



Australian Government
Department of Finance

WRITTEN DESCRIPTION OF WORKS

John Gorton Campus Car Park for National Capital Authority Approval

MARCH 15, 2023

Revision 1

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1. Written Description of the Works

This Written Description of Works has been developed to support National Capital Authority (NCA) Works Approval and provides background information on the John Gorton Campus Car Park (JGC Car Park) Project. This document includes the following:

- Project overview and background pertaining to the Works, Design and Approvals
- Architectural design overview
- Landscaping works description
- Engineering works description and output specifications

1.1. Project Overview

The purpose of the Project is to relocate the existing car parking capacity from York Park in Barton (Blocks 5 and 3, Section 1 Barton (York Park) to facilitate the development of the National Security Office Precinct (NSOP).

The JGC Car Park would be sited to the east of John Gorton Building (JGB), predominantly within Block 1 Section 35 and Section 21 and the Dorothy Tangney Place Road reserve, Kings Avenue Road Reserve, Parkes, on land currently used for car parking, road transport / carpark access, footpaths and open space.

The project includes design and construction of a multi-storey car park adjacent to JGB, including a childcare centre facility, landscaping works around the carpark, and associated road works including an upgrade to the Kings Avenue and Blackall Street intersection.

1.2. Gross Floor Area and Site Coverage

The JGC Car Park site is located across Block 1 Section 35 and Section 21 and the Dorothy Tangney Place Road reserve, Kings Avenue Road Reserve. For the purposes of the site coverage we have selected an approximate site area based on a future adjustment of block and section boundaries for the new site as indicated by the solid red line below.

The site area is 42,201m² as shown by the solid red line within the site plan (see figure below).

The footprint area for the site is 7,915m² resulting in a site coverage ratio of 18.7%.

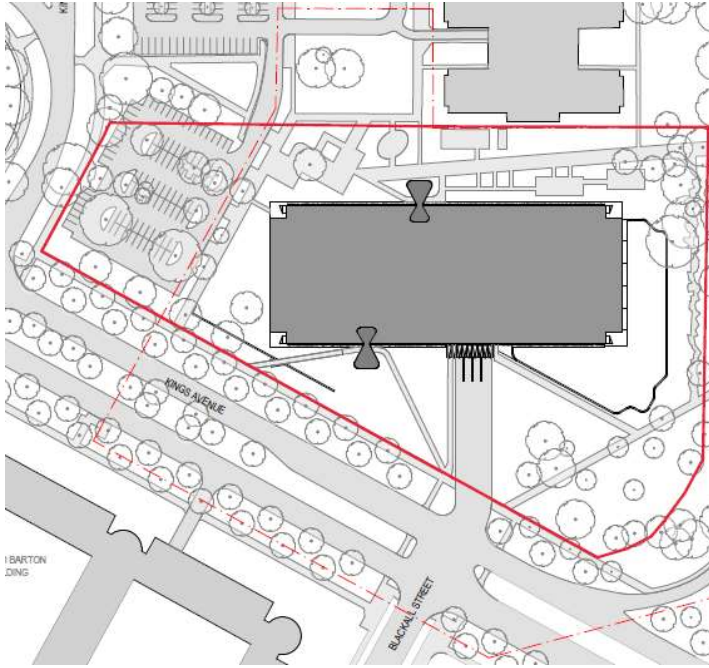


Figure 1: Site Plan

The total Gross Floor Area for the building is approximately 33,785m². Refer below for a summary of the GFA for each area:

Table 1 – John Gorton Campus Car Park Gross Floor Area Summary

Description	Approx. m ²
Child Care	2,332 m ²
Parking Areas	30,841 m ²
Services and Plant Zones	200 m ²
Circulation and Stairwells	413 m ²
Total	33,785 m ²

Note: areas are an approximation only and subject to minor changes during development of the Final Design.

1.3. Project Background

In consultation with the NCA, a site has been selected for a new multi-storey car park structure adjacent to the JGB in Parkes. The development of the land around the JGB is consistent with the National Capital Plan (NCP) which envisages the establishment of a ‘John Gorton Campus’.

The site selected is current car parking (on-grade) and approximately 540 spaces will be displaced by the construction of the new carpark structure, associated roads and landscaping works. The new carpark structure will accommodate approximately 1,071 parking spaces including 1,055 car spaces and 16 motorcycle spaces. Car Parking spaces are inclusive of 45 car spaces dedicated for the childcare centre facility staff, visitors and drop off, 12 accessible spaces, 16 EV spaces and an average of 256 spaces on levels 01 - 04.

The new car park structure also includes a childcare centre facility and outdoor play area. This childcare facility is envisaged to provide additional capacity in Barton and Parkes to cater for increasing workforce in the area. The childcare facility scope is a warm-shell only, with fit out to be separately delivered by the childcare operator.

In addition to the car park structure, there are associated civil demolition and landscaping works around the development, modifications to local access roads and upgrade to the Blackall Street and Kings Avenue intersection to provide vehicle access and egress.

Finance has commissioned and completed both the reference and concept design for the JGC Car Park. The Preliminary Design Solution was prepared in close consultation with the NCA and has been focused on resolving the key design components which impact both the planning and environmental approvals for the project.

It is important that the detailed design and construction of the Works remain consistent with the Preliminary Design Solution. Changes to aspects of any of the elements of the building, especially the siting, functionality, appearance, and materiality, need to be negotiated and approved by stakeholders and the NCA.

1.4. Approvals

The following legislation and associated approvals are relevant to this Project: *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and *Australian Capital Territory (Planning and Land Management) Act 1988* (ACT PALM Act). Given the site is located within the Parliamentary Zone, the project is also subject to Parliamentary Approval under the *Parliament Act 1974*, and other ACT Government and Utility Authority Approvals.

The obligations under the EPBC Act, the ACT PALM Act and other relevant approvals are outlined below.

EPBC Act

Under the EPBC Act, any action that would result in a significant impact to the environment of Commonwealth land, or any action undertaken by, or on behalf of a Commonwealth Agency that is likely to have a significant impact on the environment or a matter of national environmental significance (MNES) must undergo a rigorous assessment and approval process.

As the Proposed Action would be funded by the Commonwealth (Department of Finance), the action is considered a Commonwealth action. Section 28 of the EPBC Act regulates actions by the Commonwealth or a Commonwealth agency that is likely to have a significant impact on the environment and details the requirement for approval of activities of Commonwealth agencies significantly affecting the environment. An action which will, or is likely to, have a significant impact on the environment by a Commonwealth agency is required to be assessed with respect to the potential significance of impacts on matters of national environmental significance and the environment generally in consideration of the Significant Impact Guidelines 1.1 Matters of National Environmental Significance and Significant Impact Guidelines 1.2 Actions on, or impacting upon, Commonwealth land and Actions by Commonwealth Agencies.

In addition to the assessment of significant impact, the EPBC Act protects heritage values on Commonwealth land including those on the Commonwealth Heritage List. The Department of Finance, as a Commonwealth Agency, must not contravene a plan made under Section 341T of the EPBC Act for managing a Commonwealth Heritage place or authorise another person to do, or omit to do, anything that would be inconsistent with such a plan. Heritage management plans are in place for Parliament House Vista and JGB Commonwealth Heritage places. The project has been assessed against these in the Heritage Impact Assessment (**Appendix E**) for the project.

The project is currently awaiting a decision regarding the EPBC referral which was submitted in November 2022 (EPBC 2022/09400 refers).

ACT PALM Act / National Capital Plan

Planning and development in the ACT is governed by two separate but related planning jurisdictions and statutory controls, being the NCP and the Territory Plan, administered by the ACT PALM Act.

The project area is classified as “National Land” and is within ‘Designated Lands, Designated Area Precinct 1 – The Central National Area’ under the NCP. As such, jurisdiction for planning and development on the project area rests with the Commonwealth Government under the Department of Climate Change, Energy the Environment and Water (DCCEEW) responsible for administering the EPBC Act, and the NCA responsible for administering the NCP.

The Commonwealth has previously submitted the Preliminary Design Solution to the NCA for consideration and comment and conducted pre-application meetings. An application for Works Approval will be lodged with the NCA following the receipt by the Department of Finance of the decision regarding this EPBC referral.

Parliamentary Approval

The Parliamentary Zone - the place of the people is the physical manifestation of Australian democratic government and the home of the nation's most important cultural and judicial institutions and symbols. Because of this significance, works proposed within the Parliamentary Zone require the approval of the NCA and also require the approval of both Houses of Federal Parliament. The Parliamentary Approval process is coordinated by the NCA, but is separate from, and in addition to, the NCA Works Approval.

Authority Approvals

Separately to the above, relevant authority approvals associated with the works including from Transport Canberra and City Services (TCCS), Icon Water, Evo Energy and communications authorities must be sought. Consultation with the ACT Government agencies regarding vehicular access, traffic safety, waste management, storm water drainage, leasing and lease compliance, tree preservation, and verge landscaping and management will also be undertaken where required.

TCCS authority approvals will include the submission of traffic control device (TCD) drawings to TCCS for approval and upload to the TCCS ProjectWise database.

1.5. Program / Stages of Work

Pending receipt of required approvals, Site Establishment for the works is expected to commence in June 2023. The works are due for completion in September 2024.

We note that there will be a requirement to undertake further site investigations (i.e. geotechnical investigation, water pressure testing, service locating etc.) to inform the Design and Construction Contractor’s design prior to establishing on site. Any early access to complete site investigations will be coordinated in advance with the NCA via the Department of Finance and would aim to minimise the impact to existing car park users.

Below is a summary of the proposed Stages of Works envisaged for the project:

Stage 1: JGB access roads

Stage 2: Kings Avenue / Blackall Street intersection

Stage 3: JGC Car Park

Stage 4: JGC Childcare Centre facility warm-shell

Stage 5: Landscaping and all other Works

Stages of the Works have been developed based upon the envisaged sequencing of the works, including all supporting engineering services infrastructure, and to minimise impact of the works on stakeholders and the

public. Any changes to staging if required when finalising the design will need consultation with stakeholders and the NCA.

In addition to the staging of proposed works, the works must include procedures for establishing site boundary fences in the Site Management Plan, including any consultation required with approval authorities. Adequate notice periods must be provided to the public prior to installing Site boundary fences.

Stage 1: John Gorton Building access roads

This Stage of works includes modifications to JGB and car park access roads in front of the JGB, including a re-positioned Parkes Place East loop road and new access road to the existing southern on-grade car park. Construction of this Stage of the Works must continue to allow access for service vehicles to the JGB building via the existing access road, and users of the existing on-grade carpark to the Southwest of the JGB to continue to be able to access that car park.

Stage 2: Kings Avenue / Blackall Street intersection

This stage of works includes upgrades to the existing Blackall Street intersection, to a four-way signalised intersection including pedestrian crossings on all legs, new road entry to the JGC Car Park, alterations to Kings Avenue, including left hand turn onto King Edward Terrace.

Construction of this stage must continue to allow traffic movement along Kings Avenue and King Edward Terrace. The works must obtain relevant statutory approvals for subordinate construction sequencing of this Stage of the Works from the relevant approval authorities.

The NCA has stated a desire for the length of the right turn lane (in the median) from Kings Avenue to Blackall Street to be minimised in the final design. This element will be critically reviewed within the Final Design.

Stage 3: JGC Car Park

This stage of works includes the demolition of the existing Dorothy Tangney Place on-grade carpark, including furnishings, construction of the new JGC Car Park and all engineering infrastructure and all other Works that are required to enable Stage 3 to be used safely by the public for its intended purpose, such as access and egress footpaths.

Construction of this Stage of the Works will aim to minimise disruption to the public and surrounding building occupants. This Stage of the Works must reach Completion on or after the Date of Completion of Stage 2 of the Works, so that vehicle access and egress routes provided by Stage 2 enable the carpark to be used for its intended purpose.

The JGC Car Park is to be a five-level multi-storey carpark with a minimum of 1,070 car spaces. The north façade is to align with the northern façade of the JGB on King Edward Terrace. The southern corner of the JGC Car Park must not extend beyond the setback alignment of Kings Avenue with the East Block building located at 1 Queen Victoria Terrace, Parkes. The access and egress routes for the on-site parking shall be designed to mitigate excessive delays and queuing of vehicles seeking to enter or exit the car park.

Stage 4: JGC Childcare Centre Facility warm-shell

This stage of works includes the Childcare Facility warm-shell within the JGC Car Park, with a capacity for approximately 170 children. This shall consist of internal spaces for staff requirements, including end of trip facilities and outdoor space suitable to be fitted out as an enclosed play area.

All engineering infrastructure and all other Works that are required to enable the fit out of the Childcare Facility by the childcare operator at a later date whilst maintaining access by the public, such as access and egress footpaths.

This stage of the works must reach Completion on or after the Date of Completion of Stage 3 of the Works, so that vehicle access and egress routes provided by Stages 2 and 3 enable the completion for the fit out of the Childcare Facility.

Stage 5: Landscaping and all other Works

This stage consists of the new landscape works around the modified access roads, to be delivered as part of Stage 1 of the Works. Construction of these works shall be undertaken to minimise disruption to the public and surrounding building occupants.

This shall include new landscape works to the 'Campus Green' and the JGC Car Park surrounds, including around all Works delivered as part of Stages 2, 3 and 4 of the Works, all remaining new pedestrian pathways not previously required to enable use of Stages 3 and 4 of the Works, site demobilisation, removal of the site works compound and associated facilities from Site.

Additionally, this stage shall carry out remediation works, as may be required, to return areas used during construction activities to the condition identified in the dilapidation report, in addition to reconfiguration of the balance of on-grade spaces contained within the Site to optimise the number of cars parking spaces, including pavement re-surface and line marking. All other Works not reasonably inferred to be included within previous Stages.

1.6. Site Management, Temporary Traffic Management and Parking

A Temporary Traffic Management Plan will be prepared and submitted to Roads ACT prior to commencement of the works with consideration of minimising the impact of the works on stakeholders and the public. Should it remain pending when the NCA reaches its decision, it is requested that this be made conditions to approval.

A separate application for temporary works including site establishment plan detailing site compound, temporary parking and logistics will be undertaken. The site establishment plan will be prepared with consideration of incorporating parking for construction workforce onsite where possible, whilst encouraging carpooling and other measures to minimise the impact of the works on existing carpark users.

1.7. Consultation

The Commonwealth has closely liaised with the NCA as well as DCCEEW and GML regarding the planning, heritage and site management implications of the project. We note that the NCA have contributed to the design development of the project.

Below is a brief summary of the key stakeholders who have been consulted on the project to date:

Table 2: Consultation Summary

Stakeholder	Objectives
DCCEEW	<ul style="list-style-type: none">• Early engagement on design and environmental aspects.• Various meetings over a two-year period.• EPBC Referral process.
NCA	<ul style="list-style-type: none">• Early engagement on design and planning aspects.• Various meetings over a two-year period.

Contractors	<p>Finance has worked closely with the following contractors in the development of the design, consultation, workshops and development of project documentation and reports:</p> <ul style="list-style-type: none"> • GML Heritage • GHD • BVN Architecture, Architect • Oxigen Architects, Landscape Architects
Public	<p><i>Project Announcement</i></p> <p>The project was announced as part of the October 2022 Budget, and information is available on the Finance website, National Security Office Precinct Department of Finance.</p> <p><i>Public Engagement</i></p> <p>As part of the EPBC Referral process there have been two rounds of public exhibition (open for 10 business days each) inviting public comments on the Referral for the development of the JGC Car Park. Public Notices were published in The Canberra Times, with Referral Documentation made available in hard copy at local libraries and online at the Finance website.</p> <p>The first round of public exhibition was coordinated by DCCEEW in December 2022, some comments were received and considered by DCCEEW as part of the assessment process. The second round of public exhibition was coordinated by Finance in February 2023, with only one submission being received, Finance determined that no changes were required to be made based on the comments received, so the EPBC Preliminary Documentation was made final.</p>
Surrounding Commonwealth Agencies	<p>Finance has engaged with multiple Commonwealth entities nearby who have been offered briefings on the project and potential impacts on parking changes.</p> <p>Finance will continue provide regular updates to surrounding agencies via a regular newsletters, meetings and briefings.</p>
Key interest groups	<p>In preparation for the EPBC referral process Finance identified five key interest groups that may have a strong interest in the project. In December 2022, Finance wrote offering a project specific briefing to the following organisations:</p> <ul style="list-style-type: none"> • Australian Institute of Landscape Architects • Walter Burley Griffin Society • Lake Burley Griffin Guardians • National Trust of Australia • Australian Institute of Architects.

