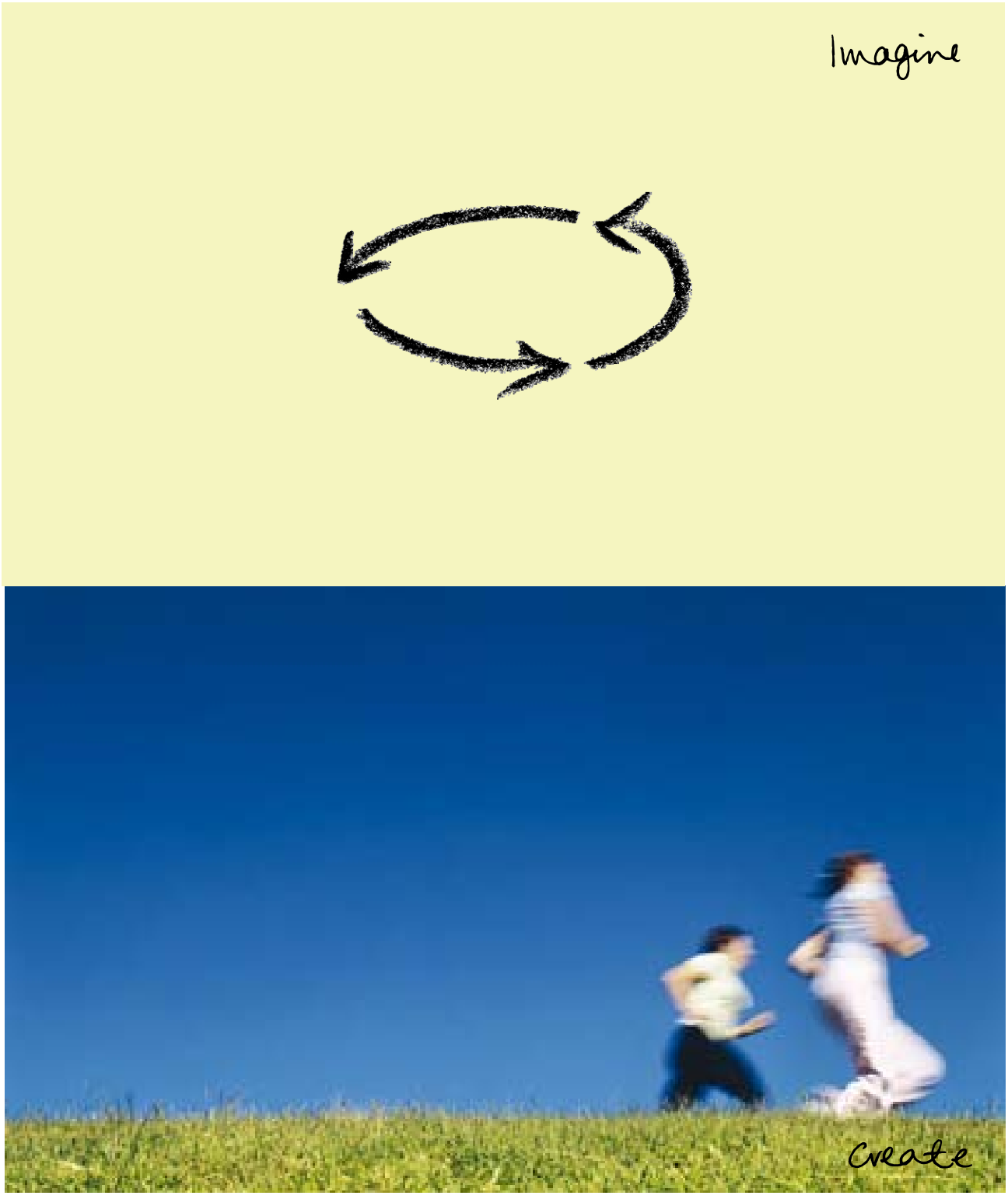
Marrickville Metro
Ecologically Sustainable Development (ESD)

November 2010



DOCUMENT HISTORY

Revision	Date	Prepared By	Checked By	Description
Draft	12/5/10	Matt Williams	Stacey Prowse	First Draft
Final	20/5/10	Matt Williams	AMPCI Urbis	Final issue, inc. client comments.
V3	2/11/10	Matt Williams	Derrick Burrows	Includes responses to comments from the Exhibition Period

