Planning Proposal Report

50-56 Atchison Street, St Leonards, NSW

80818192

Prepared for

EPIC Leisure Pty Ltd

21 February 2018

Cardno

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1 Introduction

1.1 Engagement

Cardno (NSW/ACT) Pty. Ltd. (Cardno) has been engaged by EPIC Leisure Pty Ltd to create planning proposal report for a mix use development located on 50-56 Atchison St, St Leonards NSW. The report comprises of building services and structural engineering services.

1.2 Scope

The purpose of this document is to highlight the following:

- Building services utility supply philosophies for the respective disciplines (electrical, communications, sewer, gas, stormwater, towns mains, essential fire services mains);
- General building services methodology;
- Building services spatial requirements;
- Conceptual building services designs; and
- Ecological Sustainable Development Principles proposed for the project.

1.3 Site Location

The proposed development site is located at 50-56 Atchison St, St Leonards NSW and bound by Atchison St to the south and Atchison Lane to the North.

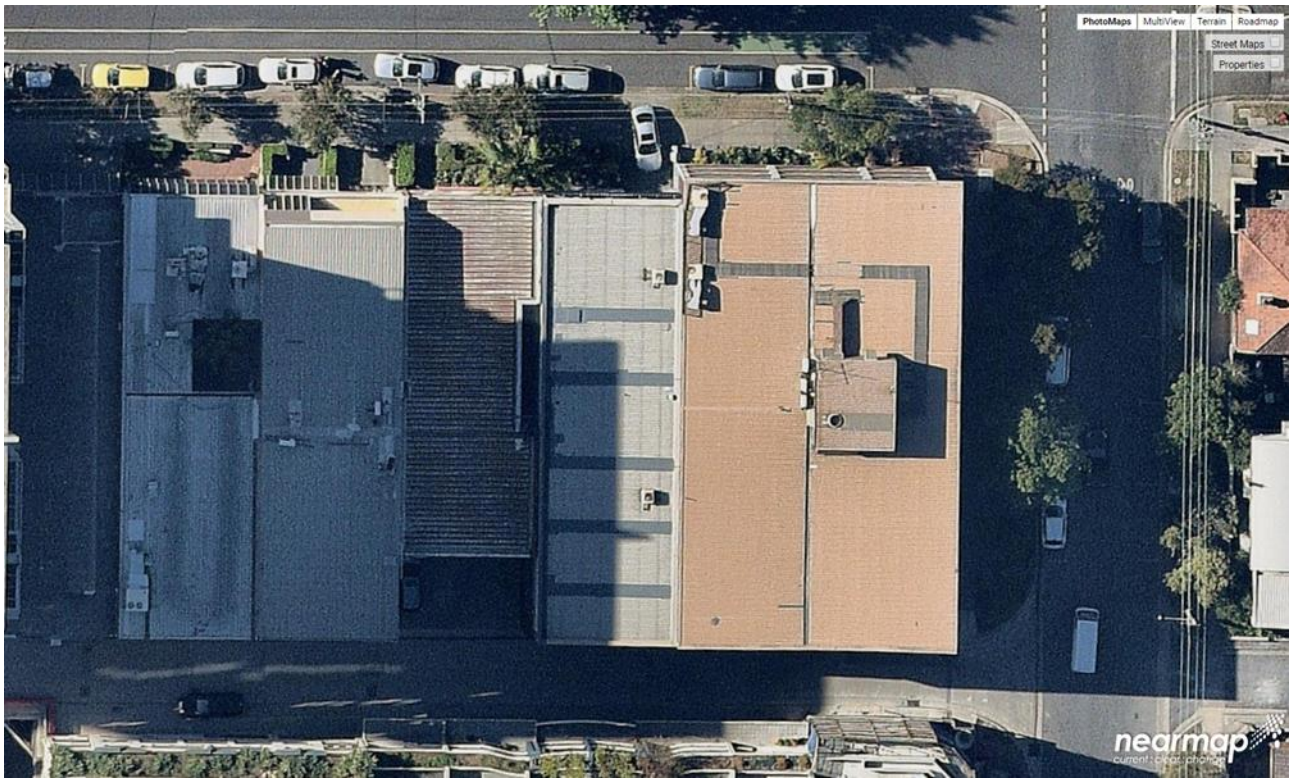


Figure 1-1 Satellite View

1.4 Proposed Development

EPIC Leisure Pty Ltd are proposing to develop the site into a mixed-use development consisting of nineteen levels as following with the following use:

- Common Basement Carpark (3 Levels);
- Commercial/Retail (4 levels);
- Residential (13 levels).

