LEHR CONSULTANTS INTERNATIONAL
(AUSTRALIA) PTY LTD
ACN: 124 107 973 ABN: 92 124 107 973
Level 4, 73 Walker Street, North Sydney, NSW 2060
TEL: 02-9157 0570 FAX: 03-9533 2199

9th October 2017

Avenor
Level 17, 9 Castlereagh Street
Sydney, NSW, 2000

Attention Mr Peter Clemesha,

173-179 WALKER STREET, NORTH SYDNEY
ESD OPTIONS ASSESSMENT

Dear Peter,

Further to your request, we are pleased to provide our ESD options assessment for consideration for the above-mentioned project. The following strategies are considered as opportunities that could be considered for the 173-179 Walker Street development.

The residential development will be designed to achieve a low energy, and low water consumption footprint. The emphasis will be placed on achieving a passive response to the climate there-by minimising the requirements for active services operation.

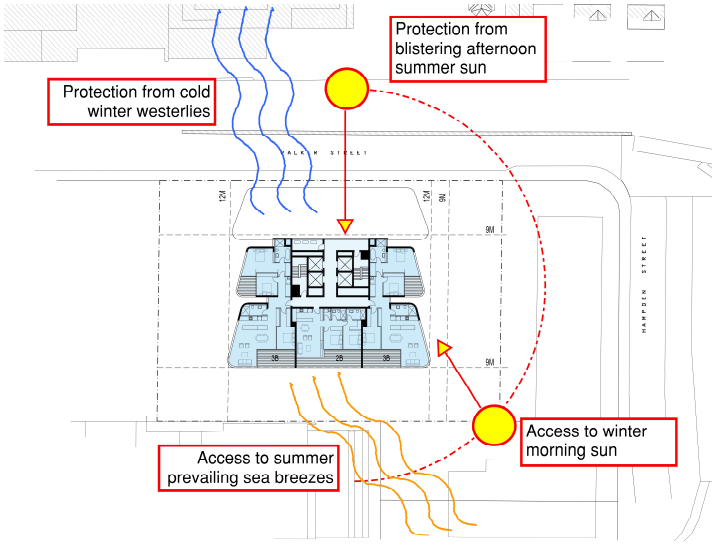
The building is a vertical precinct. At 47 stories above ground level the building will accommodate 284 apartments. Consequently, to provide a sense of neighbourhood, the building will provide its own communal space at ground and terrace level. The ground and lower ground levels provide retail and gardens for public access. The proposed Level 1 and Level 32 Terraces will accommodate community spaces for residents to access open air and sunlight.

The philosophy of the design has been to address the passive features first followed by active systems. An approach focused around design priorities has been adopted and underpins the sustainable design approach.

PASSIVE DESIGN PRINCIPLES

The proposed passive design approach responds to the local climate, local sun path and wind profile, reducing the building's demand for active building-services systems to provide thermal comfort and lighting and reducing peak energy demand and annual energy consumption. The following passive design opportunities are considered suited to the site and proposed scheme:

- Orientation. The building has been orientated to turn its back on the blistering western sun. At the higher levels of the building, the exposed western façade comprises of the lift wells and transient areas.



- High performance façade. This is imperative for parts of the western façade which will be exposed to the low angle sun. It is also relevant to the morning summer sun which has the potential to heat the apartments up before the day.

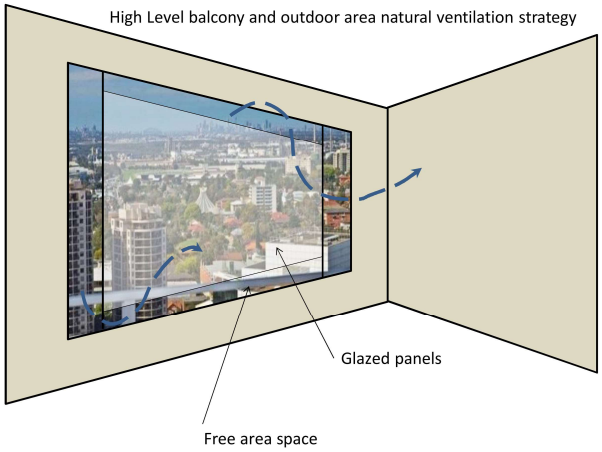
- Cross flow ventilation will be encouraged to over 80% of apartments for the first nine levels through the innovative building form and layout. Apartments will use a combination of balcony and window design to encourage natural ventilation into apartments.