Finance will develop a communication plan to disseminate information to identified stakeholders, including notification letters and meetings as required with tenants, neighboring heritage places and existing carpark users.

These letters and meetings will include all relevant information, including the timing of proposed works, anticipated impacts and mitigations associated with the erection of the new multi-storey carpark and relevant contact details for the appointed liaison officer.

1.8. Lighting and Signage

Partial preliminary lighting details are included within the landscape documentation, however we note that the lighting and signage design remains in development and yet to be finalised. Once the design has been developed further and a Final Design Solution is available, this will be provided to the NCA for consultation and included as a separate Works Approval as required.

Signage Design Specification

Road and path signage shall comply with AS 1742 Manual of Uniform Traffic Control Devices. Traffic control and restrictive signs are to be manufactured, sited, installed and illuminated in accordance with Australian Standards for Road Traffic Control Devices.

External directional and building signage is to be standardised across the site, with low maintenance materials. Directional signage is to be provided at primary access points and indicate direction to major functional areas and deliveries. Building Identification signage is to be provided, integrated with the design of the building. It can be either on the building facade or a separate freestanding sign incorporated into the landscaping. The Building Identification Sign will be able to be viewed and read from the main public road servicing the Works and will be flood lit at night.

External Lighting Design Specification

The provision of lighting is to be limited to satisfying public safety, security monitoring and Statutory Requirements. Liaison is required with local authorities prior to finalising the criteria and requirement for street lighting.

Standardisation across the site of styles and fittings is to ensure minimum light spill into the sky and daylight colour rendering where possible. Placement and types of fixtures and fittings is part of the urban design considerations for the Works and is to minimise impact on neighbouring properties.

1.9. Traffic Impact Assessment

Traffic modelling investigations have been completed to determine the cumulative traffic impacts of the proposed development of a JGC Car Park including Kings Avenue and Blackall Street intersection works previously. A Traffic Statement summarising the works required to the existing road network has been included at **Appendix D**.

Upon engagement of the Design and Construction contractor an updated Traffic Report and Traffic Impact Assessment will be prepared.

These investigations are being undertaken to determine the potential impacts on the operation of the existing road network and identify potential road network improvements to mitigate those impacts and appropriately accommodate the proposed developments. These investigations and Traffic Impact Assessment will be utilised for consultation with the NCA and TCCS and associated approvals.

2. Description of Architectural Works

2.1 Project purpose

The purpose of the project is to relocate the existing car parking capacity from York Park in Barton (Blocks 5 and 3, Section 1 Barton (York Park)) to facilitate the development of the National Security Office Precinct.

The project includes design and construction of a multi-storey carpark adjacent to the JGB, including a childcare centre, landscaping works around the carpark, and associated road works including an upgrade to the Kings Avenue and Blackall Street intersection.

2.2 Design solution

The design of the JGC Car Park – known as Dhulwa – has evolved since April 2020 with consultation and collaboration resulting in a design that enmeshes a range of cultural and contextual issues pertaining to urban design, heritage, landscape, Country and architecture – hence a design solution described as “blurring the lines between building, heritage and landscape”.

It is noteworthy that the last building realised in the Parliamentary Zone was the National Portrait Gallery opened in 2008 – a measure of change that demands a collaborative process to respect the diverse and sometimes conflicting circumstances that shape contemporary “place making”.

Changes to aspects of any of the elements of the building - notably the siting, functionality, appearance, and materiality need to be negotiated and approved by stakeholders and the NCA. This document describes the rationale of the design to date, to enable a clearly defined understanding of the development and design tenets.

2.3 Siting

Previous studies of the proposed JGB campus describe two development sites – A and B - both edging a new public place giving the JGB a formal address, enabling a lively and sun filled public square, demonstrating the siting of the heritage listed Communication Centre below it and providing address points for the two development sites.



Figure 2: Development Site A and Site B

The larger context of Kings Avenue is reflected in the setback alignment with East Block further to the south. On site B the southwest corner is held by the intersection of the two development sites ensuring an appropriately orthogonal relationship between the future development of site A and the existing geometry of JGB. This also enables the rectangular plan of the carpark to be sited primarily away from Kings Avenue and by coincidence aligns with the King Edward Terrace face of JGB.

The 170-capacity childcare centre facility is located to the north on the King Edward Terrace edge of the building to enable the maximisation of sunlight to the external play area. Lift and stair cores are located to facilitate pedestrian movement from Kings Avenue and the JGB precinct.

Below is the final siting solution for the JGC Car Park:

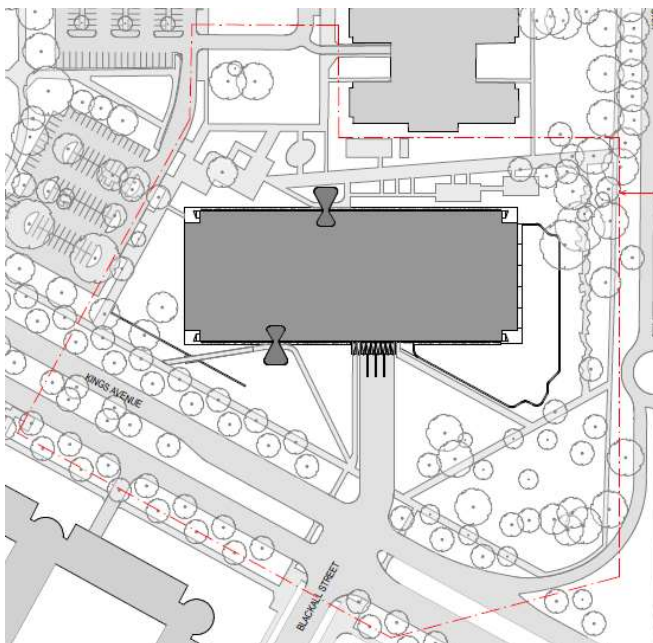


Figure 3: Site Plan

2.4 Architectural Expression

The architectural expression is unashamedly contemporary – the Parliamentary Zone is a collection of buildings that mark their time and talk of an evolving nation reflecting the maturation of the dialogue between buildings, landscape, heritage and diverse cultural milieu. As such, the design makes reference to its immediate built context by the use of mass and form, materiality, colour and geometry; it refers to the heritage landscape and setting of the Parliamentary Zone and especially to the heritage status of JGB; it acknowledges Country in a universal manner rather than specific by the trope of landscape – in this case the ubiquitous banksia flower known in Ngunnawal as “Dhulwa”; and seeks appropriate urban disposition by presenting a formal facade language to King Edward and King George Terraces and an informal tactility to the landscape setting of the east and west facades.

The material palette of polished and exposed coloured aggregate precast concrete panels references the monumentality of the Parliamentary Zone buildings, and the diverse, variegated Corten steel leaves reference the landscape at a micro level of the Dhulwa and a macro level of the iron oxide underpinning of the Australian continent. Importantly, together with the concrete frame of the carpark these materials have been chosen for maintenance-free longevity – contributing to the sustainable profile of the development.

2.5 Embedding Country

The facades of the carpark have dual readings – whilst the north and south façades appear to be contemporary concrete elements derived from the buildings sited throughout the Parliamentary Zone, they also resonate in a very abstract manner with the shape and expression of the banksia flower as it ages and enters its monochromatic grey phase. The facades of the east and west are more dynamic – their materiality will create a varying patina over time with each panel reacting to light and shadow differently and with a random patternation found in micro nature through to macro patterns in the natural world. The overall expression of these facades makes reference directly to the Dhulwa with its varying colour palette, its small and complex geometry and its distinctive tactility.

None of these references might be discernible to the passer-by, however with the resonance of heritage, building mass and form and the micro and macro nature references the building has a sense of where it specifically is – so that its visual derivation is unique to this place. It creates a “sense of place” through this site and materiality specificity – it is a building of Canberra and Australia as distinct from one that could be found anywhere.

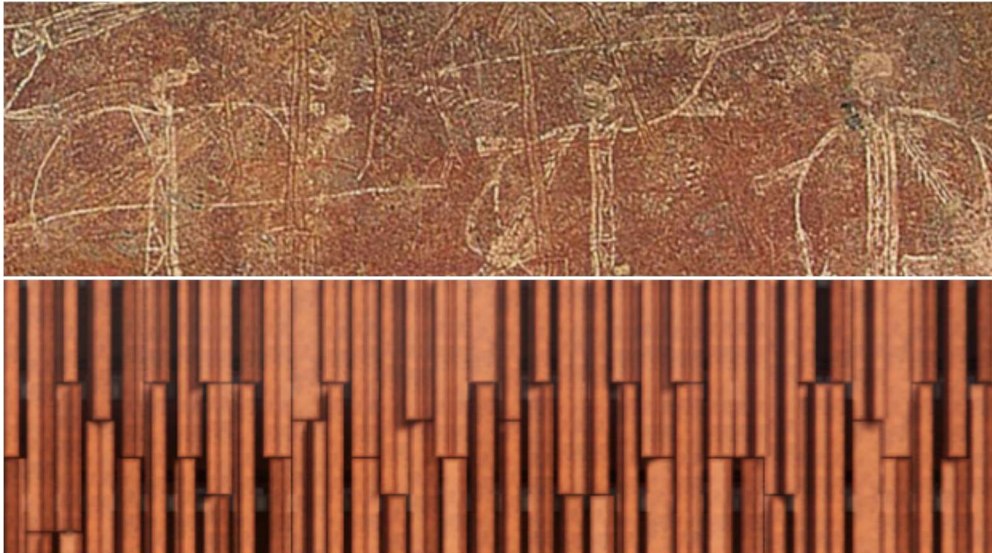


Figure 4: Facade artistic representation

Iron deposits are the key foundational geological elements in the 2.5 billion year old bedrock of Australia. Indigenous painting often uses the iron oxide to create elements; Oxidising steel plate is a metaphor for iron oxide.



Figure 5: Artistic impression of precast panels

The precast concrete panels are derivative of the monumentality of concrete buildings in the Parliamentary Zone, and the variegated pods of the banksia flower.

2.6 The Building

The proposed carpark will provide for approximately 1,071 parking spaces including 1,055 car spaces and 16 motorcycle spaces. Car parking spaces are inclusive of 45 car spaces dedicated for the childcare centre facility staff, visitors and drop off, 12 accessible spaces, 16 EV spaces and an average of 256 spaces on levels 01 - 04. Various plan configurations for efficient internal car movement and for parking functionality have been explored. This proposition has a single internal ramp with parking to minimise the impact of the ramp on the floor plan. Movement through the building is clear and logical and centered on the ramp as a reference point. Entry and exit is from the proposed upgraded Kings Avenue and Blackall Street intersection. The building frame and floors is in-situ concrete with applied facades described in the following section.

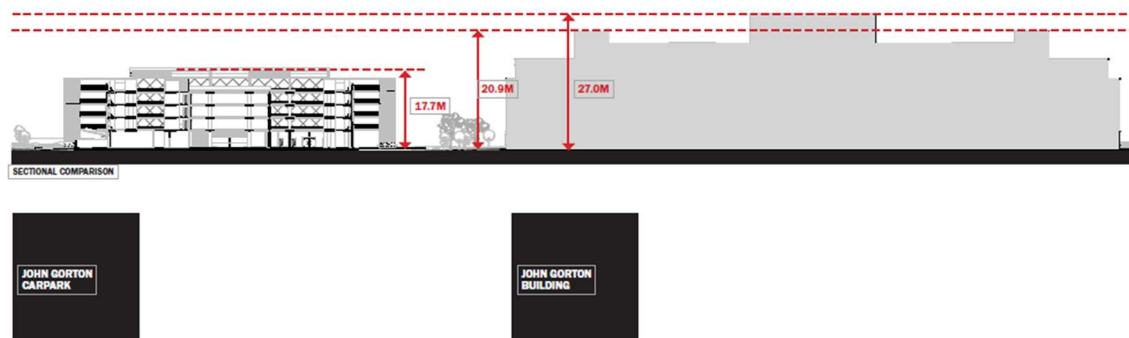


Figure 6: Profile size comparison

In profile, the building at its maximum height is 17.7 metres above the ground sitting comfortably below the 27.0m above ground maximum height of JGB.

2.7 The Façade

The façade principles are natural ventilation, opacity, materials and context.

North and South façades

The North and South facades are composed from a combination of vertical precast concrete columns and horizontal polished precast concrete screening elements. There are 4 different profiles of the polished precast panels, each with their own distinct pigment and aggregate mix; resembling the diverse stone colours of the John Gorton Building. A different fine grain metal angle is applied to the leading edge of each of the panels to further diversify the Gorton colour palette and to reflect the precious metals found on the neighbouring buildings.

The North and South facades on Levels 01 - 03 provide for a minimum of 50% free air flow to achieve the open-deck carpark deemed to satisfy requirements of the BCA.

East and West façades

The East and West facades are composed of different break pressed and welded weathering steel panels. There are 12 different panel types ranging from A - G. The panels range in height which are identified in the panel schedules on the panel system sheets. A computational design model has been used to achieve several desired outcomes:

- a) Optimisation of panel profiles
- b) 'Randomness' of the composition
- c) Prevention of geometry clashing
- d) Limit visibility to the internal carpark
- e) Maximise airflow

2.8 Materiality overview

This section contains the proposed material palette, a preliminary material schedule and material specification. Design intent for proposed materials can be found within the Architectural written description of works.

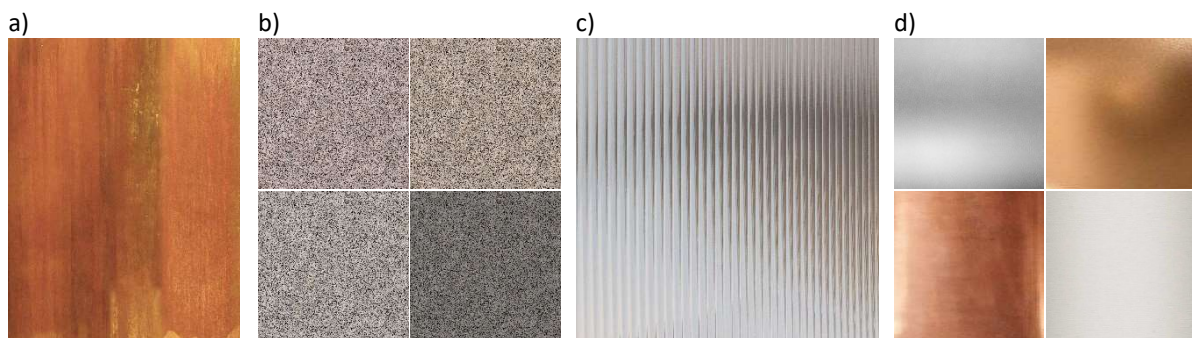
The choice of materials for all Stages of the Works is to suit the broader context of the site and Parliamentary Zone, and the strategic direction of the NCA to achieve consistency in the initial selection and subsequent management of materials, elements and techniques with the Parliamentary Zone.

As a guide, the palette developed by the NCA for Constitution Avenue is to be adopted for the project with some adjustments as outlined in the Landscaping notes.

The proposed material palette consists of the following main selections:

- a) Corten steel
- b) Precast concrete – honed and polished
- c) Glass planks
- d) Fine grain metals – Copper, zinc, aluminium and bronze

Images are indicative of proposed material palette and finish, material samples will need to be provided to determine end product finish.



Refer to attached **Appendix A** – Architectural Works Documentation for further information on location, dimensions, finishes and technical specifications.

3 Description of Engineering Works

3.1 Engineering Works Overview

This section contains a written description of the proposed engineering works and includes information relating to engineering output specifications.

- a) Structural engineering
- b) Acoustic engineering
- c) External works and parking
- d) Communications services
- e) Electrical services
- f) Environmentally sustainable development
- g) Fire engineering
- h) Fire safety services
- i) Hydraulic services
- j) Lifts / vertical transportation
- k) Mechanical services

3.2 Structural Engineering

Structural works must be considered in the context of all required architectural/building requirements as well as building services elements. Structural elements include the following:

- a) Foundations and retaining walls
- b) Slabs, beams, load bearing walls and columns
- c) Lateral load resisting system
- d) Ancillary structures

The structural design and inspection certification is to be provided by an experienced CPEng structural engineer on the NER.