1.5 Strata Configuration

The subdivision for the development will be a single strata title subdivision, with special by-laws to regulate the apportionment of costs of common property between the different parts of the development.

1.6 NCC Classification

NCC classification(s) of the development are as follows:

NCC Classification	Class 2	Residential	(Levels 3 - 15)
	Class 5	Commercial	(Level 1 and 2)
	Class 6	Retail	(Ground floor & Mezzanine floor)
	Class 7a	Carpark	(Basement Levels B1 – B3)
Rise in Storeys	Sixteen (16) storeys		
Type of Construction	Type A Construction		
Effective Height	52.85 metres		

1.7 Mandatory NCC Energy Efficiency Requirements

Mandatory NCC Energy Efficiency requirements are as follows:

- J0 - Energy Efficiency
- J1 - Building Fabric
- J2 - Glazing
- J3 - Building Sealing
- J5 - Air-conditioning and Ventilation Systems
- J6 - Artificial Lighting and Power
- J7 - Heated Water Supply and Swimming Pool and Spa Pool Plant
- J8 - Facilities for Energy Monitoring

2 Mechanical Services

2.1 Regulations and Authorities

Relevant authorities having jurisdiction over this project are as follows:

- BCA;
- Lane Cove Council;
- Relevant Australian Standards;
- Work Cover;
- NSW Fire Brigade;

2.2 Design Methodology

2.2.1 Air Conditioning

Air conditioning systems will be provided for each residential unit and generally for each retail/commercial tenancy.

Provision of a central air-cooled VRF Air Conditioning System with roof mounted condensing units for each Commercial levels 1, 2.

Provision of individual VRF Air Conditioning units for the Retail areas on Ground and Mezzanine Floor. Condensing units will be located be located on roof level.

Air-cooled Split AC units to serve the GF Comms Room with outdoor unit located in the loading dock.

Provision of an efficient Multi Split DX Reverse Cycle Air Conditioning unit with air-cooled condensers located on the balcony of each apartment.

The systems will be designed in accordance with the BCA and relevant Australian Standards including but not limited to AS1668.1, AS1668.2 and AS3666.

2.2.2 Ventilation

Mechanical Ventilation needs to be provisioned where required to meet the requirements of the BCA where natural ventilation is not achievable or desirable, in accordance with the BCA and relevant Australian Standards including but not limited to AS1668.1, AS1668.2 and AS366.

Provision for mechanical ventilation to Commercial levels 1 and 2 and retail GF areas.

2.2.3 Carpark Exhaust

Car park exhaust and supply will be provided for the basement car parking areas. Make up air will be supplied via risers from the podium and exhaust via riser to the podium in compliance with the requirements of AS1668.2. The carpark ventilation system will be provided with Variable Speed Drives (VSD) motors and CO sensors as per AS1668.2, BCA requirements to minimise energy use and limit overall system noise levels.

Car park exhaust systems will continue to run while the make-up air systems will stop in fire mode.

2.2.4 Kitchen Exhaust

Residential

Ducted kitchen exhaust will be provided for each residential apartment with discharges to the main kitchen riser. This exhaust riser discharge will be located in accordance with the BCA and AS1668.

2.2.5 General Exhaust

Residential laundries and toilets

Residential laundries and toilets will generally be mechanically exhausted via discharge grilles to the riser. The exhaust riser discharge will be located in accordance with the BCA and AS1668.

Garbage exhaust etc.

Each garbage area in each building will be mechanically exhausted via riser to the roof and roof mounted fan. Discharges as per requirements of AS1668.2.

Plant rooms

Plant rooms will generally be exhausted at podium level where natural ventilation is not achievable or unsuitable for the application.

Fire Control Room exhaust

The fire control room shall have a fresh air system in accordance with the requirements of the BCA and AS1668.

2.2.6 Stair Pressurisation

Basement levels and the Tower shall have stair pressurisation systems provided for each fire escape stair. Fans shall be located on the ground floor and roof of the building – spaced apart and allowing for acoustic limitations.

Mechanical relief air system for the tower shall be provided to serve the lobby of the tower. The relief air system shall operate in fire mode only.

Relief air system for the basement fire stairs shall be provided via the car park exhaust system.