- Active shading devices such as sliding shutters will be considered to provide effective shading to apartments that can be controlled by occupants. They also provide effective brown out conditions within rooms during the day.

- Amenity. The majority of the apartments will have access to views and daylight. Indeed, most will have access to sunlight, and all will have external balcony spaces. This ability to access daylight, sunlight, views and natural ventilation provides occupants with a high level of comfort and amenity.

- Natural ventilation to the floor lobbies can provide an opportunity to reduce air conditioning load and requirement while still providing acceptable conditions. Activated natural ventilation louvres can modulate to maintain comfort conditions year round.

- Within apartments maximising natural ventilation will be studied further using various window types. Casement type vertical hinged windows are ideal for catching oblique breezes and directing the air into the apartment while at the same time drawing it out of the other side of the window. Open windows in high rise apartments are subject to many safety issues, so casement type windows would be suited to locating at high level within apartments.
- At high elevations, wind speed can impact the comfort of occupants exposed to the outdoors. Effective detailed wind design of outdoor areas will be undertaken to maximise the comfort time for exposed external areas. Typically, strategies could include louvred winter gardens or partially glazed balconies.



ACTIVE DESIGN PRINCIPLES

The design includes many active ESD initiatives, some of which are:

- High efficiency reverse cycle air conditioning operating in mixed mode operation for residential apartments
- High efficiency luminaires including LED luminaires to be installed throughout.
- Efficient controls such as daylight dimming, timers and motion sensors would save energy when applied to the lighting control system in common areas and fire stairs.
- Light pollution from external lighting is limited by ensuring that no direct beam is directed beyond the site boundaries or upwards without falling directly on a surface with the explicit purpose of illuminating that surface.
- Low flow fixtures and fittings throughout the building.

Residential Apartments

Apartments will be air conditioned through the provision of dedicated low-profile air conditioning units. Supply and return air will be ducted to the apartment rooms from the air conditioning unit. Options considered for the air conditioning units include:

- Reverse cycle water cooled package units rejecting heat to a condenser water system.
- Reverse cycle Variable Refrigerant Volume (VRV) system rejecting heat to water cooled condensing units on plant pressure transfer station floors

Air conditioning units will be provided with reverse cycle capability to provide low energy cooling and heating. These systems provide effective heat reclaim between apartments with varying load profiles.

The condenser water circuit would be reticulated to a dedicated roof mounted cooling tower and condensing boiler unit. Plant pressure transfer stations located at intermediate levels provided with heat-exchangers would break the static column pressure of the condenser water system down the tower building.

The residential apartments will be provided with dedicated stratum centralised toilet exhaust systems. The toilet exhaust system would provide both toilet exhaust and laundry exhaust to each apartment via fire dampers and fans located at intermediate plant levels. The general kitchen exhaust systems will exhaust from each apartment directly to outdoors at the facade.

Outdoor air would be transferred from each lift lobby into each residential apartment via an acoustic transfer duct and fire damper to provide make-up air for the mechanical exhaust systems.

Residential apartment lighting would be energy efficient, dimmable and switched lighting, locally controlled to suit BASIX requirements.

Smoke Hazard Management

The smoke hazard management systems would operate in accordance with the requirements of the Building Code of Australia and the relevant Standards. Air conditioning systems would shut down when a smoke detected signal is received.

The fire stairs would be provided with stair pressurisation systems to suit the system shut down strategy. The smoke hazard management system would operate during Fire Mode and comprise of stair pressurisation fans and shafts to serve each of the fire stairs. Air would be relieved from the lobbies during fire mode through relief dampers and louvres from each corridor directly to the outdoors.

Retail

The retail tenancy will be designed to accommodate either a reverse cycle air cooled packaged unit or a dedicated water cooled packaged unit. The water cooled packaged unit would be connected to the serviced apartment's condenser water circuit.

Lobby Areas

Entry lobbies would be air conditioned through the provision of dedicated low-profile ceiling mounted water cooled packaged air conditioning units. Lift lobbies on each floor would be provided with ducted tempered outdoor air from in ceiling mounted units that can operate in mixed mode.

REGENERATIVE DESIGN PRINCIPLES

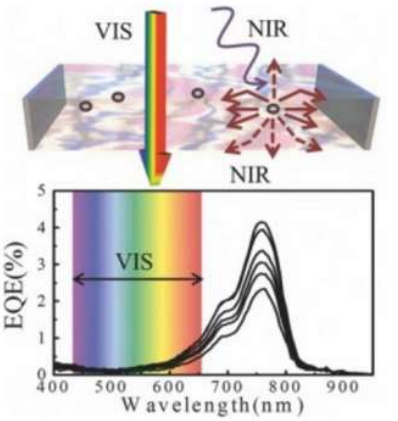
PV arrays

Photovoltaic arrays are now much more cost effective and efficient than in previous years. New technologies have allowed PV arrays to not only increase efficiency, but also become more flexible on how they are used.

