This report takes into account the particular instructions and requirements of our client. It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.
## Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1  Background</td>
<td>1</td>
</tr>
<tr>
<td>2  Objectives and Methodology</td>
<td>2</td>
</tr>
<tr>
<td>2.1 Objectives</td>
<td>2</td>
</tr>
<tr>
<td>2.2 Project Methodology</td>
<td>2</td>
</tr>
<tr>
<td>3  ESD Workshops – Internal and Client</td>
<td>3</td>
</tr>
<tr>
<td>3.1 Arup Internal Project Team Workshop</td>
<td>3</td>
</tr>
<tr>
<td>3.2 Client Workshop</td>
<td>3</td>
</tr>
<tr>
<td>3.3 Sustainability Drivers and Priorities</td>
<td>5</td>
</tr>
<tr>
<td>4  ESD Solutions</td>
<td>8</td>
</tr>
<tr>
<td>4.1 Energy</td>
<td>8</td>
</tr>
<tr>
<td>4.2 Water</td>
<td>13</td>
</tr>
<tr>
<td>4.3 Transport</td>
<td>16</td>
</tr>
<tr>
<td>4.4 Waste</td>
<td>21</td>
</tr>
<tr>
<td>5  Environmental Sustainability ‘Theme’</td>
<td>25</td>
</tr>
<tr>
<td>5.1 Energy</td>
<td>25</td>
</tr>
<tr>
<td>5.2 Water</td>
<td>25</td>
</tr>
<tr>
<td>5.3 Transport</td>
<td>26</td>
</tr>
<tr>
<td>5.4 Waste</td>
<td>26</td>
</tr>
<tr>
<td>6  Environmental Rating Tools</td>
<td>27</td>
</tr>
<tr>
<td>6.1 Green Star Communities</td>
<td>28</td>
</tr>
<tr>
<td>6.2 Green Star Multi-Unit Residential</td>
<td>29</td>
</tr>
<tr>
<td>6.3 VicUrban Sustainable Community Rating – Master Planned</td>
<td>31</td>
</tr>
<tr>
<td>7  ESD Initiatives</td>
<td>32</td>
</tr>
</tbody>
</table>

### Appendices

**Appendix A**
- Workshop Outputs

**Appendix B**
- Sustainability Solution Assessment Summaries
1 Background

Charter Keck Cramer is currently engaged by the Moonee Valley Racing Club (MVRC) to coordinate the preparation of a strategy and master plan for the development of the Moonee Valley Racecourse.

At present, this involves concluding an approach that satisfies the financial requirements of the MVRC and is acceptable to both the Moonee Valley City Council (MVCC) and community as a guide to future development as part of the Activity Centre Zone.

Within this context Arup was engaged to complete an ESD (or Sustainability) Report the purpose of which is two-fold:

- To inform MVRC of future potential sustainability-related options for the racecourse, and
- To support the incorporation of ESD considerations into the master plan to address Council and community interests.

Report Outcomes Summary

The Moonee Valley Racecourse ESD Opportunities Report is a high level study into potential sustainability solutions for the racecourse precinct which the project team may consider for inclusion in the Moonee Valley Racecourse master plan.

As the master plan is at an early stage, it is recognized that the feasibility of the potential solutions will require further analysis prior to being incorporated into later iterations or ultimate implementation.

Fourteen distinct sustainability solutions have been identified across the four themes of energy, water, transport and waste as having the potential to be further considered on technical, commercial/financial and environmental/social grounds.
2 Objectives and Methodology

2.1 Objectives

The broad project objectives were to:

- Develop an understanding of the sustainability opportunities associated with the MVRC site that may be further considered in the context of the emerging master plan (and potentially in later project stages).
- To develop a series of „themes” for the focus areas of energy, water, transport and waste to guide sustainability considerations through various iterations of the master plan process.
- To identify a series of ESD Rating Tools which may be applied to the master plan at later project stages, and
- To identify a series of ESD initiative examples in similar master plan projects.

2.2 Project Methodology

As per the project brief, Arup undertook the project utilising a simple approach and methodology, broadly consisting of two parts:

Part 1 - ESD Opportunities

A process to identify and explore the ESD opportunities for the site, through two workshops:

1. An Arup project team workshop to commence the identification of the ESD opportunities across the themes of energy, water, transport and waste.
2. A client sustainability workshop (facilitated by the Arup project team) to further identify and explore ESD initiatives for the precinct.

Part 2 – Environmental Sustainability ‘Themes’

A process whereby the Arup project team collated the opportunities and initiatives explored in the internal and external workshops to develop broad sustainability „themes” for the master plan.
3 ESD Workshops – Internal and Client

3.1 Arup Internal Project Team Workshop

As indicated in Section 2, prior to a workshop with the MVRC client, Council and other stakeholders, the Arup technical specialists held a 2 hour internal workshop to discuss the racecourse context and inform the identification of ESD opportunities across the themes of energy, water, transport and waste.

Each solution was discussed and assessed utilising a basic rating system across criteria – 0 being a low score, and 3 being a high score.

The results of the discussion are in the tables in Appendix B.

The discussion allowed the project team to approach the subsequent client workshop with a more developed idea of the potential solutions to which the participants may respond.

3.2 Client Workshop

On 24 November 2010, Arup facilitated a 2 hour ESD workshop hosted at the Moonee Valley Racecourse.

The purpose of the workshop was:

- To gain a collective understanding of the sustainability drivers of key individuals from MVRC, Council and the master plan team.
- To gain an understanding of the collective sustainability priorities of the same set of stakeholders across the themes of energy, water, transport and waste, and
- To undertake a high-level discussion of the opportunities, constraints, benefits and risks associated with potential ESD solutions for the site.

The more “qualitative” objective of the workshop was for the various design, Council and client stakeholders to commence the sharing of sustainability opinions and ideas for the site.

