focus area 4: Resilience and Hazards	
4.1 Flooding (a) Ensure that development of flood prone land is consistent with the NSW Government's Flood Prone Land Policy and the principles of the Floodplain Development Manual 2005, and	**Consistent.** The site is not identified as flood prone land.

Relevant s9.1 Directions and Objectives	Consistency/Comment
(b) Ensure that the provisions of a LEP on flood prone land are commensurate with flood behavior and include consideration of the potential flood impacts on and off the subject land.	
4.2 Coastal Management To protect and manage coastal areas of NSW.	**Consistent.** The Land is not mapped within the Coastal Management SEPP 2018 as a Coastal area or Coastal Environmental Area.
4.3 Planning for Bushfire Protection (a) Protect life, property and the environment from bush fire hazards, by discouraging the establishment of incompatible land uses in bush fire prone areas, and (b) Encourage sound management of bush fire prone areas.	This site is not identified as bushfire prone land.
4.4 Remediation of Contaminated Land The objective of this direction is to reduce the risk of harm to human health and the environment by ensuring that contamination and remediation are considered by planning proposal authorities.	**Consistent.** The site is not identified as contaminated land. The existing uses of the site are for car parking and residential accommodation and the subject sites have not been used for any activity listed as potentially contaminating land use or activity. The proposal will facilitate the expansion of the existing hospital located to the south of the subject sites.
4.5 Acid Sulfate Soils The objective of this direction is to avoid significant adverse environmental impacts from the use of land that has a probability of containing acid sulfate soils.	This site is not identified as containing acid sulfate soils.
4.6 Mine Subsidence and Unstable Land The objective of this direction is to prevent damage to life, property and the environment on land identified as unstable or potentially subject to mine subsidence.	The subject site is located within a mine subsidence district. Preliminary studies have been undertaken which did not identify any known concerns which would prohibit development. Subsidence Advisory NSW will be included in the agency consultation of this proposal prior to undertaking community consultation. Further detailed studies will also be undertaken as part of the State Significant Development Application.

Relevant s9.1 Directions and Objectives	Consistency/Comment
Focus area 5: Transport and Infrastructure	
5.1 Integrating Land Use and Transport Ensure that urban structures, building forms, land use locations, development designs, subdivision and street layouts achieve the following planning objectives: (a) improving access to housing, jobs and services by walking, cycling and public transport, and (b) increasing the choice of available transport and reducing dependence on cars, and (c) reducing travel demand including the number of trips generated by development and the distances travelled, especially by car, and (d) supporting the efficient and viable operation of public transport services, and (e) providing for the efficient movement of freight.	**Consistent.** The proposal seeks to increase the maximum permitted building height, to facilitate the expansion of the existing hospital. The site is highly accessible by an extensive local and regional road network including Pacific Highway. Bus stops along Pacific Highway provide services between Newcastle and Belmont. The provision of additional health services on the site will make use of established road infrastructure and public transport bus routes and improve viability of the public transport system through increased demand.
Focus area 6: Housing	
6.1 Residential Zones (a) Encourage a variety and choice of housing types to provide for existing and future housing needs, (b) Make efficient use of existing infrastructure and services and ensure that new housing has appropriate access to infrastructure and services, and (c) Minimise the impact of residential development on the environment and resource lands.	**Inconsistent**. The site is currently zoned R3 Medium Density Residential, however, is used for the purposes of an approved health services facility. The conditions of the Gateway Determination require the zone to be changed to SP2 Infrastructure consistent with the existing and ongoing use of the site.The proposal is consistent with the Hunter Regional Plan 2036, the Greater Newcastle Metro Plan 2036 and the Lake Macquarie Local Strategic Planning Statement and is consistent with this Direction. Even though this proposal is inconsistent, it is justified due to the existing use, intended strategic direction and public benefit provided by the hospital

E. Environmental, Social and Economic Impact

1. Is there any likelihood that critical habitat or threatened species, populations or ecological communities or their habitats, will be adversely affected as a result of the proposal?

The site is extensively developed with a mix of hospital uses, and residential and car parking associated with the adjoining hospital. There are no known critical habitat or threatened species, populations, ecological communities or their habitats that will be adversely affected due to the proposal.

2. Are there any other likely environmental effects as a result of the Planning Proposal and how are they proposed to be managed?

The potential environmental impacts relate to:

- The visual impact to the surrounding area and overshadowing.
- Traffic and parking
- Mine subsidence

Visual Impact

A Visual Impact Assessment (Attachment 1) and shadow analysis (Attachment 2) has been undertaken by the proponent to investigate the potential visual and solar impacts to neighbouring sites and the surrounding area.

Given the location of the proposed additional building height, overshadowing will mostly impact the existing hospital site.

While there will be some visual and overshadowing impact from the future development, these impacts are typical of an area undergoing transition and are considered acceptable when balanced against the strategic direction for the precinct and the social and economic benefits.

Traffic

A traffic and parking assessment (Attachment 3) has been undertaken by the proponent to support the SSD proposal. The report concludes that the existing road network and intersections are adequate to cope with the proposed hospital expansion. While the planning proposal seeks to amend planning controls, rather than proposing a specific development outcome, the report demonstrates that existing infrastructure can support development under the proposed changes. As such, the proposed change to the maximum Height of Building (HOB) will not result in demand for additional road infrastructure upgrades.

Mine Subsidence

A desktop Mine Subsidence Risk study (Attachment 4) has been undertaken which did not identify any known concerns which would affect the proposed changes to the maximum permitted height of buildings.

3. Has the Planning Proposal adequately addressed any social and economic effects?

Yes. A high-level assessment of the social and economic benefits has been undertaken to support the SSD proposal (Attachment 5). The proposal to increase the maximum permitted building height will facilitate expansion of the hospital providing additional health services for the community in an easily accessible location. The planning proposal will enable an expansion of the hospital which has economic benefits to the local community with potential growth on approximately 189 new ongoing jobs (e.g. nurses, administration staff, cleaners, food preparation) and staff medical specialist roles (e.g. surgeons, anaesthetist and other specialists).

Expansion of the hospital facilitated by this planning proposal is also likely to create an additional 800 - 1,000 direct and in-direct jobs during the construction period.

Overall, the proposal will facilitate the expansion of the hospital which will result in positive economic and social outcomes for Lake Macquarie and the region.

F. State and Commonwealth Interests

4. Is there adequate public infrastructure for the Planning Proposal?

The Site is serviced by existing infrastructure that is capable of servicing expansion of LMPH under the proposed changes to the LEP. In particular the Site is accessible by the established local and regional road network, including Pacific Highway which is also a key public transport bus route.

5. What are the views of State and Commonwealth public authorities consulted in accordance with the gateway determination?

Consultation with State and Commonwealth public authorities will occur in accordance with the Gateway determination. Consultation will occur with the following authorities:

- Health NSW
- Subsidence Advisory NSW, and
- Transport for NSW

PART 4 – COMMUNITY CONSULTATION

The planning proposal will be formally exhibited in accordance with the Lake Macquarie Community Participation Plan and the Gateway determination. It is recommended that the planning proposal be exhibited for at least 28 days.

PART 5 – CONCLUSION

This planning proposal seeks to rezone the site to SP2 Infrastructure (Health Services Facilities) and also seeks to increase heights across Part Lot 90 DP 1233497, Lot 6,7 and 8 DP 24268 from 10m to 37m to facilitate an SSD proposal for the expansion of the LMPH.

This proposal is acceptable based on the strategic direction for the precinct and the social and economic benefits it provides.

PART 6 – MAPPING

1. Locality Map

2. Subject Land Map

Subject Land

Land Parcel

Air Photo

2022 Aerial Photography

Nearmap Imagery 2022

0 50

Metres

N

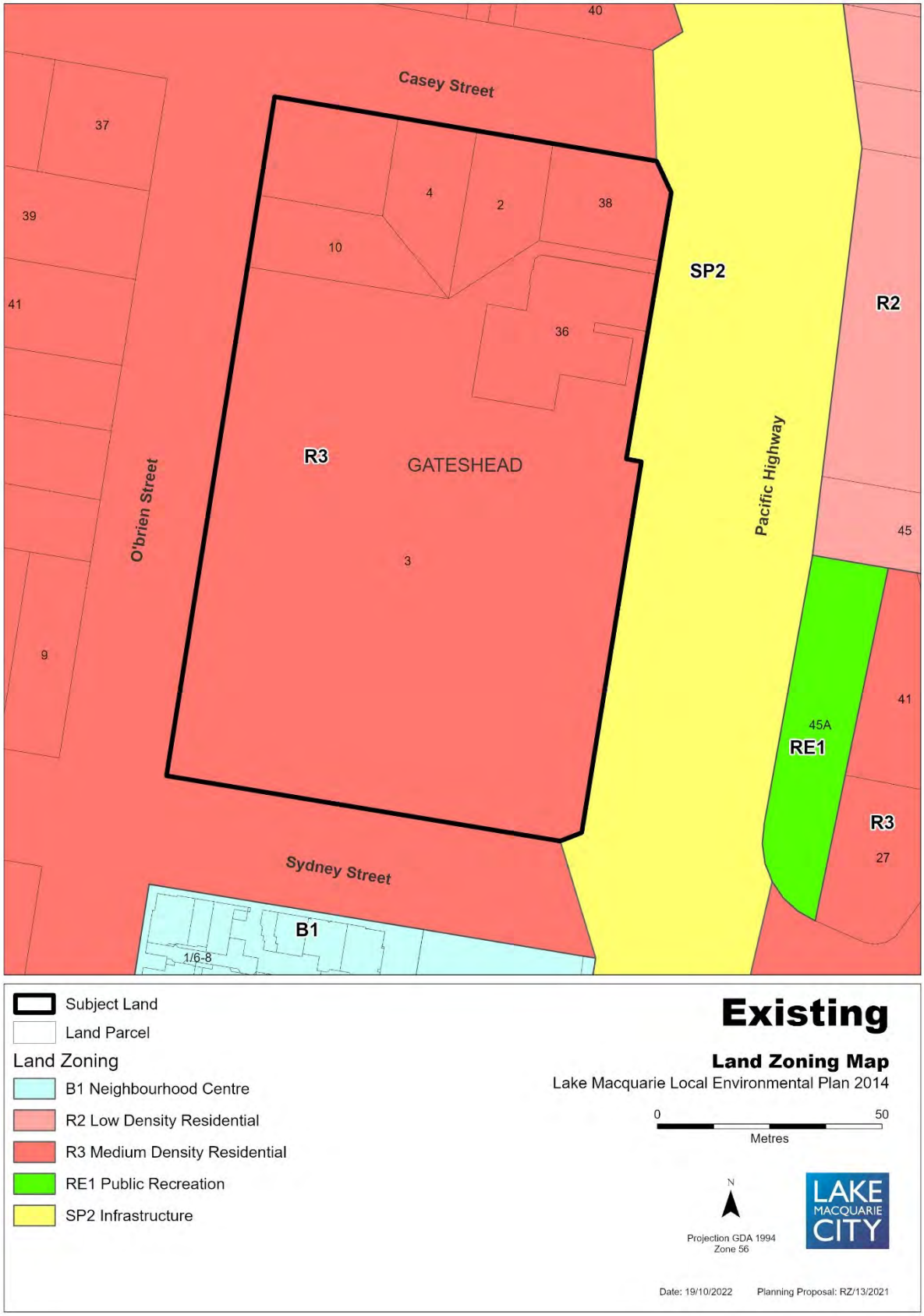
Projection GDA 1994
Zone 56

LAKE MACQUARIE CITY

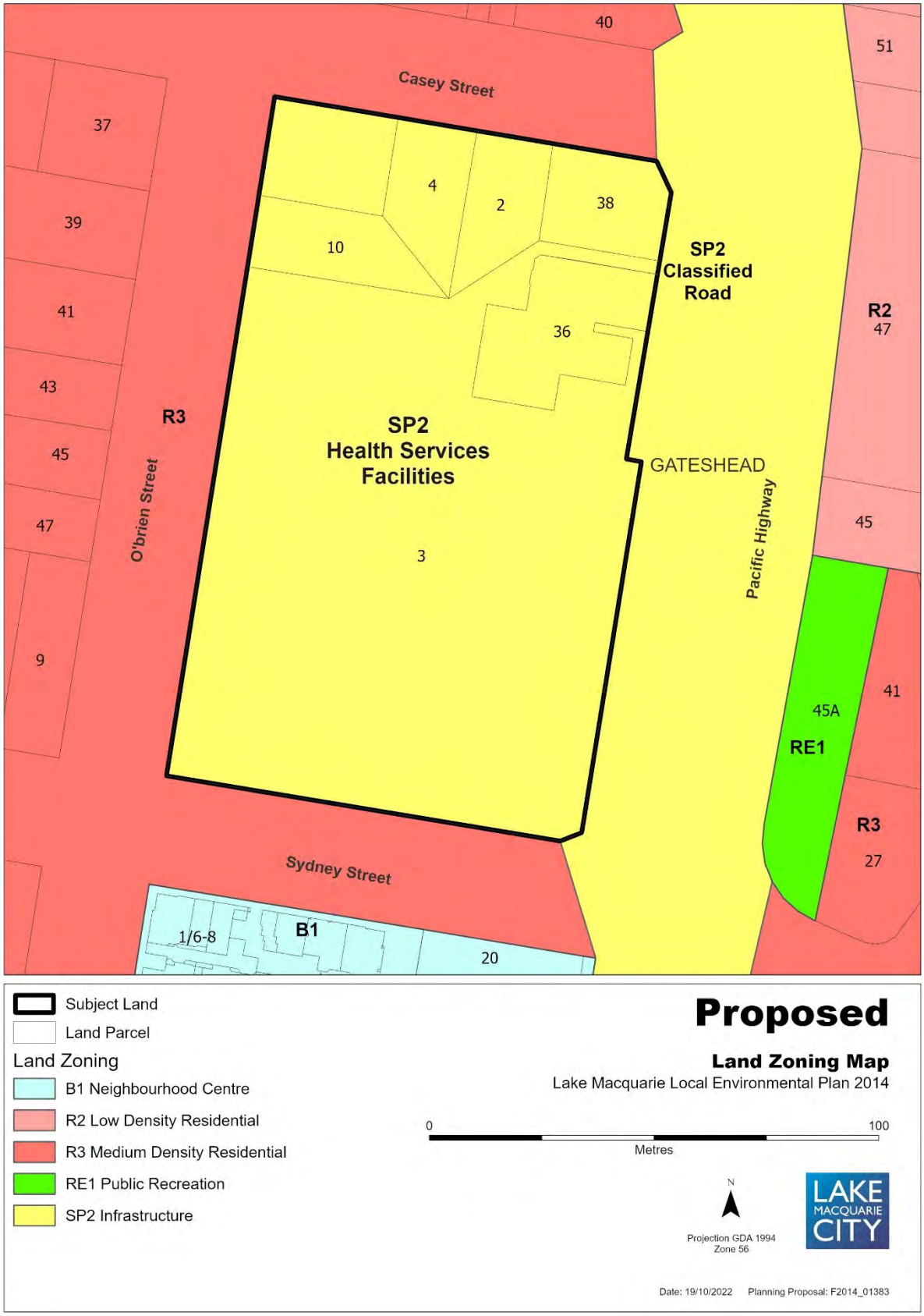
Date: 19/10/2022

Planning Proposal: RZ/13/2021

3. Current Land Zoning



4. Proposed Land Zoning



5. Existing Height of Building Map

6. Proposed Height of Building Map

PART 7 – PROJECT TIMELINE

Stage	Timeframe (working days) and/or date
Gateway determination	25 days Received 27/09/22
Pre-exhibition (including agency consultation)	50 days
Public exhibition (commencement and completion dates)	28 days
Consideration of submissions	20 days
Post exhibition review and additional studies (if required)	55 days
Submission to Department to finalise LEP	10 days
Gazettal of LEP Amendment	45 days

ATTACHMENTS

Attachment 1: Visual Impact Assessment

Attachment 2: Shadow analysis

Attachment 3: Traffic and parking assessment

Attachment 4: Mine Subsidence Risk study

Attachment 5: High-level social and economic benefits assessment

Attachment 1: Visual Impact Assessment

LAKE MACQUARIE PRIVATE HOSPITAL

Visual Impact Assessment Report

November 2021

HATCH | RobertsDay

Title:	Lake Macquarie Private Hospital Visual Impact Assessment Report
Prepared for:	Ramsay Health Care
Date:	29.11.2021
Status:	Final
Prepared by:	Hatch RobertsDay
Approved by:	Hatch RobertsDay

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INTRODUCTION & METHODOLOGY

INTRODUCTION

PURPOSE OF THIS REPORT

Hatch RobertsDay has been commissioned by Ramsay health Care to prepare this visual impact assessment (VIA) report in support of the planning proposal to amend Lake Macquarie Local Environmental Plan 2014 to include additional building height on the proposed site described as 3 Sydney Street, 2 & 4 Casey Street, 36 & 38 Pacific Highway, Gateshead.

The VIA investigates on the possible visual impacts that proposed building may have on the surrounding and adjacent publicly accessible areas, and provides detailed assessment of the sensitivity and magnitude of the changes from different vantage points in comparison to the existing.

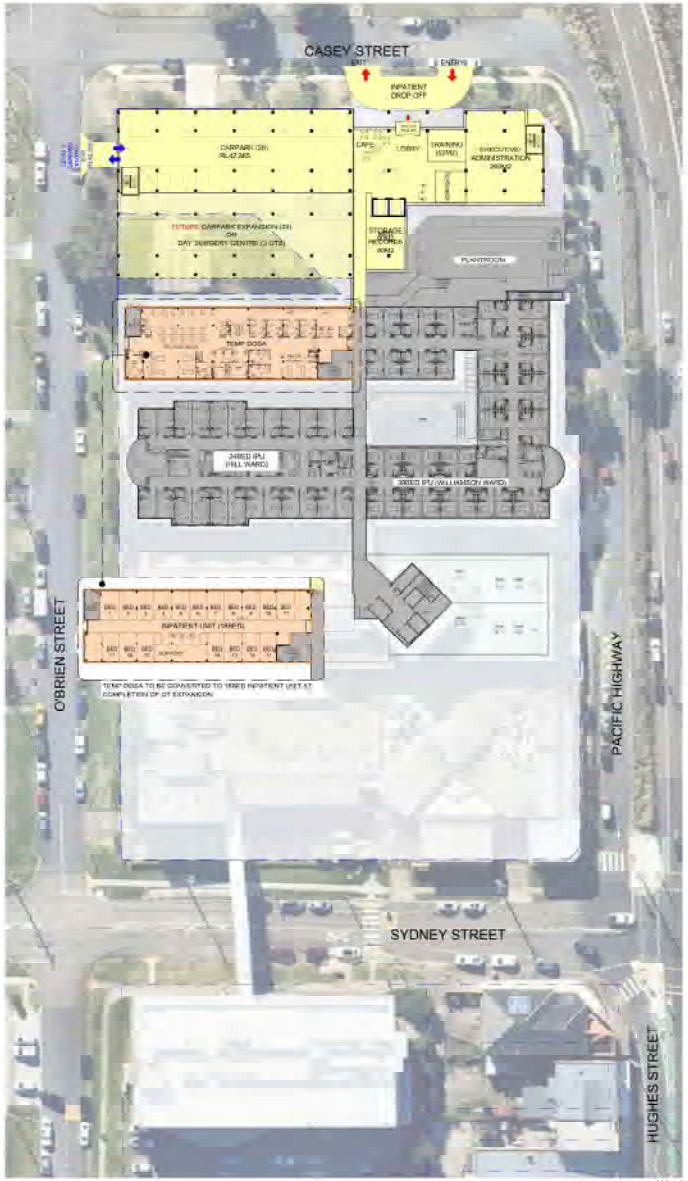
PROPOSAL OVERVIEW

The proposed site is regular in shape and has a total area of approximately 14,041m2. The Site presently contains the existing LMPH which is operated by Ramsay Health Care. LMPH adjoins low density residential development to the north, east and west of the Site as well as shop top housing and specialised medical consulting suites to the south.

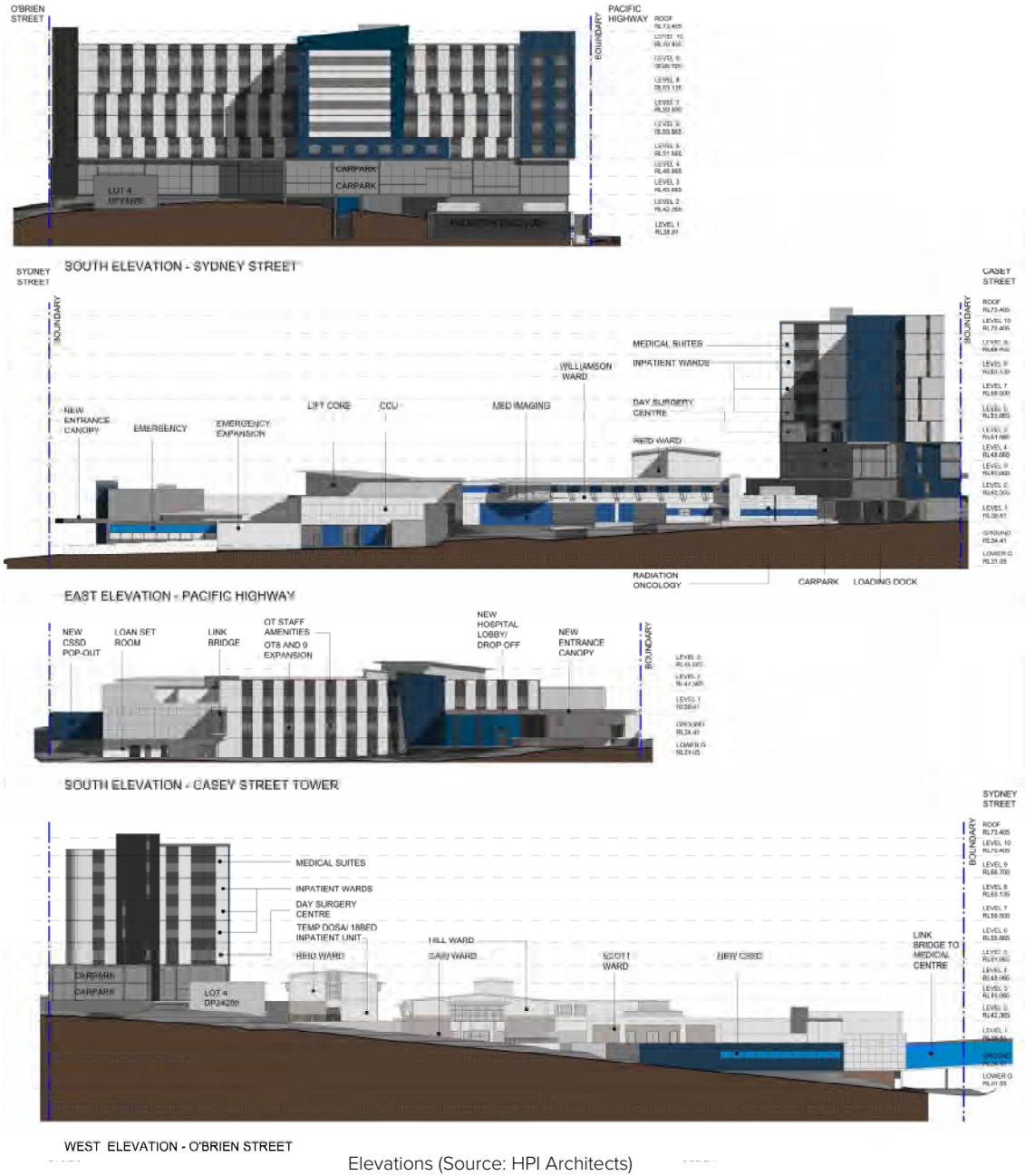
The proposed amendment to LMLEP intends to facilitate the future redevelopment of the Site for an expansion to the existing Lake Macquarie Private Hospital (LMPH) comprising additional inpatient beds, inpatient theatres, day surgery theatres, consulting suites, oncology chairs and a pharmacy.

The concept design has been informed by detailed site analysis and consideration of the surrounding context in order to provide an optimal development outcome that capitalises on the strategic potential of the land, uplifts the surrounding public domain and provides a high level of amenity.

Proposal (Source: HPI Architects)



Proposed Plan- Level 2 (Source: HPI Architects)



Elevations (Source: HPI Architects)

ASSESSMENT METHODOLOGY

CONTEXTUAL ANALYSIS

A number of locations were inspected to evaluate the scenic qualities and visual prominence of Lake Macquarie Private Hospital site to identify potential vantage viewpoints.

The key vantage points for the purpose of view analysis have been determined through identification of physical absorption capacity and visibility of the site as well as focus on the areas that are more likely to be affected by the proposal.

DETAILED ASSESSMENT METHODOLOGY

A qualitative assessment of the visual impacts and changes to landscape has been undertaken based on the following guidelines:

- RMS Environmental Impact Assessment Guidance Note: Guidelines for landscape character and visual impact assessment (2013)
- The Guidance for Landscape and Visual Impact Assessment (GLVIA), Third Edition (2013) prepared by the Landscape Institute and Institute of Environmental Management and Assessment; and Visual Representation of Development Proposals, Technical Guidance Note 02 (2017)
- The guidelines describe the assessment as a way to define the changes to the physical landscape and day to day visual effects of a project on people's views. The determination of the impacts is based on the following criteria:

Sensitivity is defined as "The sensitivity of a landscape character zone or view and its capacity to absorb change'' (EIA No4 Guidelines, 2013, RMS).

The visual sensitivity of a view is defined by the nature of the view and its duration. A higher visual sensitivity is given to views which would be seen for longer, by a higher numbers of potential viewers and where visual amenity is important to viewers (value of the view). The context of the view and the distance from the views are also used to determine the visual sensitivity level of the landscape.

Magnitude is defined as "The measurement of the scale, form and character of a development proposal when compared to the existing condition" (EIA No4 Guidelines, 2013, RMS).

It reflects the degree of visual contrast between the proposal and the existing landscape setting. In the case of visual assessment this also relates to how far the proposal is from the viewer.

For the purposes of this assessment the criteria listed in the following tables have been specifically defined for sensitivity and magnitude of change for both the assessment of landscape character and the visual impact to viewpoints. The combined assessment of sensitivity and magnitude provides an overall rating of the visual impact, as shown in the Impact Level table.

VISUALISATION OF THE DEVELOPMENT AND PROPOSED SCENARIOS

Finalisation of the design and supporting technical documentation enabled the selected vantage points to be realistically documented.

The accuracy of the existing and proposed images is based on the following process and information:

- Creating a 3D model of the terrain/ surrounding context based on the site survey information as well as the contour and cadastre information downloaded from SixMaps and Nearmap aerial image (georeferenced to GDA94/MGA56 geographical)
- Digitally linking the 3D massing model of the proposed built form provided by the project architect in the context 3D model
- Positioning camera in 3D software based on the viewpoints coordinate data recorded during site visit
- Importing actual photographs in 3D software to prepare proposed scenarios from vantage points based on existing coordination and identified reference points
- Photo matching and rendering to reflect landscaping, intended materials and lighting

Photomontages are intended to be printed at A3 and to be viewed at a distance of 300mm. That is the distance between the eye and the image and will enable the viewer to experience an approximation of what the proposed view would look like in the real world.

SENSITIVITY	MAGNITUDE					
	Very High	High	Moderate	Low	Very Low	Negligible
Very High	Substantial	Very High	High	High/Moderate	Moderate	None
High	Very High	High	High/ Moderate	Moderate	Moderate/Low	None
Moderate	High	High/Moderate	Moderate	Moderate/Low	Low	None
Low	High / Moderate	Moderate	Moderate/ Low	Low	Low/ Negligible	None
Very Low	Moderate	Moderate/ Low	Low	Low/ Negligible	Negligible	None

Table 1. Impact Level (Matrix of Sensitivity & Magnitude)

Sensitivity	Criteria
Very High	Nationally designated landscape with high conservation or heritage value and absence of landscape detractors. Protected views identified in planning policy designation, State designated publicly accessible landscape or heritage assets.
High	Locally designated valued landscape with many distinctive characteristics and very few landscape detractors. Public views with a high visual prominence and a high number of users in close proximity, private views in close proximity, passive recreational receptors where the landscape has a high visual value. Travellers on road, rail or other transport routes where travel involves recognised scenic routes.
Moderate	Landscape with some distinctive characteristics and few landscape detractors. Public views with a moderate visual value and a moderate number of users in close proximity, active recreational receptors where the landscape has little visual value.
Low	Landscape with few distinctive characteristics and presence of landscape detractors. Public views with a little visual value and a low number of users, where receptors are mostly road users in motor vehicles or passers-by, people at their work place or views from commercial buildings where the landscape has some visual value.
Very Low	Landscape with no distinctive characteristics and presence of many landscape detractors. Public views with none visual value and a limited number of users not in close proximity, people at their work place or views from commercial buildings where the landscape has little or no visual value.

Table 2.Sensitivity Ranking Criteria

Magnitude	Criteria
Very High	Total loss or major change to key characteristics of the existing landscape. The proposal forms a significant and immediately apparent part of the scene. It significantly contrasts in scale and character (either existing or planned). It is severely detrimental to the quality of the scene.
High	Notable loss or change to key characteristics of the existing landscape. The proposal forms a dominant feature of the scene to which other elements become subordinate. It contrasts in scale and character (either existing or planned). It is reducing the quality of the scene.
Moderate	Partial loss or change to key characteristics of the existing landscape. The proposal forms a visible new element within the overall scene, yet one that is relatively compatible with the surrounding character (either existing or planned) and view's composition. It is possibly reducing the quality of the scene.
Low	Minor loss or change to key characteristics of the existing landscape. The proposal constitutes only a minor component of the wider view, that is compatible with the surrounding character (either existing or planned) and view's composition.
Very Low	Limited or no loss or change to key characteristics of the existing landscape. The proposal constitutes only a minor component of the wider view, which might be missed by the casual observer or receptor. Awareness of the proposal would not have an effect on the overall quality of the scene.
Negligible	No change in the landscape or view.

Table 3. Magnitude Ranking Criteria

02

SITE ANALYSIS

LOCAL CONTEXT

LOCAL CONTEXT

The proposed site is located within the suburb of Gateshead which forms part of the Lake Macquarie local government area (LGA). It is situated approximately 15km south west of Newcastle Central Business District (CBD). The Site affords road linkages to Pacific Highway and Newcastle Inner City Bypass. The Site is also highly accessible via public transport including bus services on Pacific Highway and Oxford Street.

The surrounding context exhibits a number of residential and recreation uses, mainly characterised by low density residential housing shop top housing and specialised medical consulting suites known as Lake Macquarie Specialist Centre. It is noted that the Site comprises an existing health services facility known as the LMPH and has been integrated harmoniously within its context.

Sportfields


Low Density Residential


Existing Lake Macquarie Private Hospital


Commercial/ Retail


St Mary's Catholic College

Local School


PHOENIX CHARLESTOWN BASEBALL CLUB
LOW DENSITY HEALTHY RESIDENTIAL
OXFORD ST
CASEY ST
O'BRIEN ST
GOUNDRY ST
LOW DENSITY HEALTHY RESIDENTIAL
SITE
WILLOW ROAD
LOW DENSITY HEALTHY RESIDENTIAL
ST MARY'S CATHOLIC SCHOOL
WIRIPAANG PUBLIC SCHOOL
ALLEN DAVIS FIELD
HUNTER SPORTS PUBLIC SCHOOL
NEWCASTLE INNER CITY BYPASS
JOHNSONS CREEK
PACIFIC HIGHWAY
DICKS CREEK
INDUSTRIAL AREAS

LAKE MACQUARIE SCENIC MANAGEMENT GUIDELINES 2013

Lake Macquarie Scenic Management Guidelines document guides decisions regarding scenic and landscape values at the planning proposal stage. The visual impact analysis considers the following guidelines to ensure the scenic and landscape values are protected surrounding the site and provide responses to the relevant guidelines.

LANDSCAPE TYPE

The Scenic Management Guidelines introduces four landscape types for Lake Macquarie LGA. The proposed site is located in the **Hinterland** landscape type of Lake Macquarie LGA where views of the lake or coast are generally not available.

LOCATIONS SENSITIVE TO VISUAL CHANGE

Significant natural landscape features, natural landscape types with inherent natural values and landscapes with heritage or cultural values are identified as visually sensitive landscapes in the Lake Macquarie Scenic Management Guidelines. The proposed site is within an area which is not identified as part of lake or coastal landscape and does not have any conservation values, indigenous landscapes and other heritage significance. Therefore, the proposed site is not considered to be a visually sensitive landscape. However, the site is located along Pacific Highway with potentially a high visibility from the main road and a high visual sensitivity to change from this location.

SCENIC MANAGEMENT ZONES

The proposed site is within **Gateshead** landscape setting and **12 (hinterland, moderate settlement)** Scenic Management Zone.

GATESHEAD

A moderate level of development exists around the proposal, with residential areas consisting of mostly detached housing. Mix of uses present, including a dominance of health facilities, commercial and industrial.

The Lake Macquarie Scenic Management Guidelines requires future developments to have regards to protecting native vegetation and vegetation in and around residential areas and commercial centres. Any views of development from main roads should be softened by screening vegetation and appropriate design measures such as set-backs.

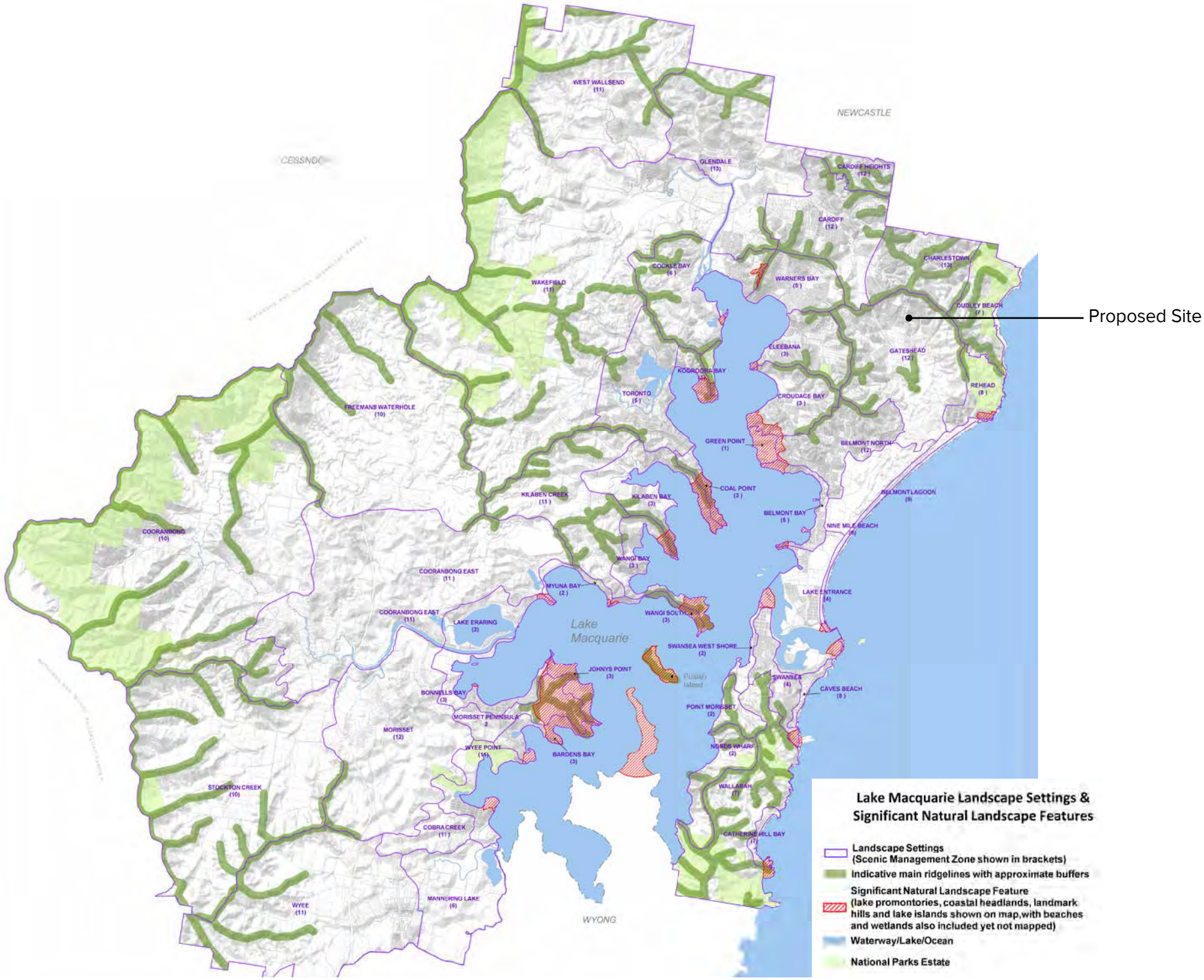
Any development within these areas is to satify a number of guidelines which are covered on page 32 of this report.

COMMERCIAL DEVELOPMENT AND TOWN CENTRES

The Guidelines recommends following design measures to improve visual outcomes in the category of Commercial Development and Town Centres:

- Ensure all opportunities taken to increase street trees and other streetscape improvements;
- Where suitable reduce the width of street pavements through measures such as widening footpaths and breaking-up car parking lanes with landscaping, this can encourage outdoor café dining which will activate the street;
- Identify existing view corridors to surrounding natural features such as the lake, coastline or western ranges and ensure these are preserved and enhanced where possible;
- Any proposed commercial/industrial development, particularly along main roads and town centres, should be treated with non-garish (i.e. overly bright) colours, limit overwhelming signage and increase amenity through appropriate landscaping;
- Identify opportunities to introducing view corridors when new developments are proposed; and
- Maintain a human-like scale to provide suitable amenity to centres through the use of continuous low awnings.

Refer to page 32 for our response to the guidelines where applicable.


Proposed Site
NEWCASTLE
CESSNOCK
WYONG
Lake Macquarie
WEST WALLSEND (11)
GLENDALE (13)
CARDIFF HEIGHTS (12)
CARDIFF (12)
CHARLESTOWN (13)
COCKLE BAY (6)
WARNERS BAY (5)
WAKEFIELD (11)
DUDLEY BEACH (7)
ELEEBANA (3)
GATESHEAD (12)
KOORORA BAY (4)
TORONTO (5)
CROUDACE BAY (3)
REHEAD (8)
FREEMANS WATERHOLE (10)
GREEN POINT (1)
BELMONT NORTH (12)
COAL POINT (3)
KILABEN CREEK (11)
KILABEN BAY (3)
BELMONT LAGOON (9)
BELMONT BAY (5)
NINE MILE BEACH (4)
COORANBONG (10)
WANGI BAY (3)
COORANBONG EAST (11)
MYUNA BAY (2)
LAKE ENTRANCE (4)
COORANBONG EAST (11)
LAKE ERARING (2)
WANGI SOUTH (3)
SWANSEA WEST SHORE (2)
JOHNYS POINT (3)
Pulpit Island
SWANSEA (4)
CAVES BEACH (8)
BONNELLS BAY (3)
POINT MORISSET (2)
MORISSET PENINSULA 2
MORISSET (12)
WYEE POINT (11)
BARDENS BAY (3)
NORDS WHARF (2)
STOCKTON CREEK (10)
WALLARAH (1)
COBRA CREEK (11)
CATHERINE HILL BAY (7)
MANNERING LAKE (6)
WYEE (11)
Lake Macquarie Landscape Settings & Significant Natural Landscape Features
Landscape Settings (Scenic Management Zone shown in brackets)
indicative main ridgelines with approximate buffers
Significant Natural Landscape Feature (lake promontories, coastal headlands, landmark hills and lake islands shown on map,with beaches and wetlands also included yet not mapped)
Waterway/Lake/Ocean
National Parks Estate

03

VISUAL ANALYSIS

VANTAGE POINTS

THE VISUAL CATCHMENT

Visibility

The visibility of a site is influenced by a number of factors. These include physical factors such as topography, the pattern and alignment of streets, character of open space, type of vegetation, and the ability of the existing and future elements of the landscape setting to physically hide, screen or disguise the proposed development. It also includes other factors such as distance, direction and angle of view as well as the siting and scale of the proposal.

Due to the existing highway and location of the site as a corner lot, land to the immediate east and north is considered to have the greatest potential for visual exposure of the proposal. In addition, due to the low density character of the precinct and relatively larger number of local residents which may be exposed to the proposal, Casey Street was considered to also be of particular interest as part of the VIA.

Visual Receptors

People within the visual catchment who will be affected by the changes in views and visual amenity are referred to as visual receptors. there are a number of different types of visual receptor for the proposal:

- Travellers on Pacific Highway from north and south- high number of receptors
- Member and visitors of the educational facilities from east- medium number of receptors
- Residents at home and visitors from north and west- low number of receptors
- People engaged in outdoor recreation from south west- medium number of receptors

SELECTION OF VANTAGE POINTS

The key vantage points for the purpose of visual impact assessment have been determined through identification of visual catchment and visibility of the site as well as focus on the areas that are more likely to be affected by the proposal. This includes nearby public receivers and significant vantage points in the broader public domain.

The key vantage points analysed include:

- Public open space along Johnsons Creek
- Pacific Highway
- Surrounding streets including Casey Street, O'Brien Street and Oxford Street
- St Paul's Primary School

> *"Landscape and Visual Assessment (LVA) is an essential tool of reconciling development with landscape and scenic values and promoting better outcomes for our communities."*
>
> **Guidance Note for Landscape and Visual Assessment, 2018**


View 1
View 2
View 3
View 4
View 5
View 6
NTS
N

VISUAL IMPACT ASSESSMENT

Viewpoint 1- from public open space along Johnsons Creek

Google Earth Coordinate: 32°58'55.4"S 151°41'15.7"E

SENSITIVITY	MAGNITUDE					
	Very High	High	Moderate	Low	Very Low	Negligible
Very High	Substantial	Very High	High	High/Moderate	Moderate	None
High	Very High	High	High/ Moderate	Moderate	Moderate/Low	None
Moderate	High	High/Moderate	Moderate	Moderate/Low	Low	None
Low	High / Moderate	Moderate	Moderate/ Low	Low	Low/ Negligible	None
Very Low	Moderate	Moderate/ Low	Low	Low/ Negligible	Negligible	None

Impact Level - Existing context (Matrix of Sensitivity & Magnitude)

SENSITIVITY	MAGNITUDE					
	Very High	High	Moderate	Low	Very Low	Negligible
Very High	Substantial	Very High	High	High/Moderate	Moderate	None
High	Very High	High	High/ Moderate	Moderate	Moderate/Low	None
Moderate	High	High/Moderate	Moderate	Moderate/Low	Low	None
Low	High / Moderate	Moderate	Moderate/ Low	Low	Low/ Negligible	None
Very Low	Moderate	Moderate/ Low	Low	Low/ Negligible	Negligible	None

Impact Level - Potential Future context (Matrix of Sensitivity & Magnitude)

Viewpoint 1

The aim of assessing the view is:

- To understand the visual impact of the proposal viewed from the public open space where people are engaged in outdoor recreation
- To assess to what degree the existing vegetation and structures screen or disguise the future development
- To test the extent to which the change of built elements may alter the existing character of the view

Sensitivity

The sensitivity of view from the public open space along Johnsons Creek factors the following:

- The public open space is used for passive and active recreation including walking, exercising and relaxing. Users engaged in passive recreation are more sensitive to visual change of their surroundings
- High numbers of receptors

However, the visual value is considered to be low due to the existing urban character and landscape detractors. As a result, the sensitivity of the view is considered MODERATE.

Magnitude

The magnitude of the proposal in this view is considered MODERATE in existing context and NEGLIGIBLE in potential future context, due to:

- Proposal forms a relatively dominant feature of the scene and contrasts in scale and massing with the existing low density character. However, the extent of the area over which the changes are visible is low. In other words, the change to the view's composition is relatively low
- Proposal is in the distance
- Proposal will not be visible from this location in the potential future context

The visual impact for this view is assessed as MODERATE in existing context and NONE in potential future context.

Existing

Proposed

Potential Future

Viewpoint 2- from Pacific Highway

Google Earth Coordinate: 32°59'02.2"S 151°41'30.5"E

SENSITIVITY	MAGNITUDE					
	Very High	High	Moderate	Low	Very Low	Negligible
Very High	Substantial	Very High	High	High/Moderate	Moderate	None
High	Very High	High	High/ Moderate	Moderate	Moderate/Low	None
Moderate	High	High/Moderate	Moderate	Moderate/ Low	Low	None
Low	High / Moderate	Moderate	Moderate/ Low	Low	Low/ Negligible	None
Very Low	Moderate	Moderate/ Low	Low	Low/ Negligible	Negligible	None

Impact Level (Matrix of Sensitivity & Magnitude)

Viewpoint 2

The aim of assessing the view is:

- To understand the visual impact of proposed built forms viewed from the main highway
- To assess to what degree the existing structures and buildings screen or disguise the future development
- To test the extent to which the change of built elements may alter the existing character of the view

Sensitivity

The view from Pacific Highway considered to have MODERATE sensitivity due to:

- Although the number of receptors is considered to be high, they have short term views to the proposal
- Receptors are mostly travellers on road that are less likely to notice, appreciate or be concentrating on views
- Public view has limited visual value due to the existing urban character with limited natural elements

Magnitude

The magnitude of the proposal in this view is considered LOW, due to:

- Proposal is in the distance
- Proposal is partly screened by the existing structures and vegetation
- The proportion of the view occupied by the proposed development is low

The visual impact for this view is assessed as MODERATE/ LOW, which is the combination of the sensitivity and magnitude of impact.

Existing

Proposed

Viewpoint 3- from Casey Street

Google Earth Coordinate: 32°58'47.9"S 151°41'24.6"E

MAGNITUDE

SENSITIVITY	Very High	High	Moderate	Low	Very Low	Negligible
Very High	Substantial	Very High	High	High/Moderate	Moderate	None
High	Very High	High	High/ Moderate	Moderate	Moderate/Low	None
Moderate	High	High/Moderate	Moderate	Moderate/Low	Low	None
Low	High / Moderate	Moderate	Moderate/ Low	Low	Low/ Negligible	None
Very Low	Moderate	Moderate/ Low	Low	Low/ Negligible	Negligible	None

Impact Level - Existing context (Matrix of Sensitivity & Magnitude)

MAGNITUDE

SENSITIVITY	Very High	High	Moderate	Low	Very Low	Negligible
Very High	Substantial	Very High	High	High/Moderate	Moderate	None
High	Very High	High	High/ Moderate	Moderate	Moderate/Low	None
Moderate	High	High/Moderate	Moderate	Moderate/Low	Low	None
Low	High / Moderate	Moderate	Moderate/ Low	Low	Low/ Negligible	None
Very Low	Moderate	Moderate/ Low	Low	Low/ Negligible	Negligible	None

Impact Level - Potential Future context (Matrix of Sensitivity & Magnitude)

Viewpoint 3

The aim of assessing the view is:

- To understand the visual impact of proposed built forms viewed from the surrounding residential street
- To assess to what degree the existing vegetation screen or disguise the future development
- To test the extent to which the change of built elements may alter the existing character of the view

Sensitivity

The view from Casey Street is considered to have MODERATE sensitivity due to:

- Public view is from a low density residential street
- Although public view has limited visual value, visual amenity is important to receptors which are mainly the local residents
- Moderate numbers of receptors in close proximity

Magnitude

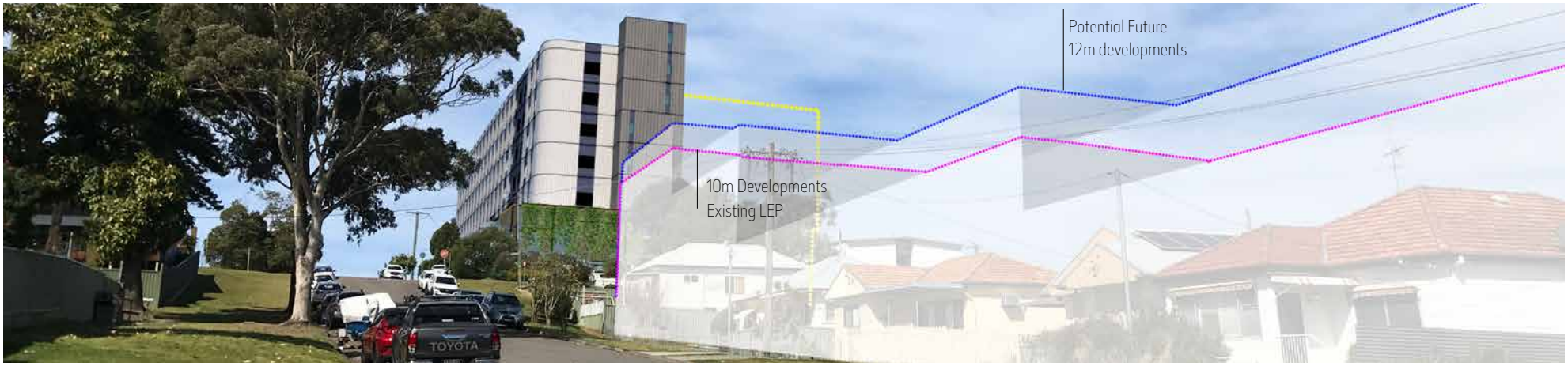
The magnitude of the proposal in this view is considered HIGH in existing context and MODERATE in potential future context, due to:

- Proposal forms a relatively dominant feature of the scene and contrasts in scale and massing with the existing low density character. However, the extent of the area over which the changes are visible is low
- Proposal is partly screened by existing vegetation, including large trees
- There will be less visual contrast between the proposal and the surrounding setting in the potential future context which reduces the magnitude

The visual impact for this view is assessed as HIGH/ MODERATE in existing context and MODERATE in potential future context.

Existing

Proposed



Potential Future

Viewpoint 4- from O'Brien Street

Google Earth Coordinate: 32°58'45.9"S 151°41'29.3"E

SENSITIVITY	MAGNITUDE					
	Very High	High	Moderate	Low	Very Low	Negligible
Very High	Substantial	Very High	High	High/Moderate	Moderate	None
High	Very High	High	High/ Moderate	Moderate	Moderate/Low	None
Moderate	High	High/Moderate	Moderate	Moderate/Low	Low	None
Low	High / Moderate	Moderate	Moderate/ Low	Low	Low/ Negligible	None
Very Low	Moderate	Moderate/ Low	Low	Low/ Negligible	Negligible	None

Impact Level - Existing context (Matrix of Sensitivity & Magnitude)

SENSITIVITY	MAGNITUDE					
	Very High	High	Moderate	Low	Very Low	Negligible
Very High	Substantial	Very High	High	High/Moderate	Moderate	None
High	Very High	High	High/ Moderate	Moderate	Moderate/Low	None
Moderate	High	High/Moderate	Moderate	Moderate/Low	Low	None
Low	High / Moderate	Moderate	Moderate/ Low	Low	Low/ Negligible	None
Very Low	Moderate	Moderate/ Low	Low	Low/ Negligible	Negligible	None

Impact Level - Potential Future context (Matrix of Sensitivity & Magnitude)

Viewpoint 4

The aim of assessing the view is:

- To understand the visual impact of proposed built forms viewed from the surrounding residential street
- To assess to what degree the existing vegetation screen or disguise the future development
- To test the extent to which the change of built elements may alter the existing character of the view

Sensitivity

The view from O'Brien Street is considered to have MODERATE sensitivity due to:

- Public view is from a low density residential street
- Although public view has limited visual value, visual amenity is important to receptors which are mainly the local residents
- Moderate numbers of receptors in close proximity

Magnitude

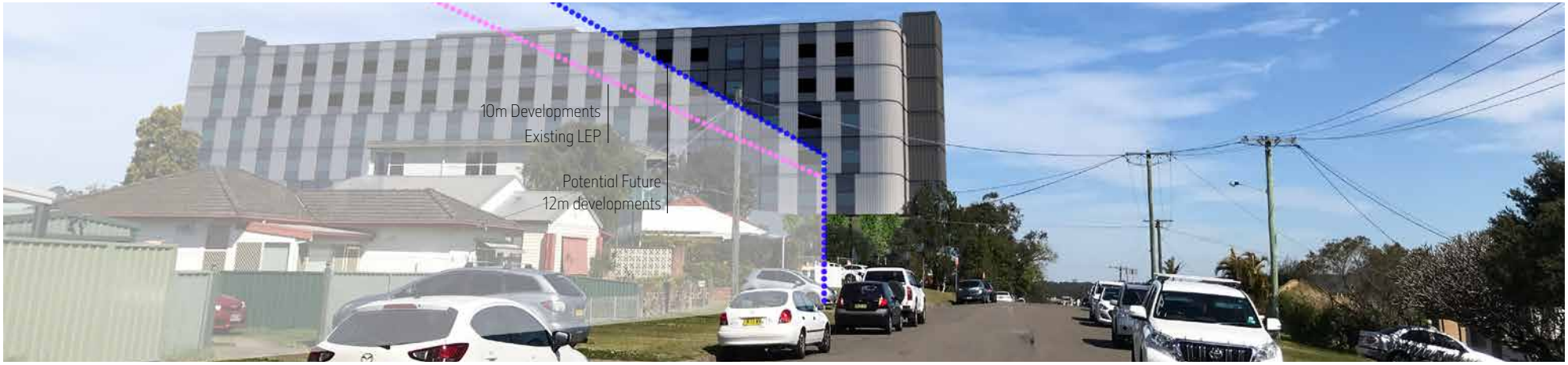
The magnitude of the proposal in this view is considered VERY HIGH in existing context and MODERATE in potential future context,due to:

- The proposal forms a dominant feature of the scene and contrasts in scale and massing with the existing low density character
- The proportion of the view occupied by the proposal is high. As a result, the change to the view's composition is relatively high
- There will be less visual contrast between the proposal and the surrounding setting in the potential future context- The proposal will be largely screened

The visual impact for this view is assessed as HIGH in existing context and MODERATE in potential future context.

Existing

Proposed



Potential Future

Viewpoint 5- from Oxford Street

Google Earth Coordinate: 32°58'43.2"S 151°41'32.3"E

SENSITIVITY	MAGNITUDE					
	Very High	High	Moderate	Low	Very Low	Negligible
Very High	Substantial	Very High	High	High/Moderate	Moderate	None
High	Very High	High	High/ Moderate	Moderate	Moderate/Low	None
Moderate	High	High/Moderate	Moderate	Moderate/Low	Low	None
Low	High / Moderate	Moderate	Moderate/ Low	Low	Low/ Negligible	None
Very Low	Moderate	Moderate/ Low	Low	Low/ Negligible	Negligible	None

Impact Level - Existing context (Matrix of Sensitivity & Magnitude)

SENSITIVITY	MAGNITUDE					
	Very High	High	Moderate	Low	Very Low	Negligible
Very High	Substantial	Very High	High	High/Moderate	Moderate	None
High	Very High	High	High/ Moderate	Moderate	Moderate/Low	None
Moderate	High	High/Moderate	Moderate	Moderate/Low	Low	None
Low	High / Moderate	Moderate	Moderate/Low	Low	Low/ Negligible	None
Very Low	Moderate	Moderate/ Low	Low	Low/ Negligible	Negligible	None

Impact Level - Potential Future context (Matrix of Sensitivity & Magnitude)

Viewpoint 5

The aim of assessing the view is:

- To understand the visual impact of proposed built forms viewed from the main highway and adjacent residential street
- To assess to what degree the existing structures and buildings screen or disguise the future development
- To test the extent to which the change of built elements may alter the existing character of the view

Sensitivity

The view from Oxford Street is considered to have LOW sensitivity due to:

- Receptors are mostly travellers on road that are less likely to notice, appreciate or be concentrating on views
- Public view has limited visual value due to the existing urban character with limited natural elements
- Low number of receptors from Oxford Street. The viewpoint is also representative of the view from Pacific Highway. In this case, number of receptors is considered to be high however, they have short term views to the proposal.

Magnitude

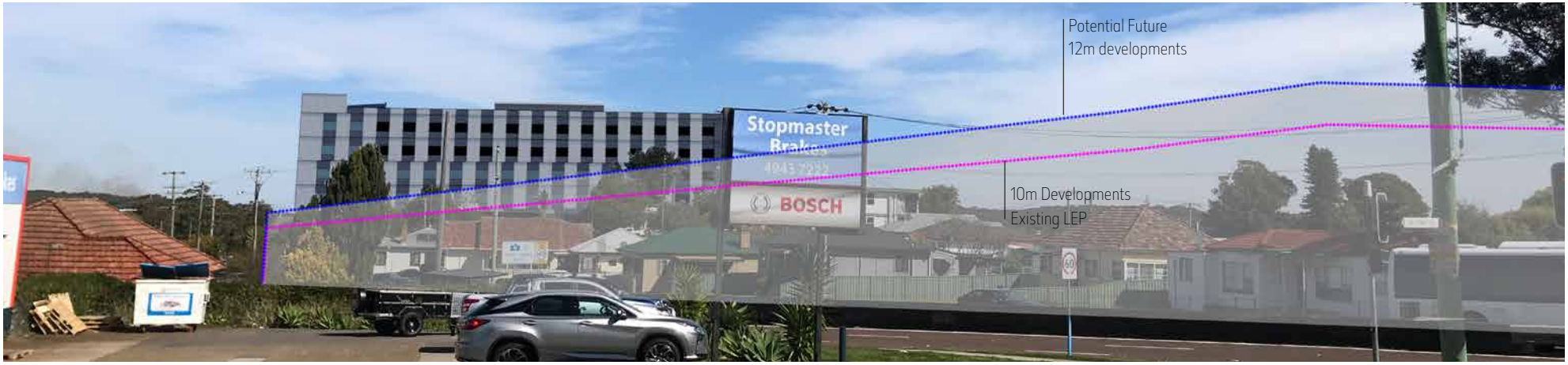
The magnitude of the proposal in this view is considered HIGH in existing context and MODERATE in potential future context, due to:

- The proposal forms a relatively dominant feature of the scene and contrasts in scale and massing with the existing low density character. However, it is partly screened by the existing landscape detractors including housing, structures and utility poles
- There will be less visual contrast between the proposal and the surrounding setting in the potential future context which reduces the magnitude

The visual impact for this view is assessed as MODERATE in existing context and MODERATE/ LOW in potential future context.

Existing

Proposed



Potential Future

Viewpoint 6- from St Paul's Primary School

Google Earth Coordinate: 33°48'43.1"S 150°58'29.6"E

SENSITIVITY	MAGNITUDE					
	Very High	High	Moderate	Low	Very Low	Negligible
Very High	Substantial	Very High	High	High/Moderate	Moderate	None
High	Very High	High	High/ Moderate	Moderate	Moderate/Low	None
Moderate	High	High/Moderate	Moderate	Moderate/Low	Low	None
Low	High / Moderate	Moderate	Moderate/Low	Low	Low/ Negligible	None
Very Low	Moderate	Moderate/ Low	Low	Low/ Negligible	Negligible	None

Impact Level (Matrix of Sensitivity & Magnitude)

Viewpoint 6

The aim of assessing the view is:

- To understand the visual impact of proposed built forms viewed from the surrounding educational facilities
- To assess to what degree the existing structures and buildings screen or disguise the future development
- To test the extent to which the change of built elements may alter the existing character of the view

Sensitivity

The sensitivity of view from St Paul's Primary School has LOW sensitivity due to:

- The attention of people will be focused on their work and activities, not on their surrounding
- Students engaged in active recreation are less sensitive to visual change of their surroundings

Magnitude

The magnitude of the proposal in this view is considered MODERATE due to:

- The proposal forms a relatively dominant feature of the scene and contrasts in scale and massing with the existing low density character. However, the extent of the area over which the changes are visible is low.
- Proposal is not in close proximity and is partly screened by existing school's buildings and facilities

The visual impact for this view is assessed as MODERATE/ LOW, which is the combination of the sensitivity and magnitude of impact.

Existing

Proposed Building

Proposed

RESPONSE TO SCENIC MANAGEMENT GUIDELINES

Guidelines	Our Response
View corridors to the lake, coast and western ranges along streets, within public reserves and from town centres are retained and enhanced where possible	There is no view corridor to the lake, coast or any significant ranges around the proposal.
Car parks should be sited and designed to not dominate views from public areas or main roads	The proposal accommodates ground floor active uses along Pacific Highway to create visual interest and activation. The car park facade is integrated into design and screened by greenery. Therefore, it is not considered to be a dominant feature when viewed from surrounding vantage points.
New and increased recreational activities within public reserves may be suitable, yet should aim to preserve and improve important natural features and public access	There is no recreational activities as a result of the proposal. No natural features or public spaces will be affected.
Existing ridgeline vegetation which provides a dominant backdrop to views from main roads, the lake and coast is retained	Pacific Highway is providing views to the northern and southern ridgelines (refer to page 15). These views are not affected by the proposed development.
opportunities to rehabilitate any degraded areas are identified	Not applicable.
Any proposed commercial/industrial development along main roads, in particular, should be treated with non-garish (i.e. overly bright) colours, limit overwhelming signage and increase amenity through appropriate landscaping	The proposed modular facade is treated with non-garish colours and some neutral tones which blend in with the natural surroundings. The facade incorporates greenery with climbing plants to increase the visual amenity and soften the views.
Neighbourhood centres should be enhanced with landscape improvements and street tree planting	Street trees are retained which reduce the visual impact perceived from the surrounding main roads.
Any views of development from the coast or lake should be softened by screening vegetation and appropriate design measures such as set-backs	Not applicable.
Green breaks that provide visual relief to the urban area should be preserved, and enhanced, where possible	The area surrounding the site is not highly developed (mainly low density detached housing) which requires less visual relief. However, the proposal incorporates green facade, facade articulation and adequate setbacks to reduce the bulk and provide some visual relief in the built form.

CONCLUSION

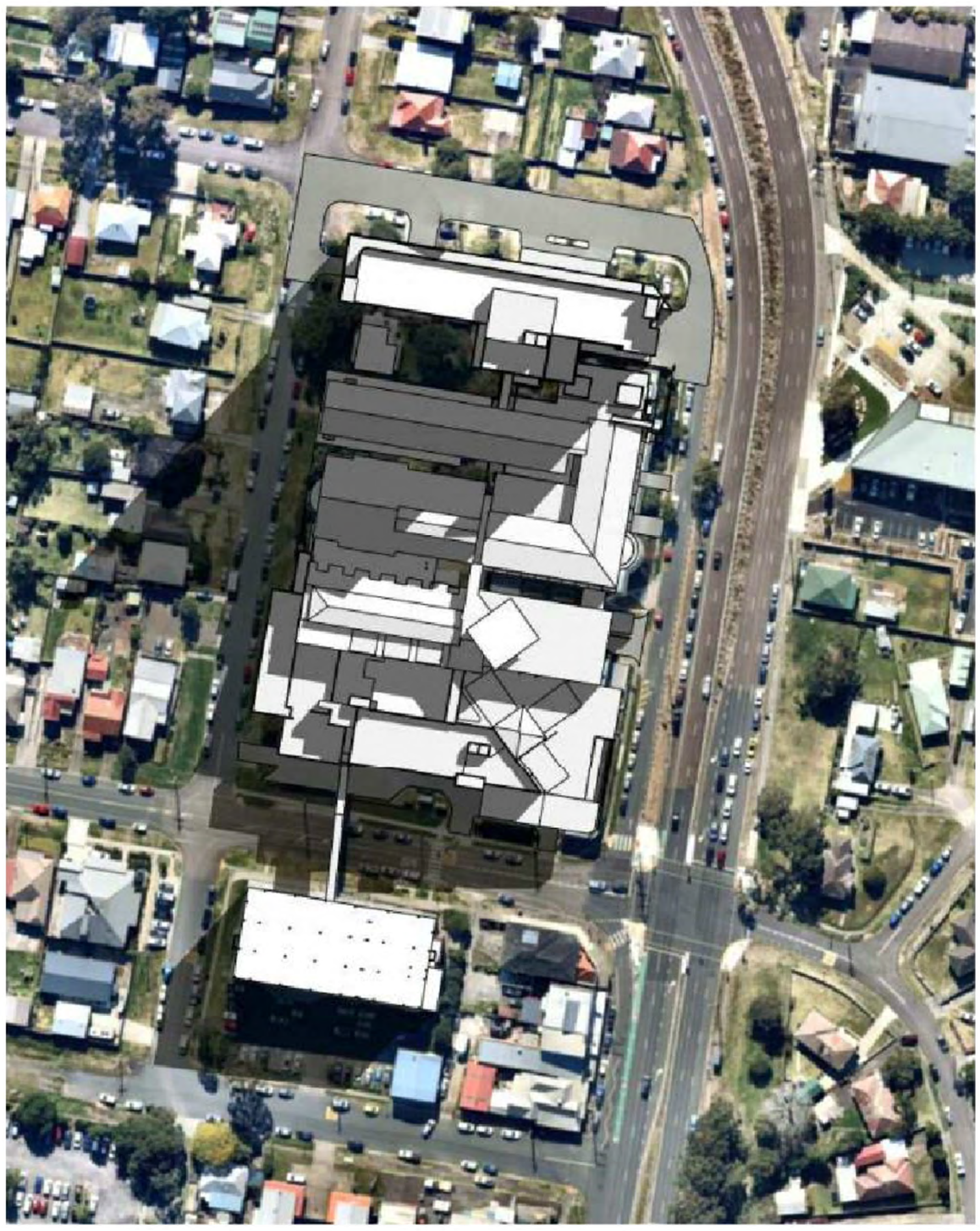
In general, the visual sensitivity of the views are considered Moderate to Low. The proposal is located in the Hinterland landscape type of Lake Macquarie LGA where views of the lake or coast are not available. The area surrounding the proposal does not have any scenic or conservation values and is not considered to be a visually sensitive landscape. However, the proposed site is fronting Pacific Highway with a high visibility which increases the visual sensitivity to change. It is argued that receptors in Pacific Highway are mostly travellers on road that are passing through therefore have short term views and are less likely to notice, appreciate or be concentrating on views. In addition, surrounding local streets are low traffic volume roads with a low number of potential viewers.

The proposal forms a visible new element and a relatively dominant feature of the overall scene in some of the vantage points. As a result, the magnitude of proposal is considered High to Moderate in the current context. However, it is anticipated that the Gateshead Precinct go through some future transformations to become one of the major health destinations in the area. As a result, the magnitude of proposal is considered Moderate in the potential future context.

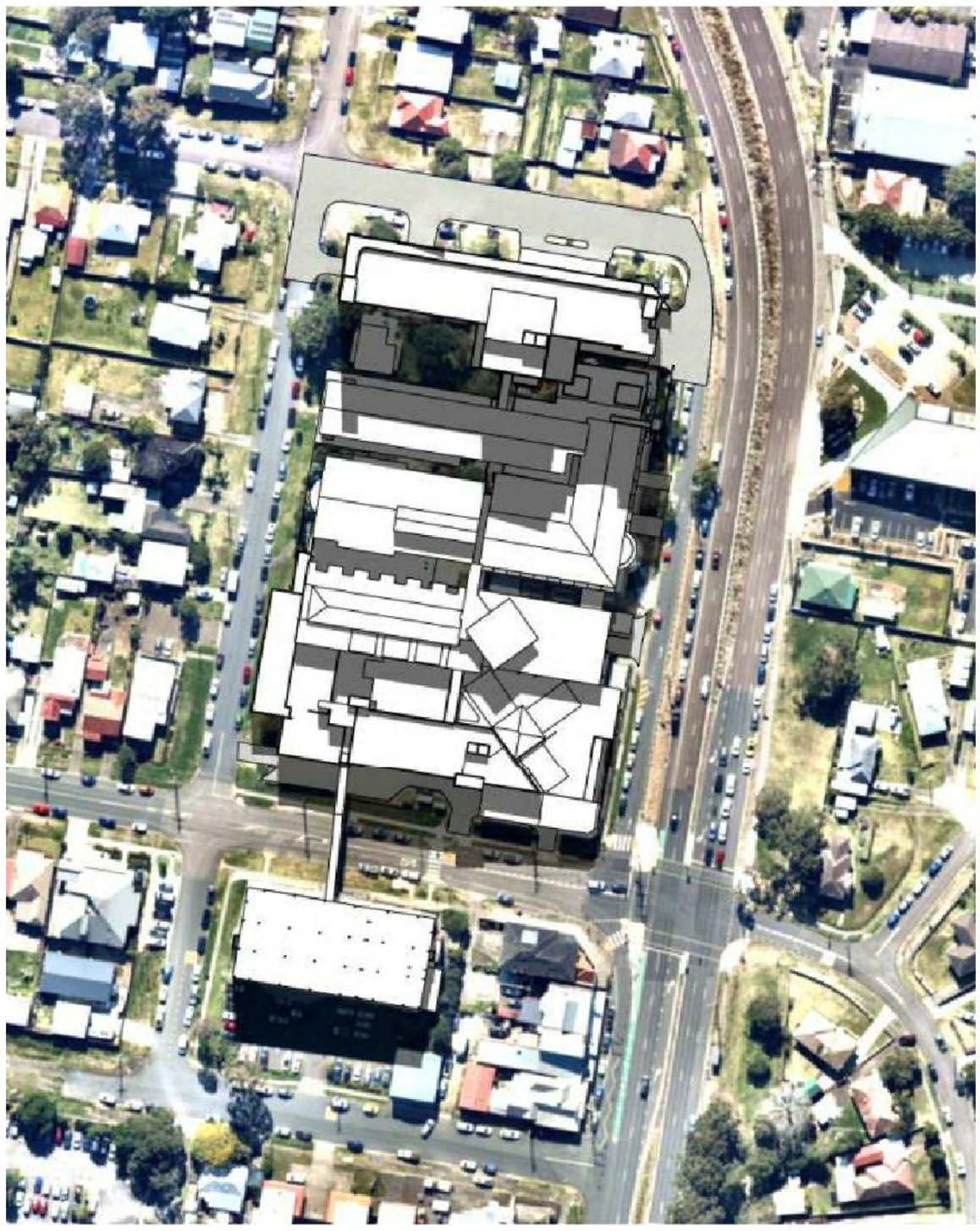
In summary:

- The proposal is consistent and compatible with the future planned character of the Gateshead as a regionally significant health precinct and contributes to the evolving character of the area from a residential neighbourood to a health hub;
- The proposal is consistent with the requirements in the Lake Macquarie Scenic Management Guidelines;
- The strategic location of the site along Pacific Highway is ideal to create a gateway tower as an iconic entry to Gateshead Health Precinct;
- It is anticipated that the surrounding lands around the Private Hospital will accommodate health allied services and medium density housing to support the Precinct. Therefore, there will be less visual contrast between the proposal and the surrounding setting compared to the existing low density scenario;
- There already exists a presence of landscape detractors in all vantage points including existing structures, housing, utility poles, billboards and etc. which reduce the dominance of the proposal;
- Existing vegetation and mature trees along main streets partly screen the proposal and reduce the visual impact; and
- The proposal does not reduce the quality of the scenes by delivering design excellence.
- Use of facade treatment, articulation and colour selection reduce the bulk impact and increase the visual amenity.

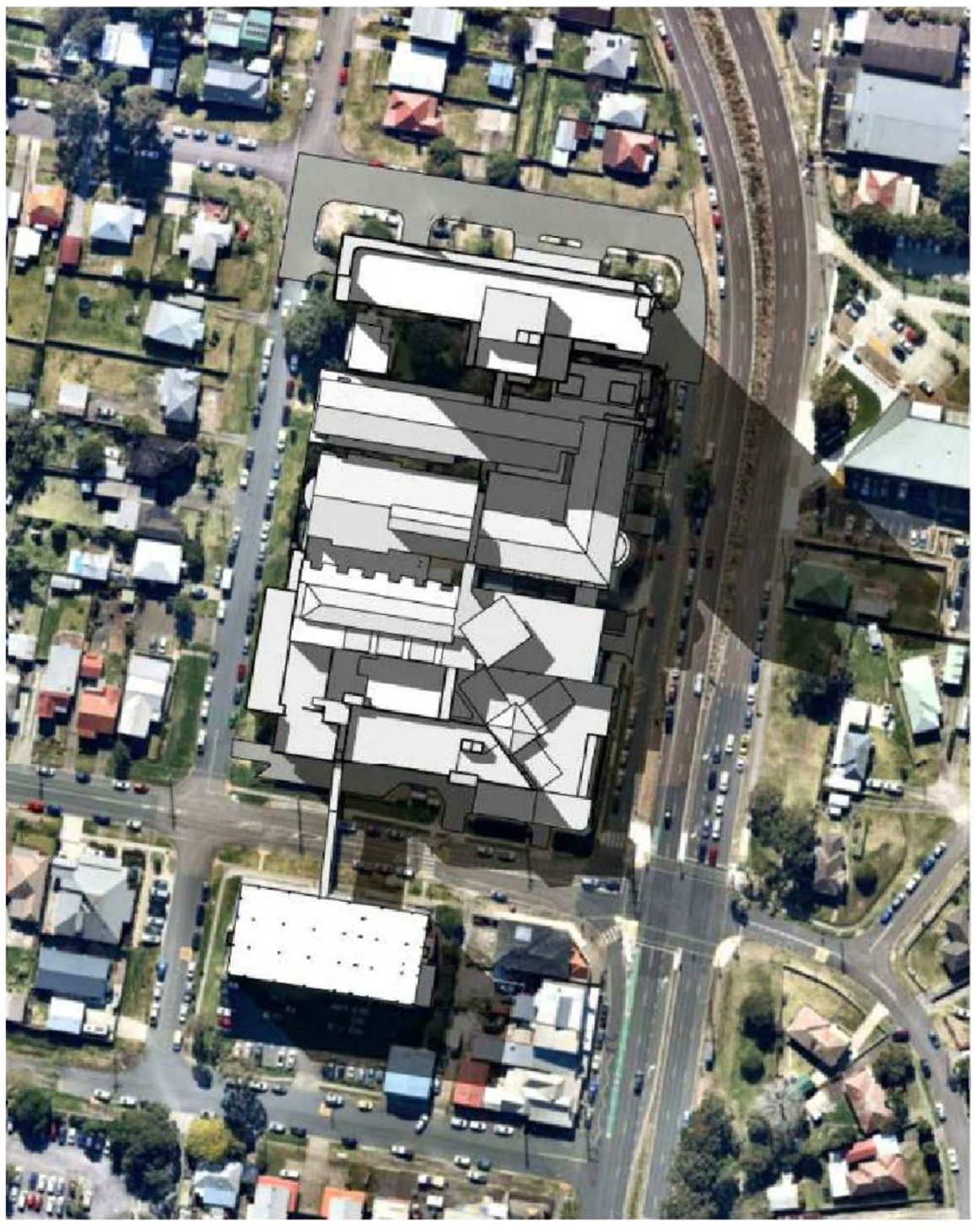
Attachment 2: Shadow analysis



1. WINTER SOLSTICE 9AM



2 WINTER SOLSTICE 12NOON



3 WINTER SOLSTICE 3PM

1	FIRST ISSUE	25.10.21	HS
REV	REVISION DESCRIPTION	DATE	BY

Project

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MASTERPLAN

Principal

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Block/ Zone	Drawn	Checked	Date
	HC	HS	25.10.21

Drawing Title
SHADOW DIAGRAMS

Scale/s
NTS

Dwg.No.
LMPH17-DA-SH

Issue
1

CAD File
LMPH17-DA-SH

Attachment 3: Traffic and parking assessment

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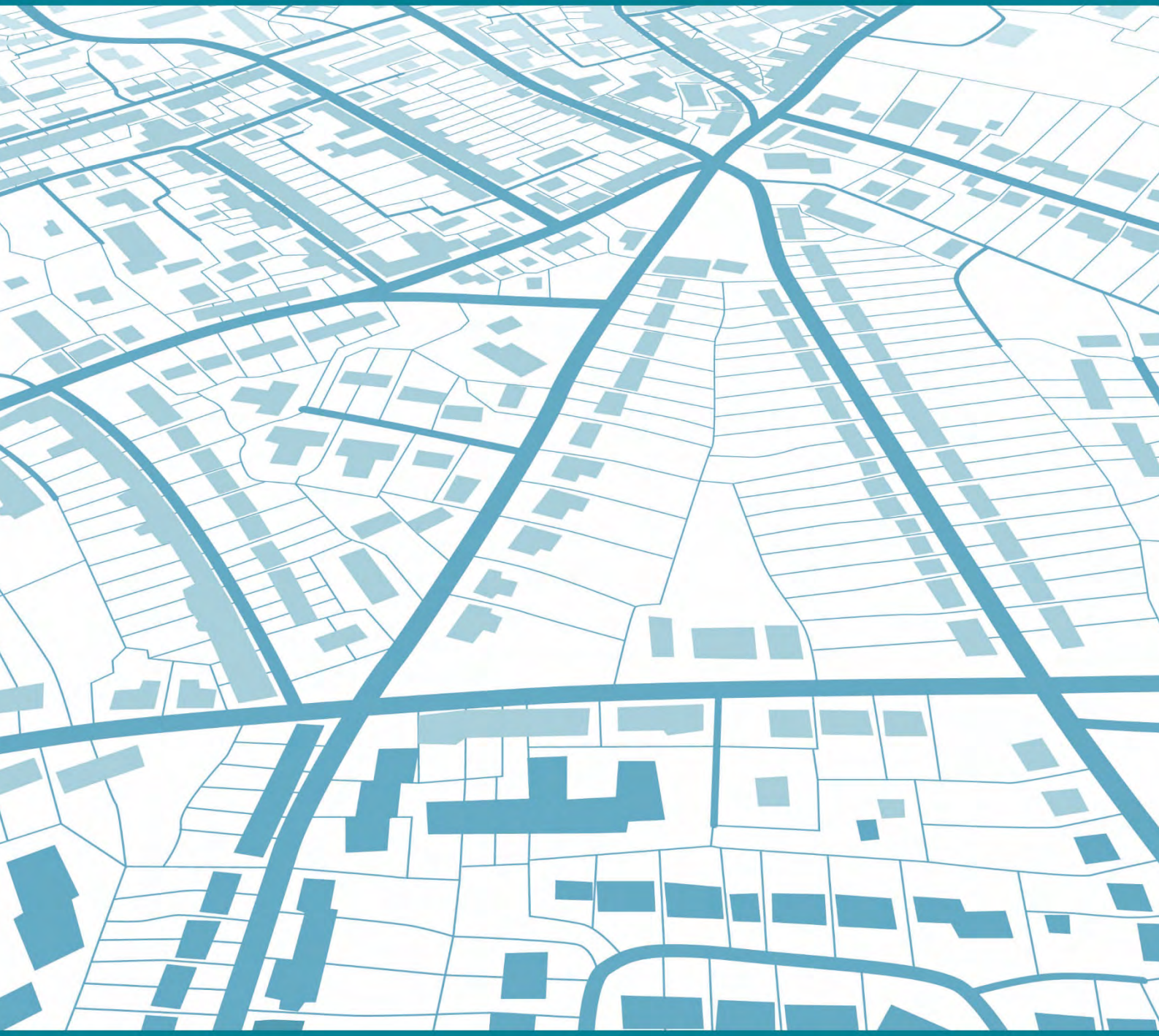

Lake Macquarie Private Hospital

Planning Proposal

Traffic and Parking Assessment

Ref: 21297
Date: OCT 2021
Rev: C

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1.0 Introduction

This report has been prepared for Ramsay to provide a Traffic, Transport and Parking Assessment to accompany a Planning Proposal which forms part of a Development Masterplan for a significant upgrade of the Lake Macquarie Private Hospital that includes:

- Planning Proposal to permit the height of the proposed Ward Tower building
- staged development
- expansion of the Hughes Street car park
- alterations and additions which are subject to existing consents

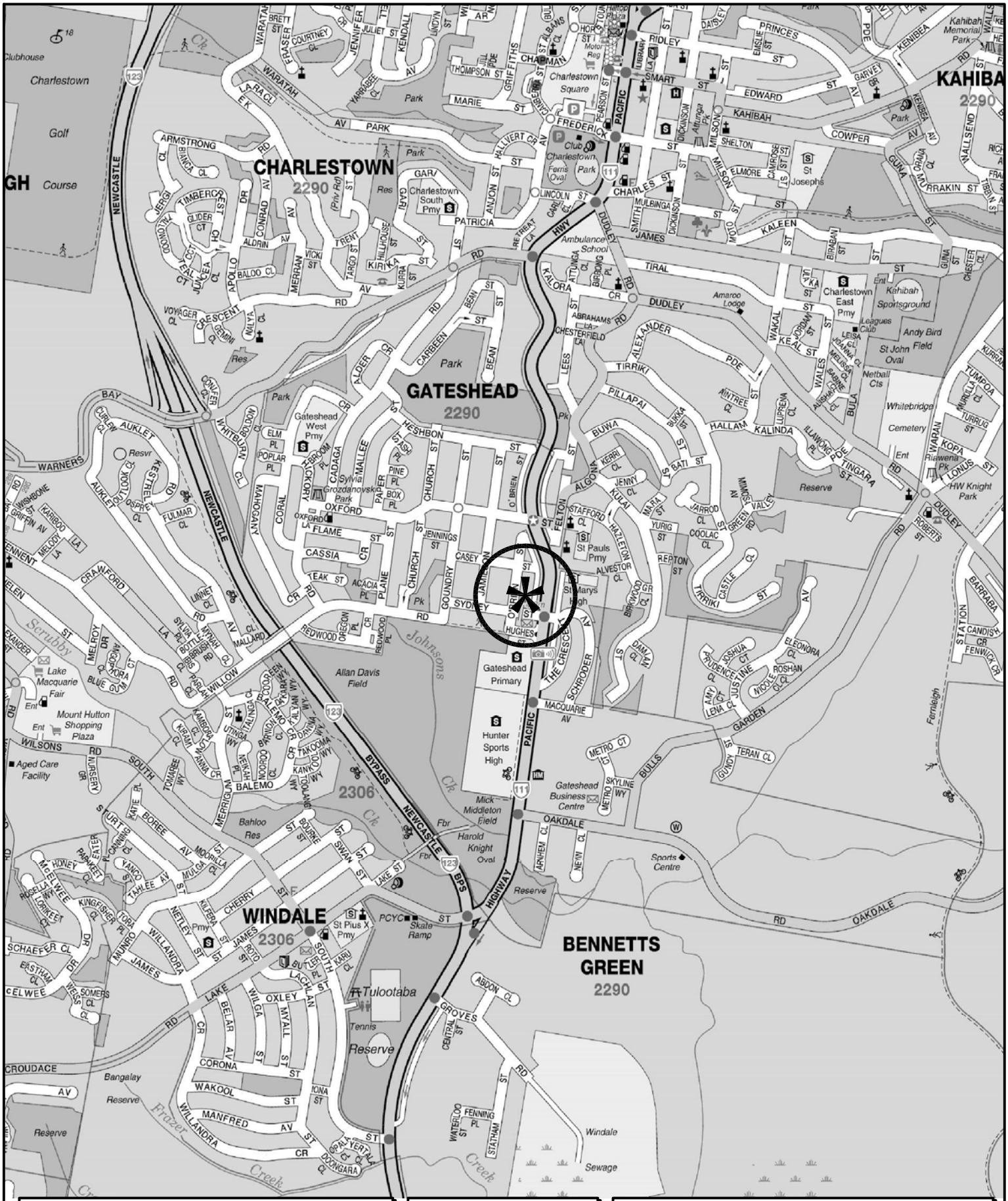
Lake Macquarie Private Hospital (Figure 1) provides healthcare services for the Newcastle and Lake Macquarie areas as well as the Hunter and New England areas. The hospital is a 187 bed “Acute Medical and Surgical Facility”, with Emergency Department and Cancer Centre, linked by overhead walkway to the Lake Macquarie Specialist Centre which provides radiology and pathology services and contains medical consulting suites.