Legislation and Standards

The building must be designed in accordance with applicable Building Legislation, the National Construction Code (NCC) and Building code of Australia (BCA), relevant Australian codes and standards. These include, but are not limited to, the following:

- a) National Construction Code (NCC)– Building Code of Australia 2019 (BCA)
- b) AS/NZS 1170.0:2002 Structural design actions – General principles
- c) AS/NZS 1170.1:2002 Structural design actions - Permanent, imposed, and other actions
- d) AS/NZS 1170.2:2021 Structural design actions - Wind actions
- e) AS 1170.4-2007 Structural design actions - Earthquake actions in Australia (Reconfirmed 2018);
- f) AS 2870-2011 Residential slabs and footings
- g) CCAA T48 guide to Industrial Floors and Pavements
- h) AS 2159-2009 Piling - Design and installation
- i) AS 4678-2002 Earth-retaining structures
- j) AS 3600:2018 Concrete structures
- k) AS 3700:2018 Masonry Structures

- l) AS 3850.1:2015 Prefabricated concrete elements - General requirements
- m) AS 3850.2:2015 Prefabricated concrete elements - Building construction
- n) Precast Concrete Handbook - National Precast and Concrete Institute Australia
- o) AS 4100:2020 Steel structures
- p) AS 2312.1:2014 Guide to the protection of structural steel against atmospheric corrosion by the use of protective coatings - Paint coatings
- q) AS/NZS 2312.2:2014 Guide to the protection of structural steel against atmospheric corrosion by the use of protective coatings - Hot dip galvanizing
- r) AS 2670.1-2001 Evaluation of human exposure to whole of body vibration 'Floor Vibrations Due to Human Activity'; Murray, T, Allen, D, Ungar, E 1997.

Dead Loads

The following dead loads are a minimum guide, and the detailed design shall consider and account for all dead loads and superimposed dead loads appropriate to the context of all required architectural/building functionality requirements as well as all building services elements.

Permanent Dead Loads:

- a) Self-weight of structural elements

Superimposed Dead Loads:

- b) Ceiling and Services
- c) Floor finishes
- d) Internal partitions
- e) External screens and façades
- f) Future flexibility and fit out loads shall be allowed for in the level 0 and level 1 slab design loads

Live Loads

The minimum live load design criteria are outlined in the following table:

Table 3: Live Load Criteria

Area	Load (Distributed and Point Load Allowances)
Ground floor occupiable zone (future Childcare)	5.0 kPa & 3.6 kN
Stairs and landings, corridors, hallways, lift lobbies	4.0 kPa & 4.5 kN
Slabs on grade & subject to wheeled traffic	10.0 kPa & 31 kN
Plant or fan rooms	5.0 kPa & 4.5 kN (unless actual plant loads are higher)
Lift motor rooms	7.5 kPa & 4.5 kN (unless machinery loads are higher)
Car park and vehicle ramps subject to medium vehicles up to 10,000 kg gross mass	5.0 kPa & 31 kN
Car park and vehicle ramps subject to medium vehicles up to 3,000 kg gross mass	3.0 kPa & 13 kN
Non-Trafficable roofs (metal deck)	0.25 kPa or $(1.8/A + 0.12)$ kPa whichever is greater
Non-Wheeled but Trafficable roofs (concrete)	3.0 kPa & 4.5 kN
Other areas	In accordance with AS/NZS 1170.1 (min 3.0 kPa)

Barriers	In accordance with AS/NZS 1170.1
Construction Loads	Any special loads to be determined and approval obtained on site prior to construction

Minimum loads for roofs and barriers shall comply with minimum loads in AS/NZS 1170.1:2002.

Wind Loads

Wind loads must be determined in accordance with AS/NZS 1170.2 and the following are the expected minimum wind load parameters unless approved otherwise.

Table 4: Wind Load Criteria

Item	Criteria
Region	A3
Importance Level	2
Regional wind speeds Ultimate	$V_{500} = 45$ m/sec
Regional wind speeds Serviceability	$V_{25} = 37$ m/sec
Terrain category	2.5
Wind direction multiplier (Md)	Determine in accordance with AS/NZS 1170.2 Table 3.2

Earthquake Loads

Earthquake loads shall be determined in accordance with AS/NZS 1170.4 as follows:

- a) Importance level: 2
- b) Hazard factor (z): 0.08
- c) Sub-soil class: To be determined by a site-specific geotechnical investigation. Class Ce is expected.
- d) Earthquake design category: as per AS 1170.4.
- e) Static analysis in accordance with Section 6 or dynamic analysis in accordance with Section 7 of AS/NZS 1170.4 as required.
- f) The requirements for securing non-structural components as outlined in Section 8 of AS/NZS 1170.4 must be adhered to.
- g) Specialist advice from the façade screen designer and component manufacturer is required to ensure compliance with AS 1170.4.

Fire Resistance Levels

The fire resistance levels (FRL's) are to be in accordance with the BCA, the Building Certifier's advice and any Fire Engineering Report requirements. Based on the concept design for Type A construction, the minimum FRL's are required for structural elements in the table below:

Table 5: Fire Resistance Levels for structure for Type A construction

Description & Class of Building	FRL Structural adequacy/Integrity/Insulation (minutes)	
	Columns	Walls, Floors
Future Retail Class 6	180/-/-	180/180/180
Carpark Class 7a	120/-/-	120/120/120
Future Childcare Class 9b	120/-/-	120/120/120

Durability Requirements

The building must have adequate durability to achieve a design life of minimum 50 years without requiring undue maintenance. Durability must be built into the structure through appropriate selection of materials, coatings of materials, careful concrete mix design, and attention to design details. Adequate separation of dissimilar metals must be provided.

Criteria in the codes relating to durability must be regarded as minimum requirements, and appropriate judgement and experience must be exercised in order to achieve the desired design life.

Particular attention is to be given to the detailing of the weathered steel screen to ensure appropriate detailing is provided to suit different materials and to avoid impacting architectural intent of the finishes.

Minimum exposure classifications for reinforced or prestressed concrete elements as defined in Table 4.3 of AS 3600 are as follows:

- a) Surfaces of members in contact with the ground: A2
- b) Surfaces of members in interior environments: A2
- c) Surfaces of members in above-ground exterior environments: B1

Serviceability Requirements

The building's structure must be designed so that deflections under serviceability loads do not impair the functionality of the building. The following additional criteria must apply:

- a) The total long-term deflection under dead load plus serviceability live load will not exceed the lesser of span/300 or 25 mm generally.
- b) Transfer Beams if required, shall be limited to a maximum total long-term deflection of 10 mm
- c) Surfaces of floor slabs shall be finished to give true planes within 6 mm in 3 m as determined by 3 m straight edge placed anywhere on the slab in any direction.
- d) The maximum variation from designed datum level shall not exceed +/-25 mm.
- e) Walls and Columns are to be perpendicular to floors.
- f) Suspended floors required to support plant or equipment that will induce vibrations in the supporting system will be assessed to limit human perception in commercial or childcare areas.
- g) New floors will be assessed for the susceptibility of the floors to vibrations and dynamic effects of traffic movement to ensure human comfort is maintained.
- h) The building shall be designed to ensure that noise and vibrations do not adversely impact the amenity of the childcare spaces.

For suspended floors, measure and record deflections in floor and roof structure at the following stages as a minimum:

- a) Prior to stripping formwork
- b) Immediately after stripping formwork
- c) 30 days after stripping formwork

Building Joints

Building joints shall be provided to allow for building movements and to suit the geometry of the floor plates of the floor plates. Building joints shall be detailed appropriately to allow for traffic and waterproofing.

Structure Supporting Masonry Walls or Precast Concrete

These elements must comply with AS 3600, AS 3700 and AS 4100. Additionally, provided elements must be able to direct and accommodate building movement without detriment to the appearance or integrity of the walls.

External Screen

The external screen of weathered steel plates shall be designed to ensure:

- a) Deflections are not visibly perceptible
- b) Vertical movement allowance is provided at slabs
- c) Noise and vibration of the screen due to wind and rain affects is eliminated

Glazing

Structural adequacy of all glazing and associated framing will be specifically certified by a CPEng engineer with NPER registration in accordance with AS 1288.

Geotechnical Conditions

A site-specific geotechnical investigation shall be undertaken as part of the detailed design to verify the ground conditions and parameters including:

- a) Sub soil class
- b) Bearing pressures and skin friction for piles
- c) Site classification to AS 2870
- d) CBRs
- e) Extent of fill – controlled or uncontrolled

3.3 Acoustic Engineering

This specification describes requirements for 'building acoustics' elements including physical construction, finishes and building services elements. Acoustic design elements must be provided to support the building and building services elements of the Works to ensure that the acoustic performance of each area supports and enhances the intended function of that area.

Physical acoustic design elements must consider the specific technical, functional, and operational requirements outlined in other sections of the Output Specification, and therefore should be read in conjunction with these elements.

Legislation and Standards

The following Laws and Standards apply to the acoustic design requirements:

- a) During construction, noise and vibration must meet the requirements of the ACT Environment Protection Regulation 2005

The following Standards or guidance documents also apply:

- b) AS/NZS 2107:2000 Acoustics – Recommended Design Sound Levels and Reverberation Times for Building Interiors (AS 2107);
- c) AS ISO 140 Acoustics – Measurement of sound insulation in buildings and of building elements (AS ISO 140);
- d) American Society of Heating, Refrigeration, and Air-conditioning Engineers (ASHRAE) Handbook – HVAC Applications; and
- e) IEC 60268-16 ed. 4 2011 Sound system equipment - Part 16: Objective rating of speech intelligibility by speech transmission index (IEC 60268-16).

Internal noise levels

For the purposes of this specification, noise sources are defined in the following two groups:

Steady state noise

Steady state or quasi-steady-state noise includes but is not limited to the following sources:

- a) Mechanical ventilation and air conditioning systems
- b) Vertical transportation systems
- c) Hydraulic systems
- d) Electrical and lighting systems
- e) Computer equipment
- f) Road traffic
- g) Impact noise from other building areas

Project-specific criteria for noise from these sources are given in the table below and apply to each and every seated position and standing room occupant position, at 1.2 m above finished floor level. For space types not listed in the table, noise levels must be no higher than the ‘maximum’ levels described in AS/NZS 2107. To minimise steady state noise; all services elements that are considered to be a source of steady state noise (including but not limited to those identified above) must be reticulated via corridor spaces (wherever possible) and where possible terminate in the functional area that they serve.

Transient noise

Transient noise is noise from transient or infrequent sources, including but not limited to bell or door operation of vertical transportation systems, aircraft, rain and hail.

For critical spaces, transient noise must be designed so as not to exceed the internal ambient noise level given in the table below. For all other areas, transient noise must not exceed the internal ambient noise level given by more than 5dB.

To address transient noise from rain and hail, design and assessment may be based on an average continuous rainfall intensity of 20 mm/hr.

Table 6: Internal Noise Level Requirements

Space Type / Occupancy	Internal Noise Level, LAeq, dB	Acoustically Critical Space (Yes ✓ / No X)
Childcare	≤40	X
Amenity First Aid room / changing room / copy rooms/ foyer	≤45	X

kitchen / meal preparation	≤45	X
Office	Private (cellular) office ≤35 Shared (open plan) office ≤40 Breakout/kitchenette ≤40	X

3.4 External works and parking

The scope of the works includes, but is not limited to:

- a) Traffic and pedestrian control
- b) Traffic control devices including traffic signals
- c) Earthworks and sub grade preparation
- d) Parking and Vehicular Access
- e) Roads and Intersections
- f) Pedestrian and Cyclist Routes
- g) Hardstands
- h) External Signage
- i) Underground and overhead services
- j) External lighting
- k) The use of local and / or recycled materials is to be considered for all hard surfaces.

Legislation and standards

The external works must be designed in accordance with applicable Australian codes and standards. In addition, the following requirements apply:

- a) AS 2890 (2020) - Parking Facilities;
- b) AS/NZS 1158 (2020) – Lighting for roads and public spaces;
- c) AS 1428 (2021) – Design for access and mobility;
- d) National Capital Authority (NCA) Guidelines for Development, Tree Management Policy, Parliamentary Zone Review and City and Gateway Urban Design Framework;
- e) TCCS Municipal Infrastructure Standards (MIS);
- f) TCCS Municipal Infrastructure Standards (MIS) Standard Drawings;
- g) TCCS Active Travel Infrastructure Practitioner Tool (ATIPT) and Associated Documents;
- h) TCCS Municipal Infrastructure Technical Specifications (MITS);
- i) Austroads Guide to Road Design (AGRD) – AGRD04-17 Part 4 Intersections and Crossings;
- j) Austroads Guide to Road Design (AGRD) – AGRD04A-17 Part 4 Unsignalised and Signalised Intersections;
- k) Austroads Guide to Road Design (AGRD) – AGRD06A-17 Part 6A Paths for Walking and Cycling;
- l) AP-G34-13 – Austroads Design Vehicles and Turning Path Templates Guide; and
- m) Evo Energy SM11117 2017 Chamber Type Substation Design and Construction Standard.

Parking & Vehicular Access

The building design shall accommodate the safe access/egress to/from the site by all users including:

- a) The provision of on-site car parking for employees and visitors
- b) The provision of accessible car parking
- c) The provision of bicycle parking for employees and visitors
- d) The provision of loading dock facilities for a suitably sized vehicle anticipated to service the site

- e) Provision for access and operation of waste collection vehicle(s)
- f) Provision for access and operation of utility maintenance vehicle(s).

Relevant codes and authorities

- | | |
|--------------|---|
| a) NCC | National Construction Code |
| b) AS 2890.1 | Parking facilities Part 1: Off-street parking |
| c) AS 2890.2 | Parking facilities Part 2: Off-street commercial vehicle facilities |
| d) AS 2890.3 | Parking facilities Part 3: Bicycle parking |
| e) AS 2890.5 | Parking facilities Part 5: On-street parking |
| f) AS 2890.6 | Parking facilities Part 6: Off-street parking for people with disabilities |
| g) ACT Govt | Parking & Vehicular Access General Code |
| h) ACT Govt | Bicycle Parking General Code |
| i) ACT Govt | Development Control Code for Best Practice Waste Management in the ACT 2019 |
| j) NCA | Barton Precinct Code |

Parking provision

The carpark includes approximately 1,071 parking spaces including 1,055 car spaces and 16 motorcycle spaces. Car Parking spaces are inclusive of 45 car spaces dedicated for the childcare centre facility staff, visitors and drop off, 12 accessible spaces, 16 EV spaces and an average of 256 spaces on levels 01 - 04.

Design of parking spaces

The design of on-site car parking shall be in accordance with AS 2890.1:2004 "Parking facilities Part 1: Off-street car parking". On-site commuter parking shall be considered User class 1.

The design of accessible parking shall be in accordance with AS 2890.6:2009 "Parking facilities Part 6: Off-street parking for people with disabilities".

The design of circulation roadways and ramps shall be in accordance with AS 2890.1:2004 "Parking facilities Part 1: Off-street car parking". On-site parking for employee use shall be considered User class 1.

A minimum headroom of 2200 mm shall be provided in all enclosed parking areas with a minimum headroom of 2300 mm to be provided along any vehicular path of travel to or from an accessible parking space in accordance with AS 2890.1:2004 and AS 2890.6:2009.

Headroom at changes of grade including at the base of ramps shall be designed to accommodate the wheelbase of the B99 vehicle in accordance with Figure 5.3 of AS 2890.1:2004.

Bicycle parking

Bicycle parking and end of trip facilities are to be provided for the childcare centre in accordance with the ACTPLA Bicycle Parking General Code as follows:

- a. Bicycle parking shall be provided in accordance with the following provision rates as per the ACTPLA Bicycle Parking General Code (2013):
 - (1) Employees - Class 2 spaces at the rate of 1 per 250 m² GFA after the first 250 m² GFA; and
 - (2) Visitors – Class 3 spaces at the rate of 1 per 950 m² after the first 400 m²; and

- b. The design of bicycle parking facilities shall be in accordance with AS 2890.3:2015 “Parking facilities Part 3: Bicycle parking”.

Parking access / egress control points

The access and egress control for the on-site parking shall be designed to mitigate excessive delays and queuing of vehicles seeking to enter or exit the site.

The control points shall be designed to:

- a. Allow a sufficient rate of entry such that the 95th percentile queue during the AM peak period does not interfere with access to nearby properties or the operation of adjacent roads including Kings Avenue and Blackall Street.
- b. A minimum of two entry and exit control points shall be provided to allow contingency in the event of the failure or blockage (i.e. broken-down vehicle) of a control point. This can be provided in the form of a shared or tidal control point for which the direction of travel can be changed.
- c. No active access controls, such as boomgates or bollards, are required. Parking enforcement will be managed via parking ticket machines and/or mobile payment. Allowance must be made for installation of parking ticket machines distributed throughout each parking level including provision of power supply to nominated locations. The NCA is responsible for active enforcement of pay parking compliance via physical inspections in lieu of access controls such as boom gates in order to maximise the throughput of access / egress points. The NCA will organise the supply and installation of any pay parking machines, utilising the supporting infrastructure (slab and power supply).