The workshop participants are detailed in the table below.
### Table 1 Client Workshop Participants – 24 November 2010

<table>
<thead>
<tr>
<th>Name</th>
<th>Organisation</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Michael Browell (MB)</td>
<td>Moonee Valley Racing Club</td>
<td>CEO</td>
</tr>
<tr>
<td>David Kobritz (DK)</td>
<td>Moonee Valley Racing Club</td>
<td>MVRC Committee</td>
</tr>
<tr>
<td>Brian Masters (BM)</td>
<td>Moonee Valley Racing Club</td>
<td>Manager Operations</td>
</tr>
<tr>
<td>Harry Fricke (HF)</td>
<td>Moonee Valley City Council</td>
<td>Senior Sustainability Officer - Environment and Lifestyle</td>
</tr>
<tr>
<td>Lisa Dunlop (LD)</td>
<td>Moonee Valley City Council</td>
<td>Coordinator Strategic Planning</td>
</tr>
<tr>
<td>Simon Gilbertson (SG)</td>
<td>Tract Consultants</td>
<td>Planning</td>
</tr>
<tr>
<td>Orlando Harrison (OH)</td>
<td>Tract Consultants</td>
<td>Urban Design and Landscape</td>
</tr>
<tr>
<td>Chris Harty (CH)</td>
<td>Plus Architecture</td>
<td>Site Master Planning and Architectural Design, Residential and Mixed Use</td>
</tr>
<tr>
<td>Shane Dalton (SDL)</td>
<td>DCE</td>
<td>Track Design</td>
</tr>
<tr>
<td>Simon Davies (SDV)</td>
<td>GTA</td>
<td>Traffic and Transport</td>
</tr>
<tr>
<td>Rob Panozzo (RP)</td>
<td>ASR Research</td>
<td>Community Infrastructure Assessment</td>
</tr>
</tbody>
</table>

### Arup Participants

<table>
<thead>
<tr>
<th>Name</th>
<th>Organisation</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>James Selth</td>
<td>Arup</td>
<td>Workshop Leader, Energy</td>
</tr>
<tr>
<td>Aaron Yuen</td>
<td>Arup</td>
<td>Energy</td>
</tr>
<tr>
<td>Jason Trenchfield</td>
<td>Arup</td>
<td>Waste</td>
</tr>
<tr>
<td>Hywel Rowlands</td>
<td>Arup</td>
<td>Transport</td>
</tr>
<tr>
<td>Michael O’Neill</td>
<td>Arup</td>
<td>Water</td>
</tr>
</tbody>
</table>
3.3 Sustainability Drivers and Priorities

As indicated above, through a process of discussion and recording, the project stakeholders were encouraged to detail their personal sustainability drivers and priorities for the master plan. This process was undertaken in 4 groups (3-4 participants each) and facilitated by the Arup technical specialists utilising the Arup Sustainability Mapping Tool to capture information.

Figure 1 Arup Sustainability Mapping Tool

During a free-ranging discussion, a number of sustainability drivers and priorities were identified across the 4 sustainability focus areas as detailed in the table below.

Although not a definitive list, the exercise enabled the stakeholder participants to elicit their thoughts regarding sustainability solutions as a precursor to the next stage of discussion.
## Sustainability Drivers

Table 2 MVRC Drivers and Priorities Summary Table

<table>
<thead>
<tr>
<th>Water</th>
<th>Energy</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Stormwater – runoff &amp; harvesting</td>
<td>• Utilised as a marketing tool</td>
</tr>
<tr>
<td>• Water utilised for aesthetics</td>
<td>• Public / Track lighting (dimmers) / Solar</td>
</tr>
<tr>
<td>• Sewer mining</td>
<td>• Identification of energy-related cost savings</td>
</tr>
<tr>
<td>• Racetrack irrigation</td>
<td>• Emission reductions</td>
</tr>
<tr>
<td>• Rainwater collection and use</td>
<td>• Low-emission energy generation - cogeneration / tri-generation</td>
</tr>
<tr>
<td>• Links with the residential development</td>
<td>• Renewable energy generation – solar, wind</td>
</tr>
<tr>
<td>• Quality water export to waterways</td>
<td>• Passive design - solar-ready orientation, reflective paint, glazing</td>
</tr>
<tr>
<td>• Rainwater harvesting from car parks</td>
<td>• Understand peak energy demand</td>
</tr>
<tr>
<td>• Water storage protection</td>
<td>• Use the existing on-site substation</td>
</tr>
<tr>
<td>• Potential downstream water trading</td>
<td>• MVRC as a self-contained energy district</td>
</tr>
<tr>
<td>• Minimisation of contamination</td>
<td>• MVRC as an owner and retailer of energy</td>
</tr>
<tr>
<td>• Efficient water fixtures</td>
<td>• PV and solar-hot water installations</td>
</tr>
<tr>
<td>• Links to laundry facilities</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Transport</strong></td>
<td><strong>Waste</strong></td>
</tr>
<tr>
<td>• Geography / topography</td>
<td>• Waste infrastructure space constraints</td>
</tr>
<tr>
<td>• Way-finding through the site</td>
<td>• „Peak” waste event considerations e.g. race days and functions</td>
</tr>
<tr>
<td>• Population changes / densities</td>
<td>• Waste logistics - private &amp; public</td>
</tr>
<tr>
<td>• Integrated links to nearby tram lines</td>
<td>• Recycling</td>
</tr>
<tr>
<td>• Potential demonstration projects e.g. tram stop no. 59</td>
<td>• On-site composting</td>
</tr>
<tr>
<td>• Understand congestion impacts of the new development</td>
<td>• Waste disposal and management automation</td>
</tr>
<tr>
<td>• Pedestrian and cycling permeability</td>
<td>• Anaerobic digestion as part of the precinct energy solution</td>
</tr>
<tr>
<td>• Public bicycle networks through the site</td>
<td>• Interface of commercial &amp; residential waste</td>
</tr>
<tr>
<td>• Balanced bicycle and car parking</td>
<td>• Contamination prevention</td>
</tr>
<tr>
<td>• Relationship with CityLink</td>
<td>• Water catchment quality maintenance</td>
</tr>
<tr>
<td>• Commercial benefits of car parking for MVRC</td>
<td>• Links with MVRC kitchen facilities</td>
</tr>
<tr>
<td>• Transport impacts of enhanced events / functions</td>
<td>• Waste as an input into community gardening options</td>
</tr>
<tr>
<td>• Electric vehicles – require infrastructure</td>
<td></td>
</tr>
<tr>
<td>• Share cars and bicycle hire</td>
<td></td>
</tr>
<tr>
<td>• Race day shuttle buses to station</td>
<td></td>
</tr>
<tr>
<td>• Park and ride facilities</td>
<td></td>
</tr>
</tbody>
</table>
Sustainability Priorities

At the conclusion of the exercise, the 12 (non-Arup) participants were asked to indicate their personal sustainability priorities. Each participant allocated three „votes” across the four themes - waste, water, energy and transport – in any fashion or weighting they wished.