The Hospital has been subject to increasing demands for its services due to the increasing number and aging of the population in the Central Coast area and there have been a number of alterations and additions undertaken over the years while there are 2 outstanding development consents which have not been implemented as yet.

The Development Masterplan involves 5 stages and the proposed Ward Tower represents Stage 3 of that process and the Planning Proposal is submitted in the context of the Masterplan.

The purpose of this report is to:

- describe the existing hospital, the outstanding Consents, the Development and the Planning Proposal Masterplan
- describe the road network serving the site and the prevailing traffic conditions on that network
- assess the adequacy and appropriateness of the proposed parking provision
- assess the potential traffic implications of the proposed development
- assess the proposed vehicle access, internal circulation and servicing arrangements



LEGEND

LOCATION

FIG 1

2.0 Proposed Development

2.1 Site, Context and Existing Circumstances

The Lake Macquarie Private Hospital site (Figure 2) comprises a consolidation of lots which is located to the south of the Gateshead Centre with frontages to the Pacific Highway service road, Sydney Street, O'Brien Street and Casey Street. The elements comprise:

- the hospital complex is located on the northern side of Sydney Street
- the associated medical centre located on the southern side of Sydney Street (with an overhead pedestrian bridge link)
- the leased area for carparking on part of the school site with frontage to Hughes Street

The surrounding area comprises residential dwellings to the west of the Highway while the primary and high schools are located just to the south and there is a mixture of uses on the western side of the highway.

The existing Hospital comprises:

- Emergency Department, Theatres, Oncology Unit, ICU, Cath and Vascular labs
- 187 inpatient beds
- 239 staff (maximum daytime)
- 9 Doctors
- 33 VMO's

Staff and Doctors at the Hospital have a wide range of working hours as follows:

- Doctors (shifts) 8:00am – 4:30pm, 9:30am – 6:00pm and 5:00pm – 11:00pm
- Ward nurses 7:00am – 4:30pm, 1:30pm - 10:00pm and 9:30am – 7:30am
- Theatre staff 7:00am – 7:30pm
- Allied Health 8:00am – 5:00pm
- Ward clerks 7:00am – 3:30 pm and 4:00pm – Midnight.

LEGEND

N

SITE

FIG 2

The Emergency Department is open 24/7 while CSSD is generally open 4:00am to 2:00am.

The existing total carparking provision of 210 spaces comprises:

- 24 spaces in an open area on the north-eastern corner of the main hospital site
- 12 spaces along the southern side of the hospital
- 148 spaces on a leased area of the school to the south
- 18 spaces accessed on O'Brien Street
- 8 spaces accessed on Casey Street

There are a number of vehicle accesses provided including a porte cochere for setdown/pickup on Sydney Street.

2.2 Approved Development

Consent (DA2320/2017) has been granted for a new 18 bed ward, 16 space car park.

Consent (DA443/2018) has been granted for additional operating theatre and CSSD facilities which comprise:

- 2 new operating theatres with reception
- Patient recovery bays (9)
- Day surgery
- Ancillary facilities including:
    - X ray room
    - Offices and lifts
    - Staff amenities
    - Waiting areas
    - Coffee cart area
    - Corridors

2.3 Development Masterplan

The Development Masterplan involves 5 stages as follows:

Stage 1 and 2

These involve the works contained in the 2 existing consents being the new 18 bed ward (DA2320/2017) and the alteration/addition for the new operating theatres, patient recovery, day surgery and ancillary facilities (DA443/2018). The additional workers will comprise:

Stage 1	Stage 2
4 additional staff	6 additional staff
	6 additional doctors

The provision of a 16-space car park was included in the Stage 1 approval however, these spaces will now be incorporated into the proposed expansion of the Hughes Street car park where there will be 44 additional spaces provided on the new Level 1.

Stage 3 (Ward Tower)

The new 9 level tower building will be provided on the northern part of the site with a porte cochere on the Casey Street frontage. There will be 3 levels of car parking and 2 “cold shell” levels with a back of house lower level containing loading docks. There will be 65 new ward beds (32 existing beds deleted) with 102 staff and 20 VMO’s with 120 new parking spaces will be provided in the Tower Building while 26 existing spaces will be deleted and the NE parking will be reduced from 24 spaces to 5 spaces.

Stage 4

This involves:

- Modification to the existing main entry
- New recovery lounge
- Hybrid OT Suite
- Emergency Department expansion
- Ambulance bays
- No increase to staff or doctors

Stage 5

This stage involves 3 new theatres, 49 ward beds, 665m^2 medical imaging and 10 consulting suites with 25 staff and 9 VMO's. The 2nd stage of the Hughes Street carpark expansion will add 103 spaces.

Details of the Masterplan scheme are provided on the plans prepared by Health Projects International which are reproduced in part in Appendix A.

2.4 Planning Proposal

The purpose of the Planning Proposal is to amend the building height restrictions to enable construction of the proposed 9 level Ward Tower.

3.0 Road Network and Traffic Conditions

3.1 Road Network

The existing road network serving the site (Figure 3) comprises:

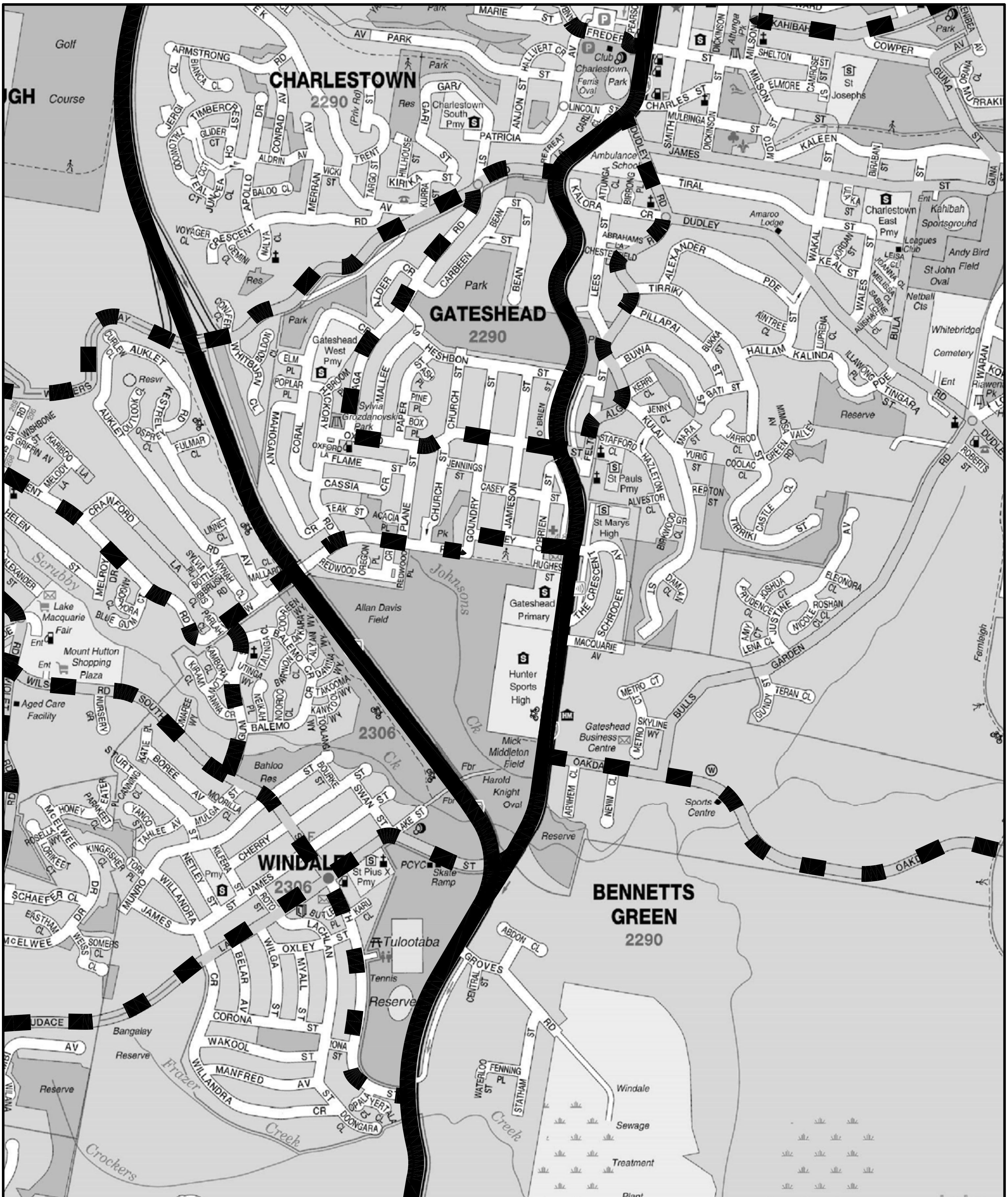
- *Pacific Highway* – a State Road and arterial route which connects between Sydney and Newcastle
- *Newcastle Inner City Bypass* – a State Road and arterial route which links between Windale and Kotara
- *Sydney Street, Willow Road and Tennent Road* – a collector route connecting between the Pacific Highway and Warners Bay Road.

O'Brien Street, Hughes Street and Casey Street are local access roads which are relatively straight and level while there is a "service road" extending along the western side of the highway northwards from Sydney Road.

3.2 Traffic Controls

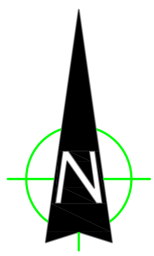
The traffic controls which have been applied to the road system in the vicinity of the site (Figure 4) include:

- the central median island along the highway which extends across the site frontage as well as the Hughes Street intersection
- the traffic control signals at the Pacific Highway and Sydney Street intersection
- the traffic signals at Pacific Highway and Oxford Street intersection
- the marked footcrossing on Sydney Street mid-way between the highway and O'Brien Street
- the 50 kmph speed limit on the local road system with section of 40 kmph in Sydney Street, O'brien Street and Hughes Street and adjacent to schools



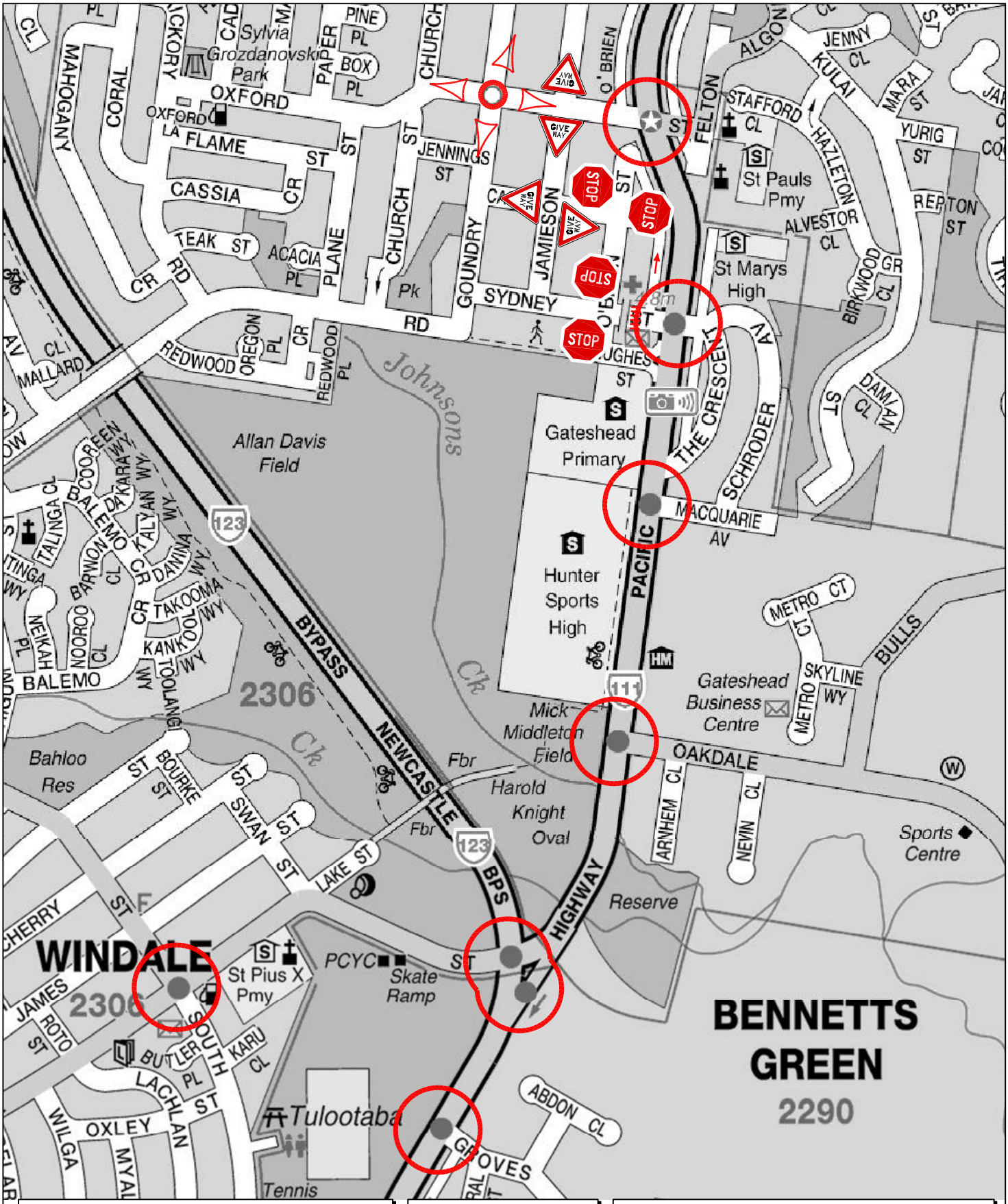
LEGEND

- ARTERIAL
- SUB-ARTERIAL
- COLLECTOR



ROAD NETWORK

FIG 3


Sylvia Grozdanovski Park
OXFORD
FLAME
CASSIA
TEAK
ACACIA
PLANE
CHURCH
JENNINGS
GOUNDRY
JAMIESON
SYDNEY
REDWOOD
OREGON
MALLARD
Allan Davis Field
Johnsons Ck
Gateshead Primary
Hunter Sports High
St Pauls Pmy
St Marys High
THE CRESCENT
SCHRODER
MACQUARIE AV
PACIFIC
METRO CT
SKYLINE WY
BULLS
Gateshead Business Centre
OAKDALE
ARNHEM CL
NEVIN CL
Sports Centre
Reserve
Mick Middleton Field
Harold Knight Oval
Fbr
BYPASS
NEWCASTLE
BPS
HIGHWAY
123
111
2306
BALEMO
Bahloo Res
BOURKE ST
SWAN ST
LAKE ST
WINDALE
St Pius X Pmy
PCYC
Skate Ramp
BUTLER
SOUTH
KARU CL
LACHLAN ST
OXLEY
Tulootaba
Tennis
ABDON CL
GROVES
BENNETTS GREEN
2290
STOP
GIVE WAY
STAFFORD
HAZLETON
ALVESTOR CL
REPTON ST
YURIG ST
KULAI
JENNY CL
ALGON
O'BRIEN
BIRKWOOD GR
DAMIAN ST
MAHOGANY
CORAL
PAPER
PINE PL
BOX PL
CHURCH ST
FELTON
TAKOOMA WY
KANKOOLA WY
BARWON CL
DAKARA WY
KALYAN WY
DANINA WY
NEIKAH PL
NOOROO CL
TALINGA CL
COOREEN
CHERRY ST
JAMES ST
ROTO ST
WILGA
MYALL
LEGEND
TRAFFIC SIGNAL CONTROL
ROUNDABOUT
RESTRICTED TURNING MOVEMENT
N
TRAFFIC CONTROLS
FIG 4

- the various GIVEWAY and STOP sign controls at intersections in the area
- the pedestrian refuge island in Sydney Street on the eastern side of O'Brien Street.

3.3 Traffic Conditions

An indication of the existing traffic conditions in the vicinity of the site is provided by data published[1] by TfNSW which is expressed in terms of Annual Average Daily Traffic (AADT). The latest recorded data indicates the following:

	AADT
Pacific Highway south of Smart Street	28,940

Collated traffic data includes SCATS data provided by TfNSW for the Pacific Highway and Sydney Street intersection (during the COVID pause in Feb 2020) traffic surveys undertaken in late October 2021 and earlier survey data for the morning and afternoon peak periods. This data has been combined with the highest movement recordings rounded off and is summarised in the following:

		AM	**PM**
Pacific Highway	Northbound	1,320	880
	Right-turn	50	50
	Left-turn	80	120
	Southbound	610	1,410
	Right-turn	90	60
	Left-turn	28	30
Sydney Street	Eastbound	10	20
	Right-turn	120	130
	Left-turn	54	61
The Crescent	Westbound	10	10
	Right-turn	20	10
	Left-turn	15	15

[1] *Traffic Volume Data for Northern Region*
Roads and Maritime Services

A SIDRA analysis of the existing operational performance of the intersection has been undertaken and the results indicating a satisfactory performance are provided in Appendix D and summarised in the following:

	AM	PM
LOS	C	39.3
AVD	D	43.0

Observations also confirm that the operation of this intersection is quite satisfactory even in the peak periods with no extensive or residual queuing apparent. Traffic conditions in the area are generally quite satisfactory with the traffic signal controlled intersections and central median island along the highway route.

3.4 Transport Services

Public transport services for the Hospital are provided by the Bus Route 14 which provides frequent 7 days per week services along the Highway between Newcastle and Belmont and Route 41 which operates as a regular service along Oxford Street (and the Highway). There is also an “on-demand” 7 days per week service provided for the Lake Macquarie area.

Details of these services are provided in Appendix E, indicating the location of the Route 14 bus stops adjacent to the Hospital and the times tables.

3.5 Bicycles and Pedestrians

Pedestrian facilities at the site include:

- over bridge connection to the Medical Centre
- marked footcrossing across Sydney Street
- foot paths along the highway, Sydney Street and Casey Street
- traffic signal controlled crossings at the Pacific Highway/Sydney Street intersection

Provision for cyclists is made by the shared path along the highway providing connection to the Newcastle Cycle Network (see details overleaf).

Map 5. Charlestown to Windale

This shared pathway is an ideal link between schools and the residential community, with a safe bridge crossing over the busy Newcastle Inner City Bypass. It is also a handy access way towards Warners Bay.

Location: Warners bay Road to Hunter Sports High, Pacific Highway, Gateshead (or reverse)

Type: Linear

Distance: 2.5km

Grade: Easy to moderate

Facilities: Sportsground, club, shops

Access: Park Avenue near the Nereida Close intersection

Information: Extensions of this track will access Mount Hutton and Warners Bay shopping areas

Windale overpass

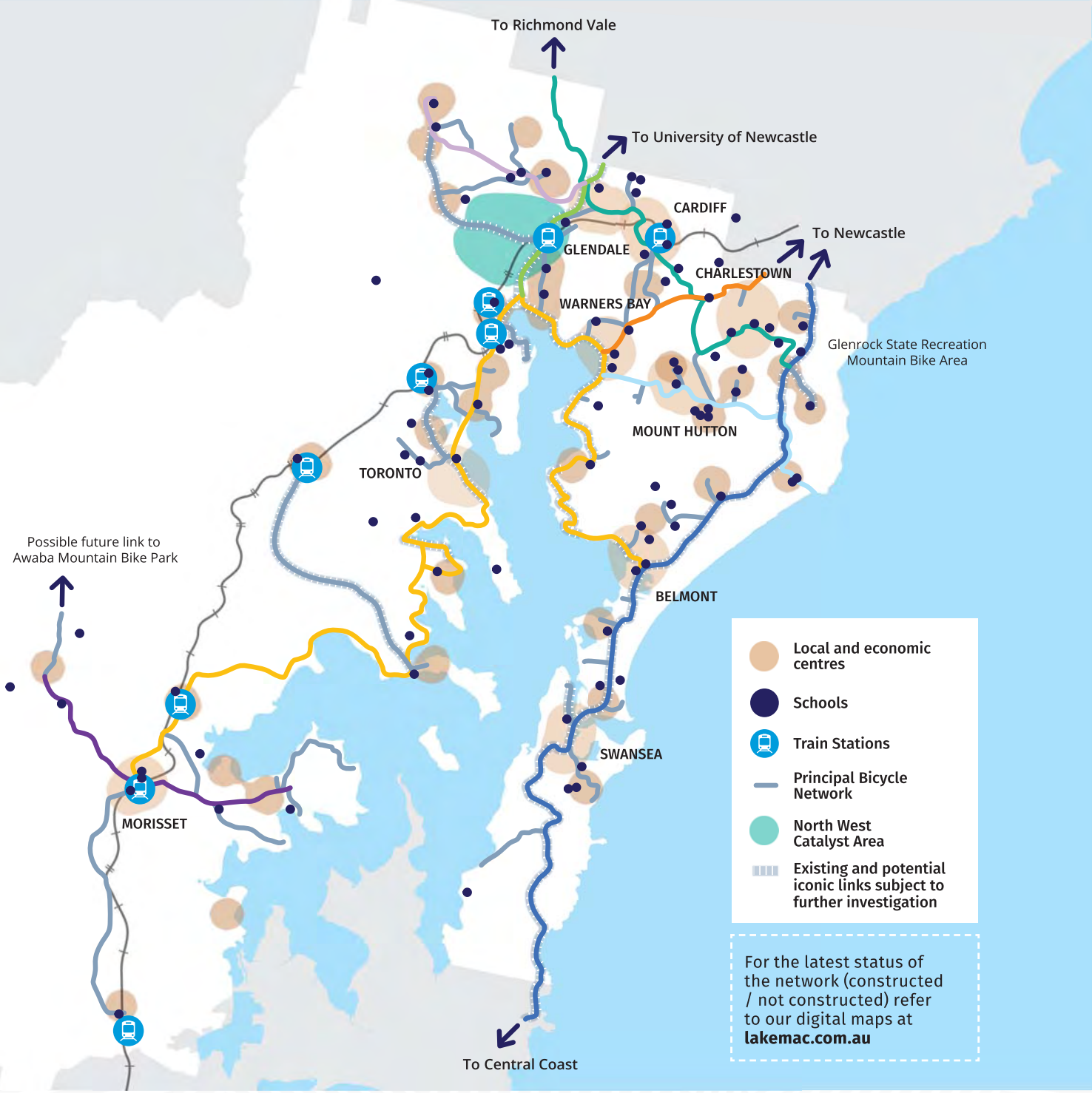
MAP 2: PRINCIPAL BICYCLE NETWORK

Regional routes

- Coastline Cycleway: Swansea to Newcastle (via Fernleigh Track); Swansea to Central Coast
- Richmond Vale to Fernleigh Track (via Charlestown)
- Belmont to Toronto (Northern Bays Way), Wangi Wangi, Morisset
- Warners Bay to Broadmeadow, Mayfield
- Speers Point to University, Newcastle*
- Morisset Peninsula to Cooranbong
- Northlakes Way (Glendale, Edgeworth, West Wallsend, Cameron Park)
- Warners Bay to Redhead Beach
- Richmond Vale to University, Newcastle*
- Maitland to University*

*Refer to City of Newcastle's Cycling Strategy

Appendix 1 provides more detail on Principal Bicycle Network routes.



For the latest status of the network (constructed / not constructed) refer to our digital maps at **lakemac.com.au**

4.0 Parking

Lake Macquarie City Council's DCP specifies the following parking requirements in relation to the elements of the Masterplan development:

Hospital	**Day Surgery**	**Health Consulting Rooms**
1 space per 2 beds	1 space per practitioner	1 space per on-duty practitioner
plus 1 space per 2 staff	1 space per 2 staff	1 space per 2 full-time staff
plus Ambulance space	1 space per 2 operating theatres	2 spaces per consulting room

The existing hospital therefore has a parking requirement as follows:

187 beds	93.5 spaces
251 staff	125.5 spaces
9 doctors	9 spaces
33 VMO's *	16.5 spaces
TOTAL:	**244.5 spaces (246)**

***** *VMO's (Visiting Medical Officers) are only on-site part time and generally about 50% at one time.*

The existing parking provision comprises:

- 24 spaces in NE carpark
- 12 spaces along south side
- 148 spaces in the Hughes Street carpark
- 8 spaces accessed on Casey Street
- 18 spaces accessed on O'Brien Street

Total 210 spaces (36 space shortfall)

The proposed progressive provision of parking relative to the development stages is as follows:

Stages 1 & 2		**Required**
18 beds		- 9 spaces
4 staff		- 2 spaces
6 Staff		- 3 spaces
6 Doctors		- 6 spaces
	Total	**20 spaces**
	Total Required	**266 spaces (246 + 20)**
Existing		210 spaces
Added		44 spaces (Hughes Street)
	Total	**254 spaces (Shortfall 12 spaces)**
Stages 3 & 4		
102 Staff		51 spaces
20 VMO's		10 spaces
33 Beds		16.5 spaces
	Total	**76.5 spaces (77)**
Total Required:		**343 spaces**
Lose		19 spaces (NE)
Lose		26 spaces (Casey Street/O'Brien Street)
Added		120 Spaces (Casey Street)
	Total	**329 spaces (Shortfall 14 spaces)**
Stage 5		
49 Beds		24.5 spaces
25 Staff		12.5 spaces
9 VMO's		4.5 spaces
3 Theatres		1.5 spaces
	Total	**43 spaces**
Total Required:		**386 spaces**
Added		103 spaces (Hughes Street)
Total		**432 spaces (Excess 46 spaces)**

Consulting Suites

The proposed Medical Suites will not generally be occupied on a full-time basis as many of the practitioners will have rooms at one or more other locations. Say the concurrent occupancy is 70%, with 1 practitioner in each and 1 staff:

10 Practitioners	-	10 spaces
10 staff	-	5 spaces
Patients	-	20 spaces
Sub-Total:		**35 spaces x 70%**
Total:		**25 spaces**
Total Required:		**411 spaces (excess 21 spaces)**

It is apparent that the proposed total parking provision will be quite adequate for the proposed development under the Masterplan and that the existing shortfall will be eliminated with the Stage 2 works.

5.0 Traffic

The RTA Guide to Traffic Generating Development provides traffic generation criteria in relation to Private Hospitals however, a review of the sites surveyed for that 1994 study revealed that they had very little in common with LMPH.

In 2013, RMS commissioned a consultant study[2] to update the Guidelines in relation to the parking and traffic generation characteristics of Major Hospitals. This study involved the surveys of sites which were split into 2 categories "Metropolitan Area Hospitals" with a high level of public transport accessibility and "Metropolitan and Regional Hospitals" with low public transport accessibility (e.g. including Sydney Adventist, John Hunter, Lismore and Blacktown hospitals).

For the latter, the traffic generation in the AM and PM peak periods:

- vtph per staff
- vtph per bed

The following peak traffic generation models were recommended for the hospitals which reflect the LMPH characteristics:

AM – 0.41 x Staff + 0.62 Beds

PM – 0.59 x Staff + 0.05 Beds

Accordingly, the assessed peak traffic generation of the existing LMPH is as follows:

AM – 0.41 x 239 + 0.62 x 187 = 236 vtph

PM – 0.59 x 239 + 0.05 x 187 = 182 vtph

[2] *Traffic Generation & Parking Analysis*
For Major Hospitals
URAP for RMS, Sept 2013

On this same basis, the assessed peak traffic generation for the Stage 3 and Stage 5 completed Masterplan development circumstances are as follows:

Stage 3

AM – 0.41 x 415 + 0.62 x 238 = 318 vtph

PM – 0.59 x 415 + 0.05 x 238 = 257 vtph

Stage 5

AM – 0.41 x 449 + 0.62 x 287 = 362 vtph (+126)

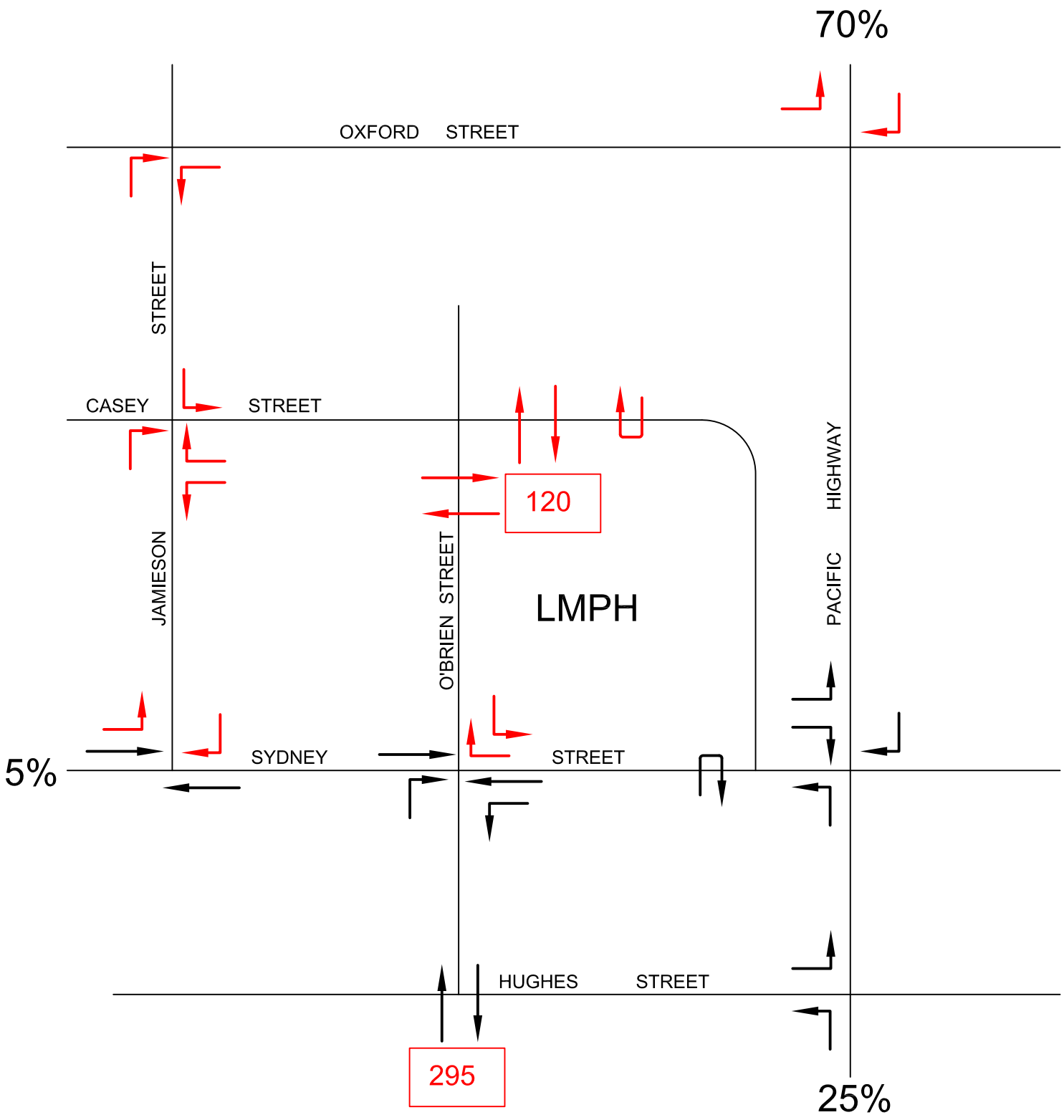
PM – 0.59 x 449 + 0.05 x 287 = 280 vtph (+98)

The approach and departure vehicle movements for the hospital will become more diverse as the development stages progress principally as a result of the advent of the Casey Street car park and porte cochere. This will result in vehicles approaching and departing the Highway via Oxford Street as indicated on Figure 5.

The additional movements via Oxford Street will however be relatively minor being largely comprised of vehicle movements to/from the north related to the new Casey Street car park (120 cars) and the adjacent porte cochere which will be secondary to the main Sydney Street porte cochere (and the generated movements will be no more than that of the existing porte cochere).

Surveys of the existing Hughes Street car park and Sydney Street porte cochere (see Appendix C) reveal the following peak traffic movements (vtph):

	AM		PM	
	IN	**OUT**	**IN**	**OUT**
Car park (148 spaces)	56	1	1	52
Porte Cochere	11	11	8	7



LEGEND

EXISTING ACCESS MOVEMENTS

FUTURE ACCESS MOVEMENTS

N

HOSPITAL ACCESS MOVEMENTS

FIG 5

This indicates that some 36% of parking spaces result in vt's during the 1 hour AM and PM peak periods. The enlarged carpark will have 295 spaces and the following traffic generation is indicated:

	AM		PM	
	IN	**OUT**	**IN**	**OUT**
Hughes Street 295 spaces	112	6	6	104
Casey Street 120 spaces	40	3	3	40

Some 70% of generated vehicle movements will be to/from the north along the Highway with some 25% to/from the south and 5% to/from the west. Cars from the north will approach the Hughes Street car park by turning right from the highway into Sydney Street and depart by turning left from Hughes Street to the highway.

Cars from the south will approach the Hughes Street car park by turning left from the highway into Hughes Street and depart by turning right from Sydney Street to the Highway.

Cars from the north approaching the Casey Street car park will turn right from the highway into Oxford Street and depart by turning left from Oxford Street to the highway. Cars from the south approaching the Casey Street car park will turn left from the highway into Sydney Street (or Hughes Street) and depart by right turn from Sydney Street to the highway.

Movements associated with the 2 porte cocheres will be quite minor at some 20 to 30 vtph in the AM and PM peak periods. Thus, the principal additional peak traffic movements resultant to the proposed expansion of LMPH will be at the Pacific Highway and Sydney Street intersection while the highest movement increase at the Pacific Highway and Oxford Street intersection will only be some 30 vtph (i.e. right turn into Oxford Street in the AM peak and left turn to the highway in the PM peak).

The projected future peak traffic movements at the Pacific Highway and Sydney Street intersection are as follows:

		AM	PM
Pacific Highway	Northbound	1,320	880
	Right-turn	50	50
	Left-turn	120	130
	Southbound	610	1,410
	Right-turn	130	80
	Left-turn	28	30
Sydney Street	Eastbound	10	20
	Right-turn	130	154
	Left-turn	65	80
The Crescent	Westbound	10	10
	Right-turn	20	10
	Left-turn	15	15

The operational performance of this intersection with the projected additional traffic volumes has been modelled with SIDRA and the results are provided in Appendix D and summarised in the following:

AM		PM	
LOS	**AVD**	**LOS**	**AVD**
C	41.8	D	44.5

These results indicate that this intersection will continue to operate satisfactorily during the peak traffic periods.

6.0 Access, Internal Circulation and Servicing

6.1 Access

The proposed new and changed vehicle access arrangements are as follows:

- **Sydney Street Porte Cochere**
  The existing egress to Sydney Street is deleted and egress is to the highway service road.

- **Casey Street Porte Cochere**
  Sperate ingress and egress driveways are provided just to the west of the highway service road where good sight distances are available.

- **Casey Street Car Park**
  Combined ingress/egress driveways are provided on Casey Street and O'Brien Street where good sight distances are available.

- **Ambulance Facility**
  A wide driveway is provided on the highway service road to enable 3 ambulances to access independently. Good sight distances are available at this location.

- **Loading dock**
  A wide access driveway is provided on the highway service road just to the south of Casey Street to enable 2 trucks to independently access the loading dock.

  Good sight distances are available at this location.

- **Hughes Street Car Park**
  A new combined ingress/egress driveway will be provided on the School access roadway just to the north of the existing access driveway where good sight distances are available.

6.2 Internal Circulation

The design of the internal circulation arrangements for the various car park areas complies with the requirements of AS 2890.1 & 6 including ramps, grades, bays, aisles, turning/manoeuvring and head room etc.

6.3 Servicing

Apart from the ambulance facility, delivery and service vehicles will utilise the 2 bay loading dock on the highway service road frontage although small vehicles (e.g. pathology pick up and urgent blood delivery) will be able to use the available short term parking spaces.

The loading dock will accommodate trucks up to 14.5m semi-trailer and details of the turning path assessment for these trucks are provided in Appendix F.

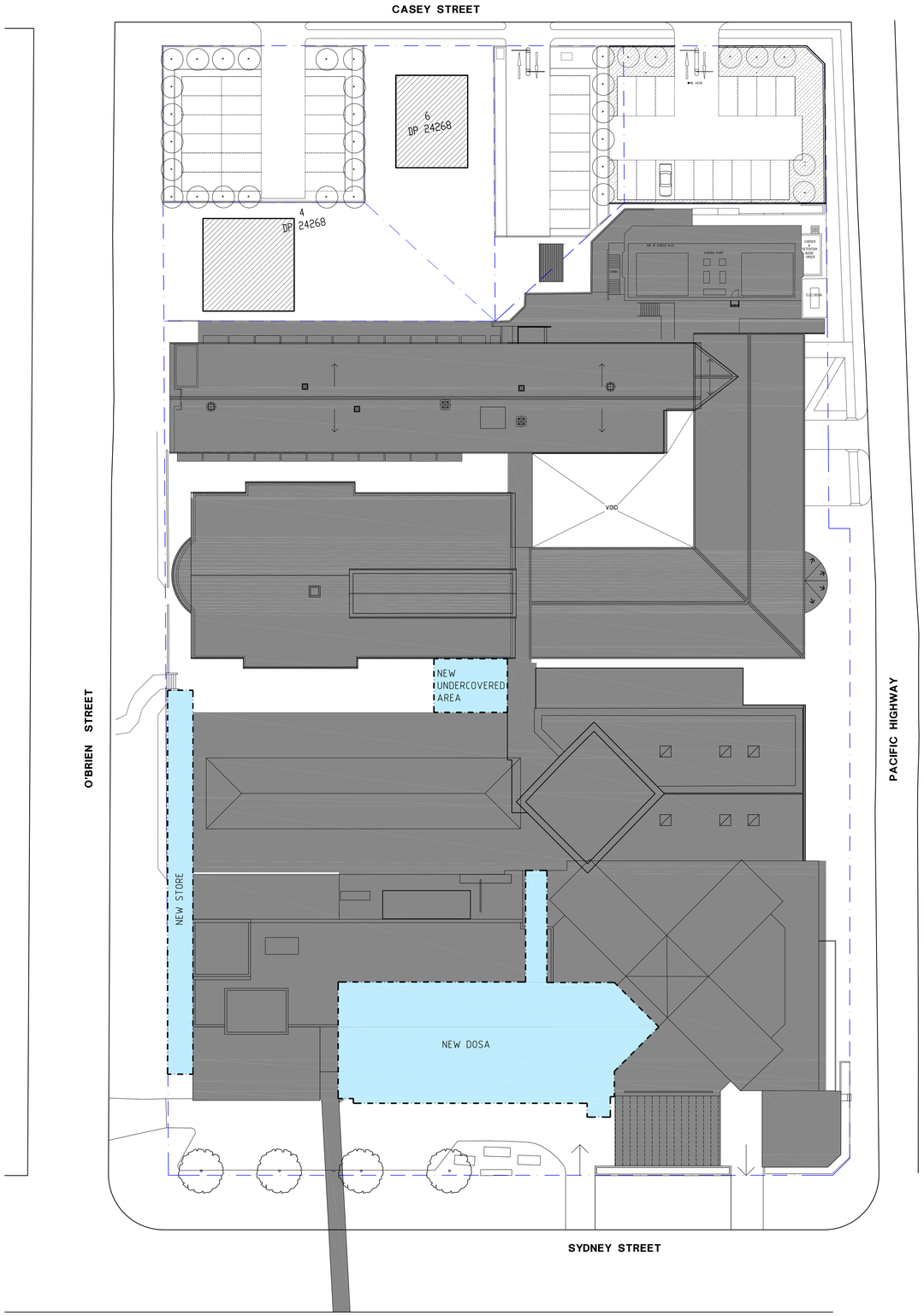
7.0 Conclusion

The proposed Development Masterplan for Lake Macquarie Private Hospital includes a Planning Proposal to permit the height of the proposed Ward Tower. This assessment has concluded that the proposed development:

- will not result in any adverse traffic implications
- will provide adequate and appropriate car parking
- will make suitable provision for vehicle access, internal circulation and servicing.

Appendix A

Approved Plans



LEGEND:

- WORK IN ADDITION TO EXISTING FOOTPRINT
- EXISTING BUILDING
- SITE BOUNDARY

REV	REVISION DESCRIPTION	DATE	BY
1	FIRST ISSUE	01.03.18	CX

Project
PRIVATE HOSPITAL
LAKE MACQUARIE

Principal
RAMSAY HEALTH CARE PTY LIMITED ACN 003 184 889

HEALTH PROJECTS INTERNATIONAL
Architects and Health Facility Planners
ACN 066 856 595
Ground Floor, Suite 1, 68 Alfred St., Milsons Point 2061
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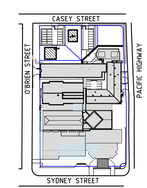


KEY PLAN

USE FIGURED DIMENSIONS ONLY.
DO NOT SCALE. ALL DIMENSIONS SHALL BE VERIFIED ON SITE AND DISCREPANCIES IMMEDIATELY BROUGHT TO THE ATTENTION OF THE PROJECT MANAGER FOR RESOLUTION

"CLOUDS" & REVISIONS ARE INTENDED AS GUIDES AND DO NOT NECESSARILY DESCRIBE THE FULL EXTENT OF REVISIONS. ASCERTAIN FULL EXTENT BY COMPARISON WITH PREVIOUS VERSION.

QA CHECK

Subject	By	Date
RDS		
ARCH		
AUT		

Subject	By	Date
STRUCT		
SPEC. CONS		
SERV		

Subject	By	Date
PROJ ARCH		

Block/ Zone: --
Drawn: CX
Checked: HST
Date: 01.03.18
Scale/s: 1:300

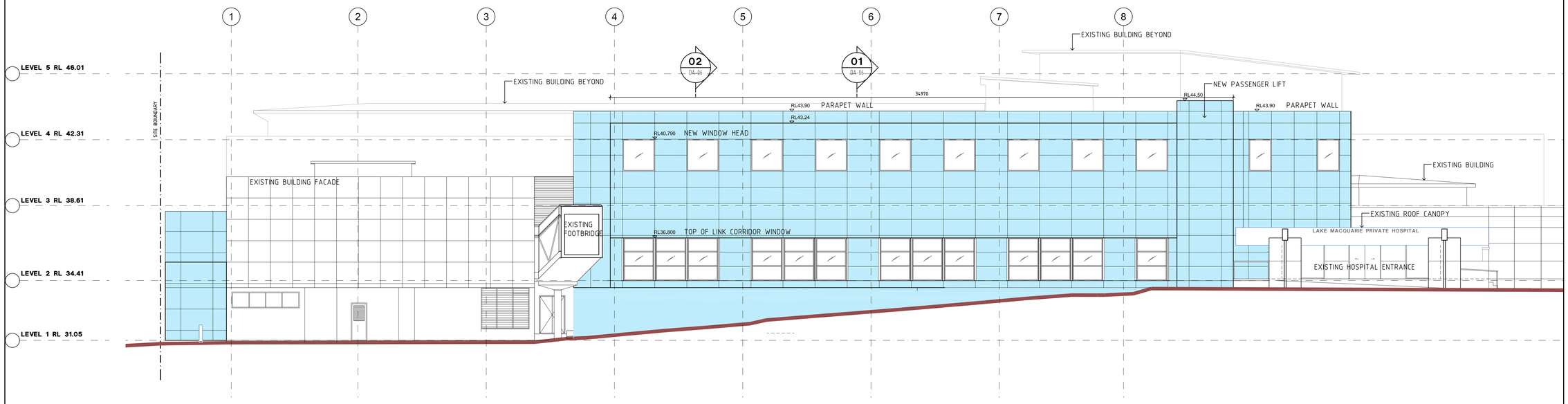
Drawing Title: **SITE PLAN**

Reason for Issue: DA SUBMISSION

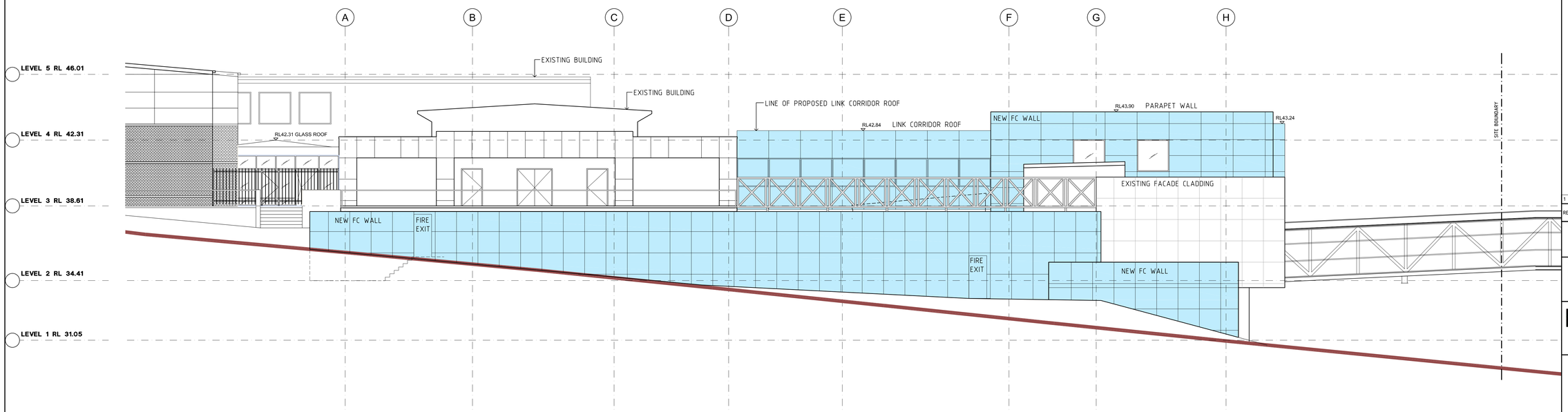
CAD File: LMPH14-DA-01
Dwg.No.: **LMPH14-DA-01**
Issue: **1**

LEGEND:

- EXISTING BUILDING
- WORK IN ADDITION TO EXISTING FOOTPRINT



01 - SYDNEY STREET ELEVATION



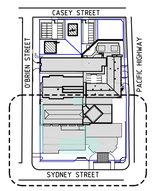
02 - O'BRIEN STREET ELEVATION

REV	REVISION DESCRIPTION	DATE	BY
1	FIRST ISSUE	01.03.18	CX

Project
PRIVATE HOSPITAL
LAKE MACQUARIE

Principal
RAMSAY HEALTH CARE PTY LIMITED ACN 003 184 889

HEALTH PROJECTS INTERNATIONAL
Architects and Health Facility Planners
ACN 066 856 595
Ground Floor, Suite 1, 68 Alfred St., Milsons Point 2061
Ph: (02) 9460 4199 Fax: (02) 9460 4299



KEY PLAN

USE FIGURED DIMENSIONS ONLY.
DO NOT SCALE. ALL DIMENSIONS SHALL BE VERIFIED ON SITE AND DISCREPANCIES IMMEDIATELY BROUGHT TO THE ATTENTION OF THE PROJECT MANAGER FOR RESOLUTION

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PROJ ARCH			

Block/ Zone	Drawn	Checked	Date	Scale/s
--	CX	HST	01.03.18	1:100

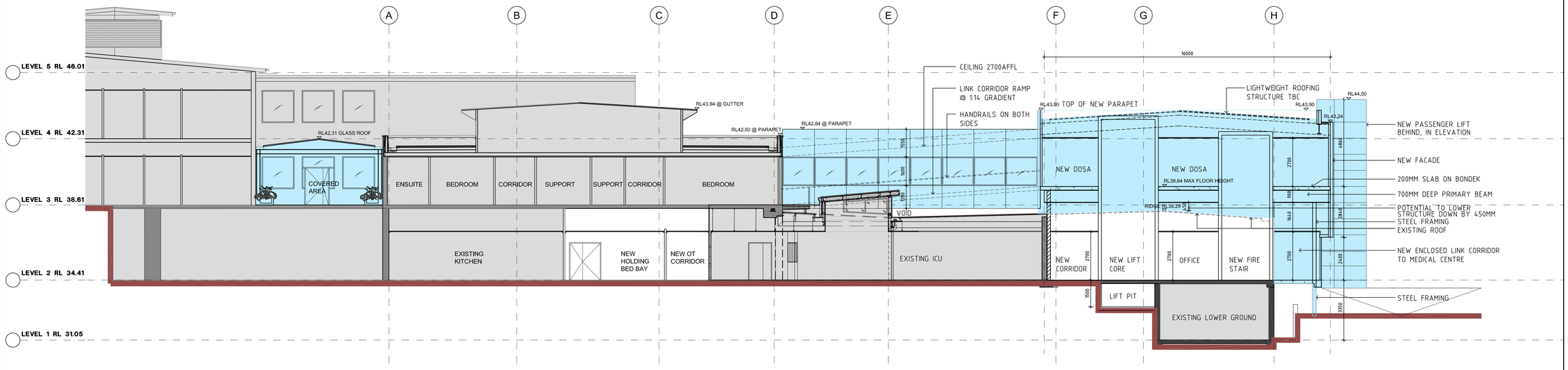
Drawing Title
ELEVATIONS

Reason for Issue
DA SUBMISSION

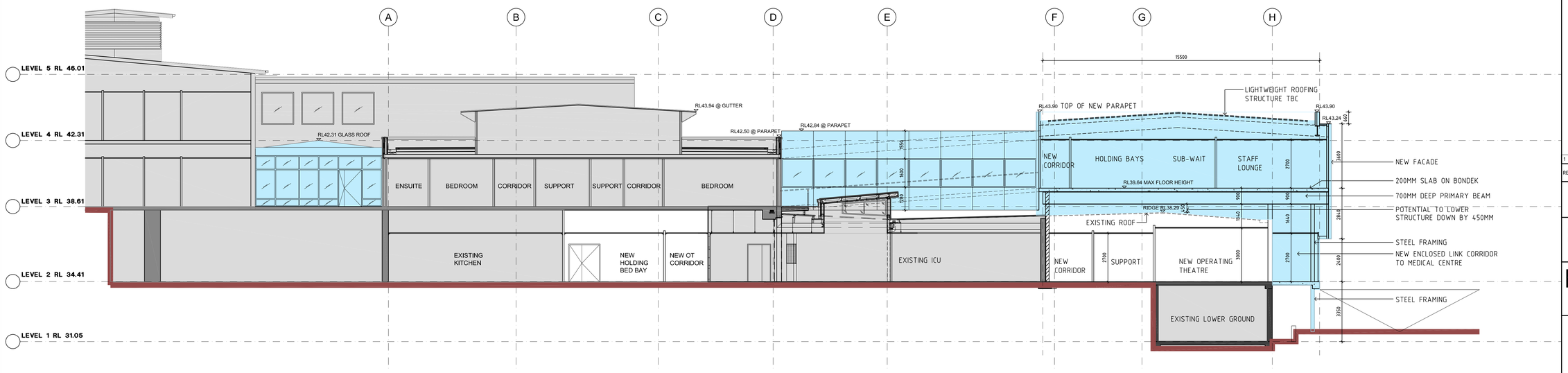
CAD File: LMPH14-DA-05

Dwg.No. **LMPH14-DA-05**

Issue **1**



01 - SECTION THROUGH LIFT AND STAIR CORES



02 - SECTION THROUGH OPERATING THEATRE

LEGEND:

- WORK IN EXISTING FOOTPRINT
- WORK IN ADDITION TO EXISTING FOOTPRINT
- EXISTING BUILDING

REV	REVISION DESCRIPTION	DATE	BY
1	FIRST ISSUE	01.03.18	CX

Project
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LAKE MACQUARIE

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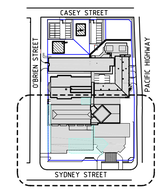

KEY PLAN

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QA CHECK

	Subject	By	Date
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AUT			

	Subject	By	Date
STRUCT			
SPEC. CONS			
SERV			

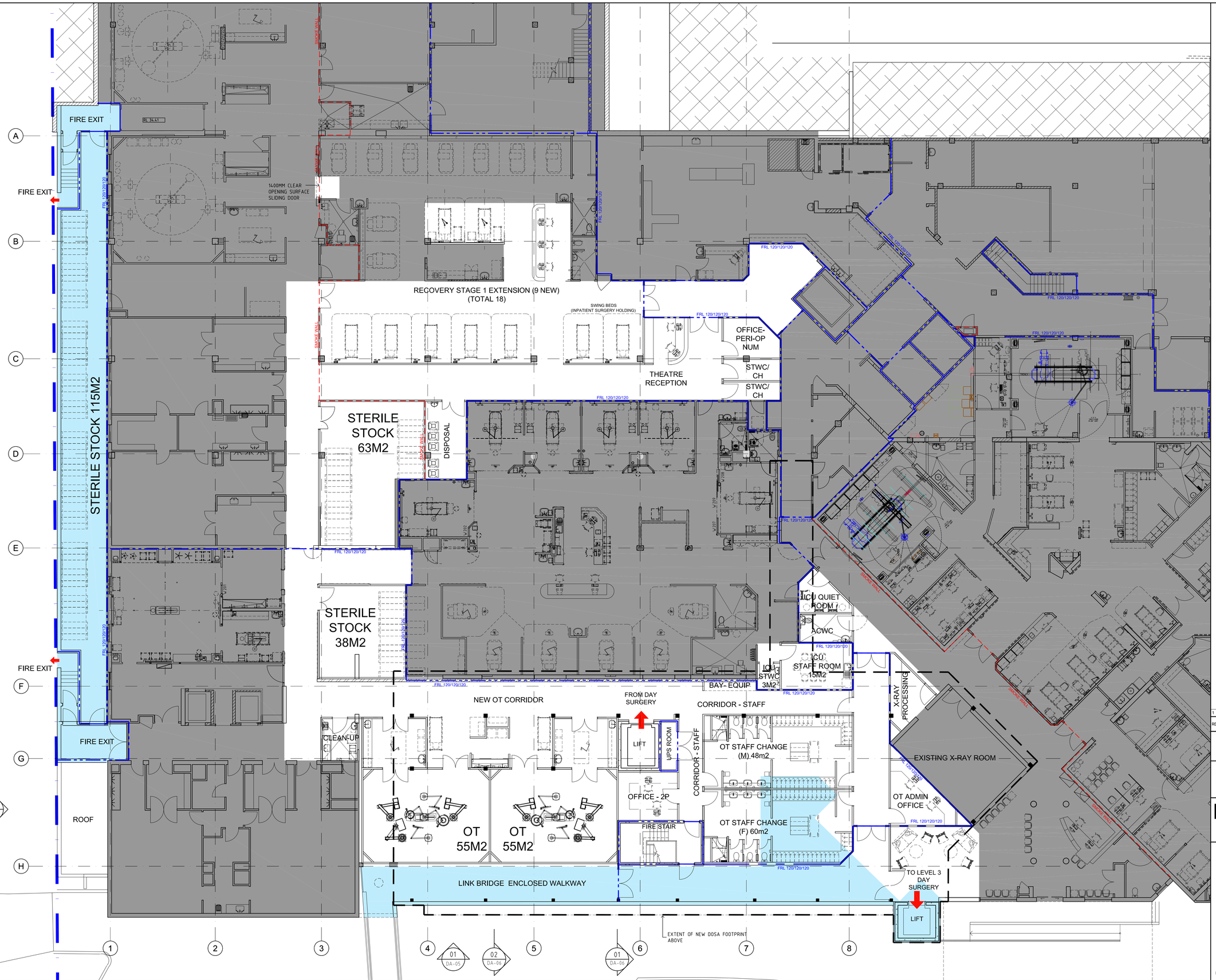
	Subject	By	Date
PROJ ARCH			

Block/ Zone: --
Drawn: CX
Checked: HST
Date: 01.03.18
Scale/s: 1:100

Drawing Title: **SECTIONS**

Reason for Issue: DA SUBMISSION

CAD File: LMPH14-DA-06
Dwg.No.: **LMPH14-DA-06**
Issue: **1**



LEGEND:

- WORK IN EXISTING BUILDING FOOTPRINT
- WORK IN NEW BUILD
- EXISTING BUILDING
- SITE BOUNDARY
- SMOKE COMPARTMENT WALL
- 60/60/60 FIRE RATED WALL
- 120/120/120 FIRE RATED WALL

REV	REVISION DESCRIPTION	DATE	BY
1	FIRST ISSUE	01.03.18	CX

Project

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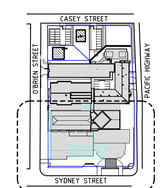

KEY PLAN

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QA CHECK

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SPEC. CONS		
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Subject	By	Date
PROJ ARCH		

Block/ Zone: --
Drawn: CX
Checked: HST
Date: 01.03.18
Scale/s: 1:100

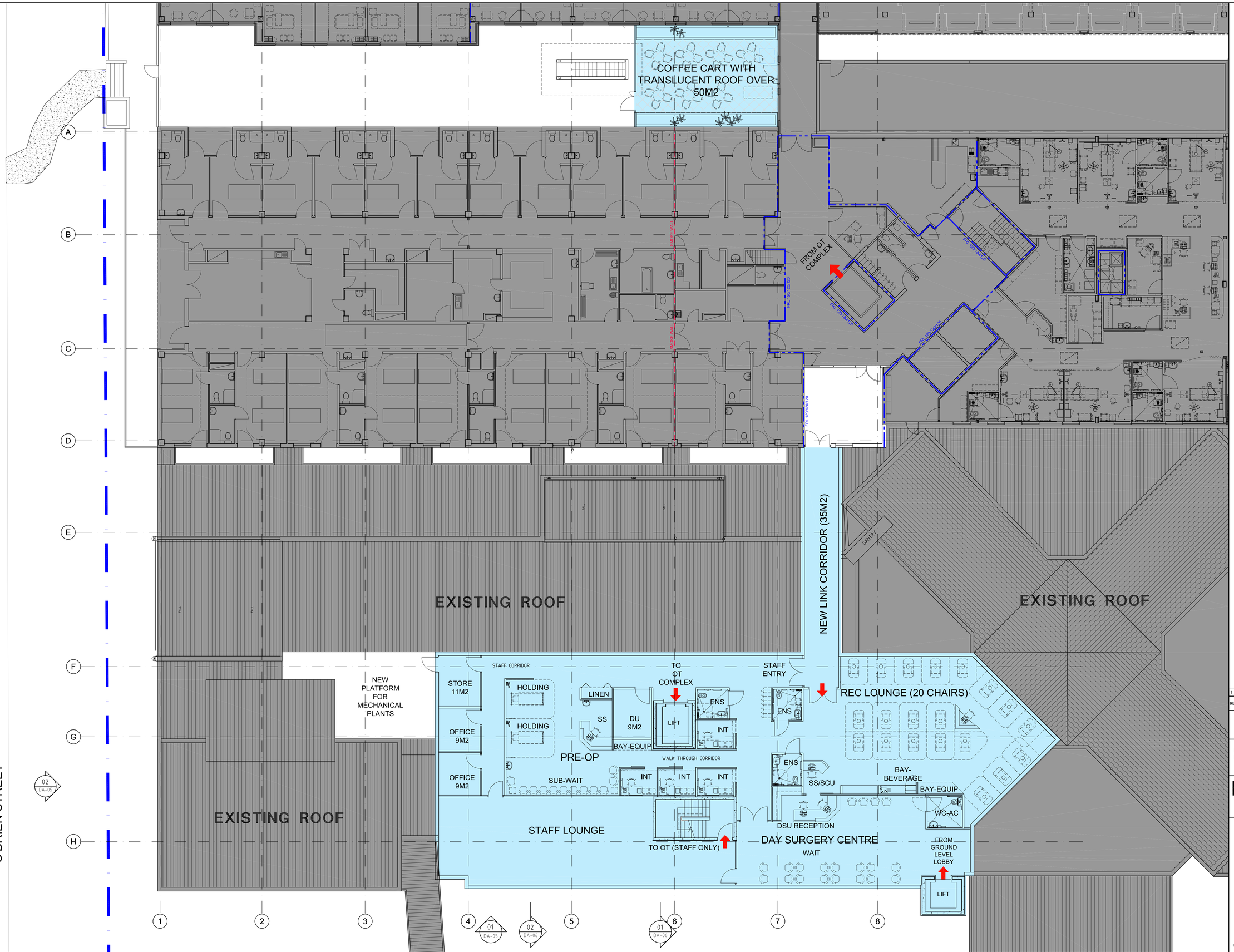
Reason for Issue: DA SUBMISSION

Drawing Title: PLAN - GROUND FLOOR

CAD File: LMPH14-DA-02

Dwg.No.: LMPH14-DA-02

Issue: 1



LEGEND:

- WORK IN EXISTING FOOTPRINT
- WORK IN ADDITION TO EXISTING FOOTPRINT
- EXISTING BUILDING
- SITE BOUNDARY
- SMOKE COMPARTMENT WALL
- 60/60/60 FIRE RATED WALL
- 120/120/120 FIRE RATED WALL

REV	REVISION DESCRIPTION	DATE	BY
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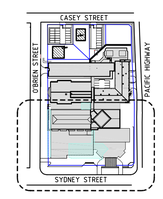

KEY PLAN

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Subject	By	Date
STRUCT		
SPEC. CONS		
SERV		

Subject	By	Date
PROJ ARCH		

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--	CX	HST	01.03.18	1:100

Drawing Title

PLAN - LEVEL 1

Reason for Issue

DA SUBMISSION

CAD File: LMPH14-DA-04

Dwg.No. **LMPH14-DA-04**

Issue **1**

LEGEND:

- WORK IN EXISTING FOOTPRINT
- WORK IN ADDITION TO EXISTING FOOTPRINT
- EXISTING BUILDING
- SITE BOUNDARY
- SMOKE WALL — SMOKE COMPARTMENT WALL
- FRL 60/60/60 — 60/60/60 FIRE RATED WALL
- FRL 120/120/120 — 120/120/120 FIRE RATED WALL

O'BRIEN STREET

SYDNEY STREET

CASEY STREET

PACIFIC HIGHWAY

DIRTY LIFT
LMR
CLEAN LIFT
COOLING
BOILER ROOM
DECONTAMINATION
CSSD
PACKING
PLANT
LOAN SET STORE
NEW WASHER
RECEIVING
SERVICES
COVERED AREA
SV
HOT WATER PLANT
MEDICAL AIR DRYERS & COMPRESSORS
SWITCH ROOM
SWITCH ROOM
WC
PLANTROOM
VOID
NEW LIFT PIT
NEW LIFT PIT
CONC. DRIVEWAY
EXISTING DRIVEWAY EXIT ONLY
BOOM GATE
EXISTING PARKING
EXISTING WALK BRIDGE ABOVE
ONE-WAY DRIVEWAY
EXISTING PARKING
BITUMEN
BITUMEN
CONC. KERB
CONC. KERB
CONC. KERB
GRASS
GRASS
GRASS
FIRE HYD. BOOSTER PUMP
ELEC. KIOSK
ELEC. KIOSK
ELEC. KIOSK
EASEMENT FOR ELECTRICITY SUBSTATION 5.3 WIDE
EASEMENT FOR ELECTRICITY PURPOSES 5.5 WIDE
WATER METER
BOOM GATE
EXISTING DRIVEWAY ENTRY ONLY
PP
CONC. PATHWAY
CONC. PATHWAY
HV
HV
HV
HV
01 DA-05
02 DA-06
01 DA-04
02 DA-05
D001
D002
D003
D004
34.0
33.0
32.8
32.6
32.4
32.2
32.0
31.8
31.6
31.4
31.2
31.0
30.8
30.6
30.4
30.2
30.0
29.8
(37.535)

REV	REVISION DESCRIPTION	DATE	BY
1	FIRST ISSUE	01.03.18	CX

Project
LAKE MACQUARIE PRIVATE HOSPITAL

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RAMSAY HEALTH CARE PTY LIMITED ACN 003 184 889

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KEY PLAN

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Subject	By	Date
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Block/ Zone: --
Drawn: CX
Checked: HST
Date: 01.03.18
Scale/s: 1:100

Drawing Title: **PLAN - LOWER GROUND**

Reason for Issue: DA SUBMISSION

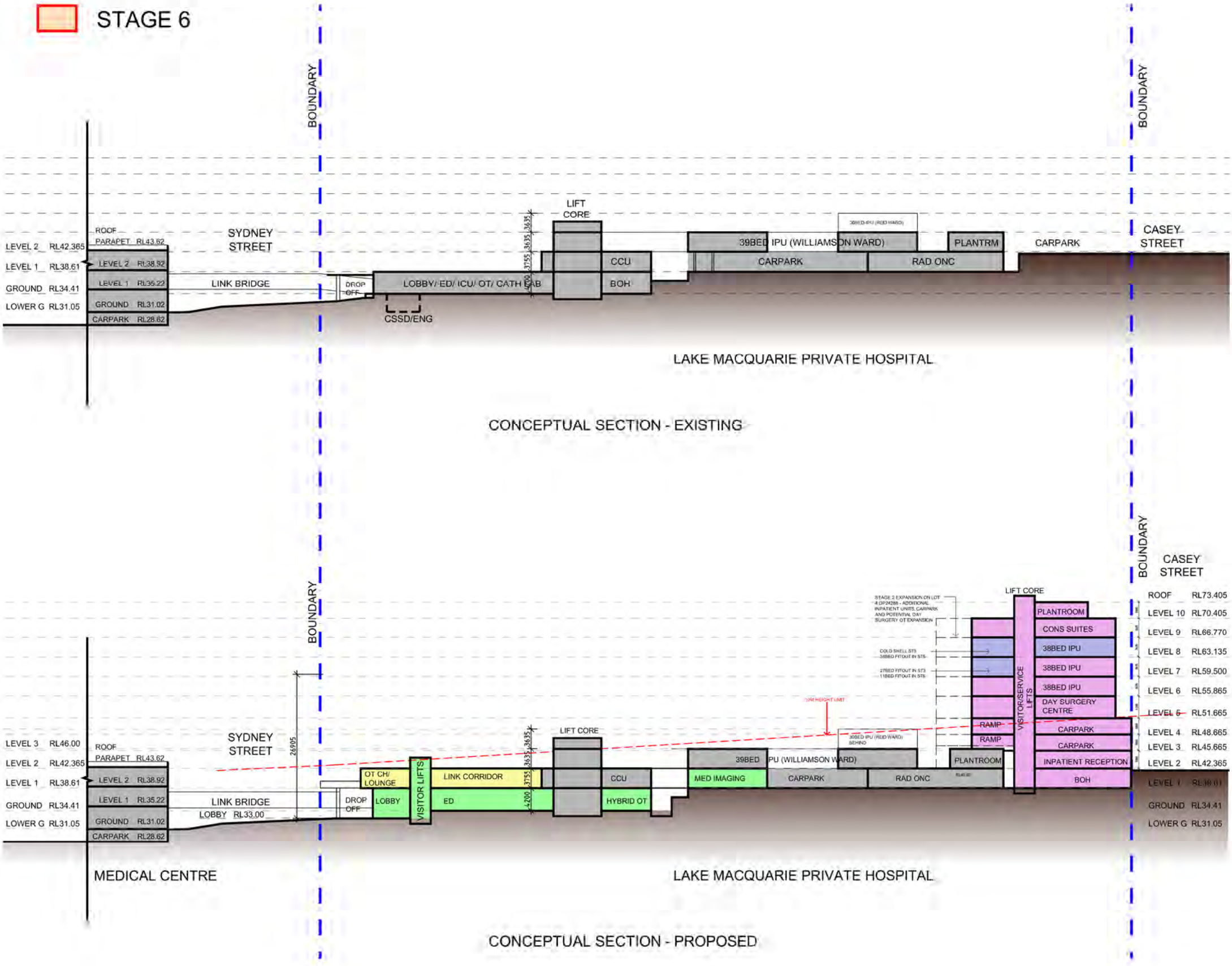
CAD File: LMPH14-DA-02
Dwg.No.: **LMPH14-DA-02**
Issue: **1**

Appendix B

Concept Plans

LEGEND:

- STAGE 1
- STAGE 2
- STAGE 3
- STAGE 4
- STAGE 5
- STAGE 6



CONCEPTUAL SECTION - PROPOSED

ARCHITECTS AND HEALTH FACILITY PLANNERS

LAKE MACQUARIE PRIVATE HOSPITAL MASTERPLAN

STAGING SECTION - OPTION 16

0 5 10 20 30

SCALE 1:750 @ A3

LMPH17-STAGING-SECTION

ISSUE 4 2 October 2021

LEGEND:

- STAGE 1
- STAGE 2
- STAGE 3
- STAGE 4
- STAGE 5
- STAGE 6

CASEY STREET

SITE BOUNDARY

4
DP24288

SITE BOUNDARY

SITE BOUNDARY

O'BRIEN STREET

PACIFIC HIGHWAY

STAGE 2
152m2

LOAN
SET
STORE

GSSD LOAN
ITEMS
LOADING
ZONE

SITE BOUNDARY

SYDNEY STREET

STAGE 6
520m2

SUPPORT
OR
TENANCY
SPACE
366M2

MEDICAL SUITES

PHARMACY
150M2

HUGHES STREET

ARCHITECTS AND HEALTH FACILITY PLANNERS

LAKE MACQUARIE PRIVATE HOSPITAL
MASTERPLAN

LOWER GROUND LEVEL STAGING PLAN - OPTION 16

0 5 10 15 20

SCALE 1:600 @ A3

LMPH17-STAGING-1

ISSUE 4 2 October 2021

LEGEND:

- STAGE 1
- STAGE 2
- STAGE 3
- STAGE 4
- STAGE 5
- STAGE 6

CASEY STREET

SITE BOUNDARY

4
DP24288

O'BRIEN STREET

PACIFIC HIGHWAY

AMBULANCE DROP OFF

NIL SETBACK

STAGE 2C
35m2

STAGE 2B
297m2

STAGE 2C
364m2

STAGE 4
222m2

STAGE 4
235m2

STAGE 4
387m2

STAGE 4
320m2

STAGE 2A
757m2

RECOVERY LOUNGE (20)
SUPPORT
HYBRID OT SUITE (213M2)
HY OT SUPPORT
OT RECEPTION
OT COMPLEX
STERILE STOCK (145M2)
SUPPLY
EQUIPMENT STORE (40M2)
CSSD (180M2)
CSSD (C)
CSSD (D)
LOAN SET ROOM
STORE ICU (25m2)
OT 55M2
OT 55M2
ED EXP. (250M2)
CATH LAB STAFF ROOM (3M2)
TRIAGE
RESUS
STORE
ACUTE HALL (6 BAYS)
ED STAFF RM
CATH LAB
HOSPITAL GROUND RL34.41
ED WAITING EXP
ED
HOSPITAL VISITOR LIFTS
HOSPITAL LOBBY
NON ACUTE HALL (8 BAYS)
EXISTING WALKWAY
AIRLOCK RL33.99
TO LOWER GROUND CARPARK
DROP OFF
EXIT
ENTRY
ALTERNATIVE EXIT
SITE BOUNDARY

SYDNEY STREET

STAGE 4
104m2

MEDICAL ONCOLOGY SUITE
DAY ONC EXP 104M2
MEDICAL SUITES
DAY ONCOLOGY
HIG CARDIO VASCULAR CENTRE
DHM

HUGHES STREET

HPI
ARCHITECTS AND HEALTH FACILITY PLANNERS

LAKE MACQUARIE PRIVATE HOSPITAL
MASTERPLAN

GROUND LEVEL STAGING PLAN - OPTION 16

0 5 10 15 20
SCALE 1:600 @ A3
LMPH17-STAGING-2
ISSUE 4 2 October 2021

LEGEND:

- STAGE 1
- STAGE 2
- STAGE 3
- STAGE 4
- STAGE 5
- STAGE 6

CASEY STREET

KITCHEN 290M2
WASTE 68M2
ENG (SUBSTATION/ SWB)
ENG
LINEN 40M2
SERVICE LIFTS LOBBY
(RL38.610)
LOADING DOCK
(RL38.165)
SERVICES VIHECLE ENTRY/ EXIT
NEW CORRIDOR LINK
SUPPLY 44M2
SUPPLY 108M2
STAGE 3
1230m2
RADIATION ONCOLOGY
24BED IPU (CAIN WARD)
MEDICAL IMAGING 665M2
STAGE 5
760m2
STAGE 4
23m2
15BED IPU (SCOTT WARD)
CCU EXPANSION
10BED CCU (EXISTING)
CCU 8
CCU 7
CCU 6
CCU 5
CCU 4
CCU 3
CCU 2
CCU 1
STAFF AMENITIES
CCU VISITOR'S LOUNGE
STAGE 4
133m2
O'BRIEN STREET
EXISTING ROOF
ROOF
EXISTING ROOF
ROOF
PACIFIC HIGHWAY
PLANT ENC
OT STAFF LOUNGE 140M2
OT CH (F) 55M2
OT CH (M) 55M2
ADMISSION
HOSPITAL RECEPTION
PUBLIC AMENITIES
SPT
VOID
EDUCATION/ TRAINING
EXISTING ROOF
CANOPY ROOF OVER ENTRANCE
STAGE 2
568m2
STAGE 4
302m2
SYDNEY STREET
MEDICAL SUITES
HUGHES STREET

HPI
ARCHITECTS AND HEALTH FACILITY PLANNERS

LAKE MACQUARIE PRIVATE HOSPITAL MASTERPLAN

LEVEL 1 STAGING PLAN - OPTION 16

0 5 10 15 20
SCALE 1:600 @ A3
LMPH17-STAGING-3
ISSUE 4 2 October 2021

LEGEND:

- STAGE 1
- STAGE 2
- STAGE 3
- STAGE 4
- STAGE 5
- STAGE 6

CASEY STREET

EXIT

ENTRY

INPATIENT DROP OFF

STAGE 3
791m2

STAGE 3
794m2

LEVEL 2 CARPARK ENTRY/ EXIT (RL42.365)

CARPARK (28)
RL42.365

AIRLOCK RL42.365

CAFE

LOBBY

TRAINING (52M2)

EXECUTIVE/ ADMINISTRATION 269M2

ADMISSION

BEYOND STAGE 5 CARPARK 677m2

FUTURE CARPARK EXPANSION (28)
OR
DAY SURGERY CENTRE (3 OTS)

STORAGE
MED RECORDS
80M2

PLANTROOM

TEMP DOSA

REC STAGE 2&3 (22)

PRE-OP HOLDING

STAGE 1
602m2

24BED IPU
(HILL WARD)

VOID

39BED IPU (WILLIAMSON WARD)

BED 1 BED 2 BED 3 BED 4 BED 5 BED 6 BED 7 BED 8 BED 9 BED 10 BED 11

INPATIENT UNIT (18BED)

BED 17 BED 16 BED 15 SUPPORT BED 14 BED 13 BED 12 BED 11

STAGE 2B
602m2

TEMP DOSA TO BE CONVERTED TO 18BED INPATIENT UNIT AT COMPLETION OF OT EXPANSION

PACIFIC HIGHWAY

SYDNEY STREET

HUGHES STREET

ARCHITECTS AND HEALTH FACILITY PLANNERS

LAKE MACQUARIE PRIVATE HOSPITAL MASTERPLAN

LEVEL 2 STAGING PLAN - OPTION 16

0 5 10 15 20

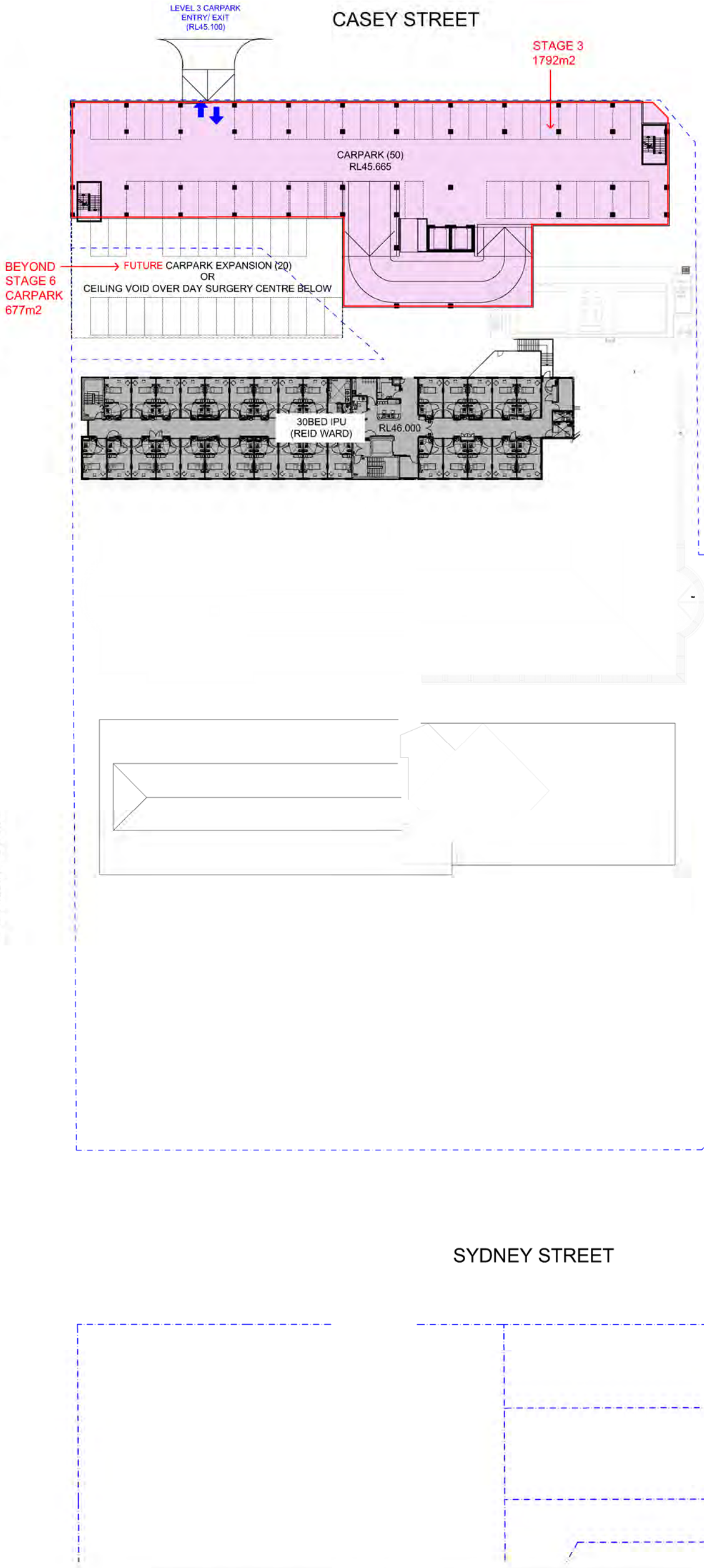
SCALE 1:600 @ A3

LMPH17-STAGING-4

ISSUE 4 2 October 2021

LEGEND:

- STAGE 1
- STAGE 2
- STAGE 3
- STAGE 4
- STAGE 5
- STAGE 6



ARCHITECTS AND HEALTH FACILITY PLANNERS

LAKE MACQUARIE PRIVATE HOSPITAL MASTERPLAN

LEVEL 3 STAGING PLAN - OPTION 16

0 5 10 15 20

SCALE 1:600 @ A3

LMPH17-STAGING-5

ISSUE 4 2 October 2021

LEGEND:

- STAGE 1
- STAGE 2
- STAGE 3
- STAGE 4
- STAGE 5
- STAGE 6

CASEY STREET

STAGE 3
1792m2

CARPARK (42)
RL48.665

PLANTROOM

BEYOND
STAGE 6
CARPARK
677m2

FUTURE CARPARK EXPANSION (20)