2.3 External Design Criteria

The air conditioning system design will be based upon the following external ambient conditions:

- Summer: 32°C DB
  23°C WB
- Winter: 7°C DB

2.4 Internal Design Conditions

The air conditioning system will be designed to maintain the following internal conditions:

- 24°C +/- 1°C in Summer
- 20°C +/- 1°C in Winter

No humidity control will be provided other than the normal dehumidification achieved as a result of cooling or heating incoming air.

2.5 Air Conditioning Loads

The following loads will be used in the design of the air conditioning systems:

- Lighting Load: 15 W/m^2
- Equipment Load: 20 W/m^2 Offices.
  5 W/m^2 Bed Rooms.
  15 W/m^2 General “front of house” areas.

2.6 Occupancy Rates & Outside Air Rates

The occupancy and outside air rates are as set out in AS1668.2

2.7 ESD Initiatives

At this stage, the following ESD initiatives are proposed:

- High efficiency (high COP) motors and equipment;
- Cross flow ventilation to apartments;
- Insulated ductwork;
- Variable speed drives on all fan motors;
- Individual toilet exhaust fans and FCR OA fan interlocked to local light switches;
- CO monitoring in the carpark;
- After hours switches.

2.8 Spatial Requirements

We have reviewed the architectural drawings and incorporated all required spatials.

3 Electrical Services

3.1 Regulations and Authorities

Relevant authorities having jurisdiction over this project are as follows:

- National Construction Code;
- Lane Cove Council;
- Relevant Australian Standards;
- Work Cover;
- NSW Fire Brigade;
- Environmental Protection Agency;
- AS/NZ 3000 – Australian Wiring Rules;
- Service and Installation Rules of NSW;
- Ausgrid Rules and Regulations;
- Australian and Communications Media Authority (ACMA);
- Communications Alliance (CA); and
- NBNco.

3.2 Design Methodology

3.2.1 Substation

At this stage, an onsite Ausgrid surface chamber substation will be provided to cater for the anticipated electrical load of the proposed development site.

The capacity of substation is assumed to be in the order of 1000kVA. However as long the existing substation supplies loads outside the property, the capacity of new substation is subject to Ausgrid approval.

The proposed substation location is shown on the architectural plans.

3.2.2 Electricity Supply

The electricity supply to the proposed onsite substation will be via the Ausgrid high voltage network in the vicinity of the site.

The high voltage feeders will be disconnected from the existing substation and connected to the new one once the building is built.

3.2.3 Consumer Mains

The consumer mains will be two (2) hour fire rated and reticulate from the onsite substation to the main switchboards.

The consumer mains supplying other buildings will be enclosed in 1500mm thick concrete casing when passing through the property.

3.2.4 Main Switchboards

Main switchboards (MSB) will be Form 3B and IP42 rated.

There will be one Switchroom on Basement 1 (B1) floor. The Main Switchboard will serve the following in respective parts of the buildings:

- Retail;
- Commercial;
- Residential;

The Switchroom will be 2-hour fire rated and will have two (2) forms of egress.

3.2.5 Distribution boards

Distribution boards will be Form 1 construction and IP42 rated.

Distribution boards will be provided as follows:

- Each retail/commercial tenancy;
- Each residential apartment;
- “House” areas of Carpark, lift lobbies and plant areas;

3.2.6 Subcircuit Cabling

Subcircuit cabling will be in accordance with AS3008 and AS3000.

Subcircuit cabling will be sized to cater for:

- the respective load;
- fault current rating; and
- voltage drop.

Subcircuit cabling will be PVC/PVC and XLPE/PVC type with the exception where fire rated cabling will be provided for safety services in accordance with the BCA.

3.2.7 Earthing

A MEN earthing system will be provided to the building in accordance with AS3000, Service and Installation Rules of NSW

3.2.8 House and Tenants Metering

“House” distribution boards will be metered at the respective main switchboard.

Retail/Commercial tenancy distribution boards will be metered from a central location in a common area.

Residential apartments will be metered on a floor by floor basis from a central location on the respective level.

3.2.9 General Lighting

General internal lighting will be provided in accordance with AS1680.

External lighting will be in accordance with AS1158 and local Council requirements. External lighting will be controlled via photoelectric cells and timers.

Internal lighting control for the following areas as follows:

- Carpark lighting – time clock and movement detectors;
- Common areas – movement detectors/local switching;
- Apartments – local switching;

3.2.10 Exit and Emergency Lighting

Single point exit and emergency lighting will be provided with test switches at the respective distribution boards.