The results (including participant initials for each vote) are presented in Table 3.

Table 3 Prioritisation of Sustainability Issues

<table>
<thead>
<tr>
<th>Water 20%</th>
<th>Energy 33%</th>
</tr>
</thead>
<tbody>
<tr>
<td>BM</td>
<td>SDV</td>
</tr>
<tr>
<td>BM</td>
<td>SDL</td>
</tr>
<tr>
<td>DK</td>
<td>OH</td>
</tr>
<tr>
<td>CW</td>
<td>OH</td>
</tr>
<tr>
<td>MB</td>
<td>CH</td>
</tr>
<tr>
<td>RP</td>
<td>LD</td>
</tr>
<tr>
<td>SDL</td>
<td>HF</td>
</tr>
<tr>
<td></td>
<td>CW</td>
</tr>
<tr>
<td></td>
<td>SG</td>
</tr>
<tr>
<td></td>
<td>MB</td>
</tr>
<tr>
<td></td>
<td>BM</td>
</tr>
<tr>
<td></td>
<td>RP</td>
</tr>
</tbody>
</table>

The spread of votes clearly indicates that:

- The participants collectively believe that **issues of Transport and Energy are a relatively high priority** for the master plan process, and
- Issues of **Waste** are a relatively low priority.

Particular points to note are:

- 2 of the 3 votes for Waste to be treated as a priority were from the Council attendees. This potentially indicates a more general waste-oriented approach from the MVCC which the MVRC may have to address more comprehensively at a later date.
- Conversely, the MVRC representatives did not view issues of Waste as a priority (no votes), but viewed issues of Water as the most important sustainability issue for the master plan, and
- The master plan consultant team was particularly focused on issues of Transport. Waste was a relatively low priority amongst the master plan consultant team.
4 ESD Solutions

Following the drivers and priorities exercise, the participants were allocated across four tables where a topic-specific discussion was facilitated by an Arup technical specialist for each of the four sustainability focus areas.

The discussion was specifically structured around the consideration of opportunities, constraints, benefits and risks.

The process allowed the Arup specialists to gain a clearer understanding of the potential sustainability solutions which are suitable for the precinct; sharpening the focus from a full set of energy, water, transport and waste options identified in initial discussions (as per Appendix B), to a sub-set of potential solutions as outlined in more detail below.

The following four sections provide high level information on potentially feasible solutions which may be considered in the master plan process; describing the solution and then (where possible) discussing the technical, commercial/financial and environmental/social aspects.

Finally, a basic set of Next Steps are provided for the master plan team to consider.

4.1 Energy

During the initial process of considering energy solutions for the site, the Arup project team considered a series of potential options including:

- Cogeneration / tri-generation
- Solar PV
- Solar hot water
- Wind, and
- Passive design.

Details of the initial assessment are provided in Appendix B1.

After the subsequent client workshop, it was decided to focus the analysis further on the solutions detailed in the boxes below.
**Cogeneration / Tri-generation**

**Description**

Cogeneration, also known as Combined Heat and Power (CHP), is the simultaneous production of electricity and heating generally through the use of steam and hot water. Generally, the fuel used is natural gas, and the system comprises of a generator and heat and electrical connections.

Tri-generation is a system which also includes the production of cooling by adding an absorption chiller.

Cogeneration and tri-generation can be installed within a large building like the racing club grandstand, or multiple cogeneration and tri-generation systems may also be installed to provide a precinct-wide energy supply solution. District heating and cooling networks are implemented to reticulate heating and cooling throughout precinct.

**Technical**

Generally for cogeneration and tri-generation, a flat load profile (constant energy-use throughout the day) will allow the system to run more efficiently. It is widely accepted that for a system to be feasible, the system should be designed to operate at maximum load during peak hours (7am to 11pm) for every weekday, equivalent to 4,000 hours per year. For tri-generation specifically, the system is particularly efficient when thermal demand in winter is accompanied by cooling demand in summer as in Victoria.

For MVRC, the constant use of the grandstand and racing club facilities, integrated with a potential mixed use (residential and commercial) development, indicates the strong potential for a cogeneration or tri-generation energy solution.

**Commercial / Financial**

The initial capital cost to implement a cogeneration or tri-generation system is significant requiring additional precinct infrastructure such as district heating and cooling network pipes and service galleries in addition to the actual unit. Despite this cost it should be noted that cogeneration or tri-generation can be installed in stages; a potentially suitable approach to suit the staged build-out profile at the MVRC.

A cogeneration or tri-generation plant will also need to be serviced and maintained thereby incurring ongoing operating costs.

Such a system will take considerable time and resources to build, own and operate and therefore an opportunity exists for the MVRC or another third party entity to manage such a system and earn an income stream.

There is also the potential that those residents and businesses within the newly master planned precinct will be able to enjoy lower energy prices.

**Environmental / Social**

As a cogeneration or tri-generation system utilises gas as its primary fuel, the associated greenhouse gas emissions are much lower than traditional grid electricity which utilises brown coal. In addition, such a system is more efficient due to the reuse of waste heat.

Making such a low emission energy generation option one of the key points of the emerging master plan, provides qualitative outcomes for the community who reside and work within a „green energy” precinct.

**Next Steps**
The master plan may include allowances for the space and infrastructure associated with such a system.

If such an energy solution is to be considered after the master plan process, the MVRC may consider:

- The development of a detailed energy profile associated with the planned future development including the grandstand, residences, and businesses including the potential for export.
- A business case which assesses elements such as CAPEX, OPEX, potential ownership models, cash flows, carbon prices, utility prices and financial measures such as payback periods and RoI.

**Solar Photovoltaics / Solar Hot Water**

**Description**

Solar photovoltaics (PV) and solar hot water are panel systems that convert solar energy into usable electricity and heat, respectively.

Solar PV cells are usually made of crystalline or amorphous (thin film) and can be mounted onto buildings as arrays. Opportunities exist for PV panels to be mounted to the roofs of residential housing or facilities such as the grandstand.

Solar hot water systems use evacuated solar tubes or flat plate solar panels and are generally installed with a gas or electric booster. By pre-heating domestic hot water before reaching the gas or electric booster, on-going energy savings may be realised.