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1. EXECUTIVE SUMMARY

This report has been produced by Lend Lease design (LLd) for AMP Capital Investors (AMPCI), owners of Marrickville Metro Shopping Centre. Lend Lease design (LLd) has been engaged by AMPCI to prepare a sustainability report to accompany a Preferred Project Report (PPR) in respect to the Concept Plan Application under Part 3A of the *NSW Environmental Planning and Assessment Act 1979* for the proposed redevelopment of the Marrickville Metro Shopping Centre.

This report has been prepared in response to the letter from the Department of Planning (DOP) dated 14th October 2010 requesting that a Preferred Project Report (PPR) be prepared. The letter requests that the proponent respond to the issues raised by the submissions and for the PPR to identify how the issues raised by the submissions including those of the DOP have been addressed and how the PPR minimises the environmental impacts of the proposal.

Marrickville Metro Shopping Centre is located at 34 Victoria Road, Marrickville. The existing shopping centre fronts Victoria Road to the north, Murray Street to the east and Smidmore Street to the south and is adjoined by single storey residential dwellings to the west. The shopping centre is predominantly a single level retail building and comprises major tenants being Kmart, Woolworths and Aldi as well as a range of speciality stores. Car parking is located at roof top level with existing vehicle ramp access via Smidmore Street and Murray Street. AMPCI proposes to upgrade and expand Marrickville Metro Shopping Centre to accommodate additional retail floor space, improved facilities and services, as well as enhance convenience and accessibility for the community

The existing Marrickville Metro centre was assessed using the newly released NABERS Energy Retail tool scoring a rating of 2 stars, just 10% behind the national average shopping centre level identified within NABERS. From a water consumption perspective the centre currently scores a 1 Star NABERS Water rating which is around 35% lower than the average shopping centre level. For comparison, using consumption figures for the previous year (2008) the centre would have achieved a 1.5 Star NABERS Energy rating and 1 Star NABERS Water rating so real improvements are already being achieved.

In mid 2009 AMPCI undertook an EEO process that identified a wide range of opportunities to reduce energy consumption. The analysis and report by produced by Energetics separated opportunities into those with a less than 4 year payback and those with a greater than 4 year payback. AMPCI are already instigating many of the improvements in the less than 4 year payback category and will use the refurbishment and extension of the centre to justify many of the greater than 4 year payback initiatives.

Construction and demolition waste recycling targets of more than 80% are achievable. Challenging operational waste recycling targets will be established for the centre and continually improved year on year. In particular, a focus on the separation of food waste would be a significant improvement but without a third-party end user willing to take this waste resource and use it for something beneficial there is a risk that this waste could end up in landfill anyway, as has been the case in other shopping centre trials.

The majority of embodied energy in a retail building relates to just 3 or 4 principle building uses which if focussed on exclusively leads to a more achievable outcome. The detailed design development stage will consider the factors for each of the building uses and inform the design process accordingly. This analysis, which often uses a weighted selection matrix, is more qualitative than quantitative with many outcomes being “on balance this product is better than that product”.

AMPCI are committed to a process of continual improvement in the areas of energy, water and waste and will use the recently released NABERS Retail suite of tools to monitor performance of the whole centre moving forward. It is a long term aspiration of AMPCI that the centre will achieve 4 Star NABERS Retail Energy and Water ratings in operation.

Whilst it is not certain that the centre could be eligible for a certified Green Star rating, by applying practical sustainability initiatives to the extension and significantly refurbished components of the existing centre the equivalent of a 4 Star

Green Star Retail Centre v1 (design) non-certified rating could be demonstrated through self-assessment. With a weighted number of credit attributes of at least 45, the GBCA describe this level of rating as “Best Practice”.