O'BRIEN STREET

PACIFIC HIGHWAY

SYDNEY STREET

HUGHES STREET

ARCHITECTS AND HEALTH FACILITY PLANNERS

LAKE MACQUARIE PRIVATE HOSPITAL MASTERPLAN

LEVEL 4 STAGING PLAN - OPTION 16

0 5 10 15 20

SCALE 1:600 @ A3

LMPH17-STAGING-6

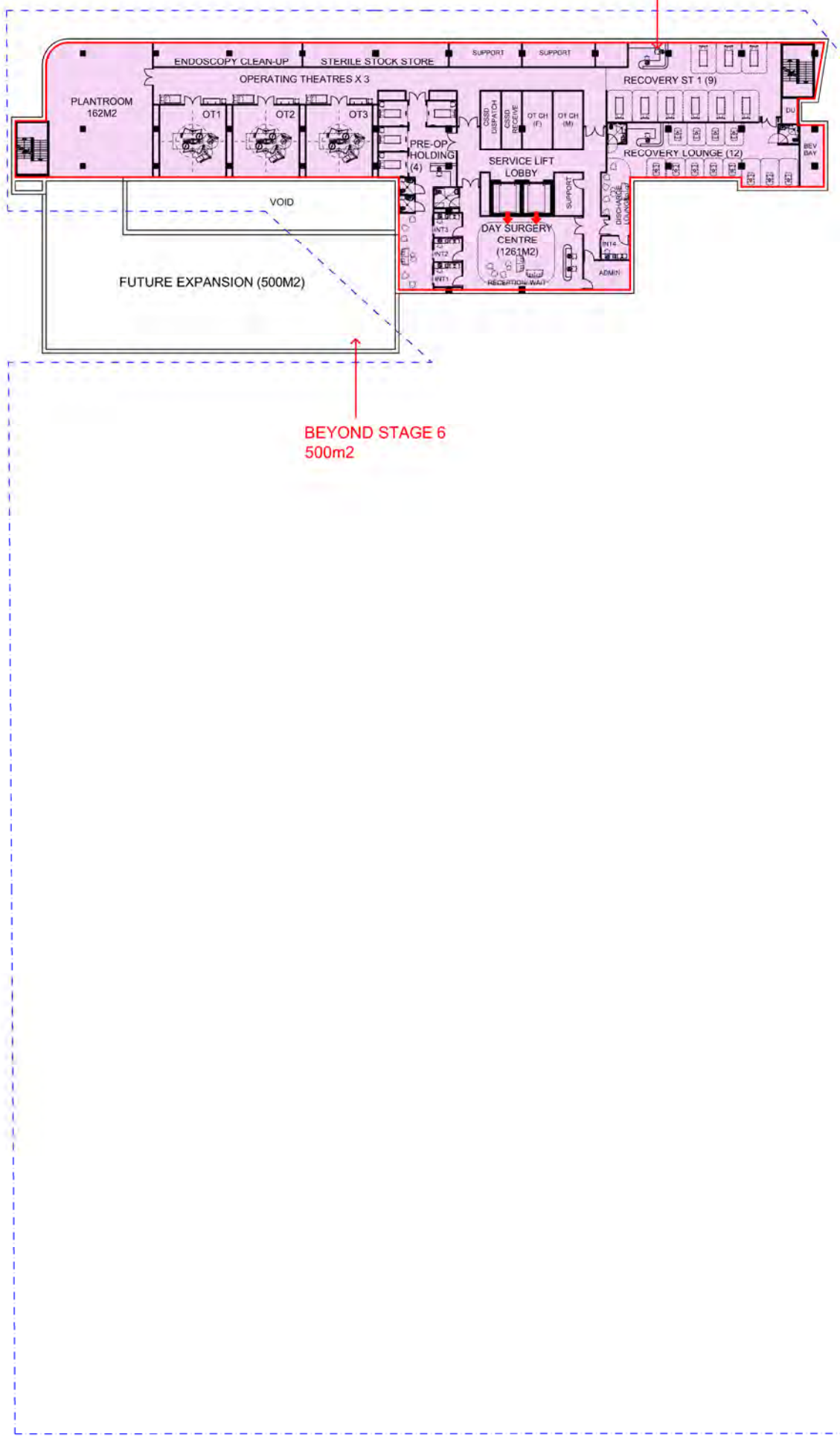
ISSUE 4 2 October 2021

LEGEND:

- STAGE 1
- STAGE 2
- STAGE 3
- STAGE 4
- STAGE 5
- STAGE 6

CASEY STREET

STAGE 3 - COLD SHELL
STAGE 5 - FITOUT (TIMING TBC)
1504m2



BEYOND STAGE 6
500m2

O'BRIEN STREET

PACIFIC HIGHWAY

SYDNEY STREET

ARCHITECTS AND HEALTH FACILITY PLANNERS

LAKE MACQUARIE PRIVATE HOSPITAL MASTERPLAN

LEVEL 5 STAGING PLAN - OPTION 16

0 5 10 15 20

SCALE 1:600 @ A3

LMPH17-STAGING-7

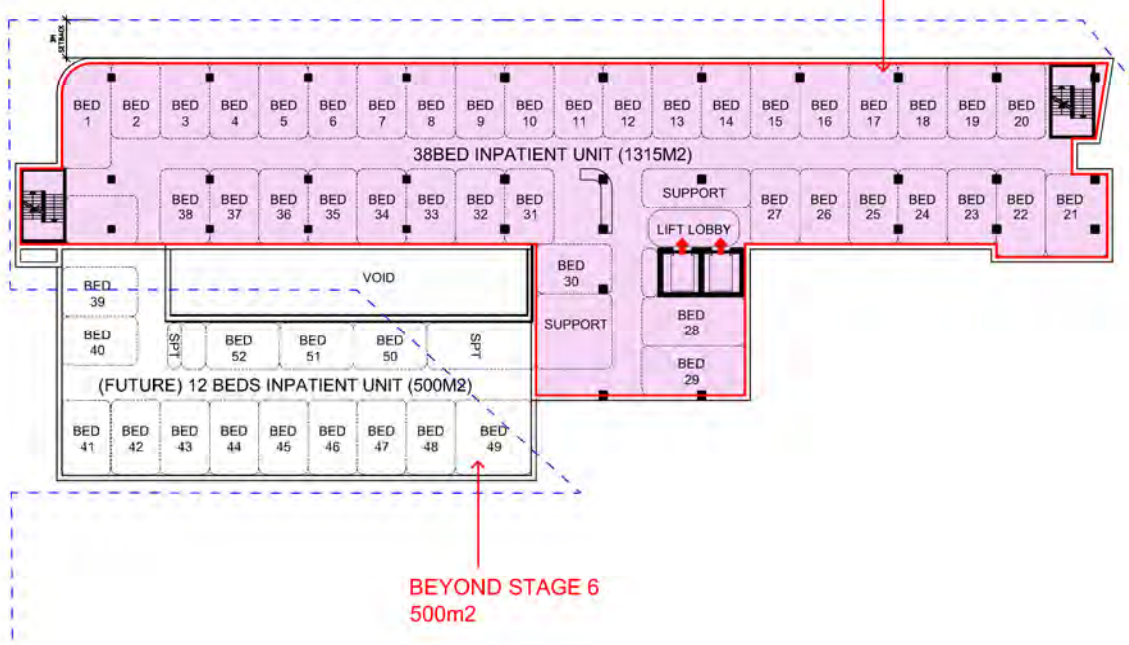
ISSUE 4 2 October 2021

LEGEND:

- STAGE 1
- STAGE 2
- STAGE 3
- STAGE 4
- STAGE 5
- STAGE 6

CASEY STREET

STAGE 3
1408m2



BEYOND STAGE 6
500m2

O'BRIEN STREET

PACIFIC HIGHWAY

SYDNEY STREET

ARCHITECTS AND HEALTH FACILITY PLANNERS

LAKE MACQUARIE PRIVATE HOSPITAL MASTERPLAN

LEVEL 6 STAGING PLAN - OPTION 16

0 5 10 15 20

SCALE 1:600 @ A3

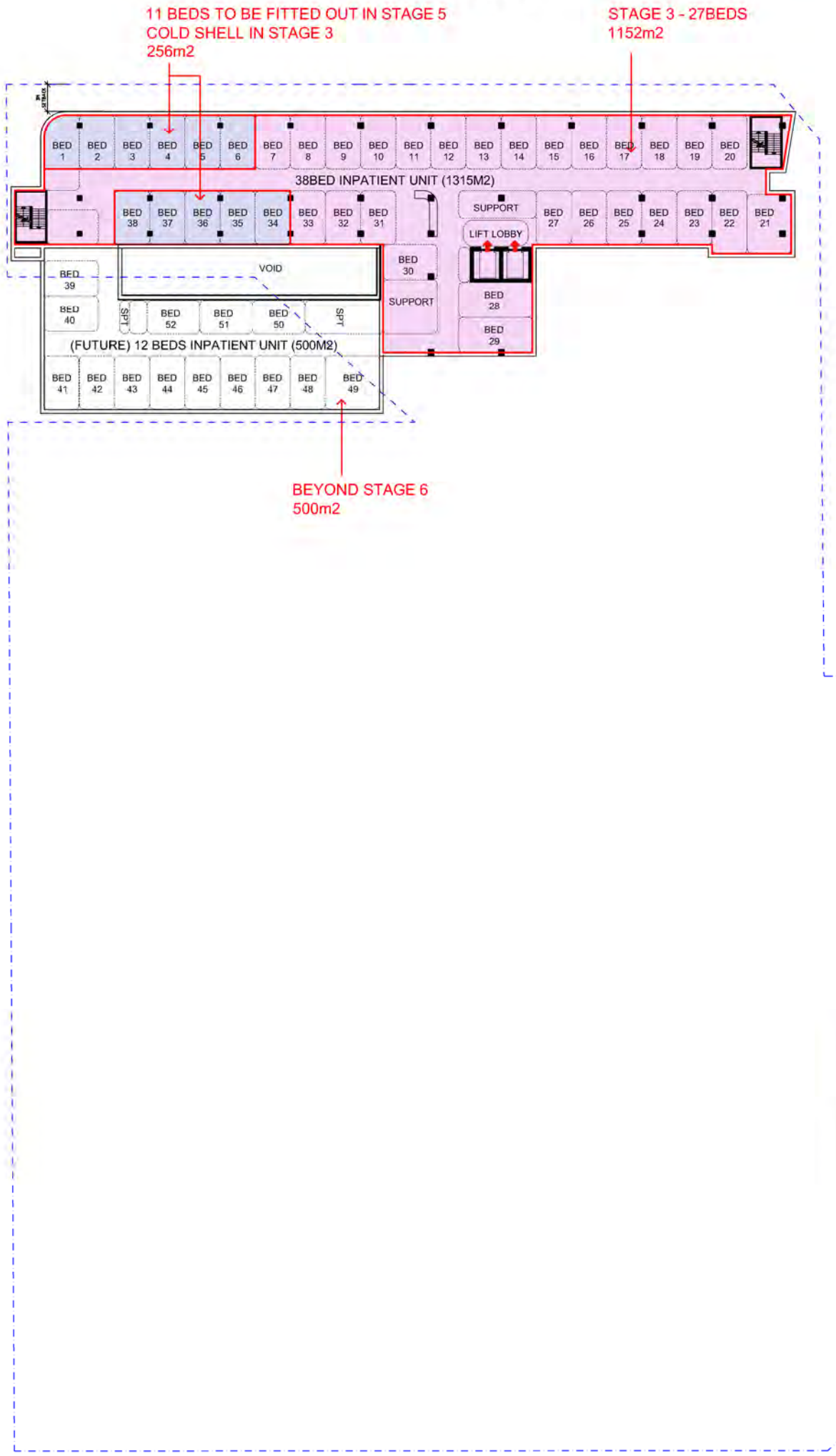
LMPH17-STAGING-8

ISSUE 4 2 October 2021

LEGEND:

- STAGE 1
- STAGE 2
- STAGE 3
- STAGE 4
- STAGE 5
- STAGE 6

CASEY STREET



O'BRIEN STREET

PACIFIC HIGHWAY

SYDNEY STREET

ARCHITECTS AND HEALTH FACILITY PLANNERS

LAKE MACQUARIE PRIVATE HOSPITAL MASTERPLAN

LEVEL 7 STAGING PLAN - OPTION 16

0 5 10 15 20

SCALE 1:600 @ A3

LMPH17-STAGING-9

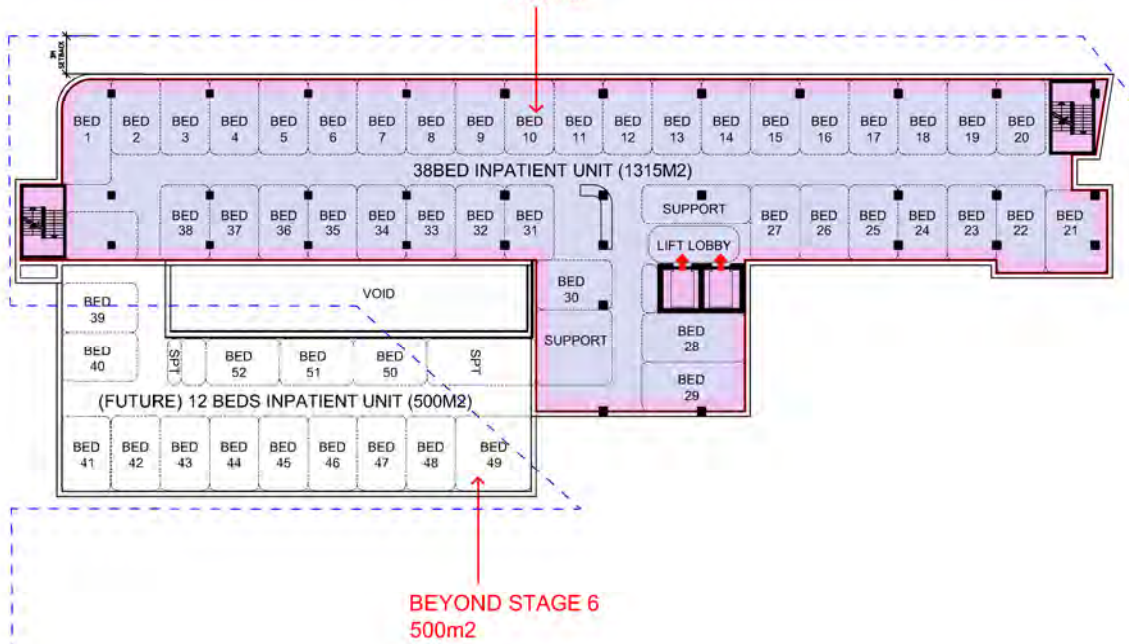
ISSUE 4 2 October 2021

LEGEND:

- STAGE 1
- STAGE 2
- STAGE 3
- STAGE 4
- STAGE 5
- STAGE 6

CASEY STREET

STAGE 3 COLD SHELL
STAGE 5 - FITOUT 38BEDS (TIMING TBC)
1408m2



BEYOND STAGE 6
500m2

O'BRIEN STREET

PACIFIC HIGHWAY

SYDNEY STREET

ARCHITECTS AND HEALTH FACILITY PLANNERS

LAKE MACQUARIE PRIVATE HOSPITAL MASTERPLAN

LEVEL 8 STAGING PLAN - OPTION 16

0 5 10 15 20

SCALE 1:600 @ A3

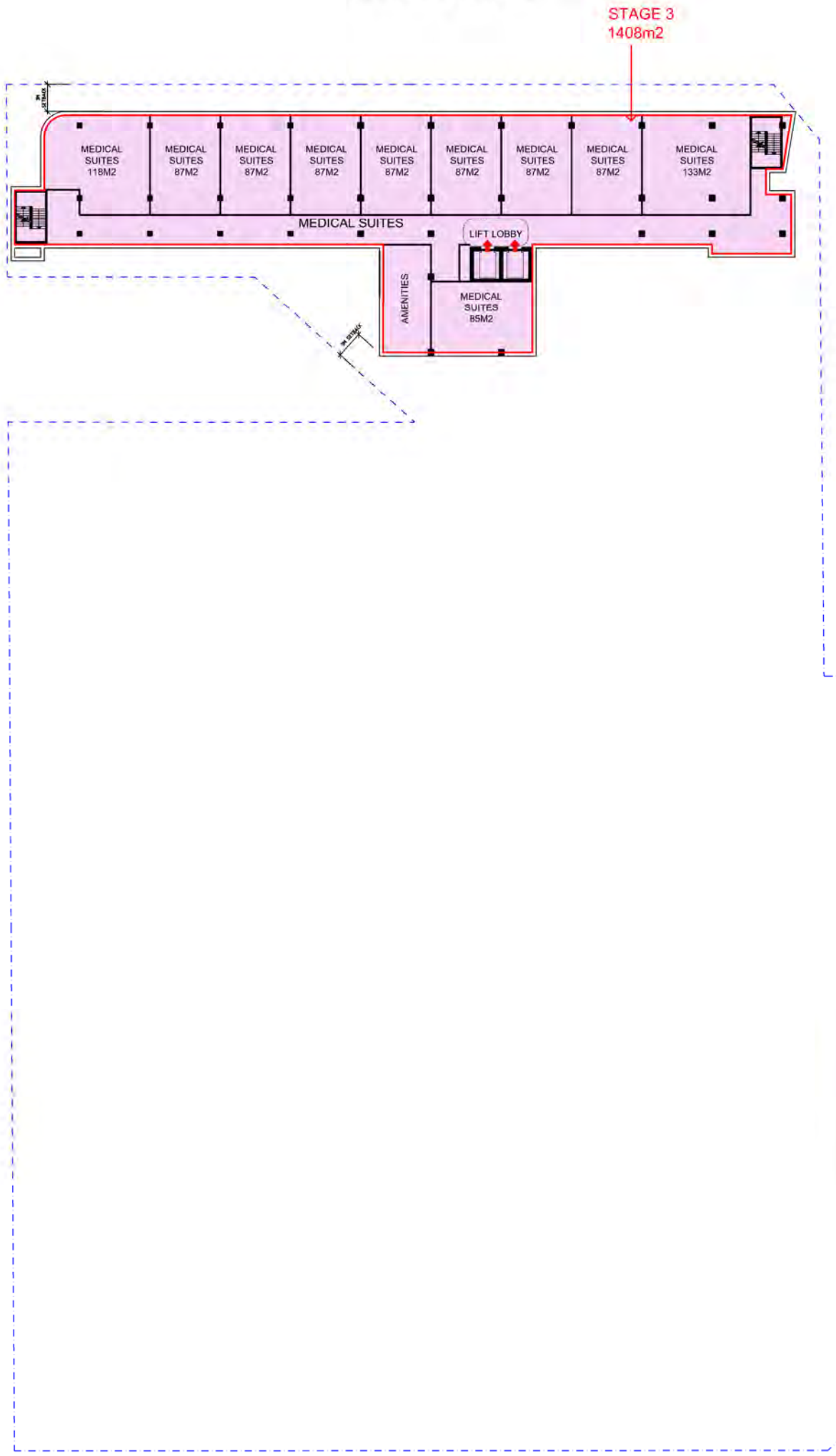
LMPH17-STAGING-10

ISSUE 4 2 October 2021

LEGEND:

- STAGE 1
- STAGE 2
- STAGE 3
- STAGE 4
- STAGE 5
- STAGE 6

CASEY STREET



O'BRIEN STREET

PACIFIC HIGHWAY

SYDNEY STREET

ARCHITECTS AND HEALTH FACILITY PLANNERS

LAKE MACQUARIE PRIVATE HOSPITAL MASTERPLAN

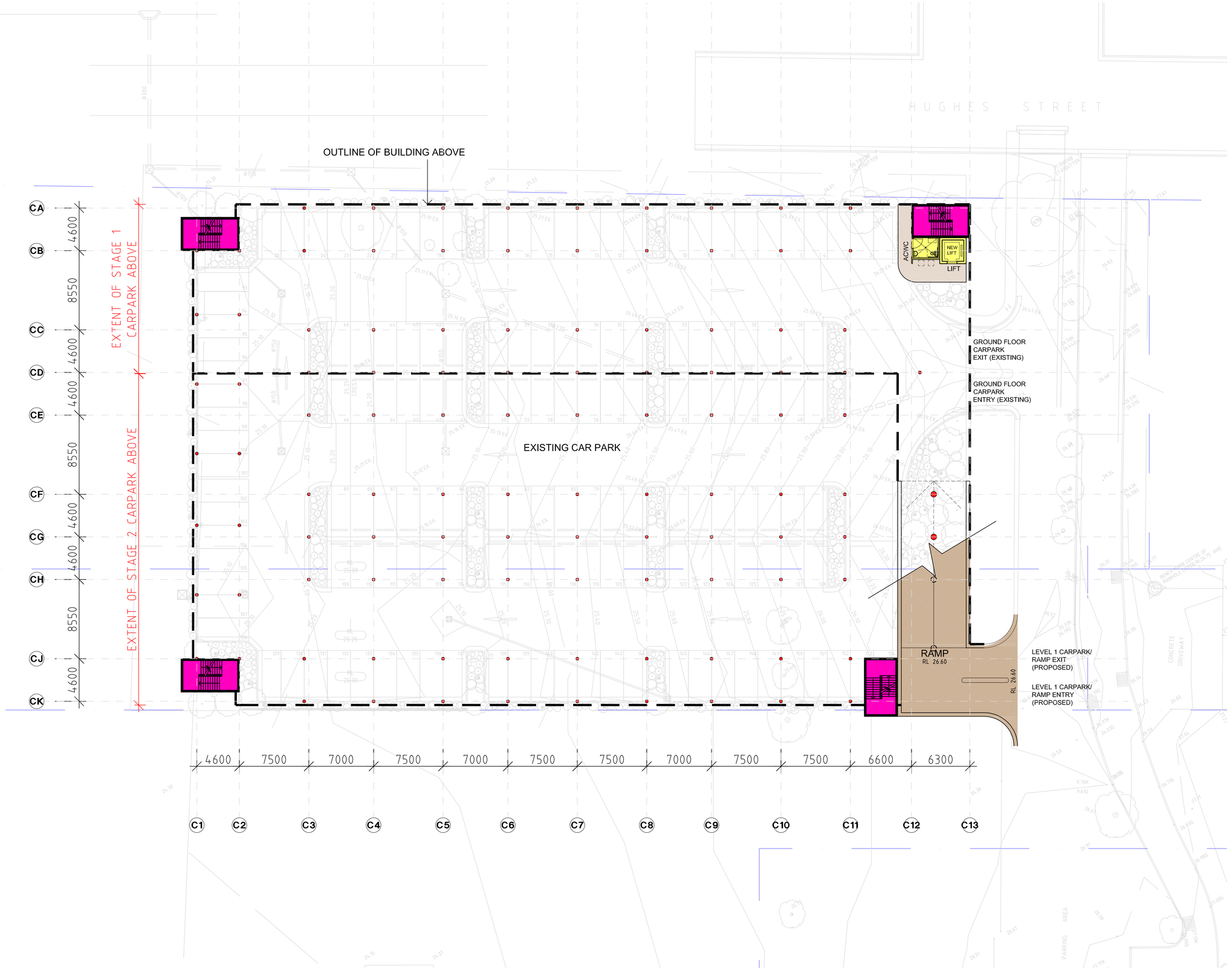
LEVEL 8 STAGING PLAN - OPTION 16

0 5 10 15 20

SCALE 1:600 @ A3

LMPH17-STAGING-11

ISSUE 4 2 October 2021



LEGEND:

SITE BOUNDARY

COLUMN ON GROUND FLOOR

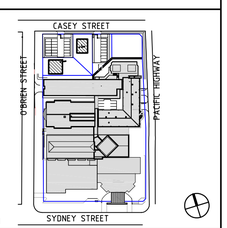
REV	REVISION DESCRIPTION	DATE	BY
1	FIRST ISSUE	19.10.21	HS

Project

LAKE MACQUARIE PRIVATE HOSPITAL

Principal

RAMSAY HEALTH CARE PTY LIMITED



KEY PLAN

USE FIGURED DIMENSIONS ONLY. DO NOT SCALE. ALL DIMENSIONS SHALL BE VERIFIED ON SITE AND DISCREPANCIES IMMEDIATELY BROUGHT TO THE ATTENTION OF THE PROJECT MANAGER FOR RESOLUTION

Quality Endorsed Company

Subject	By	Date	Subject	By	Date	Subject	By	Date
RDS			STRUCT			PROJ. ARCH		
ARCH			SPEC. CONS					
AUT			SERV					

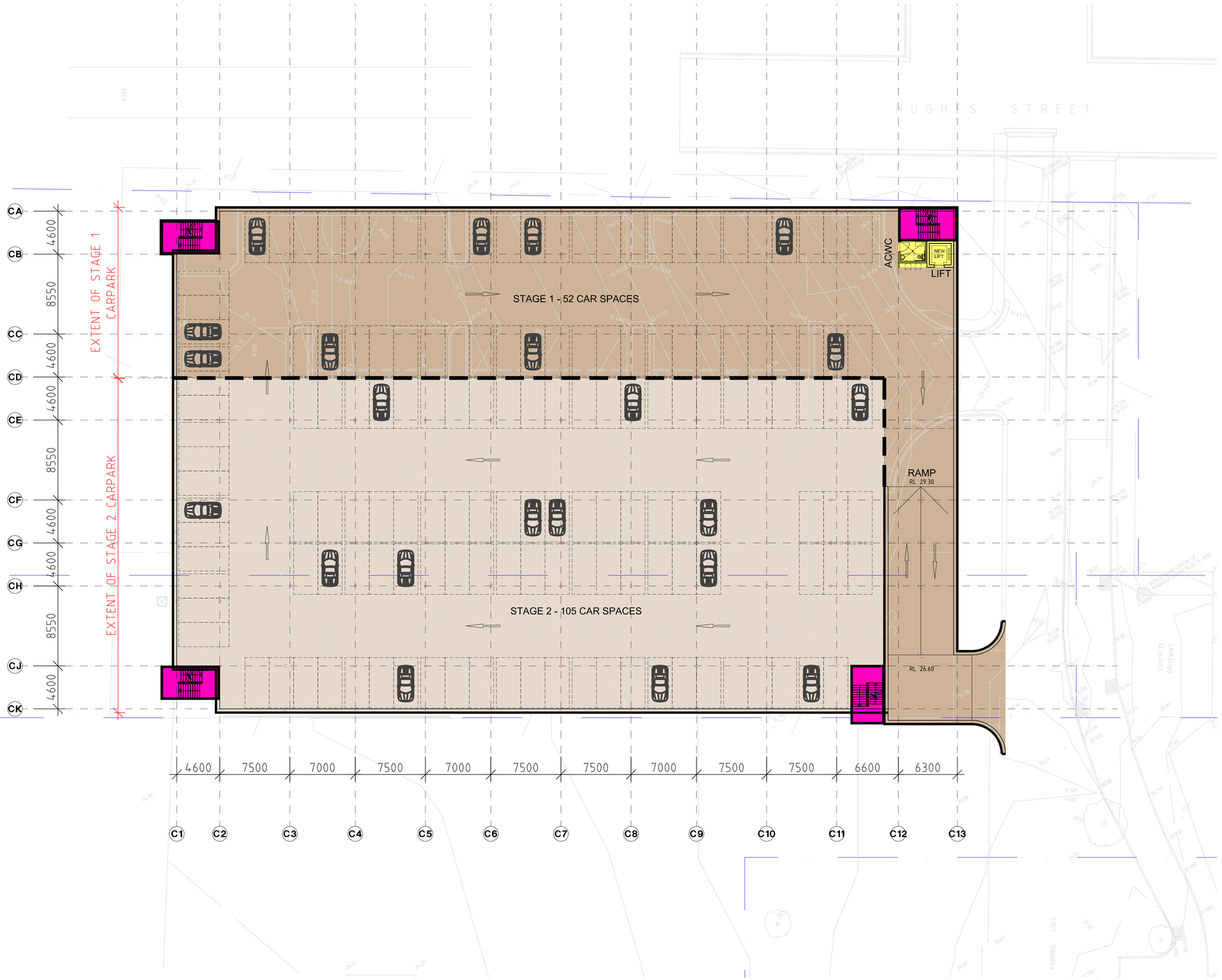
Block/ Zone	Drawn	Checked	Date	Scale/s
	AA	HST	19.10.21	1:200

Drawing Title

HUGHES STREET CARPARK - GROUND LEVEL

HEALTH PROJECTS INTERNATIONAL
Architects and Health Facility Planners
ACN 066 856 595
Suite 1, Ground Floor, 68 Millsons Point, NSW 2061
Ph: (02) 9460 4199 Fax: (02) 9460 4299

CAD File	Dwg.No.	Issue
LMPH18-CPG	**LMPH18-CPG**	**1**



LEGEND:

- SITE BOUNDARY
- COLUMN ON GROUND FLOOR

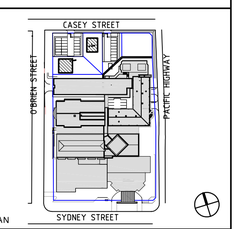
REV	REVISION DESCRIPTION	DATE	BY
1	FIRST ISSUE	18.10.21	HS

Project

LAKE MACQUARIE PRIVATE HOSPITAL

Principal

RAMSAY HEALTH CARE PTY LIMITED



KEY PLAN

USE FIGURED DIMENSIONS ONLY. DO NOT SCALE. ALL DIMENSIONS SHALL BE VERIFIED ON SITE AND DISCREPANCIES IMMEDIATELY BROUGHT TO THE ATTENTION OF THE PROJECT MANAGER FOR RESOLUTION

Subject	By	Date	Subject	By	Date	Subject	By	Date
RDS			STRUCT			PROJ. ARCH		
ARCH			SPEC. CONS					
AUT			SERV					

Block/ Zone	Drawn	Checked	Date	Scale/s
	AA	HST	18.10.21	1:200

Drawing Title

HUGHES STREET CARPARK - LEVEL 1

HEALTH PROJECTS INTERNATIONAL
Architects and Health Facility Planners
ACN 066 856 595
Suite 1, Ground Floor, 68 Millsons Point, NSW 2061
Ph: (02) 9460 4199 Fax: (02) 9460 4299

CAD File	Dwg.No.	Issue
LMPH18-CP1	**LMPH18-CP1**	**1**

Appendix C

Traffic Volume Data

TRANS TRAFFIC SURVEY

TURNING MOVEMENT SURVEY

trafficsurvey.com.au

Intersection of The Crescent and Pacific Hwy, Gateshead

GPS -32.981949, 151.692351

Date:	Wed 13/10/21
Weather:	Overcast
Suburban:	Gateshead
Customer:	TTPA

North:	Pacific Hwy
East:	The Crescent
South:	Pacific Hwy
West:	Sydney St

Survey Period	AM:	6:30 AM-9:30 AM
	PM:	3:00 PM-6:00 PM
Traffic Peak	AM:	8:00 AM-9:00 AM
	PM:	3:30 PM-4:30 PM

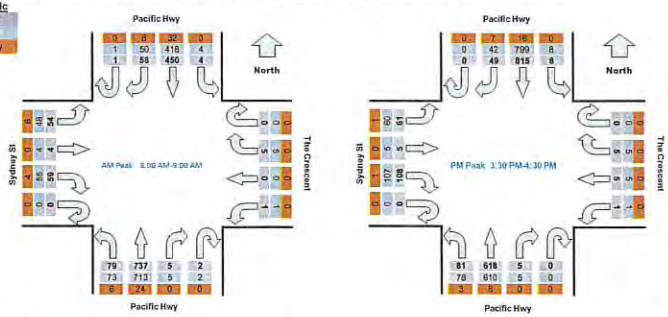
All Vehicles

Time		North Approach Pacific Hwy				East Approach The Crescent				South Approach Pacific Hwy				West Approach Sydney St				Hourly Total	
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L	Hour	Peak
6:30	6:45	0	5	65	0	0	1	0	0	0	0	162	18	0	9	0	11	1061	
6:45	7:00	0	11	84	0	0	3	0	0	0	0	146	20	0	17	0	16	1105	
7:00	7:15	0	4	64	0	0	1	2	0	0	2	119	10	0	4	1	11	1138	
7:15	7:30	0	6	86	0	0	0	0	0	0	0	150	7	0	9	1	16	1271	
7:30	7:45	0	8	100	1	0	0	0	0	0	0	178	9	0	9	0	10	1359	
7:45	8:00	0	12	114	0	0	0	1	0	0	2	150	19	0	21	0	11	1440	
8:00	8:15	0	17	96	0	0	0	0	0	0	1	181	26	0	14	1	15	1459	Peak
8:15	8:30	0	12	106	1	0	2	0	0	2	0	188	17	0	14	1	20	1445	
8:30	8:45	1	12	123	1	0	1	0	1	0	3	205	19	0	18	2	10	1396	
8:45	9:00	0	17	125	2	0	2	0	0	0	1	163	17	0	13	0	9		
9:00	9:15	0	11	102	0	0	1	1	0	0	1	165	29	0	17	1	9		
9:15	9:30	0	4	114	0	0	0	2	0	0	0	128	31	0	25	0	10		
15:00	15:15	0	11	173	3	0	1	2	1	0	2	145	43	0	24	0	19	1722	
15:15	15:30	0	14	188	2	0	2	1	0	0	0	154	22	0	33	0	8	1730	
15:30	15:45	0	12	178	2	0	2	0	0	0	1	161	21	0	27	1	11	1761	Peak
15:45	16:00	0	12	231	2	0	2	0	0	0	0	143	23	0	25	0	20	1747	
16:00	16:15	0	14	187	1	0	1	4	1	0	3	159	19	0	30	1	12	1705	
16:15	16:30	0	11	219	3	0	0	1	0	0	1	155	18	0	26	3	18	1659	
16:30	16:45	0	5	190	1	0	1	1	2	0	4	153	19	0	19	1	6	1635	
16:45	17:00	0	5	210	4	0	1	2	0	0	1	159	11	0	16	1	6	1610	
17:00	17:15	0	8	171	2	0	1	2	0	0	3	151	18	0	26	0	4	1525	
17:15	17:30	0	11	232	1	0	0	2	1	0	2	137	12	0	23	1	9		
17:30	17:45	0	6	164	1	0	2	1	1	0	0	163	13	0	21	1	4		
17:45	18:00	0	9	176	1	0	0	0	0	0	3	107	18	0	11	1	5		

Peak Time		North Approach Pacific Hwy				East Approach The Crescent				South Approach Pacific Hwy				West Approach Sydney St				Peak
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L	total
8:00	9:00	1	58	450	4	0	5	0	1	2	5	737	79	0	59	4	54	1459
15:30	16:30	0	49	815	8	0	5	5	1	0	5	618	81	0	108	5	61	1761

Note: Site sketch is for illustrating traffic flows. Direction is indicative only, drawing is not to scale and not an exact streets configuration.

Graphic: Total / Light / Heavy



Light Vehicles

Time		North Approach Pacific Hwy				East Approach The Crescent				South Approach Pacific Hwy				West Approach Sydney St			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
6:30	6:45	0	4	62	0	0	1	0	0	0	0	156	18	0	9	0	11
6:45	7:00	0	11	82	0	0	3	0	0	0	0	139	20	0	17	0	16
7:00	7:15	0	4	62	0	0	1	2	0	0	2	115	10	0	4	1	11
7:15	7:30	0	6	79	0	0	0	0	0	0	0	148	7	0	9	1	14
7:30	7:45	0	8	96	1	0	0	0	0	0	0	170	9	0	8	0	10
7:45	8:00	0	12	107	0	0	0	1	0	0	2	144	19	0	20	0	11
8:00	8:15	0	14	90	0	0	0	0	0	0	1	176	23	0	13	1	14
8:15	8:30	0	8	97	1	0	2	0	0	2	0	181	16	0	12	1	18
8:30	8:45	1	11	112	1	0	1	0	1	0	3	199	18	0	18	2	8
8:45	9:00	0	17	119	2	0	2	0	0	0	1	157	16	0	12	0	8
9:00	9:15	0	10	95	0	0	1	1	0	0	1	161	29	0	15	1	6
9:15	9:30	0	4	110	0	0	0	2	0	0	0	123	31	0	23	0	9
15:00	15:15	0	11	167	3	0	1	2	1	0	2	138	42	0	24	0	19
15:15	15:30	0	14	180	2	0	2	1	0	0	0	149	21	0	32	0	7
15:30	15:45	0	11	174	2	0	2	0	0	0	1	161	19	0	27	1	10
15:45	16:00	0	6	227	2	0	2	0	0	0	0	139	22	0	25	0	20
16:00	16:15	0	14	183	1	0	1	4	1	0	3	155	19	0	29	1	12
16:15	16:30	0	11	215	3	0	0	1	0	0	1	155	18	0	26	3	18
16:30	16:45	0	5	189	1	0	1	1	2	0	4	150	19	0	19	1	6
16:45	17:00	0	5	209	4	0	1	2	0	0	1	156	11	0	16	1	6
17:00	17:15	0	8	169	2	0	1	2	0	0	3	151	18	0	26	0	4
17:15	17:30	0	11	229	1	0	0	2	1	0	2	137	12	0	23	1	9
17:30	17:45	0	6	162	1	0	2	1	1	0	0	162	13	0	21	1	4
17:45	18:00	0	9	173	1	0	0	0	0	0	3	105	18	0	11	1	5

Peak Time		North Approach Pacific Hwy				East Approach The Crescent				South Approach Pacific Hwy				West Approach Sydney St				Peak
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L	total
8:00	9:00	1	50	418	4	0	5	0	1	2	5	713	73	0	55	4	48	1379
15:30	16:30	0	42	799	8	0	5	5	1	0	5	610	78	0	107	5	60	1725

Heavy Vehicles

Time		North Approach Pacific Hwy				East Approach The Crescent				South Approach Pacific Hwy				West Approach Sydney St			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
6:30	6:45	0	1	3	0	0	0	0	0	0	0	6	0	0	0	0	0
6:45	7:00	0	0	2	0	0	0	0	0	0	0	7	0	0	0	0	0
7:00	7:15	0	0	2	0	0	0	0	0	0	0	4	0	0	0	0	0
7:15	7:30	0	0	7	0	0	0	0	0	0	0	2	0	0	0	0	2
7:30	7:45	0	0	4	0	0	0	0	0	0	0	8	0	0	1	0	0
7:45	8:00	0	0	7	0	0	0	0	0	0	0	6	0	0	1	0	0
8:00	8:15	0	3	6	0	0	0	0	0	0	0	5	3	0	1	0	1
8:15	8:30	0	4	9	0	0	0	0	0	0	0	7	1	0	2	0	2
8:30	8:45	0	1	11	0	0	0	0	0	0	0	6	1	0	0	0	2
8:45	9:00	0	0	6	0	0	0	0	0	0	0	6	1	0	1	0	1
9:00	9:15	0	1	7	0	0	0	0	0	0	0	4	0	0	2	0	3
9:15	9:30	0	0	4	0	0	0	0	0	0	0	5	0	0	2	0	1
15:00	15:15	0	0	6	0	0	0	0	0	0	0	7	1	0	0	0	0
15:15	15:30	0	0	8	0	0	0	0	0	0	0	5	1	0	1	0	1
15:30	15:45	0	1	4	0	0	0	0	0	0	0	0	2	0	0	0	1
15:45	16:00	0	6	4	0	0	0	0	0	0	0	4	1	0	0	0	0
16:00	16:15	0	0	4	0	0	0	0	0	0	0	4	0	0	1	0	0
16:15	16:30	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0
16:30	16:45	0	0	1	0	0	0	0	0	0	0	3	0	0	0	0	0
16:45	17:00	0	0	1	0	0	0	0	0	0	0	3	0	0	0	0	0
17:00	17:15	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
17:15	17:30	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0
17:30	17:45	0	0	2	0	0	0	0	0	0	0	1	0	0	0	0	0
17:45	18:00	0	0	3	0	0	0	0	0	0	0	2	0	0	0	0	0

Peak Time		North Approach Pacific Hwy				East Approach The Crescent				South Approach Pacific Hwy				West Approach Sydney St				Peak
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L	total
8:00	9:00	0	8	32	0	0	0	0	0	0	0	24	6	0	4	0	6	80
15:30	16:30	0	7	16	0	0	0	0	0	0	0	8	3	0	1	0	1	36

TRANS TRAFFIC SURVEY

trafficsurvey.com.au

TURNING MOVEMENT SURVEY

Carpark Access off Hughes St, Gateshead

GPS	*-32.982678, 151.690775*
Date:	Wed 13/10/21
Weather:	Overcast
Suburban:	Gateshead
Customer:	TTPA

All Vehicles

Time		In	Out
Period Start	Period End		
6:30	6:45	8	1
6:45	7:00	19	0
7:00	7:15	4	0
7:15	7:30	7	0
7:30	7:45	8	0
7:45	8:00	16	0
8:00	8:15	15	0
8:15	8:30	19	1
8:30	8:45	6	0
8:45	9:00	10	0
9:00	9:15	3	1
9:15	9:30	4	0
15:00	15:15	1	8
15:15	15:30	1	7
15:30	15:45	1	6
15:45	16:00	1	6
16:00	16:15	0	12
16:15	16:30	0	14
16:30	16:45	1	11
16:45	17:00	0	8
17:00	17:15	0	19
17:15	17:30	0	6
17:30	17:45	0	6
17:45	18:00	1	2

TRANS TRAFFIC SURVEY

trafficsurvey.com.au

TURNING MOVEMENT SURVEY

Lake Macquarie Private Hospital Entrance from Sydney St, Gateshead

GPS	*-32.981727, 151.691712*
Date:	Wed 13/10/21
Weather:	Overcast
Suburban:	Gateshead
Customer:	TTPA

All Vehicles (N.B. right turn IN, not left which is to doctors car park)

Time		Entry	Exit
Period Start	Period End		
6:30	6:45	0	0
6:45	7:00	3	3
7:00	7:15	3	3
7:15	7:30	1	1
7:30	7:45	2	2
7:45	8:00	3	3
8:00	8:15	1	1
8:15	8:30	3	3
8:30	8:45	2	1
8:45	9:00	3	4
9:00	9:15	3	3
9:15	9:30	1	1
15:00	15:15	5	3
15:15	15:30	3	5
15:30	15:45	1	1
15:45	16:00	4	3
16:00	16:15	5	5
16:15	16:30	1	1
16:30	16:45	2	3
16:45	17:00	0	0
17:00	17:15	2	2
17:15	17:30	1	1
17:30	17:45	3	3
17:45	18:00	2	1
18:00	18:15	3	3
18:15	18:30	2	3
18:30	18:45	3	2
18:45	19:00	1	1
19:00	19:15	0	0
19:15	19:30	0	1
19:30	19:45	2	1
19:45	20:00	1	1
20:00	20:15	1	2
20:15	20:30	1	1

Appendix D

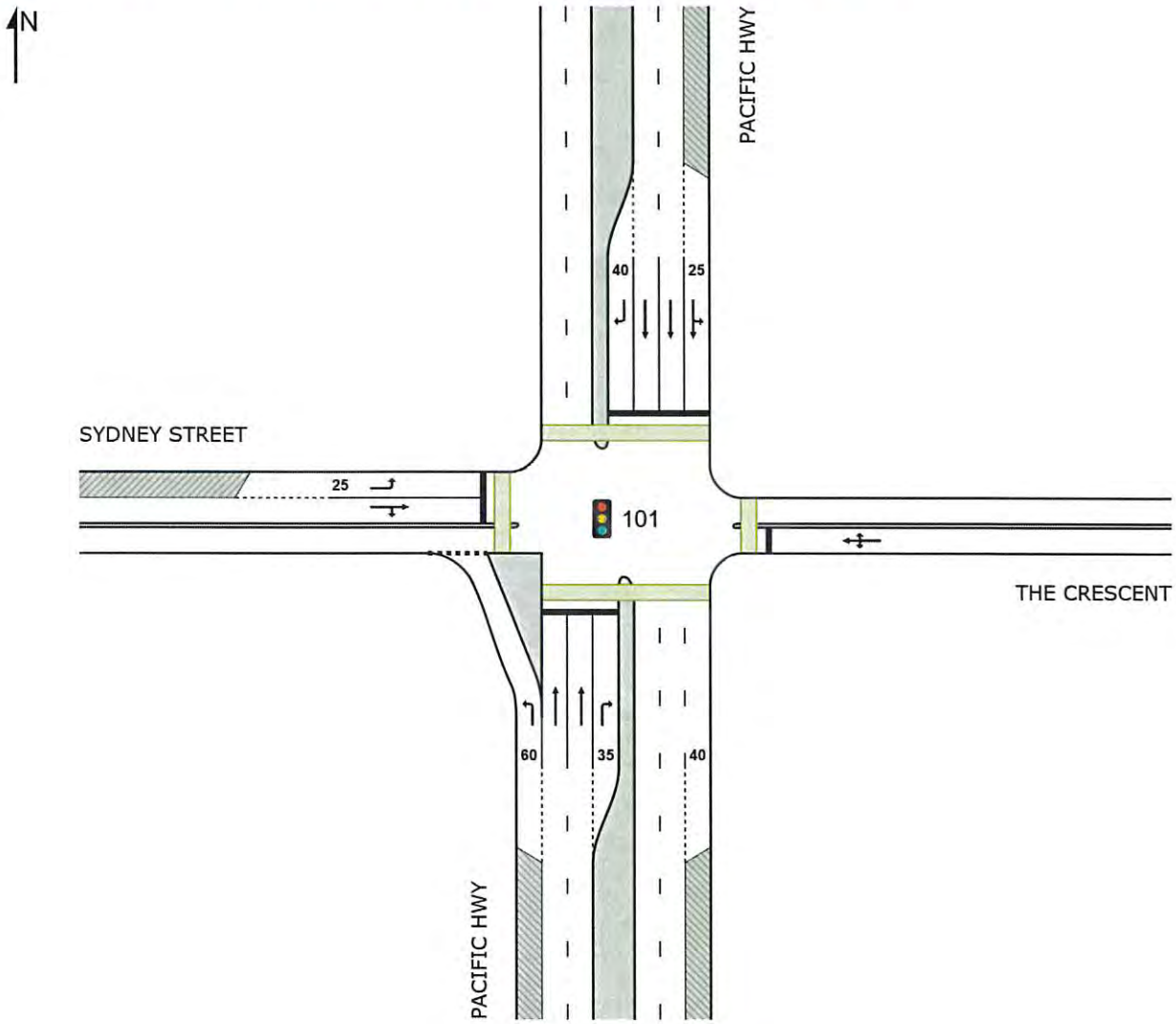
SIDRA Results

SITE LAYOUT

Site: 101 [PACIFIC HWY & SYDNEY ST/THE CRESCENT EXISTING LAYOUT (Site Folder: General)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: 101 [PACIFIC HWY & SYDNEY ST/THE CRESCENT EXISTING AM PEAK (Site Folder: General)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 130 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: PACIFIC HWY														
1	L2	80	6.0	84	6.0	0.060	6.2	LOS A	0.3	2.5	0.14	0.58	0.14	47.8
2	T1	1320	6.0	1389	6.0	* 0.909	50.0	LOS D	47.6	350.5	0.96	1.01	1.13	26.6
3	R2	50	6.0	53	6.0	0.092	21.8	LOS B	1.6	11.9	0.61	0.69	0.61	35.4
Approach		1450	6.0	1526	6.0	0.909	46.6	LOS D	47.6	350.5	0.91	0.97	1.06	27.5
East: THE CRESCENT														
4	L2	15	4.0	16	4.0	* 0.156	38.7	LOS C	1.6	11.9	0.86	0.72	0.86	24.3
5	T1	10	4.0	11	4.0	0.156	34.7	LOS C	1.6	11.9	0.86	0.72	0.86	27.4
6	R2	20	4.0	21	4.0	0.156	38.0	LOS C	1.6	11.9	0.86	0.72	0.86	27.4
Approach		45	4.0	47	4.0	0.156	37.5	LOS C	1.6	11.9	0.86	0.72	0.86	26.4
North: PACIFIC HWY														
7	L2	28	6.0	29	6.0	* 0.148	25.3	LOS B	2.1	15.1	0.79	0.66	0.79	36.3
8	T1	610	6.0	642	6.0	0.542	20.7	LOS B	9.5	70.0	0.87	0.73	0.87	39.4
9	R2	90	6.0	95	6.0	0.340	37.2	LOS C	3.8	28.2	0.93	0.75	0.93	30.6
Approach		728	6.0	766	6.0	0.542	23.0	LOS B	9.5	70.0	0.87	0.73	0.87	37.8
West: SYDNEY STREET														
10	L2	54	4.0	57	4.0	0.072	25.7	LOS B	2.0	14.8	0.61	0.65	0.61	31.8
11	T1	10	4.0	11	4.0	0.552	52.5	LOS D	8.0	57.9	0.95	0.79	0.95	22.7
12	R2	120	4.0	126	4.0	0.552	55.8	LOS D	8.0	57.9	0.95	0.79	0.95	21.3
Approach		184	4.0	194	4.0	0.552	46.8	LOS D	8.0	57.9	0.85	0.75	0.85	23.8
All Vehicles		2407	5.8	2534	5.8	0.909	39.3	LOS C	47.6	350.5	0.89	0.88	0.98	29.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: PACIFIC HWY												
P1	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	231.4	223.8	0.97
East: THE CRESCENT												
P2	Full	50	53	27.6	LOS C	0.1	0.1	0.91	0.91	188.1	208.7	1.11
North: PACIFIC HWY												

P3 Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	231.4	223.8	0.97
West: SYDNEY STREET											
P4 Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	222.3	212.0	0.95
All Pedestrians	200	211	51.4	LOS E	0.2	0.2	0.94	0.94	218.3	217.1	0.99

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [PACIFIC HWY & SYDNEY ST/THE CRESCENT EXISTING PM PEAK (Site Folder: General)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 130 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: PACIFIC HWY														
1	L2	120	6.0	126	6.0	0.090	6.1	LOS A	0.5	3.9	0.12	0.58	0.12	47.9
2	T1	880	6.0	926	6.0	0.715	34.9	LOS C	24.4	179.6	0.88	0.77	0.88	32.0
3	R2	50	6.0	53	6.0	0.164	31.0	LOS C	1.8	13.3	0.85	0.73	0.85	31.0
Approach		1050	6.0	1105	6.0	0.715	31.4	LOS C	24.4	179.6	0.79	0.75	0.79	33.2
East: THE CRESCENT														
4	L2	15	4.0	16	4.0	* 0.102	32.0	LOS C	1.4	10.5	0.83	0.66	0.83	26.5
5	T1	10	4.0	11	4.0	0.102	27.1	LOS B	1.4	10.5	0.83	0.66	0.83	30.0
6	R2	10	4.0	11	4.0	0.102	30.4	LOS C	1.4	10.5	0.83	0.66	0.83	30.0
Approach		35	4.0	37	4.0	0.102	30.1	LOS C	1.4	10.5	0.83	0.66	0.83	28.5
North: PACIFIC HWY														
7	L2	30	6.0	32	6.0	0.264	21.5	LOS B	5.8	42.9	0.70	0.61	0.70	39.3
8	T1	1410	6.0	1484	6.0	* 0.965	53.0	LOS D	45.8	337.4	0.94	1.05	1.25	25.8
9	R2	60	6.0	63	6.0	0.118	26.3	LOS B	2.1	15.7	0.73	0.72	0.73	35.0
Approach		1500	6.0	1579	6.0	0.965	51.3	LOS D	45.8	337.4	0.92	1.03	1.22	26.3
West: SYDNEY STREET														
10	L2	61	4.0	64	4.0	0.072	21.7	LOS B	2.1	15.2	0.55	0.64	0.55	33.4
11	T1	20	4.0	21	4.0	0.567	50.0	LOS D	9.0	65.4	0.94	0.79	0.94	23.3
12	R2	130	4.0	137	4.0	0.567	53.3	LOS D	9.0	65.4	0.94	0.79	0.94	21.8
Approach		211	4.0	222	4.0	0.567	43.8	LOS D	9.0	65.4	0.83	0.75	0.83	24.5
All Vehicles		2796	5.8	2943	5.8	0.965	43.0	LOS D	45.8	337.4	0.86	0.90	1.02	28.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: PACIFIC HWY												
P1	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	231.4	223.8	0.97
East: THE CRESCENT												
P2	Full	50	53	30.9	LOS D	0.1	0.1	0.91	0.91	191.5	208.7	1.09
North: PACIFIC HWY												

P3	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	231.4	223.8	0.97
West: SYDNEY STREET												
P4	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	222.3	212.0	0.95
All Pedestrians		200	211	52.2	LOS E	0.2	0.2	0.94	0.94	219.2	217.1	0.99

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [PACIFIC HWY & SYDNEY ST/THE CRESCENT FUTURE AM PEAK (Site Folder: General)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 130 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: PACIFIC HWY														
1	L2	120	6.0	126	6.0	0.092	6.6	LOS A	0.7	5.4	0.18	0.60	0.18	47.6
2	T1	1320	6.0	1389	6.0	* 0.927	55.1	LOS D	51.1	376.5	0.96	1.05	1.18	25.2
3	R2	50	6.0	53	6.0	0.092	21.8	LOS B	1.6	11.9	0.61	0.69	0.61	35.4
Approach		1490	6.0	1568	6.0	0.927	50.0	LOS D	51.1	376.5	0.89	1.00	1.08	26.5
East: THE CRESCENT														
4	L2	15	4.0	16	4.0	* 0.156	38.7	LOS C	1.6	11.9	0.86	0.72	0.86	24.3
5	T1	10	4.0	11	4.0	0.156	34.7	LOS C	1.6	11.9	0.86	0.72	0.86	27.4
6	R2	20	4.0	21	4.0	0.156	38.0	LOS C	1.6	11.9	0.86	0.72	0.86	27.4
Approach		45	4.0	47	4.0	0.156	37.5	LOS C	1.6	11.9	0.86	0.72	0.86	26.4
North: PACIFIC HWY														
7	L2	28	6.0	29	6.0	* 0.148	25.3	LOS B	2.1	15.1	0.79	0.66	0.79	36.3
8	T1	610	6.0	642	6.0	0.542	20.7	LOS B	9.5	70.0	0.87	0.73	0.87	39.4
9	R2	130	6.0	137	6.0	0.491	44.6	LOS D	5.6	41.2	0.96	0.82	0.96	28.2
Approach		768	6.0	808	6.0	0.542	24.9	LOS B	9.5	70.0	0.88	0.75	0.88	36.6
West: SYDNEY STREET														
10	L2	65	4.0	68	4.0	0.086	25.9	LOS B	2.5	18.0	0.61	0.66	0.61	31.7
11	T1	10	4.0	11	4.0	0.614	53.0	LOS D	8.7	62.9	0.96	0.80	0.96	22.6
12	R2	130	4.0	137	4.0	0.614	56.3	LOS D	8.7	62.9	0.96	0.80	0.96	21.2
Approach		205	4.0	216	4.0	0.614	46.5	LOS D	8.7	62.9	0.85	0.76	0.85	23.9
All Vehicles		2508	5.8	2640	5.8	0.927	41.8	LOS C	51.1	376.5	0.88	0.90	1.00	28.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: PACIFIC HWY												
P1	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	231.4	223.8	0.97
East: THE CRESCENT												
P2	Full	50	53	27.6	LOS C	0.1	0.1	0.91	0.91	188.1	208.7	1.11
North: PACIFIC HWY												

P3	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	231.4	223.8	0.97
West: SYDNEY STREET												
P4	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	222.3	212.0	0.95
All Pedestrians		200	211	51.4	LOS E	0.2	0.2	0.94	0.94	218.3	217.1	0.99

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [PACIFIC HWY & SYDNEY ST/THE CRESCENT FUTURE PM PEAK (Site Folder: General)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 130 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: PACIFIC HWY														
1	L2	130	6.0	137	6.0	0.099	6.3	LOS A	0.7	4.8	0.14	0.59	0.14	47.8
2	T1	880	6.0	926	6.0	0.718	34.9	LOS C	24.6	180.8	0.88	0.77	0.88	32.0
3	R2	50	6.0	53	6.0	0.163	31.0	LOS C	1.8	13.3	0.85	0.73	0.85	31.0
Approach		1060	6.0	1116	6.0	0.718	31.2	LOS C	24.6	180.8	0.79	0.75	0.79	33.3
East: THE CRESCENT														
4	L2	15	4.0	16	4.0	* 0.102	32.0	LOS C	1.4	10.5	0.83	0.66	0.83	26.5
5	T1	10	4.0	11	4.0	0.102	27.1	LOS B	1.4	10.5	0.83	0.66	0.83	30.0
6	R2	10	4.0	11	4.0	0.102	30.4	LOS C	1.4	10.5	0.83	0.66	0.83	30.0
Approach		35	4.0	37	4.0	0.102	30.1	LOS C	1.4	10.5	0.83	0.66	0.83	28.5
North: PACIFIC HWY														
7	L2	30	6.0	32	6.0	0.266	21.5	LOS B	5.9	43.3	0.70	0.61	0.70	39.3
8	T1	1410	6.0	1484	6.0	* 0.973	56.3	LOS D	46.6	343.1	0.94	1.07	1.27	24.9
9	R2	80	6.0	84	6.0	0.157	27.2	LOS B	2.9	21.5	0.75	0.74	0.75	34.6
Approach		1520	6.0	1600	6.0	0.973	54.0	LOS D	46.6	343.1	0.92	1.04	1.24	25.5
West: SYDNEY STREET														
10	L2	80	4.0	84	4.0	0.095	21.9	LOS B	2.8	20.1	0.56	0.65	0.56	33.3
11	T1	20	4.0	21	4.0	0.694	52.3	LOS D	10.9	78.9	0.96	0.84	1.01	22.8
12	R2	154	4.0	162	4.0	0.694	55.6	LOS D	10.9	78.9	0.96	0.84	1.01	21.3
Approach		254	4.0	267	4.0	0.694	44.7	LOS D	10.9	78.9	0.83	0.78	0.87	24.3
All Vehicles		2869	5.8	3020	5.8	0.973	44.5	LOS D	46.6	343.1	0.86	0.91	1.03	27.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

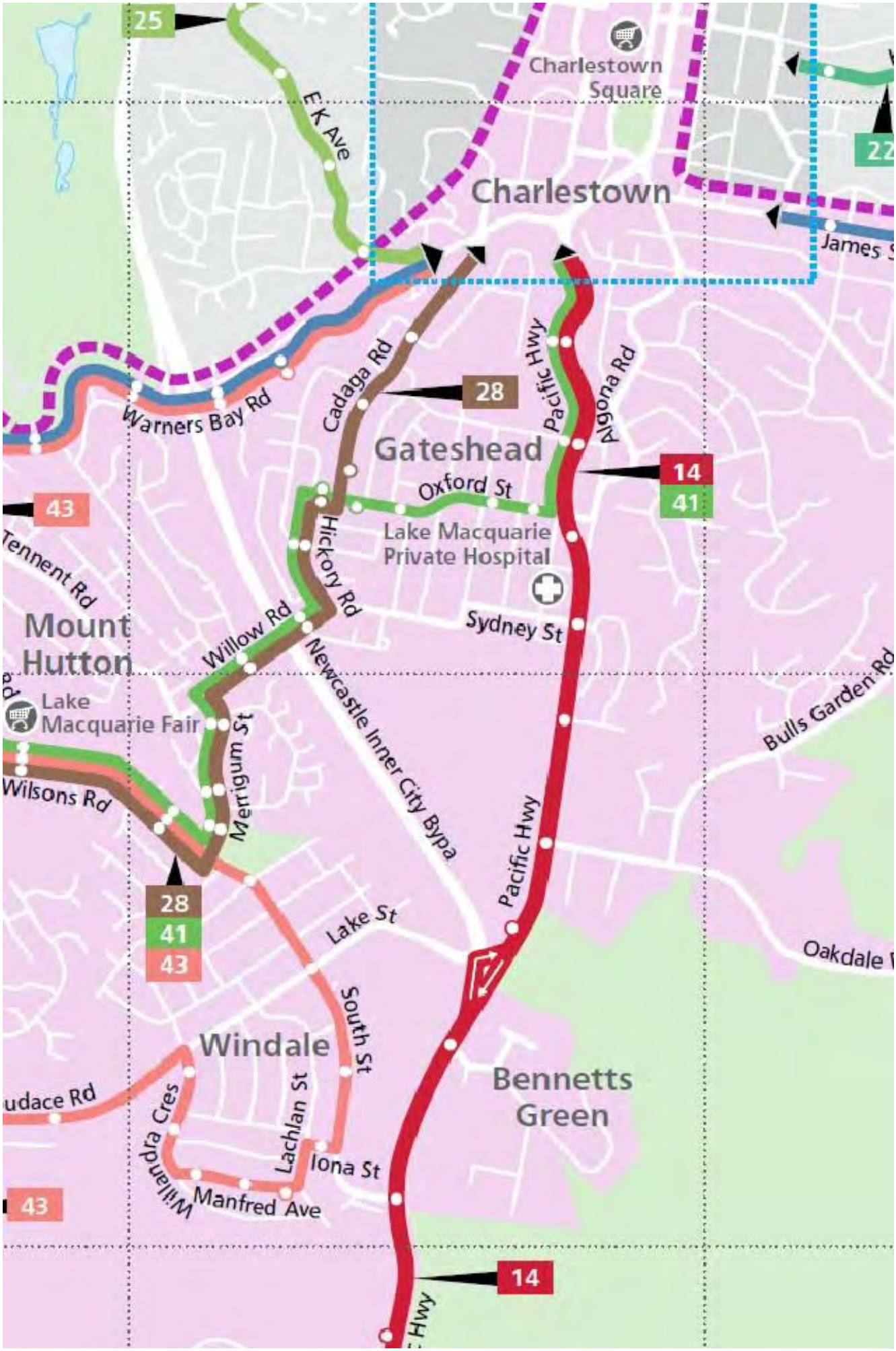
Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: PACIFIC HWY												
P1	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	231.4	223.8	0.97
East: THE CRESCENT												
P2	Full	50	53	30.9	LOS D	0.1	0.1	0.91	0.91	191.5	208.7	1.09
North: PACIFIC HWY												

P3	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	231.4	223.8	0.97
West: SYDNEY STREET												
P4	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	222.3	212.0	0.95
All Pedestrians		200	211	52.2	LOS E	0.2	0.2	0.94	0.94	219.2	217.1	0.99

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

Appendix E

Bus Services



Legend

- Frequent bus route
- Frequent bus route extension
- Standard bus route
- Tailored bus route
- Bus stop
- Bus stop this side only
- 11 Bus route number
- B Bus terminus

Newcastle Transport network effective 13 December 2020

B F L

Inset map Wallsend

Wallsend
23 27
24 42
26 46

Hunter Valley Buses operates routes in this area. Visit **cdcbus.com.au** for more information.
260 261

Rover Motors operates routes in this area. Visit **rovercoaches.com.au** for more information.
160

Hunter Valley Buses operates routes in this area. Visit **cdcbus.com.au** for more information.
140

Busways operates routes in this area. Visit **busways.com.au** for more information.
150 151 152

Port Stephens Coaches operates routes in this area. Visit **pscoaches.com.au** for more information.
130 131

Hunter Valley Buses operates routes in this area. Visit **cdcbus.com.au** for more information.
138

Inset map Broadmeadow

Broadmeadow
21 25 27

21 25 27 28
13 23 25 26 27
13 21 23 26 28

Hunter Valley Buses operates routes in this area. Visit **cdcbus.com.au** for more information.
136

Hunter Valley Buses operates routes in this area. Visit **cdcbus.com.au** for more information.
262 263 267 268

Hunter Valley Buses operates routes in this area. Visit **cdcbus.com.au** for more information.
269 270 271

Inset map Swansea

Swansea North 29
Swansea Heads 14
29 14

Busways operates routes in this area. Visit **busways.com.au** for more information.
99

Inset map Charlestown

Charlestown 25 41 45
Charlestown 11 22
Common: 11 28; 14 41; 22 43; 25 48

Inset map Belmont

On Demand area D59
41 43 48
14 29

Inset map Newcastle CBD

Newcastle Interchange 22
Common: 26 28
Newcastle 11 14 13 21
Newcastle East 23

On Demand area D59

See Broadmeadow inset for details
See Newcastle CBD inset for details
See Wallsend inset for details
See Charlestown inset for details
See Belmont inset for details

Via this section of Myall Rd on trips toward Kotara only
Via Alick St if starting or finishing at Belmont only

Joins Swansea inset above right
Joins Swansea inset above right

Trains toward Maitland & Hunter Valley
Trains toward Central Coast & Sydney

North

Legend

- Frequent bus route
- Frequent bus route extension
- Standard bus route
- Tailored bus route
- Bus stop
- Bus stop this side only
- 11 Bus route number
- B Bus terminus
- T Train line/station
- F Frequent ferry route/wharf
- L Frequent light rail line/stop
- Shopping centre
- Educational institution
- Hospital
- Beach
- Sporting facility
- Information, 09:00–16:00 Monday–Friday

NSW GOVERNMENT

Newcastle Transport

cartography by **transitgraphics**.com.au

Newcastle Transport On Demand area

effective 30 June 2019

Hunter Valley Buses operates routes in this area.
Visit cdcbus.com.au for more information.
269 270 271

See Charlestown inset for details

See Belmont inset for details

On Demand area D59

Inset map Charlestown

Common
11 28
14 41
22 43
25 48

Inset map Belmont

Via Alick St if starting or finishing at Belmont only

COVID-19 Updates:
A permit is required to travel between Greater Sydney and regional NSW, including Shellharbour and the Central Coast.
Public transport services are running to a reduced timetable for Greater Sydney, including Intercity train services. See latest travel information (/covid-19/covid-19-safer-travel-guidance)

Lake Macquarie On Demand service

From 13 December, Lake Macquarie On Demand customers will be able to access Opal Connect, including travel credit. Opal Pay will no longer be available on these services from 1 April 2021. Find out more about Opal Connect.

The Lake Macquarie On Demand service area covers Charlestown, Dudley, Whitebridge, Gateshead, Redhead, Warners Bay, Mount Hutton, Windale, Tingira Heights, Eleebana, Croudace Bay, Valentine, Belmont North and Belmont areas.

From key activity centres such as Charlestown, Warners Bay, Mount Hutton and Belmont you can connect with bus routes to continue your journey beyond the On Demand area.

The On Demand service runs in addition to existing regular timetabled services. An On Demand bus will pick you up near your home or a convenient nearby location, and take you to where you want to go within the On Demand area.

The service is operated by Newcastle Transport and began Sunday 14 January 2018.

Find out more at newcastletransport.info .

Book via the app

To book, you can download the Newcastle Transport On Demand App from the App Store or Google Play and then log in with your Opal Connect credentials.

App store

Google Play

Booking information

Another way to book

Fares

A one-way trip is equivalent to Opal peak and off-peak (/tickets-opal/opal/fares-payments/opal-peak-off-peak-fares) bus fares.

Adult

Distance	0 - 3 km
Peak	$3.20
Off peak	$2.24

Distance	3 - 8 km

Peak	$3.79
Off peak	$2.65
Distance	**8+ km**
Peak	$4.87
Off peak	$3.40

Concession

Concession fare eligibility: concession card holders, including pensioners, seniors, students and apprentices.

Distance	**0 - 3 km**
Peak	$1.60
Off peak	$1.12
Distance	**3 - 8 km**
Peak	$1.89
Off peak	$1.32
Distance	**8+ km**
Peak	$2.43
Off peak	$1.70

Hours of operation

Monday to Friday

9am-4pm

Saturday

7am-6pm

Sunday

9am-6pm

Sunday hours of operation will be in place on all public holidays.

What is travel credit?

With Opal Connect, you can earn up to $2 in travel credit every time you transfer within 60 minutes between Opal and On Demand services.

You will need an Opal Connect account to start earning travel credit. Sign up for an Opal Connect account , link your Opal card and add a payment card. Get the Newcastle Transport On Demand app from the App Store or Google Play , or if you have it, make sure it is up-to-date. Then log in to the app using your Opal Connect account username and password to complete your setup

Once you've completed these steps, any travel credit you earn will be added to your Opal Connect account. When you have accumulated enough credit, you can use it to pay for your next On Demand trip.

For more details, see the Opal Connect travel credit help page (/opal-connect-help).

Map

The Lake Macquarie On Demand service area covers Dudley, Whitebridge, Mount Hutton, Windale, Tingira Heights, Eleebana, Warners Bay, Bennetts Green, Gateshead and Charlestown. From 30 June 2019 this area has been expanded to include Belmont, Belmont North, Croudace Bay, Valentine, Floraville, Jewells, and Redhead.

Download the Newcastle Transport On Demand trial area map from June 30 2019 (pdf 633KB) (/document/4214/lake-macquarie-on-demand-map-20190630.pdf)

14 Swansea Heads to Newcastle via Belmont, Charlestown & Kotara

B

How to use this timetable

This timetable provides a snapshot of service information in 24-hour time (e.g. 5am = 05:00, 5pm = 17:00). Information contained in this timetable is subject to change without notice. Please note that timetables do not include minor stops, additional trips for special events, short term changes, holiday timetable changes, real-time information or any disruption alerts.

For the most up-to-date times, use the Trip Planner or Departures at **transportnsw.info**

Real-time planning

You can plan your trip with real-time information using the Trip Planner or Departures at **transportnsw.info** or by downloading travel apps on your smartphone or tablet.

The Trip Planner, Departures and travel apps offer various features:

- favourite your regular trips
- see where your service is on the route
- get estimated pick-up and arrival times
- receive service updates
- find nearby stations, stops, wharves and routes
- check accessibility information.

Find the latest apps at **transportnsw.info/apps**

Accessible services

All new buses are wheelchair-accessible with low-level floors and space for wheelchairs, prams or strollers. Look for the ♿ symbol in this timetable. Some older buses may not have all the features you need. There will be more accessible services as older buses are replaced.

Who is providing my bus services?

The bus services shown in this timetable are run by Newcastle Transport.

Fares

In Sydney and surrounding regions, fares are based on:

- the distance you travel from tap on to tap off
- the mode of transport you choose
- whether you're eligible for a concession fare or free travel
- any Opal benefits such as discounts and capped fares that apply.

You can use an Opal card or a contactless payment to pay for your travel.

Opal cards

An Opal card is a smartcard you keep and reuse. Add value before you travel, and tap on and tap off to pay your fares throughout Sydney, the Blue Mountains, the Central Coast, the Hunter and the Illawarra.

Which Opal card is right for you?

Adult – Customers 16 years or older who are not entitled to any concessions and normally pay full fare.

Child/Youth – For customers aged 4-15 (inclusive), or customers 16 years or older who hold a NSW/ACT Senior Secondary Student Concession Card.

Gold Senior/Pensioner – For eligible NSW and interstate seniors, pensioners, war widows/ers and asylum seekers.

Concession – For eligible tertiary students, job seekers, apprentices and trainees.

How to get an Opal card

You can get an Adult or Child/Youth Opal card over the counter at Opal retailers that display the Opal sign. To find your nearest retailer visit **transportnsw.info/opal**.

If you are eligible to travel with concession fares, you can apply for a Gold Senior/Pensioner or Concession Opal card online. Visit **transportnsw.info/opal** for more information.

Contactless payments

If you have an American Express, Mastercard, Visa card or linked device, you can use it to pay for all public transport on the Opal network. Just make sure to tap on and tap off at Opal readers at the beginning and end of your trip.

Always separate your cards when you tap on and tap off so your preferred card is charged.

You will receive the same travel benefits of an Adult Opal card when you tap on and tap off consistently with the same credit card, debit card or linked device. This includes daily, weekly and weekend travel caps, and a $2 transfer discount when you change between metro/train, ferry, bus and light rail services within 60 minutes. Adult Opal fare pricing applies.

Find out more at **transportnsw.info/contactless**

Explanation of definitions and symbols

♿	Wheelchair Accessible
F	Friday only
C	Operates Early Saturday morning only

NSW GOVERNMENT | Transport

14 Newcastle to Swansea Heads via Kotara, Charlestown & Belmont

B

Valid from: 12 July 2021

Creation date: 15 Oct 2021
NOTE: Information is correct on date of download.

Monday to Friday	♿	♿	♿	♿	♿	♿	♿	♿	♿
Customs House, Watt St, Newcastle	05:17	05:47	06:10	06:29	06:56	07:14	07:29	07:44	07:59
Darby St before Bull St, Cooks Hill	05:23	05:53	06:16	06:35	07:02	07:20	07:35	07:50	08:05
Junction Fair, Glebe Rd, The Junction	05:29	05:59	06:22	06:41	07:08	07:27	07:42	07:57	08:12
Glebe Rd opp Adamstown Uniting Church, Adamstown	05:36	06:06	06:29	06:48	07:15	07:34	07:49	08:04	08:19
Westfield Kotara, Park Ave, Kotara	05:41	06:11	06:34	06:53	07:20	07:39	07:54	08:09	08:24
Charlestown Square, Pearson St, Stand B, Charlestown	05:50	06:20	06:44	07:03	07:30	07:51	08:05	08:20	08:34
Charlestown Square, Frederick St, Stand D, Charlestown	05:51	06:21	06:45	07:04	07:31	07:52	08:08	08:21	08:36
Pacific Hwy after Oxford St, Gateshead	05:56	06:26	06:50	07:09	07:37	07:58	-	08:28	-
Jewells Plaza, Ntaba Rd, Jewells	06:02	06:32	06:57	07:16	07:45	08:06	-	08:36	-
Pacific Hwy at Cobbin Pde, Belmont	06:07	06:37	07:02	07:21	07:52	08:12	-	08:42	-
Pacific Hwy opp Macquarie St, Belmont	06:10	06:40	07:05	07:24	07:55	08:15	-	08:45	-
Pacific Hwy opp Marks Point Rd, Marks Point	06:14	06:44	–	07:28	08:00	08:20	-	08:50	-
Bowman St opp Lake Rd, Swansea	06:20	06:50	–	07:34	08:07	08:26	-	08:56	-
Park Ave opp Swansea High School, Caves Beach	06:23	06:53	–	07:38	08:11	08:30	-	09:00	-
Lambton Pde at Hamilton St, Swansea Heads	06:30	07:00	–	07:45	08:18	08:37	-	09:07	-
Alick St opp Spinnakers Leisure Park, Belmont	-	-	07:07	-	-	-	-	-	-

Monday to Friday	♿	♿	♿	♿	♿	♿	♿	♿	♿
Customs House, Watt St, Newcastle	08:14	08:27	08:42	08:54	09:09	09:24	09:39	09:54	10:09
Darby St before Bull St, Cooks Hill	08:20	08:33	08:48	09:00	09:15	09:30	09:45	10:00	10:15
Junction Fair, Glebe Rd, The Junction	08:27	08:40	08:55	09:07	09:22	09:37	09:52	10:07	10:22
Glebe Rd opp Adamstown Uniting Church, Adamstown	08:34	08:47	09:02	09:14	09:29	09:44	09:59	10:14	10:29
Westfield Kotara, Park Ave, Kotara	08:39	08:52	09:07	09:19	09:34	09:49	10:04	10:19	10:34
Charlestown Square, Pearson St, Stand B, Charlestown	08:50	09:03	09:17	09:29	09:43	09:59	10:14	10:29	10:43
Charlestown Square, Frederick St, Stand D, Charlestown	08:53	09:04	09:19	09:31	09:44	10:01	10:15	10:31	10:44
Pacific Hwy after Oxford St, Gateshead	-	09:11	-	-	09:51	-	10:21	-	10:51
Jewells Plaza, Ntaba Rd, Jewells	-	09:19	-	-	09:58	-	10:28	-	10:58
Pacific Hwy at Cobbin Pde, Belmont	-	09:25	-	-	10:04	-	10:34	-	11:04
Pacific Hwy opp Macquarie St, Belmont	-	09:28	-	-	10:07	-	10:37	-	11:07
Pacific Hwy opp Marks Point Rd, Marks Point	-	09:33	-	-	10:12	-	–	-	11:12
Bowman St opp Lake Rd, Swansea	-	09:39	-	-	10:18	-	–	-	11:18
Park Ave opp Swansea High School, Caves Beach	-	09:43	-	-	10:22	-	–	-	11:22
Lambton Pde at Hamilton St, Swansea Heads	-	09:50	-	-	10:29	-	–	-	11:29
Alick St opp Spinnakers Leisure Park, Belmont	-	-	-	-	-	-	10:39	-	-

14 Newcastle to Swansea Heads via Kotara, Charlestown & Belmont

B

Monday to Friday	♿	♿	♿	♿	♿	♿	♿	♿	♿
Customs House, Watt St, Newcastle	10:24	10:39	10:54	11:09	11:24	11:39	11:54	12:09	12:24
Darby St before Bull St, Cooks Hill	10:30	10:45	11:00	11:15	11:30	11:45	12:00	12:15	12:30
Junction Fair, Glebe Rd, The Junction	10:37	10:52	11:07	11:22	11:37	11:52	12:07	12:22	12:37
Glebe Rd opp Adamstown Uniting Church, Adamstown	10:44	10:59	11:14	11:29	11:44	11:59	12:14	12:29	12:44
Westfield Kotara, Park Ave, Kotara	10:49	11:04	11:19	11:34	11:49	12:04	12:19	12:34	12:49
Charlestown Square, Pearson St, Stand B, Charlestown	10:59	11:14	11:29	11:43	11:59	12:14	12:29	12:44	12:59
Charlestown Square, Frederick St, Stand D, Charlestown	11:01	11:15	11:31	11:44	12:01	12:15	12:31	12:45	13:01
Pacific Hwy after Oxford St, Gateshead	-	11:21	-	11:51	-	12:21	-	12:51	-
Jewells Plaza, Ntaba Rd, Jewells	-	11:28	-	11:58	-	12:28	-	12:58	-
Pacific Hwy at Cobbin Pde, Belmont	-	11:34	-	12:04	-	12:34	-	13:04	-
Pacific Hwy opp Macquarie St, Belmont	-	11:37	-	12:07	-	12:37	-	13:07	-
Pacific Hwy opp Marks Point Rd, Marks Point	-	–	-	12:12	-	–	-	13:12	-
Bowman St opp Lake Rd, Swansea	-	–	-	12:18	-	–	-	13:18	-
Park Ave opp Swansea High School, Caves Beach	-	–	-	12:22	-	–	-	13:22	-
Lambton Pde at Hamilton St, Swansea Heads	-	–	-	12:29	-	–	-	13:29	-
Alick St opp Spinnakers Leisure Park, Belmont	-	11:39	-	-	-	12:39	-	-	-

Monday to Friday	♿	♿	♿	♿	♿	♿	♿	♿	♿
Customs House, Watt St, Newcastle	12:39	12:54	13:09	13:24	13:39	13:54	14:09	14:24	14:39
Darby St before Bull St, Cooks Hill	12:45	13:00	13:15	13:30	13:45	14:00	14:15	14:30	14:45
Junction Fair, Glebe Rd, The Junction	12:52	13:07	13:22	13:37	13:52	14:07	14:22	14:37	14:52
Glebe Rd opp Adamstown Uniting Church, Adamstown	12:59	13:14	13:29	13:44	13:59	14:14	14:29	14:44	14:59
Westfield Kotara, Park Ave, Kotara	13:04	13:19	13:34	13:49	14:04	14:19	14:34	14:49	15:04
Charlestown Square, Pearson St, Stand B, Charlestown	13:14	13:29	13:43	13:59	14:14	14:29	14:44	14:58	15:15
Charlestown Square, Frederick St, Stand D, Charlestown	13:15	13:31	13:44	14:01	14:15	14:31	14:46	14:59	15:16
Pacific Hwy after Oxford St, Gateshead	13:21	-	13:51	-	14:21	-	-	15:06	15:22
Jewells Plaza, Ntaba Rd, Jewells	13:28	-	13:58	-	14:28	-	-	15:13	15:32
Pacific Hwy at Cobbin Pde, Belmont	13:34	-	14:04	-	14:34	-	-	15:19	15:38
Pacific Hwy opp Macquarie St, Belmont	13:37	-	14:07	-	14:37	-	-	15:22	15:41
Pacific Hwy opp Marks Point Rd, Marks Point	–	-	14:12	-	–	-	-	15:27	15:46
Bowman St opp Lake Rd, Swansea	–	-	14:18	-	–	-	-	15:33	15:52
Park Ave opp Swansea High School, Caves Beach	–	-	14:22	-	–	-	-	15:37	15:56
Lambton Pde at Hamilton St, Swansea Heads	–	-	14:29	-	–	-	-	15:44	16:03
Alick St opp Spinnakers Leisure Park, Belmont	13:39	-	-	-	14:39	-	-	-	-

Monday to Friday	♿	♿	♿	♿	♿	♿	♿	♿	♿
Customs House, Watt St, Newcastle	14:54	15:09	15:24	15:39	15:54	16:09	16:24	16:39	16:54
Darby St before Bull St, Cooks Hill	15:01	15:15	15:30	15:45	16:00	16:15	16:30	16:45	17:00
Junction Fair, Glebe Rd, The Junction	15:09	15:22	15:37	15:52	16:07	16:22	16:37	16:52	17:07
Glebe Rd opp Adamstown Uniting Church, Adamstown	15:16	15:29	15:44	15:58	16:13	16:28	16:43	16:58	17:13
Westfield Kotara, Park Ave, Kotara	15:21	15:34	15:49	16:03	16:18	16:33	16:48	17:03	17:18
Charlestown Square, Pearson St, Stand B, Charlestown	15:33	15:44	15:58	16:13	16:28	16:43	16:58	17:12	17:28
Charlestown Square, Frederick St, Stand D, Charlestown	15:34	15:46	15:59	16:15	16:29	16:45	17:00	17:13	17:30
Pacific Hwy after Oxford St, Gateshead	15:40	-	16:06	-	16:35	-	-	17:19	-
Jewells Plaza, Ntaba Rd, Jewells	15:49	-	16:13	-	16:42	-	-	17:27	-
Pacific Hwy at Cobbin Pde, Belmont	15:55	-	16:19	-	16:48	-	-	17:33	-
Pacific Hwy opp Macquarie St, Belmont	15:58	-	16:22	-	16:51	-	-	17:36	-
Pacific Hwy opp Marks Point Rd, Marks Point	–	-	16:27	-	16:56	-	-	17:41	-
Bowman St opp Lake Rd, Swansea	–	-	16:33	-	17:03	-	-	17:48	-
Park Ave opp Swansea High School, Caves Beach	–	-	16:37	-	17:07	-	-	17:52	-
Lambton Pde at Hamilton St, Swansea Heads	–	-	16:44	-	17:14	-	-	17:59	-
Alick St opp Spinnakers Leisure Park, Belmont	16:00	-	-	-	-	-	-	-	-

14 Newcastle to Swansea Heads via Kotara, Charlestown & Belmont

B

Monday to Friday	♿	♿	♿	♿	♿	♿	♿	♿	♿
Customs House, Watt St, Newcastle	17:09	17:24	17:32	17:47	18:02	18:17	18:32	18:47	19:02
Darby St before Bull St, Cooks Hill	17:17	17:32	17:39	17:53	18:11	18:23	18:38	18:52	19:07
Junction Fair, Glebe Rd, The Junction	17:25	17:39	17:46	17:59	18:19	18:29	18:44	18:58	19:13
Glebe Rd opp Adamstown Uniting Church, Adamstown	17:32	17:46	17:53	18:06	18:27	18:36	18:51	19:05	19:20
Westfield Kotara, Park Ave, Kotara	17:37	17:50	17:58	18:11	18:31	18:41	18:56	19:09	19:24
Charlestown Square, Pearson St, Stand B, Charlestown	17:46	18:00	18:08	18:21	18:42	18:51	19:05	19:18	19:33
Charlestown Square, Frederick St, Stand D, Charlestown	17:47	18:01	18:09	18:21	18:44	18:52	19:06	19:20	19:35
Pacific Hwy after Oxford St, Gateshead	17:54	18:06	-	18:26	-	-	19:11	-	-
Jewells Plaza, Ntaba Rd, Jewells	18:02	18:11	-	18:31	-	-	19:16	-	-
Pacific Hwy at Cobbin Pde, Belmont	18:08	18:16	-	18:36	-	-	19:21	-	-
Pacific Hwy opp Macquarie St, Belmont	18:11	18:19	-	18:39	-	-	19:24	-	-
Pacific Hwy opp Marks Point Rd, Marks Point	18:16	18:23	-	18:43	-	-	19:28	-	-
Bowman St opp Lake Rd, Swansea	18:22	18:29	-	18:49	-	-	19:34	-	-
Park Ave opp Swansea High School, Caves Beach	18:26	18:32	-	18:53	-	-	19:37	-	-
Lambton Pde at Hamilton St, Swansea Heads	18:32	18:39	-	18:59	-	-	19:44	-	-