**Technical**

Solar PV is a commonly used and proven technology; however, the technology must be optimised for the specific site and conditions. For example, electricity generation capability depends on orientation, where the optimal operation is when the array faces north, tilted at an angle equal to the site latitude minus 10 degrees (37.5° - 10° for Melbourne), with good access to sunlight. Similar principles apply for solar hot water systems.

It should be noted that solar PV and solar hot water systems will only reduce the need for grid energy supply and not provide the full energy supply required for the site. Additionally, solar hot water systems may soon become a legislative requirement for any new residential buildings.

Solar PV may be particularly suitable for the grandstand or racing club facilities; taking advantage of the available space and orientation as determined through the master plan process.

**Commercial / Financial**

Generally, capital costs are comparatively high for solar PV panels and solar hot water units however, government rebates can lower this initial cost.

There are opportunities for solar PV to connect to the national grid. Under a feed-in tariff, commercial returns can be made in the form of energy cost savings as grid electricity prices continue to become relatively more expensive, or renewable energy certificates. MVRC can also charge a premium to properties for this benefit.
For the home owner, commercial returns are made in the form of energy savings. Energy can be generated in relatively large volumes leading to short payback periods.

**Environmental / Social**

Solar PV and solar hot water systems are a source of renewable energy and emissions from their operation are effectively zero. However, it should be noted that the embodied energy of solar PV is high due to manufacturing process which utilises silicon material, fossil fuels used for extraction, and lead based batteries for energy storage.

Both systems are a visible sign of sustainability; readily identifiable to the public and supporting the „green” credentials of the precinct.

**Next Steps**

Similar to the next steps for cogeneration and/or tri-generation, the master plan may include allowances for Solar PV and solar hot water systems.

If such an energy solution is to be considered after the master plan process, the MVRC may consider:

- The development of a detailed energy profile associated with the planned future development including the grandstand, residences, and businesses including the potential for export.
- A business case which assesses elements such as CAPEX, OPEX, cash flows, carbon prices, utility prices and financial measures such as payback periods and RoI.

**Passive Solar Design**

**Description**

The consideration of passive solar design associated with the built form during the master plan stage will allow the project team and/or developer to maximise energy efficiency, reduce energy demand (and associated operating costs) and maintain thermal comfort.

**Technical**

Passive design may be in the form of solar orientation, shading, passive heating and cooling, and some building retrofits. Building orientation and design can increase passive ventilation and manage appropriate internal light levels, both which reduce energy consumption associated with air conditioning demand and artificial lights.

**Commercial / Financial**

To take advantage of passive design opportunities on the site, investment has to be made to fully consider building design and infrastructure to maximise energy efficiency, solar heat gains and/or ventilation. Ongoing investment is minimal.

Potential financial returns come from reduced energy costs and the marketing value of the „green” credentials of the precinct.

**Environmental / Social**

Passive design reduces energy demand and therefore has fewer associated greenhouse gas emissions.
Passive design can be a ready indicator of the site’s commitment to sustainability although such is the subtlety of such measures, the general public may not be aware of specific passive design initiatives.

**Next Steps**

There is the opportunity for the project team to achieve considerable energy efficiency benefits during the master plan process by considering passive solar design through the orientation of buildings and roofs to maximise solar access and natural ventilation.

The project team may consider undertaking a solar modelling exercise in parallel with the various master plan options to inform the final design.
## 4.2 Water

During the process of considering water solutions for the site, the Arup team considered a series of potential options including:

- Expansion of existing stormwater harvesting scheme including the provision of third pipe supply to new and redeveloped facilities.
- Mandating of water efficient fixtures, fitting and appliance to a minimum of 6 star water efficiency.
- Rainwater tanks for laundry use, and
- Sewer mining from Melbourne water asset in Tullamarine freeway reserve.

Details of the initial assessment are provided in Appendix B2.

After the subsequent client workshop, it was decided to focus the analysis further on the solutions detailed in the boxes below.

### Expansion of Existing Stormwater Harvesting

**Description**

The realignment of the track requires the relocation of at least part of the existing storage dam on-site. Additionally, the construction and redevelopment of new residential, commercial and grand stand facilities provides significant opportunity to provide an alternative water source for a variety of uses via a dedicated third pipe.

Such uses may potentially include:

- Expansion of the storage volume to improve yield and reliability.
- Augmentation of supply through redirection of existing stormwater harvesting assets.
- Construction of multiple storages capable of providing passive treatment and preventing contamination of stored water.
- Incorporation of native plantings for amenity and biodiversity purposes.
- Incorporation of the water storage/s into the fabric of the racecourse for aesthetic purposes.
- Supporting downstream water quality improvements for Moonee Ponds Creek.
- Significant reduction in the site’s dependence on potable water.
- Cost savings by off-setting potable water costs.
- Gifting of additional water to nearby community facilities such as school ovals and parks.

**Technical**

This option highly feasible. As the dam needs to be relocated during the track realignment, a more substantial dam may be constructed during earth works (subject to ground conditions).

Depending on the location of other stormwater assets there is the potential to direct stormwater to the dam to increase yield, treatment and reliability. Unused overflow may
potentially be treated to improve outcomes for Moonee Ponds Creek.

The installation of third pipe infrastructure in new and redeveloped facilities is best undertaken during construction. Water from the scheme is Class B and it appears that additional treatment of the water yield could be undertaken to ensure Class A water is provided for wash down and toilet flushing.

**Commercial / Financial**

The cost of water from the current system is estimated at $0.42 a kilolitre compared to approximately $1.10 a kilolitre for potable water making any expansion of the storm water harvesting options commercially attractive due to the offset of potable water costs.

**Environmental / Social**

Social and environmental benefits include:

- Reduced potable water usage.
- Drought proofing community facilities associated with the precinct.
- More affordable water options for resident and community groups.
- Improved amenity.
- Improved water quality outcomes for Moonee Ponds Creek.

**Next Steps**

To further consider the expansion of the storm water harvesting possibilities for the site, it is recommended that the water demand and supply system for the site be remodelled to observe the potential to increase storage in balance with increased site demands. This may be done with strong reference to the previous and current work by MVRC in this area.

Regarding demand, this process may include water demand associated with toilet flushing, wash down, cooling towers, and the irrigation demands associated with the new track layout and landscaping. External site demands may also be considered.

Regarding supply, this may include the development of stormwater asset maps to determine if current supply can be supplemented and supply volumes remodelled.