Waste collection

Provision shall be made for the collection of waste from the site in accordance with the Development Control Code for Best Practice Waste Management in the ACT 2019.

The design shall allow for the safe movement and operation of the designated collection vehicle to be agreed in consultation with the Territory’s waste transporter.

Utilities access

Provision shall be made for vehicle access for building chamber substation in accordance with the Evo Energy Chamber Type Substation Design and Construction Standard.

The design shall allow for the safe movement and operation of the designated maintenance vehicle and crane to be agreed in consultation with Evo Energy.

Stormwater management

The design of stormwater infrastructure for the site is to be undertaken in accordance with MIS 08 ‘Stormwater’.

Existing stormwater infrastructure within the footprint of the proposed carpark will need to be relocated. Indicative locations are shown on the reference drawings, however, these are to be validated on site with

stormwater modelling undertaken to demonstrate that the capacity of the existing stormwater network will be maintained.

Allowance shall be made for localised stormwater drainage infrastructure to provide flood protection for the proposed carpark structure, provide suitable overland flow across the site and avoid ponding.

Roads and intersections

A new access road is to be constructed to service the new carpark, connecting off Kings Avenue via an upgraded signalised intersection with Kings Avenue and Blackall Street. The design of the access road is to be coordinated with the carpark access / egress configuration to provide adequate storage for queued vehicles to accommodate 95th percentile queues without obstructing the operation of the new signalised intersection on Kings Avenue.

The road design shall be generally in compliance with the Preliminary Design Solution noting the following specific design requirements:

- a. Lane widths must comply with minimum width requirements as per Austroads Guide to Road Design. Kings Avenue must have a minimum nominal carriageway width of 9.3 m accommodating a 3.3 m traffic lane plus 2 x 3.0 m traffic lanes. 3.0 m right turn lanes must be constructed within the existing median on the approach to signalised intersections.
- b. Any design dimensions including kerb radii shown on the Preliminary Design Solution are concept only and are to be validated on site.
- c. Intersection and road geometry must comply with the AGRD standards and meet the requirements of the Austroads Design Vehicles and Turning Paths Templates Guide.

Service Vehicle entrance/exit into the carpark and additional sealed access routes must be considered for access to the substation hardstand and other amenities.

Road pavements shall be flexible pavements with an asphalt wearing course. The design of the pavement shall involve consideration of the following five input variables:

- a. Design traffic;
- b. Subgrade evaluation;
- c. Environment;
- d. Pavement and surfacing materials; and
- e. Construction and maintenance considerations.

Design traffic shall be calculated in equivalent standard axles (ESAs) for the applicable design life of the pavement, taking into account present and predicted traffic volumes, axle loadings and configurations, traffic growth and capacity. In the absence of any traffic data, an on site assessment will be made to determine (in ESAs) the design traffic loading.

Provision shall be made for the existing Kings Avenue pavement to undergo a 'mill and fill' or other suitable resurfacing procedure within the limit of new kerb works in order to provide a consistent surface finish.

Active travel

Paths shall be constructed to provide direct and safe pedestrian and cyclist access between the carpark and existing path networks in the Parliamentary Zone. As a minimum, connections are to be provided to existing path networks along King George Terrace, Kings Avenue, King Edward Terrace and the JGB.

Paths shall be designed in accordance with MIS 05 and have a minimum width of 1.5 m.

Paths should be aligned where practicable to avoid intrusion into the structural root zone (SRZ) of existing trees as well as utility services pits.

Paths shall be DDA compliant in accordance with AS 1428 Design for access and mobility.

The landscape architect drawings provide an indicative path layout to be developed to detailed design.

Hardstands

Hardstand areas to be constructed as a rigid pavement, to be designed by a suitably qualified structural engineer. The maximum axle loads are to be determined on site during the works and accommodated based on consultations with relevant site users including, but not limited to, utility service providers, waste collection operators and site maintenance personnel.

Underground and overhead services

Water, sewer, power and communications services are to be connected to the new carpark. The design of new services and/or modification and/or removal of existing services shall be undertaken in consultation with relevant utility services authorities.

The placement of underground services is to be in easements, usually within road verges. Verges are to be wide enough to allow for tree planting as well as underground services. Coordination with the NCA and TCCS to be undertaken for new utility approvals, relocation of existing utilities and asset ownership.

Liaison with Telstra, Evoenergy, Icon Water, NBN and Optus to be undertaken for all utility coordination works. Commence Communications to be contacted for service location of Government Fibre Optic conduits on-site. No overhead services are permitted.

3.5 Communication Services

The building communications services consist of:

- a) Managed cable support system for all areas
- b) Identified communications risers
- c) Voice and data services infrastructure to Floor distributors on each floor
- d) Building distributor room
- e) PABX System
- f) Horizontal Cat 6 cabling

Legislation and Standards

The design and installation will comply with the requirements of statutory authorities and the latest or equivalent versions of standards including but not limited to:

- a) AS/CA S008 Requirements for customer cabling products
- b) AS/CA S009 Installation requirements for customer cabling (wiring rules)
- c) AS/NZS 3084 Telecommunications installations - Telecommunications pathways and spaces for commercial buildings
- d) AS/NZS 11801.1 Information technology - Generic cabling for customer premises - General requirements

Communications Service Risers

Provide a main communications services room for incoming and outgoing cabling.

Provide cable management and labelling protocols for all vertical and horizontal cabling.

Voice Services

Provide a telephone block cabling system in accordance with the requirements of the Australian Communications and Media Authority (ACMA). The system will provide for:

- a) Incoming cable
- b) Building distributor
- c) Cabling to data cabling cabinets

Horizontal distribution of telephone cabling shall be by using cabling in accordance with AS/NZS 3080 and AS/NZS 11801, providing minimum Class E horizontal links.

Computer Networks Horizontal cabling

Provide computer networks cabling infrastructure including copper or glass cabling, cable management structures, patching points and outlets as identified in the room data sheets in accordance with the requirements of AS/NZS 3080 and AS/NZS 11801. Minimum standard shall be minimum Class E links.

Separate systems are required between carpark services and each tenancy.

3.6 Electrical services

Electrical services must be provided as a centralised, cohesive, integrated system across the Works. Modification and demolition will be required to support the retained services to the area. All electrical systems must demonstrate proven reliability, performance, ease of maintenance and replacement, energy efficiency and cost effectiveness, and must comply with current technology and Standards.

Electrical services elements include the following:

- a) Electrical supply substation, including all fees and monies associated with supply authority provisions
- b) All consumer mains
- c) Single main switchboard for carpark services and tenancy supply services
- d) Submain cabling to all carpark services including vertical transportation, fire services and general light and power
- e) Provision for separately utility metered section of the main switchboard for the future childcare tenancy and Electric Vehicle charging
- f) Floor distribution boards, including separately metered lighting chassis, separately metered general power chassis
- g) Utility metering of switchboards and electrical supplies as described
- h) An energy-monitoring system installed to measure all meters and power analysers associated with carpark and tenancy supplies
- i) Light and power sub-circuit wiring
- j) Luminaires to carpark and minimum NCC compliant lighting to tenancy space
- k) General and feature external lighting
- l) Automated lighting control system installed to control and manage all lighting throughout all areas of the carpark
- m) General and specific power wiring to equipment
- n) Fully monitored exit and emergency lighting system

Legislation and Standards

The planning, design, construction and commissioning of electrical services are required to be completed in accordance with all statutory requirements relevant to the works, current relevant Australian Standards and the National Construction Code.

- a) AS/NZS 1680 all parts and amendments: Interior and workplace lighting.
- b) AS/NZS 3000 Electrical installations (known as the Australian/New Zealand Wiring Rules).
- c) AS/NZS 3008.1.1 Electrical installations - Selection of cables - Cables for alternating voltages up to and including 0.6/1 kV – typical Australian installation conditions.
- d) AS/NZS 3013 Electrical installations - Classification of the fire and mechanical performance of wiring system elements.
- e) AS/NZS 3017 Electrical installations - Verification guidelines.
- f) AS/NZS 3080 Telecommunications installations - Generic cabling for commercial premises (ISO/IEC 11801:2002, MOD).
- g) AS/NZS 3084 Telecommunications installations – Telecommunications pathways and spaces for commercial buildings.
- h) AS/NZS 3439.1 Low-voltage switchgear and control gear assemblies -type-tested and partially type-tested assemblies.
- i) AS 4072.1 Components for the protection of openings in fire-resistant separating elements - Service penetrations and control joints.
- j) Evo Energy rules and regulations including service rules.
- k) Australian Building Codes Board: National Construction Code.
- l) Comcare Australia: Work Health and Safety Approved Codes of Practice.

Power supply and distribution

Maximum demand must be calculated based on the requirements of the whole of the Works including EV charging allowance. Maximum demand estimates must be in accordance with AS/NZS 3000 recommendations and take into account any specific operational requirements of the Works that may have a bearing on demand and diversity.

The following minimum design parameters shall be used for sizing carpark and tenant supply and maximum demand:

- a) Carpark: 10 VA per square meter (includes all lighting and power).
- b) Childcare Tenancy: 100 VA per square meter of NLA served (includes all lighting, power, hydraulic and HVAC services). Allowance for 400 A three phase supply to serve this tenancy.
- c) Electric vehicle charging: minimum 7 kW commercial charge point per defined charging bay. Approximately 60 permissible with 750 kW transformer.

Electric vehicle charging

Provision shall be made to facilitate level 2 commercial electric vehicle charging stations within the Works. Residential style socket outlets will not be permitted as a charging facility.

The commercial operator may facilitate upgrades to the building transformer with Evoenergy to increase the extent of charge points while maintaining spare electrical capacities. The maximum number of charge points active at any onetime shall be within the requirements of AS/NZS 3000 and may be negotiated with Evoenergy to deliver a software driven solution to permit additional bays to allow staggered charging.

Future growth and spare capacity

The electrical system must be constructed to allow flexibility for potential future retail. The extent of additional spare capacity is to be determined during detailed design on all key low voltage distribution infrastructure, including (but not limited to):

- a) main switchboard;
- b) distribution boards;
- c) mains and submains cabling; and
- d) cable tray and ducting systems.

Substation spatial allowances shall be coordinated with Evo Energy standards.

Provision for the future expansion must suit the proposed architectural design and allow physical and electrical expansion along the whole of the reticulation pathway.

Utility supply

A new electrical supply to the development is required. The location of the substation supply shall comply with Evo Energy and NCA requirements.

The construction of a new electricity supply authority substation is required to include:

- a) Chamber substation integrated with the building;
- b) Extension and modification of the Evo Energy High Voltage cabling network to the new Substation; and
- c) Underground consumer mains from the low voltage terminals of the substation to the building main switchboard.

The project will need to allow for trenching and conduit for high voltage cabling and provision of chamber substation in accordance with EVO SM 11117 requirements including drawing 4921_06 rev I.

Main switchboard

A single main switchboard (MSB) with the following key requirements must be provided to service the Works:

- a) be located in a room with the following features:
 - 1) dedicated, accessible room to statutory requirements
 - 2) provided with ventilation / air-conditioning to maintain required operating conditions
 - 3) sufficient space for all required switchgear, metering, power factor correction and cable support infrastructure
 - 4) minimum of two-hour fire rating in accordance with BCA requirements; and
 - 5) provided with a minimum of two distinct/separate egress doors
- b) be suitably located to:
 - 1) minimise outgoing sub-mains cabling distances
- c) be constructed to include the following:
 - 1) Form 3b segregation as a minimum (in accordance with AS/NZS 61439)
 - 2) include safety services section/s to supply new and existing safety services within the Works as required by the BCA and AS/NZS 3000; and

- 3) accommodate the full estimated demand for the Works (including anticipated future commercial spare capacity)
- 4) Provision of surge diversion equipment. Surge protection shall be provided with alarm options for monitoring via the building management system (where provided)
- 5) Fault levels on each main switchboard shall accommodate the ultimate substation capacity including spare supply provision of utility metered section of the switchboard for the carpark loads
- 6) 3-phase outgoing carpark risers
- 7) spare 3-phase take-offs on the carpark distribution section
- 8) separate 3-phase utility metered tenancy section for childcare tenancy
- 9) spare 3-phase take-offs on the utility metered tenancy section
- 10) spare future utility metered take-off for electric vehicle chargers
- 11) additional 25% spare pole capacity on each distribution chassis
- 12) separation of power and controls sections by internal metal partitioning of the switchboard; and
- 13) provision of bottom and top entry/exit cabling access and cable zones, including sufficient capacity for the ultimate capacities as defined above.

Distribution boards

Distribution boards (DB) must be provided throughout the Works based on the following functional requirements:

- a) minimise voltage drop across the power supply and distribution system to ensure overall voltage drop complies with AS/NZS 3000 requirements
- b) support sub-tenancy locations and requirements
- c) facilitate energy metering requirements
- d) minimise sub-circuit cabling distance for high load items
- e) be located in lockable cupboard/enclosure vertically aligned in accessible areas. DB's or their enclosures located in paths of egress must be appropriately fire sealed in accordance with BCA requirements
- f) be in or adjacent cable riser shafts wherever possible
- g) be located adjacent the areas / load groups that the distribution switchboards serve
- h) be easily accessible for testing, servicing and maintenance
- i) provide a minimum 30% spare capacity (load (A) and pole capacity)
- j) be rated for the fault level determined by calculations.

Commercial tenancy distribution boards. No distribution boards are required to be provided as part of base building provisions for tenants. Distribution boards to be provided by tenant as part of fitout. Utility metered supply to be made available from the un-metered section of the main switchboard.

Base building lighting and general power provided in the tenancy shell shall be initially supplied from the carpark distribution board.

Mains and sub-mains cabling

Main cabling must be coordinated with the supply authority and will be dependent on the location of substation/s and the site MSB. Mains cabling must be sized to accommodate the full estimated demand for

the Works (including anticipated future expansion and spare capacity). The mains and submains cabling installation for both carpark and tenant supplies is required to include:

- a) be compliant with overall wiring system ratings for safety services in accordance with AS/NZS 3000, AS/NZS 3013 and relevant specialist system installation Standards
- b) Separate submain cabling from the main switchboard for:
 - 1) carpark light and power rising mains cabling; and
 - 2) Essential services such as lifts, fire service and EWIS
- c) be provided with full sized neutral cabling
- d) Supply through circuit breaker equipped tee-off boxes to carpark distribution boards on each floor
- e) Separate earth conductors for each submain cabling set
- f) Full-size neutral conductors for submain cable set
- g) Installation of all submain cabling in trefoil configuration
- h) Suitable wiring rating and installation in accordance with statutory requirements when serving essential services.

Sub-circuit cabling

Sub-circuit cabling and associated cable ducting must conform to the following requirements:

- a) be concealed within lift lobbies and pedestrian entries
- b) be confined to the floor from which the cabling originates and slabs must not be penetrated to facilitate sub-circuit cabling
- c) the number of outlets connected to a final sub-circuit (excluding dedicated circuits) must be limited to 60% of the capacity of the protective device with load calculated based on AS/NZS 3000 maximum demand calculation or actual equipment load, whichever is greater
- d) be adequately supported in accordance with the cable support system requirements of this Output Specification

Outlets and accessories

Provide outlets and accessories as required to support the intended layout and function of each space. RCD protection must be provided in accordance with AS/NZS 3000. Coordinate all outlet and accessory locations with architectural layouts and other services requirements.

Provide permanent labelling indicating the point of supply (DB and circuit reference) to all outlets and accessories.

Cascading and selectivity

Provide a fully graded system complying with the requirements of AS/NZS 3000; including coordination with existing upstream protection to the Supply Authority point of entry.

Ensure all protection devices are rated such that required selectivity is maintained throughout the distribution network.

Ensure protection devices are rated to withstand the prospective short circuit current (fault current) at each point in the network. This can be achieved via suitably rated protection devices or alternatively through the implementation of a cascaded combination of breakers. If a cascaded system is proposed, evidence must be provided from the manufacturer that the proposed combination of devices has been tested for the intended application.

Cable support systems

Provide a comprehensive system for reticulation of cabling throughout the Works. All electrical cabling must be segregated from other services in accordance with AS/NZS 3000 and the Standards governing the installation of the other services.