Exit and emergency lighting will be in accordance with AS2293.

3.2.11 Telecommunications

NBN will provide lead-in fibre cables to the new development’s main campus distributor.

Following will be provided for the lead in fibre cables:

- Lead in cable pit and pipe system from street network to the building entrance.
- Provision of cable tray route and conduit to each residential apartment Network Terminating Device (NTD);
- Provision of cable tray and conduit to each commercial/retail premise NTD

Cabling infrastructure will comply with ACMA regulations and relevant Australian Standards

The central building distributor will be sized accordingly to accommodate three (3) telecommunications carriers.

The building will have full mobile phone coverage via an in-house distributed antenna system.

3.2.12 MATV and PAYTV

MATV antenna will be installed on roof complete with associated cabling, amplifiers and MATV filtered headend located within the MDF room.

PAYTV lead-in cable shall be from street and Foxtel filtered headend located within the Main campus distributor room.

A dedicated and centralised “free to air” digital and PAYTV system will be provided to the building.

There will be an RG11 backbone to splitters located on each level within the respective building telecommunications riser cupboards. For the residential levels, RG6 horizontal cables will be reticulated from the splitters on the respective levels to the individual apartments.

For the retail and commercial levels, future tenants will reticulate their own horizontal cabling from the splitters on the respective levels to their individual retail or commercial tenancies.

3.2.13 Security

CCTV

The CCTV system will consist of the following:

- Head end located in the Main building distributor room;
- IP based, individually addressable, CCTV cameras located at the following points:
  - the vehicle and pedestrian entries to the building;
  - main foyers;
  - lift lobbies;
  - carpark;
  - building perimeter;
  - exit points of the building;
  - public areas;
  - as well as any other locations instructed by the local council in their DA conditions of consent;
- Data backbone cabling to accommodate the CCTV camera infrastructure;
- Digital Video Recording (DVR) system capable of providing thirty (30) day storage capacity.

Intruder Detection

At this stage intruder detection will be provided by the individual tenants.

The access control system proposed will be capable of supporting intruder detection field devices.

Access Control

The Access Control system will consist of the following:

- Head end located in the Main campus distributor room;
- IP based, individually addressable, card readers located at the following points:
  - the vehicle and pedestrian entries to the building;
  - main commercial and residential foyer entries;
  - commercial and residential lifts.
  - Carpark B2, boom gate.
- Data backbone cabling to accommodate the access control infrastructure;
- Reed switches to all building perimeter doors;
- Access control proximity cards;
- Door controllers;
- Intercom points to the following locations:
  - the vehicle and pedestrian entries to the building;

> main commercial and residential foyer entries.

3.2.14 Lightning and Surge Protection

Lightning protection will be provided in accordance with AS1768.

Primary surge protection will be provided at the main switch board(s) and telecommunications building distributor (MDF). No secondary surge will be provided at this stage. If this is required, then the individual tenants will provide this.

3.2.15 Power Factor Correction

Power factor correction will be provided at the main switch board(s) in accordance with the Installation and Service Rules of NSW.

The power factor correction units proposed will correct the power to a factor of 0.95 or better.

3.3 Public Domain Lighting

Public Domain Lighting will be provided in accordance with:

- Local Council; and
- AS 1158.

3.4 ESD Initiatives

At this stage, the following ESD initiatives are proposed:

- Energy efficient lighting and lighting systems;
- Lighting levels and lighting power densities to all other areas in accordance with BCA – Section J requirements;
- Digital power metering for all common area submains and house distribution boards as per BCA part J8;
- Reduction of “spill” lighting;
- Power factor correction.

3.5 Spatial Requirements

We have reviewed the architectural drawings and incorporated all required spatial.

4 Fire Services

4.1 Regulations and Authorities

Relevant authorities having jurisdiction over this project are as follows:

- National Construction Code;
- Local Council;
- Relevant Australian Standards;
- Work Cover;
- NSW Fire & Rescue;
- Environmental Protection Agency.

4.2 Design Methodology

4.2.1 Fire Sprinklers

A combined fire sprinkler hydrant system utilising common, water supplies, tank, fire pumps and pipe work main risers located in the fire stairs would be provided in accordance with:

- AS 2118.6;
- AS 2419
- AS 2118
- BCA;
- Fire Engineered “Alternate Solution” where applicable.

