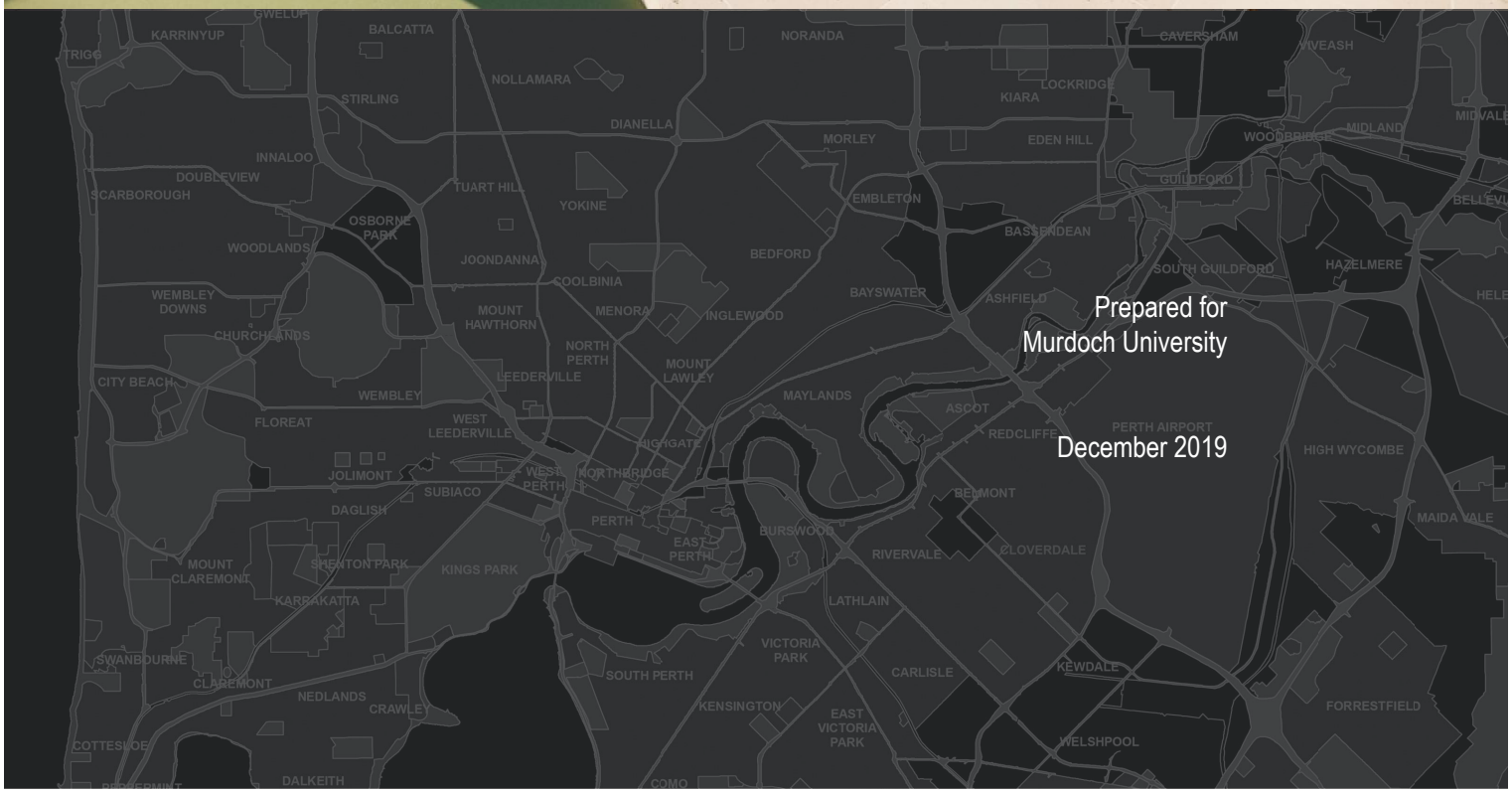
PLANNING SOLUTIONS

URBAN & REGIONAL PLANNING

Development Application

Lot 820 (90) South Street, Murdoch, Western Australia



Prepared for
Murdoch University

December 2019

Direct all inquiries to:

Planning Solutions
Level 1, 251 St Georges Terrace
Perth, WA 6000

All correspondence to:
GPO Box 2709
Cloisters Square PO 6850

Phone: 08 9227 7970
Fax: 08 9227 7971
Email: admin@planningsolutions.com.au
Web: www.planningsolutions.com.au

Project details

Job number	6267	
Client	Murdoch University	
Prepared by	Planning Solutions	
Consultant Team	Town Planning	Planning Solutions
	Architecture	Lyons Architects Silver Thomas Hanley
	Landscape Architect	ASPECT Studios
	Bushfire Consulting	Eco Logical
	Civil Engineering	Aurecon
	Transport Engineering	Aurecon
	Waste Management	Encycle
	Environmental Consulting	Talis

Document control

Revision number	File name	Document date
Rev 0	191026 6267 DA Report	26/11/2019
Rev 1	191219 6267 DA Report	18/11/2019

Contents

Figures

Appendices

1 Preliminary

1.1 Introduction

Planning Solutions acts on behalf of Murdoch University, the registered proprietor of Lot 820 (Deposited Plan 404596) South Street, Murdoch (**subject site**). Planning Solutions has prepared the following report in support of the application to develop a new academic building (**NAB**) on the subject site. The proposed academic building will be located centrally within the Murdoch campus and abutting Discovery Way, as depicted on the development plans. For clarity, and to distinguish it from the wider subject site, this location will be referred to throughout the report as the **development area**.

This report will discuss various matters pertinent to the proposal, including:

- Background
- Site details
- Proposed development
- Statutory planning framework

The NAB will provide an attractive, contemporary and sustainable facility that responds to the surrounding Murdoch University context. The development of the NAB within the existing Murdoch University site will provide over 15,000m^2 of contemporary learning spaces, academic workplaces and campus landscape.

We respectfully request the Western Australian Planning Commission (**WAPC**) and Metro Central Joint Development Assessment Panel (**JDAP**) support and approve the proposed development.

1.2 Background

1.2.1 Preliminary consultation

The NAB design has been developed over the last 12 months in close collaboration with key University stakeholders, and subjected to thorough review by the University's Campus Design Review Committee (**DRC**), which comprises the following members:

- Darren McKee – Murdoch University CEO;
- Professor Geoffrey London – Professor, BArch W. Aust., BA (Fine Arts) GradDipArt&Design WAIT, GradDipAA(Hist & Th.) AAGS Lond., FRAIA
- Alan Dodge - previous director of Art Gallery of WA, Adjunct Professor in the School of Art, Curtin University and Fellow of Edith Cowan University
- Rosie Halsmith – Director, To and Fro Landscape Architecture; and
- Patrick Kosky – Director, Kerry Hill Architects.

The design and consultation process sought to identify the key functional parameters, requirements and capacities for Murdoch University, and included review by external design leaders for adherence to the strategic objectives set out in the Campus Masterplan. Two DRC meetings held in March and May 2019, along with four (4) project design review meetings and various other stakeholder consultation events have produced a design that achieves strategic project objectives and is of exceptional design quality.

1.2.2 Pre-lodgement engagement with City of Melville

In addition to internal stakeholder consultation and design review by the University's DRC, pre-lodgement engagement has also taken place with the City of Melville (**City**), including consideration at a meeting of the City's own Design Review Panel (**DRP**) on 6 November 2019. The DRP did not identify any weaknesses in the proposal, and acknowledged its various strengths including:

- A master plan led design response, with a built form insertion that seeks to organise space and improve legibility.
- A north south proposition with high levels of east west permeability at ground level, as well as a successful response to level change across the site.
- A strong and successful north south spine is created providing strong links and activity in a way that has the potential to optimise and enhance precinct cohesion and legibility.
- A built form proposition that brings some level of definition and cohesion to a series of disjointed buildings and spaces. Open space, such as Banksia Court, are both addressed and defined by an activated built form edge.
- Innovative use of timber construction technology.
- Local firms engaged in a collaborative approach.
- An active and engaged ground plane with a series of choreographed uses, including a covered public space to the north.
- Carefully concealed plant.
- Green star project and sustainability principles.
- An integrated landscape design concept.
- A landscaping strategy to replace every tree removed with 3 new ones.
- A built form that responds well to the context and character of the Murdoch precinct in form, scale, shape and material.

The DRP suggested only a small number of relatively minor improvements prior to development application lodgement, being:

- Further design development of Discovery Way entry point to improve legibility and sense of arrival.
- Consideration of richer palette of materials and detailing to soften extent of paving.
- Consideration of how timber may engage with the ground floor as a continuation of the structure.
- Consider the soffit treatment to roof structures as these will be visually dominant.

These suggestions were considered further by the project architects, and have been addressed in the final proposed design as follows:

- Refinement of the forecourt fronting Discovery Way into an open lawn area and 18m wide promenade to capture direct footfall into the heart of campus and the NAB building.
- Functionality of extensive paved areas maintained, with use of high-quality materials in a range of palettes and treatments to enhance the identity and legibility of the landscaped spaces.
- Height of concrete plinths has been reduced to 1.75m, to preserve structural integrity of the building as well as allow for continuation of the timber structure.
- Soffit of the level four pitched roof structure is under development as a site of public art integration, including light projections and hung sculptures. The functional requirements of the soffit are maintained.

See **Appendix 1** for a copy of the DRP meeting minutes and design response.

2 Site details

2.1 Land description

Refer to **Table 1** below for a description of the subject site lot details.

Table 1: Lot details

Lot	Plan / Diagram	Volume	Folio	Area (ha)
820	404596	2913	972	223.7193

Refer **Appendix 2** for a copy of the Certificate of Title and Deposited Plan.

Please note that the proposed NAB development area measures at approximately 21,000m^2, or less than 1% of the total lot area of the subject site. The remainder of the subject site comprises the existing Murdoch University Campus and is outside the scope of this development application.

A range of limitations, interests, encumbrances and notifications are listed on the Certificate of Title and depicted on the Deposited Plan for the subject site, including:

- Easement for sewage pipeline purposes, to the benefit of Water Authority of Western Australia.
- Easement for wastewater pipeline purposes, to the benefit of Water Corporation.
- Three memorials in accordance with Retirement Villages Act 1992.

It is noted that one of the sewer/wastewater pipeline easements traverses the southernmost end of the proposed NAB development area adjacent Discovery Way. This easement area is unaffected by the proposed building footprint, and sits within the southern landscaped area of the development area.

2.2 Context

2.2.1 Regional context

The subject site, comprising the Murdoch University campus, is located approximately 15 kilometres south of the Perth city centre, approximately 8 kilometres east of Fremantle and 6 kilometres north west of Jandakot Airport. The subject site fronts South Street to the north, Farrington Road to the south, and Murdoch Drive to the east, all of which provide strategic movement linkages to the wider metropolitan area and the Kwinana Freeway (approximately 0.5km east of the campus).

The subject site is situated within the municipality of the City of Melville (**City**), and forms part of the Murdoch Specialised Activity Centre (**MSAC**), being one of five metropolitan specialised activity centres established under *State Planning Policy 4.2 Activity Centres for Perth and Peel* (**SPP4.2**). The primary functions of the MSAC are Health, Education and Research, with the activity centre including both the Murdoch University Campus and Murdoch Health Campus along with key public transport links.

Development within the Specialised Activity Centre is guided by the Murdoch Specialised Activity Centre Plan (**MSACP**). The MSACP is a strategic planning document guiding development in the centre, to capitalise upon the area's potential to become a knowledge-intensive and competitive urban centre, based around core activities of health, education and research and located at the intersection of key transport arteries. A detailed discussion of how the proposed development responds to the Murdoch Specialised Activity Centre Plan is provided in section 4.6 of this report.

2.2.2 Local context and site features

The subject site and activity centre area are generally characterised by institutional activities (including educational, health and retirement living facilities), surrounded by low density residential areas to the north and west, and the Beeliar Wetlands to the south. Discovery Way bisects the University Campus in an east-west alignment, with academic buildings and other civic activities generally occurring to the north of Discovery Way, with conservation areas, recreational facilities, renewable energy and animal grazing/research activities to the south of Discovery Way.

In addition to the MSACP, campus development is also guided by the Murdoch Campus Masterplan (**Masterplan**). The NAB development area is located in the central portion of the subject site, identified by the Masterplan as the 'Academic Core'. The Academic Core is the centre of learning and teaching on campus, with the Masterplan proposing a clustering of academic development around the existing Bush Court. Consistent with this vision, the NAB development area is located south/east of Bush Court and consolidates the University's built form within the Academic Core.

The NAB development area is located approximately one kilometre west of the Murdoch train station and bus interchange, with high frequency bus services provided along Barry Marshall Parade / Discovery Way connecting the station and the University campus. Campus car parking facilities are located generally to the south and west of the development area, on the opposite side of Discovery Way.

The Masterplan envisages the creation of a new southern arrival point for the campus on Discovery Way, adjacent the NAB development area and serving as the everyday arrival point for campus visitors (particularly those arriving by public transport). The development of a landmark building in this location will serve as important entrance statement and further activate this key arrival point.

Refer to **Figure 1**, aerial photograph.

2.2.3 Topography and environmental features

The development area has a sloping topography, falling approximately 12 metres from north to south. This topography is a critical design consideration in the formulation of plans for the proposed NAB.

Existing vegetation within the development area includes planted gardens in the northern portion, a degraded woodland area in the south-western portion and a completely degraded Leptospermum thicket in the south-eastern portion.
While no flora or vegetation of conservation significance has been recorded, a Native Vegetation Clearing Permit (**NVCP**) will be required to clear those areas of native vegetation within the proposed NAB area.

With respect to fauna, some remnant trees within the study area may provide habitat for Black Cockatoos, hence referrals to the federal Department of the Environment and Energy (**DoEE**) under the Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999* (**EPBC Act**) are also required. Furthermore, trapping and translocation programs for South-western Brown Bandicoot will be required, along with the creation of dense vegetation structures through landscaped areas.

Talis Consultants have been appointed by Murdoch University to progress the necessary approvals/referrals required under separate state and federal environmental legislation. This includes a NVCP application to the Department of Water and Environmental Regulation (**DWER**), and engagement/referrals under the EPBC Act.

Refer **Appendix 3** for environmental advice provided by Talis.

PLANNING SOLUTIONS | PS
URBAN & REGIONAL PLANNING

SCALE	1: 4,000 @ A4
DATE	25 November 2019
FILE	01 191125 6267 Aerial Photograph.dwg
REVISION	1/DR/First Draft/25.11.2019

Scale Bar (m)

AERIAL PHOTOGRAPH

LOT 820 (90) SOUTH STREET,
MURDOCH, WESTERN AUSTRALIA

FIGURE 01

3 Proposed development

The proposed NAB development will provide Murdoch University with over 15,000m^2 of contemporary collaborative learning spaces, informal peer to peer learning spaces, an academic workplace and campus landscape. The proposed development has been designed to reference existing campus buildings and demonstrates the University's commitment to sustainable practices and design innovation.

The NAB has been developed based on the following strategic project objectives:

- *To accommodate new types of contemporary new teaching and learning spaces, commensurate with current industry leaders, contemporary standards and student expectations.*
- *To increase the number of learning spaces to facilitate the University's anticipated increased student load.*
- *To provide significant additional informal student learning spaces within the centre of the campus, in response to a current deficit.*
- *To create a new home for the School of Business and Governance provisioned with the specialist spaces necessary to its success.*
- *To enhance the objectives of the 2016 Masterplan, in particular the strategic development of Discovery Way as a primary arrival point to the campus, particularly for public transport networks.*
- *To create a transformative new identity and 'front door' for the campus that reinforces the Murdoch 'brand' as documented in the 2018 Strategic Plan.*
- *To increase the University and campus visibility and profile within the wider community.*
- *To resolve long standing universal access issues to the centre of the campus, particularly from Discovery Way.*
- *To develop an identity for the building that enhances the positive characteristics of the existing campus, as a low rise and landscaped focused environment.*
- *To target international exemplar standards for both sustainable construction and operation.*

3.1 Demolition and clearing

A total of five buildings will be demolished or relocated to allow for the development of the NAB and associated landscaping in the development area. The buildings to be demolished/relocated are as follows:

- Building 380 (demolish)
- Building 385 (demolish
- Property development (demolish)
- Temporary ref (relocate)
- Central plant (relocate)

The relocation of temporary buildings/plant facilities will be undertaken in accordance with any other statutory approvals as necessary, outside the scope of the NAB and this development application area. 75 existing car parking bays are also proposed to be removed from the development area.

Three large existing trees will be retained during development. The remaining vegetation in the development area will be cleared prior to site works commencing, with additional tree planting within future landscaped areas to offset the loss of existing trees.

Refer to **Appendix 4** for a copy of the demolition plan.

3.2 Buildings and structures

The proposed NAB will provide significant additional academic and social space, and includes extensive landscaped outdoor areas for active and passive enjoyment of the campus. Specifically, the proposed development comprises a four-storey academic building and accompanying landscaped areas across the development site.

The proposed NAB is oriented in a north south direction, addressing the Bush Court, central campus facilities and Discovery Way. The siting of the NAB integrates well with the existing campus and achieves the objective of strategic development of Discovery Way as a primary arrival point for campus students, employees and visitors.

The NAB employs a range of design features resulting in an attractive and sustainable built form outcome for a development of its nature. These features include:

- Unique timber construction, making it the first large scale timber building in Western Australia, constructed with locally sourced timber.
- Creation of a new landmark southern arrival point to the campus, enhancing the arrival experience from Discovery Way.
- Designed to function as an individual building and as part of the broader campus, by externalising key building infrastructure such as vertical transport and walkways so they are accessible to students not directly participating in the building.
- Universal access as a key criterion in the design of the building, in particular 1:20 ramping to the campus promenade bookended by two lift cores.
- Design and placement of vertical transport options to promote the use of stairs and escalators over lifts to animate the building through visible student movement, promote incidental student/staff interaction and encourage physical activity.

Refer to **Table 2** below for the development particulars of the development area for each level of the NAB.

Table 2: Development particulars

Level	Development Particulars
1 / Ground	• One industry engagement space. • One café. • Toilet facilities. • One gaming/simulated trade room. • Two open offices and associated store. • Two plant rooms on the western edge. • One LV and one HV switchroom. • One hot water plant. • One cold water break room. • One waste room. • One fire pump room. • One fire tank.
2	• One academic workplace. • Two toilet facilities. • Three meeting rooms. • Three student portals. • Three student portal decks. • Two student halls. • Four collaborative learning spaces. • Two technology enabled learning spaces. • One academic support office. •

Level	Development Particulars
3	• One academic workplace. • Two toilet facilities. • Three meeting rooms. • Three student portals. • Three student portal decks. • Two student halls. • Two technology enabled learning spaces. • One VR learning space comprising. • Four collaborative learning spaces. • One academic support office. •
4	• Two collaborative learning spaces . • Four tiered collaborative learning spaces . • Mechanical plant room which extends in roof space above amenities block. • Two toilet facilities. • Two amenities blocks. • One student hall. • One student portal deck.

Refer to **Appendix 5** for a set of development plans depicting the proposed NAB.

3.3 Stormwater management

Surface water runoff around the perimeter of the NAB will be directed away from the building and where possible directed into soft landscaped areas to provide irrigation and promote natural attenuation through infiltration. A below-ground gravity-fed piped network will carry flows directly to a buried infiltration tank to the south of the building, where water will soak into the ground and ultimately aquifer below.

Refer **Appendix 6** for a copy of stormwater drainage commentary prepared in support of the development application.

3.4 Waste management

A bin store to allow for the storage and collection of all waste and recycling from the building will be located on the ground level to the north of the building. Murdoch University's waste service provider, SUEZ, will service all general waste and recycling generated by the NAB, as per the current servicing regime for the wider campus.

Refer **Appendix 7** for a copy of the waste management plan prepared in support of the development application.

3.5 Landscaping

The NAB will significantly improve the campus experience and maintain ecological connectivity through the inclusion of a number of landscaped areas. The following landscaped areas are proposed as part of the NAB:

- **Arrival Court:** A new southern gateway to the campus adjacent to the bus interchange. This will support the iconic presence of the NAB with an appropriate forecourt, including a lawn area framed by planting, seating and public art to create an arrival experience to the campus.
- **Campus Promenade and Colonnade:** An activated, social space providing a key north-south connection through the Academic Core, interconnected by perpendicular pedestrian links east-west.
- **Banksia Court:** Restoration and enhancement of the eastern edge of the existing Banksia Court, including a series of informal learning pods within the Banksia Court landscape to allow people to experience its unique qualities.
- **Library Court:** Quiet reflective spaces that support the Library and its functions.
- **Social Terrace:** Capitalises on the sloping topography of the site to create a series of generous terraces. Retention of an existing tree in this location provides shade to terraces which may be occupied for informal seating as well as viewing platforms for events on the lower stage area.
- **Undercroft:** A multi-purpose event space with weather protection to ensure flexibility for a diverse range of uses and users. Undercroft will accommodate special events as well as everyday use. The space will be highly adaptable with a combination of fixed, semi-permanent and loose furniture items.
- **The Broadwalk:** Maintained as a major east-west pedestrian spine and upgraded to improve accessibility connecting the new student landscape with Bush Court and the northern campus.
- **Eastern Gardens:** A passive environment with generous open lawn areas and arced seating. Paved plazas with a canopy of shade trees will create a landscape of connectivity between the building and eastern campus precinct.

The inclusion of landscaped areas throughout the development area will allow for the movement of fauna through an important wildlife corridor. Refer **Appendix 8** for the proposed NAB landscaping plan.

3.6 Transport considerations

East-west connectivity through the campus will be enhanced through upgrades to the existing Broadwalk. The Promenade is to become the primary north-south pedestrian promenade activating the eastern edge of the Library, intersected by a series of east-west pedestrian connections which continue through the building linking directly to Banksia Court and the academic buildings to the east.

Vehicle access to the NAB will be restricted to waste collection and delivery vehicles, which will access a loading dock on the northeast side of the NAB. Emergency vehicles which will access the building from Tea Tree Loop. Construction of the NAB will restrict vehicle access to existing buildings on the western side of the NAB.

The proposed NAB is located immediately north of a key public transport corridor (Discovery Way), and will contribute to the creation of a new campus entry point consistent with the Masterplan vision for the campus. A significant proportion of NAB visitors are expected to access the site via public transport, and for this reason, no new parking is proposed as part of this development. There are currently some 3,900 parking spaces distributed across the various campus car parks and managed using a regime of different permits. The existing and proposed car parking arrangements remain in accordance with campus policies and as separately assessed as part of the Murdoch University Master Plan Transport Assessment.

Refer **Appendix 9** for a copy of the transport impact statement prepared in support of this development application.

4 Planning framework

4.1 Perth and Peel@3.5million

Perth and Peel@3.5million is a strategic planning document which provides a long-term and integrated framework for land use and infrastructure provision in the Perth and Peel metropolitan regions. The document sets out the long-term vision for the metropolitan area:

A great, connected city that is globally competitive and technologically advanced; that is sustainable, resilient and respects its natural assets and heritage; that maximises the use of new and existing infrastructure; that offers a mix of housing and lifestyle choices; and that respects and acknowledges the regions' sensitive natural environments and their respective ecosystems.

The Central sub-regional planning framework forms part of the Perth and Peel@3.5million suite of documents, and identifies the subject site within the Murdoch Activity Centre. The framework identifies Discovery Way as a high frequency public transit link, and notes that "*Specialised activity centres provide opportunities for the development of complementary activities, particularly knowledge-based businesses. They present a unique opportunity to combine specialised employment, residential living and education in one place, while also activating the area so it becomes a distinctive and engaging location for the community. New and upgraded health and education facilities are planned at Murdoch, UWA-QEII and Curtin/Bentley, and these centres will be key engine-rooms for future growth in health, education, research and high-tech engineering and development services*."

The proposed NAB development within the Murdoch University campus will deliver new academic facilities and drive future growth in educational services. Its sustainable design is also respectful of the surrounding natural and built environments of the Murdoch campus and surrounds. It is therefore consistent with the strategic vision and planning frameworks presented by Perth and Peel@3.5million.

4.2 Metropolitan Region Scheme

The subject site is wholly reserved for *'Public Purposes – University'* under the Metropolitan Region Scheme (**MRS**). Accordingly, development approval is required pursuant to Part IV of the MRS, with the Western Australian Planning Commission (**WAPC**) being the 'responsible authority'.

4.3 Local Planning Framework

4.3.1 City of Melville Local Planning Scheme No. 6

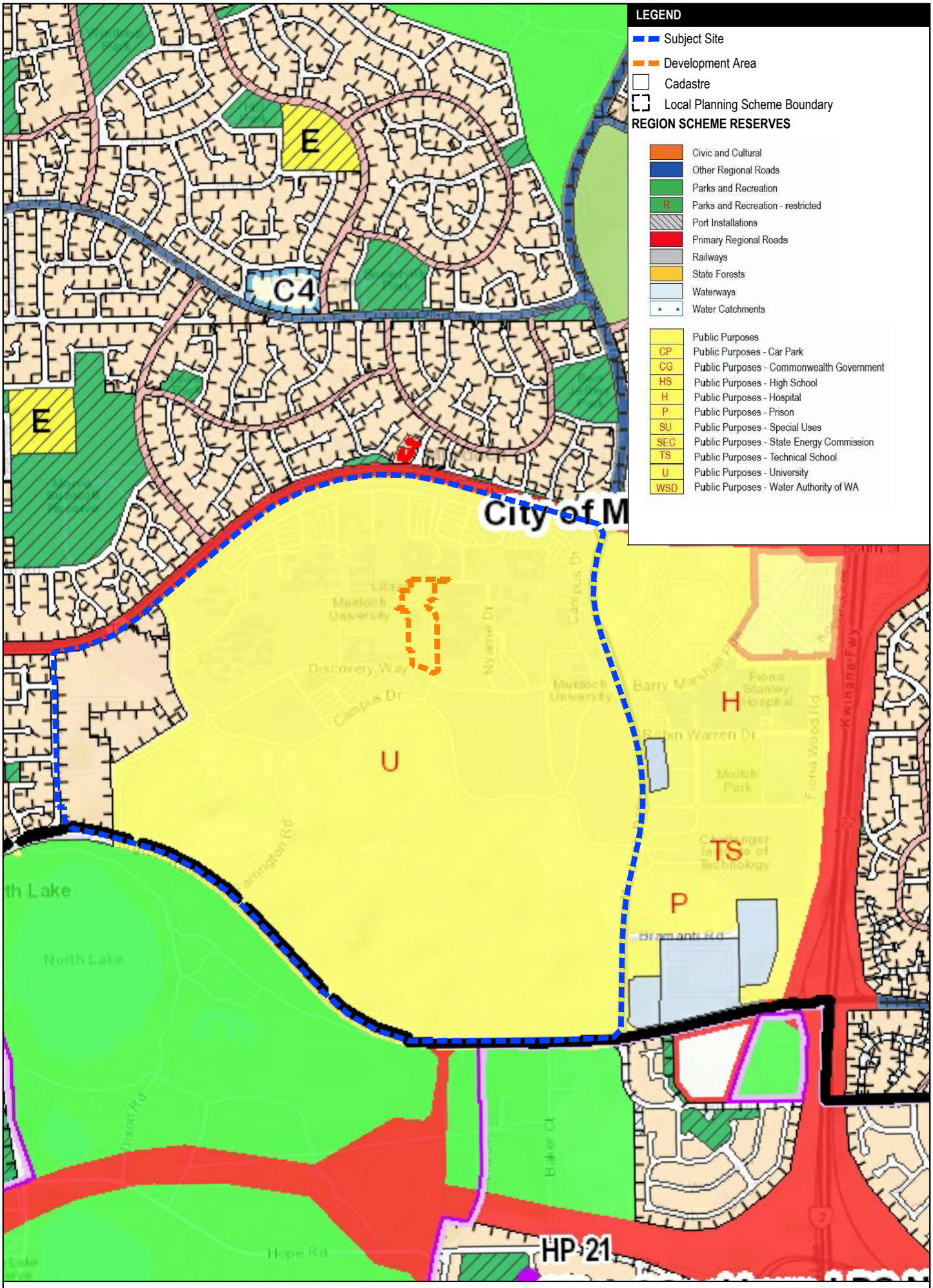
The subject site is wholly reserved for *'Public Purposes – University'* under the MRS, and is not zoned/reserved under the City of Melville's Local Planning Scheme No. 6 (**LPS6**). Refer **Figure 2** zoning map.

The proposed development is therefore exempt from requiring development approval of the local government, pursuant to Clause 61 of the Deemed Provisions of the *Planning and Development (Local Planning Schemes Regulations 2015*. Notwithstanding this, we have considered the proposal against the provisions of the City's local planning framework, and note that the proposed development is consistent with following objectives of LPS6:

(a) *(v) to promote a high standard of development;*

(vi) provide a more sustainable built urban environment

(b) *(v) to ensure urban form and development contribute to sustainability (economic, social and environmental), promote efficient resource use and minimisation of energy and waste*



PLANNING SOLUTIONS | PS
URBAN & REGIONAL PLANNING

SCALE	1: 15,000 @ A4
DATE	26 November 2019
FILE	02 191126 6267 Zoning Map.dwg
REVISION	1/DR/First Draft/26.11.2019

Scale Bar (m) 0 100 200 300 400 500

ZONING MAP

LOT 820 (90) SOUTH STREET,
MURDOCH, WESTERN AUSTRALIA

FIGURE 02

4.3.2 City of Melville Local Planning Policy 1.5 Energy Efficiency in Building Design

Local Planning Policy 1.5 (**LPP1.5**) encourages the incorporation of environmentally sustainable and energy efficient design principles as standard practice in the development of buildings within the City. The lightweight timber frame construction of the proposed development is an example of excellence in sustainable design. The sustainability of the building during its lifetime will be further enhanced by the incorporation of solar panels on the roof extent.

The proposal is therefore wholly consistent with the objectives of LPP1.5.

4.3.3 City of Melville Local Planning Policy 2.1 Non-Residential Development

Local Planning Policy 2.1 (**LPP2.1**) applies to all non-residential development in the City. The NAB is consistent with the objectives of LPP2.1, in particular:

- *To promote high quality architectural form to maintain and enhance the visual character of the City.*
- *To ensure new buildings are designed to be of human scale to facilitate effective movement and interaction between building and street.*
- *To ensure building frontages at the street level assist in the creation of safe built environments through use of internal and external lighting, encouraging visual interest and ensuring passive surveillance.*
- *To ensure that all buildings make a positive contribution to the streetscape, assisting in the maintenance and creation of safe, secure and attractive places.*

The NAB achieves an outstanding architectural form, enhancing the visual character of the campus and creating an iconic campus entry point. Glazed façades and external staircases ensure activation and visual interest as well as passive surveillance to the NAB surrounds.