Monday to Friday	♿	♿	♿	♿	♿	♿	♿	♿	♿
Day Restrictions									F
Customs House, Watt St, Newcastle	19:29	19:59	20:29	20:59	21:34	21:59	22:29	23:29	C01:05
Darby St before Bull St, Cooks Hill	19:34	20:04	20:34	21:04	21:39	22:04	22:34	23:34	C01:09
Junction Fair, Glebe Rd, The Junction	19:40	20:10	20:40	21:10	21:45	22:10	22:40	23:40	C01:13
Glebe Rd opp Adamstown Uniting Church, Adamstown	19:47	20:17	20:47	21:17	21:52	22:17	22:47	23:47	C01:18
Westfield Kotara, Park Ave, Kotara	19:51	20:21	20:51	21:21	21:56	22:21	22:51	23:51	C01:22
Charlestown Square, Pearson St, Stand B, Charlestown	20:01	20:30	21:01	21:31	22:05	22:30	23:00	00:01	C01:29
Charlestown Square, Frederick St, Stand D, Charlestown	20:01	20:32	21:01	21:32	22:06	22:32	23:01	00:01	C01:29
Pacific Hwy after Oxford St, Gateshead	20:06	-	21:06	-	22:11	-	23:06	00:06	C01:34
Jewells Plaza, Ntaba Rd, Jewells	20:11	-	21:11	-	22:16	-	23:11	00:11	C01:39
Pacific Hwy at Cobbin Pde, Belmont	20:16	-	21:16	-	22:21	-	23:17	00:16	C01:44
Pacific Hwy opp Macquarie St, Belmont	20:18	-	21:18	-	22:23	-	23:18	00:18	C01:46
Pacific Hwy opp Marks Point Rd, Marks Point	20:22	-	21:22	-	22:27	-	–	–	C01:49
Bowman St opp Lake Rd, Swansea	20:28	-	21:28	-	22:33	-	–	–	C01:53
Park Ave opp Swansea High School, Caves Beach	20:31	-	21:31	-	22:36	-	–	–	C01:56
Lambton Pde at Hamilton St, Swansea Heads	20:38	-	21:38	-	22:43	-	–	–	C02:01
Alick St opp Spinnakers Leisure Park, Belmont	-	-	-	-	-	-	23:19	00:19	-

Monday to Friday	♿	♿
	F	F
Customs House, Watt St, Newcastle	C02:05	C03:05
Darby St before Bull St, Cooks Hill	C02:09	C03:09
Junction Fair, Glebe Rd, The Junction	C02:13	C03:13
Glebe Rd opp Adamstown Uniting Church, Adamstown	C02:18	C03:18
Westfield Kotara, Park Ave, Kotara	C02:22	C03:22
Charlestown Square, Pearson St, Stand B, Charlestown	C02:29	C03:29
Charlestown Square, Frederick St, Stand D, Charlestown	C02:29	C03:29
Pacific Hwy after Oxford St, Gateshead	C02:34	C03:34
Jewells Plaza, Ntaba Rd, Jewells	C02:39	C03:39
Pacific Hwy at Cobbin Pde, Belmont	C02:44	C03:44
Pacific Hwy opp Macquarie St, Belmont	C02:46	C03:46
Pacific Hwy opp Marks Point Rd, Marks Point	C02:49	C03:49
Bowman St opp Lake Rd, Swansea	C02:53	C03:53
Park Ave opp Swansea High School, Caves Beach	C02:56	C03:56
Lambton Pde at Hamilton St, Swansea Heads	C03:01	C04:01

14 Newcastle to Swansea Heads via Kotara, Charlestown & Belmont

B

Saturday	♿	♿	♿	♿	♿	♿	♿	♿	♿
Customs House, Watt St, Newcastle	05:10	06:10	06:40	07:10	07:40	08:10	08:40	09:10	09:40
Darby St before Bull St, Cooks Hill	05:15	06:15	06:45	07:15	07:46	08:16	08:46	09:16	09:46
Junction Fair, Glebe Rd, The Junction	05:20	06:20	06:52	07:21	07:52	08:22	08:52	09:22	09:52
Glebe Rd opp Adamstown Uniting Church, Adamstown	05:26	06:26	06:58	07:27	07:59	08:29	09:00	09:30	10:00
Westfield Kotara, Park Ave, Kotara	05:30	06:30	07:03	07:31	08:03	08:33	09:05	09:35	10:05
Charlestown Square, Pearson St, Stand B, Charlestown	05:39	06:39	07:12	07:40	08:12	08:42	09:15	09:44	10:15
Charlestown Square, Frederick St, Stand D, Charlestown	05:40	06:40	07:13	07:41	08:13	08:43	09:16	09:45	10:16
Pacific Hwy after Oxford St, Gateshead	05:45	06:45	07:18	07:46	08:19	08:50	09:22	09:52	10:22
Jewells Plaza, Ntaba Rd, Jewells	05:51	06:51	07:24	07:52	08:25	08:56	09:29	09:59	10:29
Pacific Hwy at Cobbin Pde, Belmont	05:56	06:56	07:29	07:57	08:31	09:02	09:35	10:04	10:35
Pacific Hwy opp Macquarie St, Belmont	05:59	06:59	07:32	08:00	08:34	09:05	09:38	10:08	10:38
Pacific Hwy opp Marks Point Rd, Marks Point	–	–	07:36	–	08:39	–	09:43	–	10:43
Bowman St opp Lake Rd, Swansea	–	–	07:42	–	08:45	–	09:49	–	10:49
Park Ave opp Swansea High School, Caves Beach	–	–	07:46	–	08:49	–	09:53	–	10:53
Lambton Pde at Hamilton St, Swansea Heads	–	–	07:53	–	08:56	–	10:00	–	11:00
Alick St opp Spinnakers Leisure Park, Belmont	06:02	07:02	-	08:03	-	09:08	-	10:11	-

Saturday	♿	♿	♿	♿	♿	♿	♿	♿	♿
Customs House, Watt St, Newcastle	10:10	10:40	11:10	11:40	12:10	12:40	13:10	13:40	14:10
Darby St before Bull St, Cooks Hill	10:16	10:46	11:16	11:46	12:16	12:46	13:16	13:46	14:16
Junction Fair, Glebe Rd, The Junction	10:22	10:52	11:22	11:52	12:22	12:52	13:22	13:52	14:22
Glebe Rd opp Adamstown Uniting Church, Adamstown	10:30	11:00	11:30	12:00	12:30	13:00	13:30	14:00	14:30
Westfield Kotara, Park Ave, Kotara	10:35	11:05	11:35	12:05	12:35	13:05	13:35	14:05	14:35
Charlestown Square, Pearson St, Stand B, Charlestown	10:45	11:15	11:45	12:15	12:45	13:15	13:45	14:15	14:45
Charlestown Square, Frederick St, Stand D, Charlestown	10:46	11:16	11:46	12:16	12:46	13:16	13:46	14:16	14:46
Pacific Hwy after Oxford St, Gateshead	10:52	11:22	11:52	12:22	12:52	13:22	13:52	14:23	14:53
Jewells Plaza, Ntaba Rd, Jewells	10:59	11:29	11:59	12:29	12:59	13:29	13:59	14:30	15:00
Pacific Hwy at Cobbin Pde, Belmont	11:04	11:35	12:04	12:35	13:04	13:35	14:04	14:36	15:05
Pacific Hwy opp Macquarie St, Belmont	11:08	11:38	12:08	12:38	13:08	13:38	14:08	14:39	15:09
Pacific Hwy opp Marks Point Rd, Marks Point	–	11:43	–	12:43	–	13:43	–	14:44	–
Bowman St opp Lake Rd, Swansea	–	11:49	–	12:49	–	13:49	–	14:50	–
Park Ave opp Swansea High School, Caves Beach	–	11:53	–	12:53	–	13:53	–	14:54	–
Lambton Pde at Hamilton St, Swansea Heads	–	12:00	–	13:00	–	14:00	–	15:01	–
Alick St opp Spinnakers Leisure Park, Belmont	11:11	-	12:11	-	13:11	-	14:11	-	15:12

Saturday	♿	♿	♿	♿	♿	♿	♿	♿	♿
Customs House, Watt St, Newcastle	14:40	15:10	15:40	16:10	16:40	17:10	17:40	18:10	18:40
Darby St before Bull St, Cooks Hill	14:46	15:16	15:47	16:16	16:46	17:16	17:46	18:16	18:46
Junction Fair, Glebe Rd, The Junction	14:52	15:22	15:53	16:22	16:52	17:22	17:52	18:22	18:52
Glebe Rd opp Adamstown Uniting Church, Adamstown	15:00	15:30	16:00	16:29	16:59	17:29	17:59	18:29	18:58
Westfield Kotara, Park Ave, Kotara	15:05	15:35	16:05	16:34	17:04	17:34	18:04	18:34	19:03
Charlestown Square, Pearson St, Stand B, Charlestown	15:15	15:45	16:14	16:43	17:13	17:43	18:13	18:43	19:11
Charlestown Square, Frederick St, Stand D, Charlestown	15:16	15:46	16:15	16:44	17:14	17:44	18:14	18:44	19:12
Pacific Hwy after Oxford St, Gateshead	15:23	15:53	16:22	16:50	17:20	17:50	18:19	18:50	19:17
Jewells Plaza, Ntaba Rd, Jewells	15:30	16:00	16:28	16:56	17:26	17:56	18:25	18:56	19:23
Pacific Hwy at Cobbin Pde, Belmont	15:36	16:05	16:34	17:01	17:32	18:01	18:30	19:01	19:28
Pacific Hwy opp Macquarie St, Belmont	15:39	16:09	16:37	17:05	17:35	18:04	18:33	19:04	19:31
Pacific Hwy opp Marks Point Rd, Marks Point	15:44	–	16:42	–	17:40	–	18:38	–	19:35
Bowman St opp Lake Rd, Swansea	15:50	–	16:48	–	17:46	–	18:43	–	19:40
Park Ave opp Swansea High School, Caves Beach	15:54	–	16:52	–	17:50	–	18:47	–	19:44
Lambton Pde at Hamilton St, Swansea Heads	16:01	–	16:59	–	17:57	–	18:53	–	19:50
Alick St opp Spinnakers Leisure Park, Belmont	-	16:12	-	17:08	-	18:07	-	19:07	-

14 Newcastle to Swansea Heads via Kotara, Charlestown & Belmont

B

Saturday									
Customs House, Watt St, Newcastle	19:10	20:10	21:10	22:10	23:10	00:10	C01:05	C02:05	C03:05
Darby St before Bull St, Cooks Hill	19:16	20:16	21:16	22:16	23:16	00:16	C01:09	C02:09	C03:09
Junction Fair, Glebe Rd, The Junction	19:22	20:22	21:22	22:22	23:22	00:22	C01:13	C02:13	C03:13
Glebe Rd opp Adamstown Uniting Church, Adamstown	19:28	20:28	21:28	22:28	23:28	00:28	C01:18	C02:18	C03:18
Westfield Kotara, Park Ave, Kotara	19:33	20:33	21:33	22:33	23:33	00:33	C01:22	C02:22	C03:22
Charlestown Square, Pearson St, Stand B, Charlestown	19:41	20:40	21:40	22:40	23:40	00:40	C01:29	C02:29	C03:29
Charlestown Square, Frederick St, Stand D, Charlestown	19:42	20:41	21:41	22:41	23:41	00:41	C01:29	C02:29	C03:29
Pacific Hwy after Oxford St, Gateshead	19:47	20:47	21:47	22:47	23:47	00:47	C01:34	C02:34	C03:34
Jewells Plaza, Ntaba Rd, Jewells	19:53	20:53	21:53	22:53	23:53	00:53	C01:39	C02:39	C03:39
Pacific Hwy at Cobbin Pde, Belmont	19:58	20:58	21:58	22:58	23:58	00:58	C01:44	C02:44	C03:44
Pacific Hwy opp Macquarie St, Belmont	20:01	21:01	22:01	23:01	00:01	01:01	C01:46	C02:46	C03:46
Pacific Hwy opp Marks Point Rd, Marks Point	–	21:05	22:05	23:05	00:05	–	C01:49	C02:49	C03:49
Bowman St opp Lake Rd, Swansea	–	21:10	22:10	23:10	00:10	–	C01:53	C02:53	C03:53
Park Ave opp Swansea High School, Caves Beach	–	21:14	22:14	23:14	00:14	–	C01:56	C02:56	C03:56
Lambton Pde at Hamilton St, Swansea Heads	–	21:20	22:20	23:20	00:20	–	C02:01	C03:01	C04:01
Alick St opp Spinnakers Leisure Park, Belmont	20:04	-	-	-	-	01:04	-	-	-

Sunday & Public Holidays									
Customs House, Watt St, Newcastle	06:10	06:40	07:10	07:40	08:10	08:40	09:10	09:40	10:10
Darby St before Bull St, Cooks Hill	06:15	06:45	07:15	07:46	08:16	08:46	09:16	09:46	10:16
Junction Fair, Glebe Rd, The Junction	06:20	06:52	07:21	07:52	08:22	08:52	09:22	09:52	10:22
Glebe Rd opp Adamstown Uniting Church, Adamstown	06:26	06:58	07:27	07:59	08:29	09:00	09:30	10:00	10:30
Westfield Kotara, Park Ave, Kotara	06:30	07:03	07:31	08:03	08:33	09:05	09:35	10:05	10:35
Charlestown Square, Pearson St, Stand B, Charlestown	06:39	07:12	07:40	08:12	08:42	09:14	09:44	10:15	10:44
Charlestown Square, Frederick St, Stand D, Charlestown	06:41	07:13	07:42	08:13	08:44	09:15	09:46	10:16	10:46
Pacific Hwy after Oxford St, Gateshead	-	07:18	-	08:19	-	09:22	-	10:22	-
Jewells Plaza, Ntaba Rd, Jewells	-	07:24	-	08:25	-	09:29	-	10:29	-
Pacific Hwy at Cobbin Pde, Belmont	-	07:29	-	08:31	-	09:35	-	10:35	-
Pacific Hwy opp Macquarie St, Belmont	-	07:32	-	08:34	-	09:38	-	10:38	-
Pacific Hwy opp Marks Point Rd, Marks Point	-	07:36	-	08:39	-	09:43	-	10:43	-
Bowman St opp Lake Rd, Swansea	-	07:42	-	08:45	-	09:49	-	10:49	-
Park Ave opp Swansea High School, Caves Beach	-	07:46	-	08:49	-	09:53	-	10:53	-
Lambton Pde at Hamilton St, Swansea Heads	-	07:53	-	08:56	-	10:00	-	11:00	-

Sunday & Public Holidays									
Customs House, Watt St, Newcastle	10:40	11:10	11:40	12:10	12:40	13:10	13:40	14:10	14:40
Darby St before Bull St, Cooks Hill	10:46	11:16	11:46	12:16	12:46	13:16	13:46	14:16	14:46
Junction Fair, Glebe Rd, The Junction	10:52	11:22	11:52	12:22	12:52	13:22	13:52	14:22	14:52
Glebe Rd opp Adamstown Uniting Church, Adamstown	11:00	11:30	12:00	12:30	13:00	13:30	14:00	14:30	15:00
Westfield Kotara, Park Ave, Kotara	11:05	11:35	12:05	12:35	13:05	13:35	14:05	14:35	15:05
Charlestown Square, Pearson St, Stand B, Charlestown	11:15	11:45	12:15	12:44	13:15	13:44	14:15	14:44	15:15
Charlestown Square, Frederick St, Stand D, Charlestown	11:16	11:46	12:16	12:46	13:16	13:46	14:16	14:46	15:16
Pacific Hwy after Oxford St, Gateshead	11:22	-	12:22	-	13:22	-	14:22	-	15:22
Jewells Plaza, Ntaba Rd, Jewells	11:29	-	12:29	-	13:29	-	14:29	-	15:29
Pacific Hwy at Cobbin Pde, Belmont	11:35	-	12:35	-	13:35	-	14:35	-	15:35
Pacific Hwy opp Macquarie St, Belmont	11:38	-	12:38	-	13:38	-	14:38	-	15:38
Pacific Hwy opp Marks Point Rd, Marks Point	11:43	-	12:43	-	13:43	-	14:43	-	15:43
Bowman St opp Lake Rd, Swansea	11:49	-	12:49	-	13:49	-	14:49	-	15:49
Park Ave opp Swansea High School, Caves Beach	11:53	-	12:53	-	13:53	-	14:53	-	15:53
Lambton Pde at Hamilton St, Swansea Heads	12:00	-	13:00	-	14:00	-	15:00	-	16:00

14 Newcastle to Swansea Heads via Kotara, Charlestown & Belmont

B

Sunday & Public Holidays	♿	♿	♿	♿	♿	♿	♿	♿	♿
Customs House, Watt St, Newcastle	15:10	15:40	16:10	16:40	17:10	17:40	18:10	18:40	19:10
Darby St before Bull St, Cooks Hill	15:16	15:46	16:16	16:46	17:16	17:46	18:16	18:46	19:16
Junction Fair, Glebe Rd, The Junction	15:22	15:52	16:22	16:52	17:22	17:52	18:22	18:52	19:22
Glebe Rd opp Adamstown Uniting Church, Adamstown	15:30	16:00	16:30	16:59	17:29	17:59	18:29	18:58	19:28
Westfield Kotara, Park Ave, Kotara	15:35	16:05	16:35	17:04	17:34	18:04	18:34	19:03	19:33
Charlestown Square, Pearson St, Stand B, Charlestown	15:44	16:15	16:44	17:13	17:42	18:13	18:42	19:11	19:41
Charlestown Square, Frederick St, Stand D, Charlestown	15:46	16:16	16:46	17:14	17:44	18:14	18:44	19:12	19:42
Pacific Hwy after Oxford St, Gateshead	-	16:22	-	17:20	-	18:19	-	19:17	-
Jewells Plaza, Ntaba Rd, Jewells	-	16:29	-	17:26	-	18:25	-	19:23	-
Pacific Hwy at Cobbin Pde, Belmont	-	16:35	-	17:32	-	18:30	-	19:28	-
Pacific Hwy opp Macquarie St, Belmont	-	16:38	-	17:35	-	18:33	-	19:31	-
Pacific Hwy opp Marks Point Rd, Marks Point	-	16:43	-	17:40	-	18:37	-	19:35	-
Bowman St opp Lake Rd, Swansea	-	16:49	-	17:46	-	18:43	-	19:40	-
Park Ave opp Swansea High School, Caves Beach	-	16:53	-	17:50	-	18:47	-	19:44	-
Lambton Pde at Hamilton St, Swansea Heads	-	17:00	-	17:57	-	18:53	-	19:50	-

Sunday & Public Holidays	♿	♿	♿	♿
Customs House, Watt St, Newcastle	19:40	20:40	21:40	22:40
Darby St before Bull St, Cooks Hill	19:46	20:46	21:46	22:46
Junction Fair, Glebe Rd, The Junction	19:52	20:52	21:52	22:52
Glebe Rd opp Adamstown Uniting Church, Adamstown	19:58	20:58	21:58	22:58
Westfield Kotara, Park Ave, Kotara	20:03	21:03	22:03	23:03
Charlestown Square, Pearson St, Stand B, Charlestown	20:13	21:10	22:10	23:10
Charlestown Square, Frederick St, Stand D, Charlestown	20:13	21:11	22:11	23:11
Pacific Hwy after Oxford St, Gateshead	20:17	21:17	22:17	23:17
Jewells Plaza, Ntaba Rd, Jewells	20:23	21:23	22:23	23:23
Pacific Hwy at Cobbin Pde, Belmont	20:28	21:28	22:28	23:28
Pacific Hwy opp Macquarie St, Belmont	20:31	21:31	22:31	23:31
Pacific Hwy opp Marks Point Rd, Marks Point	20:35	–	–	–
Bowman St opp Lake Rd, Swansea	20:40	–	–	–
Park Ave opp Swansea High School, Caves Beach	20:44	–	–	–
Lambton Pde at Hamilton St, Swansea Heads	20:50	–	–	–
Alick St opp Spinnakers Leisure Park, Belmont	-	21:34	22:34	23:34

14 Swansea Heads to Newcastle via Belmont, Charlestown & Kotara

B

Monday to Friday	♿	♿	♿	♿	♿	♿	♿	♿	♿
Lambton Pde at Hamilton St, Swansea Heads	05:03	05:33	-	06:29	-	06:45	-	-	07:18
Swansea High School, Park Ave, Caves Beach	05:09	05:39	-	06:35	-	06:52	-	-	07:25
Pacific Hwy after Lake Rd, Swansea	05:13	05:43	-	06:39	-	06:56	-	-	07:30
Pacific Hwy at Marks Point Rd, Marks Point	05:19	05:49	-	06:45	-	07:02	-	-	07:36
Alick St opp Spinnakers Leisure Park, Belmont	–	–	06:17	–	-	–	-	-	–
Pacific Hwy before Macquarie St, Belmont	05:22	05:52	06:20	06:49	-	07:06	-	-	07:41
Ntaba Rd opp Jewells Plaza, Jewells	05:31	06:01	06:31	07:00	-	07:18	-	-	07:55
Pacific Hwy at Oxford St, Gateshead	05:38	06:08	06:38	07:07	-	07:27	-	-	08:06
Charlestown Square, Frederick St, Stand C, Charlestown	05:40	06:10	06:41	07:11	07:21	07:31	07:41	07:56	08:10
Charlestown Square, Pearson St, Stand A, Charlestown	05:41	06:11	06:42	07:12	07:22	07:32	07:42	07:57	08:11
Park Ave opp Westfield Kotara, Kotara	05:51	06:21	06:52	07:22	07:32	07:44	07:53	08:08	08:25
Adamstown Community Early Learning, Glebe Rd, Adamstown	05:56	06:26	06:57	07:28	07:38	07:50	07:59	08:14	08:32
Junction Fair, Glebe Rd, The Junction	06:02	06:32	07:04	07:36	07:46	07:58	08:07	08:22	08:43
Darby St at Bull St, Cooks Hill	06:07	06:37	07:09	07:41	07:51	08:03	08:12	08:27	08:48
Customs House, Watt St, Newcastle	06:14	06:44	07:18	07:50	08:00	08:13	08:22	08:37	08:57

Monday to Friday	♿	♿	♿	♿	♿	♿	♿	♿	♿
Lambton Pde at Hamilton St, Swansea Heads	-	-	07:58	-	08:28	-	08:59	-	-
Swansea High School, Park Ave, Caves Beach	-	-	08:05	-	08:35	-	09:06	-	-
Pacific Hwy after Lake Rd, Swansea	-	-	08:10	-	08:40	-	09:10	-	-
Pacific Hwy at Marks Point Rd, Marks Point	-	-	08:16	-	08:46	-	09:16	-	-
Alick St opp Spinnakers Leisure Park, Belmont	-	-	–	-	–	-	–	-	09:47
Pacific Hwy before Macquarie St, Belmont	-	-	08:21	-	08:51	-	09:21	-	09:51
Ntaba Rd opp Jewells Plaza, Jewells	-	-	08:34	-	09:03	-	09:33	-	10:03
Pacific Hwy at Oxford St, Gateshead	-	-	08:44	-	09:13	-	09:41	-	10:11
Charlestown Square, Frederick St, Stand C, Charlestown	08:23	08:36	08:48	09:04	09:17	09:30	09:45	10:00	10:15
Charlestown Square, Pearson St, Stand A, Charlestown	08:23	08:37	08:49	09:05	09:18	09:31	09:46	10:01	10:16
Park Ave opp Westfield Kotara, Kotara	08:33	08:48	09:01	09:17	09:30	09:42	09:57	10:12	10:27
Adamstown Community Early Learning, Glebe Rd, Adamstown	08:42	08:55	09:08	09:23	09:36	09:48	10:03	10:18	10:33
Junction Fair, Glebe Rd, The Junction	08:54	09:05	09:18	09:31	09:44	09:56	10:11	10:26	10:41
Darby St at Bull St, Cooks Hill	08:59	09:10	09:23	09:36	09:49	10:01	10:16	10:31	10:46
Customs House, Watt St, Newcastle	09:09	09:19	09:32	09:44	09:57	10:09	10:24	10:39	10:54

Monday to Friday	♿	♿	♿	♿	♿	♿	♿	♿	♿
Lambton Pde at Hamilton St, Swansea Heads	-	09:59	-	-	-	10:59	-	-	-
Swansea High School, Park Ave, Caves Beach	-	10:06	-	-	-	11:06	-	-	-
Pacific Hwy after Lake Rd, Swansea	-	10:10	-	-	-	11:10	-	-	-
Pacific Hwy at Marks Point Rd, Marks Point	-	10:16	-	-	-	11:16	-	-	-
Alick St opp Spinnakers Leisure Park, Belmont	-	–	-	10:47	-	–	-	11:47	-
Pacific Hwy before Macquarie St, Belmont	-	10:21	-	10:51	-	11:21	-	11:51	-
Ntaba Rd opp Jewells Plaza, Jewells	-	10:33	-	11:03	-	11:33	-	12:03	-
Pacific Hwy at Oxford St, Gateshead	-	10:41	-	11:11	-	11:41	-	12:11	-
Charlestown Square, Frederick St, Stand C, Charlestown	10:30	10:44	11:00	11:15	11:30	11:45	12:00	12:15	12:30
Charlestown Square, Pearson St, Stand A, Charlestown	10:31	10:45	11:01	11:16	11:31	11:46	12:01	12:16	12:31
Park Ave opp Westfield Kotara, Kotara	10:43	10:57	11:13	11:27	11:43	11:57	12:13	12:27	12:43
Adamstown Community Early Learning, Glebe Rd, Adamstown	10:48	11:03	11:18	11:33	11:48	12:03	12:18	12:33	12:48
Junction Fair, Glebe Rd, The Junction	10:56	11:11	11:26	11:41	11:56	12:11	12:26	12:41	12:56
Darby St at Bull St, Cooks Hill	11:01	11:16	11:31	11:46	12:01	12:16	12:31	12:46	13:01
Customs House, Watt St, Newcastle	11:09	11:24	11:39	11:54	12:09	12:24	12:39	12:54	13:09

14 Swansea Heads to Newcastle via Belmont, Charlestown & Kotara

B

Monday to Friday	♿	♿	♿	♿	♿	♿	♿	♿	♿
Lambton Pde at Hamilton St, Swansea Heads	11:59	-	-	-	12:59	-	-	-	13:59
Swansea High School, Park Ave, Caves Beach	12:06	-	-	-	13:06	-	-	-	14:06
Pacific Hwy after Lake Rd, Swansea	12:10	-	-	-	13:10	-	-	-	14:10
Pacific Hwy at Marks Point Rd, Marks Point	12:16	-	-	-	13:16	-	-	-	14:16
Alick St opp Spinnakers Leisure Park, Belmont	–	-	12:47	-	–	-	13:47	-	–
Pacific Hwy before Macquarie St, Belmont	12:21	-	12:51	-	13:21	-	13:51	-	14:21
Ntaba Rd opp Jewells Plaza, Jewells	12:33	-	13:03	-	13:33	-	14:03	-	14:33
Pacific Hwy at Oxford St, Gateshead	12:41	-	13:11	-	13:41	-	14:11	-	14:41
Charlestown Square, Frederick St, Stand C, Charlestown	12:45	13:00	13:15	13:30	13:45	14:00	14:15	14:30	14:45
Charlestown Square, Pearson St, Stand A, Charlestown	12:46	13:01	13:16	13:31	13:46	14:01	14:16	14:31	14:46
Park Ave opp Westfield Kotara, Kotara	12:57	13:13	13:27	13:43	13:57	14:13	14:27	14:43	14:57
Adamstown Community Early Learning, Glebe Rd, Adamstown	13:03	13:18	13:33	13:48	14:03	14:18	14:33	14:48	15:03
Junction Fair, Glebe Rd, The Junction	13:11	13:26	13:41	13:56	14:11	14:26	14:41	14:56	15:11
Darby St at Bull St, Cooks Hill	13:16	13:31	13:46	14:01	14:16	14:31	14:46	15:01	15:16
Customs House, Watt St, Newcastle	13:24	13:39	13:54	14:09	14:24	14:39	14:54	15:09	15:24

Monday to Friday	♿	♿	♿	♿	♿	♿	♿	♿	♿
Lambton Pde at Hamilton St, Swansea Heads	-	-	14:40	-	-	-	-	15:55	-
Swansea High School, Park Ave, Caves Beach	-	-	14:47	-	-	-	-	16:02	-
Pacific Hwy after Lake Rd, Swansea	-	-	14:51	-	-	-	-	16:07	-
Pacific Hwy at Marks Point Rd, Marks Point	-	-	14:57	-	-	-	-	16:14	-
Alick St opp Spinnakers Leisure Park, Belmont	14:30	-	–	-	-	15:42	-	–	16:33
Pacific Hwy before Macquarie St, Belmont	14:34	-	15:02	-	-	15:46	-	16:20	16:37
Ntaba Rd opp Jewells Plaza, Jewells	14:48	-	15:15	-	-	16:00	-	16:32	16:48
Pacific Hwy at Oxford St, Gateshead	14:56	-	15:26	-	-	16:10	-	16:41	16:56
Charlestown Square, Frederick St, Stand C, Charlestown	15:00	15:15	15:29	15:45	16:00	16:14	16:30	16:45	16:59
Charlestown Square, Pearson St, Stand A, Charlestown	15:01	15:16	15:30	15:46	16:01	16:15	16:31	16:46	17:00
Park Ave opp Westfield Kotara, Kotara	15:12	15:28	15:42	15:57	16:12	16:27	16:41	16:57	17:11
Adamstown Community Early Learning, Glebe Rd, Adamstown	15:18	15:33	15:48	16:03	16:18	16:33	16:48	17:03	17:18
Junction Fair, Glebe Rd, The Junction	15:26	15:42	15:57	16:12	16:27	16:42	16:56	17:11	17:26
Darby St at Bull St, Cooks Hill	15:31	15:47	16:02	16:17	16:32	16:47	17:01	17:16	17:31
Customs House, Watt St, Newcastle	15:39	15:55	16:10	16:25	16:40	16:55	17:09	17:24	17:39

Monday to Friday	♿	♿	♿	♿	♿	♿	♿	♿	♿
Lambton Pde at Hamilton St, Swansea Heads	-	-	16:59	-	17:30	-	18:00	-	18:33
Swansea High School, Park Ave, Caves Beach	-	-	17:05	-	17:36	-	18:06	-	18:39
Pacific Hwy after Lake Rd, Swansea	-	-	17:10	-	17:40	-	18:10	-	18:43
Pacific Hwy at Marks Point Rd, Marks Point	-	-	17:16	-	17:46	-	18:16	-	18:48
Alick St opp Spinnakers Leisure Park, Belmont	-	-	–	17:32	–	-	–	-	–
Pacific Hwy before Macquarie St, Belmont	-	-	17:21	17:36	17:51	-	18:21	-	18:52
Ntaba Rd opp Jewells Plaza, Jewells	-	-	17:33	17:48	18:02	-	18:32	-	19:02
Pacific Hwy at Oxford St, Gateshead	-	-	17:41	17:56	18:09	-	18:39	-	19:09
Charlestown Square, Frederick St, Stand C, Charlestown	17:15	17:30	17:44	17:59	18:13	18:28	18:42	18:58	19:12
Charlestown Square, Pearson St, Stand A, Charlestown	17:16	17:31	17:45	18:00	18:14	18:29	18:43	18:58	19:13
Park Ave opp Westfield Kotara, Kotara	17:26	17:41	17:56	18:13	18:24	18:39	18:54	19:08	19:22
Adamstown Community Early Learning, Glebe Rd, Adamstown	17:33	17:46	18:03	18:19	18:29	18:44	18:59	19:12	19:26
Junction Fair, Glebe Rd, The Junction	17:41	17:53	18:11	18:28	18:35	18:50	19:05	19:18	19:32
Darby St at Bull St, Cooks Hill	17:46	17:58	18:16	18:33	18:40	18:55	19:10	19:23	19:37
Customs House, Watt St, Newcastle	17:54	18:05	18:24	18:40	18:47	19:02	19:17	19:30	19:44

14 Swansea Heads to Newcastle via Belmont, Charlestown & Kotara

B

Monday to Friday	♿	♿	♿	♿	♿	♿	♿	♿
Lambton Pde at Hamilton St, Swansea Heads	19:01	-	20:01	-	20:56	-	-	-
Swansea High School, Park Ave, Caves Beach	19:07	-	20:07	-	21:02	-	-	-
Pacific Hwy after Lake Rd, Swansea	19:11	-	20:11	-	21:06	-	-	-
Pacific Hwy at Marks Point Rd, Marks Point	19:16	-	20:16	-	21:11	-	-	-
Alick St opp Spinnakers Leisure Park, Belmont	–	-	–	-	–	-	22:12	23:12
Pacific Hwy before Macquarie St, Belmont	19:20	-	20:20	-	21:15	-	22:15	23:15
Ntaba Rd opp Jewells Plaza, Jewells	19:30	-	20:29	-	21:24	-	22:24	23:24
Pacific Hwy at Oxford St, Gateshead	19:37	-	20:35	-	21:30	-	22:30	23:30
Charlestown Square, Frederick St, Stand C, Charlestown	19:40	20:11	20:38	21:09	21:33	22:04	22:33	23:33
Charlestown Square, Pearson St, Stand A, Charlestown	19:41	20:11	20:39	21:09	21:34	22:04	22:34	23:34
Park Ave opp Westfield Kotara, Kotara	19:50	20:19	20:47	21:17	21:42	22:12	22:42	23:42
Adamstown Community Early Learning, Glebe Rd, Adamstown	19:54	20:23	20:51	21:21	21:46	22:16	22:46	23:46
Junction Fair, Glebe Rd, The Junction	20:00	20:28	20:56	21:26	21:51	22:21	22:51	23:51
Darby St at Bull St, Cooks Hill	20:05	20:33	21:01	21:31	21:56	22:26	22:56	23:56
Customs House, Watt St, Newcastle	20:12	20:40	21:08	21:38	22:03	22:33	23:03	00:03

Saturday	♿	♿	♿	♿	♿	♿	♿	♿	♿
Lambton Pde at Hamilton St, Swansea Heads	-	06:33	-	07:29	-	08:26	-	09:24	-
Swansea High School, Park Ave, Caves Beach	-	06:39	-	07:35	-	08:33	-	09:31	-
Pacific Hwy after Lake Rd, Swansea	-	06:43	-	07:39	-	08:38	-	09:37	-
Pacific Hwy at Marks Point Rd, Marks Point	-	06:48	-	07:45	-	08:44	-	09:44	-
Alick St opp Spinnakers Leisure Park, Belmont	05:50	–	07:17	–	08:15	–	09:15	–	10:15
Pacific Hwy before Macquarie St, Belmont	05:53	06:53	07:20	07:50	08:19	08:49	09:19	09:49	10:19
Ntaba Rd opp Jewells Plaza, Jewells	06:02	07:02	07:31	08:01	08:30	09:00	09:30	10:00	10:30
Pacific Hwy at Oxford St, Gateshead	06:09	07:09	07:38	08:08	08:38	09:08	09:38	10:08	10:38
Charlestown Square, Frederick St, Stand C, Charlestown	06:11	07:11	07:41	08:11	08:41	09:12	09:42	10:12	10:42
Charlestown Square, Pearson St, Stand A, Charlestown	06:12	07:12	07:42	08:12	08:42	09:13	09:43	10:13	10:43
Park Ave opp Westfield Kotara, Kotara	06:21	07:21	07:51	08:22	08:52	09:24	09:54	10:24	10:54
Adamstown Community Early Learning, Glebe Rd, Adamstown	06:26	07:26	07:56	08:27	08:57	09:29	09:59	10:29	10:59
Junction Fair, Glebe Rd, The Junction	06:32	07:32	08:02	08:34	09:05	09:37	10:07	10:37	11:07
Darby St at Bull St, Cooks Hill	06:36	07:36	08:06	08:38	09:09	09:41	10:11	10:41	11:11
Customs House, Watt St, Newcastle	06:43	07:43	08:13	08:47	09:18	09:50	10:20	10:50	11:20

Saturday	♿	♿	♿	♿	♿	♿	♿	♿	♿
Lambton Pde at Hamilton St, Swansea Heads	10:24	-	11:26	-	12:26	-	13:26	-	14:26
Swansea High School, Park Ave, Caves Beach	10:31	-	11:33	-	12:33	-	13:33	-	14:33
Pacific Hwy after Lake Rd, Swansea	10:37	-	11:38	-	12:38	-	13:38	-	14:38
Pacific Hwy at Marks Point Rd, Marks Point	10:44	-	11:44	-	12:44	-	13:44	-	14:44
Alick St opp Spinnakers Leisure Park, Belmont	–	11:15	–	12:15	–	13:15	–	14:15	–
Pacific Hwy before Macquarie St, Belmont	10:49	11:19	11:49	12:19	12:49	13:19	13:49	14:19	14:49
Ntaba Rd opp Jewells Plaza, Jewells	11:00	11:30	12:00	12:30	13:00	13:30	14:00	14:30	15:00
Pacific Hwy at Oxford St, Gateshead	11:08	11:38	12:08	12:38	13:08	13:38	14:08	14:38	15:08
Charlestown Square, Frederick St, Stand C, Charlestown	11:12	11:42	12:12	12:42	13:12	13:42	14:12	14:42	15:12
Charlestown Square, Pearson St, Stand A, Charlestown	11:13	11:43	12:13	12:43	13:13	13:43	14:13	14:43	15:13
Park Ave opp Westfield Kotara, Kotara	11:24	11:54	12:24	12:54	13:24	13:54	14:24	14:54	15:24
Adamstown Community Early Learning, Glebe Rd, Adamstown	11:29	11:59	12:29	12:59	13:29	13:59	14:29	14:59	15:29
Junction Fair, Glebe Rd, The Junction	11:37	12:07	12:37	13:07	13:37	14:07	14:37	15:07	15:37
Darby St at Bull St, Cooks Hill	11:41	12:11	12:41	13:11	13:41	14:11	14:41	15:11	15:41
Customs House, Watt St, Newcastle	11:50	12:20	12:50	13:20	13:50	14:20	14:50	15:20	15:50

14 Swansea Heads to Newcastle via Belmont, Charlestown & Kotara

B

Saturday	♿	♿	♿	♿	♿	♿	♿	♿	♿
Lambton Pde at Hamilton St, Swansea Heads	-	15:26	-	16:26	-	17:27	-	18:31	-
Swansea High School, Park Ave, Caves Beach	-	15:33	-	16:33	-	17:34	-	18:37	-
Pacific Hwy after Lake Rd, Swansea	-	15:38	-	16:38	-	17:39	-	18:42	-
Pacific Hwy at Marks Point Rd, Marks Point	-	15:44	-	16:44	-	17:45	-	18:47	-
Alick St opp Spinnakers Leisure Park, Belmont	15:15	–	16:15	–	17:16	–	18:18	–	19:18
Pacific Hwy before Macquarie St, Belmont	15:19	15:49	16:19	16:49	17:20	17:50	18:22	18:52	19:22
Ntaba Rd opp Jewells Plaza, Jewells	15:30	16:00	16:30	17:00	17:30	18:00	18:31	19:01	19:31
Pacific Hwy at Oxford St, Gateshead	15:38	16:08	16:38	17:08	17:38	18:08	18:38	19:08	19:38
Charlestown Square, Frederick St, Stand C, Charlestown	15:42	16:12	16:42	17:12	17:42	18:11	18:41	19:11	19:41
Charlestown Square, Pearson St, Stand A, Charlestown	15:43	16:13	16:43	17:13	17:43	18:12	18:42	19:12	19:42
Park Ave opp Westfield Kotara, Kotara	15:54	16:24	16:54	17:24	17:54	18:23	18:53	19:23	19:53
Adamstown Community Early Learning, Glebe Rd, Adamstown	15:59	16:29	16:59	17:29	17:59	18:28	18:58	19:28	19:58
Junction Fair, Glebe Rd, The Junction	16:07	16:37	17:07	17:37	18:07	18:36	19:05	19:35	20:05
Darby St at Bull St, Cooks Hill	16:11	16:41	17:11	17:41	18:11	18:40	19:09	19:39	20:09
Customs House, Watt St, Newcastle	16:20	16:50	17:20	17:50	18:19	18:48	19:16	19:46	20:16

Saturday	♿	♿	♿	♿	♿
Lambton Pde at Hamilton St, Swansea Heads	19:31	20:31	-	-	-
Swansea High School, Park Ave, Caves Beach	19:37	20:37	-	-	-
Pacific Hwy after Lake Rd, Swansea	19:42	20:42	-	-	-
Pacific Hwy at Marks Point Rd, Marks Point	19:47	20:47	-	-	-
Alick St opp Spinnakers Leisure Park, Belmont	–	–	21:48	22:48	23:48
Pacific Hwy before Macquarie St, Belmont	19:52	20:52	21:52	22:52	23:52
Ntaba Rd opp Jewells Plaza, Jewells	20:01	21:01	22:01	23:01	00:01
Pacific Hwy at Oxford St, Gateshead	20:08	21:08	22:08	23:08	00:08
Charlestown Square, Frederick St, Stand C, Charlestown	20:11	21:11	22:11	23:11	00:11
Charlestown Square, Pearson St, Stand A, Charlestown	20:12	21:12	22:12	23:12	00:12
Park Ave opp Westfield Kotara, Kotara	20:23	21:23	22:22	23:22	00:22
Adamstown Community Early Learning, Glebe Rd, Adamstown	20:28	21:28	22:27	23:27	00:27
Junction Fair, Glebe Rd, The Junction	20:35	21:35	22:33	23:33	00:33
Darby St at Bull St, Cooks Hill	20:39	21:39	22:37	23:37	00:37
Customs House, Watt St, Newcastle	20:46	21:46	22:44	23:44	00:44

Sunday & Public Holidays	♿	♿	♿	♿	♿	♿	♿	♿	♿
Lambton Pde at Hamilton St, Swansea Heads	-	07:29	-	08:26	-	09:24	-	10:24	-
Swansea High School, Park Ave, Caves Beach	-	07:35	-	08:33	-	09:31	-	10:31	-
Pacific Hwy after Lake Rd, Swansea	-	07:39	-	08:38	-	09:37	-	10:37	-
Pacific Hwy at Marks Point Rd, Marks Point	-	07:45	-	08:44	-	09:44	-	10:44	-
Alick St opp Spinnakers Leisure Park, Belmont	06:50	–	-	–	-	–	-	–	-
Pacific Hwy before Macquarie St, Belmont	06:53	07:50	-	08:49	-	09:49	-	10:49	-
Ntaba Rd opp Jewells Plaza, Jewells	07:02	08:01	-	09:00	-	10:00	-	11:00	-
Pacific Hwy at Oxford St, Gateshead	07:09	08:08	-	09:08	-	10:08	-	11:08	-
Charlestown Square, Frederick St, Stand C, Charlestown	07:11	08:11	08:42	09:12	09:42	10:12	10:42	11:12	11:42
Charlestown Square, Pearson St, Stand A, Charlestown	07:12	08:12	08:43	09:13	09:43	10:13	10:43	11:13	11:43
Park Ave opp Westfield Kotara, Kotara	07:21	08:22	08:53	09:24	09:53	10:24	10:53	11:24	11:53
Adamstown Community Early Learning, Glebe Rd, Adamstown	07:26	08:27	08:57	09:29	09:59	10:29	10:59	11:29	11:59
Junction Fair, Glebe Rd, The Junction	07:32	08:34	09:05	09:37	10:07	10:37	11:07	11:37	12:07
Darby St at Bull St, Cooks Hill	07:36	08:39	09:09	09:41	10:11	10:41	11:11	11:41	12:11
Customs House, Watt St, Newcastle	07:43	08:47	09:18	09:50	10:20	10:50	11:20	11:50	12:20

14 Swansea Heads to Newcastle via Belmont, Charlestown & Kotara

B

Sunday & Public Holidays	♿	♿	♿	♿	♿	♿	♿	♿	♿
Lambton Pde at Hamilton St, Swansea Heads	11:26	-	12:26	-	13:26	-	14:26	-	15:26
Swansea High School, Park Ave, Caves Beach	11:33	-	12:33	-	13:33	-	14:33	-	15:33
Pacific Hwy after Lake Rd, Swansea	11:38	-	12:38	-	13:38	-	14:38	-	15:38
Pacific Hwy at Marks Point Rd, Marks Point	11:44	-	12:44	-	13:44	-	14:44	-	15:44
Pacific Hwy before Macquarie St, Belmont	11:50	-	12:50	-	13:49	-	14:49	-	15:49
Ntaba Rd opp Jewells Plaza, Jewells	12:00	-	13:00	-	14:00	-	15:00	-	16:00
Pacific Hwy at Oxford St, Gateshead	12:08	-	13:08	-	14:08	-	15:08	-	16:08
Charlestown Square, Frederick St, Stand C, Charlestown	12:12	12:42	13:12	13:42	14:12	14:42	15:12	15:42	16:12
Charlestown Square, Pearson St, Stand A, Charlestown	12:13	12:43	13:13	13:43	14:13	14:43	15:13	15:43	16:13
Park Ave opp Westfield Kotara, Kotara	12:24	12:53	13:24	13:53	14:24	14:53	15:24	15:53	16:24
Adamstown Community Early Learning, Glebe Rd, Adamstown	12:29	12:59	13:29	13:59	14:29	14:59	15:29	15:59	16:29
Junction Fair, Glebe Rd, The Junction	12:37	13:07	13:37	14:07	14:37	15:07	15:37	16:07	16:37
Darby St at Bull St, Cooks Hill	12:41	13:11	13:41	14:11	14:41	15:11	15:41	16:11	16:41
Customs House, Watt St, Newcastle	12:50	13:20	13:50	14:20	14:50	15:20	15:50	16:20	16:50

Sunday & Public Holidays	♿	♿	♿	♿	♿	♿	♿	♿	♿
Lambton Pde at Hamilton St, Swansea Heads	-	16:26	-	17:27	-	18:31	-	19:31	20:31
Swansea High School, Park Ave, Caves Beach	-	16:33	-	17:34	-	18:37	-	19:37	20:37
Pacific Hwy after Lake Rd, Swansea	-	16:38	-	17:39	-	18:42	-	19:42	20:42
Pacific Hwy at Marks Point Rd, Marks Point	-	16:44	-	17:45	-	18:47	-	19:47	20:47
Pacific Hwy before Macquarie St, Belmont	-	16:49	-	17:50	-	18:52	-	19:52	20:52
Ntaba Rd opp Jewells Plaza, Jewells	-	17:00	-	18:00	-	19:01	-	20:01	21:01
Pacific Hwy at Oxford St, Gateshead	-	17:08	-	18:08	-	19:08	-	20:08	21:08
Charlestown Square, Frederick St, Stand C, Charlestown	16:42	17:12	17:42	18:11	18:42	19:11	19:42	20:11	21:11
Charlestown Square, Pearson St, Stand A, Charlestown	16:43	17:13	17:43	18:12	18:43	19:12	19:42	20:12	21:12
Park Ave opp Westfield Kotara, Kotara	16:53	17:24	17:53	18:23	18:53	19:22	19:52	20:22	21:22
Adamstown Community Early Learning, Glebe Rd, Adamstown	16:59	17:29	17:59	18:28	18:58	19:27	19:57	20:27	21:27
Junction Fair, Glebe Rd, The Junction	17:07	17:37	18:07	18:35	19:05	19:34	20:04	20:34	21:34
Darby St at Bull St, Cooks Hill	17:11	17:41	18:11	18:39	19:09	19:38	20:08	20:38	21:38
Customs House, Watt St, Newcastle	17:20	17:50	18:19	18:47	19:16	19:45	20:15	20:45	21:45

Sunday & Public Holidays	♿	♿	♿
Alick St opp Spinnakers Leisure Park, Belmont	21:48	22:48	23:48
Pacific Hwy before Macquarie St, Belmont	21:52	22:52	23:52
Ntaba Rd opp Jewells Plaza, Jewells	22:01	23:01	00:01
Pacific Hwy at Oxford St, Gateshead	22:08	23:08	00:08
Charlestown Square, Frederick St, Stand C, Charlestown	22:11	23:11	00:11
Charlestown Square, Pearson St, Stand A, Charlestown	22:12	23:12	00:12
Park Ave opp Westfield Kotara, Kotara	22:22	23:22	00:22
Adamstown Community Early Learning, Glebe Rd, Adamstown	22:27	23:27	00:27
Junction Fair, Glebe Rd, The Junction	22:33	23:33	00:33
Darby St at Bull St, Cooks Hill	22:37	23:37	00:37
Customs House, Watt St, Newcastle	22:44	23:44	00:44

Appendix F

Turning Path Assessment

Attachment 4: Mine Subsidence Risk study

Douglas Partners
Geotechnics / Environment / Groundwater

Integrated Practical Solutions

Report on
Desktop Study - Mine Subsidence Risk

Lake Macquarie Private Hospital Expansion
O'Brien Street, Gateshead

Prepared for
Akalan Projects Pty Ltd

Project 16471.21
October 2016

Douglas Partners
Geotechnics / Environment / Groundwater

Document History

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The undersigned, on behalf of Douglas Partners Pty Ltd, confirm that this document and all attached drawings, logs and test results have been checked and reviewed for errors, omissions and inaccuracies.

	Signature	Date
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Reviewer		25 October 2016

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Table of Contents

Report on Desktop Study - Mine Subsidence Risk
Lake Macquarie Private Hospital Expansion
O'Brien Street, Gateshead

1. Introduction

This report presents the results of a desktop study to assess the mine subsidence risk for the proposed expansion of Lake Macquarie Private Hospital (LMPH) at O'Brien and Casey Streets, Gateshead (Lots 3 to 8, DP24268). The work was carried out for Akalan Projects Pty Ltd.

It is understood that the current proposed development comprises the construction of a single storey structure on Lot 3, DP24268 as part of a 20 bed ward extension. The development will require excavation of about 2 m depth along the northern boundary. The proposed finished basement floor level will be at about RL 42.0 (AHD). The lift well and stairs will be installed to floor level of about 37.0 AHD, to connect with existing hospital buildings to the south. Other future development on Lots 4 to 8 is not yet known.

A desktop study was undertaken to comment on the stability of the mine workings and also to provide comments on the likely surface subsidence parameters which would result from the 'worst credible case' future mine subsidence. No subsurface investigation was undertaken for the mine subsidence assessment.

Douglas Partners Pty Ltd (DP) has previously undertaken a desktop mine subsidence risk assessment of the Stage 2 LMPH Medical Suits at 8 Sydney Street, Gateshead (Ref 1). The results of the previous assessment were referred to in the preparation of this report.

The location of the site is shown on Drawing 1, attached. The area of the current proposed development (Lot 3) is located in the south-west corner of the site area shown on Drawing 1.

2. Scope of Work

The scope of work comprised:

- A review of the plans of the mine workings (called Record Traces or RTs) and the Department of Primary Industries – Minerals' (DPI-Minerals) online DIGS data base for relevant information;
- Review of other historical documents and data from DP files;
- Pillar stability analysis for pillars under the site and within and immediately surrounding the angle of draw;
- Comment on the pillar stability and the likelihood of mine subsidence affecting the site.

3. Data Review

3.1 Extent of Mining

Previous inquiries to the Mine Subsidence Board (MSB) indicates that the site has been undermined by abandoned mine workings in the Victoria Tunnel Seam (Ref 1).

The Victoria Tunnel workings were undertaken by BHP's Burwood Colliery at a depth of about 118 m to 124 m beneath the proposed floor level of 42.0 AHD in the area beneath the site.

Scanned images of the plans of these abandoned mines were obtained from the DPI – Minerals as part of the work for Ref 1. The images were georeferenced to the modern surface cadastre provided by the Department of Lands.

3.2 Record Trace – Victoria Tunnel Seam

The Victoria Tunnel Seam workings of the Burwood Colliery are recorded on Record Tracing (RT) 303A. The relationship between the workings and the site is shown on Drawing 2, attached. Reference to this drawing indicates that the workings comprised bord and pillar workings.

The nearest areas of partial and full pillar extraction are immediately west of the site. One row of full pillar extraction is located within the angle of draw for the site. Additional rows are located west of, and outside the angle of draw.

Dates on the RT near the site indicate that mining likely occurred in the late 1960s to early 1970s.

No sections showing the seam thickness or working section are shown on the RT.

Reference to the RT indicated a working floor elevation in the range of about 219' to 229'. The datum to which these elevations referred is 500' below "high water mark (ordinary spring tide), that is 5'6" above zero of Tide Gauge Newcastle". The Newcastle Harbour Tide Gauge datum (NHTG) is at an elevation of about -1.01 AHD. Therefore, the floor of the workings is estimated to be in the range of about RL -75.7 to RL -83.6 (AHD).

With reference to the proposed floor level of 42.0 AHD, it is therefore estimated that the floor of the workings is in the range of about 118 m to 126 m below the proposed finished floor level of the site.

3.3 Historical Data

Information previously obtained from the on Lake Macquarie City Council (LMCC) website (Ref 1) indicates that Burwood Colliery was owned by the Burwood Coal Co. and opened in 1885 at Glenrock. The first shaft at Whitebridge was sunk in 1888. In 1894 the Scottish Australian Mining Co. bought it for 27,000 pounds. The Glenrock entrance was closed and a new line was built for transport. There were five shafts at Whitebridge, working three seams: the Borehole, Victoria Tunnel and Dudley. The workings extended for a kilometre under the sea and as far as Gateshead, Charlestown and Merewether.

In 1932, Burwood Colliery was purchased by BHP. It closed in 1982.

3.4 Working Section and Seam Thickness

Limited data has been found on the working section thickness of the Victoria Tunnel Seam in the immediate vicinity of the site.

A previous review of data available on Department of Industry's online DIGS database (Ref 1) indicated the following:

Table 1: Summary of Available Colliery Bore Data (source: DIGS online database)

Colliery	Bore Number (date)	Approximate Distance of Bore from Site	Thickness of Victoria Tunnel Seam (m)	Thickness of Working Section of Victoria Tunnel Seam (m)
BHP Windale	DDH1 (1954)	750 m SW	2.41	Not indicated
Waratah	DDH4 (undated)	1.2 km NE	2.83	Not indicated
BHP Windale	DDH3 (1957)	1.4 km SSW	3.04	Not indicated
Waratah	DDH9 (1960)	1.5 km NW	3.20	1.40 ?
BHP Burwood Dudley	DDH2 (1955)	1.6 km SE	4.13	Not indicated
BHP Burwood	DDH8 (1971)	1.8 km NW	2.74	Not indicated
BHP Burwood	No 7 Fan Shaft	1.9 km NW (?)	2.64	Not indicated
BHP Burwood Lambton	Pump Bore DDH (1958)	2.2 km ESE	3.87	Not indicated
Waratah	DDH8 (1960)	2.4 km NW	3.04	2.26
BHP Burwood Dudley	DDH1 (1954)	2.7 km ENE	3.93	Not indicated
South Burwood or Dudley	Downcast Shaft (1890)	2.7 km ESE	4.14	Not indicated
Burwood Dudley	DDH1	2.7 km ENE	3.93	Not indicated
South Burwood	Upcast Shaft (1890)	3.3 km ESE	3.18	Not indicated
Waratah	DDH7 (1960)	3.5 km NW	3.04	2.07
Waratah	DDH6-Tickhole Tunnel (1960)	4.9 km NW	3.11	2.65

Photo 1, below, from LMCC online archives, shows the workings in the Victoria Tunnel Seam at Burwood Colliery. Note there can be two people seen to the left of the photo. There seems to be limited headroom above standing height.

Photo 1 - Victoria Tunnel Seam, Burwood Colliery (Ref LMCC online archives)

In addition, a CSIRO report titled “Petrographic Data on some New South Wales Coals”, by G H Taylor in 1963 indicated an overall Burwood Colliery Victoria Tunnel seam thickness of about 2.79 m, and an inferred working section of about 2.19 m. It’s not known to where this data specifically related.

The 1969 “Geology of New South Wales” publication by the Geological Society of Australia (edited G H Packham) indicates that the working section of the Victoria Tunnel Seam is rarely more than 7 feet (2.1 m).

Based on a review of the available data, a seam thickness and working section thickness of 2.4 m has been assumed for the workings beneath the site. It is considered likely that this thickness represents an over-estimate of the working section beneath the site, based on the two publications referenced above, Photo 1, and the available data on the thickness of the Victoria Tunnel working section in other collieries.

A sensitivity analysis has been based on a pillar height of 3.0 m. It is considered likely that this would represent an over-estimate of the working section beneath the site.

4. Pillar Stability Analysis

Pillar stability analysis was undertaken using the UNSW Pillar Stability Formula (Ref 2). Pillars used in the analysis, and the assigned numbering system, are shown on Drawing 2, attached. When DP previously undertook a pillar stability analysis for the medical suites to the south, 81 pillars were modelled. These previously modelled pillars have been incorporated into the current model, and are numbered A1 to A81. Eighty-five additional pillars were incorporated into the model, to expand coverage to and around the current site extents. The pillars added to the current model are numbered B1 to B85.

The stability analysis was therefore undertaken for 166 pillars within and up to at least 100 m beyond the angle of draw relative to the edge of the site to the north, west and south of the site. The model was not expanded to the east of the site due to the presence of a barrier within the workings.

All pillar dimensions were measured as per RT 303A. Abutment loads were applied to pillars adjacent to areas of pillar extraction. Analysis was undertaken using an iterative process.

During the initial analysis (Run 1), some localised pillars (generally within areas of full or partial pillar extraction) indicated a likelihood of failure / crush. During the second iteration of the analysis (Run 2), it was assumed that these localised pillars had crushed, and abutment loads were transferred to surrounding pillars, where present.

Run 2 suggested that the pillars with the lowest factors of safety within the project area were generally related to pillars B41, B42 and B43. These three pillars are located within the angle of draw, but not beneath the site. They are located in an area where there has been full pillar extraction along both sides of the pillar. Run 2A (Table A.6) analysed the impact that assumed crushing of these three pillars might have on the pillars beneath the site and within the angle of draw.

In addition to the analysis referred to above, sensitivity analyses were undertaken as follows:

- Run 3: decrease the pillars in Run 2 by 1 m;
- Run 4: increase the working section height in Run 2 to 3.0 m;
- Run 5: decrease the pillars in Run 2 by 1 m and also increase the working section height to 3 m.

The attached Drawings 3 to 5 provide a graphical representation of the factors of safety for the pillars in each of Runs 2, 3 and 4. Each of Runs 3 to 5 is considered conservative. The annotations on the RT, and the recent nature of the workings suggest that it is unlikely that additional coal was taken from the pillars beyond what is shown on the RT. Based on the available information, a working section height of 3 m is considered highly unlikely. While analysis was undertaken for Run 5, a graphical representation is not provided as it is considered that the combination of two conservative sensitivity analyses is not a credible scenario.

The results of the analyses are given in Tables A.1 to A.6, attached. The results of Runs 2, 2A, 3 and 4, are summarised in Table 2, below.

Table 2: Summary of Results of Pillar Analysis (Runs 2 and 2A) and Sensitivity Analyses (Runs 3 and 4)

Analysis Run No	2	2A	3	4
Table No in Appendix:	A.2	A.6	A.3	A.4
Pillar Height (m)	2.4	2.4	2.4	3.0
Pillar Dimensions	as per RT, with crushed pillars removed	as per RT, with low FoS pillars removed beneath site	Pillars reduced by 1 m from RT	as per RT
Max W:H Ratio within angle of draw	7.8	7.8	7.4	6.3
Min W:H Ratio within angle of draw	6.3	6.3	5.9	5.1
Average W:H Ratio within angle of draw	7.1	7.1	6.6	5.6
Min FoS within angle of draw:	1.97	2.38	1.72	1.49
Max FoS within angle of draw:	4.76	4.76	4.08	3.54
Average FoS within	3.60	3.66	3.06	2.76

5. Comments

Based on the available data it is considered that the working section is unlikely to have been greater than 2.4 m, and is likely to have been less than 2.4 m.

Given the age of the workings ranging from late 1960's to early 1970's, the pillar dimensions are unlikely to differ significantly from that shown on the RT.

The pillars located beneath the site and within the angle of draw are somewhat "protected" by larger pillars (B16 to the north), a barrier within the workings to the east, and large areas of pillars with factors of safety greater than 3.0 to the south.

An area of full pillar extraction is located west of the site, and partly within the angle of draw. A number of pillars west of the area of pillar extraction indicated marginal stability with factors of safety less than 1.5 (e.g. B51-54), however none of these pillars are located within the angle of draw for the site. It is considered that if these pillars fail, the loss of these pillars will not increase abutment loads in the project area as pillars within higher factors of safety, and an area of full pillar extraction are located between the marginal pillars and the angle of draw. Hence, based on the layout of the mine workings, and the analysis undertaken, it is not credible for a pillar run to propagate through the site.

Pillar stability analysis based on the estimated upper limit working section height of 2.4 m and pillar dimensions shown on the RT (Run 2) demonstrates a minimum pillar factor of safety of 1.97 within the project angle of draw. After the removal of pillars B41, B42 and B43 from the analysis (Run 2A), the minimum factor of safety within the project angle of draw increases to 2.38, with an average factor of safety of 3.66. A pillar run through the site is not considered to be credible under these conditions.

If the pillar dimensions were decreased by 1.0 m from what is shown on the RT, then the minimum pillar factor of safety within the angle of draw (Run 3) decreases to 1.72, with an average factor of safety of 3.06. Given the conservative nature of the sensitivity analysis, a pillar run is also not considered to be credible under these conditions.

If the working section thickness is increased to 3.0 m height, and the pillar dimensions are as shown on the RT, then the analysis (Run 4) suggests that the minimum factor of safety within the angle of draw would be 1.49, with an average factor of safety of 2.76. As previously discussed, a working section height of greater than 2.4 is considered to be highly unlikely, hence a pillar run under these conditions is also considered not credible.

6. Conclusions

Based on the results of the above, the pillars within the project angle of draw have an acceptable factor of safety even when considering the sensitivity analyses, which model conditions which are unlikely to be present.

The risk of a pillar run propagating through the site is considered not credible.

Hence, based on the layout of the mine workings as shown on the record trace, together with historical data regarding the working section height in the Victoria Tunnel Seam, it is considered that the risk of pillar failure in the Victoria Tunnel Seam workings at this site is not credible.

7. References

1. Douglas Partners Pty Ltd, “Report on Desk Study – Mine Subsidence Risk, Lake Macquarie Private Hospital Medical Suits – Stage 2, Sydney Street, Gateshead”, Project No. 16471.12 dated 26 July 2010.
2. Galvin, J M, Hebblewhite, B K, Salamon, M D G and Lin, B B, “Establishing the Strength of Rectangular and Irregular Pillars”, Final Report for ACARP Project C5024, 1998.

8. Limitations

Douglas Partners Pty Ltd (DP) has prepared this report for this project at Lake Macquarie Private Hospital, O'Brien Street, Gateshead in accordance with DP's proposal NCL150797 dated 25 November 2015 and acceptance received from Mr Hector Pedrol of Akalan Project Pty Ltd dated 20 September 2016. The work was carried out under DP's Conditions of Engagement. This report is provided for the exclusive use of Akalan Project Pty Ltd for this project only and for the purposes as described in the report. It should not be used by or relied upon for other projects or purposes on the same or other site or by a third party. Any party so relying upon this report beyond its exclusive use and purpose as stated above, and without the express written consent of DP, does so entirely at its own risk and without recourse to DP for any loss or damage. In preparing this report DP has necessarily relied upon information provided by the client and/or their agents.

The results provided in the report are indicative of the sub-surface conditions on the site only at the specific sampling and/or testing locations, and then only to the depths investigated and at the time the work was carried out. Subsurface conditions can change abruptly due to variable geological processes and also as a result of human influences. Such changes may occur after DP's field testing has been completed.

DP's advice is based upon the conditions encountered during this investigation. The accuracy of the advice provided by DP in this report may be affected by undetected variations in ground conditions across the site between and beyond the sampling and/or testing locations. The advice may also be limited by budget constraints imposed by others or by site accessibility.

This report must be read in conjunction with all of the attached and should be kept in its entirety without separation of individual pages or sections. DP cannot be held responsible for interpretations or conclusions made by others unless they are supported by an expressed statement, interpretation, outcome or conclusion stated in this report.

This report, or sections from this report, should not be used as part of a specification for a project, without review and agreement by DP. This is because this report has been written as advice and opinion rather than instructions for construction.

The scope for work for this investigation/report did not include the assessment of surface or sub-surface materials or groundwater for contaminants, within or adjacent to the site. Should evidence of filling of unknown origin be noted in the report, and in particular the presence of building demolition materials, it should be recognised that there may be some risk that such filling may contain contaminants and hazardous building materials.

Douglas Partners Pty Ltd

Appendix A

About this Report

Douglas Partners

Introduction

These notes have been provided to amplify DP's report in regard to classification methods, field procedures and the comments section. Not all are necessarily relevant to all reports.

DP's reports are based on information gained from limited subsurface excavations and sampling, supplemented by knowledge of local geology and experience. For this reason, they must be regarded as interpretive rather than factual documents, limited to some extent by the scope of information on which they rely.

Copyright

Borehole and Test Pit Logs

The borehole and test pit logs presented in this report are an engineering and/or geological interpretation of the subsurface conditions, and their reliability will depend to some extent on frequency of sampling and the method of drilling or excavation. Ideally, continuous undisturbed sampling or core drilling will provide the most reliable assessment, but this is not always practicable or possible to justify on economic grounds. In any case the boreholes and test pits represent only a very small sample of the total subsurface profile.

Interpretation of the information and its application to design and construction should therefore take into account the spacing of boreholes or pits, the frequency of sampling, and the possibility of other than 'straight line' variations between the test locations.

Groundwater

Where groundwater levels are measured in boreholes there are several potential problems, namely:

- In low permeability soils groundwater may enter the hole very slowly or perhaps not at all during the time the hole is left open;
- A localised, perched water table may lead to an erroneous indication of the true water table;
- Water table levels will vary from time to time with seasons or recent weather changes. They may not be the same at the time of construction as are indicated in the report; and
- The use of water or mud as a drilling fluid will mask any groundwater inflow. Water has to be blown out of the hole and drilling mud must first be washed out of the hole if water measurements are to be made.

More reliable measurements can be made by installing standpipes which are read at intervals over several days, or perhaps weeks for low permeability soils. Piezometers, sealed in a particular stratum, may be advisable in low permeability soils or where there may be interference from a perched water table.

Reports

The report has been prepared by qualified personnel, is based on the information obtained from field and laboratory testing, and has been undertaken to current engineering standards of interpretation and analysis. Where the report has been prepared for a specific design proposal, the information and interpretation may not be relevant if the design proposal is changed. If this happens, DP will be pleased to review the report and the sufficiency of the investigation work.

Every care is taken with the report as it relates to interpretation of subsurface conditions, discussion of geotechnical and environmental aspects, and recommendations or suggestions for design and construction. However, DP cannot always anticipate or assume responsibility for:

- Unexpected variations in ground conditions. The potential for this will depend partly on borehole or pit spacing and sampling frequency;
- Changes in policy or interpretations of policy by statutory authorities; or
- The actions of contractors responding to commercial pressures.

If these occur, DP will be pleased to assist with investigations or advice to resolve the matter.

About this Report

Site Anomalies

In the event that conditions encountered on site during construction appear to vary from those which were expected from the information contained in the report, DP requests that it be immediately notified. Most problems are much more readily resolved when conditions are exposed rather than at some later stage, well after the event.

Information for Contractual Purposes

Where information obtained from this report is provided for tendering purposes, it is recommended that all information, including the written report and discussion, be made available. In circumstances where the discussion or comments section is not relevant to the contractual situation, it may be appropriate to prepare a specially edited document. DP would be pleased to assist in this regard and/or to make additional report copies available for contract purposes at a nominal charge.

Site Inspection

The company will always be pleased to provide engineering inspection services for geotechnical and environmental aspects of work to which this report is related. This could range from a site visit to confirm that conditions exposed are as expected, to full time engineering presence on site.

Table A.1: Pillar Stability Analysis

Run 1: Pillars As Measured

Project: Lake Macquarie Private Hospital Northern Expansion
Location: O'Brien Street, Gateshead
Analysis Assumptions: NSW Pillar formula
Project Number 16471.21

Client: Akalan Projects
Date: 18/10/16
Sheet: 1
Calculations by JAW

Key to Colour Coding of Factors of Safety / Width: Height Ratios

4.50	Greater than 3.0
2.40	Between 2.2 and 3.0
2.10	Between 1.8 and 2.2
1.70	Between 1.5 and 1.8
1.20	Less than 1.5

Indicating Pillar Located within Project Angle of Draw
Indicating Pillar Located beneath site

Analysis Id:	Comment	Depth D (m)	Panel Width/Span (Longwall only) (m)	Seam Thickness (m)	Working Section H (m)	Pillar Height Section H (m)	Unit Weigth γ (kN/m³)	Pillar Details Width w1 (m)	Length w2 (m)	Internal Angle (°)	Roadway Details b1 (m)	b2 (m)	Extract. Ratio (%)	Pillar Area m³	Total Area m³	w1/ Height Ratio w1/H	w2/H Height Ratio w2/H	Width/ Height Ratio	Width Modifier Θ0	Θ	wΘ Effective Width	Pillar Stress (Tributary) (MPa)	Pillar Load (Tributary) MN	Proportion Abutment transfer R	Abutment Angle °	Abut (A) Yield (Y) (?)	Abutment Loading Type M,T,G	Shed Load MN	Abutment Load Received MN	Pillar Stress (MPa) ("Yield") ϕ_s= 0.7	Pillar Stress ("Abut") (MPa)	Squat	Power Law Strength (MPa)	Power Law "Ultimate" Load MN	FoS	Probability of Failure	Probability of Failure NSW Power Formulae
A1		127.7		2.4	2.4	2.4	25	18.6	31.0	90.0	4.9	5.2	32.2	576.6	850.7	7.8	12.9	7.75	1.250	1.250	23.250	4.71	2716	0.79	20							Yes	23.31	13443	4.95	2.3E-24	1 in 1000000
A2		126.7		2.4	2.4	2.4	25	17.4	31.5	90.0	5.2	5.1	33.7	548.1	827.2	7.3	13.1	7.25	1.288	1.288	22.417	4.78	2619	0.77	20							Yes	22.00	12057	4.60	3.4E-22	1 in 1000000
A3		126.7		2.4	2.4	2.4	25	19.1	31.4	90.0	5.3	5.4	33.2	599.7	897.9	8.0	13.1	7.96	1.244	1.244	23.752	4.74	2843	0.81	20							Yes	23.99	14388	5.06	4.7E-25	1 in 1000000
A4	Tailgate Loading	124.6	22.0	2.4	2.4	2.4	25	16.8	31.4	90.0	5.4	5.1	34.9	527.5	810.3	7.0	13.1	7.00	1.303	1.303	21.889	4.78	2523	0.77	20	A	T		1868		8.32	Yes	21.34	11259	2.56	1.9E-09	1 in 1000000
A5		124.1		2.4	2.4	2.4	25	16.5	31.1	90.0	5.4	5.2	35.5	513.2	795.0	6.9	13.0	6.88	1.307	1.307	21.561	4.81	2466	0.77	20							Yes	21.00	10777	4.37	9.8E-21	1 in 1000000
A6		123.6		2.4	2.4	2.4	25	17.7	26.9	90.0	4.8	5.3	34.3	476.1	724.5	7.4	11.2	7.38	1.206	1.206	21.351	4.70	2238	0.78	20							Yes	21.66	10314	4.61	3.2E-22	1 in 1000000
A7		123.1		2.4	2.4	2.4	25	17.2	26.5	90.0	5.2	5.4	36.2	455.8	714.6	7.2	11.0	7.17	1.213	1.213	20.860	4.82	2199	0.78	20							Yes	21.08	9606	4.37	1.0E-20	1 in 1000000
A8		122.7		2.4	2.4	2.4	25	16.7	26.5	90.0	5.4	5.8	38.0	442.6	713.8	7.0	11.0	6.96	1.227	1.227	20.488	4.95	2189	0.77	20							Yes	20.58	9106	4.16	2.0E-19	1 in 1000000
A9		121.4		2.4	2.4	2.4	25	17.0	27.6	90.0	5.0	5.3	35.2	469.2	723.8	7.1	11.5	7.08	1.238	1.238	21.040	4.68	2196	0.77	20							Yes	21.04	9872	4.50	1.6E-21	1 in 1000000
A10		123.9		2.4	2.4	2.4	25	17.3	17.4	90.0	5.3	4.9	40.3	301.0	504.0	7.2	7.3	7.21	1.003	1.003	17.350	5.19	1561	0.78	20							Yes	19.24	5793	3.71	1.3E-16	1 in 1000000
A11		124.2		2.4	2.4	2.4	25	17.0	17.3	90.0	5.3	5.0	40.9	294.1	497.3	7.1	7.2	7.08	1.009	1.009	17.149	5.25	1544	0.77	20							Yes	18.96	5575	3.61	5.4E-16	1 in 1000000
A12		123.2		2.4	2.4	2.4	25	16.7	17.1	90.0	5.1	5.2	41.3	285.6	486.1	7.0	7.1	6.96	1.012	1.012	16.898	5.24	1498	0.76	20							Yes	18.65	5326	3.56	1.2E-15	1 in 1000000
A13		123.0		2.4	2.4	2.4	25	17.0	17.0	90.0	5.3	5.1	41.4	289.0	492.8	7.1	7.1	7.08	1.000	1.000	17.000	5.24	1515	0.78	20							Yes	18.87	5454	3.60	6.4E-16	1 in 1000000
A14		121.9		2.4	2.4	2.4	25	17.0	17.1	90.0	5.5	5.7	43.3	290.7	513.0	7.1	7.1	7.08	1.003	1.003	17.050	5.38	1563	0.78	20							Yes	18.90	5494	3.51	2.2E-15	1 in 1000000
A15		128.8		2.4	2.4	2.4	25	24.5	38.0	90.0	4.2	5.1	24.7	931.0	1237.0	10.2	15.8	10.21	1.216	1.216	29.792	4.28	3984	0.87	20							Yes	33.43	31125	7.81	3.0E-42	1 in 1000000
A16		128.9		2.4	2.4	2.4	25	18.6	31.5	90.0	5.4	5.3	33.7	585.9	883.2	7.8	13.1	7.75	1.257	1.257	23.389	4.86	2846	0.80	20							Yes	23.39	13702	4.81	1.6E-23	1 in 1000000
A17		128.8		2.4	2.4	2.4	25	20.0	31.7	90.0	5.3	5.9	33.4	634.0	951.3	8.3	13.2	8.33	1.226	1.226	24.526	4.83	3064	0.82	20							Yes	25.21	15982	5.22	5.0E-26	1 in 1000000
A18		127.3		2.4	2.4	2.4	25	19.1	31.7	90.0	5.2	5.4	32.8	605.5	901.5	8.0	13.2	7.96	1.248	1.248	23.837	4.74	2869	0.80	20							Yes	24.03	14552	5.07	4.0E-25	1 in 1000000
A19		125.9		2.4	2.4	2.4	25	17.0	31.5	90.0	5.2	5.5	34.8	535.5	821.4	7.1	13.1	7.08	1.299	1.299	22.082	4.83	2585	0.77	20							Yes	21.57	11549	4.47	2.4E-21	1 in 1000000
A20		125.1		2.4	2.4	2.4	25	16.3	31.5	90.0	5.3	5.4	35.6	513.5	797.0	6.8	13.1	6.79	1.318	1.318	21.483	4.85	2493	0.76	20							Yes	20.85	10704	4.29	2.9E-20	1 in 1000000
A21		124.4		2.4	2.4	2.4	25	17.2	16.0	90.0	5.3	5.0	41.8	275.2	472.5	7.2	6.7	6.67	0.964	0.964	16.578	5.34	1469	0.78	20							Yes	18.74	5159	3.51	2.3E-15	1 in 1000000
A22		123.9		2.4	2.4	2.4	25	17.2	16.4	90.0	5.2	5.0	41.2	282.1	479.4	7.2	6.8	6.83	0.976	0.976	16.790	5.27	1485	0.78	20							Yes	18.87	5322	3.58	8.0E-16	1 in 1000000
A23		123.6		2.4	2.4	2.4	25	17.4	16.4	90.0	4.8	5.3	40.8	285.4	481.7	7.3	6.8	6.83	0.970	0.970	16.885	5.22	1489	0.77	20							Yes	19.04	5433	3.65	3.1E-16	1 in 1000000
A24		123.0		2.4	2.4	2.4	25	17.4	16.4	90.0	5.3	5.2	41.8	285.4	490.3	7.3	6.8	6.83	0.970	0.970	16.885	5.28	1508	0.78	20							Yes	19.04	5433	3.60	6.0E-16	1 in 1000000
A25		121.9		2.4	2.4	2.4	25	17.4	16.4	90.0	5.3	5.3	42.1	285.4	492.6	7.3	6.8	6.83	0.970	0.970	16.885	5.26	1501	0.78	20							Yes	19.04	5433	3.62	4.8E-16	1 in 1000000
A26	Tailgate Loading	129.9	22.0	2.4	2.4	2.4	25	20.5	23.8	90.0	5.4	6.2	37.2	487.9	777.0	8.5	9.9	8.54	1.074	1.074	22.027	5.17	2523	0.83	20	A	T		1610		8.47	Yes	24.32	11868	2.87	2.3E-11	1 in 1000000
A27	Tailgate Loading	130.2	22.0	2.4	2.4	2.4	25	22.5	40.1	90.0	5.6	6.2	30.7	902.3	1301.0	9.4	16.7	9.38	1.281	1.281	28.826	4.70	4236	0.86	20	A	T		2492		7.46	Yes	30.23	27274	4.05	9.2E-19	1 in 1000000
A28		128.8		2.4	2.4	2.4	25	23.4	25.8	90.0	5.4	5.3	32.6	603.7	895.7	9.8	10.8	9.75	1.049	1.049	24.541	4.78	2884	0.87	20							Yes	28.91	17453	6.05	3.0E-31	1 in 1000000
A29		128.2		2.4	2.4	2.4	25	10.2	25.4	90.0	5.5	5.3	46.2	259.1	482.0	4.3	10.6	4.25	1.427	1.160	11.829	5.96	1545	0.61	20							No	14.53	3765	2.44	1.2E-08	1 in 1000000
A30		127.3		2.4	2.4	2.4	25	13.5	25.7	90.0	5.5	5.3	41.1	347.0	589.0	5.6	10.7	5.63	1.311	1.268	17.112	5.40	1874	0.70	20							Yes	17.56	6092	3.25	9.7E-14	1 in 1000000
A31		125.3		2.4	2.4	2.4	25	17.4	16.7	90.0	5.4	5.2	41.8	290.6	499.3	7.3	7.0	6.96	0.979	0.979	17.043	5.38	1564	0.78	20							Yes	19.13	5558	3.55	1.2E-15	1 in 1000000
A32		124.5		2.4	2.4	2.4	25	17.8	16.7	90.0	5.4	5.1	41.2	297.3	505.8	7.4	7.0	6.96	0.968	0.968	17.232	5.30	1574	0.79	20							Yes	19.48	5791	3.68	2.0E-16	1 in 1000000
A33		125.9		2.4	2.4	2.4	25	17.3	16.6	90.0	5.6	5.0	41.9	287.2	494.6	7.2	6.9	6.92	0.979	0.979	16.943	5.42	1557	0.78	20							Yes	19.01	5460	3.51	2.4E-15	1 in 1000000
A34		122.8		2.4	2.4	2.4	25	17.3	16.1	90.0	5.5	5.2	42.6	278.5	485.6	7.2	6.7	6.71	0.964	0.964	16.678	5.35	1491	0.79	20							Yes	18.86	5253	3.52	1.9E-15	1 in 1000000
A35		121.9		2.4	2.4	2.4	25	17.3	16.9	90.0	5.3	5.2	41.5	292.4	499.5	7.2	7.0	7.04	0.988	0.988	17.098	5.20	1521	0.78	20							Yes	19.10	5584	3.67	2.3E-16	1 in 1000000
A36		126.5		2.4	2.4	2.4	25	20.0	16.1	90.0	5.4	5.5	41.3	322.0	548.6	8.3	6.7	6.71	0.892	0.892	17.839	5.39	1735	0.82	20							Yes	21.43	6901	3.98	2.8E-18	1 in 1000000
A37		125.1		2.4	2.4	2.4	25	17.8	16.1	90.0	5.2	5.5	42.3	286.6	496.8	7.4	6.7	6.71	0.950	0.950	16.907	5.42	1554	0.78	20							Yes	19.29	5529	3.56	1.1E-15	1 in 1000000
A38		124.0		2.4	2.4	2.4	25	17.6	15.8	90.0	5.1	5.6	42.8	278.1	485.8	7.3	6.6	6.58	0.946	0.946	16.651	5.41	1505	0.78	20							Yes	19.02	5290	3.51	2.2E-15	1 in 1000000
A39		123.6		2.4	2.4	2.4	25	17.6	16.0	90.0	5.3	5.4	42.5	281.6	490.1	7.3	6.7	6.67	0.952	0.952	16.762	5.38	1514	0.79	20							Yes	19.09	5375	3.55	1.3E-15	1 in 1000000
A40		121.8		2.4	2.4	2.4	25	17.6	16.4	90.0	5.3	5.5	42.4	288.6	501.5	7.3	6.8	6.83	0.965	0.965	16.979	5.29	1527	0.79	20							Yes	19.21	5545	3.63	4.0E-16	1 in 1000000
A41	Double Goaf Loading	130.0	45.0	2.4	2.4	2.4	25	28.0	32.6	90.0	5.5	5.7	28.9	912.8	1283.1	11.7	13.6	11.67	1.076	1.076	30.125	4.57	4170	0.92	20	A	G		4270		9.25	Yes	39.07	35659	4.23	7.8E-20	1 in 1000000
A42		127.3		2.4	2.4	2.4	25	21.0	23.9	90.0	5.3	5.1	34.2	501.9	762.7	8.8	10.0	8.75	1.065	1.065	22.356	4.84	2427	0.84	20							Yes	24.99	12544	5.17	1.0E-25	1 in 1000000
A43		126.8		2.4	2.4	2.4	25	16.3	22.1	90.0	5.5	5.7	40.6	360.2	606.0	6.8	9.2	6.79	1.151	1.151	18.762	5.33	1922	0.76	20							Yes	19.46	7009	3.65	3.2E-16	1 in 1000000
A44		125.1		2.4	2.4	2.4	25	17.8	16.4	90.0	5.0	5.6	41.8	291.9	501.6	7.4	6.8	6.83	0.959	0.959	17.071	5.37	1569	0.78	20							Yes	19.39	5660	3.61	5.6E-16	1 in 1000000
A45		124.3		2.4	2.4	2.4	25	17.8	16.4	90.0	5.1	5.5	41.8	291.9	501.5	7.4	6.8	6.83	0.959	0.959	17.071	5.34	1558	0.78	20							Yes	19.39	5660	3.63	3.9E-16	1 in 1000000
A46		124.2		2.4	2.4	2.4	25	17.8	16.4	90.0	5.4	5.4	42.3	291.9	505.8	7.4	6.8	6.83	0.959	0.959	17.071	5.38	1570	0.79	20							Yes	19.39	5660	3.60	6.0E-16	1 in 1000000
A47		122.0		2.4	2.4	2.4	25	17.8	16.7	90.0	5.4	5.3	41.8	297.3	510.4	7.4	7.0	6.96	0.968	0.968	17.232	5.24	1556	0.79	20							Yes	19.48	5791	3.72	1.1E-16	1 in 1000000
A48		128.2		2.4	2.4	2.4	25	18.9	29.1	90.0	6.0	6.0	37.1	550.0	874.0	7.9	12.1	7.88	1.213	1.213	22.916	5.09	2801	0.81	20							Yes	23.39	12863	4.59	4.0E-22	1 in 1000000
A49		126.8		2.4	2.4	2.4	25	33.6	44.0	90.0	5.5	6.0	24.4	1478.4	1955.0	14.0	18.3	14.00	1.134	1.134	38.103	4.19	6199	0.97	20							Yes	55.75	82417	13.30	1.6E-76	1 in 1000000
A50		128.2		2.4	2.4	2.4	25	17.8	43.0	90.0	5.1	6.2	32.1	765.4	1126.7	7.4	17.9	7.42	1.414	1.414	25.178	4.72	3611	0.78	20							Yes	23.64	18093	5.01	9.7E-25	1 in 1000000
A51		125.1		2.4	2.4	2.4	25	13.8	16.6	90.0	6.5	5.2	48.2	229.1	442.5	5.8	6.9	5.75	1.092	1.084	14.961	6.04	1384	0.73	20							Yes	16.46	3770	2.72	1.9E-10	1 in 1000000
A52		126.7		2.4	2.4	2.4	25	33.0	13.8	90.0	6.5	6.0	41.8	455.4	782.1	13.8	5.8	5.75	0.590	0.590	19.462	5.44	2476	0.97	20							Yes	38.61	17583	7.10	8.4E-38	1 in 1000000
A53	Tailgate Loading	130.2	22.0	2.4	2.4	2.4	25	14.7	39.0	90.0	6.5	6.6	40.7	573.3	966.7	6.1	16.3	6.13	1.453	1.453	21.352	5.49	3147	0.74	20	A	T		2454		9.77	Yes	20.03	11481	2.05	3.1E-06	1 in 495476
A54		129.4		2.4	2.4	2.4	25	14.7	43.3	90.0	6.5	6.5	39.7	636.5	1055.8	6.1	18.0	6.13	1.493	1.493	21.949	5.37	3416	0.74	20							Yes	20.31	12927	3.78	4.4E-17	1 in 1000000
A55		127.3		2.4	2.4	2.4	25	15.8	67.0	90.0	6.4	6.0	34.7	1058.6	1620.6	6.6	27.9	6.58	1.618	1.618	25.570	4.87	5158	0.77	20							Yes	22.49	23810	4.62	2.8E-22	1 in 1000000
A56		124.8		2.4	2.4	2.4	25	13.0	14.5	90.0	6.2	8.8	57.9	188.5	447.4	5.4	6.0	5.42	1.055	1.044	13.568	7.40	1396	0.71	20							Yes	15.52	2926	2.10	1.6E-06	1 in 1087287
A57		127.9		2.4	2.4	2.4	25	12.7	40.3	90.0	6.4	6.1	42.2	511.8	886.2	5.3	16.8	5.29	1.521	1.377	17.493	5.54	2834	0.70	20							Yes	17.64	9027	3.19	2.5E-13	1 in 1000000
A58		125.1		2.4	2.4	2.4	25	15.0	33.1	90.0	6.7	6.5	42.2	496.5	859.3	6.3	13.8	6.25	1.376	1.376	20.644	5.41	2688	0.76	20							Yes	19.80	9832	3.66	2.7E-16	1 in 1000000
A59	Double Goaf Loading	130.3	22.0	2.4	2.4	2.4	25	15.1	26.9	90.0	6.2	5.6	41.3	406.2	692.3	6.3	11.2	6.29	1.281	1.281	19.342	5.55	2255	0.74	20	A	G		2059		10.62	Yes	19.20	7797	1.81	1.0E-04	1 in 11138
A60	Tailgate Loading	129.8	22.0	2.4	2.4	2.4	25	14.6	38.6	90.0	6.2	6.0	39.3	563.6	927.7	6.1	16.1	6.08	1.451	1.451	21.186	5.34	3010	0.73	20	A	T		2391		9.58	Yes	19.91	11220	2.08	2.1E-06	1 in 781711
A61		132.3		2.4	2.4	2.4	25	14.6	43.6	90.0	6.3	6.3	39.0	636.6	1042.9	6.1	18.2	6.08	1.498	1.498	21.875	5.42	3449	0.73	20							Yes	20.24	12881	3.73	9.2E-17	1 in 1000000
A62		127.3		2.4	2.4	2.4	25	14.6	26.5	90.0	6.4	6.1	43.5	386.9	684.6	6.1	11.0	6.08	1.290	1.290	18.827	5.63	2179	0.74	20							Yes	18.75	7253	3.33	3.1E-14	1 in 1000000
A63		130.0		2.4	2.4	2.4	25	12.2	52.9	90.0	6.3	5.9	40.7	645.4	1087.8	5.1	22.0	5.08	1.625	1.401	17.093	5.48	3535	0.68	20							Yes	17.40	11229	3.18	2.8E-13	1 in 1000000
A64		127.3		2.4	2.4	2.4	25	12.2	50.8	90.0	6.2	6.3	41.0	619.8	1050.6	5.1	21.2	5.08	1.613	1.394	17.002	5.40	3344	0.68	20							Yes	17.35	10754	3.22	1.6E-13	1 in 1000000
A65	Double Goaf Loading	125.1	45.0	2.4	2.4	2.4	25	20.7	24.5	90.0	88.9	5.3	84.5	507.2	3266.1	8.6	10.2	8.63	1.084	1.084	22.440	20.14	10215	1.75	20	A	G		3158		26.37	Yes	24.75	12551	0.94	6.4E-01	1 in 2
A66	Maingate Loading	126.1	45.0	2.4	2.4	2.4	25	15.8	24.5	90.0	72.2	5.5	85.3	387.1	2640.0	6.6	10.2	6.58	1.216	1.216	19.211	21.50	8323	1.15	20	A	M		5758		36.37	Yes	19.44	7525	0.53	1.8E+00	1 in 48
A67	Maingate Loading	127.9	45.0	2.4	2.4	2.4	25	16.2	24.3	90.0	37.2	5.7	75.4	393.7	1602.0	6.8	10.1	6.75	1.200	1.200	19.440	13.01	5122	1.00	20	A	M		3419		21.70	Yes	19.76	7778	0.91	7.0E-01	1 in 1
A68	Maingate Loading	122.1	22.0	2.4	2.4	2.4	25	16.0	35.4	90.0	5.3	5.1	34.3	566.4	862.7	6.7	14.8	6.67	1.377	1.377	22.039	4.65	2633	0.76	20	A	M		1150		6.68	Yes	20.96	11869	3.14	4.9E-13	1 in 1000000
A69		122.1		2.4	2.4	2.4	25	17.4	19.4	90.0	5.6	6.5	43.3	337.6	595.7	7.3	8.1	7.25	1.054	1.054	18.346	5.39	1818	0.79	20							Yes	19.86	6704	3.69	1.8E-16	1 in 1000000
A70		122.1		2.4	2.4	2.4	25	16.9	19.2	90.0	5.4	6.5	43.4	324.5	573.1	7.0	8.0	7.04	1.064	1.064	17.977	5.39	1749	0.78	20							Yes	19.36	6282	3.59	7.2E-16	1 in 1000000
A71		121.2		2.4	2.4	2.4	25	16.9	19.2	90.0	4.9	6.5	42.1	324.5	560.3	7.0	8.0	7.04	1.064	1.064	17.977	5.23	1698	0.77	20							Yes	19.36	6282	3.70	1.5E-16	1 in 1000000
A72		120.6		2.4	2.4	2.4	25	16.9	19.2	90.0	5.0	6.5	42.3	324.5	562.8	7.0	8.0	7.04	1.064	1.064	17.977	5.23	1697	0.77	20							Yes	19.36	6282	3.70	1.5E-16	1 in 1000000
A73	Maingate Loading	124.2	22.0	2.4	2.4	2.4	25	16.5	31.9	90.0	5.3	4.7	34.0	526.4	797.9	6.9	13.3	6.88	1.318	1.318	21.750	4.71	2477	0.76	20	A	M		1068		6.74	Yes	21.09	11103	3.13	5.3E-13	1 in 1000000