4.2.2 Fire Services Water Supplies

A Grade 1 water supply via connection from the ‘town’s main water main and the provision of a 120,000 litre (approx.) combined fire sprinkler / hydrant water storage tank located in basement 1 would be provided in accordance with:

- BCA;
- AS 2118;
- AS 2419;

A pump room on basement level 2 incorporates the required combined sprinkler hydrant diesel and electric pump set. The pump room should be provided with direct street access or a Fire Engineered alternative solution would be required.

Another pump room incorporating a fire brigade relay pump will be provided on basement level 2

The pumps will be designed to provide the required flow rates and pressures.

The system will incorporate a connection to the Sydney Water main in the adjacent street, a combined sprinkler hydrant booster valve will be located adjacent the building entry

4.2.3 Fire Hydrant Service

Internal fire hydrants located within fire isolated exits of each level.

The fire hydrant service will be in accordance with the Building Code of Australia requirements and AS2419 - Fire Hydrant Installations.

4.2.4 Fire Hose Reel System

The system will be connected to the metered domestic cold water supply with hose reels located within four (4) meters of fire isolated exits on all non-residential floors.

Fire Hose reel system will be in accordance with the Building Code of Australia requirements and AS 2491.

4.2.5 Automatic Fire Detection Systems

Full addressable, automatic fire detection system protection reporting to the Main Fire Indicator Panel serving will be provided throughout the development in accordance with:

- AS1670;

- AS1668;
- BCA;
- Fire Engineered “Alternate Solutions’ where applicable.

A fire control room has been allowed for in the ground floor main entry area of the building. The Main Fire Indicator Panel for the proposed development will be located within this fire control room.

Smoke alarms will be provided within the residential apartments in accordance with AS3786.

4.2.6 Emergency Warning and Intercommunication Systems (EWIS)

An Emergency Warning and Intercommunication System (EWIS) including speakers, break glass alarms and warden intercom phones will be provided throughout the building.

- AS 1670.4;
- BCA;
- Fire Engineered “Alternate Solution” where applicable.

The EWIS Master Emergency Control Panel (MECP) for the proposed development will be located within this fire control centre.

Visual indicators will also be provided in plant rooms.

4.2.7 Fire Extinguishers

Fire extinguishers will be provided throughout the building in accordance with the BCA.

4.3 ESD Initiatives

At this stage there are no ESD initiatives are proposed:

4.4 Spatial Requirements

We have reviewed the architectural drawings incorporating required spatials.

5 Hydraulic Services

5.1 Regulations and Authorities

Relevant authorities having jurisdiction over this project are as follows:

- National Construction Code;
- Lane Cove Council;
- Relevant Australian Standards;
- Work Cover;
- NSW Fire & Rescue;
- Environmental Protection Agency
- Sydney Water.
- NCC Vol. 3 2016. Plumbing Code of Australia

5.2 Design Methodology

5.2.1 General

The hydraulic services documented for the development will be in accordance with the requirements of the relevant authorities. A hydraulic services concept plan has been appended to this brief which nominates the location of the existing Authority mains surrounding the site, proposed service connections and conceptual stormwater drainage layout.

Sydney Water will be contacted with regards to Section 73 requirements and Pressure Inquiry of the mains water supply in the vicinity of the site.

5.2.2 Sewer Drainage & Sanitary Plumbing

The sewer drainage and sanitary plumbing system will collect the discharge from the various sanitary fixtures and drainage points throughout and will gravitate to the existing Sydney Water Sewer Mains in Atchison Street.

Any Trade waste from the Food Retail Tenancies will be collected via a dedicated Trade Waste Drainage System and discharged through a Grease Arrestor governed by a Trade Waste agreement with the Sydney Water Corporation.

The system will be designed in accordance with AS3500 the National Drainage and Plumbing Code.

Final connections and arrangements for the sewer are subject to further negotiations with Sydney Water.

5.2.3 Stormwater Drainage & Downpipes

Gravity stormwater drainage will be provided from the roof areas to cater for a 1:20 and 1:100 year storm and may be gravitated to the Sydney Water controlled drainage system in the adjacent streets via a combined rainwater harvesting and onsite detention (OSD) system.

Pipe work could possibly be suspended and reticulate to the perimeter of the site where it will drop vertically to pipework under the footpath and road.

Onsite stormwater detention (OSD) tank will be provided for the proposed development in accordance with Lane Cove Council requirements.