4.4 State Planning Policies

4.4.1 State Planning Policy 3.7 Planning in Bushfire Prone Areas

State Planning Policy 3.7 Planning in Bushfire Prone Areas applies to sites which are within a designated bushfire prone area, and requires a bushfire management plan to be prepared for such sites.

The development area is located wholly outside of any Bushfire Prone Areas, thus a bushfire management plan is not strictly required to be submitted as part of this development application.

However, based on a review of previous campus bushfire investigations and the proximity of the development area to other Bushfire Prone Areas, the Department of Fire and Emergency Services (**DFES**) has been consulted and provided its 'in principle' support for the proposal.

A Bushfire Assessment by qualified bushfire consultants has recommended construction standards pertaining to BAL-12.5 be incorporated into building design and construction. Refer to **Appendix 10** for a copy of the Bushfire Assessment.

4.4.2 State Planning Policy 4.2 Activity Centres for Perth and Peel

The subject site is located in the Murdoch Specialised Activity Centre and therefore the requirements of State Planning Policy 4.2 Activity Centres for Perth and Peel (**SPP4.2**) apply.

Clause 5.1.1 (1) of SPP4.2 states that the primary functions of the Murdoch Specialised Activity Centre are Health, Education and Research. Provision of a new academic building within the existing University campus strengthens the primary functions of the Activity Centre and is therefore wholly consistent with the policy provisions of SPP4.2.

The Murdoch Specialised Activity Centre Plan (**MSACP**) has been prepared in accordance with SPP4.2, with further detailed assessment provided in section 4.6 of this report.

4.4.3 State Planning Policy 7.0 Design of the Built Environment

State Planning Policy 7.0 Design of the Built Environment (**SPP7.0**) became operational on 24 May 2019. It is the lead policy that elevates the importance of design quality, and sets out the principles, processes and considerations which apply to the design of the built environment in Western Australia, across all levels of planning and development.

SPP7.0 establishes a set of ten 'Design Principles', providing a consistent framework to guide the design, review and decision-making process for planning proposals. A high level review of these principles is provided in **Table 3** below, and addressed in further detail in the design statement included at **Appendix 11**.

Table 3: SPP7 design principles review

Design principle	Response
Context and character *Good design responds to and enhances the distinctive characteristics of a local area, contributing to a sense of place.*	The NAB responds to and enhances the distinctive characteristics of the Murdoch 'bush campus,' through its use of gable roof forms and linear building form.
Landscape quality *Good design recognises that together landscape and buildings operate as an integrated and sustainable system, within a broader ecological context.*	The landscape response represents a cohesive approach, enhancing the existing landscape character of the Murdoch campus and maintaining ecological connectivity.
Built form and scale *Good design ensures that the massing and height of development is appropriate to its setting and successfully negotiates between existing built form and the intended future character of the local area.*	The massing and height of the NAB is consistent with existing campus buildings, as well as defines a new campus character from the southern entry point on Discovery Way.
Functionality and build quality *Good design meets the needs of users efficiently and effectively, balancing functional requirements to perform well and deliver optimum benefit over the full life-cycle.*	The NAB successfully balances future flexibility with technical performance, intended to deliver optimum benefit over the full life cycle of the building. This is achieved through the 'creative warehouse' model in which internal partitions allow flexibility in internal form.
Sustainability *Good design optimises the sustainability of the built environment, delivering positive environmental, social and economic outcomes.*	A hallmark of the NAB's sustainability credentials are its use of world leading timber frame, the first mass timber building in Western Australia. The lower embodied energy of timber, as well as local sourcing achieves both environmental and social sustainability.
Amenity *Good design provides successful places that offer a variety of uses and activities while optimising internal and external amenity for occupants, visitors and neighbours, providing environments that are comfortable, productive and healthy.*	The NAB incorporates a range of teaching and learning, peer learning, academic workplace, students services, community and industry engagement spaces as well as food and retail. The diversity of activity in the building and its surrounds provides high amenity to users. The NAB is universally accessible and greatly improves the campus experience.

Design principle	Response
Legibility *Good design results in buildings and places that are legible, with clear connections and easily identifiable elements to help people find their way around.*	The NAB enhances existing campus movement corridors, with upgrades to the east-west Broadwalk and the creation of a north-south Promenade. Legibility of the southern entrance to campus along Discovery Way is greatly improved.
Safety *Good design optimises safety and security, minimising the risk of personal harm and supporting safe behaviour and use.*	The glazing extent of the NAB provides passive surveillance to the surrounding campus landscape. The primary circulation path between the campus and transit exchange will be lit after hours for improved safety and security.
Community *Good design responds to local community needs as well as the wider social context, providing environments that support a diverse range of people and facilitate social interaction.*	The NAB provides excellent opportunities for social interaction within and in the surrounding landscape. Designated community and industry spaces within the NAB promote broader connection between the university and broader community.
Aesthetics *Good design is the product of a skilled, judicious design process that results in attractive and inviting buildings and places that engage the senses.*	A collaborative design process including a range of stakeholders and industry-leading landscape and architectural practices has produced an outstanding, visually striking campus building.

As previously noted, the NAB proposal has been subjected to considerable design review exercises over the last 12 months, including multiple meetings of the University's Design Review Committee and a meeting of the City's Design Review Panel. This design review process is in accordance with best practice advocated by SPP7.0, and resulted in a high quality design that positively addresses all ten of the design principles.

4.5 WAPC Development Control Policies

4.5.1 Draft Development Control Policy 1.2 Development Control – General Principles

Draft Development Control Policy 1.2 (**DCP1.2**) applies to all land reserved or partly reserved for any purpose other than regional road purposes under the Metropolitan Region Scheme. The relevant policy objectives applicable to the proposed development are outlined below:

- *To protect the integrity and purpose of reservations made under the MRS.*
- *To ensure development is consistent with the provisions of the relevant local government scheme.*
- *To ensure development is in accordance with sound town planning principles.*
- *To promote development that is sustainable and achieves appropriate community standards of health, safety and amenity.*
- *To ensure development is site-responsive, enhances local identity and character and is well-connected to the adjacent neighbourhood.*
- *To facilitate land uses that support daily needs, local employment and provide choice and variety.*

The proposed development is wholly consistent with DCP1.2. In particular, the inclusion of a new academic building is wholly consistent with the '*Public Purposes – University'* reservation under the MRS, is well integrated with the existing campus, and supports the daily needs of staff and students on campus. Further, the proposed development is in accordance with sound town planning principles and is an exemplar of sustainable design.

4.6 Murdoch Specialised Activity Centre Structure Plan

The *Murdoch Specialised Activity Centre Structure Plan* (**MSACSP**) provides a framework for the long-term planning and development of Murdoch as a specialised centre of growth. The MSACSP has a long-term vision for the market driven agglomeration of key health, education and research activities and the continued promotion of Murdoch as a knowledge intensive and competitive urban centre.

Murdoch University is one of four significant strategic anchors within the Murdoch Specialised Activity Centre, in addition to Fiona Stanley Hospital, St John of God Hospital and Challenger Institute of Technology (now South Metropolitan TAFE, Murdoch Campus). Within the Murdoch Activity Centre, the subject site is located within the Murdoch University Core Campus precinct.

Refer **Figure 3** Murdoch Specialised Activity Centre Structure Plan Map.

The proposed NAB development is consistent with the MSACSP objectives and built form guidelines, as comprehensively addressed in **Tables 4 and 5** below.

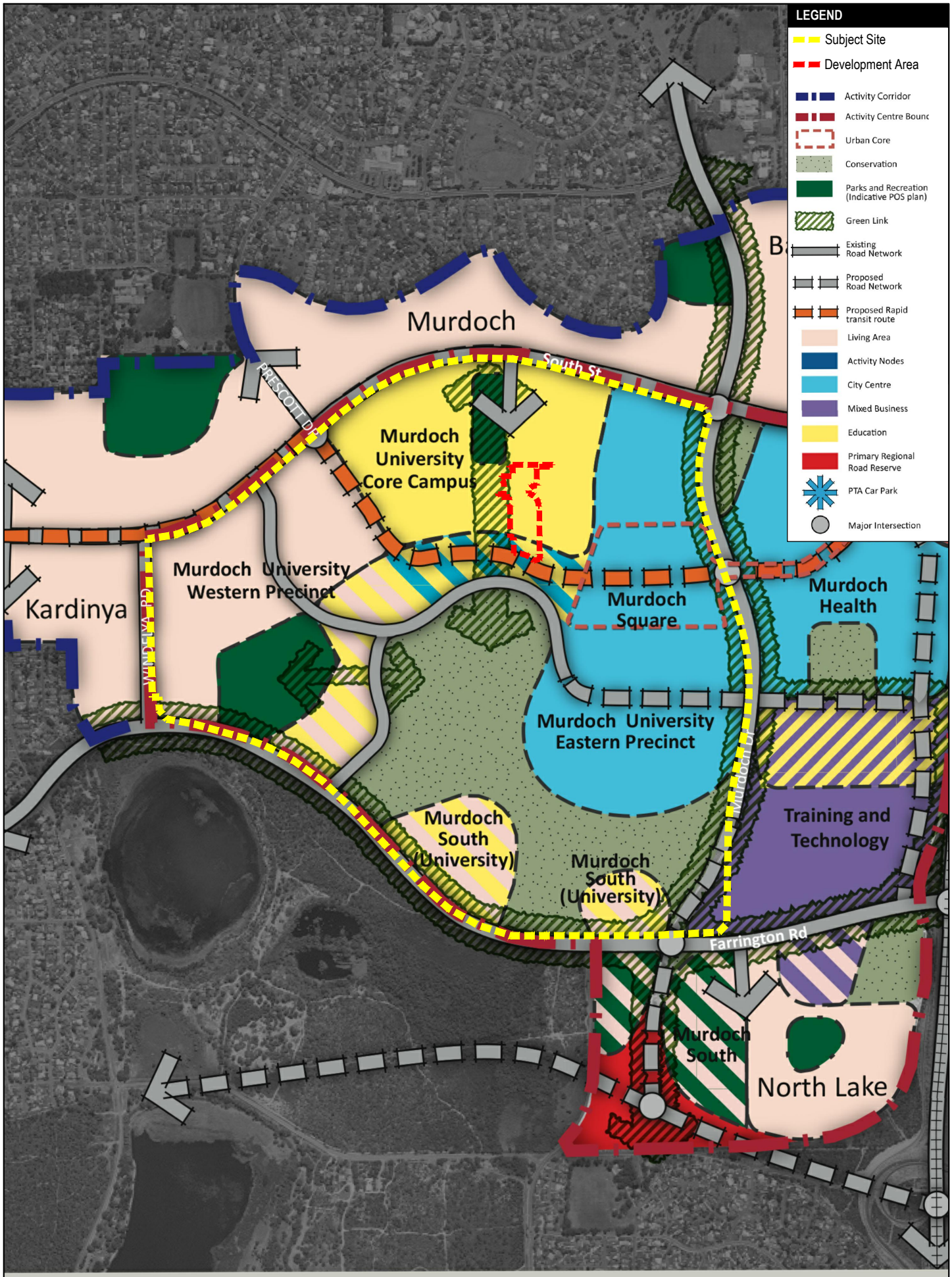
Table 4 – Murdoch Specialised Activity Centre Structure Plan objectives

#	Objective	Comment	Achieved
1	*A major urban centre with one of the highest levels of activity and employment outside the Perth CBD.*	The proposed development will create additional employment opportunities within the Murdoch Activity Centre by employing academic and other university staff.	✓
2	*A national centre for excellence in health, education and commercialisation of knowledge.*	The proposed development will continue to aid the progression of the locality towards a national centre for excellence in education through a highly innovative teaching and learning space, forming a new hub within the campus.	✓
6	*A leader in place making that will set a new benchmark for the integration of an urban centre with a sensitive natural environment.*	The proposed development responds appropriately to the bush setting of the campus, well integrated into the surrounding campus buildings and the natural environment.	✓
7	*A new standard for conserving resources on a centre-wide basis.*	The exemplary incorporation of sustainability into all aspects of the design and life of the new academic building ensures resources are conserved to the highest degree.	✓

Table 5 – Murdoch Specialised Activity Centre Structure Plan built form guidelines assessment

Urban Corridor / Bush Campus Requirement	Comment	Achieved
Urban Grain (e.g. building pattern)		
Semi-formal block pattern with partial activation to streets except within some campuses.	The NAB activates the southern entrance to the campus fronting Discovery Way, through external staircases and glazed façades encouraging connectivity between internal and external building areas.	✓
Townscape character (e.g. coherence)		
Mid-scale density and built forms with infill development blending with more traditional or well-established campus architecture.	The proposed development is of a mid-scale density and has been designed to respond to the established architecture of the existing Murdoch University Campus. The proposed development includes dominant roof forms, timber rafters and expressed copper gutters and downpipes, thus referencing the well-established campus architecture as well as taking advantage of innovative developments in construction technology.	✓

Urban Corridor / Bush Campus Requirement	Comment	Achieved
Formal mid-density campus. Formal rectilinear plan with horizontal emphasis to building forms	The built form of the proposed development has a horizontal emphasis and rectilinear design features.	✓
Building typology and scale (e.g. heights)		
3-4 storeys (up to 6 storeys within tree line in landmark locations)	The proposed development is a maximum of 4 storeys and responds well to the unique topography of the development area.	✓
Block layout principles (e.g. setbacks)		
Site coverage 80-100% up to 2m setbacks.	Site coverage and boundary setback calculations are not applicable in the context of the NAB development in the wider campus site. Notwithstanding this, the NAB achieves significant coverage of the development area, and interfaces appropriately with the surrounding campus environment.	✓
Upper storeys up to 5 m setback.	N/A – No setback is proposed or required for the upper levels as the NAB is not located in proximity to a lot boundary and is part of a wider campus.	**N/A**
Building façades and frontages (e.g. articulation and activation)		
Vertical articulation preferred.	Vertical articulation is achieved through various design elements, including the inclusion of student portal decks provide visual interest and articulation to the building façade.	✓
50–70% active frontages (80% along transit frontage).	The development proposes a new arrival promenade and improves the arrival experience from Discovery Way, with active frontages to all four sides of the NAB. The use of open façades/glazing promotes activity at ground level around all frontages.	✓
Atriums not permitted on building frontages.	No atriums are proposed as part of the development (nor does the building have public street frontage).	✓
75% of façades to have entry or window openings.	A key design feature of the NAB is the extent of glazed external walls and various entry/movement points on the various facades. All facades are extensively glazed consistent with Activity Centre Plan requirements.	✓
Unbroken awnings where 0.0 m setback employed or else 75% coverage.	Deep eaves are a defining architectural feature of the campus generally, including the NAB, and therefore perform as awnings surrounding the NAB.	✓
Vehicular access (e.g. servicing and parking)		
From lane entries off side or rear streets. *Lanes may have secondary access and service areas.* *Temporary lease car parking permitted.* *Permanent car parking in basement or integrated into built form.*	No car parking is proposed as part of this development. It is anticipated visitors to the building will make use of the public transport along Discovery Way or ample existing car parking on campus, in accordance with the Campus Masterplan. Waste collection and delivery vehicles will access a loading dock on the northeast side of the NAB, and emergency vehicles will access the building from Tea Tree Loop. Construction of the NAB will restrict vehicle access to existing buildings on the western side of the NAB.	✓



PLANNING SOLUTIONS | PS
URBAN & REGIONAL PLANNING

SCALE	1: 15,000 @ A4
DATE	26 November 2019
FILE	03 191126 6267 Structure Plan.dwg
REVISION	1/DR/First Draft/26.11.2019

Scale Bar (m) 0 100 200 300 400 500

STRUCTURE PLAN MAP

LOT 820 (90) SOUTH STREET,
MURDOCH, WESTERN AUSTRALIA

FIGURE 03

4.7 Murdoch Campus Strategic Masterplan

The *Murdoch Campus Strategic Masterplan* (**Masterplan**) establishes a framework for the progressive development of the University campus in the context of the MSACSP. The document outlines the improvements required to the physical environment that will allow the University to meet growth projections, capitalise on its core values and capabilities as well as contribute to the wider Activity Centre.

The Masterplan applies to all land located within the Murdoch Campus. The design of the NAB has been informed by consultation with the Murdoch Campus Design Review Committee, ensuring consistency with its vision. As evidenced in **Figure 4** below, the NAB development area is identified as an 'Academic Core Development Site' by the Masterplan, where refurbishment and redevelopment is to occur over the short to medium term.

Figure 4 – Murdoch Campus Masterplan

The relevant visioning and objectives of the Masterplan are addressed in **Table 6** below.

Table 6 – Murdoch Campus Masterplan Vision and Key Initiatives

Vision / objective element	Comment	Achieved
	Vision	
A revitalised campus that is a distinctive, attractive, comfortable, legible and memorable place for students, staff and the community.	The NAB is a landmark building which provides a distinctive, attractive and memorable southern entry point to the campus.	✓
New campus planning and architecture will promote sustainable design and uphold the principles and spirit of the original design that successfully unites buildings and landscape, to celebrate the beautiful bushland setting and native Australian flora and fauna.	The NAB references the original campus buildings through its use of deep eaves and timber rafters. The built form also references the surrounding flora particularly in the student portal decks have an architectural form derived from banksia seed pods. Further, the landscape design proposes a series of high-quality spaces that integrate into the existing built form and landscape context.	✓

Vision / objective element	Comment	Achieved
New development will be integrated with the academic core to achieve a consolidated campus that is consistent with the objectives of the WAPC's MSAC structure plan, respecting the character and value of the distinctive, expansive natural and cultivated landscape, farm and biodiversity assets for the benefit of generations to come.	The NAB is located within the Academic Core, achieving a consolidation of the existing campus built form to enhance the vibrancy of the campus experience and satisfy the objectives of the MSACSP.	✓
Prioritise and secure high-quality design and a standard of amenity for all existing and future occupants of land and buildings.	Principal architects Lyons are an award-winning architecture practice specialising in higher education and training facilities, and have collaborated with a number of Perth-based architecture practices to offer a diversity of approach within a large scale project. The resulting NAB design exemplifies high-quality and monumental design, evidenced by extremely positive feedback received during preliminary DRP consultation.	✓
Any development on campus needs to be cognisant of these connections (hydrology, soils and biodiversity) and ensure these significant areas are protected with appropriate buffers and neighbouring land uses.	Biodiversity connections are ensured by the planting of appropriate species in landscaped areas of the NAB, integrating the development with the 'bush campus' setting and surrounding context. Refer **Appendix 8** Landscaping Plan. A Stormwater Management Plan is also included in **Appendix 6** of this report.	✓
Key initiatives		
Develop cutting edge learning, teaching and research facilities in the Academic Core using best practice space optimisation to meet the University's growth aspirations and modern expectations.	The NAB includes a number of cutting edge learning and teaching facilities including technology enabled learning spaces, VR learning spaces and global immersive learning spaces. The diversity and flexibility of learning spaces contributes to a 21st century learning experience for students.	✓
Prioritise Discovery Way as the primary gateway for public and private transport, incorporating a clear University arrival point at Southern Plaza.	The NAB forms a key element of the southern arrival point to campus along Discovery Way.	✓
Protect and restore the ecological networks within their intrinsic wealth of biodiversity as critical community assets throughout the campus precincts and as regional connectors.	The NAB project is sensitive to the ecological importance of the subject site, and the landscaping response will ensure continuation of ecological networks on campus.	✓
Rationalise the campus precincts to create a consolidated development footprint, facilitating better connectivity.	The NAB contains development within the Academic Core, creating linkages with the Library and other surrounding academic buildings.	✓
Development acknowledges and builds upon the original campus design philosophy, and reinforces Bush Court as the primary space within the Cartesian grid.	Design of the NAB responds to and references existing campus buildings in both form and materials.	✓

Vision / objective element	Comment	Achieved
Establish a network of urban plazas and courtyards that are linked via a hierarchy of easily legible pedestrian routes.	The project includes the creation of a number of new urban plazas within the campus environment, well connected to existing campus spaces through north-south and east-west movement corridors.	✓

Having regard to the above, the NAB presents a positive step towards achieving the vision and key initiatives of the Masterplan. Collaboration with University stakeholders and the University's Campus Design Review Committee throughout the project ensured its alignment with the long-term visioning of the University campus.

5 Conclusion

This application seeks approval for the development and use of a new academic building in the development area, which sits wholly within the Academic Core of the Murdoch University Campus. The proposed development represents an exciting opportunity to modernise the Murdoch University Campus and allows the continued growth of the Murdoch Activity Centre as a hub for research and education excellence. Extensive consultation in the design of the NAB has led to a development which responds comprehensively to the Murdoch Campus Masterplan and broader planning framework.

In summary, the proposal warrants approval for the following reasons:

- A thorough process of consultation and design review has occurred to ensure the proposed NAB development meets project objectives, is consistent with the Murdoch Campus Masterplan and is of a design quality befitting of its strategic entry point location.
- The proposed development of a new academic building is consistent with the land's reservation status under the MRS.
- The proposed development is wholly consistent with Murdoch Specialised Activity Centre Plan and the broader planning framework.
- The proposed development responds sensitively to the ecological context of the Murdoch Campus, and retains Murdoch University's status as a 'bush campus.'
- The proposed development achieves an exceptional level of design quality, in particular through its use of timber frame construction to further the environmental sustainability of the University's built environment. This has seen it receive positive feedback and support of both the University's Design Review Committee and the City's Design Review Panel.

Having regard to the above, this report demonstrates the suitability of the proposed development in the context of the broader Murdoch Campus and specialised activity centre. Accordingly, we respectfully request the application be supported by the WAPC and approved by the Metro Central JDAP.

Appendix 1
Design Review Panel Meeting Minutes and Design Response

NOTES
DESIGN REVIEW PANEL

Meeting Date: **Wednesday, 6 November 2019**
Meeting Time: **9.30 am**
Venue: **Swan Room, City of Melville**
Meeting Started:

Note: Items 2-5 were considered by the panel in their capacity as the City Of Melville Design Review Panel.

1. Attendance

(a) Panel Members

Domenic Snellgrove	(Chairman – Cameron Chisolm Nicol) (left 12.40pm)
Malcolm Mackay	(Mackay Urban Design) (acting Chairman - Item 5)
Chris Maher	(Hames Sharley)
Mr Hans Oerlemans	(Wonder CL)

(b) Proponents

Embrace Architects and Element	- *Item 1*
Blocq+	- *Item 2*
Element	- *Item 3*
Planning Solutions	- *Item 4*
Planning Solutions	- *Item 5 (late item)*

(c) City Officers

Fiona Mullen	(City of South Perth)
Siven Naidu	(City of South Perth)
Laura Kelliher	(City of South Perth)
Victoria Madigan	(City of South Perth)
Mr Troy Cappellucci	(City of Melville)
Mr Ben Ashwood	(City of Melville)
Mr Mark Scarfone	(City of Melville)
Simon Childs	(City of Melville)
Peter Prendergast	(City of Melville)

2. Apologies

Damien Pericles	(Realm Studios)
Fred Chaney	(Taylor Robinson Chaney Broderick)

3. Declaration of Interest

Chris Maher – Item 3

4. Item 4 – Lot 820 (No.90) South Street, Murdoch (Pre-lodgement

Proposed Academic Building (Murdoch University)

4.1. Officer Presentation *– TO COMMENCE APPROX 11:45am*

City of Melville Planning Services Coordinator, Mark Scarfone briefly introduced this item to the Panel.

4.2. Proponent Presentation *– TO COMMENCE APPROX 11:50am*

The project team presented this item to the Panel.

4.3. Design Quality Principles

Items presented to the Design Review Panel are assessed by a panel of architects using the "design quality principles" and with due regards to Design WA. The design principles include but are not limited to – character, continuity and enclosure, quality of the public realm, ease of movement, legibility, adaptability, diversity and sustainability.

The Panel will provide commentary regarding the elements of the design that are supported and those that would benefit from further consideration. For preliminary applications, the Panel's comments shall be provided to the proponent to assist in the development of the design.

(a) Strengths of the proposal

- Master plan led design response with a built form insertion that seeks to organise space and improve legibility.
- North south proposition with high levels of east west permeability at ground as well as a successful response to level change across the site.
- A strong and successful north south spine is created providing strong links and activity in a way that has the potential to optimise and enhance precinct cohesion and legibility.
- A built form proposition that brings some level of definition and cohesion to a series of disjointed buildings and spaces. Open space, such as Banksia Court, are both addressed and defined by an activated built form edge.
- Innovative use of timber construction technology
- Local firms, including Fulcrum Agency, Office Wood and Silver Thomas Hanley engaged in a collaborative approach.
- Active and engaged ground plane with a series of choreographed uses including a covered public space to the north.
- Carefully concealed plant.
- Green star project and sustainability principles.
- Integrated landscape design concept
- Strategy to replace every tree removed with 3 new ones.
- A built form that responds well to the context and character of the Murdoch precinct in form, scale, shape and material.

(b) Weaknesses of the proposal

- None identified.

(c) Suggested improvements to the proposal

- Consider how timber may engage with the ground floor as a continuation of the structure.
- The Discovery Way point of entry could benefit from further design development to improve the sense of arrival and legibility.
- Consider the soffit treatment to roof structures as these will be visually dominant.
- Consider opportunities to mitigate the extent of paving with a richer palette of materials and detailing.

(d) Recommendation

- Incorporate the suggested improvements into the development application prior to lodgement.

Town Planning Design Review – Response to Feedback

1. Consider how timber may engage with the ground floor as a continuation of the structure.

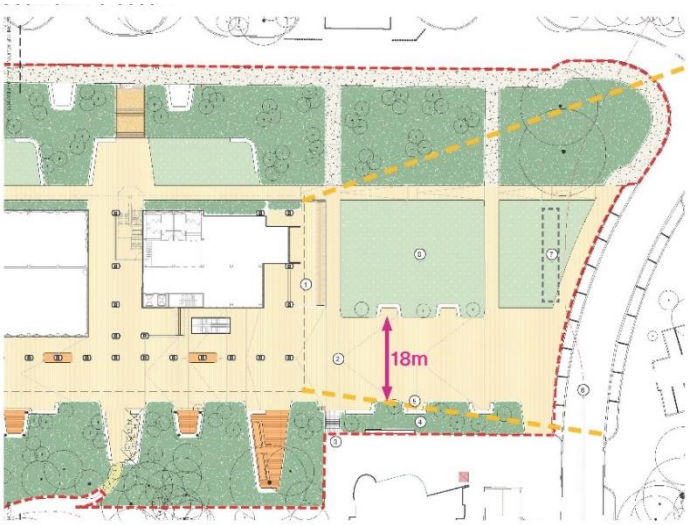
The design team has incorporated this suggestion by lowering the height of the concrete column plinths. The plinths were shown taller in the initial planning submission (varied from 4-7m tall) and have been reduced to 1.750m through detailed design with the structural engineering team. The current plinth height is a technical requirement to achieve the required structural resilience at ground level, terminate the bracing loads at ground floor, avoid termite access to timber structure and minimise vandalism at low level. The CLT timber floor structure will also be exposed as a soffit treatment for the full length of the colonnade.

Left: 4-7m concrete plinths shown in initially proposed.

Right: 1.75m concrete plinths currently proposed.

2. The Discovery Way point of entry could benefit from further design development to improve the sense of arrival and legibility

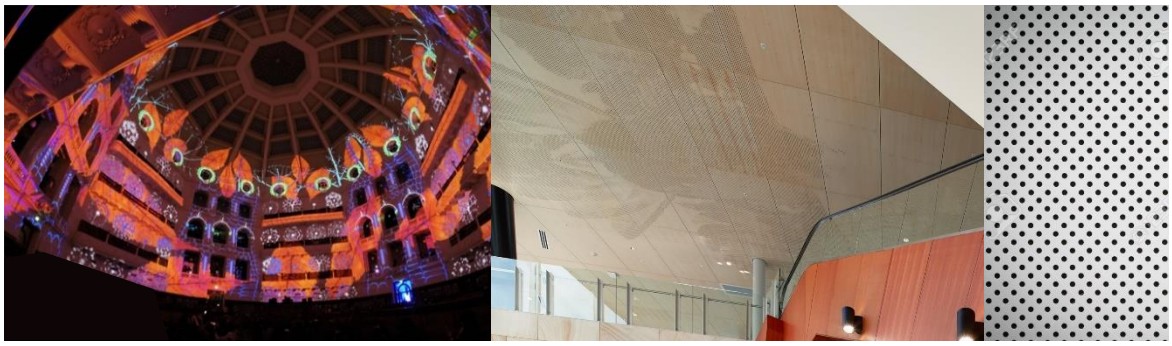
The design of the Discovery Way entrance has been further developed to improve the sense of arrival and legibility as a key entrance to the campus. The promenade has been widened to capture and direct footfall into the heart of the campus whilst also opening up to clearly allow access into the NAB building via the front door and escalator entrances. The forecourt has been refined into an open lawn space that creates a new setting and event space at the front of the building. The design includes east-west pedestrian access and anticipates the future road widening and drop-off area.



Left: Currently proposed forecourt with developed sense of arrival and legibility

3. Consider the soffit treatment to roof structures as these will be visually dominant

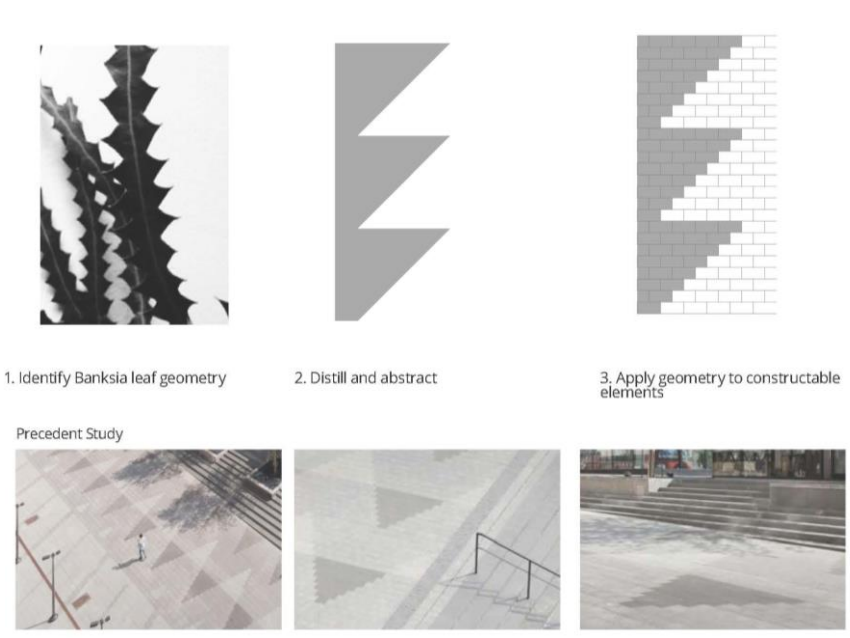
The design team has incorporated this suggestion by developing the soffit treatment to the level four pitched roof structure. This surface is under development as a canvas for public art integration in addition performing functional requirements to reflect light from wall mounted up light fittings and provide acoustic deadening. Murdoch University and the design team are currently investigating light projections, custom images in the cladding perforation and hung sculptures.