Table A.1: Pillar Stability Analysis

Run 1: Pillars As Measured

Project: Lake Macquarie Private Hospital Northern Expansion
Location: O'Brien Street, Gateshead
Analysis Assumptions: NSW Pillar formula
Project Number 16471.21

Client: Akalan Projects
Date: 18/10/16
Sheet: 1
Calculations by JAW

Key to Colour Coding of Factors of Safety / Width: Height Ratios

4.50	Greater than 3.0
2.40	Between 2.2 and 3.0
2.10	Between 1.8 and 2.2
1.70	Between 1.5 and 1.8
1.20	Less than 1.5

Indicating Pillar Located within Project Angle of Draw
Indicating Pillar Located beneath site

Analysis Id:	Comment	Depth D (m)	Panel Width/Span (Longwall only) (m)	Seam Thickness (m)	Working Section H (m)	Pillar Height Section H (m)	Unit Weigth γ (kN/m³)	Pillar Details Width w1 (m)	Length w2 (m)	Internal Angle (°)	Roadway Details b1 (m)	b2 (m)	Extract. Ratio (%)	Pillar Area m³	Total Area m³	w1/ Height Ratio w1/H	w2/H Height Ratio w2/H	Width/ Height Ratio	Width Modifier Θ0	Θ	wΘ Effective Width	Pillar Stress (Tributary) (MPa)	Pillar Load (Tributary) MN	Proportion Abutment transfer R	Abutment Angle °	Abut (A) Yield (Y) (?)	Abutment Loading Type M,T,G	Shed Load MN	Abutment Load Received MN	Pillar Stress (MPa) ("Yield") ϕ_s= 0.7	Pillar Stress ("Abut") (MPa)	Squat	Power Law Strength (MPa)	Power Law "Ultimate" Load MN	FoS	Probability of Failure	Probability of Failure NSW Power Formulae
A74		122.3		2.4	2.4	2.4	25	16.4	17.4	90.0	5.5	5.2	42.3	285.4	494.9	6.8	7.3	6.83	1.030	1.030	16.885	5.30	1513	0.77	20							Yes	18.49	5276	3.49	3.2E-15	1 in 1000000
A75		121.8		2.4	2.4	2.4	25	16.6	16.9	90.0	5.2	5.4	42.3	280.5	486.1	6.9	7.0	6.92	1.009	1.009	16.749	5.28	1480	0.77	20							Yes	18.51	5194	3.51	2.4E-15	1 in 1000000
A76		121.8		2.4	2.4	2.4	25	16.6	17.1	90.0	4.8	5.7	41.8	283.9	487.9	6.9	7.1	6.92	1.015	1.015	16.846	5.23	1486	0.76	20							Yes	18.57	5271	3.55	1.3E-15	1 in 1000000
A77		121.2		2.4	2.4	2.4	25	16.6	17.0	90.0	5.0	5.0	40.6	282.2	475.2	6.9	7.1	6.92	1.012	1.012	16.798	5.10	1440	0.76	20							Yes	18.54	5233	3.63	3.9E-16	1 in 1000000
A78	Maingate Loading	121.8	22.0	2.4	2.4	2.4	25	16.5	29.9	90.0	5.3	4.4	34.0	493.4	747.7	6.9	12.5	6.88	1.289	1.289	21.265	4.62	2277	0.77	20	A	M		985		6.61	Yes	20.85	10288	3.15	3.9E-13	1 in 1000000
A79		121.9		2.4	2.4	2.4	25	16.2	17.6	90.0	6.6	5.3	45.4	285.1	522.1	6.8	7.3	6.75	1.041	1.041	16.871	5.58	1591	0.79	20							Yes	18.38	5241	3.29	5.2E-14	1 in 1000000
A80	Tailgate Loading	125.6	45.0	2.4	2.4	2.4	25	18.5	31.5	90.0	23.2	5.0	61.7	582.8	1522.1	7.7	13.1	7.71	1.260	1.260	23.310	8.20	4779	0.98	20	A	T		3305		13.87	Yes	23.27	13558	1.68	6.6E-04	1 in 1777
A81		121.8		2.4	2.4	2.4	25	15.4	17.5	90.0	5.2	5.1	42.1	269.5	465.6	6.4	7.3	6.42	1.064	1.064	16.383	5.26	1418	0.74	20							Yes	17.75	4785	3.38	1.6E-14	1 in 1000000
B1		121.2		2.4	2.4	2.4	25	17.2	15.9	90.0	5.4	6.7	46.5	273.5	510.8	7.2	6.6	6.63	0.961	0.961	16.524	5.66	1548	0.78	20							Yes	18.71	5118	3.31	4.3E-14	1 in 1000000
B2		120.6		2.4	2.4	2.4	25	16.8	15.9	90.0	5.4	6.7	46.8	267.1	501.7	7.0	6.6	6.63	0.972	0.972	16.338	5.66	1513	0.78	20							Yes	18.39	4911	3.25	1.0E-13	1 in 1000000
B3		120.1		2.4	2.4	2.4	25	16.0	15.4	90.0	5.4	6.7	47.9	246.4	472.9	6.7	6.4	6.42	0.981	0.981	15.694	5.76	1420	0.76	20							Yes	17.62	4342	3.06	1.5E-12	1 in 1000000
B4		120.2		2.4	2.4	2.4	25	17.3	15.7	90.0	5.4	5.0	42.2	271.6	469.9	7.2	6.5	6.54	0.952	0.952	16.461	5.20	1412	0.79	20							Yes	18.73	5088	3.60	6.0E-16	1 in 1000000
B5		119.6		2.4	2.4	2.4	25	16.9	15.8	90.0	5.4	5.0	42.4	267.0	463.8	7.0	6.6	6.58	0.966	0.966	16.331	5.19	1387	0.78	20							Yes	18.44	4923	3.55	1.3E-15	1 in 1000000
B6		119.2		2.4	2.4	2.4	25	17.3	16.1	90.0	5.4	5.0	41.8	278.5	479.0	7.2	6.7	6.71	0.964	0.964	16.678	5.12	1427	0.79	20							Yes	18.86	5253	3.68	2.0E-16	1 in 1000000
B7		118.6		2.4	2.4	2.4	25	18.3	24.6	90.0	5.4	5.2	36.3	450.2	706.3	7.6	10.3	7.63	1.147	1.147	20.987	4.65	2094	0.81	20							Yes	21.90	9860	4.71	7.5E-23	1 in 1000000
B8		119.0		2.4	2.4	2.4	25	18.1	24.9	90.0	5.4	5.2	36.3	450.7	707.4	7.5	10.4	7.54	1.158	1.158	20.962	4.67	2104	0.80	20							Yes	21.74	9799	4.66	1.6E-22	1 in 1000000
B9		120.0		2.4	2.4	2.4	25	18.0	24.9	90.0	5.4	5.2	36.4	448.2	704.3	7.5	10.4	7.50	1.161	1.161	20.895	4.71	2113	0.80	20							Yes	21.64	9697	4.59	4.2E-22	1 in 1000000
B10		121.3		2.4	2.4	2.4	25	18.8	24.7	90.0	5.4	5.2	35.8	464.4	723.6	7.8	10.3	7.83	1.136	1.136	21.350	4.73	2194	0.81	20							Yes	22.48	10439	4.76	3.7E-23	1 in 1000000
B11	Maingate Loading	121.8	22.0	2.4	2.4	2.4	25	15.2	40.0	90.0	6.1	4.8	36.3	608.0	954.2	6.3	16.7	6.33	1.449	1.449	22.029	4.78	2906	0.76	20	A	M		1310		6.93	Yes	20.56	12498	2.96	5.9E-12	1 in 1000000
B12		121.0		2.4	2.4	2.4	25	18.6	19.0	90.0	5.4	5.2	39.2	353.4	580.8	7.8	7.9	7.75	1.011	1.011	18.798	4.97	1757	0.81	20							Yes	20.92	7393	4.21	1.0E-19	1 in 1000000
B13		119.7		2.4	2.4	2.4	25	16.8	18.7	90.0	5.4	5.2	40.8	314.2	530.6	7.0	7.8	7.00	1.054	1.054	17.699	5.05	1588	0.78	20							Yes	19.15	6017	3.79	4.1E-17	1 in 1000000
B14		118.4		2.4	2.4	2.4	25	17.2	18.7	90.0	5.4	5.2	40.5	321.6	540.1	7.2	7.8	7.17	1.042	1.042	17.919	4.97	1599	0.79	20							Yes	19.50	6273	3.92	6.0E-18	1 in 1000000
B15		117.7		2.4	2.4	2.4	25	17.3	19.5	90.0	5.4	5.2	39.8	337.4	560.7	7.2	8.1	7.21	1.060	1.060	18.334	4.89	1650	0.79	20							Yes	19.79	6677	4.05	1.0E-18	1 in 1000000
B16		119.0		2.4	2.4	2.4	25	63.4	42.3	90.0	5.4	5.2	17.9	2681.8	3268.0	26.4	17.6	17.63	0.800	0.800	50.744	3.63	9722	1.01	20							Yes	173.66	465736	47.90	8.0E-293	1 in 1000000
B17		119.7		2.4	2.4	2.4	25	16.1	31.1	90.0	5.5	5.7	37.0	500.7	794.9	6.7	13.0	6.71	1.318	1.318	21.217	4.75	2379	0.77	20							Yes	20.61	10318	4.34	1.6E-20	1 in 1000000
B18	Tailgate Loading	119.9	22.0	2.4	2.4	2.4	25	16.7	31.1	90.0	5.6	5.7	36.7	519.4	820.6	7.0	13.0	6.96	1.301	1.301	21.731	4.74	2460	0.78	20	A	T		1803		8.21	Yes	21.20	11013	2.58	1.4E-09	1 in 1000000
B19	Maingate Loading	120.0	45.0	2.4	2.4	2.4	25	17.5	31.3	90.0	5.6	5.7	35.9	547.8	854.7	7.3	13.0	7.29	1.283	1.283	22.449	4.68	2564	0.80	20	A	M		1723		7.83	Yes	22.08	12096	2.82	4.6E-11	1 in 1000000
B20	Maingate Loading	119.5	45.0	2.4	2.4	2.4	25	17.5	31.4	90.0	5.6	4.9	34.5	549.5	838.5	7.3	13.1	7.29	1.284	1.284	22.474	4.56	2505	0.80	20	A	M		1683		7.62	Yes	22.10	12141	2.90	1.5E-11	1 in 1000000
B21		119.3		2.4	2.4	2.4	25	16.8	31.1	90.0	5.8	4.9	35.8	522.5	813.6	7.0	13.0	7.00	1.299	1.299	21.815	4.64	2427	0.79	20							Yes	21.31	11133	4.59	4.2E-22	1 in 1000000
B22		119.2		2.4	2.4	2.4	25	16.0	30.9	90.0	5.5	0.9	27.7	494.4	683.7	6.7	12.9	6.67	1.318	1.318	21.083	4.12	2037	0.77	20							Yes	20.49	10129	4.97	1.7E-24	1 in 1000000
B23		119.1		2.4	2.4	2.4	25	13.2	15.0	90.0	5.7	5.6	49.1	198.0	389.3	5.5	6.3	5.50	1.064	1.053	13.898	5.85	1159	0.71	20							Yes	15.74	3117	2.69	3.1E-10	1 in 1000000
B24		118.2		2.4	2.4	2.4	25	12.9	10.3	90.0	5.7	5.4	54.5	132.9	292.0	5.4	4.3	4.29	0.888	0.910	11.741	6.49	863	0.70	20							Yes	14.41	1915	2.22	2.7E-07	1 in 1000000
B25		117.5		2.4	2.4	2.4	25	13.8	10.1	90.0	6.1	5.4	54.8	139.4	308.5	5.8	4.2	4.21	0.845	0.857	11.828	6.50	906	0.74	20							Yes	14.60	2035	2.25	1.8E-07	1 in 1000000
B26		116.8		2.4	2.4	2.4	25	13.6	9.9	90.0	6.6	5.4	56.4	134.6	309.1	5.7	4.1	4.13	0.843	0.859	11.679	6.70	902	0.74	20							Yes	14.47	1948	2.16	6.5E-07	1 in 1000000
B27		116.0		2.4	2.4	2.4	25	14.0	9.6	90.0	6.1	5.4	55.4	134.4	301.5	5.8	4.0	4.00	0.814	0.823	11.521	6.51	874	0.74	20							Yes	14.45	1942	2.22	2.6E-07	1 in 1000000
B28		115.2		2.4	2.4	2.4	25	13.8	10.0	90.0	5.6	5.4	53.8	138.0	298.8	5.8	4.2	4.17	0.840	0.853	11.766	6.23	860	0.73	20							Yes	14.56	2009	2.34	5.1E-08	1 in 1000000
B29		114.5		2.4	2.4	2.4	25	13.6	13.4	90.0	5.6	5.3	49.2	182.2	359.0	5.7	5.6	5.58	0.993	0.993	13.510	5.64	1028	0.73	20							Yes	15.58	2840	2.76	1.1E-10	1 in 1000000
B30		115.3		2.4	2.4	2.4	25	13.9	13.6	90.0	6.1	5.3	50.0	189.0	378.0	5.8	5.7	5.67	0.989	0.990	13.759	5.76	1090	0.74	20							Yes	15.79	2985	2.74	1.5E-10	1 in 1000000
B31		116.0		2.4	2.4	2.4	25	12.8	14.0	90.0	6.6	5.3	52.1	179.2	374.4	5.3	5.8	5.33	1.045	1.035	13.244	6.06	1086	0.73	20							Yes	15.31	2744	2.53	3.2E-09	1 in 1000000
B32		116.7		2.4	2.4	2.4	25	14.0	14.1	90.0	6.1	5.3	49.4	197.4	389.9	5.8	5.9	5.83	1.004	1.003	14.047	5.76	1138	0.74	20							Yes	15.98	3155	2.77	9.3E-11	1 in 1000000
B33		117.4		2.4	2.4	2.4	25	12.9	14.0	90.0	5.7	5.3	49.7	180.6	359.0	5.4	5.8	5.38	1.041	1.032	13.316	5.83	1054	0.71	20							Yes	15.36	2775	2.63	6.9E-10	1 in 1000000
B34		118.3		2.4	2.4	2.4	25	15.6	30.9	90.0	5.5	5.0	36.4	482.0	757.5	6.5	12.9	6.50	1.329	1.329	20.733	4.65	2240	0.76	20							Yes	20.11	9695	4.33	1.8E-20	1 in 1000000
B35		118.0		2.4	2.4	2.4	25	16.9	30.2	90.0	5.8	5.0	36.1	510.4	799.0	7.0	12.6	7.04	1.282	1.282	21.672	4.62	2357	0.79	20							Yes	21.30	10870	4.61	3.0E-22	1 in 1000000
B36	Maingate Loading	118.1	45.0	2.4	2.4	2.4	25	17.3	29.9	90.0	5.6	5.0	35.3	517.3	799.2	7.2	12.5	7.21	1.267	1.267	21.918	4.56	2360	0.80	20	A	M		1591		7.64	Yes	21.68	11214	2.84	3.6E-11	1 in 1000000
B37	Maingate Loading	117.3	45.0	2.4	2.4	2.4	25	17.3	30.6	90.0	5.7	4.5	34.4	529.4	807.3	7.2	12.8	7.21	1.278	1.278	22.104	4.47	2367	0.80	20	A	M		1597		7.49	Yes	21.77	11526	2.91	1.3E-11	1 in 1000000
B38		117.2		2.4	2.4	2.4	25	17.0	30.6	90.0	5.8	4.5	35.0	520.2	800.3	7.1	12.8	7.08	1.286	1.286	21.857	4.51	2345	0.80	20							Yes	21.45	11160	4.76	3.6E-23	1 in 1000000
B39		115.9		2.4	2.4	2.4	25	12.8	11.2	90.0	5.7	4.9	51.9	143.4	297.9	5.3	4.7	4.67	0.933	0.948	12.131	6.02	863	0.71	20							Yes	14.64	2099	2.43	1.3E-08	1 in 1000000
B40		113.8		2.4	2.4	2.4	25	13.2	11.6	90.0	6.1	4.9	51.9	153.1	318.5	5.5	4.8	4.83	0.935	0.946	12.486	5.92	906	0.73	20							Yes	14.91	2282	2.52	3.6E-09	1 in 1000000
B41	Double Goaf Loading	121.0	45.0	2.4	2.4	2.4	25	17.0	37.8	90.0	5.4	5.0	33.0	642.6	958.7	7.1	15.8	7.08	1.380	1.380	23.453	4.51	2900	0.78	20	A	G		4338		11.26	Yes	22.24	14290	1.97	9.2E-06	1 in 144252
B42	Double Goaf Loading	122.0	45.0	2.4	2.4	2.4	25	18.1	30.0	90.0	5.3	4.8	33.3	543.0	814.3	7.5	12.5	7.54	1.247	1.247	22.578	4.57	2484	0.80	20	A	G		3566		11.14	Yes	22.58	12262	2.03	4.3E-06	1 in 338156
B43	Double Goaf Loading	123.0	45.0	2.4	2.4	2.4	25	17.9	35.2	90.0	5.8	4.6	33.2	630.1	943.3	7.5	14.7	7.46	1.326	1.326	23.732	4.60	2901	0.80	20	A	G		4123		11.15	Yes	23.01	14499	2.06	2.5E-06	1 in 629304
B44	Maingate Loading	124.0	22.0	2.4	2.4	2.4	25	18.3	31.3	90.0	5.8	4.6	33.8	572.8	865.2	7.6	13.0	7.63	1.262	1.262	23.096	4.68	2682	0.81	20	A	M		1128		6.65	Yes	23.00	13173	3.46	4.9E-15	1 in 1000000
B45	Tailgate Loading	125.0	45.0	2.4	2.4	2.4	25	17.1	16.6	90.0	5.0	11.5	54.3	283.9	621.0	7.1	6.9	6.92	0.985	0.985	16.846	6.84	1941	0.77	20	A	T		2528		15.74	Yes	18.84	5348	1.20	1.4E-01	1 in 8
B46	Tailgate Loading	128.0	22.0	2.4	2.4	2.4	25	21.6	15.8	90.0	10.0	5.4	49.1	341.3	669.9	9.0	6.6	6.58	0.845	0.845	18.250	6.28	2144	0.91	20	A	T		1119		9.56	Yes	23.08	7877	2.41	1.6E-08	1 in 1000000
B47	Tailgate Loading	127.7	45.0	2.4	2.4	2.4	25	20.6	15.8	90.0	8.9	5.5	48.2	325.5	628.4	8.6	6.6	6.58	0.868	0.868	17.884	6.16	2006	0.88	20	A	T		1971		12.22	Yes	21.96	7147	1.80	1.2E-04	1 in 9543
B48	Maingate Loading	126.0	45.0	2.4	2.4	2.4	25	9.2	12.3	90.0	11.0	6.0	69.4	113.2	369.7	3.8	5.1	3.83	1.144	1.038	9.551	10.29	1164	0.73	20	A	M		941		18.61	No	13.03	1474	0.70	1.3E+00	1 in 2
B49	Rotated Panel / Double Goaf	125.0	22.0	2.4	2.4	2.4	25	13.0	8.2	90.0	5.0	6.1	58.6	106.6	257.4	5.4	3.4	3.42	0.774	0.813	10.571	7.55	804	0.68	20	A	M		368		11.00	Yes	13.67	1457	1.24	8.9E-02	1 in 12
B50	Maingate Loading	123.0	45.0	2.4	2.4	2.4	25	24.8	15.2	90.0	5.0	5.9	40.0	377.0	628.8	10.3	6.3	6.33	0.760	0.760	18.848	5.13	1933	0.89	20	A	M		1120		8.10	Yes	26.81	10106	3.31	4.1E-14	1 in 1000000
B51	Rotated Panel / Double Goaf	123.5	45.0	2.4	2.4	2.4	25	15.0	26.8	90.0	5.7	5.5	39.9	402.0	668.6	6.3	11.2	6.25	1.282	1.282	19.234	5.14	2064	0.74	20	A	G		3365		13.50	Yes	19.10	7678	1.41	1.3E-02	1 in 70
B52	Rotated Panel / Double Goaf	124.0	45.0	2.4	2.4	2.4	25	15.0	26.8	90.0	5.7	5.5	39.9	402.0	668.6	6.3	11.2	6.25	1.282	1.282	19.234	5.16	2073	0.74	20	A	G		3383		13.57	Yes	19.10	7678	1.41	1.4E-02	1 in 64
B53	Rotated Panel / Double Goaf	124.6	45.0	2.4	2.4	2.4	25	15.0	26.8	90.0	5.7	6.0	40.8	402.0	679.0	6.3	11.2	6.25	1.282	1.282	19.234	5.26	2115	0.74	20	A	G		3457		13.86	Yes	19.10	7678	1.38	1.9E-02	1 in 47
B54	Rotated Panel / Double Goaf	124.8	45.0	2.4	2.4	2.4	25	15.0	26.8	90.0	5.7	5.8	40.4	402.0	674.8	6.3	11.2	6.25	1.282	1.282	19.234	5.24	2105	0.74	20	A	G		3443		13.80	Yes	19.10	7678	1.38	1.8E-02	1 in 50
B55	Rotated Panel / Maingate Load	125.0	45.0	2.4	2.4	2.4	25	15.0	26.8	90.0	5.7	5.8	40.4	402.0	674.8	6.3	11.2	6.25	1.282	1.282	19.234	5.25	2109	0.74	20	A	M		1490		8.95	Yes	19.10	7678	2.13	9.2E-07	1 in 1000000
B56	Double Goaf Loading	123.0	45.0	2.4	2.4	2.4	25	24.2	15.4	90.0	5.0	5.4	38.6	372.7	607.4	10.1	6.4	6.42	0.778	0.778	18.822	5.01	1868	0.88	20	A	G		2155		10.79	Yes	26.12	9733	2.42	1.5E-08	1 in 1000000
B57	Double Goaf Loading	122.0	45.0	2.4	2.4	2.4	25	25.5	22.0	90.0	5.0	5.2	32.4	561.0	829.6	10.6	9.2	9.17	0.926	0.926	23.621	4.51	2530	0.90	20	A	G		2787		9.48	Yes	31.00	17388	3.27	7.3E-14	1 in 1000000
B58	Tailgate Loading	121.0	45.0	2.4	2.4	2.4	25	24.5	16.6	90.0	5.3	5.8	39.1	406.7	667.5	10.2	6.9	6.92	0.808	0.808	19.791	4.96	2019	0.89	20	A	T		1930		9.71	Yes	27.14	11037	2.79	6.8E-11	1 in 1000000
B59	Rotated Panel / Double Goaf	121.5	45.0	2.4	2.4	2.4	25	16.8	26.6	90.0	5.8	5.4	38.2	446.9	723.2	7.0	11.1	7.00	1.226	1.226	20.594	4.92	2197	0.78	20	A	G		3261		12.21	Yes	20.69	9246	1.69	5.2E-04	1 in 2239
B60	Rotated Panel / Double Goaf	122.0	45.0	2.4	2.4	2.4	25	16.8	26.6	90.0	5.8	5.4	38.2	446.9	723.2	7.0	11.1	7.00	1.226	1.226	20.594	4.94	2206	0.78	20	A	G		3279		12.27	Yes	20.69	9246	1.69	5.8E-04	1 in 1998
B61	Rotated Panel / Double Goaf	123.0	45.0	2.4	2.4	2.4	25	16.8	26.6	90.0	5.8	6.2	39.7	446.9	741.3	7.0	11.1	7.00	1.226	1.226	20.594	5.10	2279	0.78	20	A	G		3398		12.70	Yes	20.69	9246	1.63	1.1E-03	1 in 931
B62	Rotated Panel / Double Goaf	123.5	45.0	2.4	2.4	2.4	25	16.8	26.6	90.0	5.8	6.0	39.3	446.9	736.8	7.0	11.1	7.00	1.226	1.226	20.594	5.09	2275	0.78	20	A	G		3396		12.69	Yes	20.69	9246	1.63	1.3E-03	1 in 956
B63	Rotated Panel / Double Goaf	124.0	45.0	2.4	2.4	2.4	25	16.8	26.6	90.0	5.8	6.3	39.9	446.9	743.5	7.0	11.1	7.00	1.226	1.226	20.594	5.16	2305	0.78	20	A	G		3446		12.87	Yes	20.69	9246	1.61	1.4E-03	1 in 712
B64	Rotated Panel / Double Goaf	125.5	45.0	2.4	2.4	2.4	25	16.8	26.0	90.0	5.8	6.1	39.8	436.8	725.5	7.0	10.8	7.00	1.215	1.215	20.411	5.21	2276	0.78	20	A	G		3416		13.03	Yes	20.60	8997	1.58	1.9E-03	1 in 502
B65	Double Goaf Loading	120.0	45.0	2.4	2.4	2.4	25	19.8	15.5	90.0	7.5	6.1	48.0	306.9	589.7	8.3	6.5	6.46	0.878	0.878	17.388	5.76	1769	0.86	20	A	G		2165		12.82	Yes	20.99	6443	1.64	1.2E-03	1 in 1053

Table A.1: Pillar Stability Analysis

Run 1: Pillars As Measured

Project: Lake Macquarie Private Hospital Northern Expansion
Location: O'Brien Street, Gateshead
Analysis Assumptions: NSW Pillar formula
Project Number 16471.21

Client: Akalan Projects
Date: 18/10/16
Sheet: 1
Calculations by JAW

Key to Colour Coding of Factors of Safety / Width: Height Ratios

4.50	Greater than 3.0
2.40	Between 2.2 and 3.0
2.10	Between 1.8 and 2.2
1.70	Between 1.5 and 1.8
1.20	Less than 1.5

Indicating Pillar Located within Project Angle of Draw

Indicating Pillar Located beneath site

Analysis Id:	Comment	Depth	Panel Width/Span (Longwall only)	Seam Thickness	Working Section	Pillar Height Section	Unit Weigth	Pillar Details			adway Deta		Extract. Ratio	Pillar Area	Total Area	w1/ Height Ratio	w2/H Height Ratio	Width/ Height Ratio	Width Modifier			Pillar Stress	Pillar Load	Proportion Abutment	Abutment Angle	Abut (A)	Abutment Loading	Shed Load	Abutment Load	Pillar Stress (MPa)	Pillar Stress	Squat	Power Law				Probability of Failure
								Width	Length	Internal																							Strength	"Ultimate"	FoS	Probability	Probability of Failure
		D			H	H	γ	w1	w2	Angle	b1	b2				Ratio	Ratio		Θ_0	Θ	wΘ Effective	(Tributary)	(Tributary)	transfer	°	Yield (Y)	Type		Received	("Yield")	("Abut")			Load			NSW Power
		(m)	(m)	(m)	(m)	(m)	(kN/m^3)	(m)	(m)	(°)	(m)	(m)	(%)	m^3	m^3	w1/H	w2/H				Width	(MPa)	MN	R		(?)	M,T,G	MN	MN	ϕ_s= 0.7	(MPa)		(MPa)	MN			Formulae
B66	Double Goaf Loading	119.5	45.0	2.4	2.4	2.4	25	24.7	16.2	90.0	5.5	5.0	37.5	400.1	640.2	10.3	6.8	6.75	0.792	0.792	19.567	4.78	1913	0.90	20	A	G		2113		10.06	Yes	27.21	10888	2.70	2.5E-10	1 in 1000000
B67	Tailgate Loading	119.0	45.0	2.4	2.4	2.4	25	24.7	16.2	90.0	5.5	5.2	38.1	400.1	646.3	10.3	6.8	6.75	0.792	0.792	19.567	4.81	1923	0.90	20	A	T		1803		9.31	Yes	27.21	10888	2.92	1.1E-11	1 in 1000000
B68	Rotated Panel / Double Goaf	120.0	45.0	2.4	2.4	2.4	25	16.0	27.0	90.0	5.2	5.8	37.9	432.0	695.4	6.7	11.3	6.67	1.256	1.256	20.093	4.83	2086	0.76	20	A	G		3287		12.44	Yes	19.99	8636	1.61	1.4E-03	1 in 705
B69	Rotated Panel / Double Goaf	120.0	45.0	2.4	2.4	2.4	25	16.0	27.0	90.0	5.2	5.8	37.9	432.0	695.4	6.7	11.3	6.67	1.256	1.256	20.093	4.83	2086	0.76	20	A	G		3287		12.44	Yes	19.99	8636	1.61	1.4E-03	1 in 705
B70	Rotated Panel / Double Goaf	120.0	45.0	2.4	2.4	2.4	25	16.0	27.0	90.0	5.2	5.6	37.5	432.0	691.1	6.7	11.3	6.67	1.256	1.256	20.093	4.80	2073	0.76	20	A	G		3267		12.36	Yes	19.99	8636	1.62	1.3E-03	1 in 801
B71	Rotated Panel / Double Goaf	120.0	45.0	2.4	2.4	2.4	25	16.0	27.0	90.0	5.2	5.7	37.7	432.0	693.2	6.7	11.3	6.67	1.256	1.256	20.093	4.81	2080	0.76	20	A	G		3277		12.40	Yes	19.99	8636	1.61	1.3E-03	1 in 751
B72	Rotated Panel / Double Goaf	120.0	45.0	2.4	2.4	2.4	25	16.0	27.0	90.0	5.2	5.7	37.7	432.0	693.2	6.7	11.3	6.67	1.256	1.256	20.093	4.81	2080	0.76	20	A	G		3277		12.40	Yes	19.99	8636	1.61	1.3E-03	1 in 751
B73	Rotated Panel / Double Goaf	120.0	45.0	2.4	2.4	2.4	25	16.0	27.0	90.0	5.2	5.9	38.1	432.0	697.5	6.7	11.3	6.67	1.256	1.256	20.093	4.84	2092	0.76	20	A	G		3297		12.48	Yes	19.99	8636	1.60	1.5E-03	1 in 662
B74	Double Goaf Loading	118.2	45.0	2.4	2.4	2.4	25	25.3	15.5	90.0	5.5	5.3	38.8	392.2	640.6	10.5	6.5	6.46	0.760	0.760	19.223	4.83	1893	0.91	20	A	G		2043		10.04	Yes	27.67	10849	2.76	1.2E-10	1 in 1000000
B75	Double Goaf Loading	118.0	45.0	2.4	2.4	2.4	25	25.1	15.5	90.0	5.5	5.8	40.3	389.1	651.8	10.5	6.5	6.46	0.764	0.764	19.165	4.94	1923	0.91	20	A	G		2087		10.31	Yes	27.39	10655	2.66	4.9E-10	1 in 1000000
B76	Maingate Loading	117.0	45.0	2.4	2.4	2.4	25	26.4	15.6	90.0	5.5	5.3	38.2	411.8	666.7	11.0	6.5	6.50	0.743	0.743	19.611	4.74	1950	0.92	20	A	M		1090		7.38	Yes	29.30	12067	3.97	3.1E-18	1 in 1000000
B77	Rotated panel / Maingate Loading	118.0	45.0	2.4	2.4	2.4	25	15.4	27.7	90.0	5.7	5.3	38.7	426.6	696.3	6.4	11.5	6.42	1.285	1.285	19.795	4.82	2054	0.76	20	A	M		1440		8.19	Yes	19.55	8340	2.39	2.4E-08	1 in 1000000
B78	Rotated panel / Maingate Loading	119.0	45.0	2.4	2.4	2.4	25	15.3	27.3	90.0	5.6	5.3	38.7	417.7	681.3	6.4	11.4	6.38	1.282	1.282	19.610	4.85	2027	0.75	20	A	M		1423		8.26	Yes	19.41	8109	2.35	4.1E-08	1 in 1000000
B79	Rotated panel / Maingate Loading	120.0	45.0	2.4	2.4	2.4	25	15.5	27.3	90.0	5.4	5.3	37.9	423.2	681.3	6.5	11.4	6.46	1.276	1.276	19.773	4.83	2044	0.75	20	A	M		1428		8.20	Yes	19.59	8288	2.39	2.4E-08	1 in 1000000
B80	Rotated panel / Maingate Loading	121.0	45.0	2.4	2.4	2.4	25	15.5	27.3	90.0	5.7	5.3	38.8	423.2	691.1	6.5	11.4	6.46	1.276	1.276	19.773	4.94	2091	0.76	20	A	M		1463		8.40	Yes	19.59	8288	2.33	5.3E-08	1 in 1000000
B81	Rotated panel / Maingate Loading	122.0	45.0	2.4	2.4	2.4	25	15.5	27.3	90.0	5.6	5.3	38.5	423.2	687.9	6.5	11.4	6.46	1.276	1.276	19.773	4.96	2098	0.75	20	A	M		1467		8.42	Yes	19.59	8288	2.32	5.9E-08	1 in 1000000
B82	Rotated panel / Maingate Loading	123.0	45.0	2.4	2.4	2.4	25	15.5	27.3	90.0	5.6	5.3	38.5	423.2	687.9	6.5	11.4	6.46	1.276	1.276	19.773	5.00	2115	0.75	20	A	M		1479		8.49	Yes	19.59	8288	2.31	7.7E-08	1 in 1000000
B83		113.0		2.4	2.4	2.4	25	13.6	9.9	90.0	5.4	6.2	56.0	134.6	305.9	5.7	4.1	4.13	0.843	0.859	11.679	6.42	864	0.72	21	A	M		89		7.08	Yes	14.47	1948	2.04	3.4E-06	1 in 450037
B84		113.5		2.4	2.4	2.4	25	14.0	9.6	90.0	5.6	6.2	56.6	134.4	309.7	5.8	4.0	4.00	0.814	0.823	11.521	6.54	879	0.74	22	A	M		92		7.23	Yes	14.45	1942	2.00	6.4E-06	1 in 215774
B85		113.8		2.4	2.4	2.4	25	13.8	10.0	90.0	5.4	5.3	53.0	138.0	293.8	5.8	4.2	4.17	0.840	0.853	11.766	6.06	836	0.73	23	A	M		85		6.67	Yes	14.56	2009	2.18	4.6E-07	1 in 1000000

Table A.2: Pillar Stability Analysis

Run 2: Remove Crushed Pillars from Run 1

Project: Lake Macquarie Private Hospital Northern Expansion
Location: O'Brien Street, Gateshead
Analysis Assumptions: NSW Pillar formula
Project Number 16471.21

Client: Akalan Projects
Date: 18/10/16
Sheet: 2
Calculations by JAW

Key to Colour Coding of Factors of Safety / Width: Height Ratios

4.50	Greater than 3.0
2.40	Between 2.2 and 3.0
2.10	Between 1.8 and 2.2
1.70	Between 1.5 and 1.8
1.20	Less than 1.5

Indicating Pillar Located within Project Angle of Draw

Indicating Pillar Located beneath site

Analysis Id:	Comment	Depth D (m)	Panel Width/Span (Longwall only) (m)	Seam Thickness (m)	Working Section H (m)	Pillar Height Section H (m)	Unit Weigth γ (kN/m³)	Pillar Details Width w1 (m)	Length w2 (m)	Internal Angle (°)	Roadway Dets b1 (m)	b2 (m)	Extract. Ratio (%)	Pillar Area m³	Total Area m³	w1/ Height Ratio w1/H	w2/H Height Ratio w2/H	Width/ Height Ratio	Width Modifier Θ0	Θ	wΘ Effective Width	Pillar Stress (Tributary) (MPa)	Pillar Load (Tributary) MN	Proportion Abutment transfer R	Abutment Angle °	Abut (A) Yield (Y) (?)	Abutment Loading Type M,T,G	Shed Load MN	Abutment Load Received MN	Pillar Stress (MPa) ("Yield") ϕ_s= 0.7	Pillar Stress ("Abut") (MPa)	Squat	Power Law Strength (MPa)	Power Law "Ultimate" Load MN	FoS	Probability of Failure	Probability of Failure NSW Power Formulae
A1		127.7		2.4	2.4	2.4	25	18.6	31.0	90.0	4.9	5.2	32.2	576.6	850.7	7.8	12.9	7.75	1.250	1.250	23.250	4.71	2716	0.79	20							Yes	23.31	13443	4.95	2.3E-24	1 in 1000000
A2		126.7		2.4	2.4	2.4	25	17.4	31.5	90.0	5.2	5.1	33.7	548.1	827.2	7.3	13.1	7.25	1.288	1.288	22.417	4.78	2619	0.77	20							Yes	22.00	12057	4.60	3.4E-22	1 in 1000000
A3		126.7		2.4	2.4	2.4	25	19.1	31.4	90.0	5.3	5.4	33.2	599.7	897.9	8.0	13.1	7.96	1.244	1.244	23.752	4.74	2843	0.81	20							Yes	23.99	14388	5.06	4.7E-25	1 in 1000000
A4	Tailgate Loading	124.6	22.0	2.4	2.4	2.4	25	16.8	31.4	90.0	5.4	5.1	34.9	527.5	810.3	7.0	13.1	7.00	1.303	1.303	21.889	4.78	2523	0.77	20	A	T		1868		8.32	Yes	21.34	11259	2.56	1.9E-09	1 in 1000000
A5		124.1		2.4	2.4	2.4	25	16.5	31.1	90.0	5.4	5.2	35.5	513.2	795.0	6.9	13.0	6.88	1.307	1.307	21.561	4.81	2466	0.77	20							Yes	21.00	10777	4.37	9.8E-21	1 in 1000000
A6		123.6		2.4	2.4	2.4	25	17.7	26.9	90.0	4.8	5.3	34.3	476.1	724.5	7.4	11.2	7.38	1.206	1.206	21.351	4.70	2238	0.78	20							Yes	21.66	10314	4.61	3.2E-22	1 in 1000000
A7		123.1		2.4	2.4	2.4	25	17.2	26.5	90.0	5.2	5.4	36.2	455.8	714.6	7.2	11.0	7.17	1.213	1.213	20.860	4.82	2199	0.78	20							Yes	21.08	9606	4.37	1.0E-20	1 in 1000000
A8		122.7		2.4	2.4	2.4	25	16.7	26.5	90.0	5.4	5.8	38.0	442.6	713.8	7.0	11.0	6.96	1.227	1.227	20.488	4.95	2189	0.77	20							Yes	20.58	9106	4.16	2.0E-19	1 in 1000000
A9		121.4		2.4	2.4	2.4	25	17.0	27.6	90.0	5.0	5.3	35.2	469.2	723.8	7.1	11.5	7.08	1.238	1.238	21.040	4.68	2196	0.77	20							Yes	21.04	9872	4.50	1.6E-21	1 in 1000000
A10		123.9		2.4	2.4	2.4	25	17.3	17.4	90.0	5.3	4.9	40.3	301.0	504.0	7.2	7.3	7.21	1.003	1.003	17.350	5.19	1561	0.78	20							Yes	19.24	5793	3.71	1.3E-16	1 in 1000000
A11		124.2		2.4	2.4	2.4	25	17.0	17.3	90.0	5.3	5.0	40.9	294.1	497.3	7.1	7.2	7.08	1.009	1.009	17.149	5.25	1544	0.77	20							Yes	18.96	5575	3.61	5.4E-16	1 in 1000000
A12		123.2		2.4	2.4	2.4	25	16.7	17.1	90.0	5.1	5.2	41.3	285.6	486.1	7.0	7.1	6.96	1.012	1.012	16.898	5.24	1498	0.76	20							Yes	18.65	5326	3.56	1.2E-15	1 in 1000000
A13		123.0		2.4	2.4	2.4	25	17.0	17.0	90.0	5.3	5.1	41.4	289.0	492.8	7.1	7.1	7.08	1.000	1.000	17.000	5.24	1515	0.78	20							Yes	18.87	5454	3.60	6.4E-16	1 in 1000000
A14		121.9		2.4	2.4	2.4	25	17.0	17.1	90.0	5.5	5.7	43.3	290.7	513.0	7.1	7.1	7.08	1.003	1.003	17.050	5.38	1563	0.78	20							Yes	18.90	5494	3.51	2.2E-15	1 in 1000000
A15		128.8		2.4	2.4	2.4	25	24.5	38.0	90.0	4.2	5.1	24.7	931.0	1237.0	10.2	15.8	10.21	1.216	1.216	29.792	4.28	3984	0.87	20							Yes	33.43	31125	7.81	3.0E-42	1 in 1000000
A16		128.9		2.4	2.4	2.4	25	18.6	31.5	90.0	5.4	5.3	33.7	585.9	883.2	7.8	13.1	7.75	1.257	1.257	23.389	4.86	2846	0.80	20							Yes	23.39	13702	4.81	1.6E-23	1 in 1000000
A17		128.8		2.4	2.4	2.4	25	20.0	31.7	90.0	5.3	5.9	33.4	634.0	951.3	8.3	13.2	8.33	1.226	1.226	24.526	4.83	3064	0.82	20							Yes	25.21	15982	5.22	5.0E-26	1 in 1000000
A18		127.3		2.4	2.4	2.4	25	19.1	31.7	90.0	5.2	5.4	32.8	605.5	901.5	8.0	13.2	7.96	1.248	1.248	23.837	4.74	2869	0.80	20							Yes	24.03	14552	5.07	4.0E-25	1 in 1000000
A19		125.9		2.4	2.4	2.4	25	17.0	31.5	90.0	5.2	5.5	34.8	535.5	821.4	7.1	13.1	7.08	1.299	1.299	22.082	4.83	2585	0.77	20							Yes	21.57	11549	4.47	2.4E-21	1 in 1000000
A20		125.1		2.4	2.4	2.4	25	16.3	31.5	90.0	5.3	5.4	35.6	513.5	797.0	6.8	13.1	6.79	1.318	1.318	21.483	4.85	2493	0.76	20							Yes	20.85	10704	4.29	2.9E-20	1 in 1000000
A21		124.4		2.4	2.4	2.4	25	17.2	16.0	90.0	5.3	5.0	41.8	275.2	472.5	7.2	6.7	6.67	0.964	0.964	16.578	5.34	1469	0.78	20							Yes	18.74	5159	3.51	2.3E-15	1 in 1000000
A22		123.9		2.4	2.4	2.4	25	17.2	16.4	90.0	5.2	5.0	41.2	282.1	479.4	7.2	6.8	6.83	0.976	0.976	16.790	5.27	1485	0.78	20							Yes	18.87	5322	3.58	8.0E-16	1 in 1000000
A23		123.6		2.4	2.4	2.4	25	17.4	16.4	90.0	4.8	5.3	40.8	285.4	481.7	7.3	6.8	6.83	0.970	0.970	16.885	5.22	1489	0.77	20							Yes	19.04	5433	3.65	3.1E-16	1 in 1000000
A24		123.0		2.4	2.4	2.4	25	17.4	16.4	90.0	5.3	5.2	41.8	285.4	490.3	7.3	6.8	6.83	0.970	0.970	16.885	5.28	1508	0.78	20							Yes	19.04	5433	3.60	6.0E-16	1 in 1000000
A25		121.9		2.4	2.4	2.4	25	17.4	16.4	90.0	5.3	5.3	42.1	285.4	492.6	7.3	6.8	6.83	0.970	0.970	16.885	5.26	1501	0.78	20							Yes	19.04	5433	3.62	4.8E-16	1 in 1000000
A26	Tailgate Loading	129.9	22.0	2.4	2.4	2.4	25	20.5	23.8	90.0	5.4	6.2	37.2	487.9	777.0	8.5	9.9	8.54	1.074	1.074	22.027	5.17	2523	0.83	20	A	T		1610		8.47	Yes	24.32	11868	2.87	2.3E-11	1 in 1000000
A27	Tailgate Loading	130.2	22.0	2.4	2.4	2.4	25	22.5	40.1	90.0	5.6	6.2	30.7	902.3	1301.0	9.4	16.7	9.38	1.281	1.281	28.826	4.70	4236	0.86	20	A	T		2492		7.46	Yes	30.23	27274	4.05	9.2E-19	1 in 1000000
A28		128.8		2.4	2.4	2.4	25	23.4	25.8	90.0	5.4	5.3	32.6	603.7	895.7	9.8	10.8	9.75	1.049	1.049	24.541	4.78	2884	0.87	20							Yes	28.91	17453	6.05	3.0E-31	1 in 1000000
A29		128.2		2.4	2.4	2.4	25	10.2	25.4	90.0	5.5	5.3	46.2	259.1	482.0	4.3	10.6	4.25	1.427	1.160	11.829	5.96	1545	0.61	20							No	14.53	3765	2.44	1.2E-08	1 in 1000000
A30		127.3		2.4	2.4	2.4	25	13.5	25.7	90.0	5.5	5.3	41.1	347.0	589.0	5.6	10.7	5.63	1.311	1.268	17.112	5.40	1874	0.70	20							Yes	17.56	6092	3.25	9.7E-14	1 in 1000000
A31		125.3		2.4	2.4	2.4	25	17.4	16.7	90.0	5.4	5.2	41.8	290.6	499.3	7.3	7.0	6.96	0.979	0.979	17.043	5.38	1564	0.78	20							Yes	19.13	5558	3.55	1.2E-15	1 in 1000000
A32		124.5		2.4	2.4	2.4	25	17.8	16.7	90.0	5.4	5.1	41.2	297.3	505.8	7.4	7.0	6.96	0.968	0.968	17.232	5.30	1574	0.79	20							Yes	19.48	5791	3.68	2.0E-16	1 in 1000000
A33		125.9		2.4	2.4	2.4	25	17.3	16.6	90.0	5.6	5.0	41.9	287.2	494.6	7.2	6.9	6.92	0.979	0.979	16.943	5.42	1557	0.78	20							Yes	19.01	5460	3.51	2.4E-15	1 in 1000000
A34		122.8		2.4	2.4	2.4	25	17.3	16.1	90.0	5.5	5.2	42.6	278.5	485.6	7.2	6.7	6.71	0.964	0.964	16.678	5.35	1491	0.79	20							Yes	18.86	5253	3.52	1.9E-15	1 in 1000000
A35		121.9		2.4	2.4	2.4	25	17.3	16.9	90.0	5.3	5.2	41.5	292.4	499.5	7.2	7.0	7.04	0.988	0.988	17.098	5.20	1521	0.78	20							Yes	19.10	5584	3.67	2.3E-16	1 in 1000000
A36		126.5		2.4	2.4	2.4	25	20.0	16.1	90.0	5.4	5.5	41.3	322.0	548.6	8.3	6.7	6.71	0.892	0.892	17.839	5.39	1735	0.82	20							Yes	21.43	6901	3.98	2.8E-18	1 in 1000000
A37		125.1		2.4	2.4	2.4	25	17.8	16.1	90.0	5.2	5.5	42.3	286.6	496.8	7.4	6.7	6.71	0.950	0.950	16.907	5.42	1554	0.78	20							Yes	19.29	5529	3.56	1.1E-15	1 in 1000000
A38		124.0		2.4	2.4	2.4	25	17.6	15.8	90.0	5.1	5.6	42.8	278.1	485.8	7.3	6.6	6.58	0.946	0.946	16.651	5.41	1505	0.78	20							Yes	19.02	5290	3.51	2.2E-15	1 in 1000000
A39		123.6		2.4	2.4	2.4	25	17.6	16.0	90.0	5.3	5.4	42.5	281.6	490.1	7.3	6.7	6.67	0.952	0.952	16.762	5.38	1514	0.79	20							Yes	19.09	5375	3.55	1.3E-15	1 in 1000000
A40		121.8		2.4	2.4	2.4	25	17.6	16.4	90.0	5.3	5.5	42.4	288.6	501.5	7.3	6.8	6.83	0.965	0.965	16.979	5.29	1527	0.79	20							Yes	19.21	5545	3.63	4.0E-16	1 in 1000000
A41	Double Goaf Loading	130.0	45.0	2.4	2.4	2.4	25	28.0	32.6	90.0	5.5	5.7	28.9	912.8	1283.1	11.7	13.6	11.67	1.076	1.076	30.125	4.57	4170	0.92	20	A	G		4270		9.25	Yes	39.07	35659	4.23	7.8E-20	1 in 1000000
A42		127.3		2.4	2.4	2.4	25	21.0	23.9	90.0	5.3	5.1	34.2	501.9	762.7	8.8	10.0	8.75	1.065	1.065	22.356	4.84	2427	0.84	20							Yes	24.99	12544	5.17	1.0E-25	1 in 1000000
A43		126.8		2.4	2.4	2.4	25	16.3	22.1	90.0	5.5	5.7	40.6	360.2	606.0	6.8	9.2	6.79	1.151	1.151	18.762	5.33	1922	0.76	20							Yes	19.46	7009	3.65	3.2E-16	1 in 1000000
A44		125.1		2.4	2.4	2.4	25	17.8	16.4	90.0	5.0	5.6	41.8	291.9	501.6	7.4	6.8	6.83	0.959	0.959	17.071	5.37	1569	0.78	20							Yes	19.39	5660	3.61	5.6E-16	1 in 1000000
A45		124.3		2.4	2.4	2.4	25	17.8	16.4	90.0	5.1	5.5	41.8	291.9	501.5	7.4	6.8	6.83	0.959	0.959	17.071	5.34	1558	0.78	20							Yes	19.39	5660	3.63	3.9E-16	1 in 1000000
A46		124.2		2.4	2.4	2.4	25	17.8	16.4	90.0	5.4	5.4	42.3	291.9	505.8	7.4	6.8	6.83	0.959	0.959	17.071	5.38	1570	0.79	20							Yes	19.39	5660	3.60	6.0E-16	1 in 1000000
A47		122.0		2.4	2.4	2.4	25	17.8	16.7	90.0	5.4	5.3	41.8	297.3	510.4	7.4	7.0	6.96	0.968	0.968	17.232	5.24	1556	0.79	20							Yes	19.48	5791	3.72	1.1E-16	1 in 1000000
A48		128.2		2.4	2.4	2.4	25	18.9	29.1	90.0	6.0	6.0	37.1	550.0	874.0	7.9	12.1	7.88	1.213	1.213	22.916	5.09	2801	0.81	20							Yes	23.39	12863	4.59	4.0E-22	1 in 1000000
A49		126.8		2.4	2.4	2.4	25	33.6	44.0	90.0	5.5	6.0	24.4	1478.4	1955.0	14.0	18.3	14.00	1.134	1.134	38.103	4.19	6199	0.97	20							Yes	55.75	82417	13.30	1.6E-76	1 in 1000000
A50		128.2		2.4	2.4	2.4	25	17.8	43.0	90.0	5.1	6.2	32.1	765.4	1126.7	7.4	17.9	7.42	1.414	1.414	25.178	4.72	3611	0.78	20							Yes	23.64	18093	5.01	9.7E-25	1 in 1000000
A51		125.1		2.4	2.4	2.4	25	13.8	16.6	90.0	6.5	5.2	48.2	229.1	442.5	5.8	6.9	5.75	1.092	1.084	14.961	6.04	1384	0.73	20							Yes	16.46	3770	2.72	1.9E-10	1 in 1000000
A52		126.7		2.4	2.4	2.4	25	33.0	13.8	90.0	6.5	6.0	41.8	455.4	782.1	13.8	5.8	5.75	0.590	0.590	19.462	5.44	2476	0.97	20							Yes	38.61	17583	7.10	8.4E-38	1 in 1000000
A53	Tailgate Loading	130.2	22.0	2.4	2.4	2.4	25	14.7	39.0	90.0	6.5	6.6	40.7	573.3	966.7	6.1	16.3	6.13	1.453	1.453	21.352	5.49	3147	0.74	20	A	T		2454		9.77	Yes	20.03	11481	2.05	3.1E-06	1 in 495476
A54		129.4		2.4	2.4	2.4	25	14.7	43.3	90.0	6.5	6.5	39.7	636.5	1055.8	6.1	18.0	6.13	1.493	1.493	21.949	5.37	3416	0.74	20							Yes	20.31	12927	3.78	4.4E-17	1 in 1000000
A55		127.3		2.4	2.4	2.4	25	15.8	67.0	90.0	6.4	6.0	34.7	1058.6	1620.6	6.6	27.9	6.58	1.618	1.618	25.570	4.87	5158	0.77	20							Yes	22.49	23810	4.62	2.8E-22	1 in 1000000
A56		124.8		2.4	2.4	2.4	25	13.0	14.5	90.0	6.2	8.8	57.9	188.5	447.4	5.4	6.0	5.42	1.055	1.044	13.568	7.40	1396	0.71	20							Yes	15.52	2926	2.10	1.6E-06	1 in 1087287
A57		127.9		2.4	2.4	2.4	25	12.7	40.3	90.0	6.4	6.1	42.2	511.8	886.2	5.3	16.8	5.29	1.521	1.377	17.493	5.54	2834	0.70	20							Yes	17.64	9027	3.19	2.5E-13	1 in 1000000
A58		125.1		2.4	2.4	2.4	25	15.0	33.1	90.0	6.7	6.5	42.2	496.5	859.3	6.3	13.8	6.25	1.376	1.376	20.644	5.41	2688	0.76	20							Yes	19.80	9832	3.66	2.7E-16	1 in 1000000
A59	Double Goaf Loading	130.3	22.0	2.4	2.4	2.4	25	15.1	26.9	90.0	6.2	5.6	41.3	406.2	692.3	6.3	11.2	6.29	1.281	1.281	19.342	5.55	2255	0.74	20	A	G		2059		10.62	Yes	19.20	7797	1.81	1.0E-04	1 in 11138
A60	Tailgate Loading	129.8	22.0	2.4	2.4	2.4	25	14.6	38.6	90.0	6.2	6.0	39.3	563.6	927.7	6.1	16.1	6.08	1.451	1.451	21.186	5.34	3010	0.73	20	A	T		2391		9.58	Yes	19.91	11220	2.08	2.1E-06	1 in 781711
A61		132.3		2.4	2.4	2.4	25	14.6	43.6	90.0	6.3	6.3	39.0	636.6	1042.9	6.1	18.2	6.08	1.498	1.498	21.875	5.42	3449	0.73	20							Yes	20.24	12881	3.73	9.2E-17	1 in 1000000
A62		127.3		2.4	2.4	2.4	25	14.6	26.5	90.0	6.4	6.1	43.5	386.9	684.6	6.1	11.0	6.08	1.290	1.290	18.827	5.63	2179	0.74	20							Yes	18.75	7253	3.33	3.1E-14	1 in 1000000
A63		130.0		2.4	2.4	2.4	25	12.2	52.9	90.0	6.3	5.9	40.7	645.4	1087.8	5.1	22.0	5.08	1.625	1.401	17.093	5.48	3535	0.68	20							Yes	17.40	11229	3.18	2.8E-13	1 in 1000000
A64		127.3		2.4	2.4	2.4	25	12.2	50.8	90.0	6.2	6.3	41.0	619.8	1050.6	5.1	21.2	5.08	1.613	1.394	17.002	5.40	3344	0.68	20							Yes	17.35	10754	3.22	1.6E-13	1 in 1000000
~~A65~~	~~Double Goaf Loading~~	~~125.1~~	~~45.0~~	~~2.4~~	~~2.4~~	~~2.4~~	~~25~~	~~20.7~~	~~24.5~~	~~90.0~~	~~88.9~~	~~5.3~~	~~84.5~~	~~507.2~~	~~3266.1~~	~~8.6~~	~~10.2~~	~~8.63~~	~~1.084~~	~~1.084~~	~~22.440~~	~~20.14~~	~~10215~~	~~1.75~~	~~20~~	~~A~~	~~G~~		~~3158~~		~~26.37~~	~~Yes~~	~~24.75~~	~~12551~~		~~4.0E+00~~	~~#NUM!~~
~~A66~~	~~Maingate Loading~~	~~126.1~~	~~45.0~~	~~2.4~~	~~2.4~~	~~2.4~~	~~25~~	~~15.8~~	~~24.5~~	~~90.0~~	~~72.2~~	~~5.5~~	~~85.3~~	~~387.1~~	~~2640.0~~	~~6.6~~	~~10.2~~	~~6.58~~	~~1.216~~	~~1.216~~	~~19.211~~	~~21.50~~	~~8323~~	~~1.15~~	~~20~~	~~A~~	~~M~~		~~5758~~		~~36.37~~	~~Yes~~	~~19.44~~	~~7525~~		~~4.0E+00~~	~~#NUM!~~
~~A67~~	~~Maingate Loading~~	~~127.9~~	~~45.0~~	~~2.4~~	~~2.4~~	~~2.4~~	~~25~~	~~16.2~~	~~24.3~~	~~90.0~~	~~37.2~~	~~5.7~~	~~75.4~~	~~393.7~~	~~1602.0~~	~~6.8~~	~~10.1~~	~~6.75~~	~~1.200~~	~~1.200~~	~~19.440~~	~~13.01~~	~~5122~~	~~1.00~~	~~20~~	~~A~~	~~M~~		~~3419~~		~~21.70~~	~~Yes~~	~~19.76~~	~~7778~~		~~4.0E+00~~	~~#NUM!~~
A68	Maingate Loading	122.1	22.0	2.4	2.4	2.4	25	16.0	35.4	90.0	5.3	5.1	34.3	566.4	862.7	6.7	14.8	6.67	1.377	1.377	22.039	4.65	2633	0.76	20	A	M		1150		6.68	Yes	20.96	11869	3.14	4.9E-13	1 in 1000000
A69		122.1		2.4	2.4	2.4	25	17.4	19.4	90.0	5.6	6.5	43.3	337.6	595.7	7.3	8.1	7.25	1.054	1.054	18.346	5.39	1818	0.79	20							Yes	19.86	6704	3.69	1.8E-16	1 in 1000000
A70		122.1		2.4	2.4	2.4	25	16.9	19.2	90.0	5.4	6.5	43.4	324.5	573.1	7.0	8.0	7.04	1.064	1.064	17.977	5.39	1749	0.78	20							Yes	19.36	6282	3.59	7.2E-16	1 in 1000000
A71		121.2		2.4	2.4	2.4	25	16.9	19.2	90.0	4.9	6.5	42.1	324.5	560.3	7.0	8.0	7.04	1.064	1.064	17.977	5.23	1698	0.77	20							Yes	19.36	6282	3.70	1.5E-16	1 in 1000000
A72		120.6		2.4	2.4	2.4	25	16.9	19.2	90.0	5.0	6.5	42.3	324.5	562.8	7.0	8.0	7.04	1.064	1.064	17.977	5.23	1697	0.77	20							Yes	19.36	6282	3.70	1.5E-16	1 in 1000000
A73	Maingate Loading	124.2	22.0	2.4	2.4	2.4	25	16.5	31.9	90.0	5.3	4.7	34.0	526.4	797.9	6.9	13.3	6.88	1.318	1.318	21.750	4.71	2477	0.76	20	A	M		1068		6.74	Yes	21.09	11103	3.13	5.3E-13	1 in 1000000

Table A.2: Pillar Stability Analysis

Run 2: Remove Crushed Pillars from Run 1

Project: Lake Macquarie Private Hospital Northern Expansion
Location: O'Brien Street, Gateshead
Analysis Assumptions: NSW Pillar formula
Project Number 16471.21

Client: Akalan Projects
Date: 18/10/16
Sheet: 2
Calculations by JAW

Key to Colour Coding of Factors of Safety / Width: Height Ratios

4.50	Greater than 3.0
2.40	Between 2.2 and 3.0
2.10	Between 1.8 and 2.2
1.70	Between 1.5 and 1.8
1.20	Less than 1.5

Indicating Pillar Located within Project Angle of Draw
Indicating Pillar Located beneath site

Analysis Id:	Comment	Depth D (m)	Panel Width/Span (Longwall only) (m)	Seam Thickness (m)	Working Section H (m)	Pillar Height Section H (m)	Unit Weigth γ (kN/m³)	Pillar Details Width w1 (m)	Length w2 (m)	Internal Angle (°)	Roadway Details b1 (m)	b2 (m)	Extract. Ratio (%)	Pillar Area m³	Total Area m³	w1/ Height Ratio w1/H	w2/H Height Ratio w2/H	Width/ Height Ratio	Width Modifier Θ_0	Θ	wΘ Effective Width	Pillar Stress (Tributary) (MPa)	Pillar Load (Tributary) MN	Proportion Abutment transfer R	Abutment Angle °	Abut (A) Yield (Y) (?)	Abutment Loading Type M,T,G	Shed Load MN	Abutment Load Received MN	Pillar Stress (MPa) ("Yield") ϕ_p= 0.7	Pillar Stress ("Abut") (MPa)	Squat	Power Law Strength (MPa)	Power Law "Ultimate" Load MN	Power Law FoS	Power Law Probability of Failure	Probability of Failure NSW Power Formulae
A74		122.3		2.4	2.4	2.4	25	16.4	17.4	90.0	5.5	5.2	42.3	285.4	494.9	6.8	7.3	6.83	1.030	1.030	16.885	5.30	1513	0.77	20							Yes	18.49	5276	3.49	3.2E-15	1 in 1000000
A75		121.8		2.4	2.4	2.4	25	16.6	16.9	90.0	5.2	5.4	42.3	280.5	486.1	6.9	7.0	6.92	1.009	1.009	16.749	5.28	1480	0.77	20							Yes	18.51	5194	3.51	2.4E-15	1 in 1000000
A76		121.8		2.4	2.4	2.4	25	16.6	17.1	90.0	4.8	5.7	41.8	283.9	487.9	6.9	7.1	6.92	1.015	1.015	16.846	5.23	1486	0.76	20							Yes	18.57	5271	3.55	1.3E-15	1 in 1000000
A77		121.2		2.4	2.4	2.4	25	16.6	17.0	90.0	5.0	5.0	40.6	282.2	475.2	6.9	7.1	6.92	1.012	1.012	16.798	5.10	1440	0.76	20							Yes	18.54	5233	3.63	3.9E-16	1 in 1000000
A78	Maingate Loading	121.8	22.0	2.4	2.4	2.4	25	16.5	29.9	90.0	5.3	4.4	34.0	493.4	747.7	6.9	12.5	6.88	1.289	1.289	21.265	4.62	2277	0.77	20	A	M		985		6.61	Yes	20.85	10288	3.15	3.9E-13	1 in 1000000
A79		121.9		2.4	2.4	2.4	25	16.2	17.6	90.0	6.6	5.3	45.4	285.1	522.1	6.8	7.3	6.75	1.041	1.041	16.871	5.58	1591	0.79	20							Yes	18.38	5241	3.29	5.2E-14	1 in 1000000
A80	~~Tailgate Loading~~ / Double Goaf	125.6	45.0	2.4	2.4	2.4	25	18.5	31.5	90.0	23.2	5.0	61.7	582.8	1522.1	7.7	13.1	7.71	1.260	1.260	23.310	8.20	4779	0.98	20	A	G		3888		14.87	Yes	23.27	13558	1.56	2.3E-03	1 in 409
A81		121.8		2.4	2.4	2.4	25	15.4	17.5	90.0	5.2	5.1	42.1	269.5	465.6	6.4	7.3	6.42	1.064	1.064	16.383	5.26	1418	0.74	20							Yes	17.75	4785	3.38	1.6E-14	1 in 1000000
B1		121.2		2.4	2.4	2.4	25	17.2	15.9	90.0	5.4	6.7	46.5	273.5	510.8	7.2	6.6	6.63	0.961	0.961	16.524	5.66	1548	0.78	20							Yes	18.71	5118	3.31	4.3E-14	1 in 1000000
B2		120.6		2.4	2.4	2.4	25	16.8	15.9	90.0	5.4	6.7	46.8	267.1	501.7	7.0	6.6	6.63	0.972	0.972	16.338	5.66	1513	0.78	20							Yes	18.39	4911	3.25	1.0E-13	1 in 1000000
B3		120.1		2.4	2.4	2.4	25	16.0	15.4	90.0	5.4	6.7	47.9	246.4	472.9	6.7	6.4	6.42	0.981	0.981	15.694	5.76	1420	0.76	20							Yes	17.62	4342	3.06	1.5E-12	1 in 1000000
B4		120.2		2.4	2.4	2.4	25	17.3	15.7	90.0	5.4	5.0	42.2	271.6	469.9	7.2	6.5	6.54	0.952	0.952	16.461	5.20	1412	0.79	20							Yes	18.73	5088	3.60	6.0E-16	1 in 1000000
B5		119.6		2.4	2.4	2.4	25	16.9	15.8	90.0	5.4	5.0	42.4	267.0	463.8	7.0	6.6	6.58	0.966	0.966	16.331	5.19	1387	0.78	20							Yes	18.44	4923	3.55	1.3E-15	1 in 1000000
B6		119.2		2.4	2.4	2.4	25	17.3	16.1	90.0	5.4	5.0	41.8	278.5	479.0	7.2	6.7	6.71	0.964	0.964	16.678	5.12	1427	0.79	20							Yes	18.86	5253	3.68	2.0E-16	1 in 1000000
B7		118.6		2.4	2.4	2.4	25	18.3	24.6	90.0	5.4	5.2	36.3	450.2	706.3	7.6	10.3	7.63	1.147	1.147	20.987	4.65	2094	0.81	20							Yes	21.90	9860	4.71	7.5E-23	1 in 1000000
B8		119.0		2.4	2.4	2.4	25	18.1	24.9	90.0	5.4	5.2	36.3	450.7	707.4	7.5	10.4	7.54	1.158	1.158	20.962	4.67	2104	0.80	20							Yes	21.74	9799	4.66	1.6E-22	1 in 1000000
B9		120.0		2.4	2.4	2.4	25	18.0	24.9	90.0	5.4	5.2	36.4	448.2	704.3	7.5	10.4	7.50	1.161	1.161	20.895	4.71	2113	0.80	20							Yes	21.64	9697	4.59	4.2E-22	1 in 1000000
B10		121.3		2.4	2.4	2.4	25	18.8	24.7	90.0	5.4	5.2	35.8	464.4	723.6	7.8	10.3	7.83	1.136	1.136	21.350	4.73	2194	0.81	20							Yes	22.48	10439	4.76	3.7E-23	1 in 1000000
B11	Maingate Loading	121.8	22.0	2.4	2.4	2.4	25	15.2	40.0	90.0	6.1	4.8	36.3	608.0	954.2	6.3	16.7	6.33	1.449	1.449	22.029	4.78	2906	0.76	20	A	M		1310		6.93	Yes	20.56	12498	2.96	5.9E-12	1 in 1000000
B12		121.0		2.4	2.4	2.4	25	18.6	19.0	90.0	5.4	5.2	39.2	353.4	580.8	7.8	7.9	7.75	1.011	1.011	18.798	4.97	1757	0.81	20							Yes	20.92	7393	4.21	1.0E-19	1 in 1000000
B13		119.7		2.4	2.4	2.4	25	16.8	18.7	90.0	5.4	5.2	40.8	314.2	530.6	7.0	7.8	7.00	1.054	1.054	17.699	5.05	1588	0.78	20							Yes	19.15	6017	3.79	4.1E-17	1 in 1000000
B14		118.4		2.4	2.4	2.4	25	17.2	18.7	90.0	5.4	5.2	40.5	321.6	540.1	7.2	7.8	7.17	1.042	1.042	17.919	4.97	1599	0.79	20							Yes	19.50	6273	3.92	6.0E-18	1 in 1000000
B15		117.7		2.4	2.4	2.4	25	17.3	19.5	90.0	5.4	5.2	39.8	337.4	560.7	7.2	8.1	7.21	1.060	1.060	18.334	4.89	1650	0.79	20							Yes	19.79	6677	4.05	1.0E-18	1 in 1000000
B16		119.0		2.4	2.4	2.4	25	63.4	42.3	90.0	5.4	5.2	17.9	2681.8	3268.0	26.4	17.6	17.63	0.800	0.800	50.744	3.63	9722	1.01	20							Yes	173.66	465736	47.90	8.0E-293	1 in 1000000
B17		119.7		2.4	2.4	2.4	25	16.1	31.1	90.0	5.5	5.7	37.0	500.7	794.9	6.7	13.0	6.71	1.318	1.318	21.217	4.75	2379	0.77	20							Yes	20.61	10318	4.34	1.6E-20	1 in 1000000
B18	Tailgate Loading	119.9	22.0	2.4	2.4	2.4	25	16.7	31.1	90.0	5.6	5.7	36.7	519.4	820.6	7.0	13.0	6.96	1.301	1.301	21.731	4.74	2460	0.78	20	A	T		1803		8.21	Yes	21.20	11013	2.58	1.4E-09	1 in 1000000
B19	Maingate Loading	120.0	45.0	2.4	2.4	2.4	25	17.5	31.3	90.0	5.6	5.7	35.9	547.8	854.7	7.3	13.0	7.29	1.283	1.283	22.449	4.68	2564	0.80	20	A	M		1723		7.83	Yes	22.08	12096	2.82	4.6E-11	1 in 1000000
B20	Maingate Loading	119.5	45.0	2.4	2.4	2.4	25	17.5	31.4	90.0	5.6	4.9	34.5	549.5	838.5	7.3	13.1	7.29	1.284	1.284	22.474	4.56	2505	0.80	20	A	M		1683		7.62	Yes	22.10	12141	2.90	1.5E-11	1 in 1000000
B21		119.3		2.4	2.4	2.4	25	16.8	31.1	90.0	5.8	4.9	35.8	522.5	813.6	7.0	13.0	7.00	1.299	1.299	21.815	4.64	2427	0.79	20							Yes	21.31	11133	4.59	4.2E-22	1 in 1000000
B22		119.2		2.4	2.4	2.4	25	16.0	30.9	90.0	5.5	0.9	27.7	494.4	683.7	6.7	12.9	6.67	1.318	1.318	21.083	4.12	2037	0.77	20							Yes	20.49	10129	4.97	1.7E-24	1 in 1000000
B23		119.1		2.4	2.4	2.4	25	13.2	15.0	90.0	5.7	5.6	49.1	198.0	389.3	5.5	6.3	5.50	1.064	1.053	13.898	5.85	1159	0.71	20							Yes	15.74	3117	2.69	3.1E-10	1 in 1000000
B24		118.2		2.4	2.4	2.4	25	12.9	10.3	90.0	5.7	5.4	54.5	132.9	292.0	5.4	4.3	4.29	0.888	0.910	11.741	6.49	863	0.70	20							Yes	14.41	1915	2.22	2.7E-07	1 in 1000000
B25		117.5		2.4	2.4	2.4	25	13.8	10.1	90.0	6.1	5.4	54.8	139.4	308.5	5.8	4.2	4.21	0.845	0.857	11.828	6.50	906	0.74	20							Yes	14.60	2035	2.25	1.8E-07	1 in 1000000
B26		116.8		2.4	2.4	2.4	25	13.6	9.9	90.0	6.6	5.4	56.4	134.6	309.1	5.7	4.1	4.13	0.843	0.859	11.679	6.70	902	0.74	20							Yes	14.47	1948	2.16	6.5E-07	1 in 1000000
B27		116.0		2.4	2.4	2.4	25	14.0	9.6	90.0	6.1	5.4	55.4	134.4	301.5	5.8	4.0	4.00	0.814	0.823	11.521	6.51	874	0.74	20							Yes	14.45	1942	2.22	2.6E-07	1 in 1000000
B28		115.2		2.4	2.4	2.4	25	13.8	10.0	90.0	5.6	5.4	53.8	138.0	298.8	5.8	4.2	4.17	0.840	0.853	11.766	6.23	860	0.73	20							Yes	14.56	2009	2.34	5.1E-08	1 in 1000000
B29		114.5		2.4	2.4	2.4	25	13.6	13.4	90.0	5.6	5.3	49.2	182.2	359.0	5.7	5.6	5.58	0.993	0.993	13.510	5.64	1028	0.73	20							Yes	15.58	2840	2.76	1.1E-10	1 in 1000000
B30		115.3		2.4	2.4	2.4	25	13.9	13.6	90.0	6.1	5.3	50.0	189.0	378.0	5.8	5.7	5.67	0.989	0.990	13.759	5.76	1090	0.74	20							Yes	15.79	2985	2.74	1.5E-10	1 in 1000000
B31		116.0		2.4	2.4	2.4	25	12.8	14.0	90.0	6.6	5.3	52.1	179.2	374.4	5.3	5.8	5.33	1.045	1.035	13.244	6.06	1086	0.73	20							Yes	15.31	2744	2.53	3.2E-09	1 in 1000000
B32		116.7		2.4	2.4	2.4	25	14.0	14.1	90.0	6.1	5.3	49.4	197.4	389.9	5.8	5.9	5.83	1.004	1.003	14.047	5.76	1138	0.74	20							Yes	15.98	3155	2.77	9.3E-11	1 in 1000000
B33		117.4		2.4	2.4	2.4	25	12.9	14.0	90.0	5.7	5.3	49.7	180.6	359.0	5.4	5.8	5.38	1.041	1.032	13.316	5.83	1054	0.71	20							Yes	15.36	2775	2.63	6.9E-10	1 in 1000000
B34		118.3		2.4	2.4	2.4	25	15.6	30.9	90.0	5.5	5.0	36.4	482.0	757.5	6.5	12.9	6.50	1.329	1.329	20.733	4.65	2240	0.76	20							Yes	20.11	9695	4.33	1.8E-20	1 in 1000000
B35		118.0		2.4	2.4	2.4	25	16.9	30.2	90.0	5.8	5.0	36.1	510.4	799.0	7.0	12.6	7.04	1.282	1.282	21.672	4.62	2357	0.79	20							Yes	21.30	10870	4.61	3.0E-22	1 in 1000000
B36	Maingate Loading	118.1	45.0	2.4	2.4	2.4	25	17.3	29.9	90.0	5.6	5.0	35.3	517.3	799.2	7.2	12.5	7.21	1.267	1.267	21.918	4.56	2360	0.80	20	A	M		1591		7.64	Yes	21.68	11214	2.84	3.6E-11	1 in 1000000
B37	Maingate Loading	117.3	45.0	2.4	2.4	2.4	25	17.3	30.6	90.0	5.7	4.5	34.4	529.4	807.3	7.2	12.8	7.21	1.278	1.278	22.104	4.47	2367	0.80	20	A	M		1597		7.49	Yes	21.77	11526	2.91	1.3E-11	1 in 1000000
B38		117.2		2.4	2.4	2.4	25	17.0	30.6	90.0	5.8	4.5	35.0	520.2	800.3	7.1	12.8	7.08	1.286	1.286	21.857	4.51	2345	0.80	20							Yes	21.45	11160	4.76	3.6E-23	1 in 1000000
B39		115.9		2.4	2.4	2.4	25	12.8	11.2	90.0	5.7	4.9	51.9	143.4	297.9	5.3	4.7	4.67	0.933	0.948	12.131	6.02	863	0.71	20							Yes	14.64	2099	2.43	1.3E-08	1 in 1000000
B40		113.8		2.4	2.4	2.4	25	13.2	11.6	90.0	6.1	4.9	51.9	153.1	318.5	5.5	4.8	4.83	0.935	0.946	12.486	5.92	906	0.73	20							Yes	14.91	2282	2.52	3.6E-09	1 in 1000000
B41	Double Goaf Loading	121.0	45.0	2.4	2.4	2.4	25	17.0	37.8	90.0	5.4	5.0	33.0	642.6	958.7	7.1	15.8	7.08	1.380	1.380	23.453	4.51	2900	0.78	20	A	G		4338		11.26	Yes	22.24	14290	1.97	9.2E-06	1 in 144252
B42	Double Goaf Loading	122.0	45.0	2.4	2.4	2.4	25	18.1	30.0	90.0	5.3	4.8	33.3	543.0	814.3	7.5	12.5	7.54	1.247	1.247	22.578	4.57	2484	0.80	20	A	G		3566		11.14	Yes	22.58	12262	2.03	4.3E-06	1 in 338156
B43	Double Goaf Loading	123.0	45.0	2.4	2.4	2.4	25	17.9	35.2	90.0	5.8	4.6	33.2	630.1	943.3	7.5	14.7	7.46	1.326	1.326	23.732	4.60	2901	0.80	20	A	G		4123		11.15	Yes	23.01	14499	2.06	2.5E-06	1 in 629304
B44	~~Maingate Loading~~ / Double Goaf	124.0	22.0	2.4	2.4	2.4	25	18.3	31.3	90.0	5.8	4.6	33.8	572.8	865.2	7.6	13.0	7.63	1.262	1.262	23.096	4.68	2682	0.81	20	A	G		2150		8.44	Yes	23.00	13173	2.73	1.8E-10	1 in 1000000
~~B45~~	~~Tailgate Loading~~	~~125.0~~	~~45.0~~	~~2.4~~	~~2.4~~	~~2.4~~	~~25~~	~~17.1~~	~~16.6~~	~~90.0~~	~~5.0~~	~~11.5~~	~~54.3~~	~~283.9~~	~~621.0~~	~~7.1~~	~~6.9~~	~~6.92~~	~~0.985~~	~~0.985~~	~~16.846~~	~~6.84~~	~~1941~~	~~0.77~~	~~20~~	~~A~~	~~T~~		~~2528~~		~~15.74~~	~~Yes~~	~~18.84~~	~~5348~~		~~4.0E+00~~	~~#NUM!~~
B46	Tailgate Loading	128.0	22.0	2.4	2.4	2.4	25	21.6	15.8	90.0	10.0	5.4	49.1	341.3	669.9	9.0	6.6	6.58	0.845	0.845	18.250	6.28	2144	0.91	20	A	T		1119		9.56	Yes	23.08	7877	2.41	1.6E-08	1 in 1000000
B47	Tailgate Loading	127.7	45.0	2.4	2.4	2.4	25	20.6	15.8	90.0	8.9	5.5	48.2	325.5	628.4	8.6	6.6	6.58	0.868	0.868	17.884	6.16	2006	0.88	20	A	T		1971		12.22	Yes	21.96	7147	1.80	1.2E-04	1 in 9543
~~B48~~	~~Maingate Loading~~	~~126.0~~	~~45.0~~	~~2.4~~	~~2.4~~	~~2.4~~	~~25~~	~~9.2~~	~~12.3~~	~~90.0~~	~~11.0~~	~~6.0~~	~~69.4~~	~~113.2~~	~~369.7~~	~~3.8~~	~~5.1~~	~~3.83~~	~~1.144~~	~~1.038~~	~~9.551~~	~~10.29~~	~~1164~~	~~0.73~~	~~20~~	~~A~~	~~M~~		~~941~~		~~18.61~~	~~No~~	~~13.03~~	~~1474~~		~~4.0E+00~~	~~#NUM!~~
~~B49~~	~~Rotated Panel / Double Goaf~~	~~125.0~~	~~22.0~~	~~2.4~~	~~2.4~~	~~2.4~~	~~25~~	~~13.0~~	~~8.2~~	~~90.0~~	~~5.0~~	~~6.1~~	~~58.6~~	~~106.6~~	~~257.4~~	~~5.4~~	~~3.4~~	~~3.42~~	~~0.774~~	~~0.813~~	~~10.571~~	~~7.55~~	~~804~~	~~0.68~~	~~20~~	~~A~~	~~M~~		~~368~~		~~11.00~~	~~Yes~~	~~13.67~~	~~1457~~		~~4.0E+00~~	~~#NUM!~~
B50	~~Maingate Loading~~ / Double Goaf	123.0	45.0	2.4	2.4	2.4	25	24.8	15.2	90.0	5.0	5.9	40.0	377.0	628.8	10.3	6.3	6.33	0.760	0.760	18.848	5.13	1933	0.89	20	A	G		2186		10.93	Yes	26.81	10106	2.45	9.3E-09	1 in 1000000
B51	Rotated Panel / Double Goaf	123.5	45.0	2.4	2.4	2.4	25	15.0	26.8	90.0	5.7	5.5	39.9	402.0	668.6	6.3	11.2	6.25	1.282	1.282	19.234	5.14	2064	0.74	20	A	G		3365		13.50	Yes	19.10	7678	1.41	1.3E-02	1 in 70
B52	Rotated Panel / Double Goaf	124.0	45.0	2.4	2.4	2.4	25	15.0	26.8	90.0	5.7	5.5	39.9	402.0	668.6	6.3	11.2	6.25	1.282	1.282	19.234	5.16	2073	0.74	20	A	G		3383		13.57	Yes	19.10	7678	1.41	1.4E-02	1 in 64
B53	Rotated Panel / Double Goaf	124.6	45.0	2.4	2.4	2.4	25	15.0	26.8	90.0	5.7	6.0	40.8	402.0	679.0	6.3	11.2	6.25	1.282	1.282	19.234	5.26	2115	0.74	20	A	G		3457		13.86	Yes	19.10	7678	1.38	1.9E-02	1 in 47
B54	Rotated Panel / Double Goaf	124.8	45.0	2.4	2.4	2.4	25	15.0	26.8	90.0	5.7	5.8	40.4	402.0	674.8	6.3	11.2	6.25	1.282	1.282	19.234	5.24	2105	0.74	20	A	G		3443		13.80	Yes	19.10	7678	1.38	1.8E-02	1 in 50
B55	Rotated Panel / Maingate Load	125.0	45.0	2.4	2.4	2.4	25	15.0	26.8	90.0	5.7	5.8	40.4	402.0	674.8	6.3	11.2	6.25	1.282	1.282	19.234	5.25	2109	0.74	20	A	M		1490		8.95	Yes	19.10	7678	2.13	9.2E-07	1 in 1000000
B56	Double Goaf Loading	123.0	45.0	2.4	2.4	2.4	25	24.2	15.4	90.0	5.0	5.4	38.6	372.7	607.4	10.1	6.4	6.42	0.778	0.778	18.822	5.01	1868	0.88	20	A	G		2155		10.79	Yes	26.12	9733	2.42	1.5E-08	1 in 1000000
B57	Double Goaf Loading	122.0	45.0	2.4	2.4	2.4	25	25.5	22.0	90.0	5.0	5.2	32.4	561.0	829.6	10.6	9.2	9.17	0.926	0.926	23.621	4.51	2530	0.90	20	A	G		2787		9.48	Yes	31.00	17388	3.27	7.3E-14	1 in 1000000
B58	Tailgate Loading	121.0	45.0	2.4	2.4	2.4	25	24.5	16.6	90.0	5.3	5.8	39.1	406.7	667.5	10.2	6.9	6.92	0.808	0.808	19.791	4.96	2019	0.89	20	A	T		1930		9.71	Yes	27.14	11037	2.79	6.8E-11	1 in 1000000
B59	Rotated Panel / Double Goaf	121.5	45.0	2.4	2.4	2.4	25	16.8	26.6	90.0	5.8	5.4	38.2	446.9	723.2	7.0	11.1	7.00	1.226	1.226	20.594	4.92	2197	0.78	20	A	G		3261		12.21	Yes	20.69	9246	1.69	5.2E-04	1 in 2239
B60	Rotated Panel / Double Goaf	122.0	45.0	2.4	2.4	2.4	25	16.8	26.6	90.0	5.8	5.4	38.2	446.9	723.2	7.0	11.1	7.00	1.226	1.226	20.594	4.94	2206	0.78	20	A	G		3279		12.27	Yes	20.69	9246	1.69	5.8E-04	1 in 1998
B61	Rotated Panel / Double Goaf	123.0	45.0	2.4	2.4	2.4	25	16.8	26.6	90.0	5.8	6.2	39.7	446.9	741.3	7.0	11.1	7.00	1.226	1.226	20.594	5.10	2279	0.78	20	A	G		3398		12.70	Yes	20.69	9246	1.63	1.1E-03	1 in 931
B62	Rotated Panel / Double Goaf	123.5	45.0	2.4	2.4	2.4	25	16.8	26.6	90.0	5.8	6.0	39.3	446.9	736.8	7.0	11.1	7.00	1.226	1.226	20.594	5.09	2275	0.78	20	A	G		3396		12.69	Yes	20.69	9246	1.63	1.3E-03	1 in 956
B63	Rotated Panel / Double Goaf	124.0	45.0	2.4	2.4	2.4	25	16.8	26.6	90.0	5.8	6.3	39.9	446.9	743.5	7.0	11.1	7.00	1.226	1.226	20.594	5.16	2305	0.78	20	A	G		3446		12.87	Yes	20.69	9246	1.61	1.4E-03	1 in 712
B64	Rotated Panel / Double Goaf	125.5	45.0	2.4	2.4	2.4	25	16.8	26.0	90.0	5.8	6.1	39.8	436.8	725.5	7.0	10.8	7.00	1.215	1.215	20.411	5.21	2276	0.78	20	A	G		3416		13.03	Yes	20.60	8997	1.58	1.9E-03	1 in 502
B65	Double Goaf Loading	120.0	45.0	2.4	2.4	2.4	25	19.8	15.5	90.0	7.5	6.1	48.0	306.9	589.7	8.3	6.5	6.46	0.878	0.878	17.388	5.76	1769	0.86	20	A	G		2165		12.82	Yes	20.99	6443	1.64	1.2E-03	1 in 1053