This level of performance is considered sufficient to meet clause 9 of the Director General’s requirements set out in Section 75F that state;

“The EA shall detail how the development will incorporate ESD principles in the design, construction and ongoing operational phases of the development. The EA must demonstrate that the development has been assessed against a suitably accredited rating scheme to meet industry best practice”

2. INTRODUCTION

2.1. Site Context

Marrickville Metro Shopping Centre is located at 34 Victoria Road, Marrickville. The existing shopping centre fronts Victoria Road to the north, Murray Street to the east and Smidmore Street to the south and is adjoined by single storey residential dwellings to the west. The shopping centre is predominantly a single level retail building and comprises major tenants being Kmart, Woolworths and Aldi as well as a range of speciality stores. Car parking is located at roof top level with existing vehicle ramp access via Smidmore Street and Murray Street.
The land at 13-55 Edinburgh Road is located to the south of Smidmore Street and is bounded by Edinburgh Road and Murray Street. This site is currently used as a warehouse with associated ground level car parking.
The shopping centre is located within an established residential and industrial precinct surrounded by small lot residential housing to the north and west, and predominantly industrial land comprising larger allotments and larger building scales to the south and east.

Figure 1 – Location plan

AMP Capital Investors (AMPCI) owns Marrickville Metro Shopping Centre and the land to the immediate south at 13-55 Edinburgh Road, Marrickville.

AMPCI proposes to upgrade and expand Marrickville Metro Shopping Centre to accommodate additional retail floor space, improved facilities and services, as well as enhance convenience and accessibility for the community.

The proposal has three key elements:

- An extension of retail floor area at first floor level above the existing shopping centre building with further additional roof top parking above;
- Redevelopment of the existing industrial land south of Smidmore Street (13-55 Edinburgh Road) to create a two level retail addition to the shopping centre with car parking above.
- The retaining of Smidmore Street's operations with active retail frontage improving the public domain

The additional retail floor area will primarily accommodate a discount department store, supermarket, mini major and specialty retail space. The development will incorporate additional car parking as well as improved vehicle access and loading facilities.

The proposal will create a new urban plaza in Smidmore Street and will be complimentary to an enhanced public space fronting Victoria Road. The proposal will include works to the public domain in order to improve the pedestrian, cycle and public transport connections to and from the site and enhance pedestrian and patron safety.

2.2. Construction Staging details

Owing to the scale of the project and the need to undertake the development whilst maintaining a safe and functional retail centre, it is proposed that construction will occur over at least two discrete stages.

Stage 1 will involve the redevelopment of the industrial site at 13-55 Edinburgh Road to accommodate the new two level retail centre including car parking above. This work will also incorporate the refurbishment of the existing shopping centre building fronting the northern side of Smidmore Street.

Stage 2 will involve the first floor level retail extension over the existing shopping centre building with the proposed additional car parking at roof top level and the relocation of the existing Smidmore Street ramp

2.3. Sustainability Experience and Vision

Lend Lease design (LLd) has been engaged by AMPCI to prepare a sustainability report to accompany a Preferred Project Report (PPR) in respect to the Concept Plan Application under Part 3A of the *NSW Environmental Planning and Assessment Act 1979* for the proposed redevelopment of the Marrickville Metro Shopping Centre.

This report has been prepared in response to the letter from the Department of Planning (DOP) dated 14th October 2010 requesting that a Preferred Project Report (PPR) be prepared. The letter requests that the proponent respond to the issues raised by the submissions and for the PPR to identify how the issues raised by the submissions including those of the DOP have been addressed and how the PPR minimises the environmental impacts of the proposal.

LLd is a specialist consultancy within the Lend Lease group that actively supports Bovis Lend Lease in designing and constructing environmentally responsible buildings for our clients. LLd have particular expertise in designing and commissioning shopping centres to minimise their demand on energy and water resources, using materials that have a low environmental impact and embodied energy.

AMPCI operate a wide variety of shopping centres across Australia and New Zealand within their investment portfolio. AMPCI's vision is to be a world best practice manager of retail property assets in Australia and New Zealand and sustainability is a vital part of that vision. In particular, AMPCI have a continual improvement approach to sustainability which focuses on measured operational savings in energy and water.