Left: Light projections. Centre: Perforated image on soffit by commissioned artist at University of Newcastle, Newspace. Right: Perforated aluminium sheet.

4. Consider opportunities to mitigate the extent of paving with a richer palette of materials and detailing.

The geometry and extents of the paved areas is largely a function of service, fire and maintenance access to the building as well as accommodating the anticipated footfall around the building. A refined palette of robust and low maintenance materials are proposed that are in keeping with the project context and architecture. The proposed design will use a mixed palette of high quality materials to create a decorative paving treatment that will reinforce the identity and legibility of the landscape spaces.



Left: Current development status and precedent of decorative paving treatments.

Appendix 2
Certificate of Title and Deposited Plan

Appendix 3
Environmental Consultant Advice

1300 251 070
604 Newcastle St
Leederville WA 6007
PO Box 454
Leederville WA 6903
info@talisconsultants.com.au
www.talisconsultants.com.au

Memorandum

Murdoch New Academic Building – Summary of Biological Work

To: Kali Duff - Donald Cant Watts Corke

From: Andrew Mack - Talis

Date: 29 November 2019

Dear Kali,

Talis Consultants Pty Ltd (Talis) is assisting Murdoch University with respect to the approvals required for its New Academic Building (NAB) at its Murdoch campus. As part of this process, we have engaged Spectrum Ecology (Spectrum) to undertake a flora/fauna survey of the area identified to be cleared as part of the demolition/construction works associated with the NAB building. This document summarises the findings of this survey work.

Overview of Work

The reconnaissance flora and vegetation field survey was conducted on the 4th September 2019 and the Level 1 terrestrial fauna survey was conducted on the 9th September 2019.

The assessment was required to include:

- information to support a native vegetation clearing permit application (a new building is proposed, and an area of native vegetation will need to be cleared); and
- information related to any potential Threatened fauna issues (such as black cockatoo species) protected under Commonwealth and/or State legislation.

Ahead of the site work, a desktop review of all relevant and available flora, vegetation and terrestrial fauna data sources was completed. This enabled identification of communities and species that may be present on site (based on existing records/resources).

In terms of the fieldwork, the study area is located within the south-western bioregion and the optimal timing for a flora survey is therefore Spring (September to November). Given the location and area involved, a reconnaissance level flora and vegetation assessment was conducted consisting of a combination of relevés, traverses and opportunistic sampling. This approach was appropriate for this style of survey and is consistent with the EPA's requirements for this work.

The terrestrial fauna survey was consistent with a Level 1 survey as described in the EPA's Technical Guidance for terrestrial fauna surveys and sampling methods. The survey was used to describe and map the vertebrate fauna habitats across the study area and complete active searches to describe the

fauna assemblages of the study area, particularly any conservation significant fauna identified as likely to be present.

The assessment of Black Cockatoo habitat followed the Federal Government's Black Cockatoo referral guidelines and the revised draft referral guideline for three threatened black cockatoo species.

There were no limitations identified with the surveys undertaken.

Findings

In relation to the flora field work, thirty-eight taxa, from 15 families and 29 genera were recorded during the survey. Of these 18 (49%) were introduced species. No significant flora taxon (either listed as Threatened or occurring on DBCA's Priority Flora list) was recorded.

A total of 12 vertebrate fauna species were recorded during the survey: one native mammal species, nine native bird species and two introduced bird species. The South-western Brown Bandicoot and secondary evidence of Black Cockatoo foraging was also recorded (chewed pine cones) although these are likely to be foraging remnants from the wider campus.

The majority of the Study Area is developed or dominated by planted species and classified as gardens. (Much of the vegetation condition at the Study Area was rated as Degraded (19%) and aligns with the areas mapped as woodland. The remainder of the Study Area was rated as Completely Degraded (81%) which included the areas already cleared for infrastructure, the planted gardens and the *Leptospermum laevigatum* (the Coast Teatree from Victoria) as these have had their original structure completely altered.

No Threatened flora taxa were recorded at the Study Area either during the survey or previously during the literature review. Sixteen Threatened flora taxa were recorded during the literature review of which 15 were given a Low likelihood of occurrence. One taxon, *Caladenia huegelii* (Grand Spider Orchid) was given a High likelihood of occurrence as it was recorded 1.3 km from the Study Area and its habitat - grey or brown sands or clay loam - is likely to occur within. Following the site visit, Spectrum noted that the majority of the Study Area is garden and has undergone significant disturbance. Spectrum concluded that this species is unlikely to occur.

The literature review shows that three Priority flora species were recorded within 2 km of the Study; *Jacksonia gracillima* (Priority 3), *Styphelia filifolia* (Priority 3) and *Jacksonia sericea* (Priority 4). These species were given a High likelihood of occurrence due to proximity to the Study Area (1.7 km, 1.2 km and 1.9 km, respectively) and the habitat likely to occur within. However, the survey did not identify any of these due to the condition of the site.

No vegetation recorded at the Study Area is considered significant. The buffer of the EPBC Act listed Endangered TEC and state listed Priority 3 PEC - Banksia Woodlands of the Swan Coastal Plain was recorded within the Study Area. However, the vegetation at the Study Area is not considered to be representative of this community.

Four fauna habitats were identified from the Study Area. Woodland habitat is located in the southern section of remnant vegetation and covers 0.34 ha which represents 21% of the study area.

Leptospermum Thicket habitat type was also recorded from the southern section of remnant vegetation and covers 0.21 ha which represents 13.1% of the study area. Garden habitat type constitutes several planted gardens that occur in the northern section of the study area and covers 0.48 ha which represents 29.8% of the study area.

Cleared/Developed habitat type constitutes all areas of the study area that do not have vegetation and do not form a fauna habitat (paths, roads, building and car parks). These areas cover 0.58 ha which represents 36.0% of the study area

The fauna literature review identified 24 species of conservation significance as potentially occurring in the wider region of the study area. The Priority listed South-western Brown Bandicoot (Priority 4) was both observed (one individual) and numerous diggings were recorded from both the Woodland and Leptospermum Thicket habitats. Two EPBC-listed Black Cockatoo species were assessed as occurring in the study area based on foraging remnants consisting of multiple chewed pine cones and previous observations by Murdoch University staff.

All sightings and secondary evidence were recorded from the Woodland and Leptospermum Thicket habitats located in the southern half of the study area.

Approvals

The surveyed area is scheduled for future development. The report highlighted biodiversity values that will be impacted when the future development proceeds. This impact will require assessment and approval.

From a WA Government perspective, any disturbance, damage and/or clearing of native vegetation requires approval under the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004* (Clearing Regulations), unless an exemption applies. The approval in question is referred to as a Native Vegetation Clearing Permit (NVCP) and the application will be considered by the Department of Water and Environmental Regulation (DWER). An application for a NVCP is currently being prepared by Talis.

From a Federal Government perspective, the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) requires that any action that will have or has the potential to have a significant impact on a Matter of National Environmental Significance (MNES) should be referred to the Department of the Environment and Energy (DoEE) for consideration. Where the action is determined to have a significant impact, it will be considered as a Controlled Action and either refused or conditionally approved. The relevant MNES for the area in question are two Black Cockatoo species and a referral is currently being prepared by Talis under the EPBC Act with reference to the DoEE's 2017 "Revised Draft Referral Guideline for Three Threatened Black Cockatoo Species".

Summary and Closing

While no flora or vegetation of conservation significance has been recorded, a NVCP will be required under WA legislation to clear those areas of native vegetation within the proposed NAB area.

With regard to fauna, whilst it was acknowledged that the remnant *Eucalyptus* and *Corymbia* trees recorded from the study area form important remnant habitat and the presence of foraging habitat and potential breeding trees as well as the presence of water sources in the local region increases the trees suitability for roosting and potentially as breeding trees in the future, the proposed development is limited in area but necessitates removal of the majority of these. Where practicable, impacts to suitable foraging and potential breeding trees will be avoided (through design refinement) and there will be a replanting process on campus in accordance with their Biodiversity Procedure and Guidelines.

Furthermore, trapping and translocation programs for South-western Brown Bandicoot are recommended to be developed in conjunction with Murdoch university research staff as opportunities exist to research the impact of translocations on the local bandicoot population. Landscaping undertaken as part of the NAB should also consider the creation of dense vegetation structures and maintain suitable connectivity across the university campus.

Where appropriate to the development of the NAB, these recommendations will be incorporated into the application for a NVCP and a referral under the EPBC Act to the DoEE being prepared. These will be finalised and submitted following confirmation of final designs and overall extent of clearing and agreed approach in relation to mitigating the impacts of the development (limited as they are).

We trust that this advice meets your requirements at this time.

Regards,

Andrew Mack
Associate Director & Environment Section Leader
TALIS CONSULTANTS
e – **andrew.mack@talisconsultants.com.au**
m – **0402 029 244**

Appendix 4
Demolition Plan

CLIENT
Murdoch University
90 South St
Murdoch, Western Australia 6150
T (08) 9360 6000

SERVICES, ESD & AV ENGINEERING
NDY
Level 11/200 St Georges Terrace
Perth, Western Australia 6000
T (08) 9281 6800

STRUCTURAL & CIVIL ENGINEERING
Aurecon
Level 5/863 Hay Street
Perth, Western Australia 6000
T (08) 6145 9300

BUILDING SURVEYOR
Resolve Group
Level 3/48 Kishorn Road
Applecross, Western Australia 6153
T (08) 92364 3395

COST CONSULTANT
RLB

LANDSCAPE ARCHITECT
Aspect Studios
Level 1/191 St Georges Terrace
Perth, Western Australia
T 0497 834 599

FACADE
Inhabit
Level 1/430 Roberts Road
Subiaco, Western Australia 6008
T (08) 6160 3000

PROJECT MANAGER
DCWC
Level 8/191 St Georges Terrace
Perth, Western Australia 6000
T (08) 9324 1950

REV.	DETAILS	DATE
0	D: / / M: / /	/ /
0	/ / M: / / D: /	/ /
0	D: / / D: / / D: / / M: / /	/ /
0	D: / / D: / / D: / / M: / /	/ /
0	D: / / D: / / D: / / M: / / D: / /	/ /

Level 3, 246 Bourke Street
Melbourne Victoria
Australia 3000
T +61 3 9600 2818
F +61 3 9600 2819
lyons@lyonsarch.com.au
www.lyonsarch.com.au

lyons

PROJECT
MURDOCH UNIVERSITY NEW ACADEMIC BUILDING

DRAWING TITLE
DEMOLITION SITE PLAN

NORTH

SCALE
1 : 500 @A0

JOB No.	DRAWN	CHECKED	DATE
MU41	Author	Checker	18/12/19

DRAWING No.
DA00-04

REVISION
5

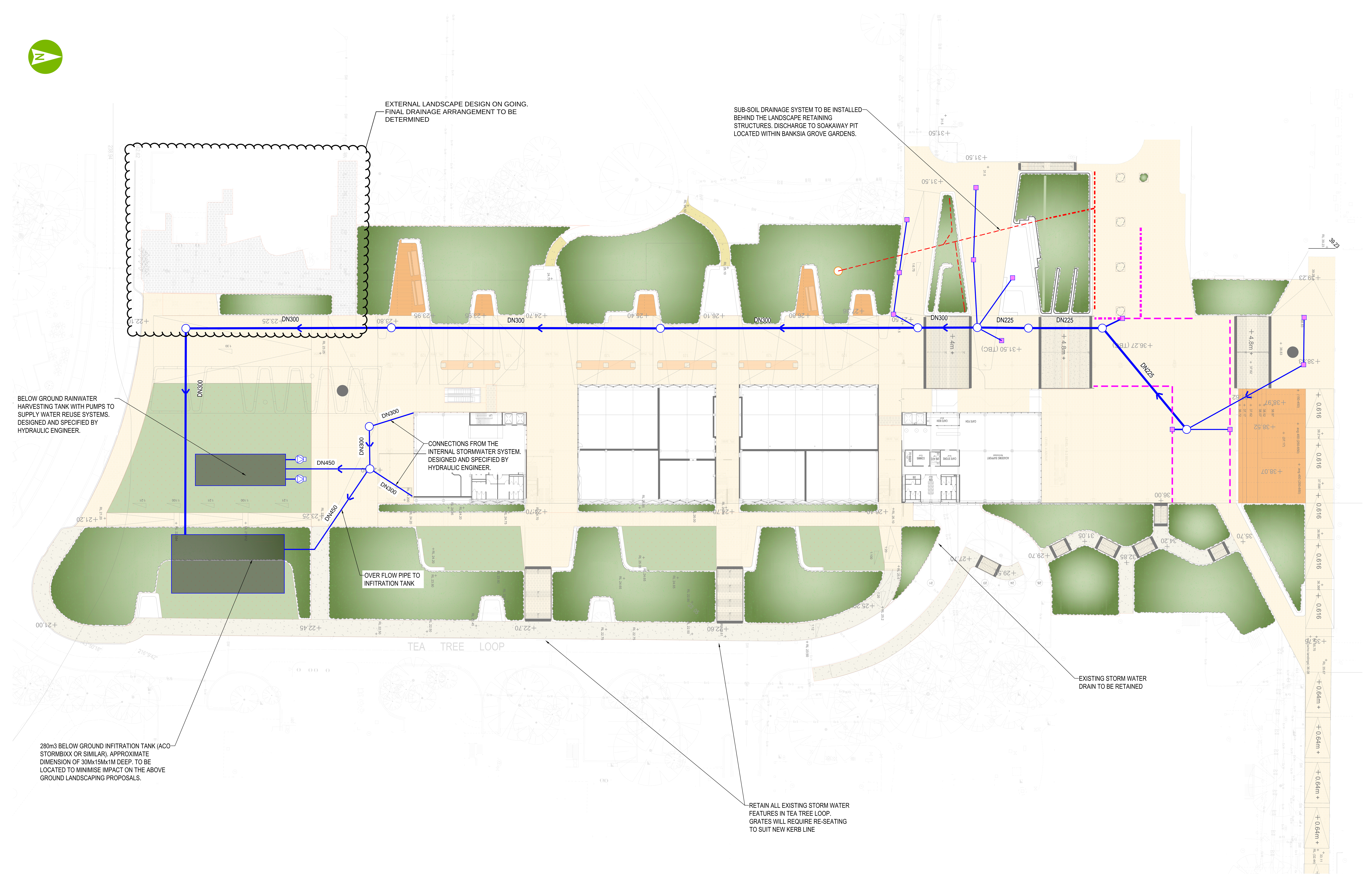
ALL DIMENSIONS ARE IN MILLIMETERS. DO NOT SCALE DRAWINGS FOR CRITICAL DIMENSIONS. CHECK DRAWING IS TO SCALE BY MEASURING SCALE BAR BELOW. VERIFY ALL DIMENSIONS ON SITE BEFORE COMMENCING ANY WORK. SHOP DRAWINGS OR ORDERING MATERIALS.

0 10 20 30 40 50 60 70 80 90 100

A0 1186 x 841

FILE: C:\Users\adrian.fernandez\Documents\191209_MU41 - Main Model_central HUB_adrian.fernandez.rvt
PRINTED: 18/12/2019 4:07:27 PM

Appendix 6
Stormwater Management Plan



LEGEND:

- STORMWATER DRAINAGE (ALL PIPEWORK 150MM AT 1 IN 100 U.N.O)
- SUB-SOIL DRAINAGE
- LINEAR DRAIN (ACO DRAIN OR SIMILAR)
- DRAIN GULLY PIT OR SUMP FOR CONNECTION TO BELOW GROUND SYSTEM
- STORMWATER MANHOLE
- BUBBLE-UP PIT

NOTES:

1. CIVIL DRAWING BASED UPON LANDSCAPE ARCHITECTURAL ISSUE FROM 20TH NOVEMBER 2019.
2. FOR HORIZONTAL SET-OUT OF THE FOLLOWING ELEMENTS PLEASE REFER TO THE ARCHITECTURAL DOCUMENTATION:
   - SURFACE MOUNTED EXTERNAL DRAINAGE FEATURES
   - PAVEMENT EXTENTS.
   - KERB ALIGNMENTS
   - LANDSCAPING EXTENTS.
   - SITE ENTRANCES.
   - RETAINING WALLS AND OTHER EXTERNAL STRUCTURES.

SCALE 1:300

PRINT IN COLOUR

aurecon
www.aurecongroup.com

CLIENT
Murdoch UNIVERSITY

REV	DATE	REVISION DETAILS	APPROVED
A	20.11.19	ISSUED FOR DEVELOPMENT APPLICATION	M. BURLEY

SCALE: 1:300 | SIZE: A0

PRELIMINARY
NOT FOR CONSTRUCTION

DRAWN: T. TRAN
DESIGNED: H. NGUYEN
CHECKED: V. TRINH
APPROVED / DATE

PROJECT
MURDOCH UNIVERSITY
NEW ACADEMIC BUILDING

TITLE
STORMWATER DRAINAGE PLAN

DRAWING NUMBER

PROJECT No.	WBS	TYPE	DISC - NUMBER	REV
506040	0000	DRG	CV-0020	A

Appendix 7
Waste Management Plan

encycle consulting

waste less, achieve more

Murdoch University New Academic Building

Waste Management Plan

21 November 2019

Rev_0

Murdoch University

waste less, achieve more

Encycle Consulting Pty Ltd
ABN 41 129 141 484

Sydney contact:
T: 0423 886 709
E: vpetrone@encycle.com.au

Perth contact:
T : 08 9444 7668
E : mlam@encycle.com.au

www.encycle.com.au

Revision	Drafted	Reviewed	Date issued
Rev_0	V Petrone/ J Campbell	A Bremner	21/11/2019

Table of contents

Glossary of terms and acronyms

Cart	Wheeled, open top bin often used for bulky items such as cardboard
Commingled recycling	Common recyclables, mostly packaging; such as glass, plastics, aluminium, steel, liquid paper board (milk cartons). Commingled recycling may include paper but often, and particularly in offices, paper and cardboard are collected separately.
General Waste	Material that is intended for disposal to landfill (or in some States, incineration), normally what remains after the recyclables have been collected separately.
MGB	Mobile Garbage Bin – A wheeled bin with a lid often used for kerbside collection of waste or recyclables. (Often called a 'wheelie bin').
MRB	Mobile Recycling Bin – A wheeled bin ("wheelie" bin) with a lid often used for kerbside collection of recyclables (similar to an MGB). Generally have a different colour body and/or lid to MGBs.
Organic waste	Separated food and/or 'green' material (e.g. grass clippings or vegetation prunings).
Recyclable	Material that can be collected separately from the general waste and sent for recycling. The precise definition will vary, depending upon location (i.e. systems exist for the recycling of some materials in some areas and not in others).
Recycling	Where a material or product undergoes a form of processing to produce a feedstock suitable for the manufacture of new products.
Reuse	The transfer of a product to another user, with no major dismantling or processing required. The term "reuse" can also be applied in circumstances where an otherwise disposable item is replaced by a more durable item hence avoiding the creation of waste (e.g. using a ceramic coffee mug in place of disposable cups).

1 Introduction

This Waste Management Plan (WMP) has been prepared for Lyons Architects on behalf of their client, Murdoch University, for the Development Application for the proposed Murdoch University New Academic Building project.

The proposed development will consist of 11,265 m² of learning and teaching spaces, 85 m² of food & beverage outlets and 130 m² of retail spaces. This WMP has been prepared based on the following information:

- Architectural plans and area schedule from Lyons Architects dated 7 October 2019
- WALGA Guidelines for Waste Management in New Commercial & Industrial Developments (2018)
- City of Melbourne Guidelines for Waste Management Plan (2014) (education generation rates)
- Green Star Office Design and As Built v1.3 credit 8.A requirements

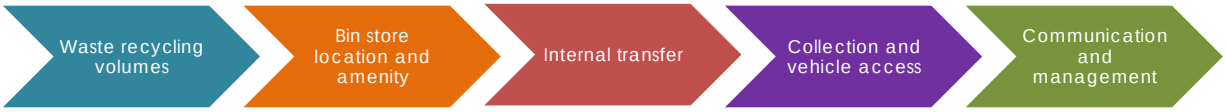
1.1 Context

For efficient and effective waste management, the collection and centralisation of waste and recyclables has been carefully considered at the building design phase. Key factors to consider at the design phase include:

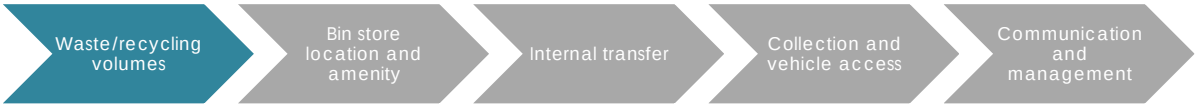
- The volumes of waste and recyclables likely to be generated during building operation
- Size of bin storage area
- Safety for all operatives involved in waste management
- Access to bins and storage areas from within the building
- Access for trucks for waste collection
- Local council requirements
- Amenity (odours and noise)
- The ongoing management of waste and recycling services

1.2 Key components of the WMP

This WMP consists of five core components. The following report will present detailed information on each of the following components.



2 Estimated waste and recycling volumes



2.1 Local government requirements for waste volumes and bin type

The WALGA Guidelines for Waste Management in New Commercial & Industrial Developments (2018) are referenced as the project is aiming for Green Star accreditation. The 'education/training' rate in the City of Melbourne's Guidelines for Waste Management Plan (2014) is also applied as the most appropriate available standard generation rates for this building. Encycle's experience and knowledge of the use of the development is used to calculate the generation of specific recycling streams, as per the table below.

Activity type	Waste generation rate	Recycling generation rate	Percentage breakdown of recycling stream by material
Retail >100m^2	0.5 L /1m^2/day	0.5 L /1m^2/day	50% cardboard 25% commingled 25% soft plastics
Café	3 L /1m^2/day	2 L /1m^2/day	50% cardboard 40% commingled 10% soft plastics 20% cooking oil 20% of waste is organics)
Learning/ teaching spaces	0.05 L/1m^2/day	0.05 L/1m^2/day	40% cardboard 20% paper 30% commingled 10% soft plastics

2.2 Number and type of bins required for development

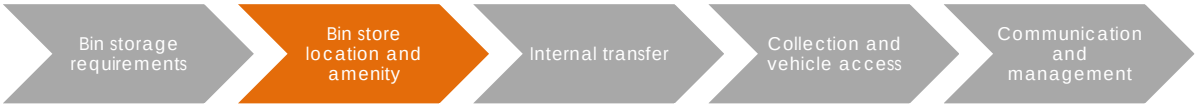
The bin numbers for the various uses of the building, based on 11,265 m² of learning and teaching space, 85 m² of food & beverage and 130 m² of retail are shown in table 1.

Please note that it is assumed that any internal paper bins (at administration office/printer areas) would be consolidated in the cardboard stream for collection and other sources of paper generated on an *ad hoc* basis in other areas of the teaching spaces is deposited into the commingled stream.

Table 1: Number of general waste and recycling bins for education, café and retail spaces

	Bin size (L)	Number of bins	Collection frequency
General waste	660	2	Daily
Commingled recycling (inc. some paper)	660	1	Daily
Cardboard/paper	660	1	Approx. 3 times per week
Soft plastic	240	1	As required
Used cooking oil	200	1	As required
Food waste (optional)	*At least 1x 120 L bins worth of general waste will be food waste which could be separated for composting*		

3 Bin store location and amenity



3.1 Bin store location

The building will have one bin store to allow for the storage and collection of all waste and recycling from the building.

The bin store will be located on ground level to the north of the building (refer Figure 1). Figure 2 shows the layout of the bins in the bin store.

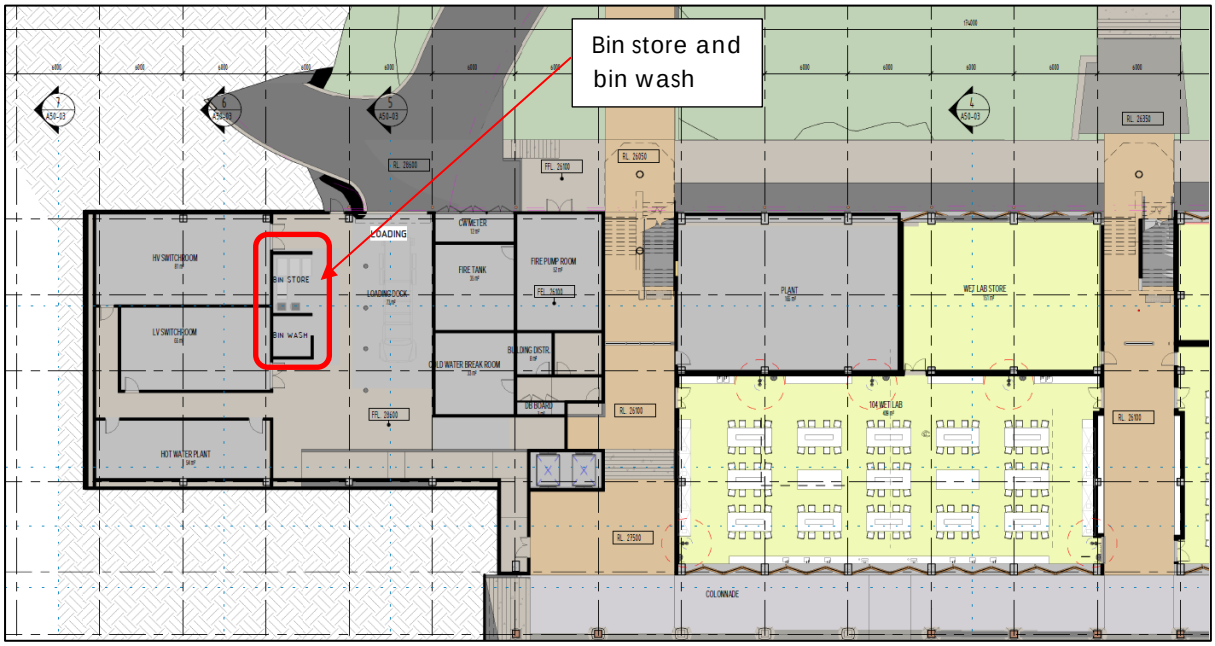


Figure 1: Ground floor plan showing the bin store location

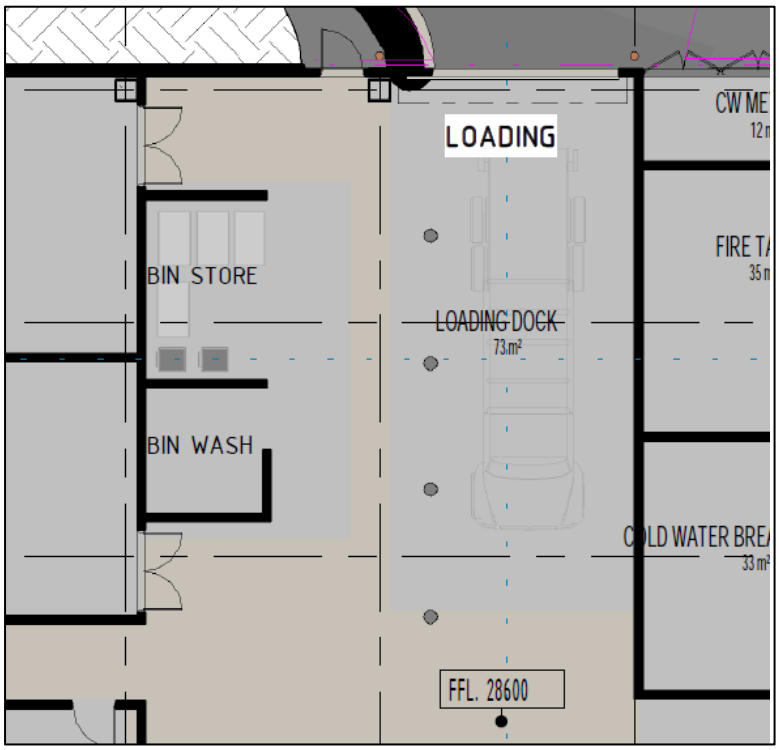
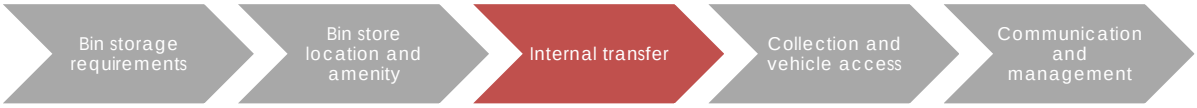


Figure 2: Layout of the bin store

3.2 Bin store amenity

Bin Transfer	
Aisle door and lift width:	All doors, corridors and lifts on the transfer route are designed for the largest bin to fit through.
General health and safety:	Waste systems are designed to ensure that bins (particularly when full) are not required to be moved over any significant distances, up/down steep ramps (grade of slope <1:20) and definitely avoid stairs or other potential hazards.
	Manual handling of waste in garbage bags is excluded from the waste management systems where possible.
Bin store	
Washing bins and waste storage area:	Impermeable floors grading to an industrial floor waste (including a charged 'water-trap' connected to sewer or an approved septic system), with a hose cock to enable bins and /or the enclosure to be washed out. 100 mm floor waste gully to waste outlet. Both hot and cold water will be available.
Bin store walls and ceilings:	All internal walls in bin store will be cement rendered (solid and impervious) to enable easy cleaning. Ceilings will be finished with a smooth faced, non-absorbent material capable of being easily cleaned. Walls and ceilings will be finished or painted in a light colour.
Ventilation and odour:	The design of bin store will provide for adequate separate ventilation with a system that complies with Australian Standard 1668 (AS1668). The ventilation outlet is not in the vicinity of windows or intake vents associated with other ventilation systems.
Doors:	Ventilated roller doors will be specified both internally and externally to enable bins to be easily wheeled into and out of the bin store.
Vermin:	Self-closing doors to the bin store will be installed to eliminate access by vermin
Lighting:	Bin store will be provided with artificial lighting, sensor or switch controlled both internal/external to the room.
Noise:	Noise is to be minimised to prevent disruption to occupants or neighbours.
Fully Enclosed:	The bin store will be fully enclosed and only be accessible by residents, tenancy staff and the waste service provider.
Aesthetics:	The bin store will be consistent with the overall aesthetics of the development.
Signage:	Visual aids and signage will be provided to ensure that the area works as intended.