Recent innovation in thin film Photovoltaic arrays has also seen new opportunities. With the increase in efficiencies and reduction in manufacturing costs, it is now possible to coat building facades in PV systems to offset energy consumed from the Grid.

These façade solar panels could be capable of being connected directly to each apartment's distribution board to provide solar power.

Clear glass PV arrays are now a reality however at low efficiencies. By the time this building is procured however, clear glass transparent photovoltaic arrays may be commercially available.

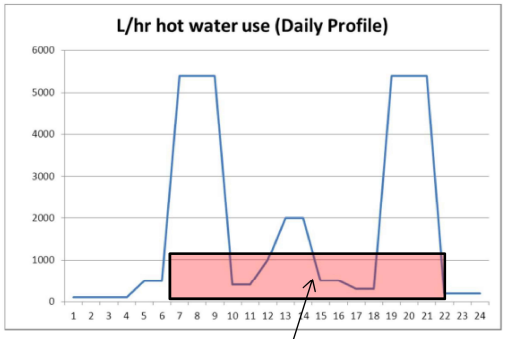


The organic salts absorb UV and infrared, and emit infrared — processes that occur outside of the visible spectrum, so that it appears transparent.

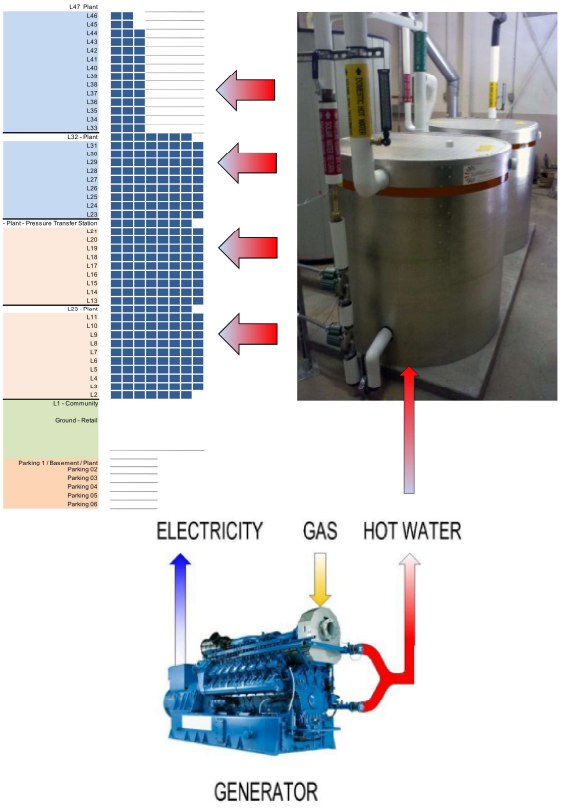
Domestic Hot Water Co-generation

Domestic hot water is one of the largest energy consumers within residential buildings. An opportunity exists to reduce the carbon emissions of the building by generating domestic hot water through a simple co-generation system. As a by-product the co-generation system would generate electricity to power constant electrical loads within the building during the peak load hours. Domestic hot water storage tanks located in the basement could charge during the off-peak hours and discharge to meet the peak demand during the morning and evening peaks. By using domestic hot water storage tanks, the co-generator can be reduced in sized to achieve an effective life cycle cost.

Co-generation hot water



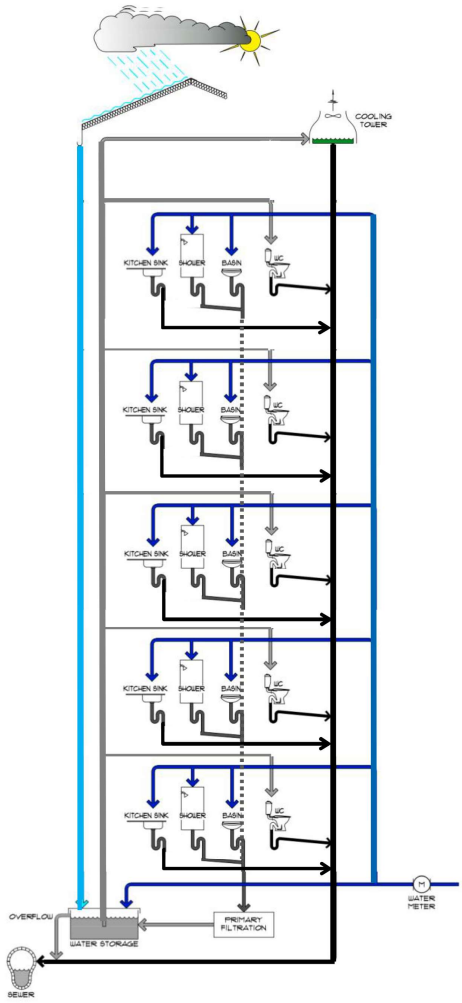
Cogen unit sized for continuous running during day hours