2.4. Response to Comments from the Exhibition Period

1. *The proposed development does not demonstrate any real commitment to sustainability and to reducing the carbon/ecological footprint of the redeveloped Metro. There is no mention of embodied energy in the EA in terms of the construction and choice of building materials.*

   Lend Lease design consider embodied energy for all of our projects as described in Section 6.5. The carbon analysis we have carried out on retail centres shows that up to 80% of the embodied energy will be in four key areas; concrete and steel structure, facade selection, internal partitioning and floor finishes. Our construction teams have consistently reduced embodied energy by using flyash as cement replacement, steel reinforcement with up to 100% recycled content, lightweight internal blockwork and safe, natural non-slip floor finishes that require minimal ongoing maintenance (no chemicals or energy use). All of this experience will be brought to the detailed design of Marrickville Metro.

2. *The EA makes no reference to innovation in energy generation – for example tri/co-generation or renewable energy. The notion taken in the EA that decentralised or local generation is less efficient is incorrect and demonstrates a lack of knowledge in this area.*

   The application considers the use of onsite renewables and co-generation (also commonly referred to as trigeneration once absorption cooling is added) in Section 6.1. The provision of on-site solar renewables is straightforward and has little ongoing operational implications for the owner but the provision of gas-fired decentralised power is not so straightforward and should be managed by a specialist energy services company (ESCO)). Decentralised cogeneration increases reliance on natural gas (fossil fuel) infrastructure and introduces issues of local air quality for nearby residents. Many experts in the industry recognise cogeneration as a transition technology that can be used to reduce our reliance on fossil fuels but it can only go so far; a truly zero carbon future can only be delivered by renewable energy sources and solutions that take us straight to that scenario, leap frogging any transitional fossil fuel based solutions, are certainly of equal merit to cogeneration.

   Whichever path is taken to reduce energy supply side emissions the first priority should always be to reduce energy demand. AMPCI will be investing in efficient building services that minimise the energy used to light and condition the space while maintaining appropriate air quality and visual and thermal comfort.

3. *Reuse of organic waste does not appear to be a high order objective in the operation of the new centre. There are many options available to the Metro to manage this waste and to avoid it ending up in landfills but these have not been explored*

   Approximately half of all waste in landfill is organic and the decomposition of this waste is a key contributor to methane levels in the atmosphere, a significant greenhouse gas. Separation of organic waste at source is not common but the method used by most proponents is to send the material to a third party off-site where it can be converted to fertiliser and methane for generating power. AMPCI will identify and implement an operational waste strategy that builds and improves on current recycling practice at Marrickville Metro. The strategy will include recycling/recovery targets for each waste stream appropriate to this size of development that will ensure all waste, and in particular organic waste, is recycled wherever feasible.

4. MARRICKVILLE METRO – EXISTING CENTRE

4.1. Current Energy and Water Consumption

Since AMPCI initiated their ESD programme annual energy consumption has reduced by approximately 6.5% and water use has reduced by 20% (which made AMPCI a finalist in the Water Saver category of Marrickville Council's Environment Awards 2009).

The existing centre was assessed using the newly released NABERS Energy Retail tool and achieved a rating of 2 stars, just 10% behind the national average shopping centre level identified within NABERS. From a water consumption perspective the centre currently scores a 1 Star NABERS Water rating which is around 35% lower than the average shopping centre level. For comparison, using consumption figures for the previous year (2008) the centre would have achieved a 1.5 Star NABERS Energy rating and 1 Star NABERS Water rating so real improvements are already being achieved.

Whilst there still may be some way to go in achieving higher ratings, this level of performance is entirely expected in a centre of this age and type and the NABERS Retail tool will undoubtedly become more widely used in benchmarking performance in shopping centres, just as it has for commercial offices. AMPCI have a commitment to ongoing ratings and fully intend to support the rollout of the NABERS Retail tool as more information is released by the Department of Environment, Climate Change and Water (DECCW).

4.2. Energy Efficiency Opportunities (EEO)

In mid 2009 AMPCI undertook an EEO process that identified a wide range of opportunities to reduce energy consumption. The analysis and report by produced by Energetics separated opportunities into those with a less than 4 year payback and those with a greater than 4 year payback.