Table A.2: Pillar Stability Analysis

Run 2: Remove Crushed Pillars from Run 1

Project: Lake Macquarie Private Hospital Northern Expansion
Location: O'Brien Street, Gateshead
Analysis Assumptions: NSW Pillar formula
Project Number 16471.21

Client: Akalan Projects
Date: 18/10/16
Sheet: 2
Calculations by JAW

Key to Colour Coding of Factors of Safety / Width: Height Ratios

4.50	Greater than 3.0
2.40	Between 2.2 and 3.0
2.10	Between 1.8 and 2.2
1.70	Between 1.5 and 1.8
1.20	Less than 1.5

Indicating Pillar Located within Project Angle of Draw
Indicating Pillar Located beneath site

Analysis Id:	Comment	Depth	Panel Width/Span (Longwall only)	Seam Thickness	Working Section	Pillar Height Section	Unit Weigth	Pillar Details			adway Deta		Extract. Ratio	Pillar Area	Total Area	w1/ Height Ratio	w2/H Height Ratio	Width/ Height Ratio	Width Modifier			Pillar Stress	Pillar Load	Proportion Abutment	Abutment Angle	Abut (A)	Abutment Loading	Shed Load	Abutment Load	Pillar Stress (MPa)	Pillar Stress	Squat	Power Law			Probability of Failure
								Width	Length	Internal																							Strength	"Ultimate"	FoS	
		D			H	H	γ	w1	w2	Angle	b1	b2				Ratio	Ratio		Θ_0	Θ	wΘ Effective	(Tributary)	(Tributary)	transfer		Yield (Y)	Type		Received	("Yield")	("Abut")		Load		Probability
		(m)	(m)	(m)	(m)	(m)	(kN/m^3)	(m)	(m)	(°)	(m)	(m)	(%)	m^3	m^3	w1/H	w2/H				Width	(MPa)	MN	R	°	(?)	M,T,G	MN	MN	ϕ_p= 0.7	(MPa)		MN		of Failure
B66	Double Goaf Loading	119.5	45.0	2.4	2.4	2.4	25	24.7	16.2	90.0	5.5	5.0	37.5	400.1	640.2	10.3	6.8	6.75	0.792	0.792	19.567	4.78	1913	0.90	20	A	G		2113		10.06	Yes	27.21	10888	2.70	2.5E-10
B67	Tailgate Loading	119.0	45.0	2.4	2.4	2.4	25	24.7	16.2	90.0	5.5	5.2	38.1	400.1	646.3	10.3	6.8	6.75	0.792	0.792	19.567	4.81	1923	0.90	20	A	T		1803		9.31	Yes	27.21	10888	2.92	1.1E-11
B68	Rotated Panel / Double Goaf	120.0	45.0	2.4	2.4	2.4	25	16.0	27.0	90.0	5.2	5.8	37.9	432.0	695.4	6.7	11.3	6.67	1.256	1.256	20.093	4.83	2086	0.76	20	A	G		3287		12.44	Yes	19.99	8636	1.61	1.4E-03
B69	Rotated Panel / Double Goaf	120.0	45.0	2.4	2.4	2.4	25	16.0	27.0	90.0	5.2	5.8	37.9	432.0	695.4	6.7	11.3	6.67	1.256	1.256	20.093	4.83	2086	0.76	20	A	G		3287		12.44	Yes	19.99	8636	1.61	1.4E-03
B70	Rotated Panel / Double Goaf	120.0	45.0	2.4	2.4	2.4	25	16.0	27.0	90.0	5.2	5.6	37.5	432.0	691.1	6.7	11.3	6.67	1.256	1.256	20.093	4.80	2073	0.76	20	A	G		3267		12.36	Yes	19.99	8636	1.62	1.3E-03
B71	Rotated Panel / Double Goaf	120.0	45.0	2.4	2.4	2.4	25	16.0	27.0	90.0	5.2	5.7	37.7	432.0	693.2	6.7	11.3	6.67	1.256	1.256	20.093	4.81	2080	0.76	20	A	G		3277		12.40	Yes	19.99	8636	1.61	1.3E-03
B72	Rotated Panel / Double Goaf	120.0	45.0	2.4	2.4	2.4	25	16.0	27.0	90.0	5.2	5.7	37.7	432.0	693.2	6.7	11.3	6.67	1.256	1.256	20.093	4.81	2080	0.76	20	A	G		3277		12.40	Yes	19.99	8636	1.61	1.3E-03
B73	Rotated Panel / Double Goaf	120.0	45.0	2.4	2.4	2.4	25	16.0	27.0	90.0	5.2	5.9	38.1	432.0	697.5	6.7	11.3	6.67	1.256	1.256	20.093	4.84	2092	0.76	20	A	G		3297		12.48	Yes	19.99	8636	1.60	1.5E-03
B74	Double Goaf Loading	118.2	45.0	2.4	2.4	2.4	25	25.3	15.5	90.0	5.5	5.3	38.8	392.2	640.6	10.5	6.5	6.46	0.760	0.760	19.223	4.83	1893	0.91	20	A	G		2043		10.04	Yes	27.67	10849	2.76	1.2E-10
B75	Double Goaf Loading	118.0	45.0	2.4	2.4	2.4	25	25.1	15.5	90.0	5.5	5.8	40.3	389.1	651.8	10.5	6.5	6.46	0.764	0.764	19.165	4.94	1923	0.91	20	A	G		2087		10.31	Yes	27.39	10655	2.66	4.9E-10
B76	Maingate Loading	117.0	45.0	2.4	2.4	2.4	25	26.4	15.6	90.0	5.5	5.3	38.2	411.8	666.7	11.0	6.5	6.50	0.743	0.743	19.611	4.74	1950	0.92	20	A	M		1090		7.38	Yes	29.30	12067	3.97	3.1E-18
B77	Rotated panel / Maingate Loading	118.0	45.0	2.4	2.4	2.4	25	15.4	27.7	90.0	5.7	5.3	38.7	426.6	696.3	6.4	11.5	6.42	1.285	1.285	19.795	4.82	2054	0.76	20	A	M		1440		8.19	Yes	19.55	8340	2.39	2.4E-08
B78	Rotated panel / Maingate Loading	119.0	45.0	2.4	2.4	2.4	25	15.3	27.3	90.0	5.6	5.3	38.7	417.7	681.3	6.4	11.4	6.38	1.282	1.282	19.610	4.85	2027	0.75	20	A	M		1423		8.26	Yes	19.41	8109	2.35	4.1E-08
B79	Rotated panel / Maingate Loading	120.0	45.0	2.4	2.4	2.4	25	15.5	27.3	90.0	5.4	5.3	37.9	423.2	681.3	6.5	11.4	6.46	1.276	1.276	19.773	4.83	2044	0.75	20	A	M		1428		8.20	Yes	19.59	8288	2.39	2.4E-08
B80	Rotated panel / Maingate Loading	121.0	45.0	2.4	2.4	2.4	25	15.5	27.3	90.0	5.7	5.3	38.8	423.2	691.1	6.5	11.4	6.46	1.276	1.276	19.773	4.94	2091	0.76	20	A	M		1463		8.40	Yes	19.59	8288	2.33	5.3E-08
B81	Rotated panel / Maingate Loading	122.0	45.0	2.4	2.4	2.4	25	15.5	27.3	90.0	5.6	5.3	38.5	423.2	687.9	6.5	11.4	6.46	1.276	1.276	19.773	4.96	2098	0.75	20	A	M		1467		8.42	Yes	19.59	8288	2.32	5.9E-08
B82	Rotated panel / Maingate Loading	123.0	45.0	2.4	2.4	2.4	25	15.5	27.3	90.0	5.6	5.3	38.5	423.2	687.9	6.5	11.4	6.46	1.276	1.276	19.773	5.00	2115	0.75	20	A	M		1479		8.49	Yes	19.59	8288	2.31	7.7E-08
B83		113.0		2.4	2.4	2.4	25	13.6	9.9	90.0	5.4	6.2	56.0	134.6	305.9	5.7	4.1	4.13	0.843	0.859	11.679	6.42	864	0.72	21	A	M		89		7.08	Yes	14.47	1948	2.04	3.4E-06
B84		113.5		2.4	2.4	2.4	25	14.0	9.6	90.0	5.6	6.2	56.6	134.4	309.7	5.8	4.0	4.00	0.814	0.823	11.521	6.54	879	0.74	22	A	M		92		7.23	Yes	14.45	1942	2.00	6.4E-06
B85		113.8		2.4	2.4	2.4	25	13.8	10.0	90.0	5.4	5.3	53.0	138.0	293.8	5.8	4.2	4.17	0.840	0.853	11.766	6.06	836	0.73	23	A	M		85		6.67	Yes	14.56	2009	2.18	4.6E-07

Table A.3: Pillar Stability Analysis

Run 3: Decrease Run 2 Pillars by 1 m

Project: Lake Macquarie Private Hospital Northern Expansion
Location: O'Brien Street, Gateshead
Analysis Assumptions: NSW Pillar formula
Project Number 16471.21

Client: Akalan Projects
Date: 18/10/16
Sheet: 3
Calculations by JAW

Key to Colour Coding of Factors of Safety / Width: Height Ratios

4.50	Greater than 3.0
2.40	Between 2.2 and 3.0
2.10	Between 1.8 and 2.2
1.70	Between 1.5 and 1.8
1.20	Less than 1.5

Indicating Pillar Located within Project Angle of Draw
Indicating Pillar Located beneath site

Analysis Id:	Comment	Depth D (m)	Panel Width/Span (Longwall only) (m)	Seam Thickness (m)	Working Section H (m)	Pillar Height Section H (m)	Unit Weigth γ (kN/m³)	Pillar Details Width w1 (m)	Length w2 (m)	Internal Angle (°)	Roadway Details b1 (m)	b2 (m)	Extract. Ratio (%)	Pillar Area m³	Total Area m³	w1/ Height Ratio w1/H	w2/H Height Ratio w2/H	Width/ Height Ratio	Width Modifier Θ_0	Θ	wΘ Effective Width	Pillar Stress (Tributary) (MPa)	Pillar Load (Tributary) MN	Proportion Abutment transfer R	Abutment Angle °	Abut (A) Yield (Y) (?)	Abutment Loading Type M,T,G	Shed Load MN	Abutment Load Received MN	Pillar Stress (MPa) ("Yield") ϕ_p= 0.7	Pillar Stress ("Abut") (MPa)	Squat	Power Law Strength (MPa)	Power Law "Ultimate" Load MN	Power Law FoS	Power Law Probability of Failure	Probability of Failure NSW Power Formulae
A1		127.7		2.4	2.4	2.4	25	17.6	30.0	90.0	5.9	6.2	37.9	528.0	850.7	7.3	12.5	7.33	1.261	1.261	22.185	5.14	2716	0.79	20							Yes	22.02	11626	4.28	3.5E-20	1 in 1000000
A2		126.7		2.4	2.4	2.4	25	16.4	30.5	90.0	6.2	6.1	39.5	500.2	827.2	6.8	12.7	6.83	1.301	1.301	21.330	5.24	2619	0.77	20							Yes	20.83	10418	3.98	2.7E-18	1 in 1000000
A3		126.7		2.4	2.4	2.4	25	18.1	30.4	90.0	6.3	6.4	38.7	550.2	897.9	7.5	12.7	7.54	1.254	1.254	22.690	5.17	2843	0.81	20							Yes	22.64	12457	4.38	8.3E-21	1 in 1000000
A4	Tailgate Loading	124.6	22.0	2.4	2.4	2.4	25	15.8	30.4	90.0	6.4	6.1	40.7	480.3	810.3	6.6	12.7	6.58	1.316	1.316	20.793	5.25	2523	0.77	20	A	T		1868		9.14	Yes	20.24	9722	2.21	2.9E-07	1 in 1000000
A5		124.1		2.4	2.4	2.4	25	15.5	30.1	90.0	6.4	6.2	41.3	466.6	795.0	6.5	12.5	6.46	1.320	1.320	20.463	5.29	2466	0.77	20							Yes	19.93	9299	3.77	5.5E-17	1 in 1000000
A6		123.6		2.4	2.4	2.4	25	16.7	25.9	90.0	5.8	6.3	40.3	432.5	724.5	7.0	10.8	6.96	1.216	1.216	20.307	5.17	2238	0.78	20							Yes	20.48	8860	3.96	3.6E-18	1 in 1000000
A7		123.1		2.4	2.4	2.4	25	16.2	25.5	90.0	6.2	6.4	42.2	413.1	714.6	6.8	10.6	6.75	1.223	1.223	19.813	5.32	2199	0.78	20							Yes	19.95	8242	3.75	7.5E-17	1 in 1000000
A8		122.7		2.4	2.4	2.4	25	15.7	25.5	90.0	6.4	6.8	43.9	400.4	713.8	6.5	10.6	6.54	1.238	1.238	19.434	5.47	2189	0.77	20							Yes	19.51	7810	3.57	1.0E-15	1 in 1000000
A9		121.4		2.4	2.4	2.4	25	16.0	26.6	90.0	6.0	6.3	41.2	425.6	723.8	6.7	11.1	6.67	1.249	1.249	19.981	5.16	2196	0.77	20							Yes	19.93	8484	3.86	1.4E-17	1 in 1000000
A10		123.9		2.4	2.4	2.4	25	16.3	16.4	90.0	6.3	5.9	47.0	267.3	504.0	6.8	6.8	6.79	1.003	1.003	16.350	5.84	1561	0.78	20							Yes	18.14	4849	3.11	7.8E-13	1 in 1000000
A11		124.2		2.4	2.4	2.4	25	16.0	16.3	90.0	6.3	6.0	47.6	260.8	497.3	6.7	6.8	6.67	1.009	1.009	16.149	5.92	1544	0.77	20							Yes	17.88	4664	3.02	2.7E-12	1 in 1000000
A12		123.2		2.4	2.4	2.4	25	15.7	16.1	90.0	6.1	6.2	48.0	252.8	486.1	6.5	6.7	6.54	1.013	1.013	15.897	5.93	1498	0.76	20							Yes	17.61	4451	2.97	5.4E-12	1 in 1000000
A13		123.0		2.4	2.4	2.4	25	16.0	16.0	90.0	6.3	6.1	48.1	256.0	492.8	6.7	6.7	6.67	1.000	1.000	16.000	5.92	1515	0.78	20							Yes	17.80	4556	3.01	3.2E-12	1 in 1000000
A14		121.9		2.4	2.4	2.4	25	16.0	16.1	90.0	6.5	6.7	49.8	257.6	513.0	6.7	6.7	6.67	1.003	1.003	16.050	6.07	1563	0.78	20							Yes	17.83	4592	2.94	8.8E-12	1 in 1000000
A15		128.8		2.4	2.4	2.4	25	23.5	37.0	90.0	5.2	6.1	29.7	869.5	1237.0	9.8	15.4	9.79	1.223	1.223	28.744	4.58	3984	0.87	20							Yes	31.47	27361	6.87	2.4E-36	1 in 1000000
A16		128.9		2.4	2.4	2.4	25	17.6	30.5	90.0	6.4	6.3	39.2	536.8	883.2	7.3	12.7	7.33	1.268	1.268	22.320	5.30	2846	0.80	20							Yes	22.09	11857	4.17	1.8E-19	1 in 1000000
A17		128.8		2.4	2.4	2.4	25	19.0	30.7	90.0	6.3	6.9	38.7	583.3	951.3	7.9	12.8	7.92	1.235	1.235	23.473	5.25	3064	0.82	20							Yes	23.76	13860	4.52	1.1E-21	1 in 1000000
A18		127.3		2.4	2.4	2.4	25	18.1	30.7	90.0	6.2	6.4	38.4	555.7	901.5	7.5	12.8	7.54	1.258	1.258	22.773	5.16	2869	0.80	20							Yes	22.68	12603	4.39	7.0E-21	1 in 1000000
A19		125.9		2.4	2.4	2.4	25	16.0	30.5	90.0	6.2	6.5	40.6	488.0	821.4	6.7	12.7	6.67	1.312	1.312	20.989	5.30	2585	0.77	20							Yes	20.44	9975	3.86	1.5E-17	1 in 1000000
A20		125.1		2.4	2.4	2.4	25	15.3	30.5	90.0	6.3	6.4	41.5	466.7	797.0	6.4	12.7	6.38	1.332	1.332	20.378	5.34	2493	0.76	20							Yes	19.80	9239	3.71	1.4E-16	1 in 1000000
A21		124.4		2.4	2.4	2.4	25	16.2	15.0	90.0	6.3	6.0	48.6	243.0	472.5	6.8	6.3	6.25	0.962	0.962	15.577	6.05	1469	0.78	20							Yes	17.65	4288	2.92	1.2E-11	1 in 1000000
A22		123.9		2.4	2.4	2.4	25	16.2	15.4	90.0	6.2	6.0	48.0	249.5	479.4	6.8	6.4	6.42	0.975	0.975	15.790	5.95	1485	0.78	20							Yes	17.77	4433	2.99	4.4E-12	1 in 1000000
A23		123.6		2.4	2.4	2.4	25	16.4	15.4	90.0	5.8	6.3	47.6	252.6	481.7	6.8	6.4	6.42	0.969	0.969	15.884	5.89	1489	0.77	20							Yes	17.92	4526	3.04	2.0E-12	1 in 1000000
A24		123.0		2.4	2.4	2.4	25	16.4	15.4	90.0	6.3	6.2	48.5	252.6	490.3	6.8	6.4	6.42	0.969	0.969	15.884	5.97	1508	0.78	20							Yes	17.92	4526	3.00	3.5E-12	1 in 1000000
A25		121.9		2.4	2.4	2.4	25	16.4	15.4	90.0	6.3	6.3	48.7	252.6	492.6	6.8	6.4	6.42	0.969	0.969	15.884	5.94	1501	0.78	20							Yes	17.92	4526	3.02	2.9E-12	1 in 1000000
A26	Tailgate Loading	129.9	22.0	2.4	2.4	2.4	25	19.5	22.8	90.0	6.4	7.2	42.8	444.6	777.0	8.1	9.5	8.13	1.078	1.078	21.021	5.68	2523	0.83	20	A	T		1610		9.30	Yes	22.87	10169	2.46	8.4E-09	1 in 1000000
A27	Tailgate Loading	130.2	22.0	2.4	2.4	2.4	25	21.5	39.1	90.0	6.6	7.2	35.4	840.7	1301.0	9.0	16.3	8.96	1.290	1.290	27.744	5.04	4236	0.86	20	A	T		2492		8.00	Yes	28.46	23927	3.56	1.2E-15	1 in 1000000
A28		128.8		2.4	2.4	2.4	25	22.4	24.8	90.0	6.4	6.3	38.0	555.5	895.7	9.3	10.3	9.33	1.051	1.051	23.539	5.19	2884	0.87	20							Yes	27.15	15082	5.23	4.1E-26	1 in 1000000
A29		128.2		2.4	2.4	2.4	25	9.2	24.4	90.0	6.5	6.3	53.4	224.5	482.0	3.8	10.2	3.83	1.452	1.109	10.205	6.88	1545	0.61	20							No	13.48	3025	1.96	1.1E-05	1 in 112021
A30		127.3		2.4	2.4	2.4	25	12.5	24.7	90.0	6.5	6.3	47.6	308.8	589.0	5.2	10.3	5.21	1.328	1.232	15.402	6.07	1874	0.70	20							Yes	16.51	5098	2.72	2.0E-10	1 in 1000000
A31		125.3		2.4	2.4	2.4	25	16.4	15.7	90.0	6.4	6.2	48.4	257.5	499.3	6.8	6.5	6.54	0.978	0.978	16.042	6.08	1564	0.78	20							Yes	18.01	4638	2.96	5.9E-12	1 in 1000000
A32		124.5		2.4	2.4	2.4	25	16.8	15.7	90.0	6.4	6.1	47.8	263.8	505.8	7.0	6.5	6.54	0.966	0.966	16.231	5.97	1574	0.79	20							Yes	18.32	4833	3.07	1.3E-12	1 in 1000000
A33		125.9		2.4	2.4	2.4	25	16.3	15.6	90.0	6.6	6.0	48.6	254.3	494.6	6.8	6.5	6.50	0.978	0.978	15.942	6.12	1557	0.78	20							Yes	17.91	4553	2.92	1.1E-11	1 in 1000000
A34		122.8		2.4	2.4	2.4	25	16.3	15.1	90.0	6.5	6.2	49.3	246.1	485.6	6.8	6.3	6.29	0.962	0.962	15.677	6.06	1491	0.79	20							Yes	17.75	4370	2.93	9.5E-12	1 in 1000000
A35		121.9		2.4	2.4	2.4	25	16.3	15.9	90.0	6.3	6.2	48.1	259.2	499.5	6.8	6.6	6.63	0.988	0.988	16.098	5.87	1521	0.78	20							Yes	17.99	4664	3.07	1.4E-12	1 in 1000000
A36		126.5		2.4	2.4	2.4	25	19.0	15.1	90.0	6.4	6.5	47.7	286.9	548.6	7.9	6.3	6.29	0.886	0.886	16.827	6.05	1735	0.82	20							Yes	20.05	5753	3.32	3.8E-14	1 in 1000000
A37		125.1		2.4	2.4	2.4	25	16.8	15.1	90.0	6.2	6.5	48.9	253.7	496.8	7.0	6.3	6.29	0.947	0.947	15.905	6.12	1554	0.78	20							Yes	18.14	4601	2.96	6.2E-12	1 in 1000000
A38		124.0		2.4	2.4	2.4	25	16.6	14.8	90.0	6.1	6.6	49.4	245.7	485.8	6.9	6.2	6.17	0.943	0.943	15.648	6.13	1505	0.78	20							Yes	17.88	4394	2.92	1.1E-11	1 in 1000000
A39		123.6		2.4	2.4	2.4	25	16.6	15.0	90.0	6.3	6.4	49.2	249.0	490.1	6.9	6.3	6.25	0.949	0.949	15.759	6.08	1514	0.79	20							Yes	17.95	4469	2.95	7.2E-12	1 in 1000000
A40		121.8		2.4	2.4	2.4	25	16.6	15.4	90.0	6.3	6.5	49.0	255.6	501.5	6.9	6.4	6.42	0.963	0.963	15.978	5.97	1527	0.79	20							Yes	18.07	4621	3.03	2.4E-12	1 in 1000000
A41	Double Goaf Loading	130.0	45.0	2.4	2.4	2.4	25	27.0	31.6	90.0	6.5	6.7	33.5	853.2	1283.1	11.3	13.2	11.25	1.078	1.078	29.119	4.89	4170	0.92	20	A	G		4270		9.89	Yes	36.78	31381	3.72	1.2E-16	1 in 1000000
A42		127.3		2.4	2.4	2.4	25	20.0	22.9	90.0	6.3	6.1	40.0	458.0	762.7	8.3	9.5	8.33	1.068	1.068	21.352	5.30	2427	0.84	20							Yes	23.49	10758	4.43	4.0E-21	1 in 1000000
A43		126.8		2.4	2.4	2.4	25	15.3	21.1	90.0	6.5	6.7	46.7	322.8	606.0	6.4	8.8	6.38	1.159	1.159	17.738	5.95	1922	0.76	20							Yes	18.45	5955	3.10	8.6E-13	1 in 1000000
A44		125.1		2.4	2.4	2.4	25	16.8	15.4	90.0	6.0	6.6	48.4	258.7	501.6	7.0	6.4	6.42	0.957	0.957	16.070	6.06	1569	0.78	20							Yes	18.23	4717	3.01	3.2E-12	1 in 1000000
A45		124.3		2.4	2.4	2.4	25	16.8	15.4	90.0	6.1	6.5	48.4	258.7	501.5	7.0	6.4	6.42	0.957	0.957	16.070	6.02	1558	0.78	20							Yes	18.23	4717	3.03	2.4E-12	1 in 1000000
A46		124.2		2.4	2.4	2.4	25	16.8	15.4	90.0	6.4	6.4	48.8	258.7	505.8	7.0	6.4	6.42	0.957	0.957	16.070	6.07	1570	0.79	20							Yes	18.23	4717	3.00	3.4E-12	1 in 1000000
A47		122.0		2.4	2.4	2.4	25	16.8	15.7	90.0	6.4	6.3	48.3	263.8	510.4	7.0	6.5	6.54	0.966	0.966	16.231	5.90	1556	0.79	20							Yes	18.32	4833	3.11	7.8E-13	1 in 1000000
A48		128.2		2.4	2.4	2.4	25	17.9	28.1	90.0	7.0	7.0	42.4	503.0	874.0	7.5	11.7	7.46	1.222	1.222	21.869	5.57	2801	0.81	20							Yes	22.07	11102	3.96	3.4E-18	1 in 1000000
A49		126.8		2.4	2.4	2.4	25	32.6	43.0	90.0	6.5	7.0	28.3	1401.8	1955.0	13.6	17.9	13.58	1.138	1.138	37.085	4.42	6199	0.97	20							Yes	52.76	73963	11.93	5.4E-68	1 in 1000000
A50		128.2		2.4	2.4	2.4	25	16.8	42.0	90.0	6.1	7.2	37.4	705.6	1126.7	7.0	17.5	7.00	1.429	1.429	24.000	5.12	3611	0.78	20							Yes	22.37	15784	4.37	9.6E-21	1 in 1000000
A51		125.1		2.4	2.4	2.4	25	12.8	15.6	90.0	7.5	6.2	54.9	199.7	442.5	5.3	6.5	5.33	1.099	1.076	13.771	6.93	1384	0.73	20							Yes	15.62	3119	2.25	1.6E-07	1 in 1000000
A52		126.7		2.4	2.4	2.4	25	32.0	12.8	90.0	7.5	7.0	47.6	409.6	782.1	13.3	5.3	5.33	0.571	0.571	18.286	6.05	2476	0.97	20							Yes	35.88	14697	5.94	1.6E-30	1 in 1000000
A53	Tailgate Loading	130.2	22.0	2.4	2.4	2.4	25	13.7	38.0	90.0	7.5	7.6	46.1	520.6	966.7	5.7	15.8	5.71	1.470	1.416	19.399	6.04	3147	0.74	20	A	T		2454		10.76	Yes	18.77	9769	1.74	2.5E-04	1 in 4501
A54		129.4		2.4	2.4	2.4	25	13.7	42.3	90.0	7.5	7.5	45.1	579.5	1055.8	5.7	17.6	5.71	1.511	1.451	19.883	5.89	3416	0.74	20							Yes	19.00	11012	3.22	1.4E-13	1 in 1000000
A55		127.3		2.4	2.4	2.4	25	14.8	66.0	90.0	7.4	7.0	39.7	976.8	1620.6	6.2	27.5	6.17	1.634	1.634	24.178	5.28	5158	0.77	20							Yes	21.38	20881	4.05	9.9E-19	1 in 1000000
A56		124.8		2.4	2.4	2.4	25	12.0	13.5	90.0	7.2	9.8	63.8	162.0	447.4	5.0	5.6	5.00	1.059	1.039	12.466	8.62	1396	0.71	20							Yes	14.93	2418	1.73	3.0E-04	1 in 3807
A57		127.9		2.4	2.4	2.4	25	11.7	39.3	90.0	7.4	7.1	48.1	459.8	886.2	4.9	16.4	4.88	1.541	1.310	15.332	6.16	2834	0.70	20							No	16.59	7627	2.69	3.0E-10	1 in 1000000
A58		125.1		2.4	2.4	2.4	25	14.0	32.1	90.0	7.7	7.5	47.7	449.4	859.3	5.8	13.4	5.83	1.393	1.367	19.141	5.98	2688	0.76	20							Yes	18.72	8411	3.13	5.5E-13	1 in 1000000
A59	Double Goaf Loading	130.3	22.0	2.4	2.4	2.4	25	14.1	25.9	90.0	7.2	6.6	47.2	365.2	692.3	5.9	10.8	5.88	1.295	1.281	18.064	6.17	2255	0.74	20	A	G		2059		11.81	Yes	18.20	6646	1.54	3.0E-03	1 in 305
A60	Tailgate Loading	129.8	22.0	2.4	2.4	2.4	25	13.6	37.6	90.0	7.2	7.0	44.9	511.4	927.7	5.7	15.7	5.67	1.469	1.407	19.140	5.89	3010	0.73	20	A	T		2391		10.56	Yes	18.61	9518	1.76	1.9E-04	1 in 5793
A61		132.3		2.4	2.4	2.4	25	13.6	42.6	90.0	7.3	7.3	44.4	579.4	1042.9	5.7	17.8	5.67	1.516	1.448	19.686	5.95	3449	0.73	20							Yes	18.88	10940	3.17	3.0E-13	1 in 1000000
A62		127.3		2.4	2.4	2.4	25	13.6	25.5	90.0	7.4	7.1	49.3	346.8	684.6	5.7	10.6	5.67	1.304	1.266	17.223	6.28	2179	0.74	20							Yes	17.64	6117	2.81	5.7E-11	1 in 1000000
A63		130.0		2.4	2.4	2.4	25	11.2	51.9	90.0	7.3	6.9	46.6	581.3	1087.8	4.7	21.6	4.67	1.645	1.319	14.768	6.08	3535	0.68	20							No	16.27	9459	2.68	3.8E-10	1 in 1000000
A64		127.3		2.4	2.4	2.4	25	11.2	49.8	90.0	7.2	7.3	46.9	557.8	1050.6	4.7	20.8	4.67	1.633	1.313	14.707	5.99	3344	0.68	20							No	16.24	9057	2.71	2.4E-10	1 in 1000000
~~A65~~	~~Double Goaf Loading~~	~~125.1~~	~~45.0~~	~~2.4~~	~~2.4~~	~~2.4~~	~~25~~	~~19.7~~	~~23.5~~	~~90.0~~	~~89.9~~	~~6.3~~	~~85.8~~	~~463.0~~	~~3266.1~~	~~8.2~~	~~9.8~~	~~8.21~~	~~1.088~~	~~1.088~~	~~21.433~~	~~22.06~~	~~10215~~	~~1.75~~	~~20~~	~~A~~	~~G~~		~~3158~~		~~28.89~~	~~Yes~~	~~23.27~~	~~10773~~		~~4.0E+00~~	~~#NUM!~~
~~A66~~	~~Maingate Loading~~	~~126.1~~	~~45.0~~	~~2.4~~	~~2.4~~	~~2.4~~	~~25~~	~~14.8~~	~~23.5~~	~~90.0~~	~~73.2~~	~~6.5~~	~~86.8~~	~~347.8~~	~~2640.0~~	~~6.2~~	~~9.8~~	~~6.17~~	~~1.227~~	~~1.227~~	~~18.162~~	~~23.93~~	~~8323~~	~~1.15~~	~~20~~	~~A~~	~~M~~		~~5812~~		~~40.64~~	~~Yes~~	~~18.47~~	~~6426~~		~~4.0E+00~~	~~#NUM!~~
~~A67~~	~~Maingate Loading~~	~~127.9~~	~~45.0~~	~~2.4~~	~~2.4~~	~~2.4~~	~~25~~	~~15.2~~	~~23.3~~	~~90.0~~	~~38.2~~	~~6.7~~	~~77.9~~	~~354.2~~	~~1602.0~~	~~6.3~~	~~9.7~~	~~6.33~~	~~1.210~~	~~1.210~~	~~18.398~~	~~14.46~~	~~5122~~	~~1.00~~	~~20~~	~~A~~	~~M~~		~~3467~~		~~24.25~~	~~Yes~~	~~18.75~~	~~6641~~		~~4.0E+00~~	~~#NUM!~~
A68	Maingate Loading	122.1	22.0	2.4	2.4	2.4	25	15.0	34.4	90.0	6.3	6.1	40.2	516.0	862.7	6.3	14.3	6.25	1.393	1.393	20.891	5.10	2633	0.76	20	A	M		1196		7.42	Yes	19.92	10280	2.68	3.3E-10	1 in 1000000
A69		122.1		2.4	2.4	2.4	25	16.4	18.4	90.0	6.6	7.5	49.3	301.8	595.7	6.8	7.7	6.83	1.057	1.057	17.343	6.03	1818	0.79	20							Yes	18.74	5656	3.11	7.3E-13	1 in 1000000
A70		122.1		2.4	2.4	2.4	25	15.9	18.2	90.0	6.4	7.5	49.5	289.4	573.1	6.6	7.6	6.63	1.067	1.067	16.972	6.05	1749	0.78	20							Yes	18.29	5294	3.03	2.4E-12	1 in 1000000
A71		121.2		2.4	2.4	2.4	25	15.9	18.2	90.0	5.9	7.5	48.3	289.4	560.3	6.6	7.6	6.63	1.067	1.067	16.972	5.87	1698	0.77	20							Yes	18.29	5294	3.12	6.5E-13	1 in 1000000
A72		120.6		2.4	2.4	2.4	25	15.9	18.2	90.0	6.0	7.5	48.6	289.4	562.8	6.6	7.6	6.63	1.067	1.067	16.972	5.86	1697	0.77	20							Yes	18.29	5294	3.12	6.3E-13	1 in 1000000
A73	Maingate Loading	124.2	22.0	2.4	2.4	2.4	25	15.5	30.9	90.0	6.3	5.7	40.0	479.0	797.9	6.5	12.9	6.46	1.332	1.332	20.644	5.17	2477	0.76	20	A	M		1111		7.49	Yes	20.02	9589	2.67	4.0E-10	1 in 1000000

Table A.3: Pillar Stability Analysis

Run 3: Decrease Run 2 Pillars by 1 m

Project: Lake Macquarie Private Hospital Northern Expansion
Location: O'Brien Street, Gateshead
Analysis Assumptions: NSW Pillar formula
Project Number 16471.21

Client: Akalan Projects
Date: 18/10/16
Sheet: 3
Calculations by JAW

Key to Colour Coding of Factors of Safety / Width: Height Ratios

4.50	Greater than 3.0
2.40	Between 2.2 and 3.0
2.10	Between 1.8 and 2.2
1.70	Between 1.5 and 1.8
1.20	Less than 1.5

Indicating Pillar Located within Project Angle of Draw
Indicating Pillar Located beneath site

Analysis Id:	Comment	Depth D (m)	Panel Width/Span (Longwall only) (m)	Seam Thickness (m)	Working Section H (m)	Pillar Height Section H (m)	Unit Weigth γ (kN/m³)	Pillar Details Width w1 (m)	Length w2 (m)	Internal Angle (°)	Roadway Details b1 (m)	b2 (m)	Extract. Ratio (%)	Pillar Area m³	Total Area m³	w1/ Height Ratio w1/H	w2/H Height Ratio w2/H	Width/ Height Ratio	Width Modifier Θ_0	Θ	wΘ Effective Width	Pillar Stress (Tributary) (MPa)	Pillar Load (Tributary) MN	Proportion Abutment transfer R	Abutment Angle °	Abut (A) Yield (Y) (?)	Abutment Loading Type M,T,G	Shed Load MN	Abutment Load Received MN	Pillar Stress (MPa) ("Yield") ϕ_p= 0.7	Pillar Stress ("Abut") (MPa)	Squat	Power Law Strength (MPa)	Power Law "Ultimate" Load MN	FoS	Probability of Failure	Probability of Failure NSW Power Formulae
A74		122.3		2.4	2.4	2.4	25	15.4	16.4	90.0	6.5	6.2	49.0	252.6	494.9	6.4	6.8	6.42	1.031	1.031	15.884	5.99	1513	0.77	20							Yes	17.48	4414	2.92	1.2E-11	1 in 1000000
A75		121.8		2.4	2.4	2.4	25	15.6	15.9	90.0	6.2	6.4	49.0	248.0	486.1	6.5	6.6	6.50	1.010	1.010	15.749	5.97	1480	0.77	20							Yes	17.48	4336	2.93	9.9E-12	1 in 1000000
A76		121.8		2.4	2.4	2.4	25	15.6	16.1	90.0	5.8	6.7	48.5	251.2	487.9	6.5	6.7	6.50	1.016	1.016	15.846	5.92	1486	0.76	20							Yes	17.54	4404	2.96	5.9E-12	1 in 1000000
A77		121.2		2.4	2.4	2.4	25	15.6	16.0	90.0	6.0	6.0	47.5	249.6	475.2	6.5	6.7	6.50	1.013	1.013	15.797	5.77	1440	0.76	20							Yes	17.51	4370	3.04	2.1E-12	1 in 1000000
A78	Maingate Loading	121.8	22.0	2.4	2.4	2.4	25	15.5	28.9	90.0	6.3	5.4	40.1	448.0	747.7	6.5	12.0	6.46	1.302	1.302	20.178	5.08	2277	0.77	20	A	M		1025		7.37	Yes	19.79	8865	2.68	3.3E-10	1 in 1000000
A79		121.9		2.4	2.4	2.4	25	15.2	16.6	90.0	7.6	6.3	51.7	252.3	522.1	6.3	6.9	6.33	1.044	1.044	15.869	6.31	1591	0.79	20							Yes	17.39	4388	2.76	1.2E-10	1 in 1000000
A80	~~Tailgate Loading~~ / Double Goaf	125.6	45.0	2.4	2.4	2.4	25	17.5	30.5	90.0	24.2	6.0	64.9	533.8	1522.1	7.3	12.7	7.29	1.271	1.271	22.240	8.95	4779	0.98	20	A	G		3888		16.24	Yes	21.98	11730	1.35	2.5E-02	1 in 36
A81		121.8		2.4	2.4	2.4	25	14.4	16.5	90.0	6.2	6.1	49.0	237.6	465.6	6.0	6.9	6.00	1.068	1.068	15.379	5.97	1418	0.74	20							Yes	16.85	4003	2.82	4.5E-11	1 in 1000000
B1		121.2		2.4	2.4	2.4	25	16.2	14.9	90.0	6.4	7.7	52.7	241.4	510.8	6.8	6.2	6.21	0.958	0.958	15.523	6.41	1548	0.78	20							Yes	17.62	4252	2.75	1.3E-10	1 in 1000000
B2		120.6		2.4	2.4	2.4	25	15.8	14.9	90.0	6.4	7.7	53.1	235.4	501.7	6.6	6.2	6.21	0.971	0.971	15.337	6.43	1513	0.78	20							Yes	17.33	4080	2.70	2.8E-10	1 in 1000000
B3		120.1		2.4	2.4	2.4	25	15.0	14.4	90.0	6.4	7.7	54.3	216.0	472.9	6.3	6.0	6.00	0.980	0.980	14.694	6.57	1420	0.76	20							Yes	16.65	3596	2.53	3.0E-09	1 in 1000000
B4		120.2		2.4	2.4	2.4	25	16.3	14.7	90.0	6.4	6.0	49.0	239.6	469.9	6.8	6.1	6.13	0.948	0.948	15.459	5.89	1412	0.79	20							Yes	17.63	4224	2.99	4.0E-12	1 in 1000000
B5		119.6		2.4	2.4	2.4	25	15.9	14.8	90.0	6.4	6.0	49.3	235.3	463.8	6.6	6.2	6.17	0.964	0.964	15.330	5.89	1387	0.78	20							Yes	17.37	4087	2.95	7.6E-12	1 in 1000000
B6		119.2		2.4	2.4	2.4	25	16.3	15.1	90.0	6.4	6.0	48.6	246.1	479.0	6.8	6.3	6.29	0.962	0.962	15.677	5.80	1427	0.79	20							Yes	17.75	4370	3.06	1.5E-12	1 in 1000000
B7		118.6		2.4	2.4	2.4	25	17.3	23.6	90.0	6.4	6.2	42.2	408.3	706.3	7.2	9.8	7.21	1.154	1.154	19.965	5.13	2094	0.81	20							Yes	20.67	8440	4.03	1.3E-18	1 in 1000000
B8		119.0		2.4	2.4	2.4	25	17.1	23.9	90.0	6.4	6.2	42.2	408.7	707.4	7.1	10.0	7.13	1.166	1.166	19.936	5.15	2104	0.80	20							Yes	20.53	8391	3.99	2.4E-18	1 in 1000000
B9		120.0		2.4	2.4	2.4	25	17.0	23.9	90.0	6.4	6.2	42.3	406.3	704.3	7.1	10.0	7.08	1.169	1.169	19.868	5.20	2113	0.80	20							Yes	20.43	8303	3.93	5.5E-18	1 in 1000000
B10		121.3		2.4	2.4	2.4	25	17.8	23.7	90.0	6.4	6.2	41.7	421.9	723.6	7.4	9.9	7.42	1.142	1.142	20.331	5.20	2194	0.81	20							Yes	21.20	8942	4.08	6.8E-19	1 in 1000000
B11	Maingate Loading	121.8	22.0	2.4	2.4	2.4	25	14.2	39.0	90.0	7.1	5.8	42.0	553.8	954.2	5.9	16.3	5.92	1.466	1.451	20.599	5.25	2906	0.76	20	A	M		1362		7.71	Yes	19.49	10793	2.53	3.1E-09	1 in 1000000
B12		121.0		2.4	2.4	2.4	25	17.6	18.0	90.0	6.4	6.2	45.5	316.8	580.8	7.3	7.5	7.33	1.011	1.011	17.798	5.55	1757	0.81	20							Yes	19.68	6234	3.55	1.3E-15	1 in 1000000
B13		119.7		2.4	2.4	2.4	25	15.8	17.7	90.0	6.4	6.2	47.3	279.7	530.6	6.6	7.4	6.58	1.057	1.057	16.696	5.68	1588	0.78	20							Yes	18.10	5061	3.19	2.4E-13	1 in 1000000
B14		118.4		2.4	2.4	2.4	25	16.2	17.7	90.0	6.4	6.2	46.9	286.7	540.1	6.8	7.4	6.75	1.044	1.044	16.917	5.58	1599	0.79	20							Yes	18.41	5278	3.30	4.7E-14	1 in 1000000
B15		117.7		2.4	2.4	2.4	25	16.3	18.5	90.0	6.4	6.2	46.2	301.6	560.7	6.8	7.7	6.79	1.063	1.063	17.330	5.47	1650	0.79	20							Yes	18.68	5634	3.42	9.1E-15	1 in 1000000
B16		119.0		2.4	2.4	2.4	25	62.4	41.3	90.0	6.4	6.2	21.1	2577.1	3268.0	26.0	17.2	17.21	0.797	0.797	49.703	3.77	9722	1.01	20							Yes	167.32	431202	44.35	1.3E-270	1 in 1000000
B17		119.7		2.4	2.4	2.4	25	15.1	30.1	90.0	6.5	6.7	42.8	454.5	794.9	6.3	12.5	6.29	1.332	1.332	20.111	5.23	2379	0.77	20							Yes	19.58	8900	3.74	8.3E-17	1 in 1000000
B18	Tailgate Loading	119.9	22.0	2.4	2.4	2.4	25	15.7	30.1	90.0	6.6	6.7	42.4	472.6	820.6	6.5	12.5	6.54	1.314	1.314	20.636	5.21	2460	0.78	20	A	T		1803		9.02	Yes	20.11	9505	2.23	2.3E-07	1 in 1000000
B19	Maingate Loading	120.0	45.0	2.4	2.4	2.4	25	16.5	30.3	90.0	6.6	6.7	41.5	500.0	854.7	6.9	12.6	6.88	1.295	1.295	21.365	5.13	2564	0.80	20	A	M		1767		8.66	Yes	20.90	10451	2.41	1.7E-08	1 in 1000000
B20	Maingate Loading	119.5	45.0	2.4	2.4	2.4	25	16.5	30.4	90.0	6.6	5.9	40.2	501.6	838.5	6.9	12.7	6.88	1.296	1.296	21.390	4.99	2505	0.80	20	A	M		1726		8.44	Yes	20.92	10491	2.48	6.4E-09	1 in 1000000
B21		119.3		2.4	2.4	2.4	25	15.8	30.1	90.0	6.8	5.9	41.5	475.6	813.6	6.6	12.5	6.58	1.312	1.312	20.722	5.10	2427	0.79	20							Yes	20.21	9609	3.96	3.6E-18	1 in 1000000
B22		119.2		2.4	2.4	2.4	25	15.0	29.9	90.0	6.5	1.9	34.4	448.5	683.7	6.3	12.5	6.25	1.332	1.332	19.978	4.54	2037	0.77	20							Yes	19.47	8734	4.29	3.2E-20	1 in 1000000
B23		119.1		2.4	2.4	2.4	25	12.2	14.0	90.0	6.7	6.6	56.1	170.8	389.3	5.1	5.8	5.08	1.069	1.047	12.776	6.79	1159	0.71	20							Yes	15.00	2562	2.21	3.1E-07	1 in 1000000
B24		118.2		2.4	2.4	2.4	25	11.9	9.3	90.0	6.7	6.4	62.1	110.7	292.0	5.0	3.9	3.88	0.877	0.918	10.926	7.80	863	0.70	20							No	13.96	1544	1.79	1.3E-04	1 in 8619
B25		117.5		2.4	2.4	2.4	25	12.8	9.1	90.0	7.1	6.4	62.2	116.5	308.5	5.3	3.8	3.79	0.831	0.866	11.084	7.78	906	0.74	20							Yes	13.98	1629	1.80	1.2E-04	1 in 9658
B26		116.8		2.4	2.4	2.4	25	12.6	8.9	90.0	7.6	6.4	63.7	112.1	309.1	5.3	3.7	3.71	0.828	0.868	10.936	8.05	902	0.74	20							Yes	13.87	1556	1.72	3.4E-04	1 in 3374
B27		116.0		2.4	2.4	2.4	25	13.0	8.6	90.0	7.1	6.4	62.9	111.8	301.5	5.4	3.6	3.58	0.796	0.832	10.821	7.82	874	0.74	20							Yes	13.83	1546	1.77	1.8E-04	1 in 6362
B28		115.2		2.4	2.4	2.4	25	12.8	9.0	90.0	6.6	6.4	61.4	115.2	298.8	5.3	3.8	3.75	0.826	0.862	11.028	7.47	860	0.73	20							Yes	13.95	1607	1.87	4.3E-05	1 in 27211
B29		114.5		2.4	2.4	2.4	25	12.6	12.4	90.0	6.6	6.3	56.5	156.2	359.0	5.3	5.2	5.17	0.992	0.994	12.524	6.58	1028	0.73	20							Yes	14.87	2323	2.26	1.5E-07	1 in 1000000
B30		115.3		2.4	2.4	2.4	25	12.9	12.6	90.0	7.1	6.3	57.0	162.5	378.0	5.4	5.3	5.25	0.988	0.991	12.780	6.70	1090	0.74	20							Yes	15.05	2446	2.24	1.9E-07	1 in 1000000
B31		116.0		2.4	2.4	2.4	25	11.8	13.0	90.0	7.6	6.3	59.0	153.4	374.4	4.9	5.4	4.92	1.048	1.031	12.162	7.08	1086	0.73	20							No	14.74	2261	2.08	1.9E-06	1 in 853092
B32		116.7		2.4	2.4	2.4	25	13.0	13.1	90.0	7.1	6.3	56.3	170.3	389.9	5.4	5.5	5.42	1.004	1.003	13.040	6.68	1138	0.74	20							Yes	15.21	2591	2.28	1.2E-07	1 in 1000000
B33		117.4		2.4	2.4	2.4	25	11.9	13.0	90.0	6.7	6.3	56.9	154.7	359.0	5.0	5.4	4.96	1.044	1.029	12.241	6.81	1054	0.71	20							No	14.79	2288	2.17	5.4E-07	1 in 1000000
B34		118.3		2.4	2.4	2.4	25	14.6	29.9	90.0	6.5	6.0	42.4	436.5	757.5	6.1	12.5	6.08	1.344	1.344	19.620	5.13	2240	0.76	20							Yes	19.14	8357	3.73	9.7E-17	1 in 1000000
B35		118.0		2.4	2.4	2.4	25	15.9	29.2	90.0	6.8	6.0	41.9	464.3	799.0	6.6	12.2	6.63	1.295	1.295	20.589	5.08	2357	0.79	20							Yes	20.19	9373	3.98	2.8E-18	1 in 1000000
B36	Maingate Loading	118.1	45.0	2.4	2.4	2.4	25	16.3	28.9	90.0	6.6	6.0	41.1	471.1	799.2	6.8	12.0	6.79	1.279	1.279	20.844	5.01	2360	0.80	20	A	M		1632		8.47	Yes	20.53	9671	2.42	1.4E-08	1 in 1000000
B37	Maingate Loading	117.3	45.0	2.4	2.4	2.4	25	16.3	29.6	90.0	6.7	5.5	40.2	482.5	807.3	6.8	12.3	6.79	1.290	1.290	21.023	4.91	2367	0.80	20	A	M		1638		8.30	Yes	20.62	9948	2.48	6.0E-09	1 in 1000000
B38		117.2		2.4	2.4	2.4	25	16.0	29.6	90.0	6.8	5.5	40.8	473.6	800.3	6.7	12.3	6.67	1.298	1.298	20.772	4.95	2345	0.80	20							Yes	20.33	9629	4.11	4.3E-19	1 in 1000000
B39		115.9		2.4	2.4	2.4	25	11.8	10.2	90.0	6.7	5.9	59.6	120.4	297.9	4.9	4.3	4.25	0.927	0.953	11.244	7.17	863	0.71	20							No	14.16	1704	1.97	9.1E-06	1 in 145652
B40		113.8		2.4	2.4	2.4	25	12.2	10.6	90.0	7.1	5.9	59.4	129.3	318.5	5.1	4.4	4.42	0.930	0.951	11.599	7.01	906	0.73	20							Yes	14.28	1846	2.04	3.7E-06	1 in 406374
B41	Double Goaf Loading	121.0	45.0	2.4	2.4	2.4	25	16.0	36.8	90.0	6.4	6.0	38.6	588.8	958.7	6.7	15.3	6.67	1.394	1.394	22.303	4.93	2900	0.78	20	A	G		4338		12.29	Yes	21.08	12414	1.72	3.8E-04	1 in 2990
B42	Double Goaf Loading	122.0	45.0	2.4	2.4	2.4	25	17.1	29.0	90.0	6.3	5.8	39.1	495.9	814.3	7.1	12.1	7.13	1.258	1.258	21.514	5.01	2484	0.80	20	A	G		3566		12.20	Yes	21.34	10585	1.75	2.3E-04	1 in 4850
B43	Double Goaf Loading	123.0	45.0	2.4	2.4	2.4	25	16.9	34.2	90.0	6.8	5.6	38.7	578.0	943.3	7.0	14.3	7.04	1.339	1.339	22.622	5.02	2901	0.80	20	A	G		4123		12.15	Yes	21.77	12582	1.79	1.3E-04	1 in 8813
B44	Maingate Loading	124.0	22.0	2.4	2.4	2.4	25	17.3	30.3	90.0	6.8	5.6	39.4	524.2	865.2	7.2	12.6	7.21	1.273	1.273	22.025	5.12	2682	0.81	20	A	M		1173		7.35	Yes	21.73	11392	2.96	6.8E-12	1 in 1000000
~~B45~~	~~Tailgate Loading~~	~~125.0~~	~~45.0~~	~~2.4~~	~~2.4~~	~~2.4~~	~~25~~	~~16.1~~	~~15.6~~	~~90.0~~	~~6.0~~	~~12.5~~	~~59.6~~	~~251.2~~	~~621.0~~	~~6.7~~	~~6.5~~	~~6.50~~	~~0.984~~	~~0.984~~	~~15.846~~	~~7.73~~	~~1941~~	~~0.77~~	~~20~~	~~A~~	~~T~~		~~2528~~		~~17.79~~	~~Yes~~	~~17.76~~	~~4460~~		~~4.0E+00~~	~~#NUM!~~
B46	Tailgate Loading	128.0	22.0	2.4	2.4	2.4	25	20.6	14.8	90.0	11.0	6.4	54.5	304.9	669.9	8.6	6.2	6.17	0.836	0.836	17.225	7.03	2144	0.91	20	A	T		1119		10.70	Yes	21.54	6567	2.01	5.3E-06	1 in 269329
B47	Tailgate Loading	127.7	45.0	2.4	2.4	2.4	25	19.6	14.8	90.0	9.9	6.5	53.8	290.1	628.4	8.2	6.2	6.17	0.860	0.860	16.865	6.92	2006	0.88	20	A	T		1971		13.71	Yes	20.52	5951	1.50	5.0E-03	1 in 178
~~B48~~	~~Maingate Loading~~	~~126.0~~	~~45.0~~	~~2.4~~	~~2.4~~	~~2.4~~	~~25~~	~~8.2~~	~~11.3~~	~~90.0~~	~~12.0~~	~~7.0~~	~~74.9~~	~~92.7~~	~~369.7~~	~~3.4~~	~~4.7~~	~~3.42~~	~~1.159~~	~~1.021~~	~~8.370~~	~~12.57~~	~~1164~~	~~0.73~~	~~20~~	~~A~~	~~M~~		~~962~~		~~22.95~~	~~No~~	~~12.18~~	~~1129~~		~~4.0E+00~~	~~#NUM!~~
~~B49~~	~~Rotated Panel / Double Goaf~~	~~125.0~~	~~22.0~~	~~2.4~~	~~2.4~~	~~2.4~~	~~25~~	~~12.0~~	~~7.2~~	~~90.0~~	~~6.0~~	~~7.1~~	~~66.4~~	~~86.4~~	~~257.4~~	~~5.0~~	~~3.0~~	~~3.00~~	~~0.750~~	~~0.825~~	~~9.906~~	~~9.31~~	~~804~~	~~0.68~~	~~20~~	~~A~~	~~M~~		~~383~~		~~13.75~~	~~Yes~~	~~13.27~~	~~1147~~		~~4.0E+00~~	~~#NUM!~~
B50	~~Maingate Loading~~ / Double Goaf	123.0	45.0	2.4	2.4	2.4	25	23.8	14.2	90.0	6.0	6.9	46.3	338.0	628.8	9.9	5.9	5.92	0.747	0.747	17.787	5.72	1933	0.89	20	A	G		2186		12.19	Yes	24.95	8432	2.05	3.2E-06	1 in 470545
B51	Rotated Panel / Double Goaf	123.5	45.0	2.4	2.4	2.4	25	14.0	25.8	90.0	6.7	6.5	46.0	361.2	668.6	5.8	10.8	5.83	1.296	1.278	17.891	5.72	2064	0.74	20	A	G		3365		15.03	Yes	18.08	6531	1.20	1.3E-01	1 in 9
B52	Rotated Panel / Double Goaf	124.0	45.0	2.4	2.4	2.4	25	14.0	25.8	90.0	6.7	6.5	46.0	361.2	668.6	5.8	10.8	5.83	1.296	1.278	17.891	5.74	2073	0.74	20	A	G		3383		15.10	Yes	18.08	6531	1.20	1.4E-01	1 in 8
B53	Rotated Panel / Double Goaf	124.6	45.0	2.4	2.4	2.4	25	14.0	25.8	90.0	6.7	7.0	46.8	361.2	679.0	5.8	10.8	5.83	1.296	1.278	17.891	5.86	2115	0.74	20	A	G		3457		15.43	Yes	18.08	6531	1.17	1.8E-01	1 in 7
B54	Rotated Panel / Double Goaf	124.8	45.0	2.4	2.4	2.4	25	14.0	25.8	90.0	6.7	6.8	46.5	361.2	674.8	5.8	10.8	5.83	1.296	1.278	17.891	5.83	2105	0.74	20	A	G		3443		15.36	Yes	18.08	6531	1.18	1.7E-01	1 in 7
B55	Rotated Panel / Maingate Load	125.0	45.0	2.4	2.4	2.4	25	14.0	25.8	90.0	6.7	6.8	46.5	361.2	674.8	5.8	10.8	5.83	1.296	1.278	17.891	5.84	2109	0.74	20	A	M		1527		10.07	Yes	18.08	6531	1.80	1.2E-04	1 in 9467
B56	Double Goaf Loading	123.0	45.0	2.4	2.4	2.4	25	23.2	14.4	90.0	6.0	6.4	45.0	334.1	607.4	9.7	6.0	6.00	0.766	0.766	17.770	5.59	1868	0.88	20	A	G		2155		12.04	Yes	24.32	8124	2.02	4.8E-06	1 in 299926
B57	Double Goaf Loading	122.0	45.0	2.4	2.4	2.4	25	24.5	21.0	90.0	6.0	6.2	38.0	514.5	829.6	10.2	8.8	8.75	0.923	0.923	22.615	4.92	2530	0.90	20	A	G		2787		10.34	Yes	29.05	14945	2.81	5.4E-11	1 in 1000000
B58	Tailgate Loading	121.0	45.0	2.4	2.4	2.4	25	23.5	15.6	90.0	6.3	6.8	45.1	366.6	667.5	9.8	6.5	6.50	0.798	0.798	18.752	5.51	2019	0.89	20	A	T		1930		10.77	Yes	25.31	9278	2.35	4.1E-08	1 in 1000000
B59	Rotated Panel / Double Goaf	121.5	45.0	2.4	2.4	2.4	25	15.8	25.6	90.0	6.8	6.4	44.1	404.5	723.2	6.6	10.7	6.58	1.237	1.237	19.540	5.43	2197	0.78	20	A	G		3261		13.49	Yes	19.61	7931	1.45	8.1E-03	1 in 108
B60	Rotated Panel / Double Goaf	122.0	45.0	2.4	2.4	2.4	25	15.8	25.6	90.0	6.8	6.4	44.1	404.5	723.2	6.6	10.7	6.58	1.237	1.237	19.540	5.45	2206	0.78	20	A	G		3279		13.56	Yes	19.61	7931	1.45	8.8E-03	1 in 99
B61	Rotated Panel / Double Goaf	123.0	45.0	2.4	2.4	2.4	25	15.8	25.6	90.0	6.8	7.2	45.4	404.5	741.3	6.6	10.7	6.58	1.237	1.237	19.540	5.64	2279	0.78	20	A	G		3398		14.04	Yes	19.61	7931	1.40	1.5E-02	1 in 57
B62	Rotated Panel / Double Goaf	123.5	45.0	2.4	2.4	2.4	25	15.8	25.6	90.0	6.8	7.0	45.1	404.5	736.8	6.6	10.7	6.58	1.237	1.237	19.540	5.62	2275	0.78	20	A	G		3396		14.02	Yes	19.61	7931	1.40	1.5E-02	1 in 59
B63	Rotated Panel / Double Goaf	124.0	45.0	2.4	2.4	2.4	25	15.8	25.6	90.0	6.8	7.3	45.6	404.5	743.5	6.6	10.7	6.58	1.237	1.237	19.540	5.70	2305	0.78	20	A	G		3446		14.22	Yes	19.61	7931	1.38	1.9E-02	1 in 47
B64	Rotated Panel / Double Goaf	125.5	45.0	2.4	2.4	2.4	25	15.8	25.0	90.0	6.8	7.1	45.6	395.0	725.5	6.6	10.4	6.58	1.225	1.225	19.363	5.76	2276	0.78	20	A	G		3416		14.41	Yes	19.52	7710	1.35	2.5E-02	1 in 36
B65	Double Goaf Loading	120.0	45.0	2.4	2.4	2.4	25	18.8	14.5	90.0	8.5	7.1	53.8	272.6	589.7	7.8	6.0	6.04	0.871	0.871	16.372	6.49	1769	0.86	20	A	G		2165		14.43	Yes	19.63	5352	1.36	2.3E-02	1 in 39

Table A.3: Pillar Stability Analysis

Run 3: Decrease Run 2 Pillars by 1 m

Project: Lake Macquarie Private Hospital Northern Expansion
Location: O'Brien Street, Gateshead
Analysis Assumptions: NSW Pillar formula
Project Number 16471.21

Client: Akalan Projects
Date: 18/10/16
Sheet: 3
Calculations by JAW

Key to Colour Coding of Factors of Safety / Width: Height Ratios

4.50	Greater than 3.0
2.40	Between 2.2 and 3.0
2.10	Between 1.8 and 2.2
1.70	Between 1.5 and 1.8
1.20	Less than 1.5

Indicating Pillar Located within Project Angle of Draw
Indicating Pillar Located beneath site

Analysis Id:	Comment	Depth D (m)	Panel Width/Span (Longwall only) (m)	Seam Thickness (m)	Working Section H (m)	Pillar Height Section H (m)	Unit Weigth γ (kN/m³)	Pillar Details Width w1 (m)	Length w2 (m)	Internal Angle (°)	adway Dete b1 (m)	b2 (m)	Extract. Ratio (%)	Pillar Area m³	Total Area m³	w1/ Height Ratio w1/H	w2/H Height Ratio w2/H	Width/ Height Ratio	Width Modifier Θ0	Θ	wΘ Effective Width	Pillar Stress (Tributary) (MPa)	Pillar Load (Tributary) MN	Proportion Abutment transfer R	Abutment Angle °	Abut (A) Yield (Y) (?)	Abutment Loading Type M,T,G	Shed Load MN	Abutment Load Received MN	Pillar Stress (MPa) ("Yield") ϕ_p= 0.7	Pillar Stress ("Abut") (MPa)	Squat	Power Law Strength (MPa)	Power Law "Ultimate" Load MN	Power Law FoS	Power Law Probability of Failure	Probability of Failure NSW Power Formulae
B66	Double Goaf Loading	119.5	45.0	2.4	2.4	2.4	25	23.7	15.2	90.0	6.5	6.0	43.7	360.2	640.2	9.9	6.3	6.33	0.781	0.781	18.521	5.31	1913	0.90	20	A	G		2113		11.17	Yes	25.36	9136	2.27	1.3E-07	1 in 1000000
B67	Tailgate Loading	119.0	45.0	2.4	2.4	2.4	25	23.7	15.2	90.0	6.5	6.2	44.3	360.2	646.3	9.9	6.3	6.33	0.781	0.781	18.521	5.34	1923	0.90	20	A	T		1803		10.34	Yes	25.36	9136	2.45	9.4E-09	1 in 1000000
B68	Rotated Panel / Double Goaf	120.0	45.0	2.4	2.4	2.4	25	15.0	26.0	90.0	6.2	6.8	43.9	390.0	695.4	6.3	10.8	6.25	1.268	1.268	19.024	5.35	2086	0.76	20	A	G		3287		13.78	Yes	18.99	7408	1.38	1.9E-02	1 in 47
B69	Rotated Panel / Double Goaf	120.0	45.0	2.4	2.4	2.4	25	15.0	26.0	90.0	6.2	6.8	43.9	390.0	695.4	6.3	10.8	6.25	1.268	1.268	19.024	5.35	2086	0.76	20	A	G		3287		13.78	Yes	18.99	7408	1.38	1.9E-02	1 in 47
B70	Rotated Panel / Double Goaf	120.0	45.0	2.4	2.4	2.4	25	15.0	26.0	90.0	6.2	6.6	43.6	390.0	691.1	6.3	10.8	6.25	1.268	1.268	19.024	5.32	2073	0.76	20	A	G		3267		13.69	Yes	18.99	7408	1.39	1.7E-02	1 in 52
B71	Rotated Panel / Double Goaf	120.0	45.0	2.4	2.4	2.4	25	15.0	26.0	90.0	6.2	6.7	43.7	390.0	693.2	6.3	10.8	6.25	1.268	1.268	19.024	5.33	2080	0.76	20	A	G		3277		13.74	Yes	18.99	7408	1.38	1.8E-02	1 in 49
B72	Rotated Panel / Double Goaf	120.0	45.0	2.4	2.4	2.4	25	15.0	26.0	90.0	6.2	6.7	43.7	390.0	693.2	6.3	10.8	6.25	1.268	1.268	19.024	5.33	2080	0.76	20	A	G		3277		13.74	Yes	18.99	7408	1.38	1.8E-02	1 in 49
B73	Rotated Panel / Double Goaf	120.0	45.0	2.4	2.4	2.4	25	15.0	26.0	90.0	6.2	6.9	44.1	390.0	697.5	6.3	10.8	6.25	1.268	1.268	19.024	5.37	2092	0.76	20	A	G		3297		13.82	Yes	18.99	7408	1.37	2.0E-02	1 in 45
B74	Double Goaf Loading	118.2	45.0	2.4	2.4	2.4	25	24.3	14.5	90.0	6.5	6.3	45.0	352.4	640.6	10.1	6.0	6.04	0.747	0.747	18.162	5.37	1893	0.91	20	A	G		2043		11.17	Yes	25.75	9075	2.31	7.8E-08	1 in 1000000
B75	Double Goaf Loading	118.0	45.0	2.4	2.4	2.4	25	24.1	14.5	90.0	6.5	6.8	46.4	349.5	651.8	10.0	6.0	6.04	0.751	0.751	18.106	5.50	1923	0.91	20	A	G		2087		11.47	Yes	25.50	8910	2.22	2.6E-07	1 in 1000000
B76	Maingate Loading	117.0	45.0	2.4	2.4	2.4	25	25.4	14.6	90.0	6.5	6.3	44.4	370.8	666.7	10.6	6.1	6.08	0.730	0.730	18.542	5.26	1950	0.92	20	A	M		1118		8.27	Yes	27.28	10116	3.30	4.9E-14	1 in 1000000
B77	Rotated panel / Maingate Loading	118.0	45.0	2.4	2.4	2.4	25	14.4	26.7	90.0	6.7	6.3	44.8	384.5	696.3	6.0	11.1	6.00	1.299	1.299	18.709	5.34	2054	0.76	20	A	M		1477		9.18	Yes	18.62	7158	2.03	4.3E-06	1 in 341810
B78	Rotated panel / Maingate Loading	119.0	45.0	2.4	2.4	2.4	25	14.3	26.3	90.0	6.6	6.3	44.8	376.1	681.3	6.0	11.0	5.96	1.296	1.291	18.460	5.39	2027	0.75	20	A	M		1459		9.27	Yes	18.46	6943	1.99	7.2E-06	1 in 189645
B79	Rotated panel / Maingate Loading	120.0	45.0	2.4	2.4	2.4	25	14.5	26.3	90.0	6.4	6.3	44.0	381.4	681.3	6.0	11.0	6.04	1.289	1.289	18.694	5.36	2044	0.75	20	A	M		1464		9.20	Yes	18.64	7110	2.03	4.3E-06	1 in 336458
B80	Rotated panel / Maingate Loading	121.0	45.0	2.4	2.4	2.4	25	14.5	26.3	90.0	6.7	6.3	44.8	381.4	691.1	6.0	11.0	6.04	1.289	1.289	18.694	5.48	2091	0.76	20	A	M		1500		9.42	Yes	18.64	7110	1.98	8.4E-06	1 in 158049
B81	Rotated panel / Maingate Loading	122.0	45.0	2.4	2.4	2.4	25	14.5	26.3	90.0	6.6	6.3	44.6	381.4	687.9	6.0	11.0	6.04	1.289	1.289	18.694	5.50	2098	0.75	20	A	M		1504		9.45	Yes	18.64	7110	1.97	9.3E-06	1 in 142496
B82	Rotated panel / Maingate Loading	123.0	45.0	2.4	2.4	2.4	25	14.5	26.3	90.0	6.6	6.3	44.6	381.4	687.9	6.0	11.0	6.04	1.289	1.289	18.694	5.55	2115	0.75	20	A	M		1517		9.52	Yes	18.64	7110	1.96	1.2E-05	1 in 110435
B83		113.0		2.4	2.4	2.4	25	12.6	8.9	90.0	6.4	7.2	63.3	112.1	305.9	5.3	3.7	3.71	0.828	0.868	10.936	7.71	864	0.72	21	A	M		105		8.64	Yes	13.87	1556	1.60	1.4E-03	1 in 683
B84		113.5		2.4	2.4	2.4	25	13.0	8.6	90.0	6.6	7.2	63.9	111.8	309.7	5.4	3.6	3.58	0.796	0.832	10.821	7.86	879	0.74	22	A	M		109		8.83	Yes	13.83	1546	1.57	2.2E-03	1 in 417
B85		113.8		2.4	2.4	2.4	25	12.8	9.0	90.0	6.4	6.3	60.8	115.2	293.8	5.3	3.8	3.75	0.826	0.862	11.028	7.25	836	0.73	23	A	M		101		8.13	Yes	13.95	1607	1.71	3.8E-04	1 in 2982

Table A.4: Pillar Stability Analysis

Run 4: Increase Run 2 Working Section Height to 3.0 m

Project: Lake Macquarie Private Hospital Northern Expansion
Location: O'Brien Street, Gateshead
Analysis Assumptions: NSW Pillar formula
Project Number 16471.21

Client: Akalan Projects
Date: 18/10/16
Sheet: 4
Calculations by JAW

Key to Colour Coding of Factors of Safety / Width: Height Ratios

4.50	Greater than 3.0
2.40	Between 2.2 and 3.0
2.10	Between 1.8 and 2.2
1.70	Between 1.5 and 1.8
1.20	Less than 1.5

Indicating Pillar Located within Project Angle of Draw
Indicating Pillar Located beneath site