Potable Water Reduction

Opportunities exist to reclaim much of the grey water that will be generated by the residential component of the development. Hand basins, showers and kitchen sink water could be collected and filtered with rainwater to feed the cooling tower and potentially toilet flush.

Rainwater runoff from the facade areas can also be collected and stored to provide irrigation for gardens on the terrace levels, roof of the retail, and the roof of the commercial building. Rainwater shall be treated to an acceptable level prior to reticulating to the usage points.



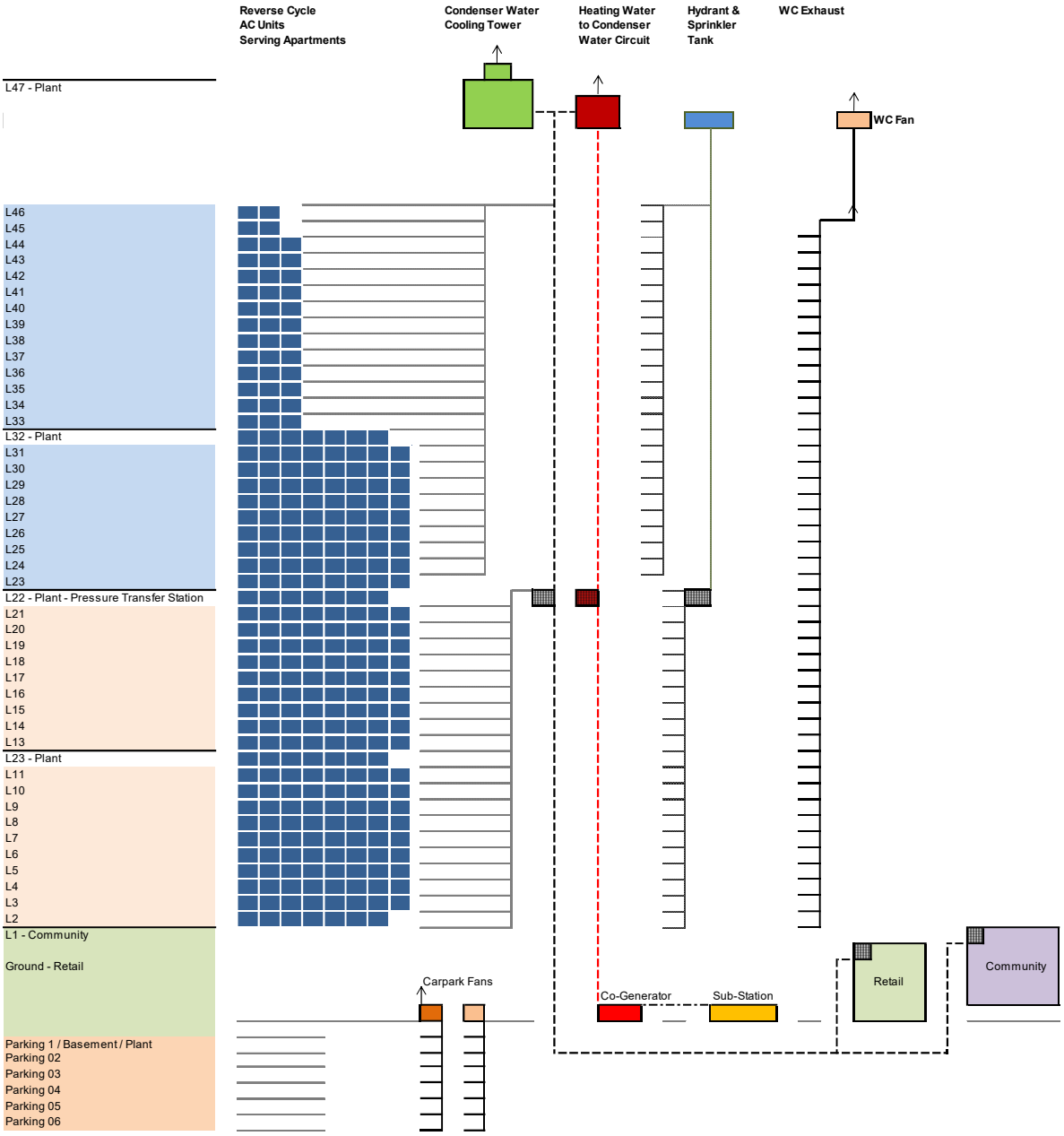
Grey Water system for toilet flush and cooling tower