A rainwater harvesting tank will intercept roof water run-off from the new roof for possible re-use of the water for the purpose of toilet flushing, landscape irrigation and laundry re-use may also be considered.

The stormwater drainage system will be designed in accordance with Lane Cove Council current stormwater guidelines, “Australian Rainfall and Runoff” and AS3500 the National Drainage and Plumbing Code.

The proposed onsite detention tank and rainwater harvesting tanks will be documented on the concept plans appended to this document for further reference.

5.2.4 Cold Water Service

The cold water service for domestic supply will be a metered mains-fed system and be complete with new connections to the Sydney Water’s main in Atchison Street.

Independent mains water meter may be provided to service the each of the respective stratums (ie. retail, commercial, residential) subject to further negotiations with Sydney Water.

The cold water service will be reticulated to all fixtures, faucets, and points of connection.

Independent metering will also be provided to the proposed stratums.

The cold water service will be in accordance with AS3500 the National Drainage and Plumbing Code.

The proposed cold water service with meter locations have been documented on the concept plans appended to this document for further reference.

5.2.5 Domestic Hot Water Service

The domestic hot water service will provide controlled temperature hot water to all fixtures and faucets requiring hot water.

Cross linked polyethylene piping will also be considered for the service from the apartment control valve to apartment fixtures and fittings.

The domestic hot water for the residential may be provided via gas centralised hot water system. The reticulation of hot (50oc) water will be provided via centrally controlled Thermostatic Mixing Valves, UV sterilisation (optional), circulating pumps and possibly a ring main system.

The retail and commercial may be provided with independent electric storage heaters.

The hot/warm water service will be in accordance with AS3500 the National Drainage and Plumbing Code.

The proposed hot water system will be documented on the concept plans appended to this document for further reference.

5.2.6 Fire Hydrant Service

The system will incorporate a connection to the Sydney Water main in the adjacent street, a hydrant booster valve located adjacent the building entry and internal fire hydrants located within fire isolated exits of each individual residential/commercial building.

A pump room incorporating the required pump set, (diesel), will be provided with direct street access. The pump will be designed to provide the required flow rates and pressures.

The fire hydrant service will be in accordance with the Building Code of Australia requirements and AS2419 - Fire Hydrant Installations.

5.2.7 Fire Hose Reel System

The system will be connected to the metered domestic cold water supply with hose reels located within four (4) meters of fire isolated exits in basements and commercial levels.

Fire Hose reel system will be in accordance with the Building Code of Australia requirements and AS 2491.

5.2.8 Gas Service

The gas service regulated supply will be connected to Jemena main where accepted by the authority in Atchison Street.

Independent gas metering will be provided to service the each of the various users (ie. retail, commercial, residential) subject to further negotiations with Jemena.

The system could be reticulated to the domestic hot water plant, and kitchen cook tops.

Any kitchen cooktops will be fitted with flame failure devices.

For any future retail tenancies, the capacity and associated metering will be available for future connection.

The new gas service(s) will be in accordance with the AS 5601.1:2010 and the requirements of Jemena.

5.2.9 Sanitary Fixtures, Faucets and General Equipment

All equipment such as sinks, basins and tapware will be specified by the architect/interior designer.

The sanitary fixtures and faucets will be of a reasonable standard throughout to achieve high levels of energy and water efficiency. These may be 3A WELS rated (equivalent to previous AAA rating) or better in accordance with the requirements for this type and class of building. To be confirmed.

Water reduction may be achieved via the use of dual flush cisterns for the water closets (3 litre half / 6 litre full flush), and the use of water flow controls on faucets and temperature limiting devices.

Shower hoses to be low flow type.

Isolation valves required to all toilets, bathrooms and kitchens.

5.2.10 In-house Flow Metering

The following areas shall be independently metered via a NHP type metering system or equivalent. Head-end software will be installed on the building managers PC.

5.3 ESD Initiatives

At this stage, the following ESD initiatives are proposed:

- Rainwater harvesting for landscape irrigation;
- Low flow fittings and fixtures;
- Additional insulation to hot water pipework;
- Solar hot water systems with gas boost.

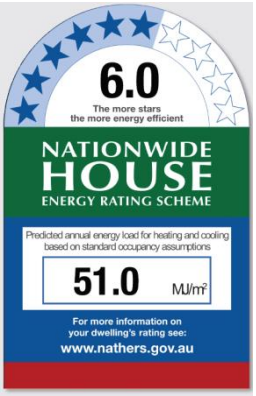
5.4 Spatial Requirements

We have reviewed the architectural drawings and incorporated all required spatial.