Some of the opportunities with relatively quick payback include;

- Controls strategies
  - Timers on escalators and lifts
  - Timers on lighting systems including mall and signage
  - Timers on HVAC plant and alternative setpoints.
- Delamping and Replacing globes with lower power items
- Rezoning lighting groups to allow areas of the lighting to be switched off more easily.
- New variable speed drives to selected HVAC pumps

Other opportunities that have a prohibitively long payback for the existing centre could be made more effective through the extension and refurbishment works. These opportunities include

- Upgraded HVAC plant, including the replacement of DX (i.e. refrigerant based) units with centrally located energy efficient water cooled and/or water efficient air cooled chillers.
- A Building Management System (BMS) with combined controls for existing plant, new plant and lighting zones.
- Energy and Water sub-metering and monitoring system, with a remote interface, to identify unusual energy and water use and provide feedback as performance improves.
- Sensors for automated lighting and HVAC control – occupancy movement, daylight levels.

And whilst the EEO focuses primarily on energy efficiency AMPCI have also identified opportunities for water efficiency improvements including;

- Rainwater and condensate harvesting for toilet flushing and cooling towers.
- Restrictor valves to high water using tenancies in addition to the waterless woks already mandated in the fast food tenancies.

Unfortunately, the pay back on these water savings initiatives is long due to the relatively cheap cost of water.

5. MARRICKVILLE METRO – EXTENSION AND REFURBISHMENT

5.1. Energy Efficiency

As previously outlined, energy efficiency is a key focus of AMPCI's operations and by combining strategies from the EEO report with design opportunities for the extension the overall centre will be significantly improved.

For the extension and refurbishment key principles that may be followed in the detailed design stage include;

Principle	Area of Focus	Strategy
Passive design	Orientation of openings/ entries	• Minimise solar gain and glare on shopfronts • Maximise natural light to mall areas • Minimise uncontrolled infiltration of cold air (drafts) and warm winds. • Maximise potential for natural ventilation where appropriate, particularly car parking.
	Building Fabric	• Insulation • High thermal mass to mitigate temperature peaks and troughs • For roofs above conditioned spaces (not car parks), use light coloured roofing materials and/or heat reflective roof surfaces to minimise solar heat gain.
Energy Demand Reduction	Controls and Metering	• A BMS and a Meter Monitoring system to control HVAC and lights and provide feedback on energy and water use.
	HVAC Plant	• Energy Efficient chilled water plant, centralised and including an option for major tenants to take chilled water where appropriate. • Zoned air handling to minimise after hours energy use • Variable speed drives to pumps. • Where water cooled plant is used, cooling towers may be oversized to minimise water use and allow for condenser water offered to major tenants to minimise their DX system energy. • Control strategies to minimise system peaks, including energy storage, night purge/pre-cooling and economy cycle operation.
	Lighting	• Minimise mall lighting loads through alternative lamp selection. • Layered lighting for specific purposes – clear control distinction between circulation lighting and feature lighting. • Small lighting zones to allow better after-hours control • LED lighting to tenancy and emergency exit signage
	Tenant Engagement	• Work with tenants to minimise lighting and small power demands. • Share best practice design strategies for effective control of lights and small power.
Alternative Energy Sources	Onsite renewables	• Investigate the feasibility of providing onsite power generation through renewable systems such as solar photovoltaic panels. These systems may serve multiple purposes including educational demonstration and/or shelter. • Solar hot water systems, with a suitably sized and located storage tank, may be used to provide hot water to amenities and food courts.
	Onsite electrical generation	• Significant onsite generation potential may only be achieved through the use of gas fired generators with waste heat used for cooling, heating and/or domestic hot water; a cogeneration system.
	Offsite offsets	• Producing power onsite may not be the most effective method of reducing greenhouse emissions. Significant investment in renewable power generation is being sought throughout Australia in wind and solar farms

		located where generation potential is greatest. This may prove to be the most cost and energy effective way to reduce Marrickville Metro's (and Australia's) reliance on fossil fuels rather than numerous decentralised generators dotted throughout cities.

5.2. Water Efficiency

As stated in the previous section, whilst water is becoming a more precious commodity until now its relatively low cost has led to long paybacks on water efficiency measures. This is also due in part to the significant cost and disruption of retrofitting bulky items such as rainwater tanks. The extension and refurbishment offers a rare chance to integrate these systems cost-effectively.