All cabling must be supported using one or more of the following methods:

- a) cable tray / ladder / duct;
- b) catenary system
- c) conduit (with conduit being appropriately supported / fixed to nearby building elements)

Provide a minimum of 30% spare capacity to all cable tray support systems

Where specific mechanical protection or fire resistance is required, wiring systems must comply with AS/NZS 3013 requirements.

Allow sufficient access and clearance for reticulation of future cabling. Coordinate access requirements with the architectural design to ensure access hatches are provided where the ceiling/wall system is inaccessible if cable concealment is required to particular areas.

Lightning and surge protection

Verify against AS/NZS 1768 if a lightning protection system is required for the building. Where required, coordinate lightning protection system elements with the building structure and architectural requirements.

Surge protection devices must be provided to the main switchboard (primary incoming protection), and distribution switchboards supplying the following load groups:

- a) communications equipment
- b) electronic security equipment (including security alarm and intruder detection system/s and CCTV)
- c) critical mechanical (HVAC) equipment (where provided)
- d) Surge protection device coordination and ratings must be as follows:
- e) building entry (main switchboard): Category C3
- f) distribution switchboards: Category B
- g) required final sub-circuits and sensitive electronic equipment: Category A

Installed lightning and/or surge protection systems must comply with AS/NZS 1768.

Power factor correction

Provide power factor correction at the main switchboard so as to bring the overall power factor for the Works to as close to 1 as practical. Power factor correction equipment must be located in the main switch room and be scalable for future expansion.

Energy metering

Provide energy metering to meet the following requirements:

- a) separate metering for commercial and retail tenancies

- b) private metering to satisfy the energy monitoring requirements of the BCA and Design Requirements relating to Utilities
- c) to facilitate energy reporting in accordance with Schedule 28 – Energy Targets Schedule and the energy reporting requirements as defined in the Schedule 24 – Services Phase Reports and Plans Schedule

Connect all private metered services into a combined metering and recording system capable of producing energy trend data and energy consumption/greenhouse gas production data metering and reports. Each meter must be capable of measuring the following minimum parameters:

- a) voltage (V)
- b) current (A)
- c) active (W), reactive (var) and apparent (VA) power
- d) power factor
- e) energy (kWh).

Meters must facilitate measurement of both peak and instantaneous parameters.

For all three-phase metering in excess of 100 A/phase, provide metering Current Transforms (CTs) and all required removable links, barriers and labels.

Lighting

Design objectives

The lighting installation must be designed to achieve the following objectives:

- a) safe to install, operate and maintain
- b) support and enhance the ability for building occupants to perform their required duties/functions within each space
- c) comply with energy efficiency requirements as part of the overall ESD strategy for the Works
- d) complement the architecture of the Works in providing a safe, functional and aesthetically pleasing environment.

Lighting requirements must be coordinated with all other design disciplines and stakeholders so as to ensure the following objectives are met for each area of the Works:

- a) coordination with building elements including:
 - 1) presence and impact of natural light
 - 2) surface reflectance
- b) lighting to support and enhance the safety and security objectives of the Works including:
 - 1) coordination with CCTV monitoring requirements to ensure CCTV operational objectives are achieved
 - 2) consideration of the perceived level of safety/security within each area and opportunities for mitigating risks through the use of appropriate lighting strategies
 - 3) consideration of interior and exterior lighting as a cohesive system tailored to anticipated occupant movements in and around the Site
- c) maintenance requirements including access to fittings and lumen depreciation over time.

Performance requirements

Interior lighting must be in accordance with the recommendations outlined in AS/NZS 1680 (as a minimum requirement). AS/NZS 1680 requirements may be exceeded in situations where the operational function of the area dictates enhanced performance of the lighting installation. Higher lighting levels may be required where video cameras are in operation.

The designed lighting power densities must comply with the requirements of the BCA.

The interior lighting installation must be considered in conjunction with ESD initiatives.

Task illumination levels shall comply with the recommendations of the AS 1680 series. The following minimum levels should be provided:

Table 7 Lighting illuminance and power density

Area	Maintained Average Illuminance (lux)	Maximum Power Density (W/m ²)
Commercial Tenancy – Shell	20	1.5
Lobbies, Lift Lobbies	160	4
Circulation	40	5
Stairs	80	2
Amenities	80	3
Carpark	40	2
Carpark – Disabled and Aisles	40	2
Carpark – Vehicle Entry during daytime	800	11.5

External lighting must be provided in accordance with AS/NZS 1158 and AS/NZS 4282 to facilitate safe egress across the Site. The following AS/NZS 1158 lighting categories are the minimum required performance benchmark for exterior lighting:

- a) major pedestrian pathways: Category PP4
- b) minor pathways: Category PP4
- c) car parks and vehicle access areas: Category PC2
- d) disabled car parks: Category PCD
- e) steps, stairs and ramps: Category PE1
- f) pedestrian crossings: Category PCX

Additional requirements for disabled access and security must also be considered. This may result in a higher level performance requirement than that stipulated in accordance with the equivalent AS/NZS 1158 lighting category.

A clear hierarchy of built environment illumination is provided to the National Triangle. The illuminance of the Works shall not exceed level 4 (5 cd/m²) per NCA policy.

Architectural external feature lighting must complement the architectural design intent of the building and its surrounds (including landscape elements). Feature lighting will be required to not contradict/impair any of the following requirements:

- a) Safety of building occupants
- b) the intended function/operation of an area or system
- c) the overall ESD strategy for the Works

- d) contradictory to NCA or heritage requirements

All feature lighting must be easily accessible for installation and maintenance and must be controlled separately from other functional lighting elements.

Consultation with the project Architect and NCA will be required to capture aesthetic and location requirements. It is expected that the fittings and design will be of a high quality suitable for the buildings' prominent location.

Luminaires

The overall strategy behind luminaire selection is to minimise whole of life costs whilst meeting the stated performance requirements of the lighting installation.

- a) Luminaires must be selected based on the following considerations:
 - 1) suitability for the intended application, including output, glare, and control arrangement
 - 2) suitability for the conditions that it will be exposed to, including wet areas, corrosive environments, and vandalism
 - 3) frequency, ease and safety of required maintenance. Maintenance burden must be minimised wherever possible
 - 4) energy efficiency
 - 5) warranties and availability of replacement components
 - 6) physical characteristics (visual appeal) of the fitting.
- b) Additional requirement for external fittings has the following additional considerations:
 - 1) Use high quality light fittings and hardware with a high standard of detail and finish;
 - 2) Full cut-off light fittings in all landscape areas, roads, paths and car parks; and
 - 3) Facade lighting to be integrated with the building structure.
- c) Colour temperature must commensurate with adjacent NCA precincts. Colour temperature must generally be consistent throughout the site, with luminaires directly adjacent to each other being of identical colour temperature. External colour temperature shall give the appearance of daylight (approximately 4500K-6500K).
- d) RGBW colour changing or fixed colour lighting may be used in specific situations to complement the architectural intent of the space.
- e) Colour rendering index (CRI) of all chosen light sources must be >85 (with the exception of coloured lighting).
- f) All LED luminaires must be provided with a minimum 5-year manufacturer's warranty (on all components).

Lighting control system

The Works must be provided with a programmable lighting control system complete with all switching modules, dimmers, switches and other control devices, control panels, power supplies, wiring and other equipment necessary to provide a complete and operational installation. The system shall serve all areas of the building, including but not limited to:

- a) Parking zones
- b) Vehicle entry transition zones
- c) External and landscaped areas
- d) Circulation areas
- e) Plant rooms

The LCS for the commercial tenancies to be installed by the tenant. Provide switched control for shell lighting supplied from the closest distribution board.

The lighting control system must achieve the following objectives:

- a) support and the functional operation of each space;
- b) maintain CPTED principles afterhours;
- c) Reduce the impact to wildlife;
- d) limit the impact of the Works within the Parliamentary Triangle;
- e) Control groups shall be no larger than 1,000 m²; and
- f) minimise energy consumption associated with lighting system by switching or dimming:
 - 1) perimeter parking spaces
 - 2) transition zones
 - 3) unoccupied spaces

All manual lighting controls must not be accessible to the general public.

The lighting control system must consist of the following:

- a) programmable head end to enable on-site adjustment of system parameters and dimming level;
- b) occupancy detection devices to control lighting based on local presence. Occupancy detector technology must be chosen to suit the intended area/application;
- c) photoelectric sensors for:
 - 1) control of exterior lighting; and
 - 2) control of interior lighting in areas where sufficient levels of natural light are available;
- a) time clock and calendar functionality for scheduling of control;
- b) other input devices as required to suit the intended control strategy (e.g. key switches if required in plant spaces); and
- c) all associated system wiring and software.

The table below outlines the intended lighting control strategy for each area. This must be confirmed and refined with relevant stakeholders prior to installation.

Table 8 Lighting Control by Functional Area

Area	Local Manual Control	Central Control	Dimmable	Motion Detection	Day lighting	PE Cell	Time Clock
Amenities		X		X			
External lighting		X				X	X
Plant rooms	X	X		X			
Public circulation		X	X	X	X		
Parking		X	X			X	X
Vehicle entry		X	X		X		X

Table 9 Control descriptions

Control	Control Description
Local Manual:	Lighting must be controlled from within the space it serves by users.
Central Control:	Lighting must be controlled via a central system such as central time clock, corridor linking functionality or similar.
Dimmable:	Lighting must be provided with dimming capability.

Motion Detection:	Motion detectors must be provided to detect occupancy within a room or area. Detection may be used to automatically turn off lights after an extended period of no occupancy within the room or area. Detector technology must be chosen to best suit the intended application.
Day Lighting:	Lighting within the room or area must be provided with automatic controls to dim or turn off lighting where adequate daylight is present. Minimum target lighting levels must be maintained using artificial lighting, natural lighting or a combination of both.
PE Cell:	Lighting must be controlled depending on day and night times.
Time Clock:	Lighting must be programmed to turn on or off at pre-set times. Alternatively, lighting is switched on for a pre-set time on activation of another input (e.g. local switch).

Emergency and evacuation lighting

Emergency and evacuation lighting must be provided as required by the NCC and AS 2293. The system must be a networked, computer monitored system to facilitate real time system monitoring, centralised testing and automatic (programmed) testing.

The emergency and evacuation lighting system must be provided with consideration of the following:

- a) BCA and AS/NZS 2293 requirements (as a minimum)
- b) the proposed egress strategy from all areas of the Works
- c) additional safety requirements in key areas such as plant rooms, switch rooms and fire control points
- d) additional security requirements that may be applicable in certain areas
- e) any fire engineered solutions that may be applicable in-lieu of Standards, BCA and AS/NZS 2293 requirements

3.7 Environmentally sustainable development

The Project has defined a philosophy for Environmentally Sustainable Development (ESD) to guide the priorities in the design, construction and operation of the Works, based on achieving the following objectives:

- a) energy and water efficiency to reduce ongoing recurrent costs of the Works
- b) creation of an indoor environment that provides a high quality, healthy and productive space for tenancies including daylight quality and level, acoustics, and indoor air quality
- c) reduction in Greenhouse Gas Emissions as measured by CO₂e

Policies and codes:

- a) Carbon Neutral ACT Government Framework;
- b) Energy Efficiency in Government Operations (EEGO); and
- c) National Construction Code Section J provisions.

Value for money (VFM):

- a) The Project has a preference for ESD initiatives that provide whole of life VFM outcomes that minimise capital and recurrent costs and incorporate passive ESD initiatives into the design where practical.

Thermal performance – building envelope

The following thermal performance criteria must be delivered for the Works:

- a) the external envelope:
 - must meet or exceed the requirements of BCA Section J1, for the relevant climate zone of the precinct
 - the façade thermal insulation performance must not be reduced from the BCA Deemed to Satisfy requirements under any JV3 performance-based compliance approach
- b) where improvements on R values above the BCA minimum requirements are to be incorporated, these must be applied for walls, ceilings, roofs and floors
- c) the façade systems must promote daylight penetration, exclude direct solar heat ingress and provide energy efficient operation. Energy efficiency must not be provided at the expense of daylight.

Building and engineering services equipment selection

Heating, ventilation and air-conditioning

The HVAC equipment and design for the Works must achieve the specified environmental conditions and be selected to minimise energy consumption. High efficiency equipment and controls must be implemented.

All refrigerants and insulation must have zero ozone depletion potential.

Lighting

The design must provide an appropriate internal lighting system to the parking areas that:

- a) wherever feasible, uses natural light as the primary daytime light source; and
- b) incorporates daylight dimming operation where sufficient daylight is available.

The lighting control system must be designed to suit occupancy patterns, function of the space and deliver the energy reduction through automatic control whilst areas are not in use.

Energy and greenhouse gas emissions.

The Works must minimise energy use and Greenhouse Gas Emissions. The Works must be designed having considered the “Carbon Neutral ACT Government Framework” objectives and the key ESD principles.

The annual Greenhouse Gas Emissions of the Works must be calculated by applying the energy modelling protocols taking into account:

- a) the operational Greenhouse Gas Emissions of the buildings and systems comprising the Works;
- b) the gross floor areas of all areas;
- c) all energy consumption within the Works; and
- d) all on-site generation using renewable energy or low carbon technologies.

Energy modelling protocols

The modelling process used for determining the energy consumption of the Works must include the following requirements:

- a) ABCB Protocol for Building Energy Analysis Software;
- b) building services energy consumption using manufacturer's data, modified to reflect the anticipated site conditions where applicable; and
- c) modelling data for any renewable energy sources used.

Renewable energy

Renewable energy sources are encouraged to be included for reductions in Greenhouse Gas Emissions. Where renewable energy is elected to be utilised, the reduction in Greenhouse Gas Emissions resulting from any renewable energy sources and the percentage contribution from each renewable energy source must be nominated. The allowance for the annual degradation of performance shall be stated.

All renewable energy used to reduce the Greenhouse Gas Emissions for the Works must be generated exclusively on the site. The use of imported renewable energy from offsite facilities must not be assessed as offsetting Greenhouse Gas Emissions.

Renewable energy sources with high operating costs will not be acceptable.

Building fabric

The Works must:

- a) maximise solar control properties of the different façade orientations through a combination of external solar shading, self-shading and solar performance of façade;
- b) provide for internal blinds with good external solar glare properties to every external window to provide effective glare, thermal and solar control and to suit the function of each space unless it can be demonstrated that external solar shading provisions (such as interstitial blinds, external blinds, or self-shading by building structure) can provide sufficient year-round protection; and
- c) ensure the air tightness of façades, doorways, roofs and other parts on the building envelope such that infiltration rates into any air-conditioned space are minimised.

Water use

The Works must minimise use of potable and non-potable water. The design must include water saving initiatives where practical and include anticipated savings for each against a baseline consumption.

The requirements of the ACT Planning & Land Authority (ACTPLA) 'Waterways Water Sensitive Urban Design General Code' (effective 2008) shall be incorporated into the hydraulic services design. Approval from ACTPLA is to be obtained for all proposals.

Metering and monitoring

Metering

Facilities for metering the Works must comply with:

- a) the minimum requirements of BCA Section J8; and
- b) any additional requirements indicated in this specification.

Meters must be connected directly to the EMS and provide data output at least every 15 minutes.

Electricity

At a minimum, sub-metering is required in relation to the following items/areas:

- a) designated commercial areas;
- b) mechanical services switchboards;

- c) central hot water systems;
- d) solar PV generation (if applicable);
- e) lighting;
- f) general power; and
- g) lifts.

Water

At a minimum, sub-metering is required in relation to the following items/areas:

- a) designated commercial areas;
- b) water supply to plant rooms;
- c) water supply to the landscape irrigation system;
- d) potable and non-potable water supplies; and
- e) rainwater harvesting (if applicable).

Monitoring

Data from individual meters must be able to be viewed graphically and through user friendly dashboards to allow hourly, daily, weekly and monthly trends to be viewed to assist in identifying problems and excessive energy use. When necessary for fault identification, the system shall be capable of trending at shorter intervals, selected either manually or automatically on change of value.

Monitoring systems must be able to combine the individual metered data into simple summary reports (numerical and graphical) with the following functionality:

- a. breakdown;
 - i. by source (e.g. electricity, water); and
 - ii. by type (e.g. lighting, HVAC);
- b. graphs must show trends against previous periods;
 - i. daily: compared with the previous 14 days;
 - ii. weekly: compared with the previous eight weeks;
 - iii. months: compared with the previous 18 months; and
 - iv. yearly: compared with all previous years;
- c. reporting must show progress/prediction against annual energy/CO2 targets so that corrective action can be taken if annual targets are at risk of not being achieved;
- d. read only access via a web portal to the BMS for the Department; and
- e. reporting must also show comparison trending for monthly and seasonal periods over the contract period with a minimum of five years trending to be displayed.