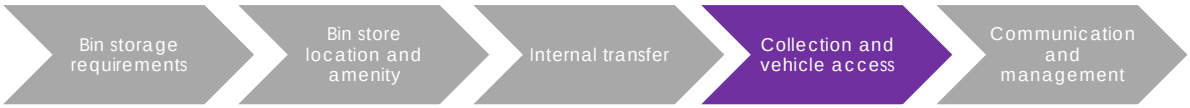
4 Internal transfer



4.1 Transfer of waste from each floor

Cleaners servicing the teaching areas on each floor and staff from the retail and food and beverage tenancies will manually transfer waste and recyclables via the lifts to bin store.

5 Collection and vehicle access



Murdoch University's waste service provider, SUEZ, will service all the general waste and recycling bins as per the current servicing regime for the wider campus.

On collection days rear-lift vehicles for general waste and recycling will drive along Tee Tree loop and reverse into loading zone at the northern end of the building. The vehicles will park adjacent to the bin store and the operatives will enter the bin store to retrieve and service the bins.

Access to the grease traps located in the loading zone on ground level will also be from Tee Tree Loop.

A height clearance of 4 m is provided to accommodate a range of waste and recycling vehicles to access the loading zone.

Swept path analysis for vehicle ingress and egress has been completed by Aurecon taking into consideration the specifications of the largest waste collection vehicles (see Figure 2).

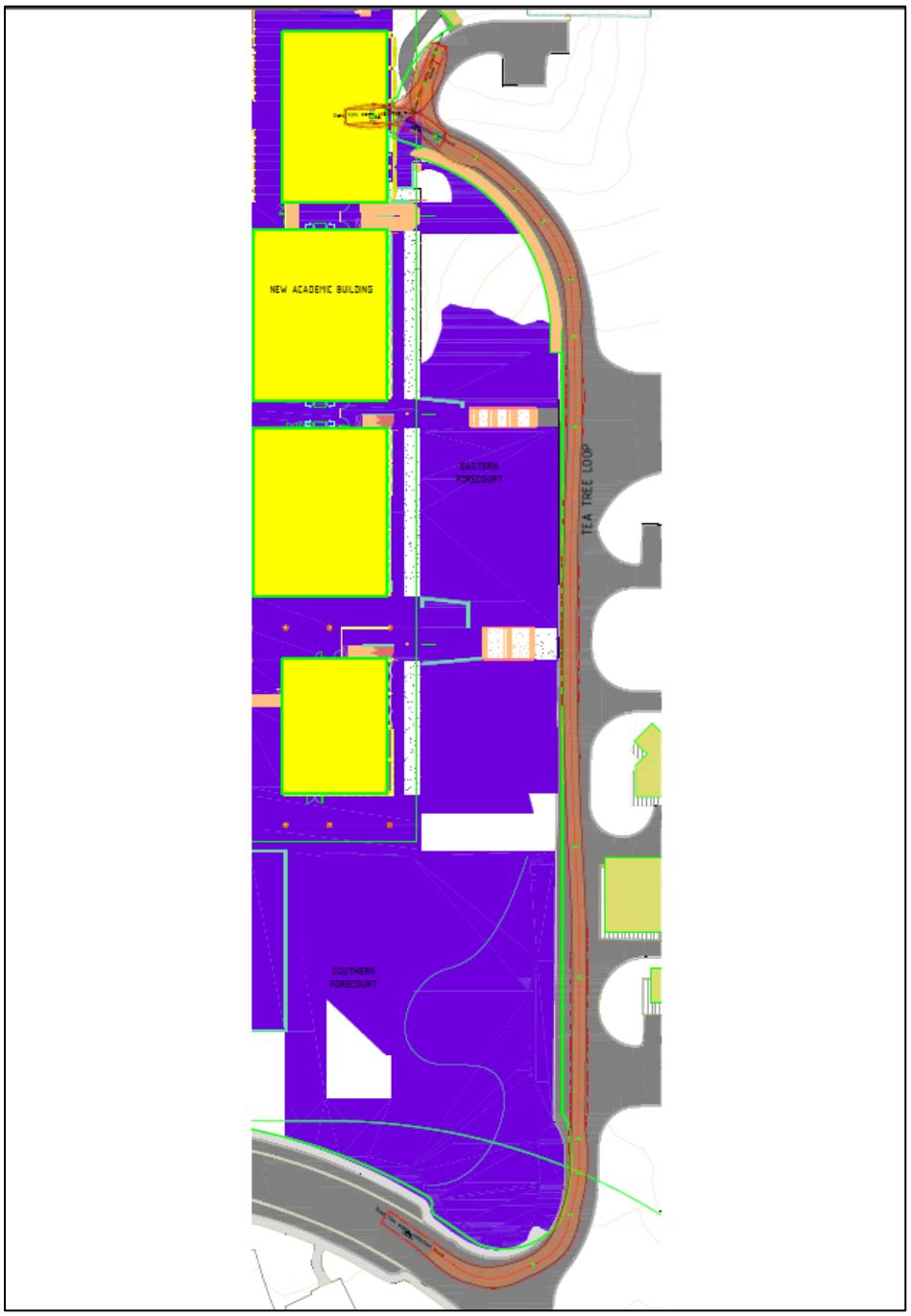
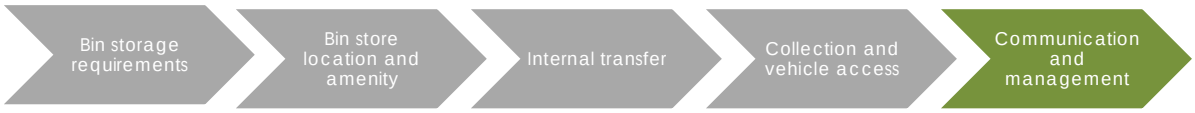


Figure 2: Swept path analysis showing access for waste collection vehicles

6 Ongoing communication and management



6.1 Management

The Facility Manager will be responsible for overseeing the waste management systems. The cleaners will be trained and informed about their responsibility to work closely with the Facility Managers and private service provider regarding the schedule for collection and presentation of bins. The cleaners will be responsible for maintaining the bin store in a clean and tidy condition at all times and ensuring bins are washed regularly.

6.2 Communication

Cleaners and tenants will be made aware through an Operational Waste Management Plan (OWMP) of the waste and recycling systems and how they should be used. An OWMP suitable for presenting to building users, including how the plan should be communicated will be developed and implemented during both the initial occupation and ongoing management of the building.

Facilities Management will be responsible for the continuing education of cleaners and tenants on correct segregation of waste and recyclables and usage of the waste systems to ensure successful performance of the buildings waste and recycling systems.

Appendix 8
Landscaping Plan

MURDOCH UNIVERSITY

NEW ACADEMIC BUILDING

Development Application
December 2019

ASPECT Studios®

Contents

Prepared by:

ASPECT Studios
L1 / 191 St Georges Tce
Perth, WA, 6000

Prepared for:

Murdoch University
90 South Street, Murdoch
Western Australia 6150

Document Control:
Job Number: P19011
Report Title: Development Application
Revision: B

Context

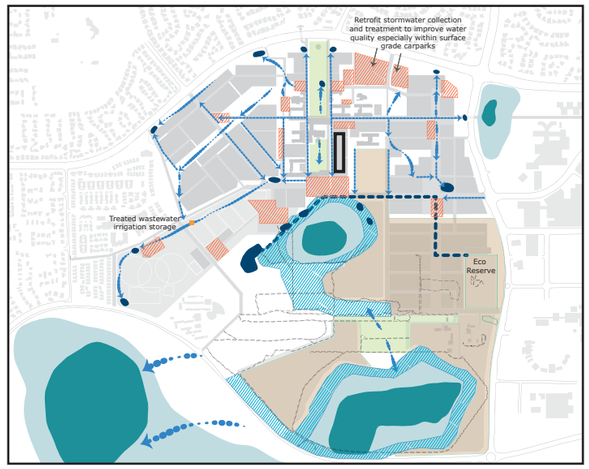
Murdoch New Academic Building (NAB) is the first major project of this scale to be undertaken by the University in the last 20 years. It represents an exciting opportunity to reinforce the value of Landscape as a defining and structuring element for the campus which contributes to its unique character & identity.

The landscape proposal is structured around the existing topographic, hydraulic and environmental conditions of the campus which have shaped and defined the campus master plan. The design of the landscape surrounds to the NAB building address the significant topographic level changes, collection and disposal of surface water and enhances the existing ecological conditions on the site.

In addition, the landscape proposal builds upon the principals and vision of the original Masterplan, with an emphasis on creating a uniquely West Australian campus setting. The building and landscape formalise the eastern edge of Banksia Court and create a significant new north-south promenade that connects into the existing linear circulation principles of the campus and extends the circulation network south into the future development areas south of Discovery Way.

Careful consideration is also given to the extending and enhancing the landscape character that was established by Marion Blackwell in the original master plan. The landscape design physically and symbolically connects to the existing campus landscape environments and creates 'outdoor rooms' to facilitate student life.

Topography



Hydraulic

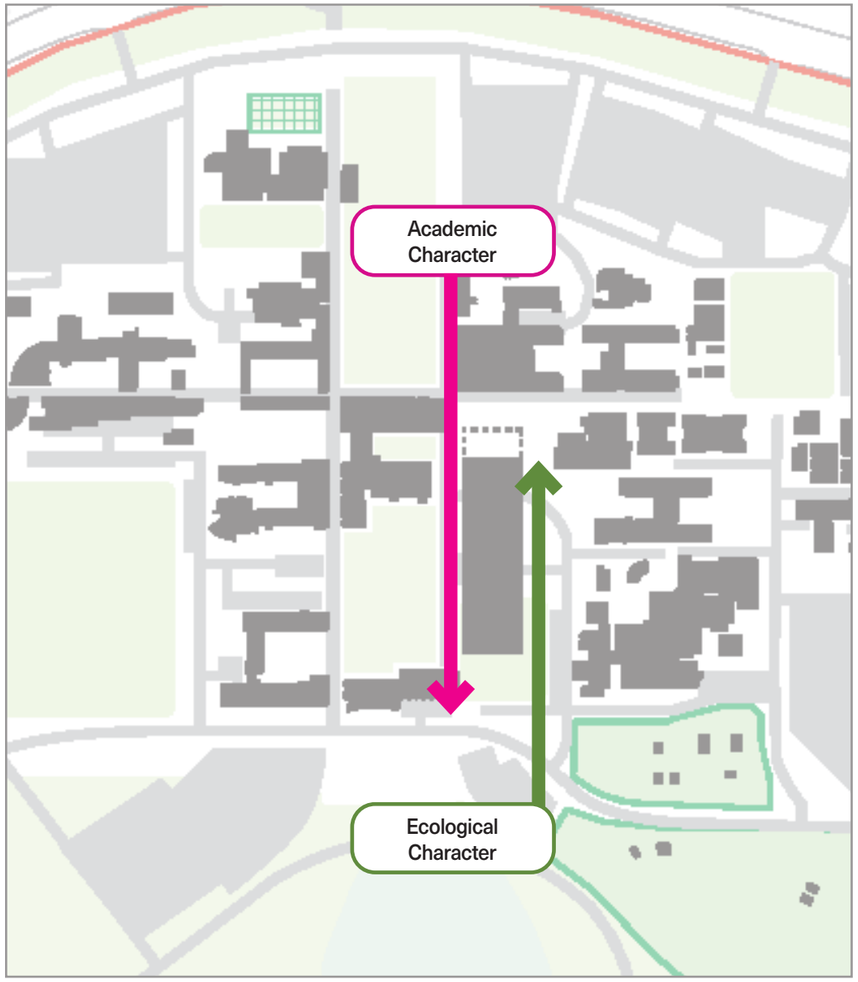
Environment & Ecology

Master Plan Context

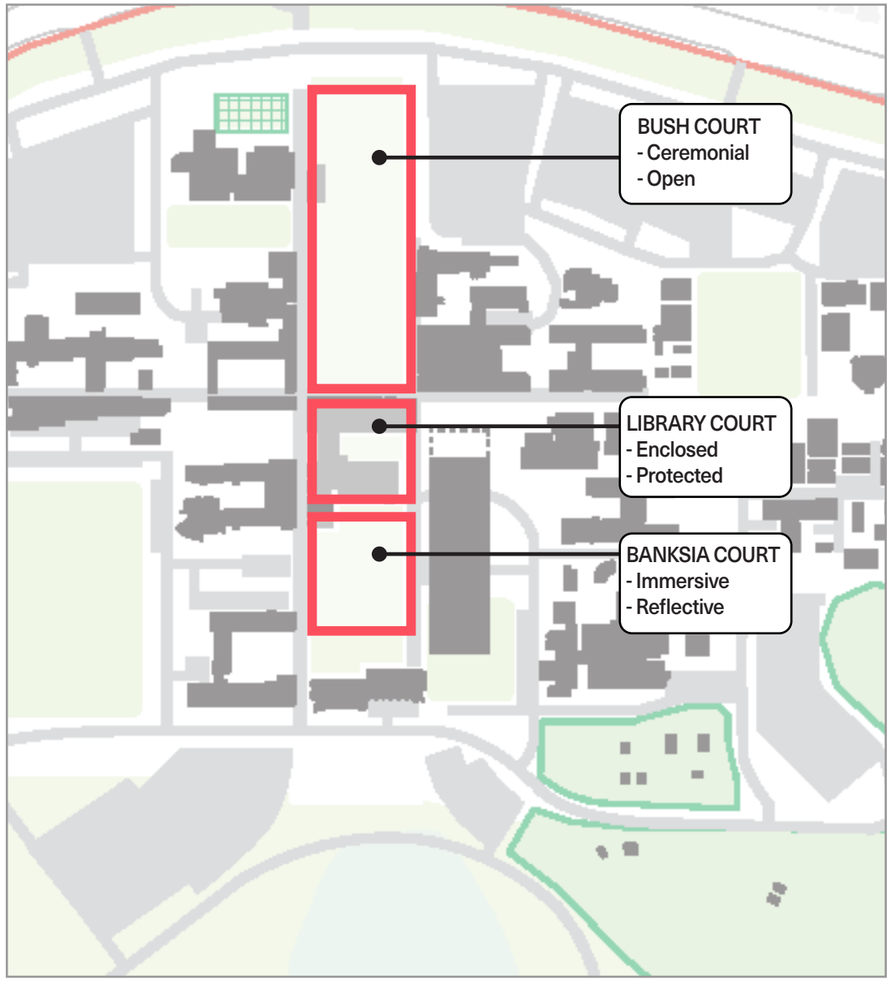
Character

The NAB building is located at the intersection of the northern Academic Core and Southern Precinct and plays an important role in connecting the two campus precincts. The landscape design seeks to extend the academic character down the western side of the building to frame Banksia Court and create a significant urban connection through the campus that supports a range of student amenity and social spaces along its length.

The eastern landscape is designed to contrast the western promenade and extend the native landscape character of the southern landscape up along the eastern façade of the building to create a series of informal recreational landscape spaces.



Campus Character



Campus Courts

Academic Character

Ecological Character

Landscape Approach

Overview

The landscape design includes the public and communal external spaces around the New Academic Building at Level 1, 2 & 3. The design is intended to create an attractive and high quality landscape for the amenity of students, staff, and visitors.

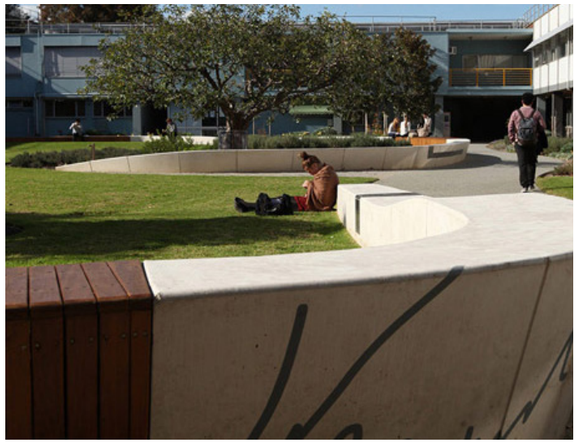
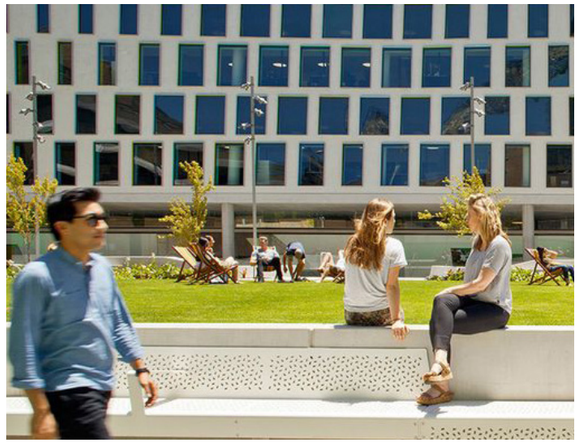
The design responds to the scale and geometry of the architectural form in order to create a dynamic and engaging landscape experience that flows seamlessly from internal to external spaces. The landscape design is influenced by the unique natural character and qualities of the campus

Landscape Approach

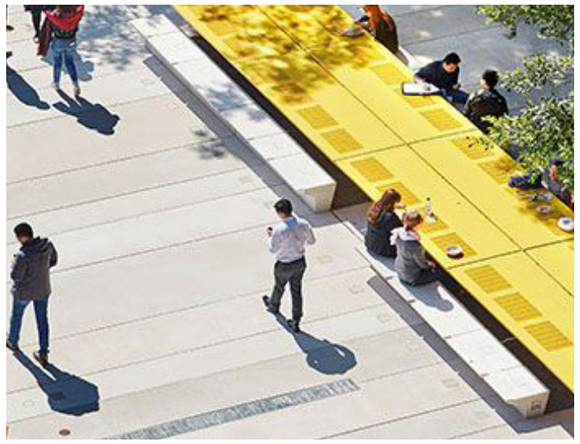
The landscape design aims to create a contemporary, functional and aesthetically pleasing landscape that seamlessly blends with the built form. The following general principles form the landscape approach to the site:

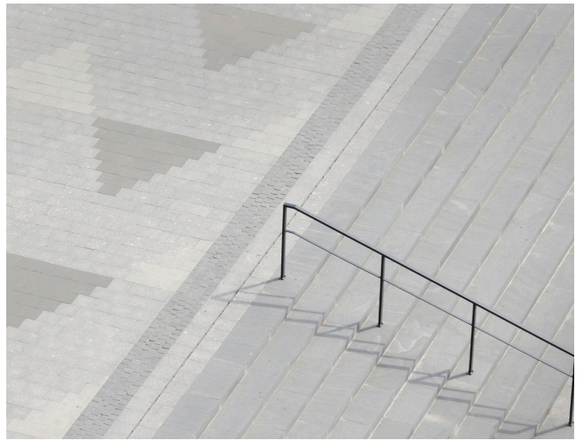
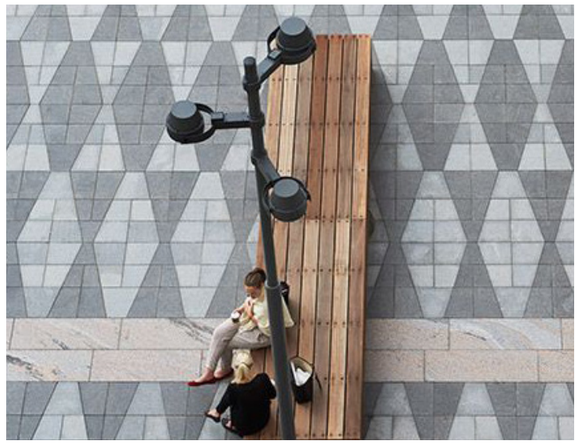
- Fuse together natural systems, technology and student experience to create a new public realm;
- Reveal the richness, diversity and complexity of the landscape in a contemporary way;
- Create a visual dialogue between architecture and landscape;
- Develop a legible network of spaces that support the architectural program and fully integrate with and connect to the surrounding campus;
- Create spaces with varying characters and identities;
- Design spaces that will become activated and vital;
- Maximise opportunities for social interaction through arrangement of seating;
- Create a robust landscape made from simple materials, proven planting and bold forms that can be managed and maintained;
- Provide clear and integrated access;

The design of landscape considers the architectural design by Lyons Architects in both concept and materiality, with the intention of creating a cohesive transition from internal to external spaces.





Legibility and Amenity

The landscape has been designed as a legible and amenity rich environment that offer a variety of uses and activities and supports the internal building program. A diverse range of external environments have been created to cater for students, staff and visitors needs throughout the year and accommodate a range of university programmed events. The landscape areas include:

Arrival Court

Arrival Court is a new Southern gateway adjacent to the proposed Bus Interchange. The new building will provide an iconic presence that is supported with an appropriate forecourt setting which includes a large lawn area framed by planting, seating and public art to create a welcoming entrance to the campus.

Promenade

A formal north – south spine is created connecting Discovery Way to Bush Court. The promenade completes the edge of Banksia Court and creates an activated, social space that engages with Banksia Court and connects with a series of perpendicular pedestrian links that stitch the campus from east to west.

Banksia Court

The project provides the opportunity to reinforce the significance of Banksia court as an integral and high value open space, to restore and enhance its eastern edge and allow people to experience its unique qualities and characteristics. A series of informal learning pods and seating areas are sensitively nestled within the Banksia landscape creating a uniquely inspiring place to learn and socialise.

Library Court

The Library Court takes advantage of the major landscape interventions associated with the new building and landscape to create improved access and amenity to the Southern and Eastern edges of the Library that were previously considered back of house. These courts create quieter more reflective spaces for students, staff and visitors and that support the Library and its functions.

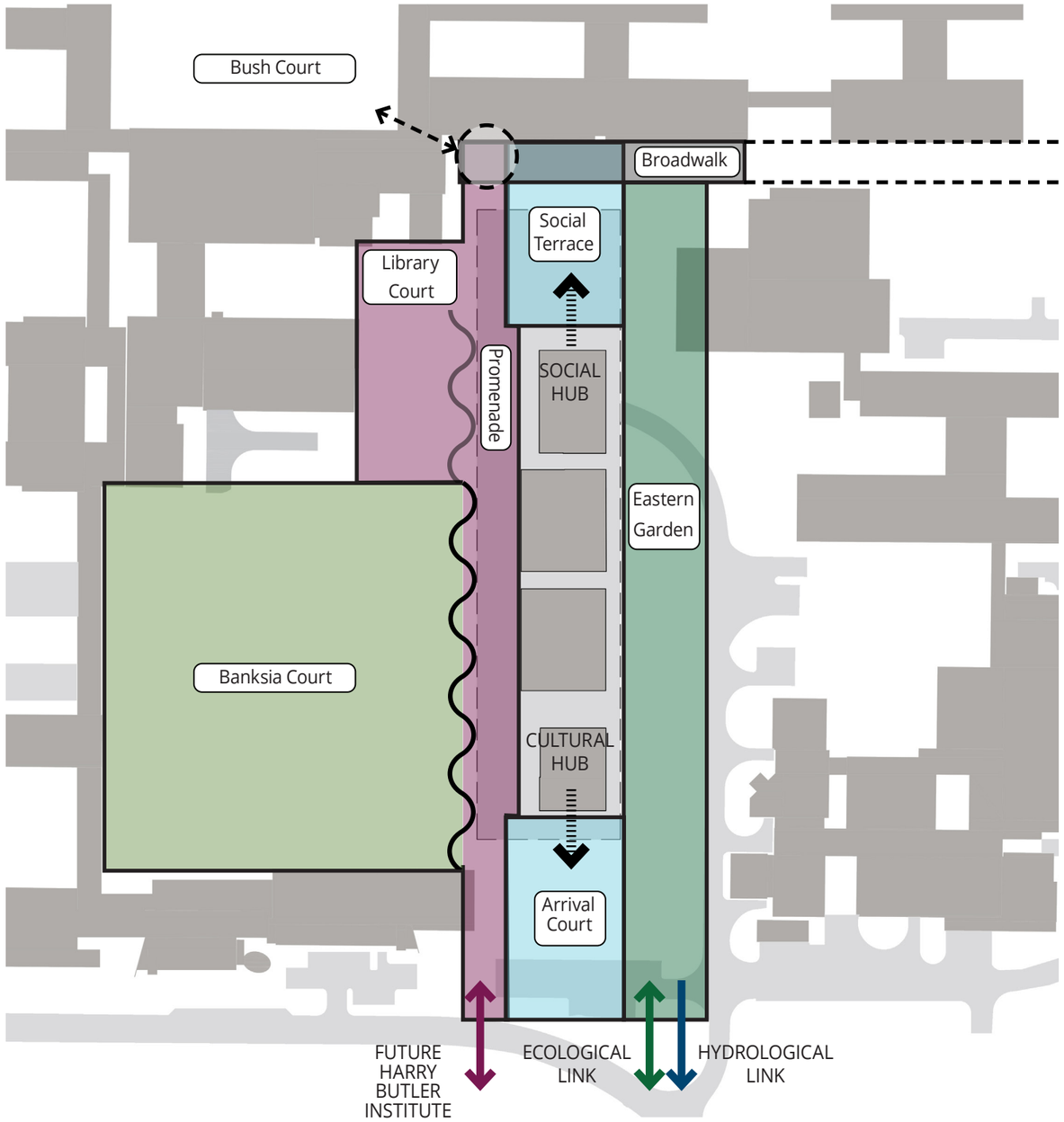
Social Terrace / Undercroft

The Social Terrace takes advantage of the level change around the existing tree which is retained in this location and provides a series of generous terraces that can be occupied for informal seating and socialising and also functions as a viewing platform for events and performances in the undercroft area.

The Undercroft is conceived as a multi-functional external space with all-weather protection to provide ultimate flexibility for a diversity of users and uses. The space can be arranged and programmed in a number of different ways for everyday use to special events and seasonal use. A combination of fixed and loose furniture items will ensure the space is highly adaptable.

Eastern Gardens

The Eastern landscape gardens provides a different character and experience to the promenade, offering a more passive environment with generous open lawn areas framed by arced seating elements. Pathways create a permeable landscape of connectivity between the building and eastern campus precinct. A new pedestrian connection along Tea Tree Loop provides north south access and connects the project to the Adjacent buildings.



Landscape Plan

Arrival Court

Landscape Plan

Arrival Court

Arrival Court is a new Southern gateway adjacent to the proposed Bus Interchange. The new building will provide an iconic presence that is supported with an appropriate forecourt setting which includes large event lawn areas framed by planting, seating and public art to create a welcoming entrance to the campus.

Legend

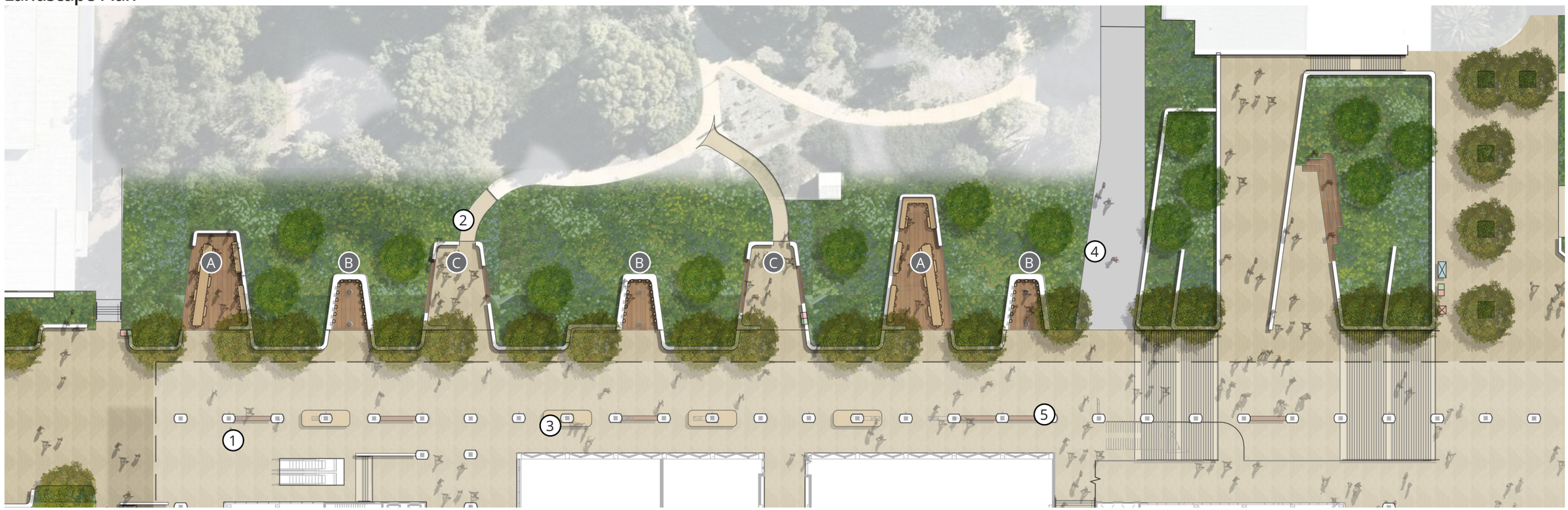
1. Planting and seating nooks
2. Public artwork
3. Lawn for future Canopy (by others)
4. Future kerb realignment of Discovery Way
5. Events Lawn
6. Steps to Foyer
7. Eastern garden link
8. Amenity Lawn

Arrival Court

Welcoming forecourt entrance

Promenade & Banksia Court

Landscape Plan



Promenade & Banksia Court

Promenade

A formal north – south spine is created connecting Discovery Way to Bush Court. The promenade completes the edge of Banksia Court and creates activated, social spaces that engage with Banksia Court and connect with a series of perpendicular pedestrian links that stitch the campus from east to west.

Banksia Court

The project provides the opportunity to reinforce the significance of Banksia court as an integral and high value open space, to restore and enhance its eastern edge and allow people to occupy and experience its unique qualities and characteristics. A series of informal learning pods and seating areas are sensitively nestled within the Banksia landscape creating a uniquely inspiring place to learn and socialise.