Principle	Area of Focus	Strategy
Passive design	Minimising run-off and stormwater volume	• Incorporate bioswales into the edge of the shopping centre to absorb and direct natural overland flows • Use native planting around Smidmore Street and Victoria Road to add interest and educate residents on the pre-development environment of the Cooks River area.
Water Demand Reduction	Controls	• Use the Meter Monitoring System to identify leaks at times of low water use (overnight)
	Efficient Fittings	• All new fittings will be of the highest WELS ratings. o 5 Star basin taps in amenities with automated occupant controls (timers motion sensors) o 4 Star WCs incorporating dual flush control o 6 Star Urinals incorporating smart flush technology (<1L) o 4 Star Showerheads (where fitted)
	HVAC plant	• Operate all cooling towers to achieve at least 6 cycles of concentration. • Investigate alternatives to cooling towers including air cooled plant (for smaller end users) and hybrid evaporative coolers for central plant
	Tenant Engagement	• Work with tenants to minimise water demands. • Share best practice design strategies for effective control of water use – particularly in fresh and fast food tenancies.
Alternative Water Sources	Stormwater management	• Marrickville Metro sits on a major stormwater path with a significant upstream catchment. Subject to water quality issues/constraints this water could be used for sub surface irrigation and toilet flushing.
	Rainwater capture	• A rainwater capture and reuse system will be provided with a Class A quality treatment system for use in toilet flushing, surface washdown, irrigation and cooling tower make up. • Rainwater collected from non-trafficable roof surfaces is suitable for direct use in toilet flushing and cooling towers. • However rainwater collected from the uppermost car parking surfaces will need to be treated to ensure any hydrocarbon pollution is removed.
	Water recycling	• Opportunities to re-use waste water will be investigated but may not be necessary given the availability of stormwater and rainwater. • There may be an opportunity to include a small demonstration water recycling facility in the extension to study which type of system may be most appropriate to a retail setting.

5.3. Tracking Operational Energy and Water Performance

It is a long term aspiration of AMPCI that the centre will achieve 4 Star NABERS Retail Energy and Water ratings in operation. This will not be easily achieved and will require continual improvement under the ESD programme that AMPCI have employed.

5.4. Waste Efficiency

Waste management will be considered in two different ways;

Waste Type	Strategy
Construction and Demolition	• Partner with waste management contractors to maximise volumes of waste separated for recycling and reuse • Bovis Lend Lease, through its partners, regularly achieves a recycling and reuse rate of more than 80%.
Operational	• Set aside sufficient space/area for management of recyclables and general waste • Maximise recycling streams, including at a minimum; o Plastics o Glass o Metals o Cardboard/Paper • Investigate separation of green/food waste from supermarkets and food courts (subject to partnership with user(s) who can benefit from this waste stream)

Challenging operational waste recycling targets will be established for the centre and continually improved year on year. In particular, a focus on the separation of food waste would be a significant improvement but without a third-party end user willing to take this waste resource and use it for something beneficial there is a risk that this waste could end up in landfill anyway, as has been the case in other shopping centre trials.

The NABERS scheme for commercial offices includes a waste management rating and it is possible that this will be extended to Retail developments too. If that occurs, AMPCI will consider applying this to their shopping centre portfolio as a way of benchmarking waste management performance.

5.5. Materials and Embodied Energy

The construction of any development "locks" carbon into the structure and fabric of the building that can be equivalent to many years of operational energy use. Lend Lease design have specialist expertise in minimising this embodied energy (and water) through careful design and material selection. The majority of embodied energy in a retail building relates to just 3 or 4 principle building uses which if focussed on exclusively leads to a more achievable outcome.

Factor	Building Use
Design Life	
Number of component parts *(design for disassembly)*	
Ease of construction *(prefabrication)*	Structure (columns and/or slabs)
Location of manufacture *(transport energy)*	Facade Systems
Post -consumer recycled content	Internal Partitioning
Ongoing maintenance requirements – cleaning, refinishing	Flooring
Third Party certification *(Good Environmental Choice Australia, Forestry Stewardship Council)*	

The detailed design development stage will consider the factors for each of the building uses and inform the design process accordingly. This analysis, which often uses a weighted selection matrix, is more qualitative than quantitative with many outcomes being "on balance this product is better than that product". LLd can use Simapro life cycle analysis (LCA) software to quantify savings but the analysis is still somewhat subjective with the choice of assessment boundaries impacting heavily on the final result. This space is still rapidly developing and it is possible in the future that rating systems may be developed to more easily and consistently rate different products.