3.8 Fire engineering

This section provides guidance on the fire engineering process to be followed in the event that an alternate solution to the Deemed-to-Satisfy provisions of the BCA is required

Laws and Standards

Fire safety requirements are as specified in the BCA. ACT Fire and Rescue policy requirements also apply. Should the Deemed-to-Satisfy provisions of the BCA not be reasonably achievable, an alternate solution must be developed to demonstrate compliance with the performance-based requirements of BCA.

For fire safety compliance, the following is required to enable the project to achieve a Building Approval (BA):

- a) BCA compliance report;
- b) ACT Fire and Rescue plan review report;
- c) Fire Engineering Brief (FEB) – if any alternative solutions are proposed;
- d) fire engineering alternative solution report – if any alternative solutions are proposed; and
- e) ACT Fire and Rescue commentary on the alternative solution report – if any alternative solutions are proposed.

Fire engineering alternative solution process

Fire engineering brief (FEB) overview

When areas requiring alternative solutions have been identified, all relevant stakeholders must be consulted. An FEB in accordance with chapter 1.2 of the International Fire Engineering Guidelines (IFEG) is required for proposed fire related alternative solutions. The FEB should commence at the start of the development process.

FEB stakeholders

The FEB must involve consultation with the relevant stakeholders prior to preparing any reports to achieve in-principal agreement of the alternative solution. Stakeholders are to discuss the scope of the project, to agree upon the objectives, fire safety measures for fire related alternative solutions, methods of analysis and acceptance criteria for the assessments.

FEB process

The following FEB process is to be undertaken for fire-related alternative solutions:

- a) prepare a draft fire engineering brief document and circulate to all stakeholders;
- b) undertake a meeting with all stakeholders to discuss the draft fire engineering brief and proposed fire safety engineering assessment methodology;
- c) minutes of the meeting to be prepared and changes made to the draft fire engineering brief document if deemed necessary by stakeholders. In-principle support of assessment methodology should be received from stakeholders; and

- d) if during the detailed documentation or construction process changes are made to the assessment methodology or additional non-compliances are identified that require assessment, the changes are to be referred to stakeholders for comment.

Fire engineering alternative solution report

When the FEB has been completed an alternative solution report must be prepared. The alternative solution report is to demonstrate compliance with the performance requirements of the BCA and document any specific measures, management-in-use and maintenance requirements forming part of the alternative solution.

The information to be included in the fire engineering alternative solution report should be as per chapter 1.11 of the IFEF.

ACT Fire and Rescue commentary

Item 6 of part 2.2, schedule 2 of the ACT Building Regulation 2008, states that use of an alternative building solution for a provision of the building Standards that deals with fire protection must be referred to the Chief Officer of the fire brigade.

This requires the alternative solution report to be submitted to the fire safety section of ACT Fire and Rescue for review (contact: actfbfireengineer@act.gov.au).

In order for the building certifier to issue the building approval, the alternative solution report must be reviewed and endorsed by ACT Fire and Rescue and their commentary must be provided to the building certifier.

3.9 Fire safety services

The fire protection engineering services for the building shall include, but not be limited to, the following:

- a) Fire water connection from authority infrastructure to serve development site;
- b) Provision of an external and internal hydrant system;
- c) Provision of an internal fire hose reel system;
- d) Fire booster for hydrant system;
- e) Hydrant pump system;
- f) Provision of portable fire extinguishers;
- g) Smoke and thermal detection systems; and
- h) Occupant Warning Systems.

Sprinklers are not required on the basis of a free to air carpark structure design.

Relevant codes and authorities

Relevant codes and authorities' requirements will include, but not be limited to the applicable version of the following:

- a) AS/NZS 1850:Portable fire extinguishers - classification, rating and performance testing.
- b) AS 1851:Maintenance of fire protection systems and equipment.
- c) AS 2419.1:Fire hydrant installations - system design, installation and commissioning.
- d) AS 2419.2:Fire hydrant installations - Fire hydrant valves.
- e) AS 2419.3:Fire hydrant installations - Fire Brigade booster connections.
- f) AS 2441:Installation of fire hose reels.
- g) AS 2444:Portable fire extinguishers and fire blankets - selection and location.
- h) AS/NZS 3504: Fire blankets.
- i) AS 3745: Planning for emergencies in facilities.
- j) Australian Building Codes Board: National Construction Code.
- k) Fire Safety Section of ACT Fire and Rescue: as a Regulatory Authority under the Building Act.
- l) ICON Water, Water Supply and Sewerage Standards.

Wet fire protection

Fire hydrant system

The fire hydrant system shall be installed in accordance with the relevant standards and codes, the following shall be included as part of the system installation:

- a) Point of connection from authority infrastructure to serve the fire hydrant system supply.
- b) Provision of fire pump room for the development fire hydrant system.
- c) Hydrant booster arrangement to boost the system during a fire event.
- d) Twin pillar external hydrants around the carpark structure, internal hydrants providing coverage for carpark structure and childcare.
- e) All fire hydrant main risers within buildings to be located within fire isolated stairwells of the development.

Fire hose reels

Fire hose reels shall be installed in accordance with the relevant standards and codes, the following shall be included as part of the system installation.

- a) Point of connection to the buildings potable water supply where required.
- b) Provision of backflow prevention devices on all fire hose reels located in plant and back of house areas.

Portable fire extinguishers

Portable fire extinguishers shall be installed in accordance with the relevant standards and codes, the following shall be included as part of the system installation.

- a) Provision within childcare tenancy.
- b) Provision in close proximity to electrical switchboards.
- c) Provision of portable fire extinguishers to accompany fire hose reels.

Dry fire protection

The Works must be provided with an addressable Fire Detection and Alarm System (FDAS) to comply with the BCA and AS 1670.1 complete with Fire Detection Control and Indicating Equipment (FDCIE), detectors, building occupant warning system and other equipment necessary to provide a complete and operational installation.

Dry fire protection is required to the childcare and retail tenancies. The requirement for dry fire services to car parking areas is to be developed with the project certifier.

The fire detection system must include provision of all required components to ensure a fully functioning, compliant system, including but not limited to the following:

- a) fire indicator panel/s;
- b) mimic panels as required;
- c) analogue addressable detection devices;
- d) valve monitors on all isolation fire services valves as required for remote monitoring;
- e) manual call points;
- f) electromagnetic door holders;
- g) other field devices as required;
- h) fire fan control panel/s and all associated interfaces with mechanical (HVAC) systems; and
- i) interfaces with building management and security systems as required.

Fire Detection Control and Indicating Equipment (FDCIE)

The FDCIE shall be located and provided with suitable protection from vehicular traffic and pedestrians.

The building designated entry point shall be determined with the ACT F&R. Provide an external visual alarm device shall be located outside the designated building entry point.

Individual alarm indications shall be provided at the FDCIE.

The FDCIE shall be powered from the MSB or the closest DB, not more than one DB removed from the MSB.

The FDCIE shall provide a fire trip signal to HVAC equipment/Mechanical switchboards, automatic doors and security panels to allow automatic override of functions for fire mode.

Detection

The type of detection device must be chosen to suit the specific operating/building conditions of each area, with consideration of minimisation of false alarms. This also includes risk assessment of manual call points (MCP's) located in publicly accessible areas.

- a. Detectors shall be provided to all areas of the building to the requirements of AS 1670.1.
- b. Carpark: Point type heat detector with normal temperature duty and rate of rise operation.
- c. Enclosed circulation: Point type photoelectric smoke detector.
- d. Tenancy: Point type photoelectric smoke detector.
- e. Provide remote indicators for normally locked rooms, cupboards and concealed spaces.

Building occupant warning system

The Works must be provided with a building occupant warning system (BOWS) that is fully compliant with the BCA, referenced Standards, applicable fire engineered solution/s and ACT Fire and Rescue requirements.

An additional 30% capacity must be provided in the new Master Evacuation Control Panel (MECP) to support the addition of future speakers as required.

The new MECP must be co-located with the new FIP (at the nominated Fire and Rescue response point).

Visual warning devices must be provided where required due to high ambient noise or DDA requirements.

The system must be capable of delivering intelligible speech for announcement and directions.

Speech intelligibility shall be not less than 0.7 on the Common Intelligibility Scale.

3.10 Hydraulic services

The hydraulic engineering services for the building shall include, but not be limited to, the following:

- a) Potable water connection from authority infrastructure to serve development site;
- b) Sewer connection(s) from authority infrastructure to serve development site;
- c) Domestic cold water reticulation serving all fire hose reels;
- d) Provisional sanitary drainage provisions for future tenant connection;
- e) Potable water provisions for future tenant connection;
- f) Stormwater connection from authority infrastructure to serve the development; and
- g) Stormwater riser stacks.

Relevant codes and authorities

Relevant codes and authorities' requirements will include, but not be limited to the applicable version of the following:

- a) AS/NZS 3500.0: Plumbing and drainage - Glossary of terms.
- b) AS/NZS 3500.1: Plumbing and drainage - Water services.
- c) AS/NZS 3500.2: Plumbing and drainage - Sanitary plumbing and drainage.
- d) AS/NZS 3500.3: Plumbing and drainage - Stormwater drainage.
- e) Australian Building Codes Board: National Construction Code.
- f) ACT government Environment and Sustainable Development Directorate, Plumbing and Gas Inspectorate.
- g) ICON Water Water Supply and Sewerage Standards.
- h) Water and Sewerage Act 2000.
- i) ACT Water and Sewerage Regulations 2001.
- j) ACT Health rules and regulations applicable to the building.
- k) ACT government Water Sensitive Urban Design Code.
- l) Environment ACT rules and regulations applicable to the building.

Major system and equipment requirements

The following are considered to be requirements in common for all hydraulic services within the buildings and precinct.

Domestic Cold Water

The cold water requirements for the building shall be constructed in accordance with the applicable code and authority requirements current at the date of the building approval listed above, and shall include but not be limited to the following:

- a) Point of connection to the authority infrastructure complete with authority water meter for the development;
- b) Base building potable water risers within carpark structure and childcare tenancy;
- c) Sub-metered cold water supply for childcare tenancy; and
- d) Potable cold water provisional points within childcare tenancy across floor plate.

Sanitary Drainage

Point of connection(s) to the authority infrastructure complete with an authority sewer manhole located external of property boundary. Sanitary drainage shall serve all core fixtures and fittings with sanitary stack risers located in dedicated service riser within building core spaces.

Provisional sanitary drainage points shall be provided to serve tenant fixtures within the childare tenancy space. These provisional stacks shall be positioned to permit connection of fixtures placed across the net-lettable area.

Building Stormwater Drainage

The buildings stormwater drainage requirements shall be constructed in accordance with the applicable code and authority requirements current at the date of the building approval listed above, and shall include but not be limited to the following:

- a) Point of connection to the site stormwater infrastructure system;
- b) Provision for stormwater drainage stacks to be provided to collect rainwater run-off on rooftop carpark structure; and
- c) Provision for rainwater drainage points at ground level carpark entry and floor perimeter where water ingress is possible through the façade.

Water and energy conservation

A water efficient approach shall be adopted to the buildings consistent with Commonwealth Policies. Authority supply, isolation and metering

All supply authority metering and isolation points shall be remote of the structure and is proposed to be located at or near the entrance readily accessible to authorities.

3.11 Lifts / vertical transportation

Lifts must be provided to allow vertical transport between levels for general access and DDA requirements.

Lift elements include the following:

- a. lift motor rooms;
- b. lift shafts; and
- c. passenger lifts.

All lifts in the Works must be appropriately selected for the anticipated use and occupancy of the Works in order to provide a quality of service which meets the minimum lift performance and criteria as set out in this Output Specification.

Laws and Standards

The lift shall comply with all applicable Laws and Standards including and not limited to:

- a. AS/NZS 1735; and
- b. BS EN81.1:2000 including EN81.1/A2 (2005).

Lift traffic analysis

A comprehensive traffic analysis study must utilise the dynamic simulation method based on one-way traffic relative to the operation of the Works.

All traffic analysis calculations must be undertaken using traditional control methodology to meet the specific design requirements.

Destination control systems may be considered as an option to improve way-giving and operations and reduce overall lift numbers.

The design of the integrated transport installation must be based on the five-minute handling capacity of the percentage of sectional and total building population.

The entire installation using the array of solutions must be designed to minimise both waiting and transit time of all users of the vertical transportation system.

For the purposes of the lift traffic analysis, pedestrian and vehicular traffic must include:

- a. public visitor demand.
- b) The following information must form part of the traffic analysis results:
 - a. a thorough summary of the overall vertical transportation strategy for the Works including staff and visitors;
 - b. a vertical transportation site plan outlining main transportation cores and paths;
 - c. a detailed overview of the estimated / actual population within the Works and its effect on the vertical transportation system; and
 - d. traffic analysis results and system characteristics for each dedicated vertical transportation core including:
 - (1) round trip time
 - (2) average waiting time
 - (3) interval
 - (4) five minute handling capacity
 - (5) acceleration rate
 - (6) jerk rate
 - (7) passenger transfer rate (shall not be less than one second / person)
 - (8) door cycle times
 - (9) internal car dimensions, rated load and passenger capacity
 - (10) lift car rated speed
 - (11) percentage car loading

Population and handling requirements

The total population of the Works must be derived with architectural requirements. Estimated specific user groups sizes are to form the basis of traffic analysis calculations.

The vertical transportation system must meet the criteria for each zone type within the Works as detailed in the table below:

Table 10 Lift Handling Capacity

Lift System	Average Waiting interval (seconds)	Average Handling capacity (% of specified population transported within a 5-minute period)
Public passenger lift system (Estimated car loading peak capacity at 80%)	Maximum 35 s	15%

Lift system performance

The table below outlines typical lift performance requirements.

Table 11 Typical lift requirements

Lift components	Minimum requirements
Car and counterweight guides	Spring loaded roller guide shoes.
Car and counterweight guide rails	Heavy duty section tee bar.
Car operating panel	Stainless steel car operating panel incorporating the following features: Illuminated call record buttons with audible feedback Illuminating alarm/communications buttons (lowest RH button) Doors open and doors close buttons Telephone use surface engraving (6 mm high filled white) Telephone speaker (two way) Fan key switch (off/on) light key switch (off/on/test) Fireman’s service key switch Lift exclusive operation key switch
Car indication	Digital position and direction of travel indicators shall be located on car operating panel.
Communication	Hands free autodial voice communication shall be two way and activated by the pressing of the alarm button for at least three seconds. There shall be a button to illuminate acknowledgement of the registered call. A voice stamp or similar system shall enable the telephone operator at the answering service to identify the location and lift number from which the telephone call originates.
Landing indication	Hall lanterns with two tone electronic gongs with independent adjustable volume controls at each landing shall be provided.
Doorway protection	A passive detection system incorporating infra-red beams shall be provided. Beams shall not be activated by ambient light. (Three dimensional projection colour coding operation).
Buttons	All buttons shall be LED dual illuminating with a dual colour call recorded signal and audible feedback. Tactile and braille characters shall be positioned on the button.

Lift components	Minimum requirements
Lift well lighting	Lift well lighting shall be switched at the top and bottom of lift well and machine room. Protected units shall be located in pit, top overrun and then at six metre maximum centres in each lift shaft.
Protective blankets, where required	One set of fire rated overlapping blankets for each lift type. Hidden steel mounting clips to be plastic coated and removable.
Travelling cables	There shall be a minimum of 10% spare travelling cable inclusive of at least two spare shielded pair cables per lift.
Facilities for people with disabilities	Full facilities in accordance with the Australian disability standards shall be provided.

Ride Quality

Ride quality must be measured utilising a calibrated vibration analyser, over the entire length of travel, in both directions.

The minimum ride quality must be measured at the maximum horizontal acceleration inside the lift car from both front-to-rear and side-to-side as follows:

- a. 0.12 m/s² peak to peak; and
- b. 0.10 m/s² peak to peak (A95%) in the frequency range of 0 to 10 Hz.

Landings

Landing buttons must be provided per pair of lifts.

All buttons must be identical to those provided for the car operating panels and shall illuminate when pressed and remain illuminated until the call is answered.

Faceplates must be manufactured from no less than 2.5 mm thickness satin finished stainless steel.