Analysis Id:	Comment	Depth D (m)	Panel Width/Span (Longwall only) (m)	Seam Thickness (m)	Working Section H (m)	Pillar Height Section H (m)	Unit Weigth γ (kN/m³)	Pillar Details Width w1 (m)	Length w2 (m)	Internal Angle (°)	Roadway Dets b1 (m)	b2 (m)	Extract. Ratio (%)	Pillar Area m³	Total Area m³	w1/ Height Ratio w1/H	w2/H Height Ratio w2/H	Width/ Height Ratio	Width Modifier Θ0	Θ	wΘ Effective Width	Pillar Stress (Tributary) (MPa)	Pillar Load (Tributary) MN	Proportion Abutment transfer R	Abutment Angle °	Abut (A) Yield (Y) (?)	Abutment Loading Type M,T,G	Shed Load MN	Abutment Load Received MN	Pillar Stress (MPa) ("Yield") ϕ_p= 0.7	Pillar Stress ("Abut") (MPa)	Squat	Power Law Strength (MPa)	Power Law "Ultimate" Load MN	Power Law FoS	Power Law Probability of Failure	Probability of Failure NSW Power Formulae
A1		127.7		3.0	3.0	3.0	25	18.6	31.0	90.0	4.9	5.2	32.2	576.6	850.7	6.2	10.3	6.20	1.250	1.250	23.250	4.71	2716	0.79	20							Yes	17.40	10033	3.69	1.6E-16	1 in 1000000
A2		126.7		3.0	3.0	3.0	25	17.4	31.5	90.0	5.2	5.1	33.7	548.1	827.2	5.8	10.5	5.80	1.288	1.267	22.042	4.78	2619	0.77	20							Yes	16.65	9128	3.49	3.3E-15	1 in 1000000
A3		126.7		3.0	3.0	3.0	25	19.1	31.4	90.0	5.3	5.4	33.2	599.7	897.9	6.4	10.5	6.37	1.244	1.244	23.752	4.74	2843	0.81	20							Yes	17.74	10640	3.74	8.1E-17	1 in 1000000
A4	Tailgate Loading	124.6	22.0	3.0	3.0	3.0	25	16.8	31.4	90.0	5.4	5.1	34.9	527.5	810.3	5.6	10.5	5.60	1.303	1.258	21.130	4.78	2523	0.77	20	A	T		1868		8.32	Yes	16.20	8546	1.95	1.4E-05	1 in 92112
A5		124.1		3.0	3.0	3.0	25	16.5	31.1	90.0	5.4	5.2	35.5	513.2	795.0	5.5	10.4	5.50	1.307	1.250	20.621	4.81	2466	0.77	20							Yes	15.96	8190	3.32	3.5E-14	1 in 1000000
A6		123.6		3.0	3.0	3.0	25	17.7	26.9	90.0	4.8	5.3	34.3	476.1	724.5	5.9	9.0	5.90	1.206	1.199	21.218	4.70	2238	0.78	20							Yes	16.39	7806	3.49	3.2E-15	1 in 1000000
A7		123.1		3.0	3.0	3.0	25	17.2	26.5	90.0	5.2	5.4	36.2	455.8	714.6	5.7	8.8	5.73	1.213	1.192	20.506	4.82	2199	0.78	20							Yes	16.02	7301	3.32	3.6E-14	1 in 1000000
A8		122.7		3.0	3.0	3.0	25	16.7	26.5	90.0	5.4	5.8	38.0	442.6	713.8	5.6	8.8	5.57	1.227	1.191	19.892	4.95	2189	0.77	20							Yes	15.70	6946	3.17	3.0E-13	1 in 1000000
A9		121.4		3.0	3.0	3.0	25	17.0	27.6	90.0	5.0	5.3	35.2	469.2	723.8	5.7	9.2	5.67	1.238	1.209	20.548	4.68	2196	0.77	20							Yes	16.00	7508	3.42	8.6E-15	1 in 1000000
A10		123.9		3.0	3.0	3.0	25	17.3	17.4	90.0	5.3	4.9	40.3	301.0	504.0	5.8	5.8	5.77	1.003	1.003	17.346	5.19	1561	0.78	20							Yes	14.72	4432	2.84	3.6E-11	1 in 1000000
A11		124.2		3.0	3.0	3.0	25	17.0	17.3	90.0	5.3	5.0	40.9	294.1	497.3	5.7	5.8	5.67	1.009	1.008	17.132	5.25	1544	0.77	20							Yes	14.58	4289	2.78	8.7E-11	1 in 1000000
A12		123.2		3.0	3.0	3.0	25	16.7	17.1	90.0	5.1	5.2	41.3	285.6	486.1	5.6	5.7	5.57	1.012	1.010	16.869	5.24	1498	0.76	20							Yes	14.43	4121	2.75	1.3E-10	1 in 1000000
A13		123.0		3.0	3.0	3.0	25	17.0	17.0	90.0	5.3	5.1	41.4	289.0	492.8	5.7	5.7	5.67	1.000	1.000	17.000	5.24	1515	0.78	20							Yes	14.53	4198	2.77	9.7E-11	1 in 1000000
A14		121.9		3.0	3.0	3.0	25	17.0	17.1	90.0	5.5	5.7	43.3	290.7	513.0	5.7	5.7	5.67	1.003	1.003	17.044	5.38	1563	0.78	20							Yes	14.55	4229	2.70	2.5E-10	1 in 1000000
A15		128.8		3.0	3.0	3.0	25	24.5	38.0	90.0	4.2	5.1	24.7	931.0	1237.0	8.2	12.7	8.17	1.216	1.216	29.792	4.28	3984	0.87	20							Yes	22.74	21168	5.31	1.2E-26	1 in 1000000
A16		128.9		3.0	3.0	3.0	25	18.6	31.5	90.0	5.4	5.3	33.7	585.9	883.2	6.2	10.5	6.20	1.257	1.257	23.389	4.86	2846	0.80	20							Yes	17.45	10226	3.59	7.0E-16	1 in 1000000
A17		128.8		3.0	3.0	3.0	25	20.0	31.7	90.0	5.3	5.9	33.4	634.0	951.3	6.7	10.6	6.67	1.226	1.226	24.526	4.83	3064	0.82	20							Yes	18.35	11632	3.80	3.7E-17	1 in 1000000
A18		127.3		3.0	3.0	3.0	25	19.1	31.7	90.0	5.2	5.4	32.8	605.5	901.5	6.4	10.6	6.37	1.248	1.248	23.837	4.74	2869	0.80	20							Yes	17.77	10761	3.75	7.2E-17	1 in 1000000
A19		125.9		3.0	3.0	3.0	25	17.0	31.5	90.0	5.2	5.5	34.8	535.5	821.4	5.7	10.5	5.67	1.299	1.262	21.450	4.83	2585	0.77	20							Yes	16.36	8758	3.39	1.3E-14	1 in 1000000
A20		125.1		3.0	3.0	3.0	25	16.3	31.5	90.0	5.3	5.4	35.6	513.5	797.0	5.4	10.5	5.43	1.318	1.251	20.392	4.85	2493	0.76	20							Yes	15.85	8137	3.26	7.9E-14	1 in 1000000
A21		124.4		3.0	3.0	3.0	25	17.2	16.0	90.0	5.3	5.0	41.8	275.2	472.5	5.7	5.3	5.33	0.964	0.967	16.633	5.34	1469	0.78	20							Yes	14.40	3962	2.70	2.8E-10	1 in 1000000
A22		123.9		3.0	3.0	3.0	25	17.2	16.4	90.0	5.2	5.0	41.2	282.1	479.4	5.7	5.5	5.47	0.976	0.978	16.826	5.27	1485	0.78	20							Yes	14.48	4085	2.75	1.3E-10	1 in 1000000
A23		123.6		3.0	3.0	3.0	25	17.4	16.4	90.0	4.8	5.3	40.8	285.4	481.7	5.8	5.5	5.47	0.970	0.972	16.919	5.22	1489	0.77	20							Yes	14.55	4153	2.79	7.3E-11	1 in 1000000
A24		123.0		3.0	3.0	3.0	25	17.4	16.4	90.0	5.3	5.2	41.8	285.4	490.3	5.8	5.5	5.47	0.970	0.972	16.919	5.28	1508	0.78	20							Yes	14.55	4153	2.75	1.2E-10	1 in 1000000
A25		121.9		3.0	3.0	3.0	25	17.4	16.4	90.0	5.3	5.3	42.1	285.4	492.6	5.8	5.5	5.47	0.970	0.972	16.919	5.26	1501	0.78	20							Yes	14.55	4153	2.77	1.0E-10	1 in 1000000
A26	Tailgate Loading	129.9	22.0	3.0	3.0	3.0	25	20.5	23.8	90.0	5.4	6.2	37.2	487.9	777.0	6.8	7.9	6.83	1.074	1.074	22.027	5.17	2523	0.83	20	A	T		1610		8.47	Yes	17.55	8565	2.07	2.2E-06	1 in 718899
A27	Tailgate Loading	130.2	22.0	3.0	3.0	3.0	25	22.5	40.1	90.0	5.6	6.2	30.7	902.3	1301.0	7.5	13.4	7.50	1.281	1.281	28.826	4.70	4236	0.86	20	A	T		2492		7.46	Yes	21.14	19070	2.83	3.9E-11	1 in 1000000
A28		128.8		3.0	3.0	3.0	25	23.4	25.8	90.0	5.4	5.3	32.6	603.7	895.7	7.8	8.6	7.80	1.049	1.049	24.541	4.78	2884	0.87	20							Yes	19.95	12046	4.18	1.6E-19	1 in 1000000
A29		128.2		3.0	3.0	3.0	25	10.2	25.4	90.0	5.5	5.3	46.2	259.1	482.0	3.4	8.5	3.40	1.427	1.049	10.695	5.96	1545	0.61	20							No	11.44	2965	1.92	2.0E-05	1 in 60557
A30		127.3		3.0	3.0	3.0	25	13.5	25.7	90.0	5.5	5.3	41.1	347.0	589.0	4.5	8.6	4.50	1.311	1.145	15.459	5.40	1874	0.70	20							No	13.81	4791	2.56	2.1E-09	1 in 1000000
A31		125.3		3.0	3.0	3.0	25	17.4	16.7	90.0	5.4	5.2	41.8	290.6	499.3	5.8	5.6	5.57	0.979	0.981	17.066	5.38	1564	0.78	20							Yes	14.62	4248	2.71	2.2E-10	1 in 1000000
A32		124.5		3.0	3.0	3.0	25	17.8	16.7	90.0	5.4	5.1	41.2	297.3	505.8	5.9	5.6	5.57	0.968	0.969	17.245	5.30	1574	0.79	20							Yes	14.77	4390	2.79	7.4E-11	1 in 1000000
A33		125.9		3.0	3.0	3.0	25	17.3	16.6	90.0	5.6	5.0	41.9	287.2	494.6	5.8	5.5	5.53	0.979	0.981	16.970	5.42	1557	0.78	20							Yes	14.56	4181	2.69	3.3E-10	1 in 1000000
A34		122.8		3.0	3.0	3.0	25	17.3	16.1	90.0	5.5	5.2	42.6	278.5	485.6	5.8	5.4	5.37	0.964	0.967	16.726	5.35	1491	0.79	20							Yes	14.45	4025	2.70	2.6E-10	1 in 1000000
A35		121.9		3.0	3.0	3.0	25	17.3	16.9	90.0	5.3	5.2	41.5	292.4	499.5	5.8	5.6	5.63	0.988	0.989	17.113	5.20	1521	0.78	20							Yes	14.62	4275	2.81	5.5E-11	1 in 1000000
A36		126.5		3.0	3.0	3.0	25	20.0	16.1	90.0	5.4	5.5	41.3	322.0	548.6	6.7	5.4	5.37	0.892	0.892	17.839	5.39	1735	0.82	20							Yes	15.60	5022	2.89	1.6E-11	1 in 1000000
A37		125.1		3.0	3.0	3.0	25	17.8	16.1	90.0	5.2	5.5	42.3	286.6	496.8	5.9	5.4	5.37	0.950	0.951	16.927	5.42	1554	0.78	20							Yes	14.63	4192	2.70	2.7E-10	1 in 1000000
A38		124.0		3.0	3.0	3.0	25	17.6	15.8	90.0	5.1	5.6	42.8	278.1	485.8	5.9	5.3	5.27	0.946	0.948	16.693	5.41	1505	0.78	20							Yes	14.49	4029	2.68	3.8E-10	1 in 1000000
A39		123.6		3.0	3.0	3.0	25	17.6	16.0	90.0	5.3	5.4	42.5	281.6	490.1	5.9	5.3	5.33	0.952	0.954	16.798	5.38	1514	0.79	20							Yes	14.53	4093	2.70	2.6E-10	1 in 1000000
A40		121.8		3.0	3.0	3.0	25	17.6	16.4	90.0	5.3	5.5	42.4	288.6	501.5	5.9	5.5	5.47	0.965	0.966	17.006	5.29	1527	0.79	20							Yes	14.63	4222	2.77	1.0E-10	1 in 1000000
A41	Double Goaf Loading	130.0	45.0	3.0	3.0	3.0	25	28.0	32.6	90.0	5.5	5.7	28.9	912.8	1283.1	9.3	10.9	9.33	1.076	1.076	30.125	4.57	4170	0.92	20	A	G		4270		9.25	Yes	25.53	23301	2.76	1.1E-10	1 in 1000000
A42		127.3		3.0	3.0	3.0	25	21.0	23.9	90.0	5.3	5.1	34.2	501.9	762.7	7.0	8.0	7.00	1.065	1.065	22.356	4.84	2427	0.84	20							Yes	17.89	8978	3.70	1.5E-16	1 in 1000000
A43		126.8		3.0	3.0	3.0	25	16.3	22.1	90.0	5.5	5.7	40.6	360.2	606.0	5.4	7.4	5.43	1.151	1.121	18.270	5.33	1922	0.76	20							Yes	14.98	5398	2.81	5.6E-11	1 in 1000000
A44		125.1		3.0	3.0	3.0	25	17.8	16.4	90.0	5.0	5.6	41.8	291.9	501.6	5.9	5.5	5.47	0.959	0.960	17.087	5.37	1569	0.78	20							Yes	14.70	4291	2.74	1.6E-10	1 in 1000000
A45		124.3		3.0	3.0	3.0	25	17.8	16.4	90.0	5.1	5.5	41.8	291.9	501.5	5.9	5.5	5.47	0.959	0.960	17.087	5.34	1558	0.78	20							Yes	14.70	4291	2.75	1.2E-10	1 in 1000000
A46		124.2		3.0	3.0	3.0	25	17.8	16.4	90.0	5.4	5.4	42.3	291.9	505.8	5.9	5.5	5.47	0.959	0.960	17.087	5.38	1570	0.79	20							Yes	14.70	4291	2.73	1.7E-10	1 in 1000000
A47		122.0		3.0	3.0	3.0	25	17.8	16.7	90.0	5.4	5.3	41.8	297.3	510.4	5.9	5.6	5.57	0.968	0.969	17.245	5.24	1556	0.79	20							Yes	14.77	4390	2.82	4.7E-11	1 in 1000000
A48		128.2		3.0	3.0	3.0	25	18.9	29.1	90.0	6.0	6.0	37.1	550.0	874.0	6.3	9.7	6.30	1.213	1.213	22.916	5.09	2801	0.81	20							Yes	17.36	9547	3.41	1.0E-14	1 in 1000000
A49		126.8		3.0	3.0	3.0	25	33.6	44.0	90.0	5.5	6.0	24.4	1478.4	1955.0	11.2	14.7	11.20	1.134	1.134	38.103	4.19	6199	0.97	20							Yes	34.80	51442	8.30	2.7E-45	1 in 1000000
A50		128.2		3.0	3.0	3.0	25	17.8	43.0	90.0	5.1	6.2	32.1	765.4	1126.7	5.9	14.3	5.93	1.414	1.404	24.984	4.72	3611	0.78	20							Yes	17.84	13656	3.78	4.6E-17	1 in 1000000
A51		125.1		3.0	3.0	3.0	25	13.8	16.6	90.0	6.5	5.2	48.2	229.1	442.5	4.6	5.5	4.60	1.092	1.048	14.464	6.04	1384	0.73	20							No	13.35	3058	2.21	3.1E-07	1 in 1000000
A52		126.7		3.0	3.0	3.0	25	33.0	13.8	90.0	6.5	6.0	41.8	455.4	782.1	11.0	4.6	4.60	0.590	0.590	19.462	5.44	2476	0.97	20							Yes	24.20	11019	4.45	3.1E-21	1 in 1000000
A53	Tailgate Loading	130.2	22.0	3.0	3.0	3.0	25	14.7	39.0	90.0	6.5	6.6	40.7	573.3	966.7	4.9	13.0	4.90	1.453	1.267	18.621	5.49	3147	0.74	20	A	T		2454		9.77	No	15.18	8706	1.55	2.6E-03	1 in 362
A54		129.4		3.0	3.0	3.0	25	14.7	43.3	90.0	6.5	6.5	39.7	636.5	1055.8	4.9	14.4	4.90	1.493	1.289	18.948	5.37	3416	0.74	20							No	15.32	9752	2.86	2.9E-11	1 in 1000000
A55		127.3		3.0	3.0	3.0	25	15.8	67.0	90.0	6.4	6.0	34.7	1058.6	1620.6	5.3	22.3	5.27	1.618	1.439	22.731	4.87	5158	0.77	20							Yes	16.71	17685	3.43	7.4E-15	1 in 1000000
A56		124.8		3.0	3.0	3.0	25	13.0	14.5	90.0	6.2	8.8	57.9	188.5	447.4	4.3	4.8	4.33	1.055	1.024	13.311	7.40	1396	0.71	20							No	12.80	2412	1.73	3.2E-04	1 in 3582
A57		127.9		3.0	3.0	3.0	25	12.7	40.3	90.0	6.4	6.1	42.2	511.8	886.2	4.2	13.4	4.23	1.521	1.188	15.089	5.54	2834	0.70	20							No	13.64	6981	2.46	8.0E-09	1 in 1000000
A58		125.1		3.0	3.0	3.0	25	15.0	33.1	90.0	6.7	6.5	42.2	496.5	859.3	5.0	11.0	5.00	1.376	1.237	18.560	5.41	2688	0.76	20							Yes	15.16	7527	2.80	6.3E-11	1 in 1000000
A59	Double Goaf Loading	130.3	22.0	3.0	3.0	3.0	25	15.1	26.9	90.0	6.2	5.6	41.3	406.2	692.3	5.0	9.0	5.03	1.281	1.183	17.859	5.55	2255	0.74	20	A	G		2059		10.62	Yes	14.75	5991	1.39	1.7E-02	1 in 53
A60	Tailgate Loading	129.8	22.0	3.0	3.0	3.0	25	14.6	38.6	90.0	6.2	6.0	39.3	563.6	927.7	4.9	12.9	4.87	1.451	1.261	18.406	5.34	3010	0.73	20	A	T		2391		9.58	No	15.10	8507	1.57	2.0E-03	1 in 468
A61		132.3		3.0	3.0	3.0	25	14.6	43.6	90.0	6.3	6.3	39.0	636.6	1042.9	4.9	14.5	4.87	1.498	1.286	18.776	5.42	3449	0.73	20							No	15.25	9707	2.81	5.2E-11	1 in 1000000
A62		127.3		3.0	3.0	3.0	25	14.6	26.5	90.0	6.4	6.1	43.5	386.9	684.6	4.9	8.8	4.87	1.290	1.171	17.103	5.63	2179	0.74	20							No	14.54	5626	2.58	1.5E-09	1 in 1000000
A63		130.0		3.0	3.0	3.0	25	12.2	52.9	90.0	6.3	5.9	40.7	645.4	1087.8	4.1	17.6	4.07	1.625	1.188	14.499	5.48	3535	0.68	20							No	13.37	8626	2.44	1.1E-08	1 in 1000000
A64		127.3		3.0	3.0	3.0	25	12.2	50.8	90.0	6.2	6.3	41.0	619.8	1050.6	4.1	16.9	4.07	1.613	1.185	14.460	5.40	3344	0.68	20							No	13.35	8272	2.47	6.9E-09	1 in 1000000
~~A65~~	~~Double Goaf Loading~~	~~125.1~~	~~45.0~~	~~3.0~~	~~3.0~~	~~3.0~~	~~25~~	~~20.7~~	~~24.5~~	~~90.0~~	~~88.9~~	~~5.3~~	~~84.5~~	~~507.2~~	~~3266.1~~	~~6.9~~	~~8.2~~	~~6.90~~	~~1.084~~	~~1.084~~	~~22.440~~	~~20.14~~	~~10215~~	~~1.75~~	~~20~~	~~A~~	~~G~~		~~3158~~		~~26.37~~	~~Yes~~	~~17.80~~	~~9027~~		~~4.0E+00~~	~~#NUM!~~
~~A66~~	~~Maingate Loading~~	~~126.1~~	~~45.0~~	~~3.0~~	~~3.0~~	~~3.0~~	~~25~~	~~15.8~~	~~24.5~~	~~90.0~~	~~72.2~~	~~5.5~~	~~85.3~~	~~387.1~~	~~2640.0~~	~~5.3~~	~~8.2~~	~~5.27~~	~~1.216~~	~~1.159~~	~~18.315~~	~~21.50~~	~~8323~~	~~1.15~~	~~20~~	~~A~~	~~M~~		~~5758~~		~~36.37~~	~~Yes~~	~~14.96~~	~~5792~~		~~4.0E+00~~	~~#NUM!~~
~~A67~~	~~Maingate Loading~~	~~127.9~~	~~45.0~~	~~3.0~~	~~3.0~~	~~3.0~~	~~25~~	~~16.2~~	~~24.3~~	~~90.0~~	~~37.2~~	~~5.7~~	~~75.4~~	~~393.7~~	~~1602.0~~	~~5.4~~	~~8.1~~	~~5.40~~	~~1.200~~	~~1.157~~	~~18.744~~	~~13.01~~	~~5122~~	~~1.00~~	~~20~~	~~A~~	~~M~~		~~3419~~		~~21.70~~	~~Yes~~	~~15.17~~	~~5973~~		~~4.0E+00~~	~~#NUM!~~
A68	Maingate Loading	122.1	22.0	3.0	3.0	3.0	25	16.0	35.4	90.0	5.3	5.1	34.3	566.4	862.7	5.3	11.8	5.33	1.377	1.283	20.525	4.65	2633	0.76	20	A	M		1150		6.68	Yes	15.87	8991	2.38	2.8E-08	1 in 1000000
A69		122.1		3.0	3.0	3.0	25	17.4	19.4	90.0	5.6	6.5	43.3	337.6	595.7	5.8	6.5	5.80	1.054	1.051	18.281	5.39	1818	0.79	20							Yes	15.14	5110	2.81	5.4E-11	1 in 1000000
A70		122.1		3.0	3.0	3.0	25	16.9	19.2	90.0	5.4	6.5	43.4	324.5	573.1	5.6	6.4	5.63	1.064	1.056	17.842	5.39	1749	0.78	20							Yes	14.87	4827	2.76	1.1E-10	1 in 1000000
A71		121.2		3.0	3.0	3.0	25	16.9	19.2	90.0	4.9	6.5	42.1	324.5	560.3	5.6	6.4	5.63	1.064	1.056	17.842	5.23	1698	0.77	20							Yes	14.87	4827	2.84	3.4E-11	1 in 1000000
A72		120.6		3.0	3.0	3.0	25	16.9	19.2	90.0	5.0	6.5	42.3	324.5	562.8	5.6	6.4	5.63	1.064	1.056	17.842	5.23	1697	0.77	20							Yes	14.87	4827	2.84	3.3E-11	1 in 1000000
A73	Maingate Loading	124.2	22.0	3.0	3.0	3.0	25	16.5	31.9	90.0	5.3	4.7	34.0	526.4	797.9	5.5	10.6	5.50	1.318	1.259	20.771	4.71	2477	0.76	20	A	M		1068		6.74	Yes	16.02	8432	2.38	2.7E-08	1 in 1000000

Table A.4: Pillar Stability Analysis

Run 4: Increase Run 2 Working Section Height to 3.0 m

Project: Lake Macquarie Private Hospital Northern Expansion
Location: O'Brien Street, Gateshead
Analysis Assumptions: NSW Pillar formula
Project Number 16471.21

Client: Akalan Projects
Date: 18/10/16
Sheet: 4
Calculations by JAW

Key to Colour Coding of Factors of Safety / Width: Height Ratios

4.50	Greater than 3.0
2.40	Between 2.2 and 3.0
2.10	Between 1.8 and 2.2
1.70	Between 1.5 and 1.8
1.20	Less than 1.5

Indicating Pillar Located within Project Angle of Draw
Indicating Pillar Located beneath site

Analysis Id:	Comment	Depth D (m)	Panel Width/Span (Longwall only) (m)	Seam Thickness (m)	Working Section H (m)	Pillar Height Section H (m)	Unit Weigth γ (kN/m³)	Pillar Details Width w1 (m)	Length w2 (m)	Internal Angle (°)	adway Dete b1 (m)	b2 (m)	Extract. Ratio (%)	Pillar Area m³	Total Area m³	w1/ Height Ratio w1/H	w2/H Height Ratio w2/H	Width/ Height Ratio	Width Modifier Θ0	Θ	wΘ Effective Width	Pillar Stress (Tributary) (MPa)	Pillar Load (Tributary) MN	Proportion Abutment transfer R	Abutment Angle °	Abut (A) Yield (Y) (?)	Abutment Loading Type M,T,G	Shed Load MN	Abutment Load Received MN	Pillar Stress (MPa) ("Yield") ϕ_p= 0.7	Pillar Stress ("Abut") (MPa)	Squat	Power Law Strength (MPa)	Power Law "Ultimate" Load MN	Power Law FoS	Power Law Probability of Failure	Probability of Failure NSW Power Formulae
A74		122.3		3.0	3.0	3.0	25	16.4	17.4	90.0	5.5	5.2	42.3	285.4	494.9	5.5	5.8	5.47	1.030	1.024	16.798	5.30	1513	0.77	20							Yes	14.37	4099	2.71	2.3E-10	1 in 1000000
A75		121.8		3.0	3.0	3.0	25	16.6	16.9	90.0	5.2	5.4	42.3	280.5	486.1	5.5	5.6	5.53	1.009	1.008	16.725	5.28	1480	0.77	20							Yes	14.36	4027	2.72	2.0E-10	1 in 1000000
A76		121.8		3.0	3.0	3.0	25	16.6	17.1	90.0	4.8	5.7	41.8	283.9	487.9	5.5	5.7	5.53	1.015	1.013	16.808	5.23	1486	0.76	20							Yes	14.39	4085	2.75	1.3E-10	1 in 1000000
A77		121.2		3.0	3.0	3.0	25	16.6	17.0	90.0	5.0	5.0	40.6	282.2	475.2	5.5	5.7	5.53	1.012	1.010	16.767	5.10	1440	0.76	20							Yes	14.37	4056	2.82	4.9E-11	1 in 1000000
A78	Maingate Loading	121.8	22.0	3.0	3.0	3.0	25	16.5	29.9	90.0	5.3	4.4	34.0	493.4	747.7	5.5	10.0	5.50	1.289	1.235	20.385	4.62	2277	0.77	20	A	M		985		6.61	Yes	15.87	7828	2.40	2.0E-08	1 in 1000000
A79		121.9		3.0	3.0	3.0	25	16.2	17.6	90.0	6.6	5.3	45.4	285.1	522.1	5.4	5.9	5.40	1.041	1.033	16.735	5.58	1591	0.79	20							Yes	14.32	4083	2.57	1.8E-09	1 in 1000000
A80	~~Tailgate Loading~~ / Double Goaf	125.6	45.0	3.0	3.0	3.0	25	18.5	31.5	90.0	23.2	5.0	61.7	582.8	1522.1	6.2	10.5	6.17	1.260	1.260	23.310	8.20	4779	0.98	20	A	G		3888		14.87	Yes	17.40	10138	1.17	1.8E-01	1 in 6
A81		121.8		3.0	3.0	3.0	25	15.4	17.5	90.0	5.2	5.1	42.1	269.5	465.6	5.1	5.8	5.13	1.064	1.045	16.093	5.26	1418	0.74	20							Yes	13.99	3771	2.66	4.8E-10	1 in 1000000
B1		121.2		3.0	3.0	3.0	25	17.2	15.9	90.0	5.4	6.7	46.5	273.5	510.8	5.7	5.3	5.30	0.961	0.964	16.583	5.66	1548	0.78	20							Yes	14.37	3931	2.54	2.7E-09	1 in 1000000
B2		120.6		3.0	3.0	3.0	25	16.8	15.9	90.0	5.4	6.7	46.8	267.1	501.7	5.6	5.3	5.30	0.972	0.976	16.399	5.66	1513	0.78	20							Yes	14.24	3803	2.51	3.9E-09	1 in 1000000
B3		120.1		3.0	3.0	3.0	25	16.0	15.4	90.0	5.4	6.7	47.9	246.4	472.9	5.3	5.1	5.13	0.981	0.985	15.762	5.76	1420	0.76	20							Yes	13.87	3418	2.41	1.8E-08	1 in 1000000
B4		120.2		3.0	3.0	3.0	25	17.3	15.7	90.0	5.4	5.0	42.2	271.6	469.9	5.8	5.2	5.23	0.952	0.955	16.525	5.20	1412	0.79	20							Yes	14.36	3901	2.76	1.1E-10	1 in 1000000
B5		119.6		3.0	3.0	3.0	25	16.9	15.8	90.0	5.4	5.0	42.4	267.0	463.8	5.6	5.3	5.27	0.966	0.970	16.400	5.19	1387	0.78	20							Yes	14.25	3805	2.74	1.4E-10	1 in 1000000
B6		119.2		3.0	3.0	3.0	25	17.3	16.1	90.0	5.4	5.0	41.8	278.5	479.0	5.8	5.4	5.37	0.964	0.967	16.726	5.12	1427	0.79	20							Yes	14.45	4025	2.82	4.7E-11	1 in 1000000
B7		118.6		3.0	3.0	3.0	25	18.3	24.6	90.0	5.4	5.2	36.3	450.2	706.3	6.1	8.2	6.10	1.147	1.147	20.987	4.65	2094	0.81	20							Yes	16.44	7400	3.53	1.6E-15	1 in 1000000
B8		119.0		3.0	3.0	3.0	25	18.1	24.9	90.0	5.4	5.2	36.3	450.7	707.4	6.0	8.3	6.03	1.158	1.158	20.962	4.67	2104	0.80	20							Yes	16.38	7383	3.51	2.4E-15	1 in 1000000
B9		120.0		3.0	3.0	3.0	25	18.0	24.9	90.0	5.4	5.2	36.4	448.2	704.3	6.0	8.3	6.00	1.161	1.161	20.895	4.71	2113	0.80	20							Yes	16.33	7320	3.46	4.5E-15	1 in 1000000
B10		121.3		3.0	3.0	3.0	25	18.8	24.7	90.0	5.4	5.2	35.8	464.4	723.6	6.3	8.2	6.27	1.136	1.136	21.350	4.73	2194	0.81	20							Yes	16.72	7762	3.54	1.6E-15	1 in 1000000
B11	Maingate Loading	121.8	22.0	3.0	3.0	3.0	25	15.2	40.0	90.0	6.1	4.8	36.3	608.0	954.2	5.1	13.3	5.07	1.449	1.291	19.627	4.78	2906	0.76	20	A	M		1310		6.93	Yes	15.48	9411	2.23	2.2E-07	1 in 1000000
B12		121.0		3.0	3.0	3.0	25	18.6	19.0	90.0	5.4	5.2	39.2	353.4	580.8	6.2	6.3	6.20	1.011	1.011	18.798	4.97	1757	0.81	20							Yes	15.61	5518	3.14	4.7E-13	1 in 1000000
B13		119.7		3.0	3.0	3.0	25	16.8	18.7	90.0	5.4	5.2	40.8	314.2	530.6	5.6	6.2	5.60	1.054	1.046	17.577	5.05	1588	0.78	20							Yes	14.75	4633	2.92	1.2E-11	1 in 1000000
B14		118.4		3.0	3.0	3.0	25	17.2	18.7	90.0	5.4	5.2	40.5	321.6	540.1	5.7	6.2	5.73	1.042	1.038	17.854	4.97	1599	0.79	20							Yes	14.92	4800	3.00	3.4E-12	1 in 1000000
B15		117.7		3.0	3.0	3.0	25	17.3	19.5	90.0	5.4	5.2	39.8	337.4	560.7	5.8	6.5	5.77	1.060	1.055	18.252	4.89	1650	0.79	20							Yes	15.11	5097	3.09	9.8E-13	1 in 1000000
B16		119.0		3.0	3.0	3.0	25	63.4	42.3	90.0	5.4	5.2	17.9	2681.8	3268.0	21.1	14.1	14.10	0.800	0.800	50.744	3.63	9722	1.01	20							Yes	99.66	267280	27.49	3.0E-165	1 in 1000000
B17		119.7		3.0	3.0	3.0	25	16.1	31.1	90.0	5.5	5.7	37.0	500.7	794.9	5.4	10.4	5.37	1.318	1.243	20.016	4.75	2379	0.77	20							Yes	15.68	7851	3.30	4.7E-14	1 in 1000000
B18	Tailgate Loading	119.9	22.0	3.0	3.0	3.0	25	16.7	31.1	90.0	5.6	5.7	36.7	519.4	820.6	5.6	10.4	5.57	1.301	1.253	20.920	4.74	2460	0.78	20	A	T		1803		8.21	Yes	16.10	8364	1.96	1.1E-05	1 in 118738
B19	Maingate Loading	120.0	45.0	3.0	3.0	3.0	25	17.5	31.3	90.0	5.6	5.7	35.9	547.8	854.7	5.8	10.4	5.83	1.283	1.265	22.140	4.68	2564	0.80	20	A	M		1723		7.83	Yes	16.71	9154	2.14	9.0E-07	1 in 1000000
B20	Maingate Loading	119.5	45.0	3.0	3.0	3.0	25	17.5	31.4	90.0	5.6	4.9	34.5	549.5	838.5	5.8	10.5	5.83	1.284	1.267	22.164	4.56	2505	0.80	20	A	M		1683		7.62	Yes	16.72	9188	2.19	3.9E-07	1 in 1000000
B21		119.3		3.0	3.0	3.0	25	16.8	31.1	90.0	5.8	4.9	35.8	522.5	813.6	5.6	10.4	5.60	1.299	1.254	21.069	4.64	2427	0.79	20							Yes	16.18	8452	3.48	3.4E-15	1 in 1000000
B22		119.2		3.0	3.0	3.0	25	16.0	30.9	90.0	5.5	0.9	27.7	494.4	683.7	5.3	10.3	5.33	1.318	1.239	19.829	4.12	2037	0.77	20							Yes	15.60	7711	3.78	4.4E-17	1 in 1000000
B23		119.1		3.0	3.0	3.0	25	13.2	15.0	90.0	5.7	5.6	49.1	198.0	389.3	4.4	5.0	4.40	1.064	1.029	13.587	5.85	1159	0.71	20							No	12.93	2560	2.21	3.2E-07	1 in 1000000
B24		118.2		3.0	3.0	3.0	25	12.9	10.3	90.0	5.7	5.4	54.5	132.9	292.0	4.3	3.4	3.43	0.888	0.950	12.252	6.49	863	0.70	20							No	12.27	1630	1.89	3.1E-05	1 in 37682
B25		117.5		3.0	3.0	3.0	25	13.8	10.1	90.0	6.1	5.4	54.8	139.4	308.5	4.6	3.4	3.37	0.845	0.914	12.616	6.50	906	0.74	20							No	12.45	1735	1.92	2.1E-05	1 in 56745
B26		116.8		3.0	3.0	3.0	25	13.6	9.9	90.0	6.6	5.4	56.4	134.6	309.1	4.5	3.3	3.30	0.843	0.916	12.460	6.70	902	0.74	20							No	12.37	1666	1.85	5.8E-05	1 in 19665
B27		116.0		3.0	3.0	3.0	25	14.0	9.6	90.0	6.1	5.4	55.4	134.4	301.5	4.7	3.2	3.20	0.814	0.892	12.484	6.51	874	0.74	20							No	12.38	1664	1.90	2.5E-05	1 in 47349
B28		115.2		3.0	3.0	3.0	25	13.8	10.0	90.0	5.6	5.4	53.8	138.0	298.8	4.6	3.3	3.33	0.840	0.911	12.577	6.23	860	0.73	20							No	12.43	1715	1.99	6.9E-06	1 in 197155
B29		114.5		3.0	3.0	3.0	25	13.6	13.4	90.0	5.6	5.3	49.2	182.2	359.0	4.5	4.5	4.47	0.993	0.996	13.548	5.64	1028	0.73	20							No	12.91	2353	2.29	9.8E-08	1 in 1000000
B30		115.3		3.0	3.0	3.0	25	13.9	13.6	90.0	6.1	5.3	50.0	189.0	378.0	4.6	4.5	4.53	0.989	0.994	13.817	5.76	1090	0.74	20							No	13.04	2465	2.26	1.4E-07	1 in 1000000
B31		116.0		3.0	3.0	3.0	25	12.8	14.0	90.0	6.6	5.3	52.1	179.2	374.4	4.3	4.7	4.27	1.045	1.019	13.039	6.06	1086	0.73	20							No	12.66	2269	2.09	1.7E-06	1 in 966596
B32		116.7		3.0	3.0	3.0	25	14.0	14.1	90.0	6.1	5.3	49.4	197.4	389.9	4.7	4.7	4.67	1.004	1.002	14.028	5.76	1138	0.74	20							No	13.14	2594	2.28	1.1E-07	1 in 1000000
B33		117.4		3.0	3.0	3.0	25	12.9	14.0	90.0	5.7	5.3	49.7	180.6	359.0	4.3	4.7	4.30	1.041	1.018	13.126	5.83	1054	0.71	20							No	12.70	2294	2.18	4.9E-07	1 in 1000000
B34		118.3		3.0	3.0	3.0	25	15.6	30.9	90.0	5.5	5.0	36.4	482.0	757.5	5.2	10.3	5.20	1.329	1.232	19.218	4.65	2240	0.76	20							Yes	15.32	7387	3.30	4.9E-14	1 in 1000000
B35		118.0		3.0	3.0	3.0	25	16.9	30.2	90.0	5.8	5.0	36.1	510.4	799.0	5.6	10.1	5.63	1.282	1.244	21.023	4.62	2357	0.79	20							Yes	16.17	8255	3.50	2.6E-15	1 in 1000000
B36	Maingate Loading	118.1	45.0	3.0	3.0	3.0	25	17.3	29.9	90.0	5.6	5.0	35.3	517.3	799.2	5.8	10.0	5.77	1.267	1.244	21.519	4.56	2360	0.80	20	A	M		1591		7.64	Yes	16.43	8501	2.15	7.1E-07	1 in 1000000
B37	Maingate Loading	117.3	45.0	3.0	3.0	3.0	25	17.3	30.6	90.0	5.7	4.5	34.4	529.4	807.3	5.8	10.2	5.77	1.278	1.254	21.686	4.47	2367	0.80	20	A	M		1597		7.49	Yes	16.50	8734	2.20	3.4E-07	1 in 1000000
B38		117.2		3.0	3.0	3.0	25	17.0	30.6	90.0	5.8	4.5	35.0	520.2	800.3	5.7	10.2	5.67	1.286	1.250	21.255	4.51	2345	0.80	20							Yes	16.28	8469	3.61	5.4E-16	1 in 1000000
B39		115.9		3.0	3.0	3.0	25	12.8	11.2	90.0	5.7	4.9	51.9	143.4	297.9	4.3	3.7	3.73	0.933	0.971	12.433	6.02	863	0.71	20							No	12.36	1772	2.05	3.0E-06	1 in 520247
B40		113.8		3.0	3.0	3.0	25	13.2	11.6	90.0	6.1	4.9	51.9	153.1	318.5	4.4	3.9	3.87	0.935	0.969	12.796	5.92	906	0.73	20							No	12.54	1920	2.12	1.1E-06	1 in 1000000
B41	Double Goaf Loading	121.0	45.0	3.0	3.0	3.0	25	17.0	37.8	90.0	5.4	5.0	33.0	642.6	958.7	5.7	12.6	5.67	1.380	1.331	22.629	4.51	2900	0.78	20	A	G		4338		11.26	Yes	16.81	10801	1.49	5.2E-03	1 in 170
B42	Double Goaf Loading	122.0	45.0	3.0	3.0	3.0	25	18.1	30.0	90.0	5.3	4.8	33.3	543.0	814.3	6.0	10.0	6.03	1.247	1.247	22.578	4.57	2484	0.80	20	A	G		3566		11.14	Yes	17.01	9238	1.53	3.5E-03	1 in 258
B43	Double Goaf Loading	123.0	45.0	3.0	3.0	3.0	25	17.9	35.2	90.0	5.8	4.6	33.2	630.1	943.3	6.0	11.7	5.97	1.326	1.322	23.658	4.60	2901	0.80	20	A	G		4123		11.15	Yes	17.37	10948	1.56	2.4E-03	1 in 381
B44	Maingate Loading	124.0	22.0	3.0	3.0	3.0	25	18.3	31.3	90.0	5.8	4.6	33.8	572.8	865.2	6.1	10.4	6.10	1.262	1.262	23.096	4.68	2682	0.81	20	A	M		1128		6.65	Yes	17.26	9887	2.60	1.2E-09	1 in 1000000
~~B45~~	~~Tailgate Loading~~	~~125.0~~	~~45.0~~	~~3.0~~	~~3.0~~	~~3.0~~	~~25~~	~~17.1~~	~~16.6~~	~~90.0~~	~~5.0~~	~~11.5~~	~~54.3~~	~~283.9~~	~~621.0~~	~~5.7~~	~~5.5~~	~~5.53~~	~~0.985~~	~~0.987~~	~~16.871~~	~~6.84~~	~~1941~~	~~0.77~~	~~20~~	~~A~~	~~T~~		~~2528~~		~~15.74~~	~~Yes~~	~~14.49~~	~~4112~~		~~4.0E+00~~	~~#NUM!~~
B46	Tailgate Loading	128.0	22.0	3.0	3.0	3.0	25	21.6	15.8	90.0	10.0	5.4	49.1	341.3	669.9	7.2	5.3	5.27	0.845	0.845	18.250	6.28	2144	0.91	20	A	T		1119		9.56	Yes	16.36	5584	1.71	4.0E-04	1 in 2845
B47	Tailgate Loading	127.7	45.0	3.0	3.0	3.0	25	20.6	15.8	90.0	8.9	5.5	48.2	325.5	628.4	6.9	5.3	5.27	0.868	0.868	17.884	6.16	2006	0.88	20	A	T		1971		12.22	Yes	15.82	5149	1.29	4.9E-02	1 in 20
~~B48~~	~~Maingate Loading~~	~~126.0~~	~~45.0~~	~~3.0~~	~~3.0~~	~~3.0~~	~~25~~	~~9.2~~	~~12.3~~	~~90.0~~	~~11.0~~	~~6.0~~	~~69.4~~	~~113.2~~	~~369.7~~	~~3.1~~	~~4.1~~	~~3.07~~	~~1.144~~	~~1.003~~	~~9.228~~	~~10.29~~	~~1164~~	~~0.73~~	~~20~~	~~A~~	~~M~~		~~941~~		~~18.61~~	~~No~~	~~10.61~~	~~1201~~		~~4.0E+00~~	~~#NUM!~~
~~B49~~	~~Rotated Panel / Double Goaf~~	~~125.0~~	~~22.0~~	~~3.0~~	~~3.0~~	~~3.0~~	~~25~~	~~13.0~~	~~8.2~~	~~90.0~~	~~5.0~~	~~6.1~~	~~58.6~~	~~106.6~~	~~257.4~~	~~4.3~~	~~2.7~~	~~2.73~~	~~0.774~~	~~0.892~~	~~11.598~~	~~7.55~~	~~804~~	~~0.68~~	~~20~~	~~A~~	~~M~~		~~368~~		~~11.00~~	~~No~~	~~11.93~~	~~1271~~		~~4.0E+00~~	~~#NUM!~~
B50	~~Maingate Loading~~ / Double Goaf	123.0	45.0	3.0	3.0	3.0	25	24.8	15.2	90.0	5.0	5.9	40.0	377.0	628.8	8.3	5.1	5.07	0.760	0.760	18.848	5.13	1933	0.89	20	A	G		2186		10.93	Yes	18.16	6847	1.66	8.2E-04	1 in 1453
B51	Rotated Panel / Double Goaf	123.5	45.0	3.0	3.0	3.0	25	15.0	26.8	90.0	5.7	5.5	39.9	402.0	668.6	5.0	8.9	5.00	1.282	1.180	17.704	5.14	2064	0.74	20	A	G		3365		13.50	Yes	14.80	5949	1.10	3.1E-01	1 in 4
B52	Rotated Panel / Double Goaf	124.0	45.0	3.0	3.0	3.0	25	15.0	26.8	90.0	5.7	5.5	39.9	402.0	668.6	5.0	8.9	5.00	1.282	1.180	17.704	5.16	2073	0.74	20	A	G		3383		13.57	Yes	14.80	5949	1.09	3.2E-01	1 in 4
B53	Rotated Panel / Double Goaf	124.6	45.0	3.0	3.0	3.0	25	15.0	26.8	90.0	5.7	6.0	40.8	402.0	679.0	5.0	8.9	5.00	1.282	1.180	17.704	5.26	2115	0.74	20	A	G		3457		13.86	Yes	14.80	5949	1.07	3.6E-01	1 in 3
B54	Rotated Panel / Double Goaf	124.8	45.0	3.0	3.0	3.0	25	15.0	26.8	90.0	5.7	5.8	40.4	402.0	674.8	5.0	8.9	5.00	1.282	1.180	17.704	5.24	2105	0.74	20	A	G		3443		13.80	Yes	14.80	5949	1.07	3.5E-01	1 in 3
B55	Rotated Panel / Maingate Load	125.0	45.0	3.0	3.0	3.0	25	15.0	26.8	90.0	5.7	5.8	40.4	402.0	674.8	5.0	8.9	5.00	1.282	1.180	17.704	5.25	2109	0.74	20	A	M		1490		8.95	Yes	14.80	5949	1.65	9.3E-04	1 in 1292
B56	Double Goaf Loading	123.0	45.0	3.0	3.0	3.0	25	24.2	15.4	90.0	5.0	5.4	38.6	372.7	607.4	8.1	5.1	5.13	0.778	0.778	18.822	5.01	1868	0.88	20	A	G		2155		10.79	Yes	17.83	6645	1.65	9.5E-04	1 in 1271
B57	Double Goaf Loading	122.0	45.0	3.0	3.0	3.0	25	25.5	22.0	90.0	5.0	5.2	32.4	561.0	829.6	8.5	7.3	7.33	0.926	0.926	23.621	4.51	2530	0.90	20	A	G		2787		9.48	Yes	20.82	11679	2.20	3.8E-07	1 in 1000000
B58	Tailgate Loading	121.0	45.0	3.0	3.0	3.0	25	24.5	16.6	90.0	5.3	5.8	39.1	406.7	667.5	8.2	5.5	5.53	0.808	0.808	19.791	4.96	2019	0.89	20	A	T		1930		9.71	Yes	18.46	7506	1.90	2.6E-05	1 in 45320
B59	Rotated Panel / Double Goaf	121.5	45.0	3.0	3.0	3.0	25	16.8	26.6	90.0	5.8	5.4	38.2	446.9	723.2	5.6	8.9	5.60	1.226	1.193	20.042	4.92	2197	0.78	20	A	G		3261		12.21	Yes	15.77	7047	1.29	5.1E-02	1 in 19
B60	Rotated Panel / Double Goaf	122.0	45.0	3.0	3.0	3.0	25	16.8	26.6	90.0	5.8	5.4	38.2	446.9	723.2	5.6	8.9	5.60	1.226	1.193	20.042	4.94	2206	0.78	20	A	G		3279		12.27	Yes	15.77	7047	1.28	5.5E-02	1 in 18
B61	Rotated Panel / Double Goaf	123.0	45.0	3.0	3.0	3.0	25	16.8	26.6	90.0	5.8	6.2	39.7	446.9	741.3	5.6	8.9	5.60	1.226	1.193	20.042	5.10	2279	0.78	20	A	G		3398		12.70	Yes	15.77	7047	1.24	9.0E-02	1 in 12
B62	Rotated Panel / Double Goaf	123.5	45.0	3.0	3.0	3.0	25	16.8	26.6	90.0	5.8	6.0	39.3	446.9	736.8	5.6	8.9	5.60	1.226	1.193	20.042	5.09	2275	0.78	20	A	G		3396		12.69	Yes	15.77	7047	1.24	8.9E-02	1 in 12
B63	Rotated Panel / Double Goaf	124.0	45.0	3.0	3.0	3.0	25	16.8	26.6	90.0	5.8	6.3	39.9	446.9	743.5	5.6	8.9	5.60	1.226	1.193	20.042	5.16	2305	0.78	20	A	G		3446		12.87	Yes	15.77	7047	1.23	1.1E-01	1 in 10
B64	Rotated Panel / Double Goaf	125.5	45.0	3.0	3.0	3.0	25	16.8	26.0	90.0	5.8	6.1	39.8	436.8	725.5	5.6	8.7	5.60	1.215	1.184	19.888	5.21	2276	0.78	20	A	G		3416		13.03	Yes	15.71	6861	1.21	1.2E-01	1 in 9
B65	Double Goaf Loading	120.0	45.0	3.0	3.0	3.0	25	19.8	15.5	90.0	7.5	6.1	48.0	306.9	589.7	6.6	5.2	5.17	0.878	0.878	17.388	5.76	1769	0.86	20	A	G		2165		12.82	Yes	15.33	4706	1.20	1.4E-01	1 in 8

Table A.4: Pillar Stability Analysis

Run 4: Increase Run 2 Working Section Height to 3.0 m

Project: Lake Macquarie Private Hospital Northern Expansion
Location: O'Brien Street, Gateshead
Analysis Assumptions: NSW Pillar formula
Project Number 16471.21

Client: Akalan Projects
Date: 18/10/16
Sheet: 4
Calculations by JAW

Key to Colour Coding of Factors of Safety / Width: Height Ratios

4.50	Greater than 3.0
2.40	Between 2.2 and 3.0
2.10	Between 1.8 and 2.2
1.70	Between 1.5 and 1.8
1.20	Less than 1.5

Indicating Pillar Located within Project Angle of Draw
Indicating Pillar Located beneath site

Analysis Id:	Comment	Depth D (m)	Panel Width/Span (Longwall only) (m)	Seam Thickness (m)	Working Section H (m)	Pillar Height Section H (m)	Unit Weigth γ (kN/m³)	Pillar Details Width w1 (m)	Length w2 (m)	Internal Angle (°)	adway Dete b1 (m)	b2 (m)	Extract. Ratio (%)	Pillar Area m³	Total Area m³	w1/ Height Ratio w1/H	w2/H Height Ratio w2/H	Width/ Height Ratio	Width Modifier Θ0	Θ	wΘ Effective Width	Pillar Stress (Tributary) (MPa)	Pillar Load (Tributary) MN	Proportion Abutment transfer R	Abutment Angle °	Abut (A) Yield (Y) (?)	Abutment Loading Type M,T,G	Shed Load MN	Abutment Load Received MN	Pillar Stress (MPa) ("Yield") ϕ_s= 0.7	Pillar Stress ("Abut") (MPa)	Squat	Power Law Strength (MPa)	Power Law "Ultimate" Load MN	Power Law FoS	Power Law Probability of Failure	Probability of Failure NSW Power Formulae
B66	Double Goaf Loading	119.5	45.0	3.0	3.0	3.0	25	24.7	16.2	90.0	5.5	5.0	37.5	400.1	640.2	8.2	5.4	5.40	0.792	0.792	19.567	4.78	1913	0.90	20	A	G		2113		10.06	Yes	18.46	7386	1.83	6.8E-05	1 in 16681
B67	Tailgate Loading	119.0	45.0	3.0	3.0	3.0	25	24.7	16.2	90.0	5.5	5.2	38.1	400.1	646.3	8.2	5.4	5.40	0.792	0.792	19.567	4.81	1923	0.90	20	A	T		1803		9.31	Yes	18.46	7386	1.98	8.1E-06	1 in 164699
B68	Rotated Panel / Double Goaf	120.0	45.0	3.0	3.0	3.0	25	16.0	27.0	90.0	5.2	5.8	37.9	432.0	695.4	5.3	9.0	5.33	1.256	1.194	19.101	4.83	2086	0.76	20	A	G		3287		12.44	Yes	15.30	6610	1.23	1.0E-01	1 in 11
B69	Rotated Panel / Double Goaf	120.0	45.0	3.0	3.0	3.0	25	16.0	27.0	90.0	5.2	5.8	37.9	432.0	695.4	5.3	9.0	5.33	1.256	1.194	19.101	4.83	2086	0.76	20	A	G		3287		12.44	Yes	15.30	6610	1.23	1.0E-01	1 in 11
B70	Rotated Panel / Double Goaf	120.0	45.0	3.0	3.0	3.0	25	16.0	27.0	90.0	5.2	5.6	37.5	432.0	691.1	5.3	9.0	5.33	1.256	1.194	19.101	4.80	2073	0.76	20	A	G		3267		12.36	Yes	15.30	6610	1.24	9.4E-02	1 in 12
B71	Rotated Panel / Double Goaf	120.0	45.0	3.0	3.0	3.0	25	16.0	27.0	90.0	5.2	5.7	37.7	432.0	693.2	5.3	9.0	5.33	1.256	1.194	19.101	4.81	2080	0.76	20	A	G		3277		12.40	Yes	15.30	6610	1.23	9.8E-02	1 in 11
B72	Rotated Panel / Double Goaf	120.0	45.0	3.0	3.0	3.0	25	16.0	27.0	90.0	5.2	5.7	37.7	432.0	693.2	5.3	9.0	5.33	1.256	1.194	19.101	4.81	2080	0.76	20	A	G		3277		12.40	Yes	15.30	6610	1.23	9.8E-02	1 in 11
B73	Rotated Panel / Double Goaf	120.0	45.0	3.0	3.0	3.0	25	16.0	27.0	90.0	5.2	5.9	38.1	432.0	697.5	5.3	9.0	5.33	1.256	1.194	19.101	4.84	2092	0.76	20	A	G		3297		12.48	Yes	15.30	6610	1.23	1.1E-01	1 in 10
B74	Double Goaf Loading	118.2	45.0	3.0	3.0	3.0	25	25.3	15.5	90.0	5.5	5.3	38.8	392.2	640.6	8.4	5.2	5.17	0.760	0.760	19.223	4.83	1893	0.91	20	A	G		2043		10.04	Yes	18.63	7305	1.86	5.0E-05	1 in 22922
B75	Double Goaf Loading	118.0	45.0	3.0	3.0	3.0	25	25.1	15.5	90.0	5.5	5.8	40.3	389.1	651.8	8.4	5.2	5.17	0.764	0.764	19.165	4.94	1923	0.91	20	A	G		2087		10.31	Yes	18.49	7192	1.79	1.2E-04	1 in 9113
B76	Maingate Loading	117.0	45.0	3.0	3.0	3.0	25	26.4	15.6	90.0	5.5	5.3	38.2	411.8	666.7	8.8	5.2	5.20	0.743	0.743	19.611	4.74	1950	0.92	20	A	M		1090		7.38	Yes	19.47	8020	2.64	6.5E-10	1 in 1000000
B77	Rotated panel / Maingate Loading	118.0	45.0	3.0	3.0	3.0	25	15.4	27.7	90.0	5.7	5.3	38.7	426.6	696.3	5.1	9.2	5.13	1.285	1.195	18.410	4.82	2054	0.76	20	A	M		1440		8.19	Yes	14.99	6392	1.83	7.3E-05	1 in 15475
B78	Rotated panel / Maingate Loading	119.0	45.0	3.0	3.0	3.0	25	15.3	27.3	90.0	5.6	5.3	38.7	417.7	681.3	5.1	9.1	5.10	1.282	1.190	18.203	4.85	2027	0.75	20	A	M		1423		8.26	Yes	14.90	6222	1.80	1.1E-04	1 in 10545
B79	Rotated panel / Maingate Loading	120.0	45.0	3.0	3.0	3.0	25	15.5	27.3	90.0	5.4	5.3	37.9	423.2	681.3	5.2	9.1	5.17	1.276	1.192	18.480	4.83	2044	0.75	20	A	M		1428		8.20	Yes	15.02	6355	1.83	7.3E-05	1 in 15669
B80	Rotated panel / Maingate Loading	121.0	45.0	3.0	3.0	3.0	25	15.5	27.3	90.0	5.7	5.3	38.8	423.2	691.1	5.2	9.1	5.17	1.276	1.192	18.480	4.94	2091	0.76	20	A	M		1463		8.40	Yes	15.02	6355	1.79	1.3E-04	1 in 8450
B81	Rotated panel / Maingate Loading	122.0	45.0	3.0	3.0	3.0	25	15.5	27.3	90.0	5.6	5.3	38.5	423.2	687.9	5.2	9.1	5.17	1.276	1.192	18.480	4.96	2098	0.75	20	A	M		1467		8.42	Yes	15.02	6355	1.78	1.4E-04	1 in 7767
B82	Rotated panel / Maingate Loading	123.0	45.0	3.0	3.0	3.0	25	15.5	27.3	90.0	5.6	5.3	38.5	423.2	687.9	5.2	9.1	5.17	1.276	1.192	18.480	5.00	2115	0.75	20	A	M		1479		8.49	Yes	15.02	6355	1.77	1.8E-04	1 in 6309
B83		113.0		3.0	3.0	3.0	25	13.6	9.9	90.0	5.4	6.2	56.0	134.6	305.9	4.5	3.3	3.30	0.843	0.916	12.460	6.42	864	0.72	21	A	M		89		7.08	No	12.37	1666	1.75	2.4E-04	1 in 4733
B84		113.5		3.0	3.0	3.0	25	14.0	9.6	90.0	5.6	6.2	56.6	134.4	309.7	4.7	3.2	3.20	0.814	0.892	12.484	6.54	879	0.74	22	A	M		92		7.23	No	12.38	1664	1.71	3.9E-04	1 in 2941
B85		113.8		3.0	3.0	3.0	25	13.8	10.0	90.0	5.4	5.3	53.0	138.0	293.8	4.6	3.3	3.33	0.840	0.911	12.577	6.06	836	0.73	23	A	M		85		6.67	No	12.43	1715	1.86	4.6E-05	1 in 25244

Table A.5: Pillar Stability Analysis

Run 5: Decrease Run 2 Pillars by 1 m and increase working section to 3.0 m

Project: Lake Macquarie Private Hospital Northern Expansion
Location: O'Brien Street, Gateshead
Analysis Assumptions: NSW Pillar formula
Project Number 16471.21

Client: Akalan Projects
Date: 18/10/16
Sheet: 5
Calculations by JAW

Key to Colour Coding of Factors of Safety / Width: Height Ratios

4.50	Greater than 3.0
2.40	Between 2.2 and 3.0
2.10	Between 1.8 and 2.2
1.70	Between 1.5 and 1.8
1.20	Less than 1.5

Indicating Pillar Located within Project Angle of Draw
Indicating Pillar Located beneath site

Analysis Id:	Comment	Depth D (m)	Panel Width/Span (Longwall only) (m)	Seam Thickness (m)	Working Section H (m)	Pillar Height Section H (m)	Unit Weigth γ (kN/m³)	Pillar Details Width w1 (m)	Length w2 (m)	Internal Angle (°)	Roadway Details b1 (m)	b2 (m)	Extract. Ratio (%)	Pillar Area m³	Total Area m³	w1/ Height Ratio w1/H	w2/H Height Ratio w2/H	Width/ Height Ratio	Width Modifier Θ0	Θ	wΘ Effective Width	Pillar Stress (Tributary) (MPa)	Pillar Load (Tributary) MN	Proportion Abutment transfer R	Abutment Angle °	Abut (A) Yield (Y) (?)	Abutment Loading Type M,T,G	Shed Load MN	Abutment Load Received MN	Pillar Stress (MPa) ("Yield") ϕ_p= 0.7	Pillar Stress ("Abut") (MPa)	Squat	Power Law Strength (MPa)	Power Law "Ultimate" Load MN	FoS	Probability of Failure	Probability of Failure NSW Power Formulae
A1		127.7		3.0	3.0	3.0	25	17.6	30.0	90.0	5.9	6.2	37.9	528.0	850.7	5.9	10.0	5.87	1.261	1.248	21.958	5.14	2716	0.79	20							Yes	16.66	8798	3.24	1.1E-13	1 in 1000000
A2		126.7		3.0	3.0	3.0	25	16.4	30.5	90.0	6.2	6.1	39.5	500.2	827.2	5.5	10.2	5.47	1.301	1.241	20.357	5.24	2619	0.77	20							Yes	15.84	7926	3.03	2.4E-12	1 in 1000000
A3		126.7		3.0	3.0	3.0	25	18.1	30.4	90.0	6.3	6.4	38.7	550.2	897.9	6.0	10.1	6.03	1.254	1.254	22.690	5.17	2843	0.81	20							Yes	17.06	9385	3.30	4.7E-14	1 in 1000000
A4	Tailgate Loading	124.6	22.0	3.0	3.0	3.0	25	15.8	30.4	90.0	6.4	6.1	40.7	480.3	810.3	5.3	10.1	5.27	1.316	1.231	19.443	5.25	2523	0.77	20	A	T		1868		9.14	Yes	15.43	7410	1.69	5.7E-04	1 in 2045
A5		124.1		3.0	3.0	3.0	25	15.5	30.1	90.0	6.4	6.2	41.3	466.6	795.0	5.2	10.0	5.17	1.320	1.222	18.943	5.29	2466	0.77	20							Yes	15.21	7096	2.88	2.1E-11	1 in 1000000
A6		123.6		3.0	3.0	3.0	25	16.7	25.9	90.0	5.8	6.3	40.3	432.5	724.5	5.6	8.6	5.57	1.216	1.182	19.741	5.17	2238	0.78	20							Yes	15.63	6763	3.02	2.6E-12	1 in 1000000
A7		123.1		3.0	3.0	3.0	25	16.2	25.5	90.0	6.2	6.4	42.2	413.1	714.6	5.4	8.5	5.40	1.223	1.175	19.031	5.32	2199	0.78	20							Yes	15.29	6316	2.87	2.2E-11	1 in 1000000
A8		122.7		3.0	3.0	3.0	25	15.7	25.5	90.0	6.4	6.8	43.9	400.4	713.8	5.2	8.5	5.23	1.238	1.172	18.403	5.47	2189	0.77	20							Yes	14.99	6003	2.74	1.5E-10	1 in 1000000
A9		121.4		3.0	3.0	3.0	25	16.0	26.6	90.0	6.0	6.3	41.2	425.6	723.8	5.3	8.9	5.33	1.249	1.189	19.019	5.16	2196	0.77	20							Yes	15.27	6498	2.96	6.4E-12	1 in 1000000
A10		123.9		3.0	3.0	3.0	25	16.3	16.4	90.0	6.3	5.9	47.0	267.3	504.0	5.4	5.5	5.43	1.003	1.002	16.340	5.84	1561	0.78	20							Yes	14.16	3784	2.42	1.4E-08	1 in 1000000
A11		124.2		3.0	3.0	3.0	25	16.0	16.3	90.0	6.3	6.0	47.6	260.8	497.3	5.3	5.4	5.33	1.009	1.007	16.115	5.92	1544	0.77	20							Yes	14.03	3659	2.37	3.1E-08	1 in 1000000
A12		123.2		3.0	3.0	3.0	25	15.7	16.1	90.0	6.1	6.2	48.0	252.8	486.1	5.2	5.4	5.23	1.013	1.009	15.847	5.93	1498	0.76	20							Yes	13.89	3512	2.34	4.4E-08	1 in 1000000
A13		123.0		3.0	3.0	3.0	25	16.0	16.0	90.0	6.3	6.1	48.1	256.0	492.8	5.3	5.3	5.33	1.000	1.000	16.000	5.92	1515	0.78	20							Yes	13.98	3579	2.36	3.5E-08	1 in 1000000
A14		121.9		3.0	3.0	3.0	25	16.0	16.1	90.0	6.5	6.7	49.8	257.6	513.0	5.3	5.4	5.33	1.003	1.002	16.039	6.07	1563	0.78	20							Yes	14.00	3606	2.31	7.7E-08	1 in 1000000
A15		128.8		3.0	3.0	3.0	25	23.5	37.0	90.0	5.2	6.1	29.7	869.5	1237.0	7.8	12.3	7.83	1.223	1.223	28.744	4.58	3984	0.87	20							Yes	21.69	18859	4.73	5.2E-23	1 in 1000000
A16		128.9		3.0	3.0	3.0	25	17.6	30.5	90.0	6.4	6.3	39.2	536.8	883.2	5.9	10.2	5.87	1.268	1.255	22.086	5.30	2846	0.80	20							Yes	16.71	8971	3.15	4.0E-13	1 in 1000000
A17		128.8		3.0	3.0	3.0	25	19.0	30.7	90.0	6.3	6.9	38.7	583.3	951.3	6.3	10.2	6.33	1.235	1.235	23.473	5.25	3064	0.82	20							Yes	17.60	10268	3.35	2.3E-14	1 in 1000000
A18		127.3		3.0	3.0	3.0	25	18.1	30.7	90.0	6.2	6.4	38.4	555.7	901.5	6.0	10.2	6.03	1.258	1.258	22.773	5.16	2869	0.80	20							Yes	17.09	9495	3.31	4.1E-14	1 in 1000000
A19		125.9		3.0	3.0	3.0	25	16.0	30.5	90.0	6.2	6.5	40.6	488.0	821.4	5.3	10.2	5.33	1.312	1.235	19.761	5.30	2585	0.77	20							Yes	15.57	7598	2.94	8.6E-12	1 in 1000000
A20		125.1		3.0	3.0	3.0	25	15.3	30.5	90.0	6.3	6.4	41.5	466.7	797.0	5.1	10.2	5.10	1.332	1.222	18.699	5.34	2493	0.76	20							Yes	15.10	7048	2.83	4.3E-11	1 in 1000000
A21		124.4		3.0	3.0	3.0	25	16.2	15.0	90.0	6.3	6.0	48.6	243.0	472.5	5.4	5.0	5.00	0.962	0.969	15.700	6.05	1469	0.78	20							Yes	13.86	3368	2.29	9.5E-08	1 in 1000000
A22		123.9		3.0	3.0	3.0	25	16.2	15.4	90.0	6.2	6.0	48.0	249.5	479.4	5.4	5.1	5.13	0.975	0.980	15.871	5.95	1485	0.78	20							Yes	13.94	3477	2.34	4.7E-08	1 in 1000000
A23		123.6		3.0	3.0	3.0	25	16.4	15.4	90.0	5.8	6.3	47.6	252.6	481.7	5.5	5.1	5.13	0.969	0.974	15.975	5.89	1489	0.77	20							Yes	14.00	3536	2.38	2.8E-08	1 in 1000000
A24		123.0		3.0	3.0	3.0	25	16.4	15.4	90.0	6.3	6.2	48.5	252.6	490.3	5.5	5.1	5.13	0.969	0.974	15.975	5.97	1508	0.78	20							Yes	14.00	3536	2.35	4.4E-08	1 in 1000000
A25		121.9		3.0	3.0	3.0	25	16.4	15.4	90.0	6.3	6.3	48.7	252.6	492.6	5.5	5.1	5.13	0.969	0.974	15.975	5.94	1501	0.78	20							Yes	14.00	3536	2.36	3.8E-08	1 in 1000000
A26	Tailgate Loading	129.9	22.0	3.0	3.0	3.0	25	19.5	22.8	90.0	6.4	7.2	42.8	444.6	777.0	6.5	7.6	6.50	1.078	1.078	21.021	5.68	2523	0.83	20	A	T		1610		9.30	Yes	16.79	7466	1.81	1.0E-04	1 in 10976
A27	Tailgate Loading	130.2	22.0	3.0	3.0	3.0	25	21.5	39.1	90.0	6.6	7.2	35.4	840.7	1301.0	7.2	13.0	7.17	1.290	1.290	27.744	5.04	4236	0.86	20	A	T		2492		8.00	Yes	20.21	16988	2.52	3.3E-09	1 in 1000000
A28		128.8		3.0	3.0	3.0	25	22.4	24.8	90.0	6.4	6.3	38.0	555.5	895.7	7.5	8.3	7.47	1.051	1.051	23.539	5.19	2884	0.87	20							Yes	19.01	10561	3.66	2.6E-16	1 in 1000000
A29		128.2		3.0	3.0	3.0	25	9.2	24.4	90.0	6.5	6.3	53.4	224.5	482.0	3.1	8.1	3.07	1.452	1.008	9.277	6.88	1545	0.61	20							No	10.64	2389	1.55	2.8E-03	1 in 329
A30		127.3		3.0	3.0	3.0	25	12.5	24.7	90.0	6.5	6.3	47.6	308.8	589.0	4.2	8.2	4.17	1.328	1.117	13.958	6.07	1874	0.70	20							No	13.11	4047	2.16	6.4E-07	1 in 1000000
A31		125.3		3.0	3.0	3.0	25	16.4	15.7	90.0	6.4	6.2	48.4	257.5	499.3	5.5	5.2	5.23	0.978	0.982	16.105	6.08	1564	0.78	20							Yes	14.06	3620	2.31	6.9E-08	1 in 1000000
A32		124.5		3.0	3.0	3.0	25	16.8	15.7	90.0	6.4	6.1	47.8	263.8	505.8	5.6	5.2	5.23	0.966	0.971	16.306	5.97	1574	0.79	20							Yes	14.19	3744	2.38	2.7E-08	1 in 1000000
A33		125.9		3.0	3.0	3.0	25	16.3	15.6	90.0	6.6	6.0	48.6	254.3	494.6	5.4	5.2	5.20	0.978	0.982	16.009	6.12	1557	0.78	20							Yes	14.01	3562	2.29	1.0E-07	1 in 1000000
A34		122.8		3.0	3.0	3.0	25	16.3	15.1	90.0	6.5	6.2	49.3	246.1	485.6	5.4	5.0	5.03	0.962	0.969	15.793	6.06	1491	0.79	20							Yes	13.91	3424	2.30	8.8E-08	1 in 1000000
A35		121.9		3.0	3.0	3.0	25	16.3	15.9	90.0	6.3	6.2	48.1	259.2	499.5	5.4	5.3	5.30	0.988	0.990	16.136	5.87	1521	0.78	20							Yes	14.06	3645	2.40	2.1E-08	1 in 1000000
A36		126.5		3.0	3.0	3.0	25	19.0	15.1	90.0	6.4	6.5	47.7	286.9	548.6	6.3	5.0	5.03	0.886	0.886	16.827	6.05	1735	0.82	20							Yes	14.85	4262	2.46	8.9E-09	1 in 1000000
A37		125.1		3.0	3.0	3.0	25	16.8	15.1	90.0	6.2	6.5	48.9	253.7	496.8	5.6	5.0	5.03	0.947	0.954	16.021	6.12	1554	0.78	20							Yes	14.07	3569	2.30	8.8E-08	1 in 1000000
A38		124.0		3.0	3.0	3.0	25	16.6	14.8	90.0	6.1	6.6	49.4	245.7	485.8	5.5	4.9	4.93	0.943	0.951	15.793	6.13	1505	0.78	20							Yes	13.94	3425	2.28	1.2E-07	1 in 1000000
A39		123.6		3.0	3.0	3.0	25	16.6	15.0	90.0	6.3	6.4	49.2	249.0	490.1	5.5	5.0	5.00	0.949	0.957	15.887	6.08	1514	0.79	20							Yes	13.98	3482	2.30	8.5E-08	1 in 1000000
A40		121.8		3.0	3.0	3.0	25	16.6	15.4	90.0	6.3	6.5	49.0	255.6	501.5	5.5	5.1	5.13	0.963	0.968	16.073	5.97	1527	0.79	20							Yes	14.07	3596	2.36	3.8E-08	1 in 1000000
A41	Double Goaf Loading	130.0	45.0	3.0	3.0	3.0	25	27.0	31.6	90.0	6.5	6.7	33.5	853.2	1283.1	9.0	10.5	9.00	1.078	1.078	29.119	4.89	4170	0.92	20	A	G		4270		9.89	Yes	24.28	20720	2.46	9.1E-09	1 in 1000000
A42		127.3		3.0	3.0	3.0	25	20.0	22.9	90.0	6.3	6.1	40.0	458.0	762.7	6.7	7.6	6.67	1.068	1.068	21.352	5.30	2427	0.84	20							Yes	17.10	7830	3.23	1.4E-13	1 in 1000000
A43		126.8		3.0	3.0	3.0	25	15.3	21.1	90.0	6.5	6.7	46.7	322.8	606.0	5.1	7.0	5.10	1.159	1.109	16.968	5.95	1922	0.76	20							Yes	14.37	4640	2.41	1.6E-08	1 in 1000000
A44		125.1		3.0	3.0	3.0	25	16.8	15.4	90.0	6.0	6.6	48.4	258.7	501.6	5.6	5.1	5.13	0.957	0.962	16.165	6.06	1569	0.78	20							Yes	14.13	3656	2.33	5.4E-08	1 in 1000000
A45		124.3		3.0	3.0	3.0	25	16.8	15.4	90.0	6.1	6.5	48.4	258.7	501.5	5.6	5.1	5.13	0.957	0.962	16.165	6.02	1558	0.78	20							Yes	14.13	3656	2.35	4.3E-08	1 in 1000000
A46		124.2		3.0	3.0	3.0	25	16.8	15.4	90.0	6.4	6.4	48.8	258.7	505.8	5.6	5.1	5.13	0.957	0.962	16.165	6.07	1570	0.79	20							Yes	14.13	3656	2.33	5.6E-08	1 in 1000000
A47		122.0		3.0	3.0	3.0	25	16.8	15.7	90.0	6.4	6.3	48.3	263.8	510.4	5.6	5.2	5.23	0.966	0.971	16.306	5.90	1556	0.79	20							Yes	14.19	3744	2.41	1.8E-08	1 in 1000000
A48		128.2		3.0	3.0	3.0	25	17.9	28.1	90.0	7.0	7.0	42.4	503.0	874.0	6.0	9.4	5.97	1.222	1.219	21.821	5.57	2801	0.81	20							Yes	16.67	8386	2.99	3.9E-12	1 in 1000000
A49		126.8		3.0	3.0	3.0	25	32.6	43.0	90.0	6.5	7.0	28.3	1401.8	1955.0	10.9	14.3	10.87	1.138	1.138	37.085	4.42	6199	0.97	20							Yes	33.16	46482	7.50	2.7E-40	1 in 1000000
A50		128.2		3.0	3.0	3.0	25	16.8	42.0	90.0	6.1	7.2	37.4	705.6	1126.7	5.6	14.0	5.60	1.429	1.362	22.885	5.12	3611	0.78	20							Yes	16.87	11906	3.30	4.9E-14	1 in 1000000
A51		125.1		3.0	3.0	3.0	25	12.8	15.6	90.0	7.5	6.2	54.9	199.7	442.5	4.3	5.2	4.27	1.099	1.040	13.318	6.93	1384	0.73	20							No	12.80	2556	1.85	5.8E-05	1 in 19912
A52		126.7		3.0	3.0	3.0	25	32.0	12.8	90.0	7.5	7.0	47.6	409.6	782.1	10.7	4.3	4.27	0.571	0.571	18.286	6.05	2476	0.97	20							Yes	22.65	9277	3.75	7.7E-17	1 in 1000000
A53	Tailgate Loading	130.2	22.0	3.0	3.0	3.0	25	13.7	38.0	90.0	7.5	7.6	46.1	520.6	966.7	4.6	12.7	4.57	1.470	1.223	16.753	6.04	3147	0.74	20	A	T		2454		10.76	No	14.39	7491	1.34	3.0E-02	1 in 31
A54		129.4		3.0	3.0	3.0	25	13.7	42.3	90.0	7.5	7.5	45.1	579.5	1055.8	4.6	14.1	4.57	1.511	1.240	16.994	5.89	3416	0.74	20							No	14.49	8399	2.46	8.6E-09	1 in 1000000
A55		127.3		3.0	3.0	3.0	25	14.8	66.0	90.0	7.4	7.0	39.7	976.8	1620.6	4.9	22.0	4.93	1.634	1.372	20.306	5.28	5158	0.77	20							No	15.87	15503	3.01	3.3E-12	1 in 1000000
A56		124.8		3.0	3.0	3.0	25	12.0	13.5	90.0	7.2	9.8	63.8	162.0	447.4	4.0	4.5	4.00	1.059	1.019	12.231	8.62	1396	0.71	20							No	12.26	1985	1.42	1.1E-02	1 in 76
A57		127.9		3.0	3.0	3.0	25	11.7	39.3	90.0	7.4	7.1	48.1	459.8	886.2	3.9	13.1	3.90	1.541	1.139	13.321	6.16	2834	0.70	20							No	12.80	5886	2.08	2.1E-06	1 in 781330
A58		125.1		3.0	3.0	3.0	25	14.0	32.1	90.0	7.7	7.5	47.7	449.4	859.3	4.7	10.7	4.67	1.393	1.202	16.828	5.98	2688	0.76	20							No	14.42	6481	2.41	1.7E-08	1 in 1000000
A59	Double Goaf Loading	130.3	22.0	3.0	3.0	3.0	25	14.1	25.9	90.0	7.2	6.6	47.2	365.2	692.3	4.7	8.6	4.70	1.295	1.158	16.324	6.17	2255	0.74	20	A	G		2059		11.81	No	14.20	5185	1.20	1.3E-01	1 in 8
A60	Tailgate Loading	129.8	22.0	3.0	3.0	3.0	25	13.6	37.6	90.0	7.2	7.0	44.9	511.4	927.7	4.5	12.5	4.53	1.469	1.217	16.553	5.89	3010	0.73	20	A	T		2391		10.56	No	14.30	7313	1.35	2.5E-02	1 in 36
A61		132.3		3.0	3.0	3.0	25	13.6	42.6	90.0	7.3	7.3	44.4	579.4	1042.9	4.5	14.2	4.53	1.516	1.237	16.823	5.95	3449	0.73	20							No	14.42	8354	2.42	1.5E-08	1 in 1000000
A62		127.3		3.0	3.0	3.0	25	13.6	25.5	90.0	7.4	7.1	49.3	346.8	684.6	4.5	8.5	4.53	1.304	1.145	15.578	6.28	2179	0.74	20							No	13.86	4808	2.21	3.2E-07	1 in 1000000
A63		130.0		3.0	3.0	3.0	25	11.2	51.9	90.0	7.3	6.9	46.6	581.3	1087.8	3.7	17.3	3.73	1.645	1.129	12.649	6.08	3535	0.68	20							No	12.47	7247	2.05	3.1E-06	1 in 495132
A64		127.3		3.0	3.0	3.0	25	11.2	49.8	90.0	7.2	7.3	46.9	557.8	1050.6	3.7	16.6	3.73	1.633	1.127	12.626	5.99	3344	0.68	20							No	12.46	6947	2.08	2.1E-06	1 in 790125
~~A65~~	~~Double Goaf Loading~~	~~125.1~~	~~45.0~~	~~3.0~~	~~3.0~~	~~3.0~~	~~25~~	~~19.7~~	~~23.5~~	~~90.0~~	~~89.9~~	~~6.3~~	~~85.8~~	~~463.0~~	~~3266.1~~	~~6.6~~	~~7.8~~	~~6.57~~	~~1.088~~	~~1.088~~	~~21.433~~	~~22.06~~	~~10215~~	~~1.75~~	~~20~~	~~A~~	~~G~~		~~3158~~		~~28.89~~	~~Yes~~	~~17.03~~	~~7882~~		~~4.0E+00~~	~~#NUM!~~
~~A66~~	~~Maingate Loading~~	~~126.1~~	~~45.0~~	~~3.0~~	~~3.0~~	~~3.0~~	~~25~~	~~14.8~~	~~23.5~~	~~90.0~~	~~73.2~~	~~6.5~~	~~86.8~~	~~347.8~~	~~2640.0~~	~~4.9~~	~~7.8~~	~~4.93~~	~~1.227~~	~~1.141~~	~~16.887~~	~~23.93~~	~~8323~~	~~1.15~~	~~20~~	~~A~~	~~M~~		~~5812~~		~~40.64~~	~~No~~	~~14.45~~	~~5025~~		~~4.0E+00~~	~~#NUM!~~
~~A67~~	~~Maingate Loading~~	~~127.9~~	~~45.0~~	~~3.0~~	~~3.0~~	~~3.0~~	~~25~~	~~15.2~~	~~23.3~~	~~90.0~~	~~38.2~~	~~6.7~~	~~77.9~~	~~354.2~~	~~1602.0~~	~~5.1~~	~~7.8~~	~~5.07~~	~~1.210~~	~~1.141~~	~~17.337~~	~~14.46~~	~~5122~~	~~1.00~~	~~20~~	~~A~~	~~M~~		~~3467~~		~~24.25~~	~~Yes~~	~~14.53~~	~~5146~~		~~4.0E+00~~	~~#NUM!~~
A68	Maingate Loading	122.1	22.0	3.0	3.0	3.0	25	15.0	34.4	90.0	6.3	6.1	40.2	516.0	862.7	5.0	11.5	5.00	1.393	1.247	18.707	5.10	2633	0.76	20	A	M		1196		7.42	Yes	15.22	7854	2.05	3.0E-06	1 in 503218
A69		122.1		3.0	3.0	3.0	25	16.4	18.4	90.0	6.6	7.5	49.3	301.8	595.7	5.5	6.1	5.47	1.057	1.047	17.171	6.03	1818	0.79	20							Yes	14.53	4384	2.41	1.7E-08	1 in 1000000
A70		122.1		3.0	3.0	3.0	25	15.9	18.2	90.0	6.4	7.5	49.5	289.4	573.1	5.3	6.1	5.30	1.067	1.051	16.716	6.05	1749	0.78	20							Yes	14.29	4135	2.36	3.4E-08	1 in 1000000
A71		121.2		3.0	3.0	3.0	25	15.9	18.2	90.0	5.9	7.5	48.3	289.4	560.3	5.3	6.1	5.30	1.067	1.051	16.716	5.87	1698	0.77	20							Yes	14.29	4135	2.44	1.2E-08	1 in 1000000
A72		120.6		3.0	3.0	3.0	25	15.9	18.2	90.0	6.0	7.5	48.6	289.4	562.8	5.3	6.1	5.30	1.067	1.051	16.716	5.86	1697	0.77	20							Yes	14.29	4135	2.44	1.2E-08	1 in 1000000
A73	Maingate Loading	124.2	22.0	3.0	3.0	3.0	25	15.5	30.9	90.0	6.3	5.7	40.0	479.0	797.9	5.2	10.3	5.17	1.332	1.230	19.065	5.17	2477	0.76	20	A	M		1111		7.49	Yes	15.26	7308	2.04	3.7E-06	1 in 396322

Table A.5: Pillar Stability Analysis

Run 5: Decrease Run 2 Pillars by 1 m and increase working section to 3.0 m

Project: Lake Macquarie Private Hospital Northern Expansion
Location: O'Brien Street, Gateshead
Analysis Assumptions: NSW Pillar formula
Project Number 16471.21

Client: Akalan Projects
Date: 18/10/16
Sheet: 5
Calculations by JAW

Key to Colour Coding of Factors of Safety / Width: Height Ratios

4.50	Greater than 3.0
2.40	Between 2.2 and 3.0
2.10	Between 1.8 and 2.2
1.70	Between 1.5 and 1.8
1.20	Less than 1.5

Indicating Pillar Located within Project Angle of Draw
Indicating Pillar Located beneath site