6. ACCREDITED RATING SCHEMES FOR SUSTAINABLE DESIGN

As previously mentioned AMPCI is committed to using operational energy and water rating schemes such as NABERS to monitor performance of its shopping centres. However, this is a long term aspiration and given the age of the centre and the very recent emergence of such tools into the market it is difficult to commit to achieving a performance rating at the design stage. Principles of good design consistent with improving both the energy and water consumption of the centre will be used throughout in order to ensure that the development can track towards targeting these ratings.

AMPCI is also supportive of the Green Star suite of design tools developed by the Green Building Council of Australia and designs its new centres using the principles of the Green Star Retail Centre Tool.

6.1. Green Star Retail Centre Tool

Version 1 of the Green Star Retail Centre tool was released in August 2008 but has not been rapidly picked up by the industry with only 4 unique centres certified in either Pilot or V1 tools. It appears that the biggest issue with the tool is the application to an existing shopping centre; it is designed primarily for new-build, retail-only centres which are rare. This means that Marrickville Metro, with a significant unmodified existing component, may not be eligible for a certified rating without some negotiation with the GBCA.

Eligibility issues aside, when applying the principles of the Green Star Retail Centre tool to the centre, Marrickville Metro may be considered under self-assessment to be at a level equivalent to a 4 Star non-certified rating when considering the extension and significantly refurbished components of the existing centre. Sections 5.1.1 to 5.1.8 describe how the credits and principles in Green Star may be targeted or applied to demonstrate this rating.

6.1.1. Management

- Commissioning focus, including a post completion tuning period, delivers systems as per design intent.
- Environmental management and waste recycling minimises construction impact
- BMS systems and operational waste recycling plans improve ongoing centre management

6.1.2. Indoor Environmental Quality

- CO2 monitoring to vary outdoor air levels can be incorporated in any new HVAC system. Detailed design analysis of the air conditioning systems can identify whether additional outdoor air can be introduced without a significant energy penalty.
- Daylight to mall areas will be maximised where possible without incurring significant solar gain
- Where asbestos and other hazardous materials are found in the existing centre they will be dealt with appropriately.
- Finishes with low levels of Volatile Organic Compounds (VOCs) and Formaldehyde such as paints, sealants and floor finishes can be readily provided.
- Thermal comfort and internal noise are design issues that will be addressed at detailed design stage.

6.1.3. Energy

- A combination of air cooled and water cooled chillers with some existing DX equipment is proposed for the extension and refurbishment of the existing centre. Detailed energy analysis employed during design development will identify which systems are most appropriate but the energy calculation methodology within Green Star is not necessarily sophisticated enough to differentiate between fully air-conditioned specialties and major tenants that may only be supplied with chilled water or heat rejection. This means the predicted energy consumption for Green Star purposes may be slightly different to the real predicted energy consumption for the centre.
- Additional energy points can be achieved by employing a photovoltaic solar panel array to supplement energy demand (subject to aesthetic constraints).

- Sub metering is straight forward to employ using a monitoring system to make collection and manipulation of data far easier than manual reading.
- Car Park Ventilation will be minimised by creating exposed, naturally ventilated car park decks, significantly reducing site energy demand (though not considered directly in the Green Star energy calculator).

6.1.4. Transport

- Reductions in the number of car spaces provided when compared to the local council's allowances are rewarded. AMPCI are cognisant of the reduced need for parking given the proximity to public transport and medium density housing within walking and cycling distance.
- Small car space provision will be investigated with the option to provide small car spaces on the upper parking decks where structural column spacing is not a constraining factor.
- Cyclist facilities will be provided in line with realistic expected patronage, and documented in a Cyclist Management Plan that describes expansion opportunities should demand/patronage increase. Shopper cycle facilities provided at major entry points will ensure natural passive surveillance for security. Staff cyclist facilities will also be provided with special consideration given to the security of staff changing rooms given the wide variety of tenants and the perceived lack of personal space/ownership.
- For public transport the nearest two train stations are both just under 1km away and therefore not rewarded highly in Green Star. Based on frequent buses directly outside the centre a reasonable number of points may be achieved, with additional points if suitably dense residential developments are within 250m of the centre based on an assumption of good pedestrian access/utilisation.