Treatment requirements and opportunities to export water should also be investigated and costs determined.
Mandating Water Efficient Fittings, Fixtures and Appliances

Description

Mandating water efficient fittings, fixtures and appliances in all new and redeveloped facilities can be specified during the master plan phase. Six star fittings are currently the highest available under the Water Efficiency Labelling and Standards (WELS) Scheme.

Technical

Water efficient fixtures and fittings such as toilets, irrigation devices, showerheads and tap fittings are proven, independently tested, low cost technologies.

Commercial / Financial

The use of water efficient devices can reduce the size of required supporting infrastructure including hot water systems, pipes, sewer upgrades, pumps and header tanks resulting in significant cost savings for the developer.

Residential properties fitted with „premium“ appliances and fittings can attract higher prices.

The incorporation of such devices will also assist with any certification of the buildings under existing rating schemes from organizations such as the Green Building Council of Australia.

Environmental / Social

Reduced potable water consumption and reduced energy use associated with water heating due to reduced electricity bills.

Next Steps

Determine which fittings, fixtures and appliances can be mandated as water efficient and the appropriate star rating. Information of ratings and products is available at www.waterrating.gov.au.
4.3  Transport

During the process of considering transport solutions for the site, the Arup team considered a series of potential options including:

- Pedestrian links and amenity
- Bicycle parking
- Bicycle connectivity
- Car share
- Reduced car parking rates, and
- Electric car ready

Details of the initial assessment are provided in Appendix B3.

In particular the master plan stakeholders should consider improvements in pedestrian/ bicycle accessibility together with an integrated consideration of an integrated car and bicycle parking strategy and links to public transport.

After the subsequent client workshop, it was decided to focus the analysis further on the solutions detailed in the boxes below.

---

**Pedestrian Links and Amenity**

**Description**

Provide a permeable precinct that allows the shortest paths for pedestrians, and direct links to public transport opportunities and local facilities including schools.

Outline a strategy that includes supportive and attractive amenity such as shade, seating, path widths and passive surveillance.

**Technical**

Such an initiative is achievable, requiring consideration of the orientation of development to allow greater permeability, particularly to the south of the precinct.

**Commercial / Financial**

Greater pedestrian links and amenity are associated with reduced levels of car parking with the space saved potentially being diverted into a greater volume of units.

Combined with more affordable, accessible public transport choices, enhanced pedestrian permeability can support car ownership reductions, more affordable living, and the precinct’s “green” credentials.

**Environmental / Social**

Communities within precincts with greater pedestrian amenity have a greater propensity to utilise public transport. Such a mode shift supports a reduction in greenhouse gas emissions from car traffic and also supports a reduction in traffic congestion.

Enhanced pedestrian amenity encourages greater community interaction, public congregations at public transport nodes, and encourages passive neighbourhood surveillance.
Next Steps
The master plan should consider:

- Improvements required to street permeability to support direct links especially to surrounding tram stops and bus stops at Dean Street and McNae Street.
- Improved connection with and along Alexandra Avenue towards the Moonee Ponds Activity Centre. This will require liaison with Council.
- Shade/shelter (built form or trees) and seating.
- Good visual connections are provided between the development and the street including adjacent existing streets. A mapping exercise will ensure that areas with poor surveillance are minimised.

Bicycle Parking

Description
Provide secure and convenient residential bicycle parking that supports bicycle ownership and use.

Technical
Secure facilities would preferably be located at street level to activate the street environment.

Facilities need to be accessible, visible and user friendly for all ages and abilities.

The success of bicycle facilities is often also influenced by appropriate bicycle connections.

Commercial / Financial
Reduced car parking requirements create more available space within a precinct. Such space may then be utilised for a greater volume of residences.

Improved bicycle amenity will be a strong point of sustainability differentiation for the precinct’s marketing strategy.

Environmental / Social
The provision of bicycle infrastructure supports cycling as a mode choice; enabling healthy living choices for the community and general liveability within the precinct.

Provision of bicycle infrastructure for the precinct enhances the amount of space within individual residences and businesses as bicycles do not need to be stored internally.

Next Steps
For appropriate bicycle parking to be integrated into the master plan the following should be considered:

- An understanding of the space and infrastructure requirements for bicycle parking associated with the projected precinct population.
- Bicycle use rates to ensure future bicycle ownership levels are accounted for.
- Accessible locations that can accommodate secure bicycle parking provision.
- The provision of bicycle connections which Council may see as a priority for improving accessibility for all ages and abilities for use by the wider community.
**Bicycle Connectivity**

**Description**
Safe and equitable connectivity to the wider bicycle network including the Moonee Ponds Creek Trail that allows accessibility for all ages and abilities. Access for commuting to the CBD, Moonee Ponds Activity Centre, and Moonee Ponds Central School.

**Technical**
Requires a network vision, space allocation and a provision that the initiative would be a wider community facility, however all are readily achievable in partnership with Council.

**Commercial / Financial**
Reduced levels of car parking with the space saved potentially being diverted into a greater volume of units.
Combined with more affordable, accessible public transport choices, enhanced pedestrian permeability can support car ownership reductions, more affordable living, and the precinct’s “green” credentials.

**Environmental / Social**
The provision of bicycle infrastructure supports cycling as a mode choice; enabling healthy living choices for the community and general liveability within the precinct.
Greater bicycle amenity supports a reduction in greenhouse gas emissions from car traffic and also supports a reduction in traffic congestion.

**Next Steps**
Potentially work with Council to identify the cycling connections within and without the site as part of a wider bicycle network.
**Car Share**

**Description**
The potential to include a car share scheme (including dedicated parking spaces) at convenient locations on the site as a method to support a reduction in the need for car ownership.

**Technical**
The proposed development density is well suited to a car share initiative.

In addition, such a scheme may be managed through a third party (such as Flexicar) or governed under the body corporate arrangement.

**Commercial / Financial**
Reduced levels of car parking due to car share opportunities with the space saved potentially being diverted into a greater volume of units.

Car share is increasingly part of an integrated transport solution which seeks to activate mode shift away from privately owned vehicles. Such a scheme supports a more affordable precinct by removing the priority on car ownership, and enhances the precinct’s “green” credentials.

**Environmental / Social**
The provision of car share services is part of an overall transport solution for the precinct which seeks to guide a mode shift away from private vehicles, thereby reducing greenhouse gas emissions and supporting healthy living choices for the community and general liveability within the precinct.

**Next Steps**
The master plan may make an allowance for a number of car share spaces within the precinct. This number may be derived from discussions with a car share company or Council.