Lift Cars

Lift cars must conform to the following:

- a) openings for natural ventilation must be provided at the bottom and top of the side and rear wall panels and shall be located such that they are not directly visible from within the car;
- b) ventilation openings must be fitted with baffles and filters to minimise transmission of air borne noise and dust to lift car interiors;
- c) exhaust fans must be isolated from the car structure with anti-vibration mountings and connected to plenums via flexible ducts;
- d) a lift car indication screen must be provided to passenger lifts on the main car control panel capable of programmable messages and clearly illuminating the following:
 - (1) car position indicator (40 mm character height); and
 - (2) direction of travel arrows (40 mm character height);
- e) the car superstructure must be free of any racking, rattles or squeaks under all loading, unloading and operating modes, and
- f) door operators shall be microprocessor based units featuring:
 - (1) VF AC motor drives;
 - (2) quiet and smooth operation;
 - (3) consistent and reliable operation;
 - (4) adjustable opening, closing and dwell times;
 - (5) torque adjustment complying with AS/NZS 1735; and
 - (6) site adjustable via laptop computer.

Control Criteria

A two button directional collective control system must be provided to all floors with the following minimum features:

- a) exclusive service;
- b) door nudging system;
- c) fire service control; and
- d) security control room remote control.

Additional controls features must include:

- e) all necessary components and time delay devices must be provided to prevent a shutdown occurring upon re-establishment of supply following momentary loss of normal supply;
- f) both the landing and car doors must operate automatically and simultaneously;
- g) the door operation must be smooth and without shuddering or vibration;
- h) the doors must remain open for a pre-determined time, which shall be adjustable, or until a car button or close door button is pressed, then the doors shall close and the lift respond to the call;
- i) the lift must park with doors closed;
- j) pressure on the close door button must cancel all delay timing on the doors;
- k) the load weighing feature must be of the infinitely variable type, and it must operate:
 - (1) when loaded in excess of 110% of rated capacity;
 - (2) when loaded in excess of 50% of rated capacity, the lift shall bypass landing calls; and
 - (3) when no load is detected in the lift car, all car calls previously registered must be cancelled;
- l) the computer must cancel all previously registered car calls if the number of car calls registered exceeds a predetermined adjustable number while the light load input function is active;
- m) light load input must be provided by a load weighing device mounted on the car;
- n) all door dwell times must be removed from any lobby landing should cars become loaded to a predetermined load level;
- o) dispatch load input must be provided by a load weighing device mounted on the car;
- p) a system for accurately pre-torquing of hoist motors whilst the lift is at varying levels within the lift shaft must be provided in order to ensure consistently smooth starts;
- q) the door protection system must incorporate a nudging feature. Should the doors be prevented from closing for a period of not less than 15 seconds, due to the continuous holding of the door protection or door open button, the nudging device must operate as follows:
 - (1) override those devices after a pre-determined (adjustable) period;
 - (2) cause the doors to close at reduced speed complying with a reduced kinetic energy requirement; and
 - (3) warning buzzer in car to sound during nudging operation;
- r) levelling must be accomplished in a straight to floor stepless manner to achieve the manufacturer's specified accuracy for that lift under all load and direction conditions;
- s) the lift control equipment must immediately re-level a lift car to within the stated accuracy, should that car run past a floor during the stopping sequence or creep away from a floor by more than the stated tolerance, during loading or unloading of the car;
- t) exclusive service operation must be initiated by a three position (off-on-park) key switch on the car operating panel of each lift to enable restricted lift usage; and
- u) upon initiation, the lift car must function as follows:
 - (1) remove the lift from group operation;
 - (2) all car calls can be cancelled;
 - (3) the lift shall not respond to landing calls;
 - (4) the landing hall lanterns and gongs become inoperative;
 - (5) the lift parks with the doors open;

- (6) the lift shall respond to car calls only (one car call shall be accepted at a time); and
- (7) in the park position users shall be able to momentarily leave the lift unattended and still retain control of the lift, key removable.

Emergency Power

In the event of loss of mains supply, all lifts must return to the designated home floor served and the car doors must open.

Noise and vibration

All installed lift equipment must be suitably isolated from the structure of the Works to control the transmission of vibration or noise, and include the following:

- v) controller cubicles and transformers must be mounted on neoprene pads or mounts providing a minimum deflection of at least 1.5 mm;
 - w) all electrical connections must be in approved flexible cable between the structure and machines, and structure and controller;
 - x) the lift controllers, isolation transformers and control cabinets must be isolated from the structure by locating them on new oil resistant rubber or neoprene mounts or pads;
 - y) contactors within the controller must be mounted on rubber or neoprene mounts or pads and enclosed in sound attenuated cubicles within the controller cabinet;
 - z) the maximum acceptable noise levels applicable to this project must comply with the criteria as stipulated in the acoustics output specification; and
 - aa) doors must be adjusted to meet slowly to avoid door to door impact noise. The maximum noise level (L_{max}) of lift doors shall comply with the criteria as stipulated in the acoustics output specification.
2. Lift noise shall not exceed the following noise levels:
- a) Noise levels in lift foyer at 1 m from lift doors:
 - (1) Lift pass by ≤ 50 dB LAeq, 10 seconds; and
 - (2) Opening and closing of lift doors ≤ 60 dB LAMax,F;
 - b) Noise levels inside lift car with fan(s) off:
 - (1) Lift car levelling to floor and doors opening ≤ 60 dB LAeq, 10 seconds;
 - (2) Lift car accelerating or decelerating ≤ 60 dB LAeq, 10 seconds; and
 - (3) Lift car running at speed ≤ 50 dB LAeq, 10 seconds.

3.12 Mechanical services

The mechanical services include, but not be limited to, the following provisions:

- a) Ventilation systems;
- b) Mechanical-associated electrical; and

- c) Tenancy services provisions.

Mechanical services are envisaged to be the minimal, with a preference towards natural ventilation systems that remove the requirement for mechanical equipment. Mechanical services shall be used only where it can be demonstrated that natural ventilation is not achievable or a viable option.

Relevant codes and authorities

The planning, design, construction and commissioning of mechanical services are required to be completed in accordance with all statutory requirements relevant to the works, relevant current Australian Standards, and the National Construction Code applicable at the Award Date.

- a) NCC – National Construction Code and Referenced Australian Standards.
- b) AS 1668 – Mechanical ventilation and air conditioning: Parts 1, 2 and 4.
- c) AS 4254 – Ductwork Systems: Parts 1 and 2.
- d) AS/NZS 3000 – Electrical installations.
- e) AS/NZS 3008 – Electrical installations – Cable selection.
- f) AS 1657 – Fixed platforms, walkways, stairways and ladders.
- g) AS 1345 – Labelling and Identification.
- h) AS 1170.4 – Seismic restraints.
- i) AS/NZS 2107 – Acoustics.
- j) AS 1682 – Fire, smoke and air dampers: Parts 1 and 2.
- k) AS 4072 – Treatment of fire rated penetrations.
- l) AIRAH – Australian Institute of Refrigeration, Air conditioning and Heating Design Application Manuals.
- m) ASHRAE – American Society of Heating, Refrigerating and Air-Conditioning Engineers Handbooks.
- n) CIBSE – Commissioning Codes: Guides A, C, M.
- o) MEPS – Commonwealth Minimum Energy Performance Standards.
- p) Comcare Australia – Work Health and Safety Approved Codes of Practice (comcare.gov.au).
- q) *Work Health and Safety Act 2011* (Cth).
- r) *Work Health and Safety Act 2011* (ACT).
- s) The ACT Fire and Rescue Service.
- t) The Local Electricity Supply Authority Regulations.

Ventilation Provisions

The following areas shall be provided with ventilation:

- a) Carpark
- b) Substation
- c) Switch room
- d) Sprinkler control valve room
- e) Lift motor room (where applicable).

The intent is to provide natural ventilation to the above enclosures where possible and minimise the requirement for mechanical equipment which will increase capital, energy, and maintenance costs.

The ability to achieve natural ventilation is dependent on the architectural design (i.e. location and size of façade openings, and internal obstructions such as walls/structure). It is the responsibility of the mechanical trade to provide input and liaise with architectural trade to ensure the natural ventilation requirements are understood and accommodated in the architectural design.

Mechanical ventilation shall only be considered if it can be demonstrated to the satisfaction of the Client Representatives that natural ventilation is not achievable or suitable. In the case of the enclosure types listed below, the natural ventilation options listed shall be demonstrated to be not achievable or suitable before consideration of mechanical ventilation may be considered. This shall be presented as part of the initial design stage deliverable.

- a) Carpark ventilation – Provided in accordance with NCC Part 4.11, as either of the following (in order of preference):
 - (1) Natural ventilation, in accordance with deemed-to-satisfy requirements of an “Open-deck carpark”, as defined in the NCC, or
 - (2) Natural ventilation, in accordance with prescriptive requirements of AS 1668.4, or
 - (3) Natural ventilation, in accordance with performance requirements FP4.3 and FP4.4, with verification using computational fluid dynamics (CFD), or
 - (4) Mechanical ventilation, in accordance with AS 1668.2. Where mechanical ventilation is provided, consideration shall be provided for demand-controlled ventilation with CO monitoring, as per AS 1668.2.

- b) Substation ventilation:
 - (1) Natural ventilation in accordance with EvoEnergy ‘SM11117 Chamber Type Substation Design and Construction Standard’.

Design parameters

The following are considered minimum performance requirements and design criteria where mechanical systems are required.

Aesthetics

Mechanical systems, where required, to be integrated within plant rooms and risers to minimise impact on the aesthetics of the building exterior.

Design life and durability

Any installed mechanical systems are to have adequate durability to achieve a normal industry standard design life without requiring undue maintenance. The HVAC systems are to provide the minimum life expectancy shown in table below (based on equipment economic life figures from AIRAH DA19 and CIBSE Guide M).

Table 12 Design Life

Primary Mechanical Equipment	Economic Life (Years)
Fans	15 - 20
Ductwork – rigid	40 - 50

Quality

Design and construction quality to meet high quality commercial standards for the duty concerned. Equipment and components selected to be of a type with proven performance and comply with equipment guidelines for major equipment.

Maintainability

The mechanical systems are to be designed to allow maintenance activity to be carried out in a safe manner without risk of personnel harm or damage to collections.

Equipment to be located within plant room space where possible.

Equipment to be selected where possible of standard manufacture and configuration to increase the familiarity to service personnel and achieve long term availability of spare parts and specialist backup.

Selections shall be demonstrated to avoid technical obsolescence whilst utilising tested and proven technologies.

Plant and equipment to be configured for ease of service access and to permit the removal and replacement of major items or components with minimum disruption and in the least time.

Tenancy provisions

Childcare Centre

The following provisions shall be provided to accommodate the requirements of the future Childcare Centre Facility tenants.

Table 13 Childcare Centre tenant provisions

Item	Description of Service
Heating and cooling	Spare space provision for tenant heating/cooling outdoor plant within ventilated carpark (it is envisaged tenant heating/cooling will be reverse-cycle split/variable refrigerant flow (VRF) systems).
Outside air	Intake louvre to outdoors for tenant to draw as much outdoor air as necessary.
Exhaust air	Exhaust louvre to outdoors for tenant to discharge as much exhaust air as necessary.

4 Landscape Works

4.1 Landscape Works Design Approach

External works recognise and are responsive to the important and sensitive location of the project within the Parliamentary Zone and the wider social, environmental and historic ramifications of the site and its context.

Works are to comply with all ACT Government and Commonwealth regulations, codes and standards, including related charters and conventions such as the Burra Charter. Works within the Parliamentary Zone are compliant with the NCP administered by the NCA within the Australian Capital Territory (Planning and Land Management) Act 1988. Included within the functions of the NCP are statutory responsibilities that:

- a. “defines the planning principles and policies for giving effect to the subject of the Plan and sets general standards and aesthetic principles to be adhered to...”; and
- b. “sets out the detailed conditions of planning, design and development for Designated Areas.”

Works within Designated Areas require approval from the NCA which used the NCP to assess applications for Works Approval.

It is the responsibility of the relevant parties to ensure familiarity with the NCP and all policies, documents and requirements relating to the site, including background information and direction provided by the Griffin Legacy which is “the blueprint for the future development of the central areas of the capital.” Best practice principles are to be adopted in relation to safety and security, social inclusion, indigenous matters and environmental policies. The Australian Institute of Landscape Architects provides a suite of policies and directions that are to be generally applied.

Materials

The choice of materials is to suit the broader context of the site and Parliamentary Zone, and the strategic direction of the NCA to achieve consistency in the initial selection and subsequent management of materials, elements and techniques with the Parliamentary Zone. As a guide, the palette developed by the NCA for Constitution Avenue is to be adopted for the project with some adjustments made as outlined in the Landscape Schedules.

Planting

Generally, species are selected for their function and aesthetics in contributing towards an attractive and safe external environment. Form, colour, texture and compatibility of species are important considerations in achieving a durable and sustainable planting scheme. Generally, species are chosen for their low maintenance requirements and ability to maintain form over a long period of time. Tree species are chosen for their consistency with other tree plantings within the Parliamentary Zone and their ability to adapt to increased temperatures in urban areas and to suit Canberra's soil and climate. Species selections are also complimentary to the nearby National Gallery of Australia Sculpture Gardens.

Details of the tree selection to internal garden areas and larger tree selection to external lawn areas, planting and understory selection are included within the Preliminary Design Solution at **Appendix B** and within **Part 4.7** below. Final planting design including quantities, selections and locations will be developed in close consultation with the NCA.

Species selection should also comply with *Design Standards for Urban Infrastructure 23: Plant Species for Urban Landscape Projects*. Where alternate species are proposed, these are to be justified for suitability of use.

Fixed furniture

Furniture is designed for robustness, durability, aesthetics and consistency with other landscape elements. The placement of furniture is suited to Canberra's climate with protection from colder south-west winds in winter and shade in summer. Low sitting walls and terraces are protected with skate stops where they are located adjacent to paving. High quality finishes that are easily maintained are required. Generally, natural finishes are preferred to ones that may require painting or the application of coatings on a regular basis.

Paving

Paving complies with Australian Standards, including Design for Access and Mobility (AS 1428) and slip resistance (AS 4586 and CSIRO Handbook HB 197). Paving is designed to accommodate maintenance vehicles and occasional heavy vehicles needing to access the site for emergency fire access or building maintenance works. Generally, unit pavers are laid on a concrete base slab for structural stability and longevity on Canberra's soils.

Crime Prevention Through Environmental Design (CPTED)

The location and arrangement of all landscape elements are cognizant of CPTED requirements, with external lighting and CCTV coverage designed to achieve a safe and secure external environment. Generally, external spaces are designed for casual surveillance and open sightlines.

The arrangement of footpaths and paved external spaces is predictable and well-lit, with direct connections and logical alignment to building entries and connecting paths. External spaces visually enclosed by walls or vegetation are avoided.

4.2 Landscape Works Overview

This section contains a written description of the proposed landscaping works and includes information and specifications of the following items. The following information is to be read in conjunction with landscape plans found in the **Appendix B – Landscape Works Documentation**:

- Existing features & infrastructure
- Pavements
- Kerbs, edging & walls
- Furnishings & fixtures
- Lighting
- Planting beds, soils and mulch
- New trees
- Plant list
- Irrigation
- Service/traffic infrastructure

4.3 Existing features & infrastructure

Existing trees to be removed

Approval must be obtained from the NCA in writing prior to removal of trees including submission of a tree removal schedule with photos of proposed trees to seek NCA approval. Once approved, trees must be removed in a timely and tidy manner, including stump mulching to 500mm below finished surface level.

Existing trees to be maintained

All work around trees shall be undertaken with care and sensitivity. Particular care shall be taken to avoid damage to root systems and limbs. Tree protection during construction is to be undertaken in accordance with ACT Government Standard Specification and AS4970 - Protection of trees on development sites - 2009.

Existing trees to be pruned

Where pruning of significant trees is required, submission of a tree pruning schedule with photos of proposed trees to seek NCA approval. Approval must be obtained from the NCA in writing prior to pruning of trees.

Existing Pits (Electrical, Stormwater, Communications, Miscellaneous)

The project will ensure that all existing pits and covers are to be set level with finished surface levels. Where pits are indicated in the Preliminary Design Solution for removal or services are no longer required, the pit or cover are to be removed and made good.

4.4 Pavements

The below table summarises pavement types and details, refer to **Appendix B – Landscape Works Documentation** for Landscape plans for proposed location and additional information.