6.1.5. Water

- Water efficient outcomes can be delivered by using highly efficient fittings (including 6 star low flush urinals) and collecting rainwater from roof areas. No significant water recycling system is initially proposed but the roof area and tank volumes can be maximised to meet toilet flushing irrigation requirements. Rainwater provided as makeup to cooling towers would be beneficial subject to water quality issues and sufficient tank sizing.
- Water metering, as with energy metering, is recommended. Leak detection functionality will save water.
- Landscape irrigation will be minimised through careful plant selection and using rainwater or stormwater.
- Points can be achieved under the cooling tower credit for the use of air cooled plant whereas water cooled plant can jeopardise this credit but a good outcome could be achieved through the use of hybrid evaporative cooling towers with rainwater top up, subject to water quality issues.
- Water from mandatory fire testing of pumps can be easily diverted to rainwater tank system for reuse. Sprinklers do not need to be connected because of concerns with water quality (stagnant water).

6.1.6. Materials

- Recycling waste storage will be provided in the loading dock as a combined facility with sufficient waste streams to maximise recycling rates.
- Refurbishment of the existing centre offers good opportunities to reuse facade and structure, minimising embodied energy.
- Concrete and steel can be easily specified to incorporate post-consumer recycled material.
- PVC products will be minimised in pipework and cabling because of their poor recyclability and manufacturing methods, subject to being able to absorb the higher costs of alternatives.
- Sustainably sourced timber will be used wherever practical from a cost and functional perspective. This includes timber from an FSC certified plantation.
- The design of the building will incorporate methods that encourage prefabrication, design for disassembly and dematerialisation. Where appropriate "simple" materials shall be used so that they can easily be reused or recycled at a later date.

6.1.7. Land Use and Ecology

- Although Council confirmation would be required it is reasonable to assume that none of the site is considered of high ecological value from a Green Star perspective
- Topsoil is not of significant value and is unlikely to be negatively impacted by site works.
- Some remediation of the site may be required if contamination is present. The decision to remediate and how that is carried out will be based on statutory requirements and industry guidelines.
- Ecological value of the site will certainly not be degraded during the refurbishment and extension, by maintaining a similar built area from pre to post development. In fact, bioswales and vegetated areas in the pedestrian precincts will improve the ecological value of the site and provide some habitat corridors for native fauna.

6.1.8. Emissions

- All new refrigerants and insulation will be environmentally friendly and have no Ozone Depleting Potential.
- Where water cooled plant is located in relatively air tight plantrooms, leak detection will be provided with refrigerant pump down where appropriate.
- Watercourse pollution will be reduced by handling stormwater effectively (up to 1:2 year storm event) and treating for contaminants (up to 1:20 year storm event). Subject to safety and aesthetic design limitations (within the public precinct) the stormwater treatment train may even be part of an educational/community feature that reinforces the natural qualities of the Cooks River foreshore.
- The reduction in sewer discharge is related to the water efficient fittings and any small scale water recycling demonstration facilities that may be provided.
- Lighting will be designed to minimise spill over the boundaries and therefore limit light pollution to neighbours.
- Air cooled plant will minimise risk of Legionella but a regular and thorough maintenance regime can also eliminate this for water cooled plant.

7. CONCLUSIONS

AMPCI are committed to a process of continual improvement in the areas of energy, water and waste and will use the recently released NABERS Retail suite of tools to monitor performance of the whole centre moving forward.

For the purposes of the detailed design development stage, by applying practical sustainability initiatives to the extension and significantly refurbished components of the existing centre the equivalent of a 4 Star Green Star Retail Centre v1 (design) non-certified rating could be demonstrated through self-assessment. With a weighted number of credit attributes of at least 45, the GBCA describe this level of rating as “Best Practice”.

This level of performance is considered sufficient to meet clause 9 of the Director General’s requirements set out in Section 75F that state;

> “The EA shall detail how the development will incorporate ESD principles in the design, construction and ongoing operational phases of the development. The EA must demonstrate that the development has been assessed against a suitably accredited rating scheme to meet industry best practice”