If a further analysis demonstrates that the car share scheme is feasible, further discussions should be held between the car share company, Council and the MVRC.
Reduced Car Parking Rates

**Description**
Reduction in the level of car parking required as part of the development.

**Technical**
A reduction in the number of car parking spaces available to the residents within the precinct needs to be undertaken in parallel with improvements in pedestrian, bicycle and public transport options in order to support a transport mode shift.

**Commercial / Financial**
Reduced levels of car parking levels will potentially allow the space saved to be diverted into a greater volume of units.

Limited car park spaces is one method by which a master plan can contribute to guiding mode shift away from privately owned vehicles; supporting a more affordable precinct by removing the priority on car ownership, and enhancing the precinct’s “green” credentials.

**Environmental / Social**
The provision of fewer car spaces can be part of an overall transport solution for the precinct which seeks to guide a mode shift away from private vehicles, thereby reducing greenhouse gas emissions and supporting healthy living choices for the community and general liveability within the precinct.

**Next Steps**
The master plan may consider car parking reductions for residences in balance with enhanced cycling, pedestrian and public transport options.

Electric Car Ready

**Description**
The master plan has the opportunity to provide infrastructure for electric vehicles such as conduits or connections. It is anticipated that in the medium term electric vehicles will be more common, particularly by the end of the MVRC development.

**Technical**
There is currently infrastructure which can be installed to support electric vehicles even though the technology is yet to become mass produced.

**Commercial / Financial**
Although the development of electric vehicle is in its infancy, it may be beneficial to allow for later investments into basic electric vehicle infrastructure as retrofitting will potentially be more expensive.

**Environmental / Social**
The primary environmental outcomes for electric vehicles are the reduction in associated greenhouse gas emissions and improved local air quality and noise reductions.

**Next Steps**
Understand electrical and conduit requirements that will accommodate electric cars, and make an allowance for electric vehicle-specific car spaces in the master plan process.
4.4 Waste

During the process of considering waste solutions for the site, the Arup team considered a series of potential options including:

- Combination manual and automated waste management
- Fully automated waste management, and
- Emerging technologies.

These options broadly consider the:

- The recognition of the separation and management of waste for commercial and residential tenants.
- Assessment of new technology for the disposal and storage of waste i.e. automated waste systems (AWS).
- Provision of a waste management strategy which is efficient for all land use types within the precinct; race venue, private functions, retail, and residential accommodation (low, mid and high rise).
- Provision of a flexible strategy that identifies the long term goals that are in-line with the aspirations of the local authorities for waste minimisation.

Details of the initial assessment are provided in Appendix B4.

At a later stage of planning for the precinct, stakeholders should also consider a strategy which encompasses a „green message” associated with waste treatment and management that encourages awareness and education for residents, businesses and the racecourse.

After further consideration and the subsequent client workshop, it was decided to further analyse the solutions detailed in the boxes below.

Understanding the Business-as-Usual Waste Context

To understand the benefits of often capital-intensive waste management initiatives, it is useful to consider the business-as-usual context.

In a traditional waste management system for a precinct, waste bins will be provided for the disposal and storage of non recoverable (wet waste – food and liquid) and recoverable waste streams (dry recyclables – plastic, paper, glass, metal, cardboard and garden waste).

The traditional system will typically use 660 litre wheelie bins for the collection of all waste streams, based on the local authority requirements for equipment to be fitted to current waste vehicles.

There is no particular commercial gain from this standard approach. The local authority will collect and dispose of waste, and residents will be charged as part of
local tax. The racecourse will pay for collections either via the local authority or a 3rd party waste contractor.

It should be noted that the traditional system does not provide any initiatives to reduce waste to landfill.

**Waste Management – Combined Manual and Automated Waste System**

**Description**

A mixed use system which combines automation and traditional methods. Non recoverable waste is disposed in the automated system and recycling waste is stored in traditional wheelie bin containers.

The automated system uses a vacuum chute to transfer waste bags from the point-of-disposal (typically waste chute room or street level waste bins) to a central storage facility located within the development. The facility will typically have 20m³ containers or compactors and a mechanical vacuum system.

Providing a chute system without automation is also another option however, lower ground or basement storage will need to be considered thereby reducing the gross floor area (GFA).

**Commercial / Financial**

Non recoverable waste collected within the precinct can be treated on site through methods such as anaerobic digestion and composting with obvious gas-generation and food production related opportunities whilst also reducing waste to landfill.

**Environmental / Social**

Unless non recoverable waste is treated on site, there are no considerable environmental benefits of such an approach.

Regarding social issues, the chute system reduces waste tipping, especially within typically constrained areas (typical floors and lobby areas) associated with mid to high rise buildings. Incidence of vermin and insects are also reduced.

Conversely, such waste chutes may become blocked therefore discouraging use by residents.

**Next Steps**

There are considerable benefits associated with installing such a waste solution particularly for
mid and high rise residential accommodation; despite the expense.

Introduction of the system would require that it be considered in the master plan phase due to the space requirements, the considerable capital expenditure and the difficulties in retrofitting.

Waste Management – Fully Automated Waste System

Description

Both non recoverable and recoverable waste streams are disposed within an automated system. No additional containers are required.

Technical

The same principle applies as for the automated element of a combined automatic/manual system; a chute system uses air vacuum technology for both non recoverable and recoverable waste disposal and transfers the waste to a central facility.

Commercial / Financial

Such a system will require considerable capital expenditure to establish.

Commercial benefits may be derived from enhanced property values due to reduced noise and odour levels associated with the separation of waste from the everyday site activities.

Next Steps

Consideration of the space requirements of an automated waste system across the precinct during the master plan phase including site entrances and exits, piping, and central collection units.

Waste Management – Emerging Technologies in Australia

A general consideration for the master plan is the willingness to consider the introduction of emerging waste management technologies and processes.

Biomass – Anaerobic Digestion

Anaerobic digestion uses a series of processes in which microorganisms break down biodegradable material in the absence of oxygen, used for industrial or domestic purposes to manage waste and release energy.

Such a system has obvious waste management advantages as well as the potential to provide gas for cogeneration or tri-generation, however significant capital expenditure is required.

Composting

A system of collection and management of organic waste composting may be considered; potentially to reduce organic waste leaving the site to zero.