Legend

1. Promenade
2. Banksia Court
   - Connections to Banksia Court trails
3. Furniture integrated with building columns
4. Service vehicle access
5. Benches

Nodes:

A. Harvest Node (Dining)
B. Study Node
C. Banksia Court Node

Promenade & Banksia Court

North-south spine connecting Bush Court to Discovery Way

Promenade & Banksia Court

Activated nodes

Library Court

Landscape plan

3.4 Library Court

The Library Court takes advantage of the major landscape interventions associated with the new building and landscape to create improved access and amenity to the Southern and Eastern edges of the Library that were previously considered back of house. These courts create quieter more reflective spaces for students, staff and visitors and provide that support the Library and its functions.

Legend

1. Promenade
2. Terraced seating
3. Future Library access
4. Service access to Nexus Theatre
5. Landscape amenity's

Library Court

Improved access and amenity

Social Terrace & Undercroft

Landscape Plan

Social Terrace & Undercroft

The Undercroft is conceived as a multi-functional external space with all-weather protection to provide ultimate flexibility for a diversity of users and uses. The space can be arranged and programmed in a number of different ways for everyday use to special events and seasonal use. A combination of fixed and loose furniture items will ensure the space is highly adaptable.

The Social Terrace takes advantage of the level change around the existing tree which is retained in this location and provides a series of generous terraces that can be occupied for informal seating and socialising and also functions as a viewing platform for events and performances in the undercroft area.

Legend

1. Promenade
2. Undercroft
3. Bespoke movable furniture
4. Timber terrace amphitheater
5. Existing mature tree retained
6. Terraced access stairs
7. Planted embankment
8. Broadwalk

Social Terrace & Undercroft

A multi-functional external space

Eastern Gardens

Landscape Plan

Eastern Garderns

The Eastern landscape gardens provides a different character and experience to the promenade, offering a more passive environment with open lawn areas framed by arced seating elements. Paths with a canopy of shade trees creates a permeable landscape of connectivity between the building and eastern campus precinct. A new pedestrian connection along Tea Tree Loop provides north south access and connects the project to the Adjacent buildings.

Legend

1. Garden planting
2. Amenity lawns
3. Embankment planting
4. Seating node
5. Tea Tree Loop path
6. Terraced access stairs

Eastern Gardens

Passive, relaxed, and shaded spaces.

ASPECT Studios

Adelaide Brisbane Dubai Guangzhou Ho Chi Minh City Melbourne Perth Shanghai Sydney

Appendix 9
Traffic Impact Statement

New Academic Building, Perth

Transport Impact Statement

Lyons Architects

Reference: 506040

Revision: 1

2019-11-25

aurecon

Bringing ideas to life

Document control record

Document prepared by:

Company name
Registration number
Address line 1
Address line 2
Address line 3

T Company telephone
F Company fax
E Company email
W Company web

A person using Aurecon documents or data accepts the risk of:

a) Using the documents or data in electronic form without requesting and checking them for accuracy against the original hard copy version.

b) Using the documents or data for any purpose not agreed to in writing by Aurecon.

Document control						aurecon
Report title		Transport Impact Statement				
Document code			**Project number**		506040	
Client		Lyons Architects				
Client contact			**Client reference**			
Rev	**Date**	**Revision details/status**	**Author**	**Reviewer**	**Verifier** (if required)	**Approver**
0	2019-11-20	Draft for Comments	MJS	MBM	**AR**	AR
1	2019-11-25	Final issue for DA	MJS	MBM	JB	AR
Current revision		**1**				

Approval			
Author signature	*Michelle-Joy Stander*	Approver signature	*Adam Reynolds*
Name	Michelle Joy Stander	Name	Adam Reynolds
Title	Transport Engineer	Title	Section Lead – Urban Mobility

Contents

Appendices

No table of contents entries found.

Figures

Tables

1 Introduction

1.1 Introduction

Aurecon has been commissioned by Lyons Architects on behalf of Murdoch University to prepare a Transport Impact Statement (TIS) in accordance with WAPC Guidelines for Transport Impact Assessment Volume 4 – Individual developments (August 2016) for the New Academic Building (NAB) located at Murdoch University South Street Campus, within the Murdoch Activity Centre. NAB project is a new engineered timber building of approximately 16,000m² with total of 10,928m² for academic purposes such as academic workplace, teaching & learning, peer learning internal & external, retail (237m²), industry engagement, lab and academic support. NAB is aiming to provide a holistic transport solution tailored to the project in accordance with best practice guidelines.

1.2 Background

Murdoch University is a public university in Perth, Western Australia within the Murdoch suburb in City of Melville. Murdoch University has been at the forefront of Australian research for decades. In the face of a changing tertiary sector environment and to continue its trajectory to the top 300 universities globally in research and teaching, Murdoch University has committed to a New Academic Building (NAB).

The location of the New Academic Building in Murdoch University is shown in Figure 1-1.

Figure 1-1: Locality of the New Academic Building in Relation to Murdoch University (Source: Open Street Map)

2 Existing Situation

2.1 Site Location

Murdoch University is bounded by South Street to the north, Farrington Road to the south and Murdoch Drive to the east. The land to the east of Murdoch University, between Murdoch Drive and Kwinana Freeway, includes Fiona Stanley Hospital, St John of God Hospital Murdoch, and South Metropolitan TAFE. Together with Murdoch University, this area makes up the Murdoch Activity Centre, a major employment centre for Perth.

The proposed New Academic Building (the Site) is bounded by Discovery Way to the south, Tea Tree Loop to the east, public open space and health centre to the west and an administration building to the north. Both Discovery Way and Tea Tree Loop are internal campus roads. The locality of Murdoch University is shown in Figure 2-1.

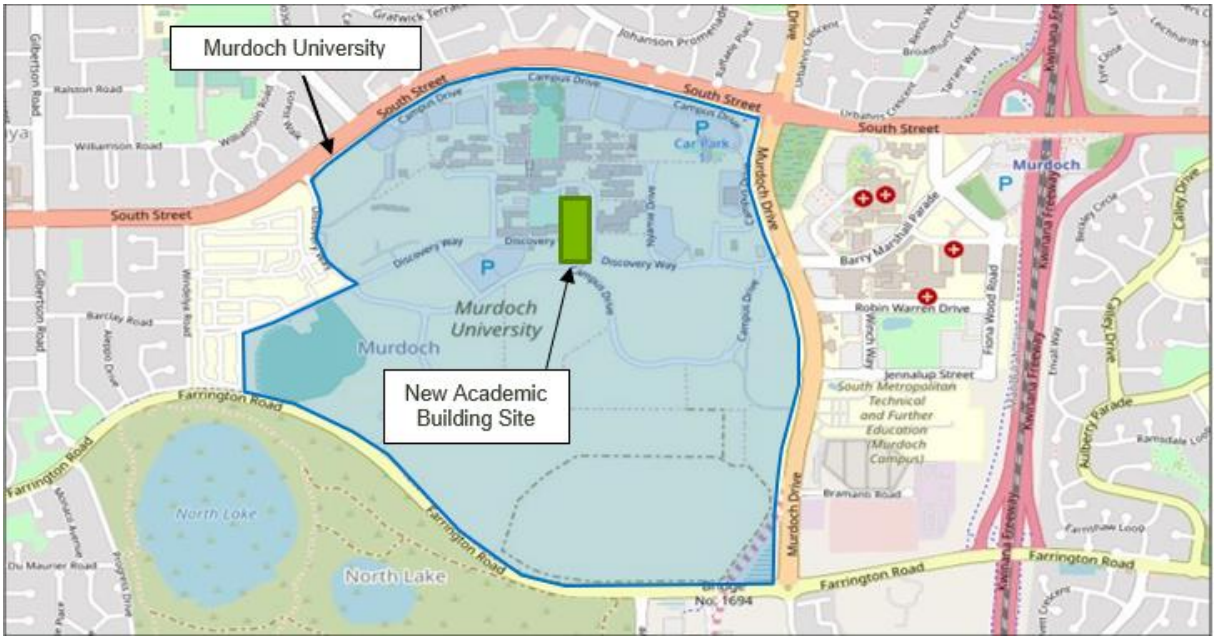


Figure 2-1: Locality of Murdoch University (Source: Open Street Map)

The NAB site is currently partially vacant land. Figure 2-2 shows the layout of the existing Tea Tree Loop and the NAB site location (in yellow). There are currently 75 car parking bays located on the east and south side of the NAB site which will be removed as a result of the construction of the NAB.

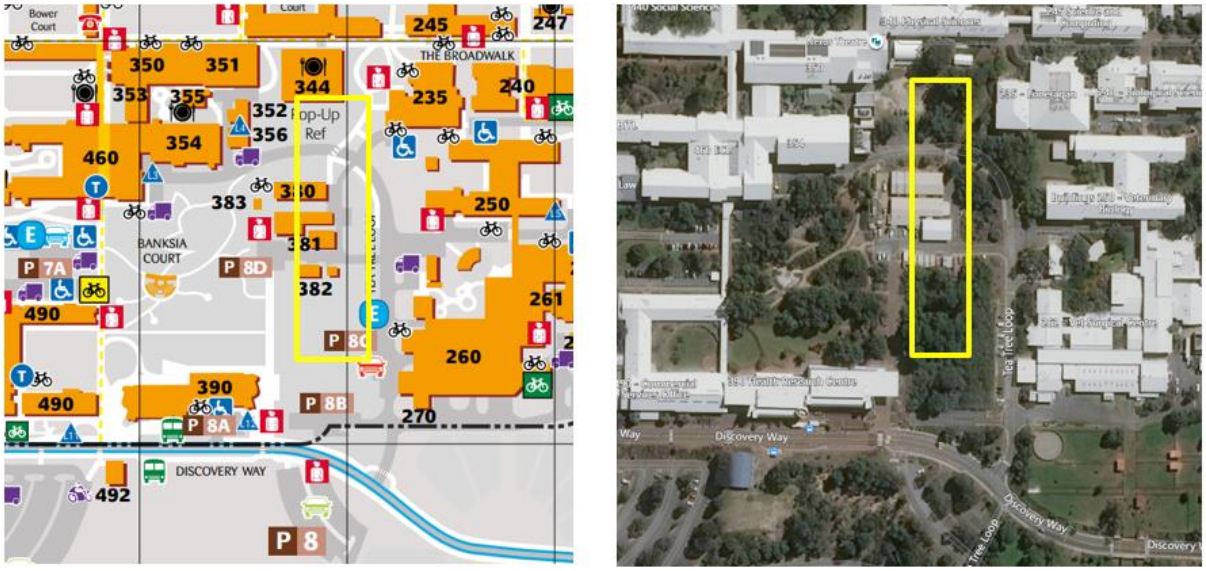


Figure 2-2: Locality of Murdoch University (Source: Murdoch University and Bing Maps)

2.2 Proposed Land Uses

Referring to Figure 2-3, the Murdoch Activity Centre is bounded by primary regional roads with two major interchanges on the north east and north west side. As per the City of Melville Local Planning Scheme No.6 the majority of the land surrounding Murdoch University is zoned as low density residential (mainly R20) with a few areas of medium to high density infill (R40-R60) except the south western side which is zoned as public open space. As per the City of Melville Local Planning Scheme No.6, Murdoch University is currently zoned as "Public Purposes - university". The proposed development is an academic building which is in line with the current zoning of Murdoch University.

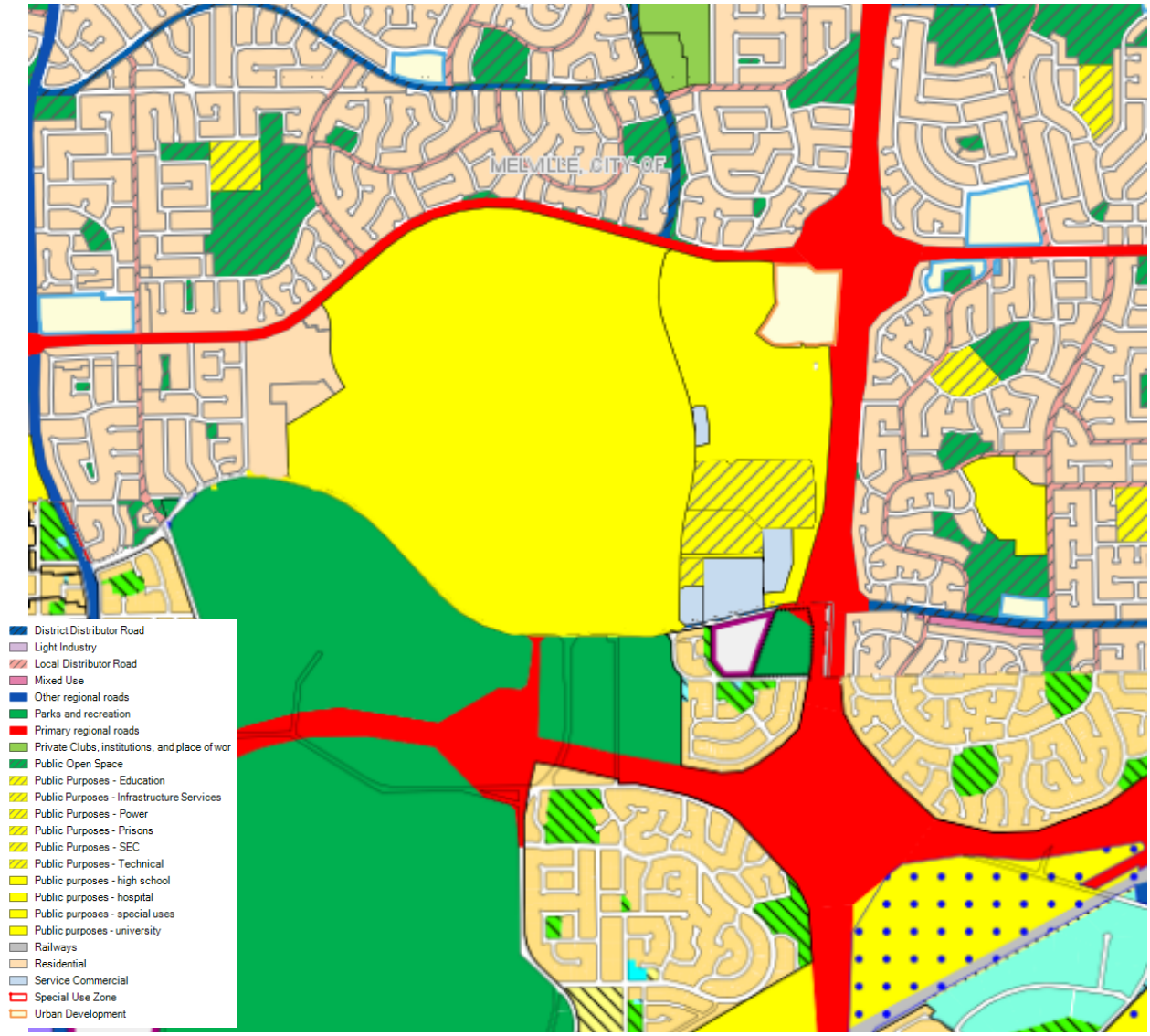


Figure 2-3: Land Use Surrounding Murdoch University

2.3 Existing Road Network Surrounding the Development Site

The existing road network surrounding Murdoch University is shown in Figure 2-4, extracted from Main Roads - Roads Information Mapping System, and these surrounding roads are listed below:

- **South Street** is a two-way, six lane divided carriageway road. South Street is classified as a Primary Distributor under the Main Roads road hierarchy system with a posted speed limit of 70 km/h. On-street parking is not allowed on South Street. South Street connects with Murdoch Drive on the north-eastern corner of the Campus and connects with Kwinana Freeway east of Murdoch Drive.

- **Murdoch Drive** is a two-way divided carriageway road. Murdoch Drive is classified as a Distributor A under the Main Roads road hierarchy system with a posted speed limit of 70 km/h. On-street parking is not provided on Murdoch Street. Murdoch Drive connects to South Street on the north-eastern corner of the Murdoch University campus and to Farrington Road on the south-eastern corner the campus. A 1.5m cycle lane is provided on both sides of Murdoch Drive bordering the campus.
- **Farrington Road** is a two-way divided carriageway road for sections either side of major intersections, and a two-way undivided carriageway Road on midblock sections. Farrington Road is classified as a Distributor A under the Main Roads road hierarchy system with a posted speed limit of 70 km/h. On-street parking is not provided on Farrington Road. Farrington Road connects to Murdoch Drive on the south-eastern corner of the campus.

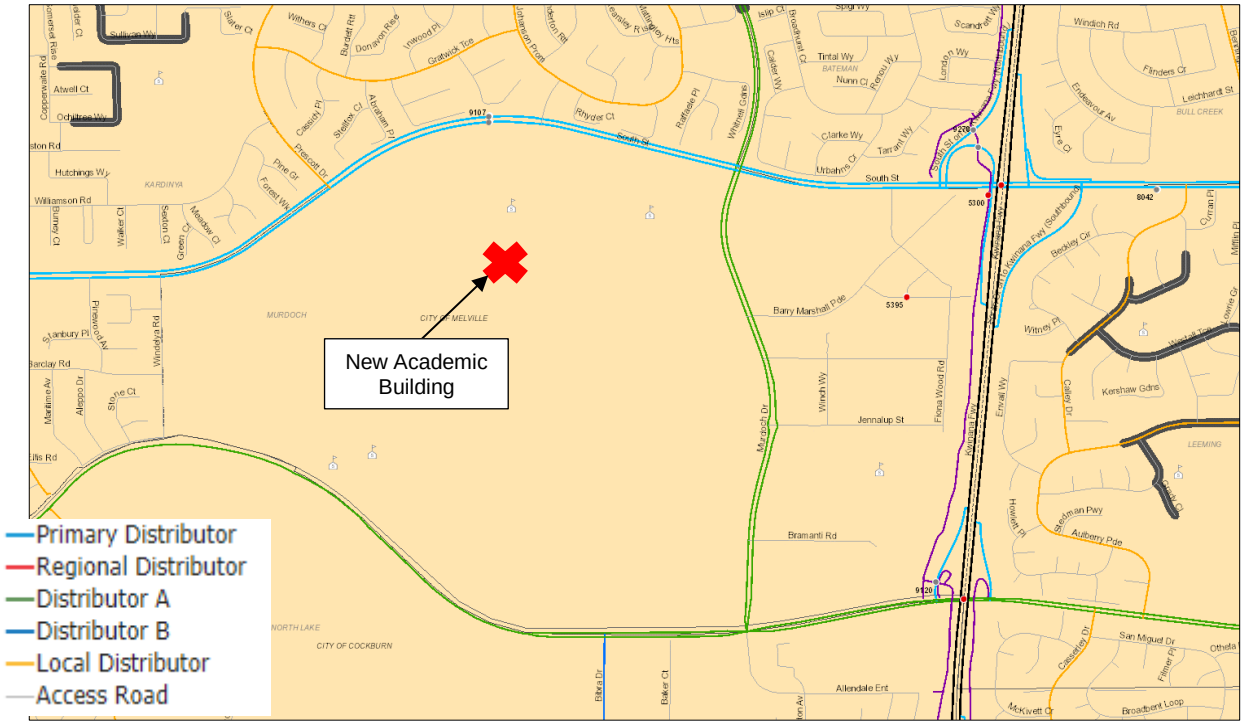


Figure 2-4: Existing Road Network Surrounding Murdoch University (Source: Main Roads WA Road Information Mapping System)

The existing road network surrounding the NAB comprises internal campus roads which are listed below:

- **Discovery Way** is a two-way undivided internal road. The posted speed limit for Discovery Way is 40 km/h. On-street parking is not allowed on Discovery Way. Discovery Way connects to Murdoch Drive on the eastern boundary of the campus, at a signalised intersection. A cycle lane is provided on both sides of Discovery Way. Intersection treatment in the form of green surfacing is provided on Discovery Way and Barry Marshall Parade at the intersection of Murdoch Drive / Barry Marshall Way / Discovery Way on the east end of Discovery Way.
- **Tea Tree Loop** is a two-way undivided internal road. Access to a number of car parking bays is provided via Tea Tree Loop. Tea Tree Loop connects to Discovery Way on the south-eastern boundary of the New Academic Building. The existing Tea Tree Loop currently starts from Discovery Way to the south east corner of the NAB site, continues to the north west of the NAB site and provides vehicle access to a number of academic buildings to the north west of the NAB site.

2.4 Existing Intersections Surrounding the New Academic Building

The existing intersections surrounding the New Academic Building are described below.

- **Intersection of Discovery Way / Tea Tree Loop** is a three-way priority-controlled intersection with Discovery Way having priority over Tea Tree Loop. A zebra crossing is provided on the eastern leg of

Discovery Way and northern leg of Tea Tree Loop. The existing layout of the intersection of Discovery Way / Tea Tree Loop is shown in Figure 2-5.

Figure 2-5: Existing Intersection of Discovery Way/Tea Tree Loop

2.5 Existing Public Transport

The existing public transport services in the area surrounding the site have been extracted from Department of Transport's Your Move Map for City of Melville and are shown in Figure 2-6.

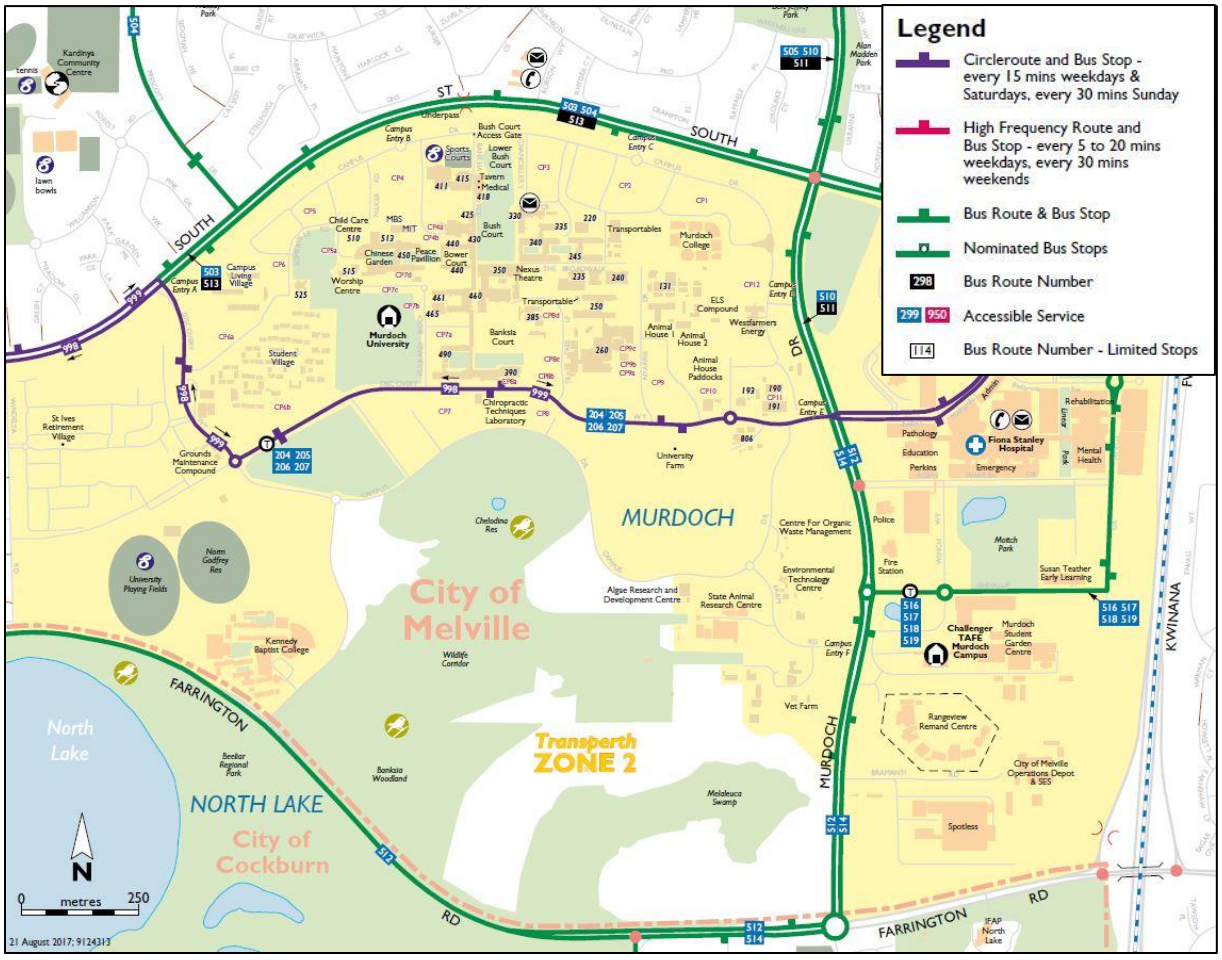


Figure 2-6: Public transport services surrounding the development site (Source: Your Move)

The bus stops listed below are located within walking distance from the NAB site:

- Bus stop located on Discovery Way eastbound, 110m west of the site
- Bus stop located on Discovery Way westbound, 145m west of the site

The above bus stops are serviced by the following bus routes:

- Bus route 204, 205, 206 and 207 provide services to Canning Vale, Thornlie Station, Cannington Station and Maddington Station.
- Bus route 999 / 998 is a high frequency circle route that services the above-mentioned bus stops (998 runs in clockwise direction and 999 runs in anti-clock wise direction). These bus route provide services to a wide range of suburbs from Fremantle and also connecting Curtin University and University of WA. The map for route 999 / 998 is shown in Figure 2-7.

The frequency of the bus services during weekdays is summarised in Table 2-1 below.

Table 2-1: Frequency of the bus services during weekdays

	AM and PM peak hours	Off peak periods
Route 204, 205,206 and 207	every 10- 15 minutes	every 15-30 minutes
Route 999 and 998	every 5-10 minutes	Every 10-15 minutes

Figure 2-7: Bus Route 998 and 999 Map (Source: Transperth)

Murdoch Train Station is located approximately 2km to the north east of the site. The Mandurah Line services Murdoch Station, and provides high frequency train services to northern and southern suburbs between Perth CBD and Mandurah.

2.6 Existing Pedestrian/Cycling Facilities

The existing pedestrian and cycling facilities in the area surrounding the site are shown in Figure 2-8. As shown, access to the NAB for pedestrian and cyclists is provided through the network of footpaths and shared paths on the roads within and outside of Murdoch University Campus. The existing pedestrian and cyclists network are summarised below:

- 1.8m wide footpath is provided on both sides of Discovery Way from the intersection of Murdoch Drive/Discovery Way/Barry Marshall Parade on the south east side of NAB to the intersection of South Street/Discovery Way on the north west side of the Campus.
- There is a signalised pedestrian crossing on all the approaches of the intersection of Murdoch Drive/Discovery Way/Barry Marshall Parade
- 1.8m wide footpaths are provided on both sides of Barry Marshall Drive from the intersection of Murdoch Drive/Discovery Way/Barry Marshall Parade that provides direct access to the Murdoch Train Station for pedestrians
- 1.5m wide on-street cycle lanes are provided on both sides of Discovery Way and Murdoch Drive. Murdoch Drive and Farrington Road are both part of the Perth Bicycle Network (PBN)
- A shared bus/cycle lane is provided on both sides of Barry Marshall drive that provides access to Murdoch Train Station and the Principal Shared Path (PSP) along the Kwinana Freeway which extends along the freeway and provides access to a number of suburbs north and south of Murdoch
- An approximately 3.0m wide shared path is provided on both sides of Murdoch Drive north of Discovery Way that connects to the 2.5m side shared path provided on the north side of South Street

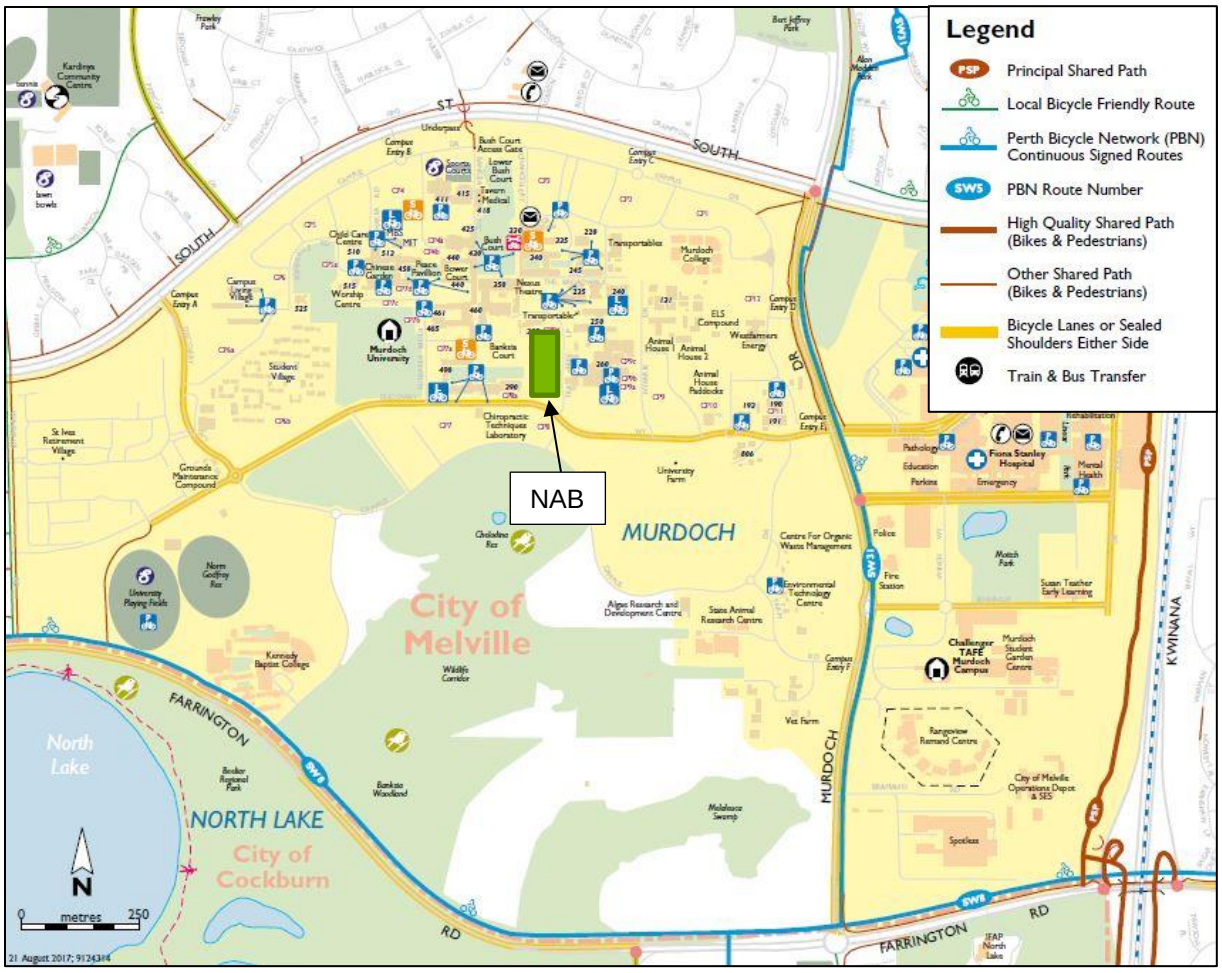


Figure 2-8: Pedestrian/Cycling Facilities surrounding the development site (Source: DoT Your Move, Melville)

Personal Bike Locker hire is available at Murdoch University for the use of students and staff at a fee of $45 per semester. Lockers are available at ECL, Energy and Engineering and the Vet Emergency Clinic.