Table 24: Pavement Types

REF	TYPE	DESCRIPTION	FINISH	SUPPLIER	NOTES
P1	PAVING TYPE 1 INSITU CONCRETE FOOTPATH	FOOTPATHS KING EDWARD TERRACE (BOTH SIDES) Light shotblast finish to top surface with a maximum of 1m reveal. Smooth even surface finish that exposes the aggregate. Ensure clean, straight edges. 120mm thick concrete slab on FCR. Parliamentary Triangle brown-grey aggregate.	Shotblast surface finish. Slip and skid resistant to Australian Standards.	CONCRETE SUPPLY Hanson 10mm Bungendore Brown aggregate and oxide. SHOTBLAST SURFACE FINISH: Shotblast with reveal less than 1mm.	SAMPLE: 3m ² sample of the concrete mix with shotblast finish is to be provided to determine final finish. This sample must then be tested for slip and skid resistance and approved.
P2	PAVING TYPE 2 BLUESTONE PAVING ON SLAB (STRETCHBOND PATTERN)	KINGS AVENUE VERGE OUTER PATH (BOTH SIDES) DIMENSIONS: 'Australian Bluestone' natural stone unit paving. 800 x 400 x 50mm mortared to concrete slab. Paving Mortar Joints 7.5mm 'Parex Davco' paving bedding and mortar system to manufacturer's specifications. Control joints 10mm Sikaflex product installed manufacturer's specifications. 'Grey' colour.	TOP SURFACE Sawn. OTHER FACES Sawn. EDGES Sawn.	PAVING Australian sourced Bamstone. BEDDING SYSTEM Davco Sika.	For Design Load ratings refer civil documentation. Slip resistance to Australian Standards. Tolerance of unit paver max +/- 2mm to Australian Standards. Application of mortar system to manufacturer's specifications. SAMPLE: 5 units and 1m ² laid.
P3	PAVING TYPE 3 COMPACTED DECOMPOSED GRANITE	Compacted Decomposed Crushed Granite with Soilbond additive.	To ACT Government standard compacted to 95% MMDD.	Canberra Sand & Gravel or similar approved.	Max 3% cross-fall. 'Soilbond' to be mixed in a mechanical mixer prior to placing and spreading onsite as per manufacturer's specification.

REF	TYPE	DESCRIPTION	FINISH	SUPPLIER	NOTES
	PRAM RAMPS	PAVING Paving on slab cut to suit pram ramp profile. TACTILES Refer TGSI.			Install to TCCS and Australian Standards.
	TGSI STONE UNIT PAVER	Tactile Indicators to Australian Standard AS1428. TACTILE INDICATORS ON SLAB 300 x 300 x 50mmD. Mortared to concrete or stone. 8mm mortar joints between pavers. 'Parex Davco' paving bedding and mortar system to manufacturer's specifications.	COLOUR: Natural black granite. EDGES & BASE: Sawn.	STONE TGSI Australian sourced natural stone. BEDDING SYSTEMS Davco Sika.	Install to comply with AS1428. Slip resistance to Australian Standards. Tolerance of unit paver max +/- 2mm to Australian Standards. Mortar system to manufacturer's specification. PROVIDE SAMPLE: 1 Unit.
	STONE LIGHT POLE SURROUNDS	'Australian Black Hill Granite' Natural Stone (King Edward Terrace, west side) Surround 1000 x 500 x 80mm cut to suit lighting pole base diameter. Set on mortar bed - 'Parex Davco' paving bedding and mortar system to manufacturer's specifications.	COLOUR: 'Australian Black Hill Granite' natural stone surround. TOP FINISH: Exfoliated. EDGES & BASE: Sawn.	STONE Australian sourced Tillett / Urbanstone or approved equivalent. BEDDING SYSTEMS Davco Sika.	Coordinate hole cut to suit diameter of light pole. PROVIDE SAMPLE: 2 units.

4.5 Kerbs, edges and walls

The following table summarises kerb, edge and wall types and details, refer to **Appendix B** – Landscape Works Documentation for Landscape plans for proposed location and additional information.

Table 35: Kerb, edge and wall types

REF	TYPE	DESCRIPTION	FINISH	SUPPLIER	NOTES
	KERB	<p>Bluestone kerbstones.</p> <p>TYPICAL 300W x 300H x 800L.</p> <p>Mortar to mass concrete footing.</p> <p>‘Parex Davco’ mortar system to manufacturer’s specifications.</p> <p>SPECIAL UNITS cut to suit radii at corners and profiles for pram ramps.</p>	<p>FACES: Sawn.</p> <p>KERBSIDE EDGE: 15mm pencil round chamfer.</p>	Australian sourced Bamstone.	PROVIDE SAMPLE: 2 units.
	KERB - STORMWATER SIDE ENTRY PIT LINTEL	<p>LINTEL Bluestone Basalt Lintel. TYPICAL 300W x 300H x 1350L.</p> <p>GRATING Cast iron grating. STANDARD 150W x 1000L. Bike safe grating heavy duty vehicle rated.</p>	<p>FACES: Sawn.</p> <p>KERBSIDE EDGE: 15mm pencil round chamfer.</p> <p>GRATING: Cast iron.</p>	<p>KERB Australian sourced Bamstone.</p> <p>GRATING Durham or equivalent local Australian supplier.</p>	<p>Lintel to match Constitution Avenue.</p> <p>PROVIDE SAMPLE: 1 unit.</p>
E1	EDGE STEEL ANGLE EDGE	<p>90 x 90 x 8mm Equal angle edge.</p> <p>Chemset anchor bolt fix direct to slab or footing below.</p>	Galvanised. Finish flush with adjacent paving/ surfaces.		<p>Lintel to match Constitution Avenue.</p> <p>PROVIDE SAMPLE: 1 lm laid.</p>
E2	EDGE STEEL BLADE EDGE	<p>100 x 5mm thk steel blade edge.</p> <p>Fix blade edge to 300mm MIN. galvanised steel pegs.</p>	Galvanised. Finish flush with adjacent paving/ surfaces.		<p>Lintel to match Constitution Avenue.</p> <p>PROVIDE SAMPLE: 1 lm laid.</p>

REF	TYPE	DESCRIPTION	FINISH	SUPPLIER	NOTES
E3	EDGE STONE EDGE	Bluestone Basalt Unit Pavers. 150 x 150 x 80mm. Laid on mortar bed levelling course. 8mm mortar joints between pavers. 'Parex Davco' paving bedding and mortar system to manufacturer's specifications.	TOP SURFACE Heavy bush hammered. OTHER FACES Sawn. EDGES Tumbled.	Australian sourced Bamstone.	Flush edge between planting beds and lawns.
W1	WALL LOW INSITU CONCRETE WALL	Exposed insitu Concrete Wall. Low wall 500mm high. Brighton Light cement. 12mm thick brass skate deterrents required spaced at 500 cts.	ALL EXPOSED FACES: Class 2 off-form finish.		PROVIDE SAMPLE: Concrete colour mix prior to pour onsite.
W2	WALL LOW CONCRETE RETAINING WALL/TERRACE	Exposed precast concrete wall. Low terrace sitting wall 450mm high. Flush at top side. Brighton Light cement.	ALL EXPOSED FACES: Class 2 off-form finish.		PROVIDE SAMPLE: Concrete colour mix prior to pour onsite.

4.6 Furnishing and fixtures

The following table summarises furnishing and fixtures type and details, refer to **Appendix B** – Landscape Works Documentation for Landscape plans for proposed location and additional information.

Table 46: Furnishings and fixtures type

REF	TYPE	DESCRIPTION	FINISH	SUPPLIER	NOTES
S1	SEAT TYPE 1 National Area Bench Long	MODEL 'National Area Bench Long' bench seat with armrests. Tamperproof fixings.	Fabricated steel frame. Timber battens Brass detailing.	Iguana Creative or approved equivalent.	Footings and installation to manufacturer's recommendations.

REF	TYPE	DESCRIPTION	FINISH	SUPPLIER	NOTES
S2	SEAT TYPE 2 National Area Seat Single	MODEL 'National Area Seat Single' single seat with armrests. Tamperproof fixings.	Fabricated steel frame. Timber battens Brass detailing.	Iguana Creative or approved equivalent.	Footings and installation to manufacturer's recommendations.
TG	TREE GRATE	FABRICATED 4000 x 2000 stainless steel grating with brass surround. Steel equal angle substructure mounted to concrete slab.	Stainless Steel 316 grade. Brass surround.	Fabricated.	Footings and installation to manufacturer's recommendations.
CS	CYCLE STAND	MODEL 'National Area Cycle Stand' Fix with secure flush mounted tamperproof fixings.	Brass flat plate.	Street Furniture Australia.	To match Constitution Avenue. Footings and installation to manufacturer's recommendations.
DF	DRINKING FOUNTAIN	MODEL 'National Area Fountain' Bubble, bottle and dog water outlets.	Brass plate surround Brass grating	Street Furniture Australia.	To match Constitution Avenue. Provide concrete footings and fixings to manufacturer's recommendation.
FP	FLAG POLES CEREMONIAL	MODEL 9m high, tapered profile. Flag size: 2700 x 1350mm Typ. Banner size: 3000 x 1000mm Typ. Steel spigot base and ground sleeve. Internal rope halyard and tamper-resistant security door. Windspin banner bar (for banners).	High-tensile marine grade aluminium with a UV- stabilised gloss-silver powder coat finish.	PILA Group.	NCA STANDARD.

REF	TYPE	DESCRIPTION	FINISH	SUPPLIER	NOTES
BS	BIN SURROUND	MODEL 'NATIONAL AREA BIN SURROUND' to suit 240L bin.	Powder coated steel frame colour 'Precious Metropolis Bronze Pearl Satin'. Infill mesh 3mm steel painted colour 'Precious Metropolis Bronze Pearl Satin'. Stainless steel cowl shroud with brass detailing.	Street Furniture Australia.	Bin enclosure to match Constitution Avenue.
F1	FENCE TYPE 1 STEEL FENCE	FABRICATED Custom freestanding steel fence mounted to concrete wall. - Height / dimensions vary – refer drawings - Recessed, Countersunk stainless steel 316 grade tamperproof fixings.	2 Coat epoxy paint system. Colour 'Precious Metropolis Bronze Pearl Satin' – To match Bowen Place steel fencing.	Fabricated	Colour to match Bowen Place and Constitution Avenue painted steelwork. Provide shop drawings of cladding and layout plans for approval by the Contract Administrator. Provide sample of fixings for approval.
SD	SKATE DETERRENTS	MODEL 'DTAC Short Bar Edge Protector' OR 'DTAC Edge protector 35m button'	Brushed brass.	DTAC	Install skate stops to walls at min 2m centres where adjacent to hard paving or to walls up to 1200 above adjacent ground level. Install with 2 pack epoxy glue fit for purpose to manufacturer's recommendations.

REF	TYPE	DESCRIPTION	FINISH	SUPPLIER	NOTES
BS	BUS STOP SHELTERS	<p>PROPRIETRY ITEM</p> <p>TYPE 1: 30m bus pad single structure.</p>	<p>STEEL FRAMING Painted 'Precious Metropolis Bronze Pearl Satin'. ROOF Insulated roof panel. SIDE PANELS Semi frameless glass.</p>	CAM (NEW ZEALAND)	To match Constitution Avenue.

4.7 Planting beds, soils and mulch

The following table summarises planting bed, soil and mulch types and details. Refer to **Appendix B – Landscape Works Documentation for Landscape plans** for proposed location and additional information.

Table 17: Planting bed, soil and mulch types

TYPE	DESCRIPTION	NOTES / REQUIREMENTS
TOPSOIL FOR TREE PITS & GARDEN BEDS	<p>Type of topsoil in accordance with ACT Standard Specification.</p> <p>Mulch layer as specified (refer below).</p>	<p>Refer ACT Government Standard Specification. Certificate of purchase must be provided.</p> <p>SAMPLE Provide control sample for approval Refer specification for hold points.</p>
TOPSOIL / SAND PROFILE – FOR TURFED AREAS	Sandy loam in accordance with ACT Standard Specification.	<p>Refer ACT Government Standard Specification. Certificate of purchase must be provided.</p> <p>SAMPLE Provide control sample for approval Refer specification for hold points.</p>
TURF	<p>Irrigated Turf- Type A – As per ACT Standard Specification – Section 9 Landscape, Table 9.7.</p> <p>Irrigation to meet NCA requirements.</p>	<p>Refer ACT Government Standard Specification. Certificate of purchase must be provided.</p> <p>SAMPLE Provide control sample for approval Refer specification for hold points. Irrigation design to NCA standards and for approval.</p>
MULCH	Organic Mulch to ACT Standard Specification - Landscape Table 9.10.2 (i) Pine Bark Mulch 12mm grading. 100mm depth.	<p>Refer ACT Government Standard Specification. Certificate of purchase must be provided.</p> <p>SAMPLE Provide control sample for approval Refer specification for hold points.</p>

4.8 New trees, shrubs and groundcovers

The following table summarises tree, shrub and groundcover types and details. Refer preliminary design solution at **Appendix B**. Final planting design including quantities, selections and locations will be developed in close consultation with the NCA.

Approval of the quality of stock and preparation of planting holes must be obtained from the NCA in writing prior to planting of trees.

Refer to the Preliminary Design Solution for planting details, including proposed size of the trees required for this project. ACT GOVERNMENT STANDARD SPECIFICATION AND NATSPEC 0255 LANDSCAPE – PLANT PROCUREMENT, including all PRE-COMPLETION TESTS and submission of all TREE INSPECTION FORMS will be complied with in delivery of the works. Trees supplied must be to conform to the recommendations of NATSPEC GUIDE: SPECIFYING TREES – A GUIDE TO ASSESSMENT OF TREE QUALITY (CLARK R. 2003)

Table 58: Tree, shrub and groundcover types

SPECIES	HEIGHT	SIZE/ CALPIER	QTY.	Species Selection
Deciduous trees – Kings Avenue	3.5	200l 75mm	92 semi-mature nursery grown stock	TREES – (INTERNAL GARDEN AREAS) <ul style="list-style-type: none"> • Banksia integrifolia • Casuarina cunninghamiana • Eucalyptus bridgesiana • Eucalyptus mannifera subsp. mannifera • Eucalyptus obliqua • Eucalyptus rossii • Eucalyptus scoparia • Eucalyptus viminalis TREES – (EXTERNAL AREAS IN LAWN) <ul style="list-style-type: none"> • Eucalyptus viminalis • Platanus × acerifolia • Quercus cerris • Quercus palustris ‘Freefall’ • Quercus phellos
Deciduous trees – other	3.5	100l 50mm	64 semi-mature nursery grown stock	
Native trees	1.5	Rocket pots 20mm	Allowance of 250 trees over in addition to below	
Native shrubs & groundcovers		Tube stock	Allowance of 3 plants per sq.m	PLANTING AND UNDERSTORY <ul style="list-style-type: none"> • Acacia sp. • Banksia sp. • Correa sp. • Dicksonia antarctica • Eremophila sp. • Grevillea sp. • Hardenbergia violacea • Lomandra sp. • Microlaena sp. • Poa sp. • Polystichum proliferum • Westringia sp.

4.9 Irrigation

The following table summarises irrigation areas and details.

Table 19: Irrigation areas

AREA	NOTES
<p>IRRIGATION SYSTEM - GENERAL</p>	<p>IRRIGATED AREAS EXTENT AND TYPES New irrigation will be provided as a design and construct item to match the existing irrigation system installed within the Parliamentary Triangle.</p> <p>All irrigation must be to Australian Standards and be approved in writing by the NCA prior to installation.</p> <p>SHOP DRAWINGS Prior to commencing any work, the contactor must submit complete drawings for approval by the National Capital Authority and the Contract Administrator. These drawings must include all irrigation details and plans.</p> <p>All parts are to be compatible with NCA’s system and controller requirements. All new irrigation must be uniform across the entire area.</p> <p>EXISTING IRRIGATION All existing irrigation areas must be maintained and protected in areas adjacent to the new irrigation system.</p> <p>Any existing irrigation that is disturbed or requires adjustment must be done and fixed at the contractor’s cost.</p>
<p>TURF AREAS</p>	<p>New pop-up sprinkler irrigation system to the turfed areas as indicated in the Preliminary Design Solution is to be provided.</p>
<p>MULCHED PLANTING BEDS</p>	<p>New inline drip irrigation system to the mulched planting bed areas as indicated on the Siteworks Plan.</p>
<p>NEW AND EXISTING TREES</p>	<p>Provide new dripline irrigation to all new & existing trees.</p>

5 Appendices

Please refer to attached supporting documentation in the appendices together with the relevant sections above.

Appendix A – Architectural Works Documentation

Appendix B – Landscape Works Documentation

Appendix C – Civil Works and Intersection Works Documentation

Appendix D - Traffic Report

Appendix E - Heritage Impact Assessment