Apart from a reduction of waste to landfill, once decomposed, the compost waste may be utilised as fertilizer and soil within the precinct.
Such a system will require relatively inexpensive technologies although investment would be made in management and there would be an opportunity cost associated with land diverted from residential or commercial development.
5  Environmental Sustainability ‘Theme’

Condensed from the previous workshops and investigation process, the Arup project team developed four sustainability themes to guide the future consideration of sustainability within the MVRC master plan; one each for energy, water, transport and waste.

The themes are broadly structured in two sections – a high level overview of the potential sustainability solution, and then a short description of the associated benefit.

5.1  Energy

The Moonee Valley Master Plan energy approach will seek to consider:

- Demand-side energy solutions in the form of energy efficient houses, passive design and building orientation.
- Supply-side energy solutions such as the potential integration of low emission and renewable energy solutions such as co-generation or solar PV.

The combination has the potential to reduce the energy consumed by the development, minimize the associated carbon footprint, and provide commercial benefits for the developers in the form of revenue streams and uplift in the market value of the site.

5.2  Water

The Moonee Valley Master Plan water approach will seek to improve upon MVRC’s existing water saving and alternative water sourcing initiatives through:

- Demand-side water saving solutions in the form of water efficient fixtures, fitting and appliances with a minimum six star rating.
- Supply-side water solutions such as the expansion of the existing stormwater harvesting scheme and provision of third pipe water supply in new and redeveloped buildings to allow for fit for purpose water use.
- Provision of excess water to nearby community facilities such as schools and community green space.

The combination of these solutions has the potential to reduce the water consumed by the development, reduce sewer discharge, improve community perception, ensure ongoing useability of the racecourse even in times of water restriction, improve the quality of Moonee Ponds Creek and provide commercial benefits for the developers in the form of reduced potable water and sewer disposal costs.
5.3 Transport

The Moonee Valley Master Plan transport approach will seek to facilitate mode shift from private vehicles to public transport, pedestrian and walking options by:

- Providing convenient, direct and safe bicycle and pedestrian links within the precinct and surrounding area.
- Providing appropriate levels of car parking commensurate with supporting a shift toward alternative transport measures.
- Providing bicycle parking and associated infrastructure to support cycling within and across the precinct.
- Where possible, better orient the site to existing or soon to be enhanced public transport infrastructure such as the nearby tram and bus stops.
- Considering new options such as car share schemes and the integration of capacity for electric vehicles.

The combination of these initiatives will reduce transport-associated emissions from private vehicles, support a cycling and pedestrian friendly precinct, and reduce noise and traffic congestion associated with private vehicle traffic.

5.4 Waste

The Moonee Valley Master Plan waste approach will seek to augment or replace traditional waste management processes by considering:

- The balance between manual and automated systems.
- The balance between waste management solutions for the precinct as distinct from individual buildings.
- Separation of the waste management processes from normal site operations in order to enhance precinct amenity.
- New technologies and processes such as anaerobic digestion (for energy generation) and composting.

The combination of initiatives will better allow for separation of the waste disposal process from general precinct operations, integration of the waste generation and disposal activities of residences, businesses and MVRC activities, minimise noise, odour and waste to landfill, and potentially provide a valuable input into related energy (anaerobic digestion) and urban agriculture (composting) initiatives.
6 Environmental Rating Tools

There are a number of environmental rating tools within the Australian market that provide environmental ratings for buildings or precincts utilising criteria such as energy efficiency, energy use, environmental performance and social performance.

This section describes the rating tools that may be applicable to the MVRC master plan and redevelopment process and specifically includes tools that relate to master planned communities or medium-high density residential housing.

Three particular rating tools were considered particularly relevant:

1. Green Star Communities
2. Green Star Multi-Unit Residential
3. VicUrban Sustainable Community Rating – Master Planned

Each has been described using the following framework:

- Overview
- Criteria
- Commercial acceptance, and
- Applicability to the master plan.
6.1 Green Star Communities

Overview

The Green Building Council of Australia (GBCA) is a national, not-for-profit organisation that rates buildings for environmental performance. Green Star ratings are provided on buildings that demonstrate environmentally-friendly design and construction practices.

One particular rating scheme is the Green Star Communities Rating Tool. Currently in development, the Tool will provide a national framework for the sustainable assessment of communities in the context of five national best practice principles.

A pilot (draft) tool is planned to be available for application in 2011, and will be tested on eligible projects.

www.gbca.org.au/green-star/green-star-communities/

Criteria

Currently, the rating tool is based on a framework of five principles:

- **Liveability** – including engagement and partnerships, affordability, diversity and respectability, health and safety, connectivity and cohesiveness, and resilience and adaptability.
- **Economic prosperity** – including employment and investment opportunities, innovation and efficiency.
- **Environmental quality** – including environmental enhancement, footprint reduction, and resource efficiency.
- **Place making** – including coherent structure and connectivity, flexibility and adaptability, attractiveness, and accessibility.
- **Urban governance** – including transparency and accountability, community engagement, evidence-based planning, and sustainable behaviour.

Commercial Acceptance

The Green Star rating tools have considerable support and recognition within the commercial sector and are perceived as leaders in Australia for assessing the environmental performance of building construction, or as-built buildings.

It is anticipated that the Green Star Community Rating Tool will be similarly regarded and although it’s wide spread application is not imminent, its release will align with the development cycle of the precinct.

Applicability to the Master Plan

The Green Star Community Rating Tool will potentially be directly applicable to the MVRC Master Plan. Additionally, MVRC can potentially be used during the pilot phase, although the Master Plan will need to commit to a number of ESD initiatives (and their costs) to obtain points for certification.

Even though the MVRC may not want to pursue the option of becoming part of the pilot process, MVRC may utilise the framework principles within the master plan.
6.2  Green Star Multi-Unit Residential

Overview

The Green Star Multi-Unit Residential Rating Tool, managed by the GBCA, assesses the environmental performance of multi-unit residential buildings.