Three free bike shelters are provided on the campus as well as free-to-use bike racks. Bike racks and bike lockers provide space for up to 426 bikes. The location of the bike racks and bike shelters are provided in

Figure 2-9. One of the bike shelters is equipped with electric power for electric bike recharging. Comprehensive bike repair stations are also provided on the campus. These include a tyre pump and an assortment of tools to help get you on the road again and are free of charge to use.

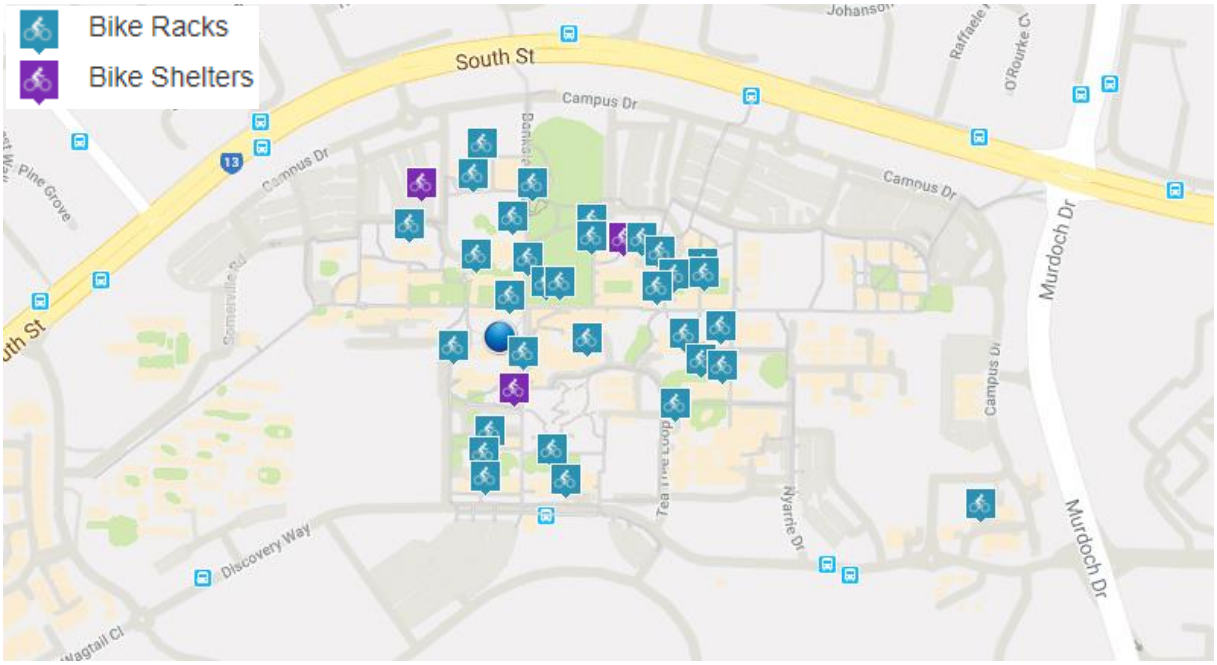


Figure 2-9: Existing Bicycle Parking Racks and Shelters at the Murdoch University Campus

The location of the bike racks, bike shelters, shower and changing rooms are shown below in **Figure 2-10**.

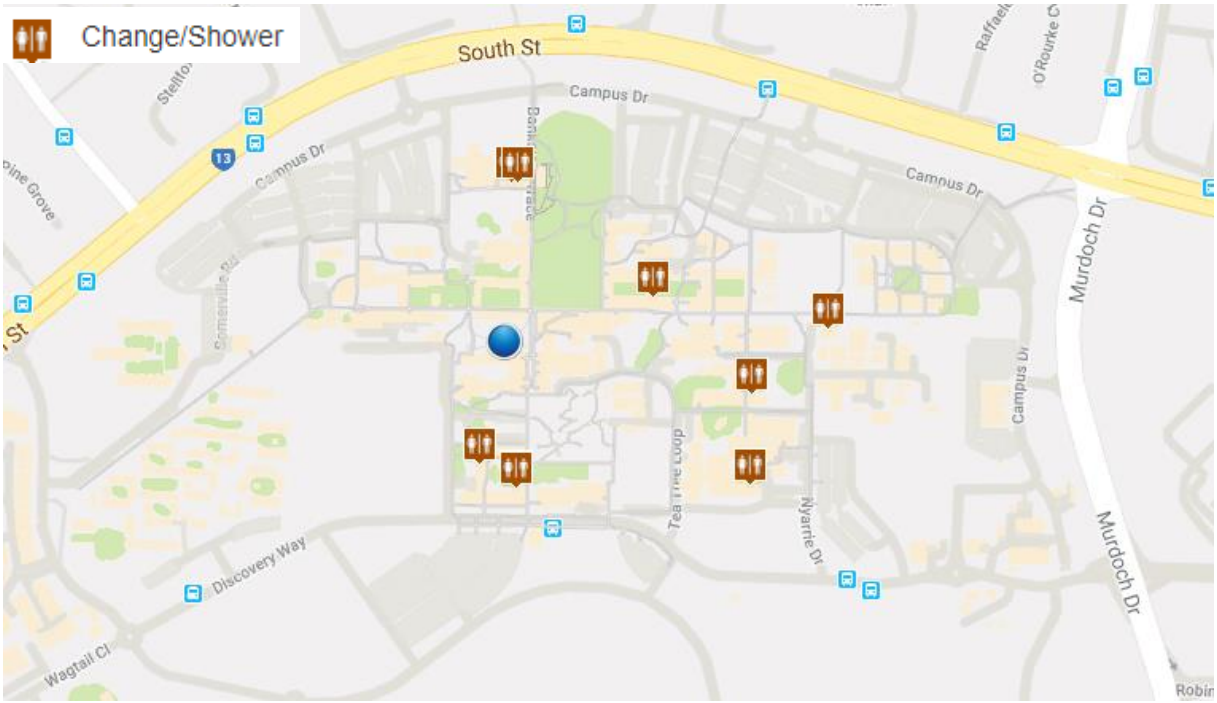


Figure 2-10: Existing Showers/Change Rooms at Murdoch university Campus

2.7 Existing Traffic Volume on the Surrounding Road Network

Existing traffic volumes on the surrounding road network are shown in Table 2-2 below.

Table 2-2: Two-way Traffic Volume on Discovery Way

Road Name	AM Peak Hour	PM Peak Hour
Discovery Way west of Murdoch Drive	590	550

Currently, there are approximately 70 car parking bays that are accessible from Tea Tree Loop. It is expected that traffic on Tee Tree Loop is limited to the number of car parks accessible from this road and the service vehicles that use Tea Tree Loop to access the existing developments on Tea Tree Loop.

3 Proposed Development

The proposed development is a New Academic Building with a total of 10,928m^2 floor area for academic purposes such as academic workplace, teaching & learning, peer learning internal & external, retail , industry engagement, lab and academic support.

The proposed floor area for different uses within the NAB is summarised in Table 3-1 below.

Table 3-1: Proposed Floor Area for the Different Academic Departments (Lyons)

Academic Department	Area (m^2)
Academic Workplace	1,269
Teaching & Learning	4,182
Peer Learning Internal	2,765
Peer Learning External	1,283
Industry Engagement	284
Lab	568
Academic Support	339
Retail	237
Total	**10,928**

3.1 Proposed Access Arrangements

No car parking or cycling facilities are proposed to be provided on site. Pedestrian access to the development is from Tea Tree Loop and through the forecourt and pedestrian area on the west side of the proposed NAB. The figure below shows the proposed site plan.

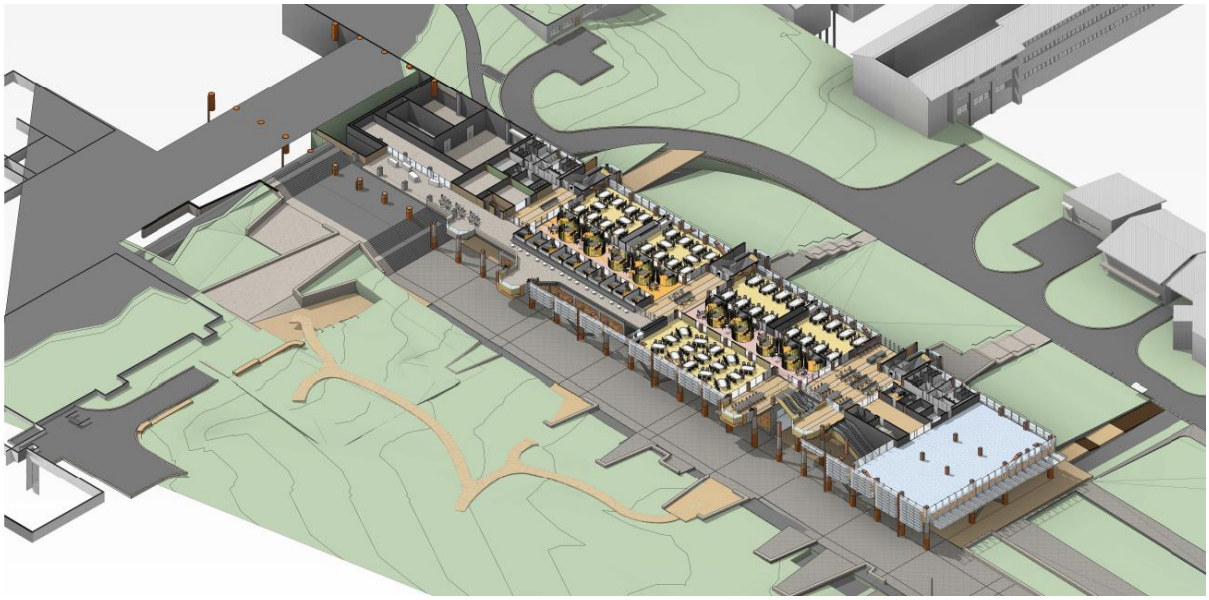


Figure 3-1: Proposed Site Plan (Source: Lyons)

3.2 Access for Service Vehicles

The development is proposed to have a loading dock on the north east side of the development site, for waste collection and delivery vehicles. As per the waste management plan prepared by Encycle, November 2019, a waste collection truck with the following characteristics is required to access the loading dock:

- Truck length: 10m
- Truck width: 2.5m
- Turning circle: 25m

Swept path analysis was undertaken for a 10m truck and is shown in Figure 3-2 below.

Figure 3-2: Swept Path Analysis for 8.8m Delivery Truck (Source: Lyons Architects, March 2019)

As shown the truck would enter Tea Tree Loop in a forward movement and reverse back into the loading dock at north end of Tea Tree Loop.

3.3 Access for Emergency Vehicles

After the construction of the proposed NAB, vehicle access to the existing buildings on the west side of the proposed NAB from Tea Tree Loop will be restricted. Emergency vehicles can only access these developments from the pedestrian area on the west side of the proposed development site.

Emergency vehicles can access the NAB from Tea Tree Loop.

Swept path analysis for a fire truck accessing the NAB and the surrounding area is shown in Figure 3-4 below.as shown, the fire truck is proposed to use Tea Tree Loop to access the NAB. The fire hydrant is located at the end of the Tea Tree Loop and at location shown in Figure 3-3. As per the DFES Guidelines, a turnaround facility needs to be provided if a dead-end road is more than 45m in length. Though the site constraint it is not possible to provide a turnaround facility and therefore, the truck will need to stop to access the fire hydrant at the location shown in Figure 3-3 which will need to be discussed with DEFES for approval.

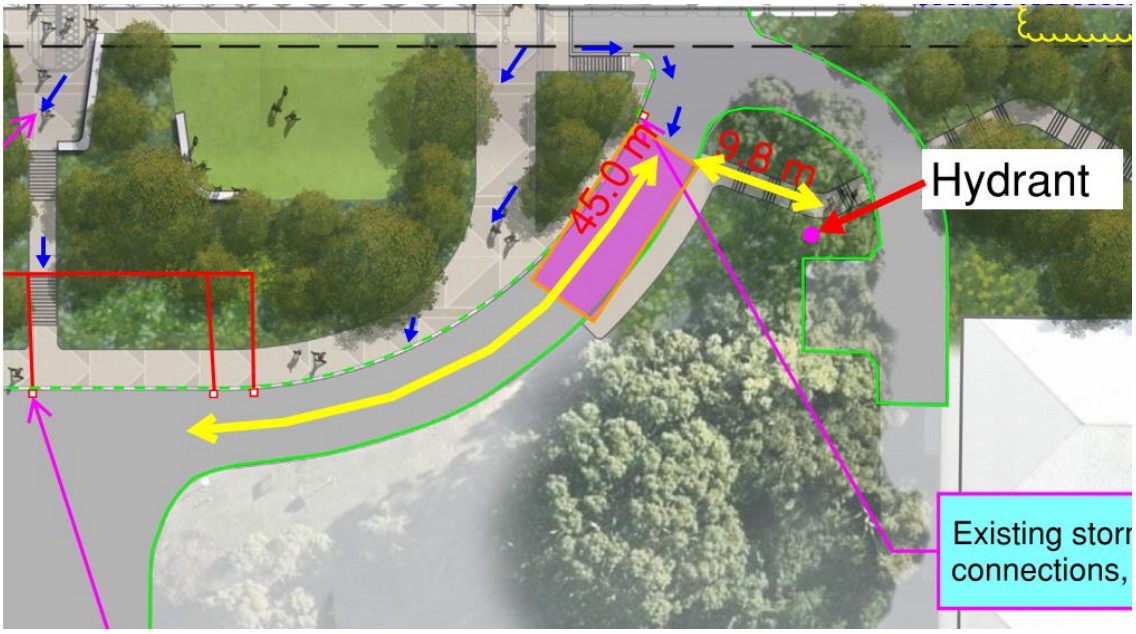


Figure 3-3: Location of the Fire Hydrant in relation to the NAB

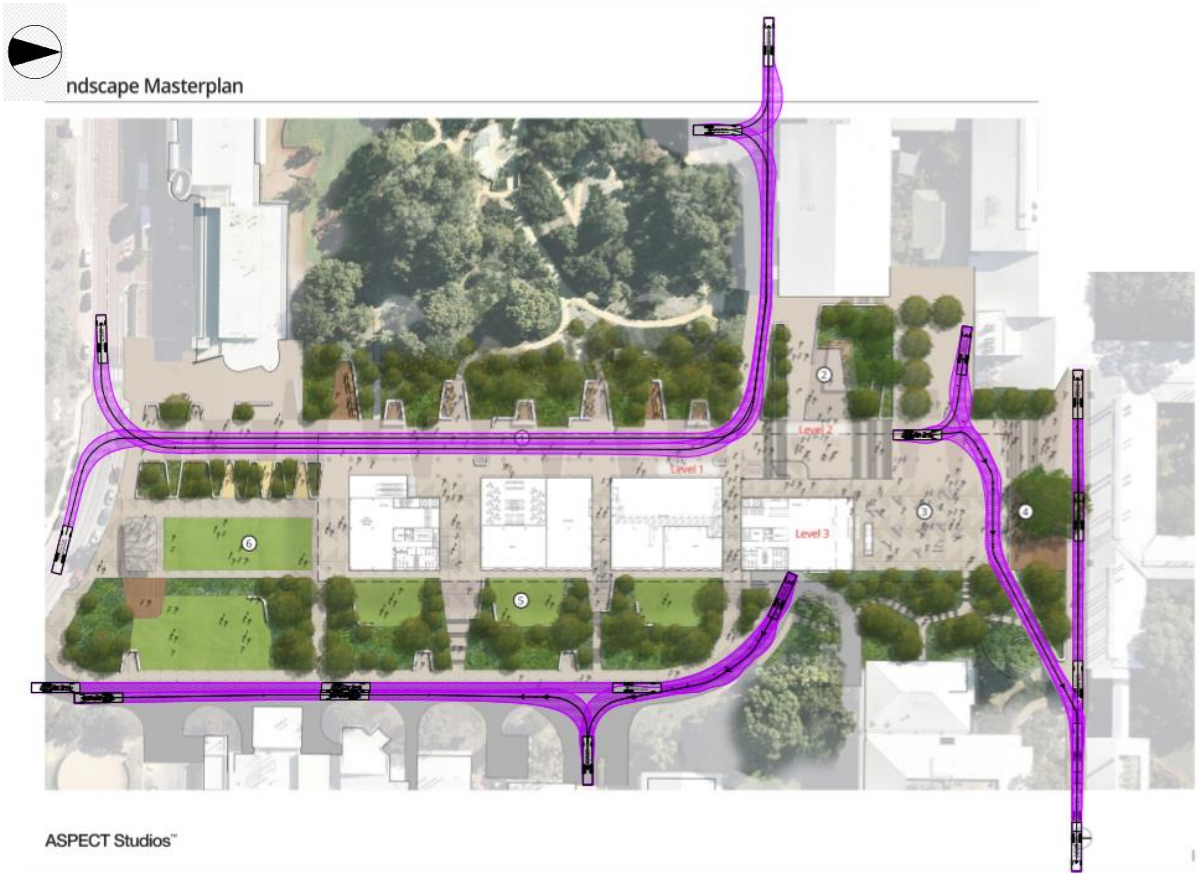


Figure 3-4: Swept Path Analysis – Fire Truck Access to the NAB and Surrounding Developments

3.4 Car Parking Provision

No car parking spaces will be provided on-site of the NAB. Car parking spaces are provided within Murdoch University Campus which are available for the use of staff, students and visitors to the NAB.

From the parking summary information provided by Murdoch University, there are currently 3,900 parking spaces distributed over multiple car parking areas including 12 main car parks. The location of the car parks is shown in Figure 3-5 below. Existing car parking is currently managed by different types of permits. There

are no allocated parking bays for staff or students. Permits are available to purchase daily, monthly, per semester or annually depending on the type and user. By using the permit system to manage the use of the car parking bays within Murdoch University, the car parking demand on the campus is operated as first-come, first-served. This allows Murdoch University to adjust the permit fees to manage the parking demand if required.

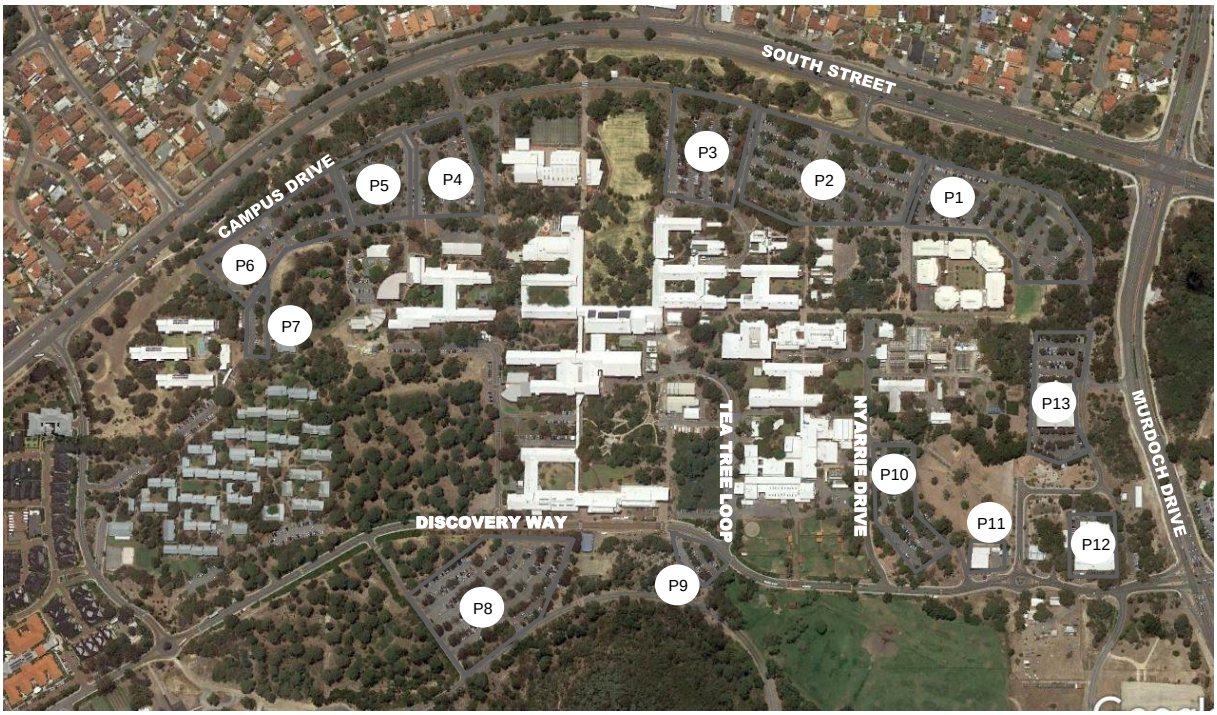


Figure 3-5: Existing Car Park Location

3.5 Proposed Pedestrian and Cycling Facilities

Murdoch Specialised Activity Centre – Structure Plan provides a layout of the existing and desirable cycle routes (shown in Figure 3-6) within Murdoch Activity Centre (surrounding and within Murdoch University campus). As per the structure plan Farrington Road will need improved pedestrian and cycle routes. A connection between the Murdoch University campus, along Farrington Road and connecting to Kwinana Freeway is yet to be investigated by the responsible planning authorities. Refer to Section 4 for more information regarding the changes in the pedestrian and cycling network surrounding Murdoch University.

It should be noted a number of bike racks will also be provided near at the campus as part of the construction of NAB.

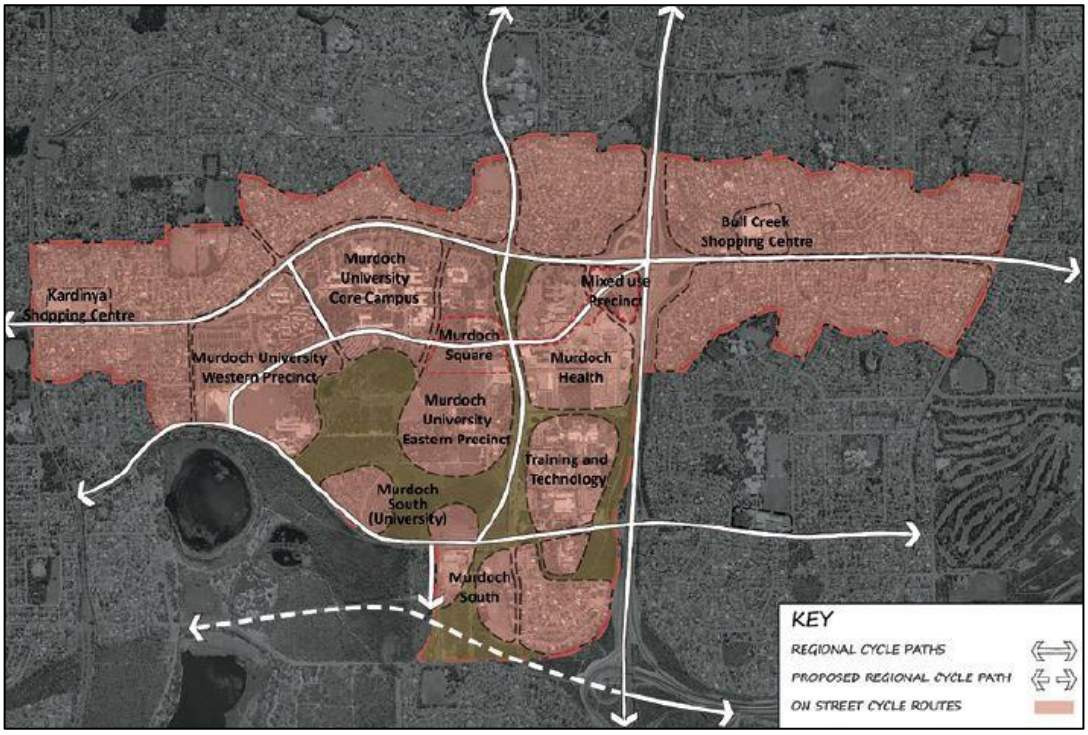


Figure 3-6: Murdoch Planned Cycle Hierarchy (Source: Murdoch Specialised Activity Centre)

3.6 Proposed Public Transport Facilities

Figure 3-7 below, extracted from Murdoch Activity Centre Structure Plan, shows the recommended public transport routes within and surrounding the Murdoch University. As shown, a rapid transit route has been proposed for Discovery Way bordering the New Academic Building on the south. This will run along South Street, with a local diversion through Murdoch University, and connect the university to Murdoch Station.

As per the advice obtained from Murdoch University, a new bus interchange is proposed to be provided on the south side of the NAB (east side of the existing bus stops on Discovery Way near the NAB). But at the time of writing this report, there is no timeline for this project.

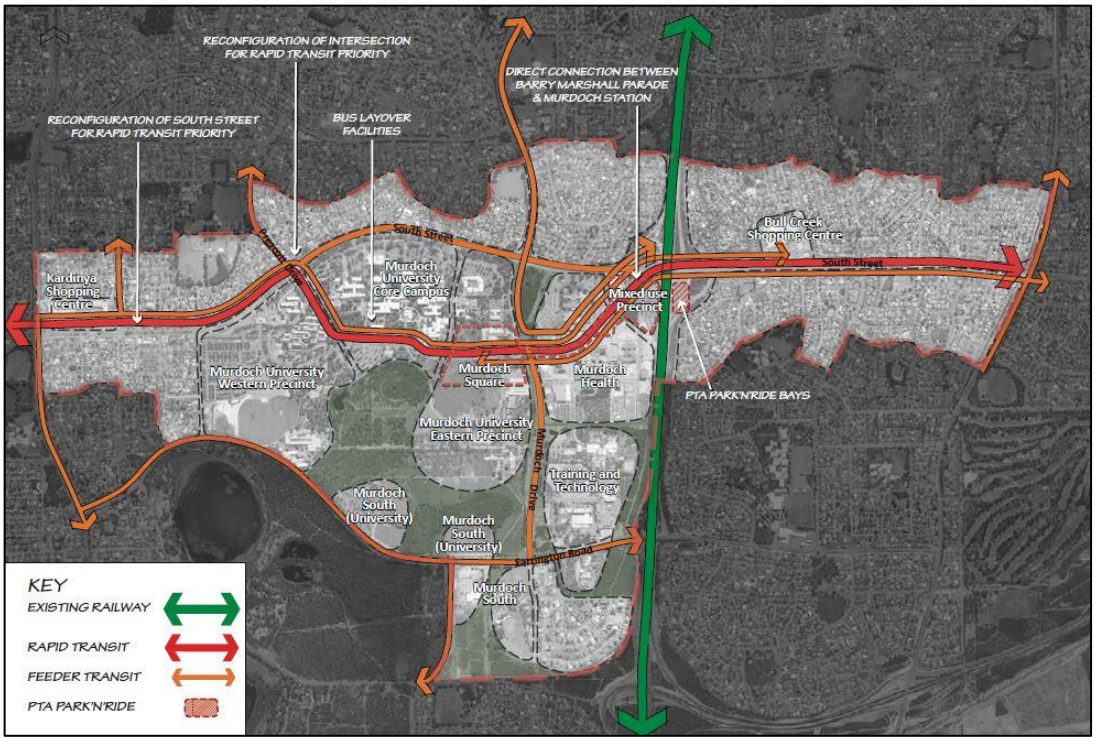


Figure 3-7: Proposed Public Transport Structure within and surrounding Murdoch University (Source: Murdoch Specialised Activity Centre)

4 Changes to the Surrounding Road Network

Murdoch Drive extension forms part of committed infrastructure works funded by the Federal and State Governments. The project comprises the extension of Murdoch Drive from Farrington Road (on the south east side of the university) to provide connection to Roe Highway and Kwinana Freeway. The connection of Murdoch Drive with Roe Highway and Kwinana Freeway is shown Figure 4-1.

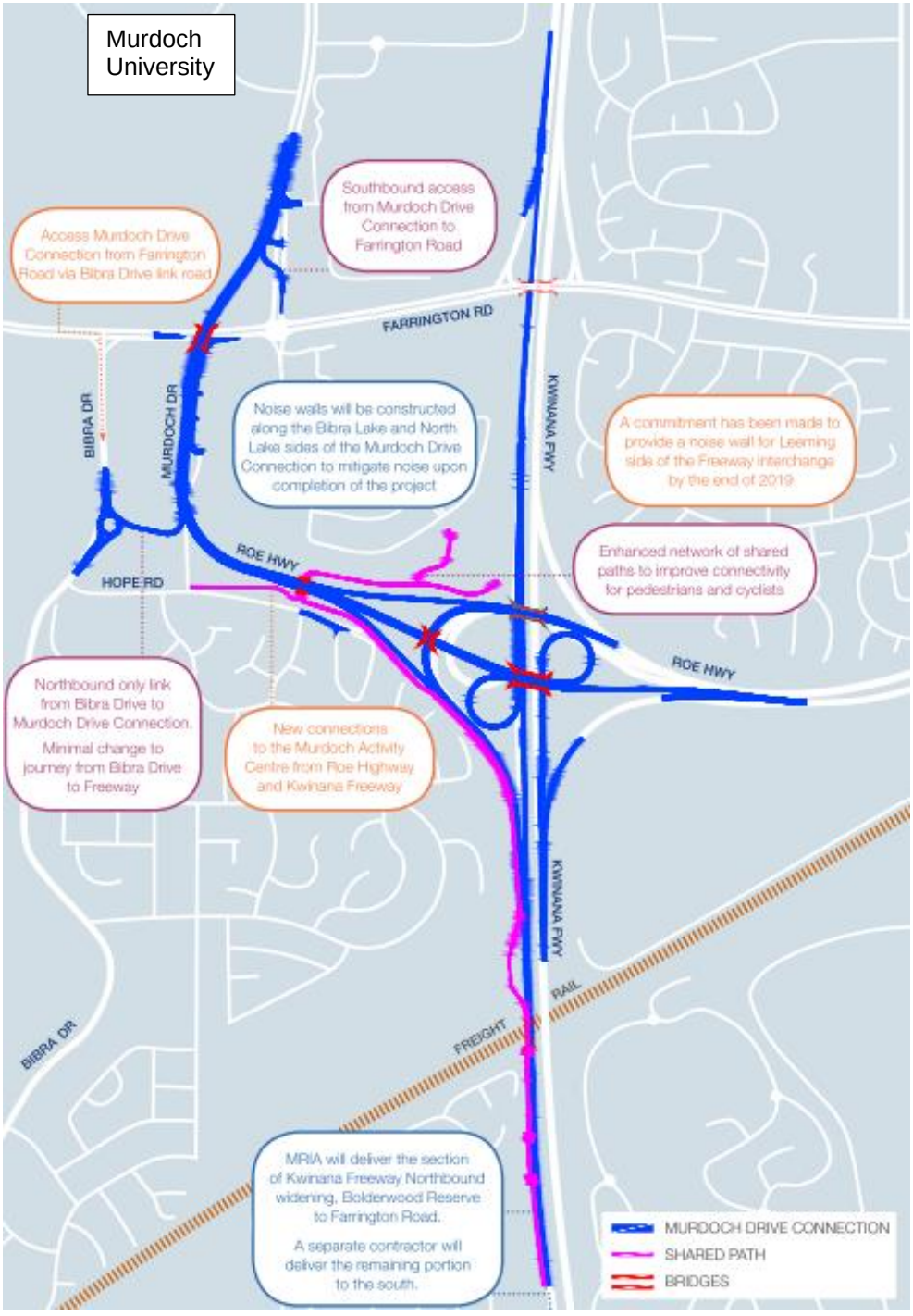


Figure 4-1: Murdoch Drive Connection Concept Plan (Source: Main Roads WA Website)

As per the Main Roads WA website, this project is currently being constructed and is expected to be completed and opened to traffic by late 2019 / early 2020. As a result of the construction of this new link, connectivity for pedestrians and cyclists will be improved between the end of Roe Highway and Farrington Road / Murdoch Drive by providing a PSP between Farrington Road and Murdoch Drive.