6 ESD Services

In line with developer's vision, the principles of ecologically sustainable design will be an integral consideration throughout this development. The sustainability targets for the development will be achieved in an integrated and staged approach through minimising the need for consumption (via passive measures) and then consumption optimisation (resource efficiency), performance management and ongoing monitoring. The initiatives presented in this report demonstrate a wide range of measures which will result in high levels of environmental performance and an increment on occupant's health, productivity, comfort and satisfaction.

6.1 Regulations and Authorities



Relevant authorities having jurisdiction over this project are as follows. The development will meet and where possible exceed the following regulatory sustainability requirements:

- Building Code of Australia;
- Lane Cove Council;
- BASIX
- NatHERS (Nationwide House Energy Rating Scheme)

6.1.1 Building Sustainability Index (BASIX)

The National Construction Code (NCC) Section J deems that developments with a building class of 1 or 2 in NSW should be assessed against the BASIX rating scheme. The BASIX rating scheme investigates the thermal comfort of the building, energy consumption and water consumption.

There are three input sections: Energy, Thermal Comfort, and Water. Each of these three categories is integrated and often influences each other.

New residential developments in NSW must reduce their energy and water use, according to BASIX requirements developed by the NSW Department of Planning & Environment. The objectives of the BASIX scheme are relative to an average development in NSW and as follows.

- BASIX Water reduction target
- BASIX Energy target for greenhouse gas emissions, depending on building height.
- BASIX Minimum thermal performance requirements for heating and cooling loads. The maximum allowable heating and cooling loads for each apartment are dependent on the floor area of the particular dwelling.

Achievement of the specified targets is demonstrated through use of a web-based prediction tool. This tool requires input of several aspects of the dwelling's design, and produces a BASIX certificate and report listing all of the environmental initiatives proposed and required to achieve the mandatory performance.

A BASIX Certificate is a DA requirement and demonstrates compliance with the NSW Government's sustainability targets. The development shall meet and where possible exceed the BASIX requirements.

6.1.2 NatHERS (Thermal performance compliance – part of BASIX)

The Nationwide House Energy Rating Scheme (NatHERS) is a star rating system (out of ten) that rates the thermal performance efficiency of a dwelling, based on its design.

The scheme provides a benchmark to estimate dwellings' potential heating and cooling energy use and helps to make residential units more comfortable and energy efficient.

This development shall comply with the NatHERS and the minimum BASIX heating and cooling requirements. The NatHERS assessments and certification will be performed at a later stage and as part of the BASIX.

The development shall achieve the minimum BASIX thermal performance for all the residential units.

6.1.3 NCC Section J

The National Construction Code (NCC) Section J sets minimum energy performance requirements for all new development, which cover air-conditioning, ventilation, lighting, power and hot water, as well as building fabric considerations including thermal construction and insulation, building sealing, glazing and shading.

The Deemed-to-Satisfy Provisions in Section J of the NCC 2016 are defined in eight parts:

- Part J1 - Building Fabric – Minimum thermal performance constructions for roofs, ceilings, roof lights, walls, and floors in the relevant climate zone.
- Part J2 - External Glazing – Minimum thermal performance for the glazing in the relevant climate zone.
- Part J3 - Building Sealing – Provisions to reduce the loss of conditioned air and restrict unwanted infiltration to a building.
- Part J4 – Blank in NCC 2016
- Part J5 - Air-Conditioning and Ventilation Systems – Requirements to ensure these services are used and use energy in an efficient manner.
- Part J6 - Artificial Lighting and Power – Requirements for lighting and power to ensure energy is used efficiently within a building.
- Part J7 - Hot Water Supply – Restrictions for hot water supply design except for solar systems within climate zones 1, 2 and 3.
- Part J8 - Facilities for Energy Monitoring

The development shall meet and where possible exceed the NCC energy efficiency requirements of Part J.