Essential Services

Fire services are required to serve the building in accordance with the latest BCA, proposed Fire Engineering Report and relevant Australian Standards. These will include:

- A combined hydrant and sprinkler system, in accordance with BCA, AS 2118.6-2012, AS2118.1-1999 and AS 2419.1-2005
- Automatic Detection and Alarm System
- Sound Systems and Intercom Systems for Emergency Purposes (SSISEP)
- Portable Fire Extinguishers
- Fire Hose Reels

173 Walker St – Services Concept Schematic



ENVIRONMENTAL CARPARKING SOLUTIONS

The excavation and construction of below ground carparking for 252 cars will involve significant amounts of energy and landfill. In addition, the lighting and ventilation of the below ground carparking space will contribute to a significant energy cost for occupants, and greenhouse gas emissions. New technology incorporating carparking stacking systems and mobile phone applications provides significant opportunities in reducing embodied energy, operating energy and landfill.

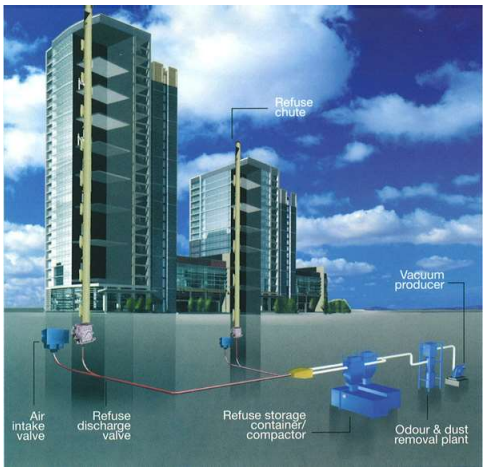
The current basement excavation is estimated to involve the removal of approximately 30,000 m^3 of rock. This could be reduced to 18,000 m^3 of rock excavation through the use of a carpark stacking solution.

Through the use of smart phone software applications, new generation carpark stacking solutions will be able to identify when occupants are approaching the carpark and thereby start positioning their car for exit. Alternatively, occupants will be able to call for their car prior to arriving at the exit point.

With this system, the lifts only need to go to the first level of carpark, and as stacked cars do not operate or need light, energy consumption from carpark lifts, ventilation systems or vast arrays of space lighting will be significantly reduced, thereby saving thousands of kilograms of CO2 per annum.

VACUUM WASTE SYSTEMS

With 284 apartments, there will be a space requirement for 564 waste bins to serve for the collection of general landfill and recyclables. Typically, the space requirement to store these will be in the order of 400 sq.m.



To reduce the requirement for multiple internal storage bins, vacuum waste systems can be installed to take waste from individual apartments and separate it before storing it in large collection bins located in the loading dock before being taken away buy trucks.

These types of systems will be considered to assist in the increase in recycling and minimise the requirement for large plastic Sulo bin usage.

This type of installation can form the nucleus of a precinct wide vacuum waste system similar to the systems being installed in Maroochydore.

SUMMARY

The development will consider a range of sustainable development strategies in addition to those outlined in this section of the proposal. The importance of providing a strong passive design approach has been recognised and adopted as this provides both amenity for residents and low energy operation.

More active measures will be adopted based on the viability of the technology. PV systems are continuously improving in efficiency and reducing in cost, while co-generation systems still provide opportunities to reduce carbon emissions but viability could be subject to future gas price increases.

Carparking solutions have been available for many years, however only recently have become more acceptable with mobile application technology. And vacuum waste systems are becoming more common in precincts overseas where the benefits of precinct systems can be realised.

The systems outlined in this proposal will be considered in detail during the design stages for the purposes of identifying viable sustainable solutions for the proposed 173-179 Walker Street development project.

Kind regards

Lester Partridge
Director
LCI Consultants