A new PSP underpass is already open for use by pedestrians and cyclists in the vicinity of Hope Road in Bibra Lake, and the realigned PSP and local network connections are due to be opened at project completion. Users will be able to travel on the existing path on the southern side of Hope Road, and then access the new PSP at the eastern end of Hope Road, near Pausin Crescent intersection.

The connection to the existing and future path network in the vicinity of Farrington Road has also been considered. This section of path will extend north from Farrington Road on the western side of Murdoch Drive, to join the Murdoch Drive pedestrian crossing point and bus stop and proposed future shared path northwards to South Street to be constructed by the City of Melville in the future.

Roundabout metering will also be implemented at the Bibra Drive roundabout, south of Farrington Road in Bibra Lake. The traffic signals are designed to allow the roundabout to function efficiently in peak hour situations, or when emergency vehicles need priority access. In non-peak times, signals may not be activated, and the intersection will operate as a normal roundabout.

5 Traffic Analysis

As mentioned in Section 3.4, the proposed development will not provide any additional car parking spaces. The existing car parking spaces on the campus have been provided in accordance with the policies and car parking requirements for Murdoch University and the impact of the existing car parking spaces on the campus has been assessed separately as part of the Murdoch University Master Plan Transport Assessment. Considering that 75 car parking spaces that are provided on the campus will be removed as a result of the construction of the NAB, lower passenger vehicle trips to the campus could be expected.

The existing parking provided on the campus is managed by using a permit system and is operated on a first-come, first-served basis. Trips to the campus by car drivers is limited to the number of car parking bays provided on the campus, therefore any additional car trips to the campus will be limited to pick-up / drop-off passengers.

6 Site Specific Issues and Safety Concerns

Given no new parking bays will be provided as part of the development, vehicle trips within and around the campus is not expected to change. Thus, it is considered unlikely that the New Academic Building will cause any material impact to traffic safety of the surrounding road network.

The closest major car park to the site as well as bus stops are located on the west side of Tea Tree Loop and it is expected the main pedestrian movement to the site will be from west side of Tea Tree Loop. Hence, providing a form of pedestrian priority facility such as a raised platform to increase visibility and reduce vehicle speed should be considered at the appropriate location.

7 Summary

This Transport Impact Statement regarding the New Academic Building (NAB) within the Murdoch University South Street Campus, Perth, has been undertaken in accordance with WAPC Guidelines for Transport Impact Assessment Volume 4 – Individual developments (August 2016).

In summary, this TIS outlines the following:

- The proposed development is for a New Academic Building within Murdoch University;
- The NAB is a new engineered timber building over an approximately 16,000m2 footprint;
- The building will be used for academic purposes with 10,928m2 of floor area;
- There are two existing bus stops located within short walking distance from the development site, providing services to surrounding suburbs and Murdoch Train Station;
- Sealed 1.5m wide cycle lanes currently exist on both sides of Discovery Way that connect to Murdoch Drive;
- On road cycle lane and pedestrian facilities are located on Murdoch Drive north of Discovery Way, as well as on South Street;
- A loading dock will be provided on the north east side of the proposed NAB for waste collection and delivery. Waste collection and delivery trucks will access the NAB via Tea Tree Loop;
- Emergency vehicles can access the site from Tea Tree Loop;
- No car parking spaces will be provided on-site of the NAB;
- The traffic generated by the proposed development on the road network has already been assessed as part of the Murdoch University Master Plan Transport Assessment.

Document prepared by

Company name
Registration number
Address line 1
Address line 2
Address line 3

T Company telephone
F Company fax
E Company email
W Company web

aurecon

Bringing ideas to life

Aurecon offices are located in:
Angola, Australia, Botswana, China, Ghana, Hong Kong, Indonesia, Kenya, Lesotho, Mozambique, Namibia, New Zealand, Nigeria, Philippines, Qatar, Rwanda, Singapore, South Africa, Swaziland, Tanzania, Thailand, Uganda, United Arab Emirates, Vietnam, Zambia,

Appendix 10
Bushfire Assessment

MEMORANDUM			
TO	Renee Fourie (Norman Disney & Young)		
FROM	Daniel Panickar		
DATE	1 July 2019	PURPOSE	For Information
SUBJECT	Bushfire Assessment: Murdoch University New Academic Building		

Introduction

Eco Logical Australia (ELA) was commissioned by Norman Disney & Young (NDY) to provide bushfire construction advice to support the development of a new academic building at Murdoch University's South Street Campus (the subject building; Figure 1). It is understood the subject building will encompass approx. 16,000 m^2 over four floors and will be used for teaching / learning spaces and a science laboratory with external corridors/circulation under a single expanse of roof. Construction is expected to incorporate timber frames, with upper floors on a concrete podium.

This assessment has been prepared by ELA Senior Bushfire Consultant, Daniel Panickar (FPAA BPAD Level 2 Certified Practitioner No. BPAD37802-L2) with quality assurance provided by ELA Senior Principal: Bushfire, Rod Rose (FPAA BPAD Level 3 Certified Practitioner No. BPAD1940-L3).

Bushfire assessment

Bushfire prone areas

The subject building is not located within a designated bushfire prone area as per the *Western Australia State Map of Bush Fire Prone Areas* (DFES 2019; Figure 2), however ELA understands that the project team is seeking bushfire construction advice given that the South Street Campus contains a significant amount of bushland that may result in embers impacting the subject building in the event of a bushfire.

Building class

In Western Australia, building work is required to comply with the requirements of the Building Code of Australia (BCA). The BCA is a performance-based document that provides minimum technical requirements for the construction of buildings. The BCA forms Volumes One and Two of the National Construction Code series.

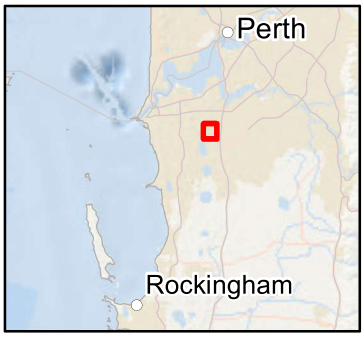
The BCA includes specific bushfire construction requirements for Class 1, 2 and 3 residential buildings and associated Class 10a structures in '*designated bush fire prone areas*' that aim to reduce the risk of ignition from a bushfire.

The subject building is neither located in a designated bushfire prone area, nor is it a Class 1, 2, 3 or 10a building / structure. However, as the South Street Campus has nearby bushland that may result in embers impacting the subject building in the event of a bushfire, the project team is seeking to incorporate elements of bushfire protection into construction where possible.

Figure 1: Site Overview

Legend

Subject building



0 75 150 300

Metres

Datum/Projection:
GDA 1994 MGA Zone 50

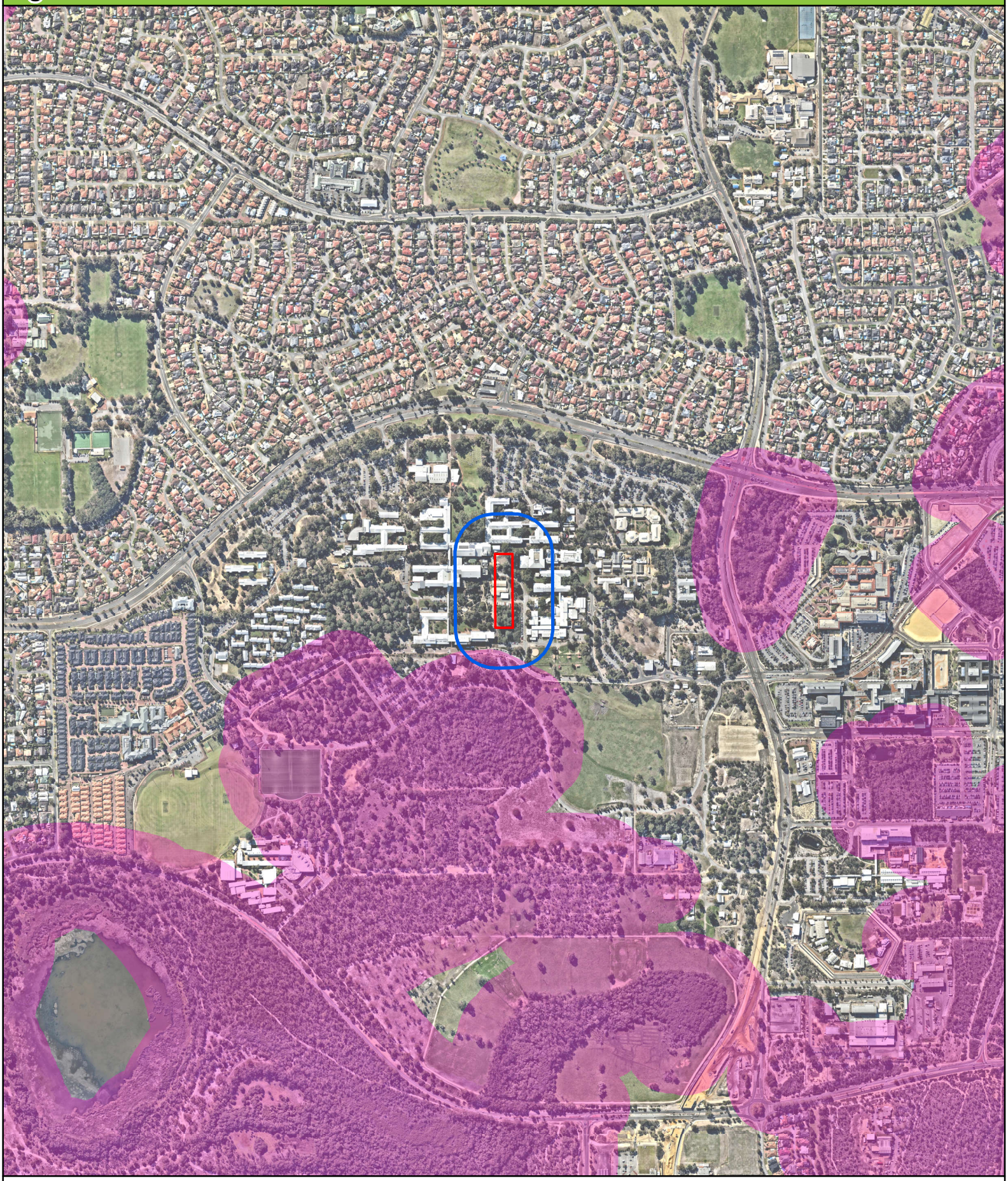
N

eco logical AUSTRALIA

www.ecoaus.com.au

Prepared by: SM Date: 25/06/2019

Figure 2: Bushfire Prone Areas



Legend

- Subject building
- 100m site assessment
- Bushfire Prone Mapping (DFES 2019)

0 100 200 400
Metres
Datum/Projection:
GDA 1994 MGA Zone 50

N

ecological AUSTRALIA
www.ecoaus.com.au

Prepared by: SM Date: 25/06/2019

Bushfire assessment inputs

ELA has undertaken a bushfire assessment in accordance with Australian Standard *AS 3959-2018 Construction of Buildings in Bushfire Prone Areas* (SA 2018) to inform potential bushfire construction standards.

Fire Danger Index

An FDI 80 is adopted for all Western Australian environments, as outlined in AS 3959–2018 and endorsed by Australasian Fire and Emergency Service Authorities Council (AFAC).

Vegetation classification

The vegetation within 100 m of the subject building has been classified through:

- Review of the vegetation assessment undertaken as part of the *Three Year Bushfire Risk Mitigation Plan for the Murdoch University South Street Campus* (BPP 2016); and
- An on-ground assessment undertaken on 11 June 2019.

The following vegetation classes and exclusions were identified within the assessment area as depicted in Figure 3 and listed below:

- Class B woodland; and
- Exclusions as per clause 2.2.3.2 (e) and (f) of AS 3959-2018 (i.e. non-vegetated areas and low-threat vegetation).

Topography and slope under vegetation

The 'effective slope' under vegetation was assessed for a distance of 100 m from the assessed buildings in accordance with AS 3959-2018 and classified as upslope/flat land in all directions.

Bushfire assessment outputs

Bushfire Attack Level (BAL) assessment

A Method 1 BAL assessment (as outlined in AS 3959-2018) has been completed for the assessed buildings and incorporates the following factors:

- State adopted FDI rating;
- Vegetation class;
- Slope under classified vegetation; and
- Distance between areas assessed buildings and the classified vegetation.

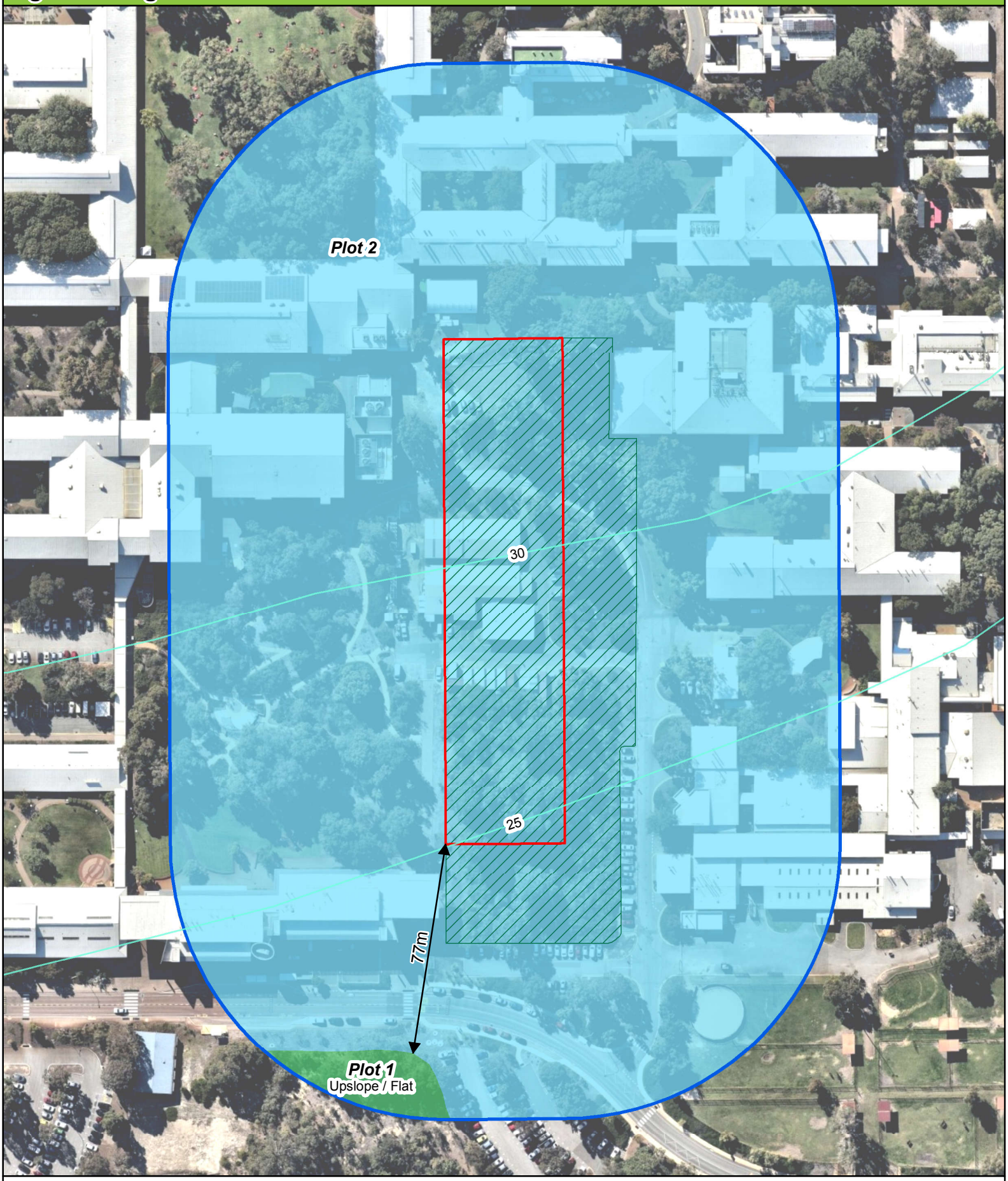
Based on the identified BAL, construction requirements for assessed buildings can then be assigned. The BAL rating gives an indication of the expected level of bushfire attack (i.e. radiant heat flux, flame contact and ember penetration) that may potentially impact the assessed buildings and subsequently informs the standard of construction required to increase building resilience.

The identified BAL rating for the subject building is **BAL-12.5** as calculated in Table 1.

Table 1: Method 1 BAL calculation

Vegetation classification	Effective slope	Hazard separation distance (m)	BAL rating
Class B woodland	Upslope /flat land	77 m	BAL-12.5

Figure 3: Vegetation Classification



Legend

- Subject building
- 100m site assessment
- Contour (5m)
- Vegetation to be modified to a low threat state

Vegetation classification

- Class B woodland
- Excluded as per clause 2.2.3.2 (e) and (f)

0 15 30 60
Metres
Datum/Projection:
GDA 1994 MGA Zone 50

N

ecological AUSTRALIA
www.ecoaus.com.au

Prepared by: SM Date: 25/06/2019

Construction upgrades

The subject building is neither located in a designated bushfire prone area, nor is it a Class 1, 2, 3 or 10a building / structure. However, as the South Street Campus contains nearby bushland that may result in embers impacting the subject building elements of bushfire protection have been sought by designers for the construction.

The subject building has a BAL rating of BAL-12.5 from the nearby vegetation; which although not large enough to be classified as bush fire prone, may still pose a risk. BAL-12.5 is primarily concerned with protection of buildings from ember attack and radiant heat up to and including 12.5 kW/m^2. This level of protection is considered adequate for the risk and the building proposed.

Relevant construction standards pertaining to BAL-12.5 and extracted from AS 3959-2018 are provided below in Table 2 for incorporation into building design and construction where relevant.

Conclusion

In the author's professional opinion, a BAL 12.5 construction for the proposed building will improve its bushfire protection to an appropriate level. Table 2 outlines the construction design required to achieve this standard.

It is assumed that the use pattern of the adjoining vegetation area will continue and that the bushfire risk will not be increased in the future by removing the existing pathways and low fuel areas. Vegetation management and maintenance in the areas adjacent to the subject building must continue at its current standard or if altered should not increase the density or proximity of vegetation to the proposed building.

Daniel Panickar

Senior Bushfire Consultant

FPAA BPAD Certified Practitioner
No. BPAD37802-L2

BPAD Bushfire Planning & Design Accredited Practitioner Level 2

Rod Rose

Senior Principal: Bushfire

FPAA BPAD Certified Practitioner
No. BPAD1940-L3

BPAD Bushfire Planning & Design Accredited Practitioner Level 3

Table 2: Bushfire construction recommendations from AS 3959-2018

Clause #	Element name	Sub Element number	Sub Element name	Requirement Summary
3.1 General				
3.2	Construction requirements for specific structures	3.2.1	Attached structures and structures sharing a common roof space	Where any part of a garage, carport, or similar roofed structure is attached to, or shares a common roof space with, a building required to conform with the Standard*, the entire roofed structure shall conform with the construction requirements of the Standard. Alternatively, the structure shall be separated from the subject building by a wall that extends to the underside of a non-combustible roof covering, and that conforms with one of the following: a. The wall shall have an FRL of not less than 60/60/60 for loadbearing walls and -/60/60 for non-loadbearing walls when tested from the attached structure side and shall have openings projected as follows: i *Doorways* – by self-closing fire doors with an FRL of -/60/30, conforming with AS 1530.4 and tested in accordance with AS 1530.4. ii *Windows* – by fire windows with an FRL of -/60/-, when tested in accordance with AS 1530.4 and permanently fixed in the closed position. iii *Other openings* – by construction with an FRL of not less than - /60/ - when tested in accordance with AS 1530.4. b. The wall shall be of masonry, earth or masonry-veneer construction with the masonry leaf of not less than 90 mm in thickness and shall have openings protected as follows: i *Doorways* – by self-closing fire doors with an FRL of -/60/30, conforming with AS 1905.1 and tested in accordance with AS 1530.4. ii *Windows* – by fire windows with an FRL of -/60/- when tested in accordance with AS 1530.4 and permanently fixed in the closed position. iii *Other openings* – by construction with an FRL of not less than -/60/- when tested in accordance with AS 1530.4.
		3.2.2	Garages and carports beneath the subject building	Where a garage or carport is beneath a building required to comply with this Standard, it shall conform with the construction requirements of the Standard, as applicable to the subject building.

Clause #	Element name	Sub Element number	Sub Element name	Requirement Summary
				Alternatively, any construction separating the garage or carport (including walls and flooring systems) from the remainder of the building shall conform with one of the following: a. The separation construction shall have an FRL of not less than 60/60/60 for loadbearing construction and -/60/60 for non-loadbearing construction when tested from the garage or carport side and shall have openings protected in accordance with the following: i *Doorways* – by self-closing fire doors with an FRL of -/60/30, conforming with AS 1905.1 and tested in accordance with AS 1530.4. ii *Windows* – by fire windows with an FRL or -/60/- when tested in accordance with AS 1530.4 and permanently fixed in the closed position. iii *Other openings* – by construction with an FRL of not less than -/60/- when tested in accordance with AS 1530.4. b. Where part or all of the separating construction is a wall, the wall need not conform with Item (a) above, provided the wall is of masonry, earth or masonry-veneer construction with the masonry leaf of not less than 90 mm in thickness and the wall has openings protected in accordance with the following: i *Doorways* – by self-closing fire doors with an FRL of -/60/30 conforming with AS 1905.1 and tested in accordance with AS 1530.4. ii *Windows* – by fire windows with an FRL of -/60/- when tested in accordance with AS 1530.4 permanently fixed in a closed position. iii *Other openings* – by construction with an FRL not less than -/60/- when tested in accordance with AS 1530.4.
		3.2.3	Adjacent structures on the subject allotment	Where any garage, carport or similar roofed structure on the subject allotment is not attached to a building required to conform with the Standard, that structure shall conform with the construction requirements of the Standard. Alternatively, the adjacent structure shall be separated from the subject building by one of the following: a. A distance of not less than 6 m from the building required to conform with the Standard. The distance is measured as any of the horizontal straight lines from the adjacent structure to the subject building.

Clause #	Element name	Sub Element number	Sub Element name	Requirement Summary
				or b. A wall of the building required to conform that extends to the underside of a non-combustible roof covering and has an FRL of not less than 60/60/60 for loadbearing walls and -/60/60 for non-loadbearing walls when tested from the outside. Any openings in the wall shall be protected in accordance with the following: i *Doorways* – by self-closing doors with an FRL of -/60/30, conforming with AS 1905.1 and tested in accordance with AS 1530.4. ii *Windows* – by fire windows with an FRL of -/60/- when tested in accordance with AS 1530.4 and permanently fixed in the closed position. iii *Other openings* – by construction with an FRL of not less than -/60/- when tested in accordance with AS 1530.4. *or* c. A wall of a building required to conform that extends to the underside of a non-combustible roof covering and is of masonry, earth, or masonry-veneer construction with the masonry leaf of not less than 90 mm in thickness. Any openings in the wall shall be protected in accordance with the following: i *Doorways* – by self-closing fire doors with an FRL of -/60/30, conforming with AS 1905.1 and tested in accordance with S1530.4. ii *Windows* – by fire windows with an FRL of -/60/- when tested in accordance with AS 1530.4 and permanently fixed in the closed position. iii *Other openings* – by construction with an FRL of not less than -/60/- when tested in accordance with AS 1530.4
3.3	External Mouldings			Unless otherwise required in Clause 3.6.1 and Sections 5 to 9, combustible external moulding, jointing strips, trims and sealants may be used for decorative purposes or to cover joints between sheeting material.
3.4	Higher Levels of Construction			The construction requirements specified for a particular BAL shall be acceptable for a lower level. For example, if the site has been assessed as at BAL-12.5, then BAL-12.5 construction is required, however any element or combination of elements contained in BAL-19 level of construction or above may be used to satisfy the Standard.

Clause #	Element name	Sub Element number	Sub Element name	Requirement Summary
3.5	Reduction in Construction Requirements due to Shielding			**Not applicable.** A reduction of construction requirements due to shielding cannot be reduced below BAL 12.5.
3.6	Vents, Weepholes, Gaps and Screening Materials	3.6.1	Vents, weepholes, joints and the like	All gaps including vents and weepholes shall be screened except for weepholes to sill of windows and doors. All joints shall be backed by breathable sarking or mesh expect permitted by Clause 3.3. Maximum allowable aperture size of any mesh **or** perforated material used as a screen shall be 2 mm.
		3.6.2	Gaps to door and window openings	Where screens are fitted to door openings for ember protection, they shall have a maximum aperture of 2 mm and be tight fitting to the frame in the closed position. Gaps between dooring including jambs, heads or sills (thresholds) shall be protected using draught seals and excluders or the like. Windows conformant with AS 2047 will satisfy the requirements for gap protection. Screens fitted to window openings shall have a maximum aperture of 2 mm and these shall be tight fitting to the frames.
3.7	Bushfire Shutters			Bushfire shutters shall: a. Protect the entire window assembly including framing, glazing, sash and sill. b. Protect the entire door assembly including framing, glazing, sill and hardware. c. Consist of materials specified in Clauses 5.5.1, 6.5.1, 7.5.1, 8.5.1 and 9.5.1 for the relevant BAL. d. Be fixed to the building and be non-removable. e. Be capable of being closed manually from either inside or outside or motorised shutter systems, where they are not reliant on mains power to close. f. When in the closed position, have no gaps greater than 2 mm between the shutter and the wall, frame or sill. g. Where perforated, have uniformly distributed perforations with a maximum aperture of 2 mm and a perforated area no greater than 20% of the shutter.

Clause #	Element name	Sub Element number	Sub Element name	Requirement Summary
				If bushfire shutters are fitted to all external doors then at least one of those shutters shall be operable from the inside to facilitate safe egress from the building.
3.8	Testing of Materials Elements of Construction and Systems to the AS 1530.8 Series			Unless otherwise specified, elements of construction and systems satisfy the Standard when tested in accordance with AS 1530.8 series for the relevant BLA level and Crib Class in Table 3.2. Elements of construction or systems tested in accordance with AS 1530.8.1-2007 with Crib Class A prior to the issue of the Standard are acceptable. Where any element of construction or system satisfies test criteria for AS 1530.8 series without screening for ember protection, the requirements of the Standard for screening of openable parts of windows still apply. Where a window protected with a shutter satisfies the test criteria in AS 1530.8 series, additional requirements of the Standard for screening pf opening parts of windows do not apply.
3.9	Glazing			Glazing requirements shall be in accordance with Sections 5 to 9 of the Standard. 1. Where double glazed assemblies are used, glazing requirements provided in the Standard apply to external face of the glazed assembly only. 2. Refer to AS 1288 for an explanation of the terminologies used to describe various types of glass in the Standard.
3.10	Sarking			Where sarking is required in Sections 5 to 9 of the Standard, the flammability index shall not exceed five when tested to AS 1530.2.
3.11	Timber Log Walls			Where the thickness of a timber log wall is specified in Sections 5,6 and 7 of the Standard, two criteria are nominated: a. Nominal overall thickness is the overall thickness of the wall. b. Minimum thickness is the thickness of the wall at the interface of two logs in the wall.