Analysis Id:	Comment	Depth D (m)	Panel Width/Span (Longwall only) (m)	Seam Thickness (m)	Working Section H (m)	Pillar Height Section H (m)	Unit Weigth γ (kN/m³)	Pillar Details Width w1 (m)	Length w2 (m)	Internal Angle (°)	adway Dete b1 (m)	b2 (m)	Extract. Ratio (%)	Pillar Area m³	Total Area m³	w1/ Height Ratio w1/H	w2/H Height Ratio w2/H	Width/ Height Ratio	Width Modifier Θ0	Θ	wΘ Effective Width	Pillar Stress (Tributary) (MPa)	Pillar Load (Tributary) MN	Proportion Abutment transfer R	Abutment Angle °	Abut (A) Yield (Y) (?)	Abutment Loading Type M,T,G	Shed Load MN	Abutment Load Received MN	Pillar Stress (MPa) ("Yield") ϕ_s= 0.7	Pillar Stress ("Abut") (MPa)	Squat	Power Law Strength (MPa)	Power Law "Ultimate" Load MN	FoS	Probability of Failure	Probability of Failure NSW Power Formulae
A74		122.3		3.0	3.0	3.0	25	15.4	16.4	90.0	6.5	6.2	49.0	252.6	494.9	5.1	5.5	5.13	1.031	1.022	15.743	5.99	1513	0.77	20				1025			Yes	13.84	3494	2.31	7.4E-08	1 in 1000000
A75		121.8		3.0	3.0	3.0	25	15.6	15.9	90.0	6.2	6.4	49.0	248.0	486.1	5.2	5.3	5.20	1.010	1.007	15.709	5.97	1480	0.77	20							Yes	13.83	3430	2.32	6.6E-08	1 in 1000000
A76		121.8		3.0	3.0	3.0	25	15.6	16.1	90.0	5.8	6.7	48.5	251.2	487.9	5.2	5.4	5.20	1.016	1.012	15.780	5.92	1486	0.76	20							Yes	13.86	3481	2.34	4.6E-08	1 in 1000000
A77		121.2		3.0	3.0	3.0	25	15.6	16.0	90.0	6.0	6.0	47.5	249.6	475.2	5.2	5.3	5.20	1.013	1.009	15.745	5.77	1440	0.76	20							Yes	13.84	3455	2.40	2.0E-08	1 in 1000000
A78	Maingate Loading	121.8	22.0	3.0	3.0	3.0	25	15.5	28.9	90.0	6.3	5.4	40.1	448.0	747.7	5.2	9.6	5.17	1.302	1.210	18.752	5.08	2277	0.77	20	A	M		1025		7.37	Yes	15.13	6778	2.05	3.0E-06	1 in 519867
A79		121.9		3.0	3.0	3.0	25	15.2	16.6	90.0	7.6	6.3	51.7	252.3	522.1	5.1	5.5	5.07	1.044	1.030	15.658	6.31	1591	0.79	20							Yes	13.79	3480	2.19	4.3E-07	1 in 1000000
A80	~~Tailgate Loading~~ / Double Goaf	125.6	45.0	3.0	3.0	3.0	25	17.5	30.5	90.0	24.2	6.0	64.9	533.8	1522.1	5.8	10.2	5.83	1.271	1.254	21.945	8.95	4779	0.98	20	A	G		3888		16.24	Yes	16.64	8880	1.02	4.5E-01	1 in 2
A81		121.8		3.0	3.0	3.0	25	14.4	16.5	90.0	6.2	6.1	49.0	237.6	465.6	4.8	5.5	4.80	1.068	1.040	14.979	5.97	1418	0.74	20							No	13.59	3229	2.28	1.2E-07	1 in 1000000
B1		121.2		3.0	3.0	3.0	25	16.2	14.9	90.0	6.4	7.7	52.7	241.4	510.8	5.4	5.0	4.97	0.958	0.966	15.656	6.41	1548	0.78	20							Yes	13.84	3341	2.16	6.4E-07	1 in 1000000
B2		120.6		3.0	3.0	3.0	25	15.8	14.9	90.0	6.4	7.7	53.1	235.4	501.7	5.3	5.0	4.97	0.971	0.978	15.449	6.43	1513	0.78	20							Yes	13.72	3230	2.14	9.0E-07	1 in 1000000
B3		120.1		3.0	3.0	3.0	25	15.0	14.4	90.0	6.4	7.7	54.3	216.0	472.9	5.0	4.8	4.80	0.980	0.986	14.795	6.57	1420	0.76	20							Yes	13.50	2917	2.05	2.9E-06	1 in 532475
B4		120.2		3.0	3.0	3.0	25	16.3	14.7	90.0	6.4	6.0	49.0	239.6	469.9	5.4	4.9	4.90	0.948	0.958	15.614	5.89	1412	0.79	20							Yes	13.83	3314	2.35	4.3E-08	1 in 1000000
B5		119.6		3.0	3.0	3.0	25	15.9	14.8	90.0	6.4	6.0	49.3	235.3	463.8	5.3	4.9	4.93	0.964	0.972	15.461	5.89	1387	0.78	20							Yes	13.73	3231	2.33	5.5E-08	1 in 1000000
B6		119.2		3.0	3.0	3.0	25	16.3	15.1	90.0	6.4	6.0	48.6	246.1	479.0	5.4	5.0	5.03	0.962	0.969	15.793	5.80	1427	0.79	20							Yes	13.91	3424	2.40	2.0E-08	1 in 1000000
B7		118.6		3.0	3.0	3.0	25	17.3	23.6	90.0	6.4	6.2	42.2	408.3	706.3	5.8	7.9	5.77	1.154	1.141	19.744	5.13	2094	0.81	20							Yes	15.73	6421	3.07	1.4E-12	1 in 1000000
B8		119.0		3.0	3.0	3.0	25	17.1	23.9	90.0	6.4	6.2	42.2	408.7	707.4	5.7	8.0	5.70	1.166	1.148	19.633	5.15	2104	0.80	20							Yes	15.65	6396	3.04	2.0E-12	1 in 1000000
B9		120.0		3.0	3.0	3.0	25	17.0	23.9	90.0	6.4	6.2	42.3	406.3	704.3	5.7	8.0	5.67	1.169	1.149	19.527	5.20	2113	0.80	20							Yes	15.59	6334	3.00	3.7E-12	1 in 1000000
B10		121.3		3.0	3.0	3.0	25	17.8	23.7	90.0	6.4	6.2	41.7	421.9	723.6	5.9	7.9	5.93	1.142	1.139	20.271	5.20	2194	0.81	20							Yes	16.04	6765	3.08	1.1E-12	1 in 1000000
B11	Maingate Loading	121.8	22.0	3.0	3.0	3.0	25	14.2	39.0	90.0	7.1	5.8	42.0	553.8	954.2	4.7	13.0	4.73	1.466	1.247	17.714	5.25	2906	0.76	20	A	M		1362		7.71	No	14.80	8198	1.92	2.0E-05	1 in 61963
B12		121.0		3.0	3.0	3.0	25	17.6	18.0	90.0	6.4	6.2	45.5	316.8	580.8	5.9	6.0	5.87	1.011	1.011	17.789	5.55	1757	0.81	20							Yes	14.97	4741	2.70	2.7E-10	1 in 1000000
B13		119.7		3.0	3.0	3.0	25	15.8	17.7	90.0	6.4	6.2	47.3	279.7	530.6	5.3	5.9	5.27	1.057	1.043	16.472	5.68	1588	0.78	20							Yes	14.18	3964	2.50	5.0E-09	1 in 1000000
B14		118.4		3.0	3.0	3.0	25	16.2	17.7	90.0	6.4	6.2	46.9	286.7	540.1	5.4	5.9	5.40	1.044	1.035	16.771	5.58	1599	0.79	20							Yes	14.34	4111	2.57	1.7E-09	1 in 1000000
B15		117.7		3.0	3.0	3.0	25	16.3	18.5	90.0	6.4	6.2	46.2	301.6	560.7	5.4	6.2	5.43	1.063	1.051	17.131	5.47	1650	0.79	20							Yes	14.50	4373	2.65	5.5E-10	1 in 1000000
B16		119.0		3.0	3.0	3.0	25	62.4	41.3	90.0	6.4	6.2	21.1	2577.1	3268.0	20.8	13.8	13.77	0.797	0.797	49.703	3.77	9722	1.01	20							Yes	96.12	247720	25.48	1.1E-152	1 in 1000000
B17		119.7		3.0	3.0	3.0	25	15.1	30.1	90.0	6.5	6.7	42.8	454.5	794.9	5.0	10.0	5.03	1.332	1.214	18.337	5.23	2379	0.77	20							Yes	14.95	6795	2.86	2.8E-11	1 in 1000000
B18	Tailgate Loading	119.9	22.0	3.0	3.0	3.0	25	15.7	30.1	90.0	6.6	6.7	42.4	472.6	820.6	5.2	10.0	5.23	1.314	1.226	19.244	5.21	2460	0.78	20	A	T		1803		9.02	Yes	15.34	7249	1.70	4.7E-04	1 in 2451
B19	Maingate Loading	120.0	45.0	3.0	3.0	3.0	25	16.5	30.3	90.0	6.6	6.7	41.5	500.0	854.7	5.5	10.1	5.50	1.295	1.240	20.465	5.13	2564	0.80	20	A	M		1767		8.66	Yes	15.90	7949	1.84	6.8E-05	1 in 16831
B20	Maingate Loading	119.5	45.0	3.0	3.0	3.0	25	16.5	30.4	90.0	6.6	5.9	40.2	501.6	838.5	5.5	10.1	5.50	1.296	1.241	20.485	4.99	2505	0.80	20	A	M		1726		8.44	Yes	15.91	7979	1.89	3.3E-05	1 in 36012
B21		119.3		3.0	3.0	3.0	25	15.8	30.1	90.0	6.8	5.9	41.5	475.6	813.6	5.3	10.0	5.27	1.312	1.227	19.393	5.10	2427	0.79	20							Yes	15.41	7327	3.02	2.7E-12	1 in 1000000
B22		119.2		3.0	3.0	3.0	25	15.0	29.9	90.0	6.5	1.9	34.4	448.5	683.7	5.0	10.0	5.00	1.332	1.211	18.158	4.54	2037	0.77	20							Yes	14.99	6724	3.30	4.7E-14	1 in 1000000
B23		119.1		3.0	3.0	3.0	25	12.2	14.0	90.0	6.7	6.6	56.1	170.8	389.3	4.1	4.7	4.07	1.069	1.024	12.492	6.79	1159	0.71	20							No	12.39	2116	1.83	7.8E-05	1 in 14473
B24		118.2		3.0	3.0	3.0	25	11.9	9.3	90.0	6.7	6.4	62.1	110.7	292.0	4.0	3.1	3.10	0.877	0.959	11.409	7.80	863	0.70	20							No	11.83	1309	1.52	3.9E-03	1 in 228
B25		117.5		3.0	3.0	3.0	25	12.8	9.1	90.0	7.1	6.4	62.2	116.5	308.5	4.3	3.0	3.03	0.831	0.925	11.838	7.78	906	0.74	20							No	12.05	1404	1.55	2.7E-03	1 in 340
B26		116.8		3.0	3.0	3.0	25	12.6	8.9	90.0	7.6	6.4	63.7	112.1	309.1	4.2	3.0	2.97	0.828	0.927	11.683	8.05	902	0.74	20							No	11.97	1343	1.49	5.5E-03	1 in 161
B27		116.0		3.0	3.0	3.0	25	13.0	8.6	90.0	7.1	6.4	62.9	111.8	301.5	4.3	2.9	2.87	0.796	0.904	11.748	7.82	874	0.74	20							No	12.01	1342	1.54	3.2E-03	1 in 285
B28		115.2		3.0	3.0	3.0	25	12.8	9.0	90.0	6.6	6.4	61.4	115.2	298.8	4.3	3.0	3.00	0.826	0.922	11.806	7.47	860	0.73	20							No	12.04	1387	1.61	1.3E-03	1 in 746
B29		114.5		3.0	3.0	3.0	25	12.6	12.4	90.0	6.6	6.3	56.5	156.2	359.0	4.2	4.1	4.13	0.992	0.997	12.560	6.58	1028	0.73	20							No	12.42	1941	1.89	3.2E-05	1 in 37512
B30		115.3		3.0	3.0	3.0	25	12.9	12.6	90.0	7.1	6.3	57.0	162.5	378.0	4.3	4.2	4.20	0.988	0.995	12.834	6.70	1090	0.74	20							No	12.56	2041	1.87	3.9E-05	1 in 29930
B31		116.0		3.0	3.0	3.0	25	11.8	13.0	90.0	7.6	6.3	59.0	153.4	374.4	3.9	4.3	3.93	1.048	1.015	11.975	7.08	1086	0.73	20							No	12.12	1860	1.71	3.9E-04	1 in 2897
B32		116.7		3.0	3.0	3.0	25	13.0	13.1	90.0	7.1	6.3	56.3	170.3	389.9	4.3	4.4	4.33	1.004	1.002	13.022	6.68	1138	0.74	20							No	12.65	2155	1.89	2.9E-05	1 in 40949
B33		117.4		3.0	3.0	3.0	25	11.9	13.0	90.0	6.7	6.3	56.9	154.7	359.0	4.0	4.3	3.97	1.044	1.014	12.067	6.81	1054	0.71	20							No	12.17	1883	1.79	1.4E-04	1 in 8291
B34		118.3		3.0	3.0	3.0	25	14.6	29.9	90.0	6.5	6.0	42.4	436.5	757.5	4.9	10.0	4.87	1.344	1.202	17.547	5.13	2240	0.76	20							No	14.73	6431	2.87	2.3E-11	1 in 1000000
B35		118.0		3.0	3.0	3.0	25	15.9	29.2	90.0	6.8	6.0	41.9	464.3	799.0	5.3	9.7	5.30	1.295	1.219	19.384	5.08	2357	0.79	20							Yes	15.41	7154	3.04	2.1E-12	1 in 1000000
B36	Maingate Loading	118.1	45.0	3.0	3.0	3.0	25	16.3	28.9	90.0	6.6	6.0	41.1	471.1	799.2	5.4	9.6	5.43	1.279	1.221	19.898	5.01	2360	0.80	20	A	M		1632		8.47	Yes	15.65	7373	1.85	5.7E-05	1 in 20051
B37	Maingate Loading	117.3	45.0	3.0	3.0	3.0	25	16.3	29.6	90.0	6.7	5.5	40.2	482.5	807.3	5.4	9.9	5.43	1.290	1.229	20.037	4.91	2367	0.80	20	A	M		1638		8.30	Yes	15.71	7578	1.89	3.0E-05	1 in 39678
B38		117.2		3.0	3.0	3.0	25	16.0	29.6	90.0	6.8	5.5	40.8	473.6	800.3	5.3	9.9	5.33	1.298	1.225	19.601	4.95	2345	0.80	20							Yes	15.50	7343	3.13	5.4E-13	1 in 1000000
B39		115.9		3.0	3.0	3.0	25	11.8	10.2	90.0	6.7	5.9	59.6	120.4	297.9	3.9	3.4	3.40	0.927	0.977	11.526	7.17	863	0.71	20							No	11.89	1431	1.66	8.7E-04	1 in 1379
B40		113.8		3.0	3.0	3.0	25	12.2	10.6	90.0	7.1	5.9	59.4	129.3	318.5	4.1	3.5	3.53	0.930	0.974	11.888	7.01	906	0.73	20							No	12.08	1562	1.72	3.4E-04	1 in 3392
B41	Double Goaf Loading	121.0	45.0	3.0	3.0	3.0	25	16.0	36.8	90.0	6.4	6.0	38.6	588.8	958.7	5.3	12.3	5.33	1.394	1.295	20.716	4.93	2900	0.78	20	A	G		4338		12.29	Yes	15.95	9390	1.30	4.8E-02	1 in 20
B42	Double Goaf Loading	122.0	45.0	3.0	3.0	3.0	25	17.1	29.0	90.0	6.3	5.8	39.1	495.9	814.3	5.7	9.7	5.70	1.258	1.230	21.026	5.01	2484	0.80	20	A	G		3566		12.20	Yes	16.21	8037	1.33	3.3E-02	1 in 28
B43	Double Goaf Loading	123.0	45.0	3.0	3.0	3.0	25	16.9	34.2	90.0	6.8	5.6	38.7	578.0	943.3	5.6	11.4	5.63	1.339	1.292	21.830	5.02	2901	0.80	20	A	G		4123		12.15	Yes	16.49	9529	1.36	2.4E-02	1 in 37
B44	Maingate Loading	124.0	22.0	3.0	3.0	3.0	25	17.3	30.3	90.0	6.8	5.6	39.4	524.2	865.2	5.8	10.1	5.77	1.273	1.249	21.615	5.12	2682	0.81	20	A	M		1173		7.35	Yes	16.47	8634	2.24	2.0E-07	1 in 1000000
~~B45~~	~~Tailgate Loading~~	~~125.0~~	~~45.0~~	~~3.0~~	~~3.0~~	~~3.0~~	~~25~~	~~16.1~~	~~15.6~~	~~90.0~~	~~6.0~~	~~12.5~~	~~59.6~~	~~251.2~~	~~621.0~~	~~5.4~~	~~5.2~~	~~5.20~~	~~0.984~~	~~0.988~~	~~15.899~~	~~7.73~~	~~1941~~	~~0.77~~	~~20~~	~~A~~	~~T~~		~~2528~~		~~17.79~~	~~Yes~~	~~13.94~~	~~3502~~		~~4.0E+00~~	~~#NUM!~~
B46	Tailgate Loading	128.0	22.0	3.0	3.0	3.0	25	20.6	14.8	90.0	11.0	6.4	54.5	304.9	669.9	6.9	4.9	4.93	0.836	0.836	17.225	7.03	2144	0.91	20	A	T		1119		10.70	Yes	15.52	4731	1.45	8.4E-03	1 in 104
B47	Tailgate Loading	127.7	45.0	3.0	3.0	3.0	25	19.6	14.8	90.0	9.9	6.5	53.8	290.1	628.4	6.5	4.9	4.93	0.860	0.860	16.865	6.92	2006	0.88	20	A	T		1971		13.71	Yes	15.04	4362	1.10	3.1E-01	1 in 4
~~B48~~	~~Maingate Loading~~	~~126.0~~	~~45.0~~	~~3.0~~	~~3.0~~	~~3.0~~	~~25~~	~~8.2~~	~~11.3~~	~~90.0~~	~~12.0~~	~~7.0~~	~~74.9~~	~~92.7~~	~~369.7~~	~~2.7~~	~~3.8~~	~~2.73~~	~~1.159~~	~~1.000~~	~~8.200~~	~~12.57~~	~~1164~~	~~0.73~~	~~20~~	~~A~~	~~M~~		~~962~~		~~22.95~~	~~No~~	~~9.99~~	~~926~~		~~4.0E+00~~	~~#NUM!~~
~~B49~~	~~Rotated Panel / Double Goaf~~	~~125.0~~	~~22.0~~	~~3.0~~	~~3.0~~	~~3.0~~	~~25~~	~~12.0~~	~~7.2~~	~~90.0~~	~~6.0~~	~~7.1~~	~~66.4~~	~~86.4~~	~~257.4~~	~~4.0~~	~~2.4~~	~~2.40~~	~~0.750~~	~~0.909~~	~~10.903~~	~~9.31~~	~~804~~	~~0.68~~	~~20~~	~~A~~	~~M~~		~~383~~		~~13.75~~	~~No~~	~~11.56~~	~~999~~		~~4.0E+00~~	~~#NUM!~~
B50	~~Maingate Loading~~ / Double Goaf	123.0	45.0	3.0	3.0	3.0	25	23.8	14.2	90.0	6.0	6.9	46.3	338.0	628.8	7.9	4.7	4.73	0.747	0.747	17.787	5.72	1933	0.89	20	A	G		2186		12.19	Yes	17.13	5788	1.40	1.4E-02	1 in 63
B51	Rotated Panel / Double Goaf	123.5	45.0	3.0	3.0	3.0	25	14.0	25.8	90.0	6.7	6.5	46.0	361.2	668.6	4.7	8.6	4.67	1.296	1.155	16.172	5.72	2064	0.74	20	A	G		3365		15.03	No	14.13	5104	0.94	6.3E-01	1 in 2
B52	Rotated Panel / Double Goaf	124.0	45.0	3.0	3.0	3.0	25	14.0	25.8	90.0	6.7	6.5	46.0	361.2	668.6	4.7	8.6	4.67	1.296	1.155	16.172	5.74	2073	0.74	20	A	G		3383		15.10	No	14.13	5104	0.94	6.4E-01	1 in 1
B53	Rotated Panel / Double Goaf	124.6	45.0	3.0	3.0	3.0	25	14.0	25.8	90.0	6.7	7.0	46.8	361.2	679.0	4.7	8.6	4.67	1.296	1.155	16.172	5.86	2115	0.74	20	A	G		3457		15.43	No	14.13	5104	0.92	6.9E-01	1 in 1
B54	Rotated Panel / Double Goaf	124.8	45.0	3.0	3.0	3.0	25	14.0	25.8	90.0	6.7	6.8	46.5	361.2	674.8	4.7	8.6	4.67	1.296	1.155	16.172	5.83	2105	0.74	20	A	G		3443		15.36	No	14.13	5104	0.92	6.8E-01	1 in 1
B55	Rotated Panel / Maingate Load	125.0	45.0	3.0	3.0	3.0	25	14.0	25.8	90.0	6.7	6.8	46.5	361.2	674.8	4.7	8.6	4.67	1.296	1.155	16.172	5.84	2109	0.74	20	A	M		1527		10.07	No	14.13	5104	1.40	1.4E-02	1 in 62
B56	Double Goaf Loading	123.0	45.0	3.0	3.0	3.0	25	23.2	14.4	90.0	6.0	6.4	45.0	334.1	607.4	7.7	4.8	4.80	0.766	0.766	17.770	5.59	1868	0.88	20	A	G		2155		12.04	Yes	16.83	5623	1.40	1.5E-02	1 in 58
B57	Double Goaf Loading	122.0	45.0	3.0	3.0	3.0	25	24.5	21.0	90.0	6.0	6.2	38.0	514.5	829.6	8.2	7.0	7.00	0.923	0.923	22.615	4.92	2530	0.90	20	A	G		2787		10.34	Yes	19.76	10164	1.91	2.3E-05	1 in 53437
B58	Tailgate Loading	121.0	45.0	3.0	3.0	3.0	25	23.5	15.6	90.0	6.3	6.8	45.1	366.6	667.5	7.8	5.2	5.20	0.798	0.798	18.752	5.51	2019	0.89	20	A	T		1930		10.77	Yes	17.44	6395	1.62	1.2E-03	1 in 827
B59	Rotated Panel / Double Goaf	121.5	45.0	3.0	3.0	3.0	25	15.8	25.6	90.0	6.8	6.4	44.1	404.5	723.2	5.3	8.5	5.27	1.237	1.174	18.551	5.43	2197	0.78	20	A	G		3261		13.49	Yes	15.06	6092	1.12	2.7E-01	1 in 4
B60	Rotated Panel / Double Goaf	122.0	45.0	3.0	3.0	3.0	25	15.8	25.6	90.0	6.8	6.4	44.1	404.5	723.2	5.3	8.5	5.27	1.237	1.174	18.551	5.45	2206	0.78	20	A	G		3279		13.56	Yes	15.06	6092	1.11	2.8E-01	1 in 4
B61	Rotated Panel / Double Goaf	123.0	45.0	3.0	3.0	3.0	25	15.8	25.6	90.0	6.8	7.2	45.4	404.5	741.3	5.3	8.5	5.27	1.237	1.174	18.551	5.64	2279	0.78	20	A	G		3398		14.04	Yes	15.06	6092	1.07	3.5E-01	1 in 3
B62	Rotated Panel / Double Goaf	123.5	45.0	3.0	3.0	3.0	25	15.8	25.6	90.0	6.8	7.0	45.1	404.5	736.8	5.3	8.5	5.27	1.237	1.174	18.551	5.62	2275	0.78	20	A	G		3396		14.02	Yes	15.06	6092	1.07	3.5E-01	1 in 3
B63	Rotated Panel / Double Goaf	124.0	45.0	3.0	3.0	3.0	25	15.8	25.6	90.0	6.8	7.3	45.6	404.5	743.5	5.3	8.5	5.27	1.237	1.174	18.551	5.70	2305	0.78	20	A	G		3446		14.22	Yes	15.06	6092	1.06	3.8E-01	1 in 3
B64	Rotated Panel / Double Goaf	125.5	45.0	3.0	3.0	3.0	25	15.8	25.0	90.0	6.8	7.1	45.6	395.0	725.5	5.3	8.3	5.27	1.225	1.166	18.424	5.76	2276	0.78	20	A	G		3416		14.41	Yes	15.01	5929	1.04	4.1E-01	1 in 3
B65	Double Goaf Loading	120.0	45.0	3.0	3.0	3.0	25	18.8	14.5	90.0	8.5	7.1	53.8	272.6	589.7	6.3	4.8	4.83	0.871	0.871	16.372	6.49	1769	0.86	20	A	G		2165		14.43	Yes	14.60	3980	1.01	4.8E-01	1 in 2

Table A.5: Pillar Stability Analysis

Run 5: Decrease Run 2 Pillars by 1 m and increase working section to 3.0 m

Project: Lake Macquarie Private Hospital Northern Expansion
Location: O'Brien Street, Gateshead
Analysis Assumptions: NSW Pillar formula
Project Number 16471.21

Client: Akalan Projects
Date: 18/10/16
Sheet: 5
Calculations by JAW

Key to Colour Coding of Factors of Safety / Width: Height Ratios

4.50	Greater than 3.0
2.40	Between 2.2 and 3.0
2.10	Between 1.8 and 2.2
1.70	Between 1.5 and 1.8
1.20	Less than 1.5

Indicating Pillar Located within Project Angle of Draw
Indicating Pillar Located beneath site

Analysis Id:	Comment	Depth D (m)	Panel Width/Span (Longwall only) (m)	Seam Thickness (m)	Working Section H (m)	Pillar Height Section H (m)	Unit Weigth γ (kN/m³)	Pillar Details Width w1 (m)	Length w2 (m)	Internal Angle (°)	adway Deta b1 (m)	b2 (m)	Extract. Ratio (%)	Pillar Area m³	Total Area m³	w1/ Height Ratio w1/H	w2/H Height Ratio w2/H	Width/ Height Ratio	Width Modifier Θ0	Θ	wΘ Effective Width	Pillar Stress (Tributary) (MPa)	Pillar Load (Tributary) MN	Proportion Abutment transfer R	Abutment Angle °	Abut (A) Yield (Y) (?)	Abutment Loading Type M,T,G	Shed Load MN	Abutment Load Received MN	Pillar Stress (MPa) ("Yield") ϕ_s= 0.7	Pillar Stress ("Abut") (MPa)	Squat	Power Law Strength (MPa)	Power Law "Ultimate" Load MN	Power Law FoS	Power Law Probability of Failure	Probability of Failure NSW Power Formulae
B66	Double Goaf Loading	119.5	45.0	3.0	3.0	3.0	25	23.7	15.2	90.0	6.5	6.0	43.7	360.2	640.2	7.9	5.1	5.07	0.781	0.781	18.521	5.31	1913	0.90	20	A	G		2113		11.17	Yes	17.43	6280	1.56	2.4E-03	1 in 388
B67	Tailgate Loading	119.0	45.0	3.0	3.0	3.0	25	23.7	15.2	90.0	6.5	6.2	44.3	360.2	646.3	7.9	5.1	5.07	0.781	0.781	18.521	5.34	1923	0.90	20	A	T		1803		10.34	Yes	17.43	6280	1.69	5.8E-04	1 in 1999
B68	Rotated Panel / Double Goaf	120.0	45.0	3.0	3.0	3.0	25	15.0	26.0	90.0	6.2	6.8	43.9	390.0	695.4	5.0	8.7	5.00	1.268	1.172	17.575	5.35	2086	0.76	20	A	G		3287		13.78	Yes	14.74	5750	1.07	3.6E-01	1 in 3
B69	Rotated Panel / Double Goaf	120.0	45.0	3.0	3.0	3.0	25	15.0	26.0	90.0	6.2	6.8	43.9	390.0	695.4	5.0	8.7	5.00	1.268	1.172	17.575	5.35	2086	0.76	20	A	G		3287		13.78	Yes	14.74	5750	1.07	3.6E-01	1 in 3
B70	Rotated Panel / Double Goaf	120.0	45.0	3.0	3.0	3.0	25	15.0	26.0	90.0	6.2	6.6	43.6	390.0	691.1	5.0	8.7	5.00	1.268	1.172	17.575	5.32	2073	0.76	20	A	G		3267		13.69	Yes	14.74	5750	1.08	3.5E-01	1 in 3
B71	Rotated Panel / Double Goaf	120.0	45.0	3.0	3.0	3.0	25	15.0	26.0	90.0	6.2	6.7	43.7	390.0	693.2	5.0	8.7	5.00	1.268	1.172	17.575	5.33	2080	0.76	20	A	G		3277		13.74	Yes	14.74	5750	1.07	3.5E-01	1 in 3
B72	Rotated Panel / Double Goaf	120.0	45.0	3.0	3.0	3.0	25	15.0	26.0	90.0	6.2	6.7	43.7	390.0	693.2	5.0	8.7	5.00	1.268	1.172	17.575	5.33	2080	0.76	20	A	G		3277		13.74	Yes	14.74	5750	1.07	3.5E-01	1 in 3
B73	Rotated Panel / Double Goaf	120.0	45.0	3.0	3.0	3.0	25	15.0	26.0	90.0	6.2	6.9	44.1	390.0	697.5	5.0	8.7	5.00	1.268	1.172	17.575	5.37	2092	0.76	20	A	G		3297		13.82	Yes	14.74	5750	1.07	3.6E-01	1 in 3
B74	Double Goaf Loading	118.2	45.0	3.0	3.0	3.0	25	24.3	14.5	90.0	6.5	6.3	45.0	352.4	640.6	8.1	4.8	4.83	0.747	0.747	18.162	5.37	1893	0.91	20	A	G		2043		11.17	Yes	17.56	6188	1.57	2.1E-03	1 in 452
B75	Double Goaf Loading	118.0	45.0	3.0	3.0	3.0	25	24.1	14.5	90.0	6.5	6.8	46.4	349.5	651.8	8.0	4.8	4.83	0.751	0.751	18.106	5.50	1923	0.91	20	A	G		2087		11.47	Yes	17.43	6091	1.52	3.8E-03	1 in 235
B76	Maingate Loading	117.0	45.0	3.0	3.0	3.0	25	25.4	14.6	90.0	6.5	6.3	44.4	370.8	666.7	8.5	4.9	4.87	0.730	0.730	18.542	5.26	1950	0.92	20	A	M		1118		8.27	Yes	18.34	6803	2.22	2.8E-07	1 in 1000000
B77	Rotated panel / Maingate Loading	118.0	45.0	3.0	3.0	3.0	25	14.4	26.7	90.0	6.7	6.3	44.8	384.5	696.3	4.8	8.9	4.80	1.299	1.170	16.849	5.34	2054	0.76	20	A	M		1477		9.18	No	14.43	5548	1.57	2.1E-03	1 in 447
B78	Rotated panel / Maingate Loading	119.0	45.0	3.0	3.0	3.0	25	14.3	26.3	90.0	6.6	6.3	44.8	376.1	681.3	4.8	8.8	4.77	1.296	1.165	16.656	5.39	2027	0.75	20	A	M		1459		9.27	No	14.35	5395	1.55	2.8E-03	1 in 332
B79	Rotated panel / Maingate Loading	120.0	45.0	3.0	3.0	3.0	25	14.5	26.3	90.0	6.4	6.3	44.0	381.4	681.3	4.8	8.8	4.83	1.289	1.168	16.935	5.36	2044	0.75	20	A	M		1464		9.20	No	14.47	5517	1.57	2.1E-03	1 in 454
B80	Rotated panel / Maingate Loading	121.0	45.0	3.0	3.0	3.0	25	14.5	26.3	90.0	6.7	6.3	44.8	381.4	691.1	4.8	8.8	4.83	1.289	1.168	16.935	5.48	2091	0.76	20	A	M		1500		9.42	No	14.47	5517	1.54	3.1E-03	1 in 290
B81	Rotated panel / Maingate Loading	122.0	45.0	3.0	3.0	3.0	25	14.5	26.3	90.0	6.6	6.3	44.6	381.4	687.9	4.8	8.8	4.83	1.289	1.168	16.935	5.50	2098	0.75	20	A	M		1504		9.45	No	14.47	5517	1.53	3.3E-03	1 in 273
B82	Rotated panel / Maingate Loading	123.0	45.0	3.0	3.0	3.0	25	14.5	26.3	90.0	6.6	6.3	44.6	381.4	687.9	4.8	8.8	4.83	1.289	1.168	16.935	5.55	2115	0.75	20	A	M		1517		9.52	No	14.47	5517	1.52	3.8E-03	1 in 235
B83		113.0		3.0	3.0	3.0	25	12.6	8.9	90.0	6.4	7.2	63.3	112.1	305.9	4.2	3.0	2.97	0.828	0.927	11.683	7.71	864	0.72	21	A	M		105		8.64	No	11.97	1343	1.38	1.8E-02	1 in 50
B84		113.5		3.0	3.0	3.0	25	13.0	8.6	90.0	6.6	7.2	63.9	111.8	309.7	4.3	2.9	2.87	0.796	0.904	11.748	7.86	879	0.74	22	A	M		109		8.83	No	12.01	1342	1.36	2.4E-02	1 in 38
B85		113.8		3.0	3.0	3.0	25	12.8	9.0	90.0	6.4	6.3	60.8	115.2	293.8	4.3	3.0	3.00	0.826	0.922	11.806	7.25	836	0.73	23	A	M		101		8.13	No	12.04	1387	1.48	6.0E-03	1 in 147

Table A.6: Pillar Stability Analysis

Run 2A: Additional Abutment load to western pillars beneath site

Project: Lake Macquarie Private Hospital Northern Expansion
Location: O'Brien Street, Gateshead
Analysis Assumptions: NSW Pillar formula
Project Number 16471.21

Client: Akalan Projects
Date: 18/10/16
Sheet: 2
Calculations by JAW

Key to Colour Coding of Factors of Safety / Width: Height Ratios

4.50	Greater than 3.0
2.40	Between 2.2 and 3.0
2.10	Between 1.8 and 2.2
1.70	Between 1.5 and 1.8
1.20	Less than 1.5

Indicating Pillar Located within Project Angle of Draw
Indicating Pillar Located beneath site

Analysis Id:	Comment	Depth D (m)	Panel Width/Span (Longwall only) (m)	Seam Thickness (m)	Working Section H (m)	Pillar Height Section H (m)	Unit Weigth γ (kN/m³)	Pillar Details Width w1 (m)	Length w2 (m)	Internal Angle (°)	Loadway Dets b1 (m)	b2 (m)	Extract. Ratio (%)	Pillar Area m³	Total Area m³	w1/ Height Ratio w1/H	w2/H Height Ratio w2/H	Width/ Height Ratio	Width Modifier Θ0	Θ	wΘ Effective Width	Pillar Stress (Tributary) (MPa)	Pillar Load (Tributary) MN	Proportion Abutment transfer R	Abutment Angle °	Abut (A) Yield (Y) (?)	Abutment Loading Type M,T,G	Shed Load MN	Abutment Load Received MN	Pillar Stress (MPa) ("Yield") ϕ_p= 0.7	Pillar Stress ("Abut") (MPa)	Squat	Power Law Strength (MPa)	Power Law "Ultimate" Load MN	FoS	Probability of Failure	Probability of Failure NSW Power Formulae
A6		123.6		2.4	2.4	2.4	25	17.7	26.9	90.0	4.8	5.3	34.3	476.1	724.5	7.4	11.2	7.38	1.206	1.206	21.351	4.70	2238	0.78	20							Yes	21.66	10314	4.61	3.2E-22	1 in 1000000
A7		123.1		2.4	2.4	2.4	25	17.2	26.5	90.0	5.2	5.4	36.2	455.8	714.6	7.2	11.0	7.17	1.213	1.213	20.860	4.82	2199	0.78	20							Yes	21.08	9606	4.37	1.0E-20	1 in 1000000
A8		122.7		2.4	2.4	2.4	25	16.7	26.5	90.0	5.4	5.8	38.0	442.6	713.8	7.0	11.0	6.96	1.227	1.227	20.488	4.95	2189	0.77	20							Yes	20.58	9106	4.16	2.0E-19	1 in 1000000
A9		121.4		2.4	2.4	2.4	25	17.0	27.6	90.0	5.0	5.3	35.2	469.2	723.8	7.1	11.5	7.08	1.238	1.238	21.040	4.68	2196	0.77	20							Yes	21.04	9872	4.50	1.6E-21	1 in 1000000
A68	Maingate Loading	122.1	90.0	2.4	2.4	2.4	25	16.0	35.4	90.0	5.3	5.1	34.3	566.4	862.7	6.7	14.8	6.67	1.377	1.377	22.039	4.65	2633	0.76	20	A	M		2079		8.32	Yes	20.96	11869	2.52	3.6E-09	1 in 1000000
A69		122.1		2.4	2.4	2.4	25	17.4	19.4	90.0	5.6	6.5	43.3	337.6	595.7	7.3	8.1	7.25	1.054	1.054	18.346	5.39	1818	0.79	20							Yes	19.86	6704	3.69	1.8E-16	1 in 1000000
A70		122.1		2.4	2.4	2.4	25	16.9	19.2	90.0	5.4	6.5	43.4	324.5	573.1	7.0	8.0	7.04	1.064	1.064	17.977	5.39	1749	0.78	20							Yes	19.36	6282	3.59	7.2E-16	1 in 1000000
A71		121.2		2.4	2.4	2.4	25	16.9	19.2	90.0	4.9	6.5	42.1	324.5	560.3	7.0	8.0	7.04	1.064	1.064	17.977	5.23	1698	0.77	20							Yes	19.36	6282	3.70	1.5E-16	1 in 1000000
A72		120.6		2.4	2.4	2.4	25	16.9	19.2	90.0	5.0	6.5	42.3	324.5	562.8	7.0	8.0	7.04	1.064	1.064	17.977	5.23	1697	0.77	20							Yes	19.36	6282	3.70	1.5E-16	1 in 1000000
A73	Maingate Loading	124.2	90.0	2.4	2.4	2.4	25	16.5	31.9	90.0	5.3	4.7	34.0	526.4	797.9	6.9	13.3	6.88	1.318	1.318	21.750	4.71	2477	0.76	20	A	M		2190		8.87	Yes	21.09	11103	2.38	2.7E-08	1 in 1000000
A74		122.3		2.4	2.4	2.4	25	16.4	17.4	90.0	5.5	5.2	42.3	285.4	494.9	6.8	7.3	6.83	1.030	1.030	16.885	5.30	1513	0.77	20							Yes	18.49	5276	3.49	3.2E-15	1 in 1000000
A75		121.8		2.4	2.4	2.4	25	16.6	16.9	90.0	5.2	5.4	42.3	280.5	486.1	6.9	7.0	6.92	1.009	1.009	16.749	5.28	1480	0.77	20							Yes	18.51	5194	3.51	2.4E-15	1 in 1000000
A76		121.8		2.4	2.4	2.4	25	16.6	17.1	90.0	4.8	5.7	41.8	283.9	487.9	6.9	7.1	6.92	1.015	1.015	16.846	5.23	1486	0.76	20							Yes	18.57	5271	3.55	1.3E-15	1 in 1000000
A77		121.2		2.4	2.4	2.4	25	16.6	17.0	90.0	5.0	5.0	40.6	282.2	475.2	6.9	7.1	6.92	1.012	1.012	16.798	5.10	1440	0.76	20							Yes	18.54	5233	3.63	3.9E-16	1 in 1000000
A78	Maingate Loading	121.8	90.0	2.4	2.4	2.4	25	16.5	29.9	90.0	5.3	4.4	34.0	493.4	747.7	6.9	12.5	6.88	1.289	1.289	21.265	4.62	2277	0.77	20	A	M		1777		8.22	Yes	20.85	10288	2.54	2.7E-09	1 in 1000000
A79		121.9		2.4	2.4	2.4	25	16.2	17.6	90.0	6.6	5.3	45.4	285.1	522.1	6.8	7.3	6.75	1.041	1.041	16.871	5.58	1591	0.79	20							Yes	18.38	5241	3.29	5.2E-14	1 in 1000000
A81		121.8		2.4	2.4	2.4	25	15.4	17.5	90.0	5.2	5.1	42.1	269.5	465.6	6.4	7.3	6.42	1.064	1.064	16.383	5.26	1418	0.74	20							Yes	17.75	4785	3.38	1.6E-14	1 in 1000000
B1		121.2		2.4	2.4	2.4	25	17.2	15.9	90.0	5.4	6.7	46.5	273.5	510.8	7.2	6.6	6.63	0.961	0.961	16.524	5.66	1548	0.78	20							Yes	18.71	5118	3.31	4.3E-14	1 in 1000000
B2		120.6		2.4	2.4	2.4	25	16.8	15.9	90.0	5.4	6.7	46.8	267.1	501.7	7.0	6.6	6.63	0.972	0.972	16.338	5.66	1513	0.78	20							Yes	18.39	4911	3.25	1.0E-13	1 in 1000000
B3		120.1		2.4	2.4	2.4	25	16.0	15.4	90.0	5.4	6.7	47.9	246.4	472.9	6.7	6.4	6.42	0.981	0.981	15.694	5.76	1420	0.76	20							Yes	17.62	4342	3.06	1.5E-12	1 in 1000000
B4		120.2		2.4	2.4	2.4	25	17.3	15.7	90.0	5.4	5.0	42.2	271.6	469.9	7.2	6.5	6.54	0.952	0.952	16.461	5.20	1412	0.79	20							Yes	18.73	5088	3.60	6.0E-16	1 in 1000000
B5		119.6		2.4	2.4	2.4	25	16.9	15.8	90.0	5.4	5.0	42.4	267.0	463.8	7.0	6.6	6.58	0.966	0.966	16.331	5.19	1387	0.78	20							Yes	18.44	4923	3.55	1.3E-15	1 in 1000000
B6		119.2		2.4	2.4	2.4	25	17.3	16.1	90.0	5.4	5.0	41.8	278.5	479.0	7.2	6.7	6.71	0.964	0.964	16.678	5.12	1427	0.79	20							Yes	18.86	5253	3.68	2.0E-16	1 in 1000000
B7		118.6		2.4	2.4	2.4	25	18.3	24.6	90.0	5.4	5.2	36.3	450.2	706.3	7.6	10.3	7.63	1.147	1.147	20.987	4.65	2094	0.81	20							Yes	21.90	9860	4.71	7.5E-23	1 in 1000000
B8		119.0		2.4	2.4	2.4	25	18.1	24.9	90.0	5.4	5.2	36.3	450.7	707.4	7.5	10.4	7.54	1.158	1.158	20.962	4.67	2104	0.80	20							Yes	21.74	9799	4.66	1.6E-22	1 in 1000000
B9		120.0		2.4	2.4	2.4	25	18.0	24.9	90.0	5.4	5.2	36.4	448.2	704.3	7.5	10.4	7.50	1.161	1.161	20.895	4.71	2113	0.80	20							Yes	21.64	9697	4.59	4.2E-22	1 in 1000000
B10		121.3		2.4	2.4	2.4	25	18.8	24.7	90.0	5.4	5.2	35.8	464.4	723.6	7.8	10.3	7.83	1.136	1.136	21.350	4.73	2194	0.81	20							Yes	22.48	10439	4.76	3.7E-23	1 in 1000000
B11	Maingate Loading	121.8	90.0	2.4	2.4	2.4	25	15.2	40.0	90.0	6.1	4.8	36.3	608.0	954.2	6.3	16.7	6.33	1.449	1.449	22.029	4.78	2906	0.76	20	A	M		2290		8.55	Yes	20.56	12498	2.41	1.8E-08	1 in 1000000
B12		121.0		2.4	2.4	2.4	25	18.6	19.0	90.0	5.4	5.2	39.2	353.4	580.8	7.8	7.9	7.75	1.011	1.011	18.798	4.97	1757	0.81	20							Yes	20.92	7393	4.21	1.0E-19	1 in 1000000
B13		119.7		2.4	2.4	2.4	25	16.8	18.7	90.0	5.4	5.2	40.8	314.2	530.6	7.0	7.8	7.00	1.054	1.054	17.699	5.05	1588	0.78	20							Yes	19.15	6017	3.79	4.1E-17	1 in 1000000
B14		118.4		2.4	2.4	2.4	25	17.2	18.7	90.0	5.4	5.2	40.5	321.6	540.1	7.2	7.8	7.17	1.042	1.042	17.919	4.97	1599	0.79	20							Yes	19.50	6273	3.92	6.0E-18	1 in 1000000
B15		117.7		2.4	2.4	2.4	25	17.3	19.5	90.0	5.4	5.2	39.8	337.4	560.7	7.2	8.1	7.21	1.060	1.060	18.334	4.89	1650	0.79	20							Yes	19.79	6677	4.05	1.0E-18	1 in 1000000
~~B41~~	~~Double Goaf Loading~~	~~121.0~~	~~45.0~~	~~2.4~~	~~2.4~~	~~2.4~~	~~25~~	~~17.0~~	~~37.8~~	~~90.0~~	~~5.4~~	~~5.0~~	~~33.0~~	~~642.6~~	~~958.7~~	~~7.1~~	~~15.8~~	~~7.08~~	~~1.380~~	~~1.380~~	~~23.453~~	~~4.51~~	~~2900~~	~~0.78~~	~~20~~	A	~~G~~		~~4338~~		~~11.26~~	~~Yes~~	~~22.24~~	~~14290~~		~~4.0E+00~~	~~#NUM!~~
~~B42~~	~~Double Goaf Loading~~	~~122.0~~	~~45.0~~	~~2.4~~	~~2.4~~	~~2.4~~	~~25~~	~~18.1~~	~~30.0~~	~~90.0~~	~~5.3~~	~~4.8~~	~~33.3~~	~~543.0~~	~~814.3~~	~~7.5~~	~~12.5~~	~~7.54~~	~~1.247~~	~~1.247~~	~~22.578~~	~~4.57~~	~~2484~~	~~0.80~~	~~20~~	A	~~G~~		~~3566~~		~~11.14~~	~~Yes~~	~~22.58~~	~~12262~~		~~4.0E+00~~	~~#NUM!~~
~~B43~~	~~Double Goaf Loading~~	~~123.0~~	~~45.0~~	~~2.4~~	~~2.4~~	~~2.4~~	~~25~~	~~17.9~~	~~35.2~~	~~90.0~~	~~5.8~~	~~4.6~~	~~33.2~~	~~630.1~~	~~943.3~~	~~7.5~~	~~14.7~~	~~7.46~~	~~1.326~~	~~1.326~~	~~23.732~~	~~4.60~~	~~2901~~	~~0.80~~	~~20~~	A	~~G~~		~~4123~~		~~11.15~~	~~Yes~~	~~23.01~~	~~14499~~		~~4.0E+00~~	~~#NUM!~~
B44	~~Maingate Loading~~ / Double Goaf	124.0	22.0	2.4	2.4	2.4	25	18.3	31.3	90.0	5.8	4.6	33.8	572.8	865.2	7.6	13.0	7.63	1.262	1.262	23.096	4.68	2682	0.81	20	A	G		2150		8.44	Yes	23.00	13173	2.73	1.8E-10	1 in 1000000

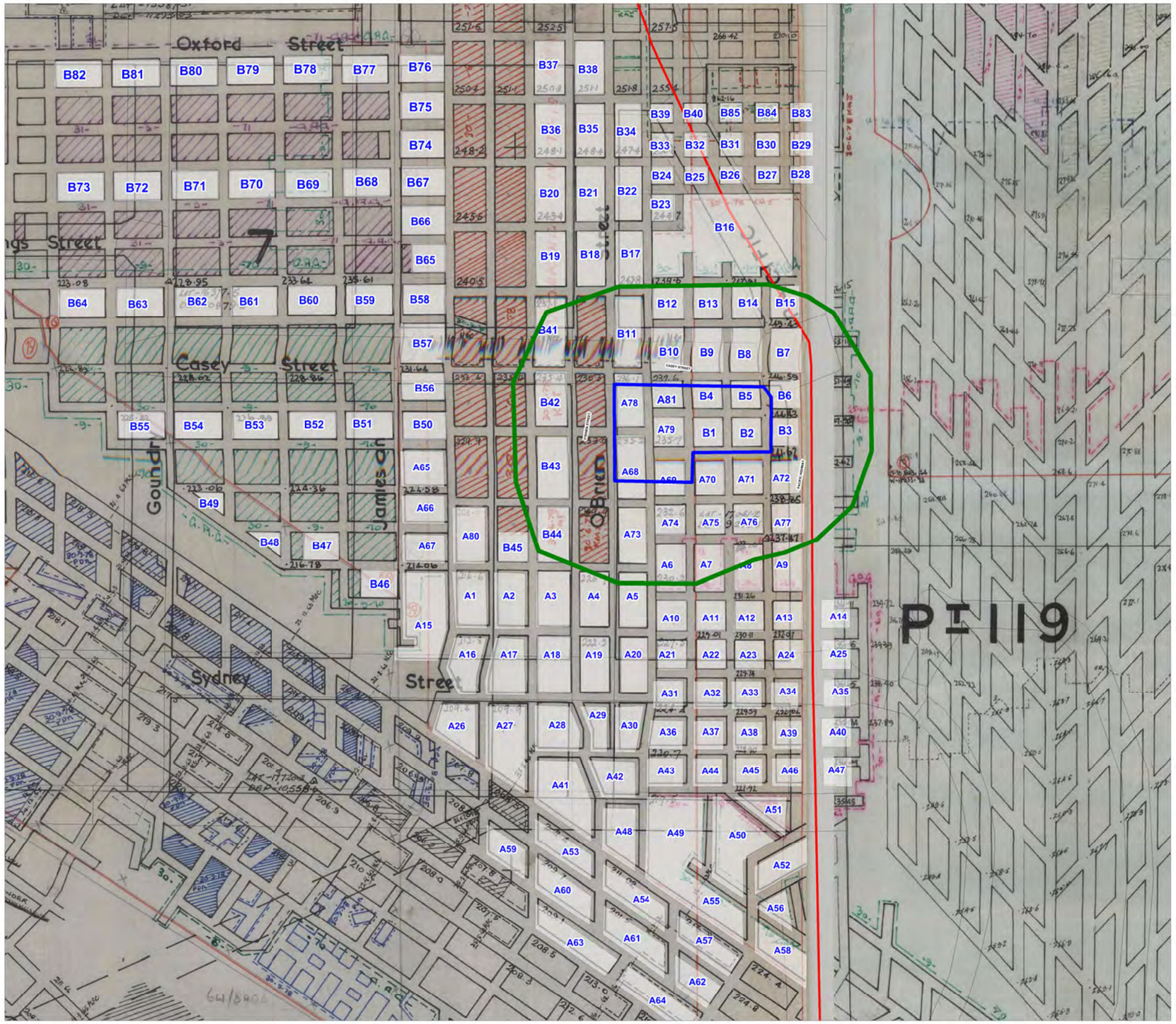
LEGEND:

SITE EXTENTS

ANGLE OF DRAW (MINE WORKINGS)

Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT: Akalan Projects Pty Ltd		TITLE: **Site Location Plan**	PROJECT No: 16471.21
OFFICE: Newcastle	DRAWN BY: JAW	**Lake Macquarie Private Hospital Expansion**	DRAWING No: 1
SCALE: 1:1000 (A3 Sheet)	DATE: 18.10.2016	**O'Brien Street, Gateshead**	REVISION: 0



LEGEND:

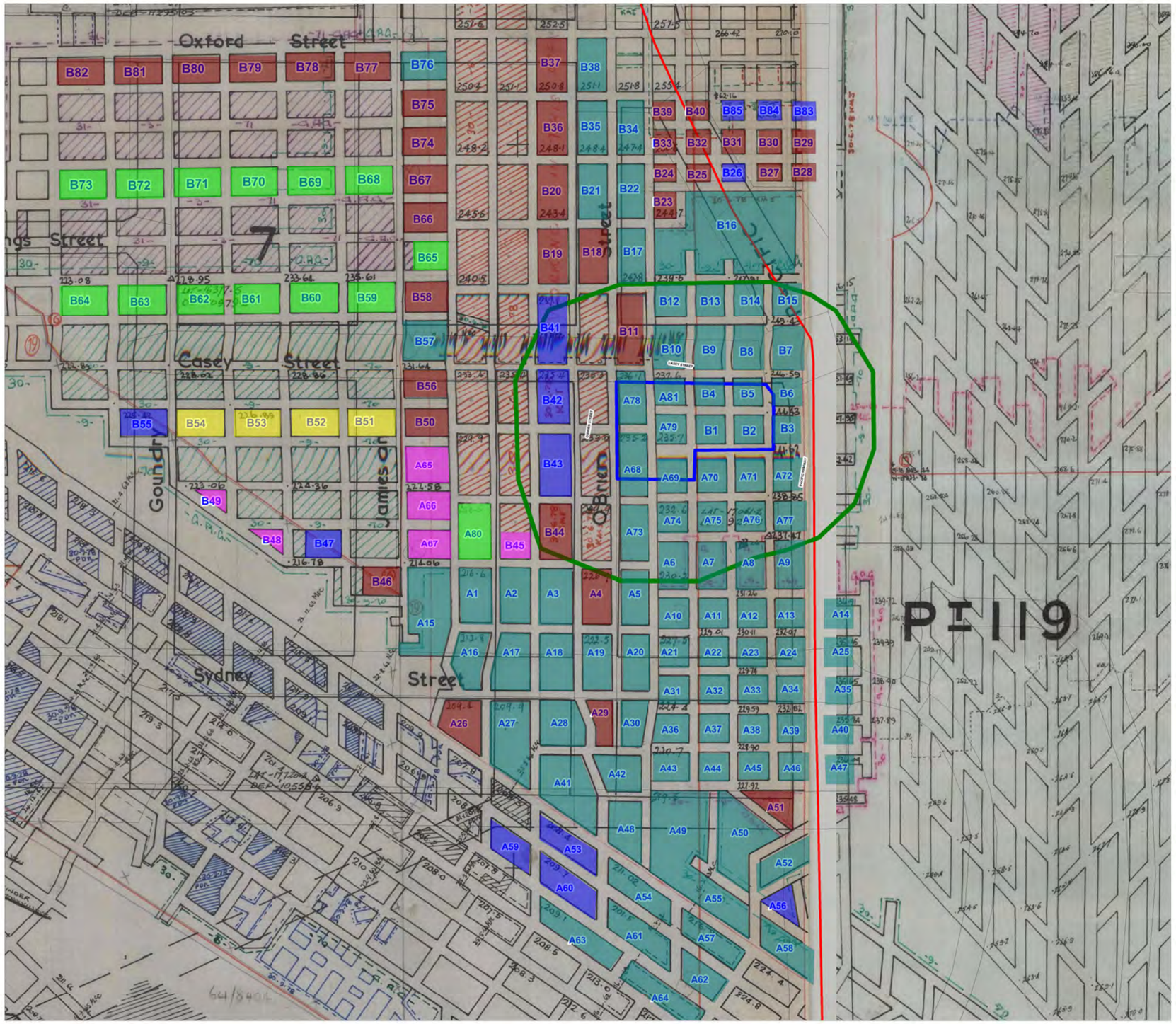
SITE EXTENTS

ANGLE OF DRAW (MINE WORKINGS)

B5 — Location of Pillar and Numbering Used in Analysis

Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: Akalan Projects Pty Ltd		TITLE: **Layout of Mine Workings and Pillar Numbering** **Lake Macquarie Private Hospital Expansion** **O'Brien Street, Gateshead**
	OFFICE: Newcastle	DRAWN BY: JAW	
	SCALE: 1:2500 (A3 Sheet)	DATE: 18.10.2016	

PROJECT No: 16471.21
DRAWING No: 2
REVISION: 0

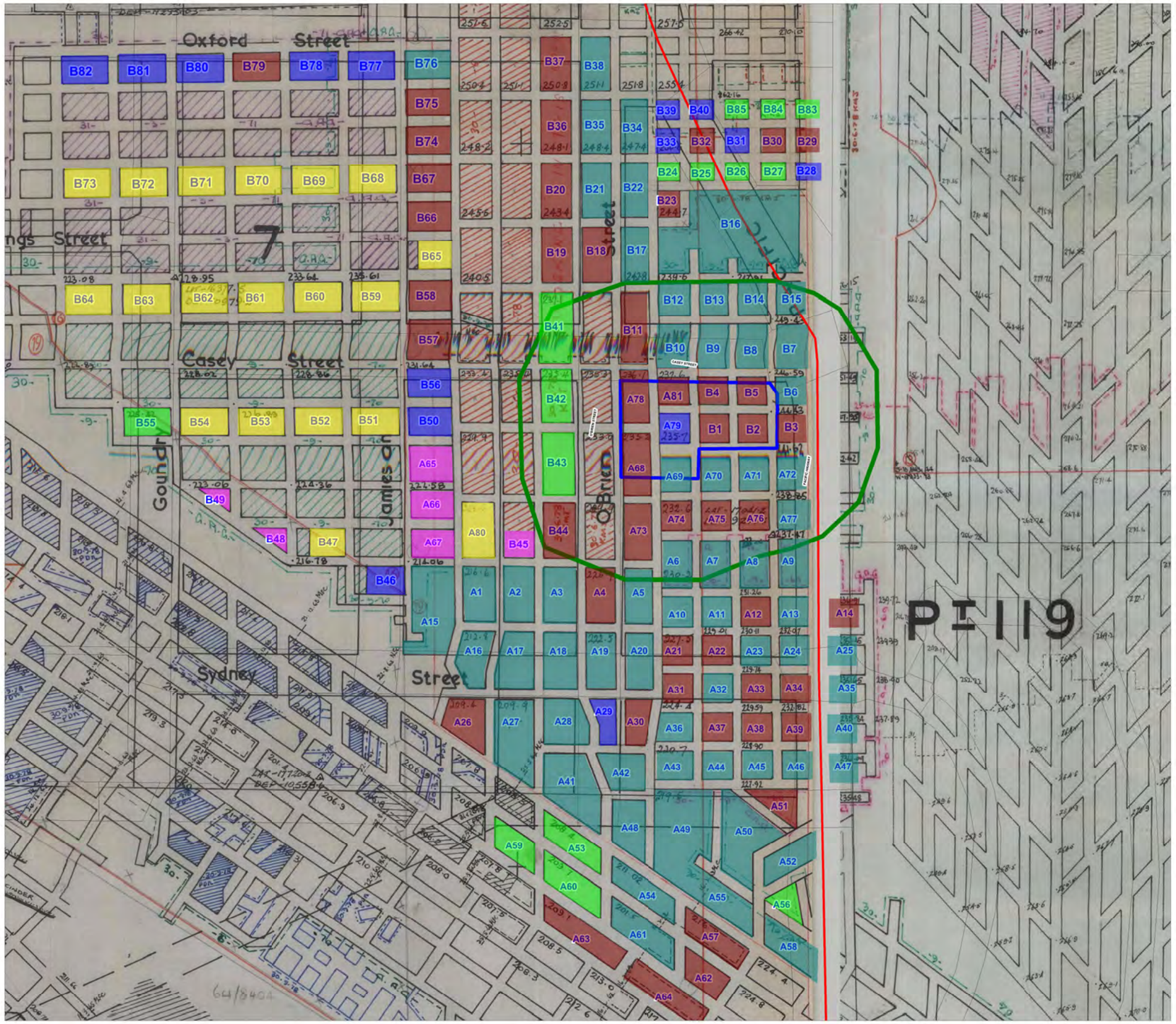


LEGEND:

- SITE EXTENTS
- ANGLE OF DRAW (MINE WORKINGS)
- B5 — Location of Pillar and Numbering Used in Analysis
- Pillar Factor of Safety Greater than 3.0
- Pillar Factor of Safety Between 2.2 and 3.0
- Pillar Factor of Safety Between 1.8 and 2.2
- Pillar Factor of Safety Between 1.5 and 1.8
- Pillar Factor of Safety Less than 1.5
- Pillars Assumed Crushed

Douglas Partners
Geotechnics | Environment | Groundwater

CLIENT: Akalan Projects Pty Ltd		TITLE: Pillar Factors of Safety - Run 2 Lake Macquarie Private Hospital Expansion O'Brien Street, Gateshead	PROJECT No: 16471.21
OFFICE: Newcastle	DRAWN BY: JAW		DRAWING No: 3
SCALE: 1:2500 (A3 Sheet)	DATE: 18.10.2016		REVISION: 0



LEGEND:

- SITE EXTENTS
- ANGLE OF DRAW (MINE WORKINGS)
- B5 — Location of Pillar and Numbering Used in Analysis
- Pillar Factor of Safety Greater than 3.0
- Pillar Factor of Safety Between 2.2 and 3.0
- Pillar Factor of Safety Between 1.8 and 2.2
- Pillar Factor of Safety Between 1.5 and 1.8
- Pillar Factor of Safety Less than 1.5
- Pillars Assumed Crushed

Douglas Partners
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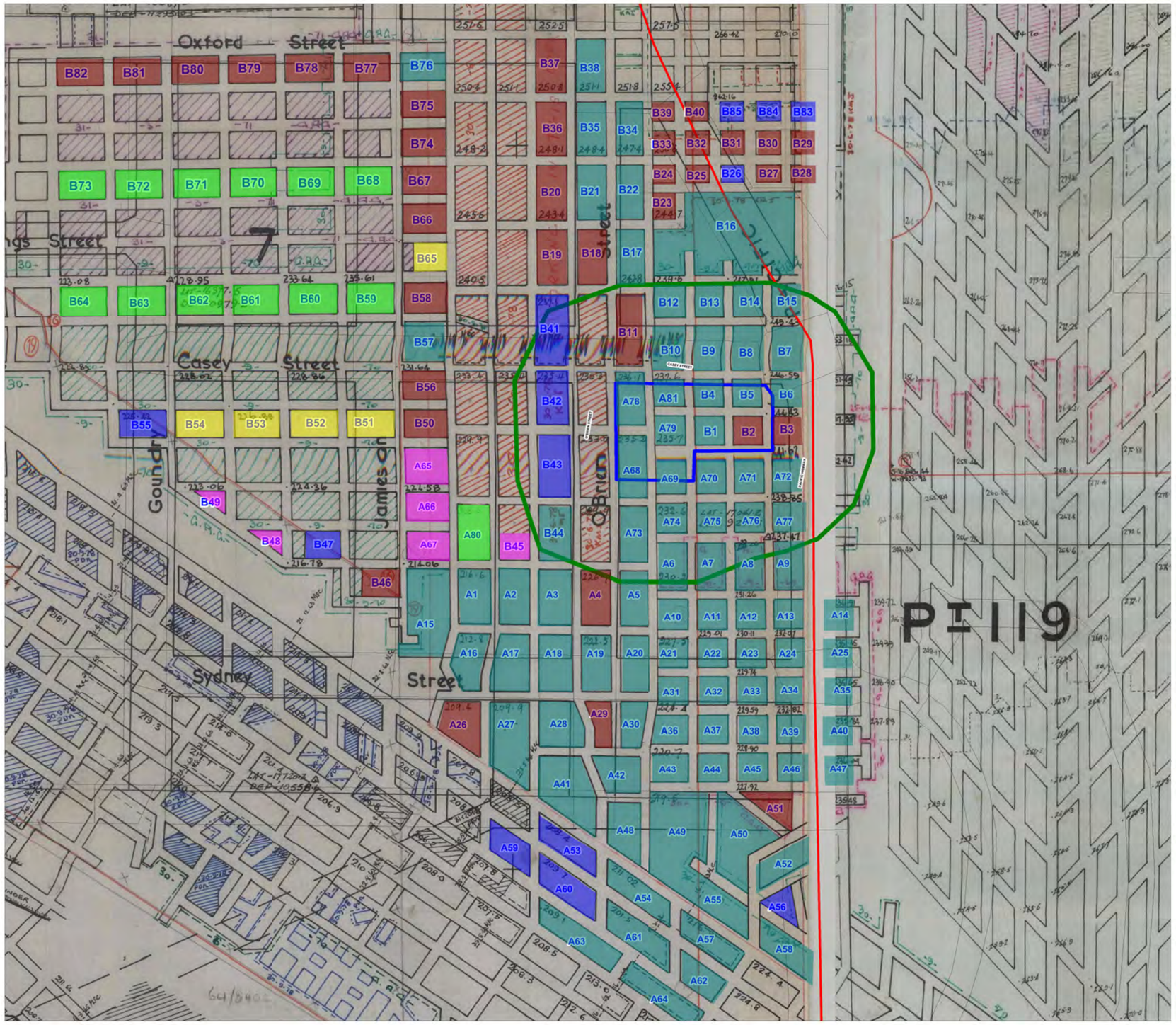
CLIENT: Akalan Projects Pty Ltd		TITLE: Pillar Factors of Safety - Run 3 (Pillars Decreased by 1 m) Lake Macquarie Private Hospital Expansion O'Brien Street, Gateshead	PROJECT No: 16471.21
OFFICE: Newcastle	DRAWN BY: JAW		DRAWING No: 4
SCALE: 1:2500 (A3 Sheet)	DATE: 18.10.2016		REVISION: 0



LEGEND:

- SITE EXTENTS
- ANGLE OF DRAW (MINE WORKINGS)
- B5 — Location of Pillar and Numbering Used in Analysis
- Pillar Factor of Safety Greater than 3.0
- Pillar Factor of Safety Between 2.2 and 3.0
- Pillar Factor of Safety Between 1.8 and 2.2
- Pillar Factor of Safety Between 1.5 and 1.8
- Pillar Factor of Safety Less than 1.5
- Pillars Assumed Crushed

Douglas Partners
Geotechnics | Environment | Groundwater

CLIENT: Akalan Projects Pty Ltd		
OFFICE: Newcastle	DRAWN BY: JAW	
SCALE: 1:2500 (A3 Sheet)	DATE: 18.10.2016	

TITLE: **Pillar Factors of Safety - Run 4 (3 m Working Section)**
Lake Macquarie Private Hospital Expansion
O'Brien Street, Gateshead

N

PROJECT No:	16471.21
DRAWING No:	5
REVISION:	0

Attachment 5: High-level social and economic benefits assessment

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Lake Macquarie Private Hospital Redevelopment

High level assessment of benefits from expansion of services at Lake Macquarie Private Hospital

11 October 2021

pwc

Strictly private and confidential

Disclaimer

This report has been prepared for Ramsay Health Care Limited for use and benefit in accordance with and for the purpose set out in our engagement letter with Ramsay Health Care Limited dated 21 September 2021. In doing so, we acted exclusively in Ramsay Health Care Limited interests.

We accept no responsibility, duty or liability:

- to anyone other than Ramsay Health Care Limited in connection with this report
- to Ramsay Health Care Limited for the consequences of using or relying on it for a purpose other than that referred to above.

We make no representation concerning the appropriateness of this report for anyone other than Ramsay Health Care Limited. If anyone other than Ramsay Health Care Limited chooses to use or rely on it they do so at their own risk.

This disclaimer applies:

- to the maximum extent permitted by law and, without limitation, to liability arising in negligence or under statute; and
- even if we consent to anyone other than Ramsay Health Care Limited receiving or using this report.

Contents

1 Background and purpose

1.1 Background

Since 1973, Lake Macquarie Private Hospital has provided private health care services to the communities of Newcastle and Lake Macquarie, as well as the broader referral region of Hunter – New England.

Lake Macquarie Private Hospital is a 187-bed medical and advanced surgical hospital owned and operated by Ramsay Health Care Limited. Together with Warners Bay Private Hospital (also owned and operated by Ramsay Health Care Limited), Lake Macquarie Private Hospital treats 35,000 patients a year. It provides specialty disciplines including cardiovascular care, orthopaedics, oncology and rehabilitation. It is also home to the Hunter Cancer Centre, the Hunter Region's only comprehensive private oncology service providing Medical Oncology, Radiation Oncology, Research, Support Services and Education.

Figure 1 - Lake Macquarie Private Hospital

Lake Macquarie Private Hospital was redeveloped in 2015 to include the Hunter Region's first private Emergency Department. It treats more than 12,000 patients a year. The Emergency Department has six beds including a state-of-the-art resuscitation room, triage room and procedure room. Other services include intensive care unit, cardiac theatre, recovery room, coronary care unit and cardiac catheterisation laboratories.

1.2 Lake Macquarie Private Hospital Redevelopment

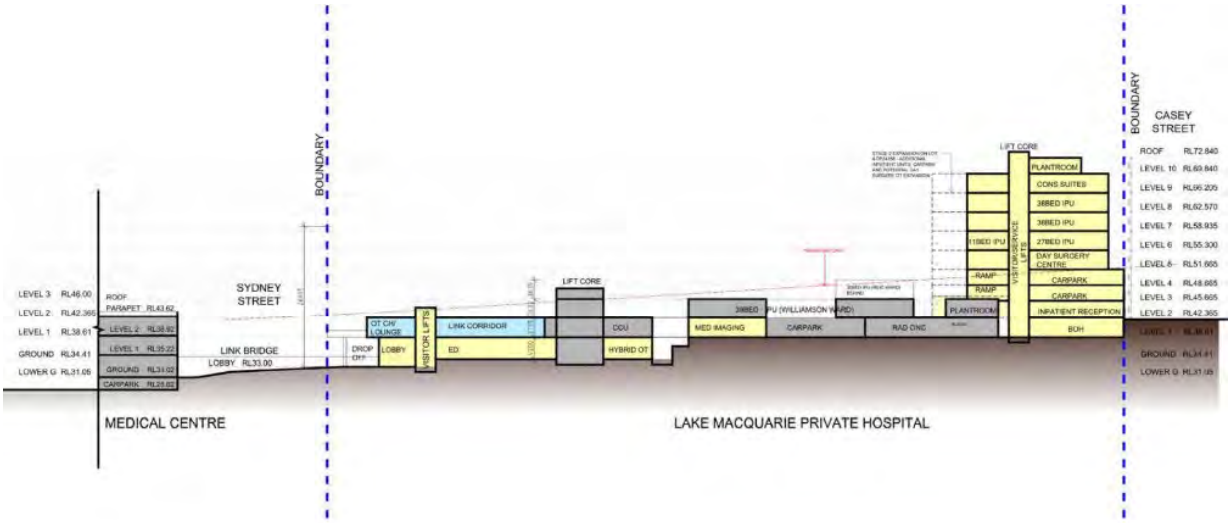
Ramsay Health Care Limited are currently investigating the redevelopment of Lake Macquarie Private Hospital to increase capacity and meet the private health needs of the local communities. The redevelopment will be completed in five stages, with a total capital expenditure of approximately $120 million. Stage 1-4 of the redevelopment is proposed to be completed by 2025 and includes:

- A net increase of 57 beds, bringing total beds to 243
- An additional six (6) emergency department bays
- An additional three (3) inpatient theatres, with one (1) being a hybrid theatre
- An additional three (3) day surgery theatres
- Consulting suites
- An additional eight (8) day oncology chairs
- A pharmacy.

The redevelopment will also include compliance upgrades to meet current National Safety and Quality Health Service (NSQHS) Standards and Australasian Health Facility Guidelines (AusHFG), including:

- A new central sterilising unit
- The relocation of the medical imaging onsite, which is currently housed in the medical centre opposite the hospital
- A fire and smoke control upgrade
- A power supply upgrade
- An emergency generator upgrade.

Figure 2 - Concept design for Lake Macquarie Private Hospital Redevelopment



1.3 Purpose of this assessment

PricewaterhouseCoopers Consulting (Australia) Pty Ltd (PwC) were engaged to provide high level guidance on the social and economic benefits associated with the redevelopment of the Lake Macquarie Private Hospital. This was carried out through a qualitative rapid desktop appraisal.

A number of assumptions and limitations underpin this benefit assessment:

- Future expansion activity is contingent on Ramsay Health Care Limited's application to the Lake Macquarie City Council for planning approvals to increase in the allowable development height for Lake Macquarie Private Hospital.
- The scope of the redevelopment is based on supply and demand projections that have not been viewed or verified by PwC. No assessment of the service need or demand for additional beds has been conducted by PwC. All benefits are contingent on current and future demand for services at Lake Macquarie Private Hospital.
- No analysis was performed on alternative options or scenarios in relation to service expansion, local service provision or alternative investments / divestments.
- Benefits are assessed in a qualitative manner, or where possible some metrics were quantified. No assessment of value for money or comparison of benefits to expected costs was made as part of this assessment.

2 Social and economic benefits

2.1 Beneficiaries of the Lake Macquarie Private Hospital Redevelopment

The redevelopment of Lake Macquarie Private Hospital has the potential to deliver a range of benefits to patients and their families and carers, staff of Lake Macquarie Private Hospital, business and industry, the broader NSW community and NSW Government. The beneficiaries of the redevelopment are presented in Figure 3.

Figure 3 - Potential beneficiaries of the Lake Macquarie Private Hospital Redevelopment

2.2 Benefit summary

Benefits of the redevelopment of Lake Macquarie Private Hospital are expected to include increased health and wellbeing for patients, access to health care closer to home, improved safety and efficiency, increased resilience and economic benefits of additional local employment. These are explored further below, including identification of expected beneficiaries.

Health and wellbeing benefits for patients

The Lake Macquarie Private Hospital Redevelopment has the potential to improve patient health and wellbeing through increased capacity in inpatient theatres, day theatres, inpatient beds, consulting suites and oncology chairs.

In 2021, Lake Macquarie Private Hospital experienced 22,207 inpatient and day patient admissions, 5,000 day surgery treatments and 13,008 emergency department attendances. Inpatient bed utilisation ranges from 80-90% on weekdays (average 72% total) and theatre utilisation on average is 80% (at peak times over 100%).

The population for Lake Macquarie Local Government Area (LGA) is expected to increase from 202,350 residents in 2016 to 232,700 in 2041 (15% increase).[1] Inpatient and day patient admissions are expected to grow to 30,970 (additional capacity to approximately 9,300 or 30%) and emergency department attendances are expected to grow to 19,245. In absence of redevelopment at Lake Macquarie Private Hospital, this projected activity would not be able to be met within the existing facility.

Expansion of capacity at Lake Macquarie Private Hospital will assist in meeting the growing health care demand in the Hunter-New England region. Failing to meet the growing health service demand would have a detrimental impact on patients' health and wellbeing arising from delay in access to healthcare or bed blockages. Waiting for access to health care mainly involves a prolonged period of decreased health and an affected psychological and social life of the patient in waiting. Provision of additional inpatient theatres, day theatres, inpatient beds and consulting suites will provide greater capacity in the private health system and reduce delays in accessing surgical or medical care, reduce bed block, and therefore improve the health and wellbeing of patients.

[1] NSW Department of Planning, Industry and Environment (2020), Lake Macquarie City Council, 2019 NSW Population Projections, www.planning.nsw.gov.au

In addition, the redevelopment will provide enhanced choice for residents in the Hunter-New England Region, with greater choice over public and private health care options.

Provision of an additional eight oncology chairs, in particular, will improve the health and wellbeing of oncology patients. Cancer is a major cause of illness in Australia and has a substantial social and economic impact on individuals, families and the community. Cancer as a disease group was the leading cause of burden in Australia in 2011, accounting for 19% of the total disease burden[2]. Increased capacity in oncology at Lake Macquarie Private Hospital will reduce delays in access to care and provide care closer to home for cancer patients, improving health and wellbeing outcomes.

By increasing capacity in the health system in the Hunter-New England region, Lake Macquarie Private Hospital redevelopment will also improve health and wellbeing outcomes of public hospital patients. Where there is less pressure on the public health system, through patients receiving health care in the private system, patients of the public health system will experience reduced delays in access to health care. While John Hunter Hospital, the principal referral centre and tertiary public hospital for the Hunter-New England Region, is currently being redeveloped to provide additional inpatient beds, theatres and expanded emergency department, additional capacity will still be required within the public and private health network to meet the future health care needs of the region. In addition, increased capacity in the public health system has flow-on implications to the private health system, increasing demand for private health services.

Access to health care closer to home

Where future demand for healthcare services cannot be met at Lake Macquarie Private Hospital, patients may need to access health care within the public system, or at an alternative private service further away from patients' homes.

In the absence of the redevelopment, it is expected that patients would be required to travel to surrounding hospitals (public or alternative private hospitals) to receive treatment, most commonly by car. At times where theatres are at capacity, patients currently have to travel to other private hospitals. As demand increases for services at Lake Macquarie Private Hospital, in absence of redevelopment, a growing number of patients will need to travel to other private hospitals to receive care. As a result, a direct benefit of the redevelopment is the reduced travel costs (both in terms of time saved and resources used) incurred by patients who would no longer be required to travel elsewhere for treatment. Benefits may also arise to families, carers and visitors to patients that do not have to travel additional distances to support or care for patients.

Improved safety and efficiency

The redevelopment of Lake Macquarie Private Hospital will deliver a new central sterilising unit, ensuring that all reusable surgical products and instruments are cleaned and sterilised in accordance with national standards. Proper sterilisation of surgical equipment is vital to the safety of patients and in reducing the risk of microbial contamination and transmission of disease. A new central sterilising unit at Lake Macquarie Private Hospital will support the delivery of quality patient care and reduced risk of hospital surgical infections.

In addition, the redevelopment of Lake Macquarie Private Hospital will improve efficiency and delivery of health care at Lake Macquarie Private Hospital through the new pharmacy and the relocation of the medical imaging onsite, which is currently housed in the medical centre opposite the hospital. Access to an onsite pharmacy has the potential to improve pharmaceutical care for patients and ensure they have access to pharmaceuticals when required, including post-hospital requirements.

The relocation of the medical imaging onsite will reduce the time and cost associated with the current requirement for vehicle transfers to offsite medical imaging. Onsite access to medical imaging will ensure timely access to care through faster diagnoses and improve staff efficiency and patient flows.

[2] Australian Institute of Health and Welfare (2020), Cancer Overview, [cited at www.aihw.gov.au, published 14 December 2020, viewed 27 September 2021]

Onsite car parking will also provide greater safety and efficiency for patients, staff and visitors. The provision of car parking onsite eliminates the need for patients, staff and visitors to cross the road to access Lake Macquarie Private Hospital, reducing the safety risks and improving accessibility.

Increased resilience

Increased resilience through a power supply upgrade and an emergency generator will be delivered through the redevelopment. The upgrades will increase power supply capacity to support increased demand for services and will be designed for service continuity during events such as emergencies and power outages.

A new emergency generator ensures that during an event, emergency procedures can continue to be delivered and that the hospital can support business as usual activities in addition to the increased demand from disaster response activities. The readiness and capacity to cater for surges in demand at critical times extends to the other hospitals within the health network which will be supported by the emergency generator located at Lake Macquarie Private Hospital. The reliability of power supply will have flow on benefits in terms of avoided delays / backlog of procedures caused by the downtime from power outages and will result in increased safety and better health outcomes for the community.

Increased capacity in the private health care system also provides increased resilience across both the private and public health care system. This has been evident in the recent COVID-19 pandemic where the private system (including Lake Macquarie Private Hospital) has supported the public system by providing additional capacity to the public system within private hospitals to support the freeing-up of beds to support COVID-19 patients. Additional capacity at Lake Macquarie Private Hospital provides increased resilience across the public and private health network for similar incidents in the future.

Economic benefits of additional local employment

The Lake Macquarie Private Hospital Redevelopment aligns with NSW Government and local plans and strategies for growing the Hunter-New England Region.

Lake Macquarie Private Hospital is among Lake Macquarie's largest employers, with a current workforce of 792 nursing, allied health, medical specialist and support staff.[3] The Lake Macquarie Private Hospital Redevelopment is expected to provide 169 new staff roles and 20 new visiting medical officer (VMO), anaesthetist and assistant surgeon roles.[4] The redevelopment will attract skilled workers to the Hunter – New England Region and provide local jobs for local residents, growing the local economy and making the Hunter Region a greater attraction for skilled health care workers. This aligns with the NSW Department of Planning and Environment (2018) *Greater Newcastle Metropolitan Plan 2036*, specifically Strategy 4 – Grow health precincts and connect the health network. [5] Attraction of speciality health care workers to the region will provide improved access to expertise for both public and private patients.

In addition to the new workforce associated with the on-going operation of the new services provided by the Lake Macquarie Private Hospital Redevelopment, construction of the project will create additional jobs and economic activity during the construction period. It is estimated that construction will create 800 - 1,000 direct and in-direct jobs over the 26-month construction period (February 2023 – April 2025).[6] The number of direct construction jobs is estimated at 108 full-time equivalent jobs over the construction

[3] Provided by Ramsay Health Care Limited for the purpose of this assessment

[4] Provided by Ramsay Health Care Limited for the purpose of this assessment

[5] NSW Department of Planning and Environment (2018), Greater Newcastle Metropolitan Plan 2036, www.planning.nsw.gov.au, September 2018

[6] Provided by Ramsay Health Care Limited for the purpose of this assessment

period.[7] This is equivalent to approximately $9.5 million (in 2021/22 prices) in additional household income over the construction period.[8]

2.3 Impacts if the redevelopment did not occur

In the absence of the redevelopment of Lake Macquarie Private Hospital, there is a potential that the facility would be unable to continue the delivery of service at the existing site. This would place an increased burden on the already at / close to capacity public health system. Increased demand for health care within the public system will have two key impacts:

- Detrimental health and wellbeing outcomes for the Hunter-New England communities through increased delays in accessing care, overcrowding and increased travel times and costs to access care further from home. Lake Macquarie Private Hospital provides the only private emergency department in the Hunter-New England Region and, as such, patients would need to access public emergency departments should Lake Macquarie Private Hospital no longer provide this service. Public emergency departments are currently available at Belmont Hospital (9km / 13 mins from Lake Macquarie Private Hospital) and John Hunter Hospital (10km / 14 mins from Lake Macquarie Private Hospital. Both of these emergency departments are currently operating at or close to capacity.[9]
- Increased costs to the NSW Government through both operating and capital expenditure. The movement of patients from the private to public health care system will mean that the NSW Government would experience greater burden in the delivery of health care. As the average cost of care at a public hospital is $5,030 per inpatient separation (in 2021/22 prices)[10], this would equate to an additional operating cost to the NSW Government of $81.9 million (in 2021/22 prices) in 2025 based on projected inpatient admissions of 16,280 in 2025 post-redevelopment[11] In addition, the NSW Government would also experience additional operating costs associated with the 14,690 day-only admissions, 5,000 day surgery attendances and 19,245 emergency department attendances not considered within this calculation. In addition, as there is greater pressure and demand for the public health system, the NSW Government may need to invest in the expansion of capacity to meet the future demand. This investment could require significant capital investment from the NSW Government to ensure the continued delivery of care for patients.

Further, Lake Macquarie Private Hospital plays an important role in the Hunter-New England community. It is one of the largest employers in Lake Macquarie, providing 792 skilled jobs and a source of economic activity. Since commencement of ownership over Lake Macquarie Private Hospital in 2002, Ramsay Health Care Limited has invested significantly in the facility to provide the bed base and services it provides today. Since 2002, the total investment in the facility is $91.1 million (nominal), including investment in furniture, fittings and equipment. This represents significant investment in providing private health care to the local community, including creation of jobs and economic activity.

It also plays an important role in the character of the local community through the following endeavours that would be lost were Lake Macquarie Private Hospital unable to continue the delivery of service:

- Major sponsorship of the Ramsay Health Care Lake Macquarie Running Festival.
- Support of the Music in the Park community event held on Friday nights through summer
- Sponsorship of two major sporting clubs.

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[7] NSW Treasury (2021) NSW Treasury Employment Calculator, [cited at www.treasury.nsw.gov.au, published 19 September 2021, viewed 28 September 2021], assumes construction industry average direct employment multiplier of 0.9 full-time equivalent jobs per $1 million expenditure.

[8] Australian Bureau of Statistics (2021), Average Weekly Earnings, Australia, May 2021, Released 19 August 2021, adopted average weekly earnings by industry (construction), full time adults by industry, original

[9] Bureau of Health Information (2021), Healthcare Observer, Emergency Department statistics – Belmont Hospital and John Hunter Hospital, Apr-Jun 2021 (estimated using time from arrival to leaving and comparison across public hospitals in local health district – Belmont (53%), John Hunter Hospital (51.5%) leaving within 4 hours

[10] Australian Institute of Health and Welfare (2019), Spending on admitted patients, [cited at www.aihw.gov.au, published 22 October 2019, viewed 27 September 2021] – assumes the national weighted average unit (NWAU) for John Hunter Hospital for 2014-15 across all acute admitted patients for 2014/15 – escalated to 2021/22 dollars using consumer price index of 1.6%

[11] Inpatient admission projects post-development provided by Ramsay Health Care Limited for the purpose of this assessment.

- Breakfast club for local primary school.
- Membership of both Warners Bay business network and Hunter Chamber of Business.

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