7 Structural Services

7.1 Regulations and Authorities

Relevant authorities having jurisdiction over this project are as follows:

- Building Code of Australia;
- Lane Cove Council;
- Work Cover;
- Relevant Australian Standards, in particular the following:

>	AS	1170-2002	Structural Design Actions
			Part 0 General Principles
			Part 1 Permanent, Imposed and other Actions
>			Part 2 Wind Actions
>			Part 4 Earthquake Loads
>	AS	3600 - 2001	Concrete Structures
>	AS	3700 - 2001	Masonry Structures
>	AS	4100 - 1998	Steel Structures
	AS	2159 - 2009	Piling Design & Installation

7.2 Proposed Structural System

We propose a robust and cost-effective framed structural system, with vertical forces carried by reinforced concrete columns and shear walls, and earthquake and wind forces resisted by reinforced concrete shear/lift /stair walls with post--tensioned suspended slabs, and a reinforced concrete piled shoring system, and columns/walls founded on pad and strip footings, as described below.

Shoring System

Based on our experience with a number of projects in the area, including 9-11 Atchison St, we propose a shoring system consisting of contiguous piles approx. 400 mm diameter on site boundaries adjoining existing buildings, and soldier piles approx. 600 mm diameter with infill shotcrete on street frontages and boundaries not adjoining existing buildings.

These piles will be socketed into the 3500 kPa sandstone, and laterally restrained by temporary rock anchors during construction, and by the suspended basement and ground floor slabs thereafter.

The above will need to be confirmed by a detailed geotechnical investigation.

Footing System

Based on experience with other projects in the area, it is likely that low –to –medium strength sandstone will be encountered at bulk excavation level.

The columns and walls are proposed to be supported on pad and strip footings founded on the low –to –medium strength sandstone.

Similarly, this will need to be confirmed by a detailed geotechnical investigation.

Columns

We propose a column grid of approx. 8.4 metres by 7.5 metres in the basements, and 7.5 metres by 7.5 metres with 6.5 metre end spans in the commercial and residential floors.

Based on the above assumed columns grids, the reinforced concrete columns will range in size from 200 x 600 mm at the top 2 floors, to 400 x 1000 at the lowest basement level (please see schedule below).

Shear Walls

The reinforced concrete lift and stair walls, supplemented by additional shear walls as required, will resist earthquake and wind forces.

The reinforced concrete shear, lift and stair walls will range in thickness from 170 thick at the upper floors to 300 thick at the basement (please see schedule below).

Suspended and Transfer Slabs

With the exception of the ground floor and level 3 transfer slabs, the post-tensioned concrete suspended slabs in the basement, commercial and residential floors will generally be 200 mm flat plates

We estimate that the level 3 transfer slab supporting 13 floors will be an approximately 1000 mm thick post-tensioned concrete flat plate.

We estimate that the ground floor transfer slab supporting 20 floors will be an approximately 1300 mm thick post-tensioned concrete flat plate.

If the basement columns could be carried up to the residential floors, both ground and level 3 transfer slabs may be avoided or minimized.

Similarly, if the commercial area columns could be carried up to the residential floors, the level 3 transfer slab may be avoided or minimized.

Indicative member sizes are summarized on the table below. The indicative member sizes are for planning purposes only.

Indicative Member Sizes

Structural Element	Location	Indicative Size (mm)	Notes
P/T Suspended Slab	All floors except Ground & Level 3	200 thick	
P/T Transfer Slab	Level 3	1000 thick	
P/T Transfer Slab	Ground Floor	1150 thick	
Slab on ground	Basement Level 4	120 thick	Allow SL 82 mesh & sawcut joints at 5 metre c/c
Column	Level 14 to Roof	200 X 600	
Column	Level 12 to 14	200 x 800	
Column	Level 9 to 14	220 X 1200	
Column	Level 3 to 9	220 X 1500	
Column	Ground to Level 3	350 X 1000	
Column	Basement Levels 1 to 4	400 X 1000	
Lift/Stair/Shear Walls	Level 14 to Roof	170 thick	
Lift/Stair/Shear Walls	Level 6 to 13	200 thick	
Lift/Stair/Shear Walls	Ground to Level 5	250 thick	

Structural Element	Location	Indicative Size (mm)	Notes
Lift/Stair/Shear Walls	Basement Levels 1 to 4	300 thick	
Pad & Strip footings	Basement Level 4	As per detailed design	On sandstone with 2000 to 3500 kPa working capacity
Shoring	Basement Level 4 to Ground, on boundaries adjoining existing buildings	contiguous piles 400 mm diameter	Socketed into 3500 kpa sandstone
Shoring	Basement Level 4 to Ground, on street frontages	soldier piles 600 mm diameter @ 2000 mm centres with 180 thick infill shotcrete	Socketed into 3500 kpa sandstone