Clause #	Element name	Sub Element number	Sub Element name	Requirement Summary
5.1	General			A building assessed in Section 2 as being Bal – 12.5 shall conform with Section 3 and Clauses 5.2 to 5.8 of the Standard. Any element of construction or system that satisfies AS 1530.8.1 criteria may be used in lieu of applicable requirements in Clauses 5.2 to 5.8. Note: BAL-12.5 is primarily concerned with protection from ember attack and radiant heat up to and including 12.5 kW/m^2 where the site is less than 100 m from the source of bushfire attack.
5.2	Subfloor Supports			The Standard does not provide construction requirements for subfloor support where the subfloor space is enclosed with: a. A wall that complies with Clause 5.4 **or** b. A mesh or perforated sheet with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze **or** aluminium **or** c. A combination of items (a) and (b). This requirement applies to the subject building only and not to verandas, decks, steps, ramps and landings.
5.3	Floors	5.3.1	General – Concrete slabs on ground	The Standard does not provide construction requirements for concrete slabs on the ground.
		5.3.2 Elevated Floors		
		5.3.2.1	Enclosed subfloor space	The Standard does not provide construction requirements for elevated floors, including bearers, joists and flooring, where the subfloor space is enclosed with: a. A wall that complies with Clause 5.4 **or** b. A mesh or perforated sheet with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze **or** aluminium **or** c. A combination of items (a) and (b).
		5.3.2.2	Unenclosed subfloor space	Where the subfloor space in unenclosed, the bearers, joists and flooring in the <400 mm above finished ground level, shall be one of the following: a. Materials that conform with the following:

Clause #	Element name	Sub Element number	Sub Element name	Requirement Summary
				i Bearers and joists shall be non-combustible or bushfire-resisting timber (Appendix F) or a combination of these. ii Flooring shall be non-combustible or bushfire-resisting timber (Appendix F) or other timber, particleboard or plywood (where underside is lined with sarking-type material or mineral wool insulation) or a combination of these items. b. A system conforming with AS 1530.8.1. The Standard does not provide construction requirements for elements of elevated floors, including bearers, joists and flooring, if the underside of the element is 400 mm or more above finished ground level.
5.4	Walls	5.4.1	General	The exposed components of an external wall that are < 400 mm from the ground or < 400 mm above decks, carport roofs, awnings and similar elements or fittings having an angle of < than 18 degrees to the horizontal and extending more than 110 mm in width from the wall shall be one of the following: a. Non-combustible material (masonry, concrete, calcium silicate, natural stone, earth wall etc min 90 mm): i Full masonry or masonry veneer walls with an outer leaf of clay, concrete, calcium silicate or natural stone ii Precast or in situ walls of concrete or aerate concrete iii Earth wall including mud brick **or** b. Timber logs of a species with a density of 680kg/m ^{3} or greater at a 12% moisture content; of a minimum nominal overall thickness of 90 mm and a minimum thickness of 70 mm and gauge planed **or** c. Cladding that is fixed externally to a timber-framed or steel-framed wall and is: i Non-combustible material **or** ii FCS minimum 6 mm **or** iii Bushfire-resisting timber (Appendix F) **or** iv Timber species specified in Paragraph E1, Appendix E **or** v a combination of any items (i), (ii), (iii) or (iv) **or** d. A combination of any of items (a), (b) or (c).

Clause #	Element name	Sub Element number	Sub Element name	Requirement Summary
				The Standard does not provide construction requirements for exposed components of an external wall that are 400 mm or more from the ground or 400 mm or more above decks, carport roofs, awnings and similar elements or fittings having an angle < 18 degrees to the horizontal and extending > 110 mm in width from the wall.
		5.4.2	Joints	All joints in the external surface material of walls shall be covered, sealed, overlapped, backed **or** butt-jointed.
		5.4.3	Vents and weepholes	Except for exclusions provided in Clause 3.6, vents and weepholes in external walls shall be screened with a mesh made of corrosion-resistant steel, bronze or aluminium.
5.5	External Glazed Elements, Assemblies and Doors	5.5.1	Bushfire shutters	Where fitted, bushfire shutter shall comply with Clause 3.7 and made from: a. Non-combustible material **or** b. Timber species specified in Paragraph E1, Appendix E **or** c. Bushfire-resisting timber (Appendix F) **or** d. A combination of any items (a), (b) or (c).
		5.5.2	Screens for windows and doors	Where fitted, screens for windows and doors shall have a mesh or perforated sheet made of corrosion-resistant steel, bronze or aluminium. The frame supporting mesh/sheet shall be made from: a. Metal **or** b. Bushfire-resisting timber (Appendix F) **or** c. A timber species specified in Paragraph E2, Appendix E.
		5.5.3	Windows and sidelights	Window assemblies shall: a. Be completely protected by a bushfire shutter that conforms with Clause 3.7 and Clause 5.5.1 **or** b. Be completely protected externally by screens that conform with Clause 3.6 and Clause 5.5.2 **or** Conform with the following: i *Frame material* -For windows assemblies <400 mm from the ground or < 400 mm above decks, carport roofs, awnings and similar elements or fittings have an angle ¸than 18 degrees to the horizontal and extending >

Clause #	Element name	Sub Element number	Sub Element name	Requirement Summary
				110 mm in width from the window frame, window frames and window joinery shall be made from one of the following: Bushfire-resisting timber (Appendix F) **or** a timber species specified in Paragraph E2, Appendix E **or** metal **or** metal-reinforced PVC-U (the reinforcing members shall be made from aluminium, stainless steel, **or** corrosion-resistant steel *ii* *Hardware* - There are no specific restrictions on hardware for windows iii Glazing – Where glazing is <400 mm from the ground or < 400 mm above decks, carport roofs, awnings and similar elements or fittings have an angle < 18 degrees to the horizontal and extending > 110 mm in width from the window frame, this, glazing shall be Grade A safety glass min. 4 mm thick **or** glass blocks with no restrictions on glazing methods *iv* *Seals and weather strips* - There are no specific requirements for seals and weather strips at this BAL level v *Screens* - The openable portions of windows shall be screened internally **or** externally with screens that comply with Clause 3.6 and Clause 5.5.2.
		5.5.4	Doors – Side hung external doors	Side-hung external doors, including French doors, panel fold and bi-fold doors, shall: a. Be completely protected by bushfire shutters that conform with Clause 3.7 and Clause 5.5.1 **or** b. Be completely protected by external screens that conform with Clause 3.6 and Clause 5.5.2 **or** c. Conform with the following: i *Door panel material* – Material shall be: - Non-combustible **or** - Solid timber, laminated timber **or** reconstituted timber door, having a minimum thickness of 35 mm for the first 400 mm above the threshold **or** - Hollow core, solid timber, laminated timber **or** reconstituted timber, with a non-combustible kickplate on the outside for the first 400 mm above the threshold **or**

Clause #	Element name	Sub Element number	Sub Element name	Requirement Summary
				- Hollow core, solid timber, laminated timber or reconstituted timber, protected externally by a screen that conforms with Clause 5.5.2 **or** - For fully framed glazed door panels, the framing shall be made from metal or bushfire-resting time (Appendix F) **or** a timber species specified in Paragraph E2, Appendix E **or** uPVC. ii *Door frame material* – Door frame materials shall be: - Bushfire-resting timber (Appendix F) **or** - A timber species specified in Paragraph E2 of Appendix E **or** - Metal **or** - Metal-reinforced uPVC (the reinforcing members shall be made from aluminium, stainless steel or corrosion-resistant steel). iii *Hardware* – There are no specific requirements for hardware at this BAL level. iv *Glazing* - The glazing shall be Grade A safety glass a min of 4 mm in thickness, or glass blocks with no restriction on glazing methods. Where double glazed units are used, the above requirement is for external face window assembly only. v *Seals and weather strips* - Weather strips, draft excluders or draft seal shall be installed. vi *Screens* – There are no requirements to screen the openable part of the door at this BAL level. vii *Doors* - shall be tight-fitting to the door frame and to an abutting door, if applicable.
		5.5.5	Doors – Sliding doors	Sliding door shall: a. Be completely protected by a bushfire shutter that conforms with Clause 3.7 and clause 5.5.1 **or** b. Be completely protected by external screens that conform with Clause 3.6 and Clause 5.5.2 **or** c. Conform with the following: i *Frame material* – The material for door frames, including fully framed glazed doors shall be: Bushfire-resisting timber (Appendix F) **or** a timber

Clause #	Element name	Sub Element number	Sub Element name	Requirement Summary
				species specified in Paragraph E2 of Appendix E **or** metal **or** metal-reinforced uPVC (the reinforcing members shall be made from aluminium, stainless steel **or** corrosion-resistant steel). ii *Hardware* – There are no specific requirements for hardware at this BAL level. iii *Glazing* – Where doors incorporate glazing, the glazing shall be grade A safety glass a min of 4 mm in thickness. iv *Seals and weather strips* – There are no specific requirements for seals and weather strips at this BAL level. v *Screens* – There is no requirement to screen the openable part of the sliding door at this BAL level. vi *Sliding panels* – Sliding panels shall be tight- fitting in the frames.
		5.5.6	Doors – Vehicle access doors (garage doors)	The following applies to vehicle access doors: a. The lower portion of a vehicle access door that is within 400 mm of the ground when the door is closed shall be made from; non-combustible material **or** bushfire-resisting timber (Appendix F) **or** fibre-cement sheet min 6 mm thick **or** timber species specified in Paragraph E1of Appendix E **or** a combination of any of these. b. All vehicle access doors shall be protected with suitable weather strips, draught excluders, draught seals or brushes. Door assemblies fitted with guide tracks do not edge gap protection. c. Vehicle access doors with ventilation slots shall be protected in accordance with Clause 3.6.
5.6	Roofs (including penetrations, eaves, facias and gables and gutters and downpipes).	5.6.1	General	The following applies to all types of roofs and roofing systems; a. Roof tiles, roof sheets and roof-covering accessories shall be non-combustible. b. The roof/wall junction shall be sealed or otherwise protected in accordance with Clause 3.6. c. Roof ventilation openings, such as gable and roof vents, shall be fitted with ember guards made of non-combustible material **or** a mesh **or** perforated sheet

Clause #	Element name	Sub Element number	Sub Element name	Requirement Summary
				conforming with Clause 3.6 and made of corrosion-resistant steel, bronze or aluminium. d. Only evaporative coolers manufactured in accordance with AS/NZS 60335.2.98 shall be used. Evaporative coolers with an internal damper to prevent the entry of embers into the roof space need not be screened externally.
		5.6.2	Tiled roofs	Tiled roofs shall be fully sarked. The sarking shall: a. Be located on top of the roof framing, except that the roof battens may be fixed above the sarking. b. Cover the entire roof area including ridges and hips. c. Extend into gutters and valleys.
		5.6.3	Sheet roofs	Sheet roofs shall: a. Be fully sarked in accordance with Clause 5.6.2, except that foil-backed insulation blankets may be installed over the battens **or** b. Have any gaps sealed at the fascia or wall line, hips and ridges by a mesh or perforated sheet that conforms with Clause 3.6 and made of corrosion-resistant steel or bronze or aluminium **or** mineral wool **or** other non-combustible material **or** a combination of any of these items.
		5.6.4	Veranda, carport and awning (VCA) roof	The following applies to veranda, carport and awning roof: a. A VCA roof forming part of the main roof space [Fig D1(a), Appendix D] shall meet all the requirements for the main roof, as specified in Clauses 5.6.1 to 5.6.6. b. A VCA roof separated from the main roof space by an external wall [see Figs D1(b) and D1(c), Appendix D] conforming with Clause 5.4 shall have a non-combustible roof covering, except where the roof covering is a translucent or transparent material. There is no requirement to line the underside of a veranda, carport or awning roof that is separated from the main roof space.
		5.6.5	Roof penetrations	The following applies to roof penetrations: a. Roof penetrations, including roof lights, roof ventilators, roof-mounted evaporative cooling units, aerials, vent pipes and supports for solar collectors or

Clause #	Element name	Sub Element number	Sub Element name	Requirement Summary
				the like, shall be sealed. The material used to seal the penetration shall be non-combustible. b. Openings in vented roof lights, roof ventilators or vent pipes shall conform with Clause 3.6 and made of corrosion-resistant steel, bronze or aluminium. - This requirement does not apply to room sealed gas appliance. - In the case of gas appliance flues, ember guards shall not be fitted. c. All overhead glazing shall be Grade A safety glass complying with AS 1288. d. Glazed elements in roof lights and skylights may be of polymer provided a Grade A safety glass diffuser, complying with AS 1288, is installed under the glazing. Where glazing is an insulated glazing unit (IGU), Grade A toughened safety glass min. 4 mm shall be used in the outer pane of the IGU. e. Flashing elements of tubular skylights may be of a fire-retardant material, provided the roof integrity is maintained by an under-flashing of a material with a flammability index ≤5. f. Evaporative cooling units shall be fitted with non-combustible butterfly closers as close as practicable to the roof level, or the unit shall be fitted with non-combustible covers with a mesh or perforated sheet with a max. aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium. g. Vent pipes made from PVC are permitted. h. Eaves lighting shall be adequately sealed and not compromise the performance of the element.
		5.6.6	Eaves lining, fascias and gables	The following apply to eaves linings, fascias and gables: a. Gables shall comply with Clause 5.4. b. Eaves penetrations shall be protected the same as for roof penetrations (see Clause 5.6.5). c. Eaves ventilation openings shall be fitted with ember guards in accordance with Clause 3.6 and made of corrosion-resistant steel, bronze or aluminium. Joints in eaves linings, fascias and gables may be sealed with plastic joining strips or timber storm moulds. The Standard does not provide construction requirements for fascias, bargeboards and eaves linings.

Clause #	Element name	Sub Element number	Sub Element name	Requirement Summary
		5.6.7	Gutters and downpipes	The Standard does not provide material requirements for: a. Gutters (except box gutters) and b. Downpipes. If installed, gutter and valley guards must be non-combustible. Box gutters to be non-combustible and flashed at roof junction with non-combustible materials.
5.7	Verandas. Decks, steps and landings	5.7.1	General	Decking may be spaced. There is no requirement to enclose the subfloor spaces of verandas, decks, steps, ramps or landings.
		5.7.2	Enclosed subfloor spaces of veranda, decks, steps ramps and landings	
		5.7.2.1	Materials to enclose a subfloor space	*Materials used to enclose a subfloor space* – The Standard does not provide construction requirements for the materials used to enclose a subfloor space except where those materials are< 400 mm from the ground. Where the materials used to enclose a subfloor space are ¸400 mm from the ground, they shall conform with Clause 5.4.
		5.7.2.2	Supports	The Standard does not provide construction requirements for support posts, columns, stumps, stringers, piers and poles.
		5.7.2.3	Framing	The Standard doe s not provide construction requirements for the framing of verandas, pergolas, decks, ramps or landings (i.e. bearers and joists).
		5.7.2.4	Decking, stair treads and the trafficable surfaces of ramps and landings	The Standard does not provide construction requirements for decking, stair treads and the trafficable surfaces of ramps and landings (< 300 mm) from a glazed element. Decking, stair treads and the trafficable surfaces of ramps and landings < 300 mm (measured horizontally at deck level) from glazed elements that are < 400 mm (measured vertically) from the surface of the deck shall be made from: Non-combustible material **or** bushfire-resisting timber (Appendix F) **or** a timber species specified in Paragraph E1 of Appendix E **or** uPVC **or** a combination of these.

Clause #	Element name	Sub Element number	Sub Element name	Requirement Summary
		5.7.3	Unenclosed subfloor spaces of verandas, decks, steps, ramps and landings	
		5.7.3.1	Supports	The Standard does not provide construction requirements for support posts, columns, stumps, stringers, piers and poles.
		5.7.3.2	Framing	The Standard does not provide construction requirements for the framing of verandas, decks, ramps or landings (i.e. bearers and joists).
		5.7.3.3	Decking, stair treads and the trafficable surfaces of ramps and landings	The Standard does not provide construction requirements for decking, stair treads and the trafficable surfaces of ramps and landings (< 300 mm) from a glazed element. Decking, stair treads and the trafficable surfaces of ramps and landings < 300 mm (measured horizontally at deck level) from glazed elements that are < 400 mm (measured vertically) from the surface of the deck shall be made from: Non-combustible material **or** bushfire-resisting timber (Appendix F) **or** a timber species specified in Paragraph E1 of Appendix E **or** a combination of these.
		5.7.4	Balustrades, handrails or other barriers	The Standard does not provide construction requirements for balustrades, handrails and other barriers.
		5.7.5	Veranda posts	Veranda posts: a. Shall be timber mounted on galvanized mounted shoes or stirrups with clearance of not < 75 mm above adjacent finished ground level **or** b. < 400 mm (measured vertically) from the surface of the deck or ground shall be made from: Non-combustible material or bushfire-resisting timber (Appendix F) or a timber species specified in Paragraph E1 of Appendix E or a combination of these.
5.8	Water and gas supply pipes			Above ground exposed water and gas supply pipes to be metal. External gas pipes and fittings above ground shall be of steel or copper with min wall thickness in accordance with gas regulations or 0.9 mm whichever is the greater. The metal pipe shall extend a min of 400 mm within the building and 100 mm below ground.

*** THE 'STANDARD' REFERS TO AS 3959-2018**

**** '<400 MM SCENARIO' IS WHERE AN ELEMENT IS LESS THAN 400 MM ABOVE FINISHED GROUND**

References

Bushfire Prone Planning (BPP). 2016. *Three Year Bushfire Risk Mitigation Plan for the Murdoch University South Street Campus*. Report prepared for Murdoch University.

Department of Fire and Emergency Services (DFES). 2019. *Map of Bush Fire Prone Areas*, [Online], Government of Western Australia, available from: http://www.dfes.wa.gov.au/regulationandcompliance/bushfireproneareas/Pages/default.aspx

Department of Planning (DoP). 2016. *Visual guide for bushfire risk assessment in Western Australia*. DoP, Perth.

Standards Australia (SA). 2018. *Construction of buildings in bushfire-prone areas, AS 3959-2018*. SAI Global, Sydney.

Appendix 11
Design Statement

NEW ACADEMIC BUILDING MURDOCH UNIVERSITY

Development Application Architects Statement

November 2019

Revision History

VERSION	SECTION	DESCRIPTION/CHANGES	ISSUED	APPROVED
Version 1	Vol 1	Draft	27/11/19	Draft Only
Version 2	Vol 1	Image Updates	17/12/19	Draft Only

Project Overview

The New Academic Building (NAB) is a new Learning and Teaching facility for Murdoch University in Perth. It is approximately 16,000m2 (GFA) distributed over four floors. The primary purpose of the project is to provide the University with highly functional learning spaces, to meet the needs of contemporary higher education pedagogy. In addition, the project provides for extensive areas of informal, 'peer to peer' learning areas in response to a University wide shortfall. The building will also contain academic staff workplace, student services and a series of innovative research and industry engagement spaces.

The University's primary address will shift to Discovery Way and the NAB will provide a new gateway for students arriving on campus. The project will include public realm upgrades to the immediate precinct to interface with Banksia Court and establish future Library connection opportunities. It will include a new covered area that will function as the primary outdoor event space on campus.

SECTION TWO

Design Statement

1. CONTEXT AND CHARACTER

The NAB project responds to and enhances the distinctive characteristics of the Murdoch campus, contributing to a sense of place. Designed by Gus Ferguson, the existing campus has a coherent architectural character of linear masonry buildings framing native landscape courtyards. These courtyards are typically bordered by long colonnades that form the primary circulation network of the campus and protected by generous gable roof forms. The façade fenestration to the long elevations is systemic in nature, expressing the rhythm of the structural grids, downpipes and infill windows. This is contrasted on the short elevations which are shear and express the figure of the building profile.

The NAB project responds intelligently and sensitively to this architectural legacy by interpreting these design tenets using contemporary construction systems. The building is linear in massing and characterised by a dominant gable roof echoing the existing campus architecture. It borders Banksia Court to the East with a colonnade further defining the edge of this landscape space and echoes the existing architecture with an expressed structural grid to this long elevation. The engineered mass timber structure is externalised where possible and registered in the high performance curtain wall façade with breaks in the sunshades for expressed downpipes. Much like short elevations of the existing campus architecture the end elevation is shear in expression and highly glazed. The cumulation of these strategies produces a contemporary building that is sympathetic to local building forms.

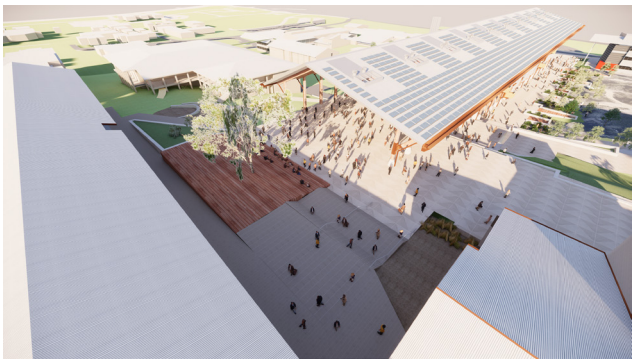
2. LANDSCAPE REPORT

Refer Landscape report.

3. BUILT FORM AND SCALE

The NAB project achieves a massing and height that is appropriate to its campus setting and successfully negotiates between the existing built form and intended future character of the campus. The low rise linear building extends from Discovery Way, which will become the new primary campus address, to the centre of campus adjacent Bush Court and the Library. In doing this the building form negotiates a 12m change over this length by retaining the roof height and gradually terracing the lower levels up the slope. As a result, the building mediates between a lower building at the centre of campus, matching adjacent building roof heights and unseen from Bush Court, to a four floor building on Discovery Way, prominent enough to define a new campus entry.

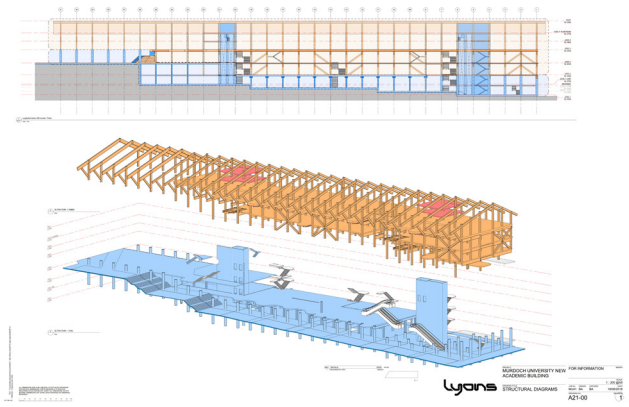
The NAB project defines new and existing open spaces to its perimeter to improve the landscape amenity of the campus. The project defines a new urban event space at the centre of campus between the Library, Building 340 and Building 235 by providing an expanded hard paved area sheltered by an extension of the building gable roof. This space is intended to compliment the amenity of Bush Court with a multi-functional space capable of hosting University events. This event space is designed to interface with the existing Library floor levels to facilitate a future renovation. The relocation of the campus primary arrival point to Discovery Way also brings activity to Banksia Court with a series of outdoor student learning pods. In this way the NAB project defines the public domain and provides good amenity for people at ground level.



4. FUNCTIONALITY AND BUILD QUALITY

The NAB project meets the needs of Murdoch University efficiently and effectively, balancing future flexibility and technical performance to deliver optimum benefit over the full life cycle. Future flexibility has been achieved through the introduction of a ‘creative warehouse’ model. The regular structural grid can have internal partitions removed or rooms further subdivided to suit future pedagogical models as they develop. Similarly, an underfloor air conditioning system allows a high degree of flexibility in future arrangements because it is more easily accessed and reconfigured. The plantrooms are located on level 1 and on mezzanines above the level 4 amenities cores to minimise riser sizes. The L4 mezzanine plantrooms are co-located with sunken plant decks to reduce visual impact on the roof form. The level 1 plantrooms and loading dock are located on the eastern façade for ease of servicing from the existing Tea Tree Loop road.

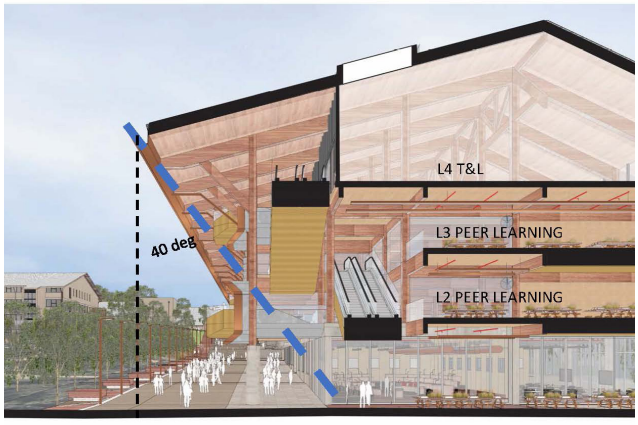
The design utilises high quality and durable materials that are easy to maintain and will weather well over time. The high performance curtain wall, aluminum sunshades, metal cladding and concrete elements are proven durable products used elsewhere on campus. The timber structure is natural material and hence susceptible to weather damage. Consequently, a balance has been achieved between exposing these elements and protecting them behind the weather line or sacrificial cladding layers.



5. SUSTAINABILITY

The NAB project has been designed to be highly sustainably, delivering positive environmental, social and economic outcomes. This embedded sustainability is demonstrated by a 6 Star Greenstar target commensurate with 'world leadership' and an industry leading rooftop solar array. The building will be one of the first innovative mass timber buildings in Western Australia, containing lower embodied energy compared to a concrete structure and fostering local industry. It offers sizable roof eaves, extensive external façade sun shading and blinds to reduce mechanical heat loads, minimise energy use and operating costs over the life-cycle of the project. The roof will capture rainwater for onsite storage and the urban design adheres to established water-sensitive urban design principles.

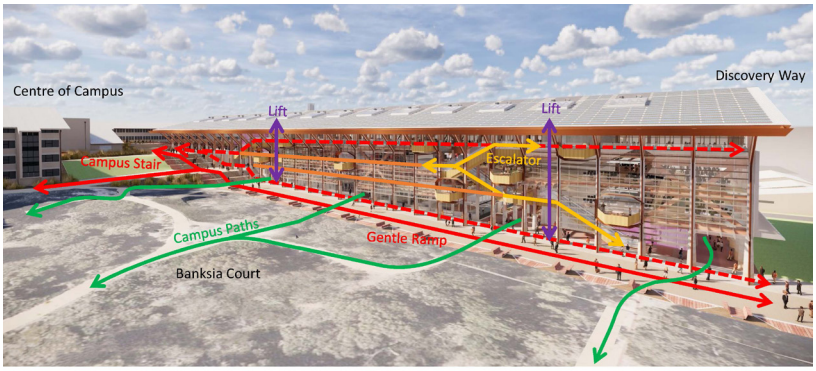
The design includes sizeable peer learning areas with mixed mode ventilation capability. The student breezeways punctuate the building in the East/West direction and will be naturally ventilated on temperate days. CFD wind modelling has been undertaken to funnel air through the internal student halls with the BMS operation of openings and exhaust fans to suit likely site wind speeds and directions. These strategies allow the building respond to the local climate and site conditions, maximise the use natural ventilation.



6. AMENITY

The NAB project provides a variety of uses and activities while optimising internal and external amenity for occupants, visitors and neighbors. This is achieved through a diverse building program that includes learning and teaching, peer learning, academic workplace, student services, community and industry engagement spaces as well as food retail. Highly active retail and community engagement uses are in prominent locations on the ground floor building entries. Similarly, showcase learning and teaching spaces have been located on ground floor to improve their visibility to pedestrians and building users. All internal spaces are appropriately sized for use, have appropriate acoustic separation, lighting and glare prevention.

The building is both universally accessible and solves longstanding campus accessibility challenges. The Promenade, bringing students from the transit hub on Discovery Way to the centre of campus, rises at a gentle 1:20 along the edge of Banksia Court. This ramp is supplemented by two building lifts located at either end of the building that have been externalised to allow the building infrastructure to become a campus amenity. The combination of the ramp and lifts allows the project to manage 12m level change and solve a campus accessibility issue that had previously required a series inequitable handrail lifts. All internal spaces are DDA compliant, universally accessible and align with the University's equitable access standards.



7. LEGIBILITY

The NAB project and surrounding precinct is a highly legible place, with clear connections and easily identifiable elements to help people find their way around. This legibility is achieved through the strengthening of existing campus movement networks and introduction of new routes as setout in the campus masterplan. The East/West Broadwalk is to be upgraded to provide ramped access to Bush Court and the North/South Promenade is to be introduced. In addition, a series of East/West breezeways punctuate the NAB building mass to allow cross site connection between Banksia Court pathways and the Veterinarian School to the East. Building escalators, stairs, student balconies and lifts are made highly visible to encourage their use by students and enliven the building facades with user activity. These strategies create a place that is logical and intuitive to use, at the scale of the building, site and precinct.

8. SAFETY

The NAB design optimises safety and security, minimising the risk of personal harm and supporting safe behavior and use. The Promenade is the primary circulation path between the campus and the transit exchange and will be well lit for extended hours to improve safety and security. Passive surveillance between the NAB building and the Promenade has been maximised through glazing extent and by locating active, extended hour uses on ground level. The industry and community engagement space will be provided as a secure indoor waiting space for students waiting for transport from campus after hours.

Pedestrian safety has been maximised by locating the service loading and level one plant room access to the eastern façade, accessed from the existing Tea Tree Loop service road. The campus Promenade and Broadwalk are shared zones for both pedestrians and infrequent service vehicles. This access is required to achieve emergency services access to the existing Library, NAB building maintenance and event setup access in the northern event space and will be managed by the University to minimise negative impacts on pedestrian amenity.

9. COMMUNITY

The NAB project responds to University needs as well as the wider social context, providing environments that support a diverse range of people and facilitate social interaction. The NAB project encourages social engagement by providing designated community and industry engagement spaces in addition to welcoming and universally accessible public spaces. Designed by collaborating local Perth architectural practices these prominent building elements will showcase the best of WA design. They will provide opportunities for existing and future students, community and industry to interact with Murdoch University and for exchange of knowledge between groups. The building is also highly adaptable to changing needs with high floor-to-floor heights, under floor services and large structural spans.

10. AESTHETICS

The NAB project is the product of a judicious design process, resulting in an attractive and inviting building that engages the senses. The design process has been led by Lyons architects in collaboration with Officer Woods, The Fulcrum Agency, STH and Aspect Landscape architects. This collaborative design methodology allows the project to showcase a variety of local design voices and still read as a coherent whole. The design has also been developed under the guidance of the Murdoch Campus Design Review Committee which has reviewed and offered feedback on the design at project gateways. This review process has improved the design outcome and ensured it is aligned with the University's ambitions.

The building form and aesthetic is highly responsive to place and has immerged through an iterative design process. The building is conceived of as a systemic framework, expressive of the innovative mass timber structural grid, sheltered under a generous gable roof form. This regular system contains echoes the existing campus architecture and is juxtaposed against a series of expressed student balconies, stairs and escalators. These elements, clad in warm coloured metals, offer compositional relief to the rhythm of the façade and differentiates between student peer learning areas and timetabled learning and teaching areas beyond the façade. Concrete structure is used for the podium level structure and precast column plinths to achieve the required structural transfers and to reference the campus masonry tradition.

The project interiors showcase the natural beauty of the timber construction materials by foregoing ceiling systems and locating most services in the raised floor. This allows the mass timber beams, columns and the underside of the CLT slab to be exposed on the interior. The combination of these timber elements and glazing extent will create a voluminous, light filled learning and teaching spaces with views over the adjacent campus and wetlands. The student hall spaces on each level are colour coded with different interior finish hues to improve wayfinding and provide distinct identities to each space.

Public art strategies will continue to be developed in consultation with the Murdoch University project leadership. Locations have been identified in the Northern Event Space, Arrival Forecourt and on the soffit of the gable roof. Budget and spatial allowances have been included in project planning and individual artist commissions as well as detailed project integration will proceed in the next stage of works.