The criteria for certification are extensive and the process for obtaining the rating is rigorous. The certification process requires a submission to the GBCA outlining the initiatives included within a design to earn points for criteria, an assessment of these points, and finally accreditation. Upon accreditation, the project will receive certification as either of the following (depending on points achieved):

- 4 Star Green Star Certified Rating – 'Best Practice' in environmentally sustainable design and/or construction
- 5 Star Green Star Certified Rating – 'Australian Excellence' in environmentally sustainable design and/or construction
- 6 Star Green Star Certified Rating – 'World Leadership' in environmentally sustainable design and/or construction


Criteria

The categories of criteria for the rating tool are:

- **Management** – environmental and waste management.
- **Indoor Environment Quality** – hazardous materials use, thermal comfort.
- **Energy** – energy improvement, peak energy demand reduction.
- **Transport** – car park minimisation.
- **Water** – occupant amenity water;
- **Materials** – recycling waste storage, recycled-content & reused materials.
- **Land Use & Ecology** – reuse of land, reclaimed contaminated land.
- **Emissions** – discharge to sewers.
- **Innovation** – innovation in design and product use.

Commercial Acceptance

As indicated above, the Green Star rating tools have considerable support and respect within the commercial sector and are recognised as leaders in Australia for assessing the environmental performance of building construction, or as-built buildings.

Nevertheless, the Green Star Multi-Unit Residential rating tool has seen limited uptake since its development in 2008.

Applicability to the Master Plan

The Green Star Multi-Unit Residential tool can be applied to the design of any medium to high-density residential housing within the MVRC master plan. The residential housing included within the master plan is most likely to be eligible for
assessment under the tool as long as “80% of the building's GFA (measured to exclude internal car parks) is comprised of any combination of BCA Class 2 and 1a (ii)”\(^1\).

It should be noted that certification under the tool may cost $16,500\(^2\) to $33,000, depending on the size of the project. Additionally, the costs of including any initiatives to obtain points for certification should be taken into account.

It should be noted that the tool is directly applicable to the design of residential buildings, and not the master plan itself. However, the master plan can include the intention of Green Star certification for selected or all residential buildings.


\(^2\) Member discounted fee
6.3 VicUrban Sustainable Community Rating – Master Planned

Overview

VicUrban is the Victorian Government agency for sustainable urban development and has developed the Sustainable Community Rating scheme for sustainable residential development which is used by VicUrban in assessing master planning for urban developments.

The scheme contains assessment tools such as the Master Planned, Urban Renewal and Provincial Community Assessment Tools, which are designed to aid the development of communities during the project planning stage. They assess residential communities against community, social and environmental impacts.

www.sustainablecommunityrating.com/cs/Satellite?pagename=SCR

Criteria

The criteria for the assessment of the planned performance of a new community are:

- **Commercial success** – including financial targets, investment recovery, and risk management.
- **Housing affordability** – including diverse housing, household affordability, whole-of-life savings, and public transport affordability.
- **Community well-being** – including community capacity, community economic benefit, healthy lifestyle, and consultation.
- **Urban design excellence** – including visual identity, permeability and connectivity, safety and security, mixed-usage, and quality of design.
- **Environmental leadership** – including aspects of energy, water, transport, materials, waste, biodiversity, and atmosphere.

Commercial Acceptance

VicUrban aids community infrastructure across Victoria and all VicUrban’s residential projects have been developed in accordance with the Sustainable Community Rating. Whilst the Sustainable Community Rating is used within VicUrban, it has not been widely adopted by other developers.

Applicability to the Master Plan

The Sustainable Community Rating was established in 2007 and the assessment tools (Master Planned, Urban Renewal and Provincial Community) are currently being road tested.

Currently, the Master Planned tool is the most applicable to the MVRC master plan, as it contains more than 500 homes and has some element of mixed use. The tool (Excel-based) is currently available online here.

This can be used as a self-assessment for the MVRC Master Plan against VicUrban’s sustainability criteria. It should be noted that no certification is provided for assessing the Master Plan against these criteria.
7  ESD Initiatives

There are a number of Victorian and Australian examples of where ESD has been included in building designs and master plans which are able to parallel with the MVRC master plan.

These examples have been specifically selected so MVRC may physically visit the sites or more readily undertake further research.

- **Loop Precinct** – developing a „best-practice” sustainable community.
- **Conveso Concavo** – marketing luxury sustainable housing at premiums.
- **Lilyfield Housing Redevelopment** – achieving highly sustainable housing on a limited budget.
- **Aurora** – design of „green” and „energy smart” homes that are affordable and accessible to the consumer.
- **VicUrban@Officer** – master plan of high-profile sustainable precinct.

The following high level assessment briefly outlines the context of each site, the sustainability features, and the basic commercial benefits which were drivers for the development.
Loop Precinct (Belconnen Markets Redevelopment), ACT

Developer
Rock Development Group

Profile
40,000 square metre mixed-use precinct in Canberra and is aiming to be Canberra’s first socially, economically and environmentally sustainable community. The precinct will contain 338 apartments, 8,575 square metres of office space, retail space (cafes, restaurants, specialty stores), and public spaces.

ESD Initiatives
- Precinct-wide energy management system.
- Integrated rainwater and wastewater reuse systems.
- Onsite commercial composting system.
- Plug-in points for electric vehicles.
- Direct public transport connections.
- Social and active spaces (parklands, walkways, communal gardens, recreation and BBQ areas).
- Seeking to achieve a 6-star Green Star Communities rating.

Commercial Benefit
- Company is a principal sponsor of the Green Star Communities rating tool.
- Reflects Rock Development Group's status as a thought leader and pioneer in the development of sustainable communities.
- Long-term financial wellbeing of the people who live and work in the precinct.
Convesso Concavo, 8 Waterside Place, Victoria

Developer
Vivas, Lend Lease

Profile
Convesso Concavo is a 31-storey luxury apartment building designed as an exclusive residential tower in the Docklands, Victoria. The building includes retail as well as residential living area. Convesso Concavo has been certified as Victoria’s first 4 Star Green Multi Unit Residential PILOT building.

ESD Initiatives
- 7-star NatHERS energy rating for each apartment.
- Energy efficient lighting and motion sensors.
- Visual display smart metering.
- Low VOC materials.
- Passive solar design principles in planning.
- 60 visitor racks and 6 retail staff racks.
- Car parking is minimised.
- Dishwashers and washing machines, water efficient by WELS.
- Rainwater harvesting.
- Accredited 4 Star Green Multi Unit Residential PILOT.

Commercial Benefit
- Exclusive residential tower.
- Exclusive waterfront homes, enviable penthouses, prestigious tower apartments and contemporary city side apartments.
- Unique selling proposition.
- Additional capital cost of around 2% to design and construction cost.
Lilyfield Housing Redevelopment, NSW

Developer
Housing NSW

Profile
A social housing scheme in NSW with 8,600 square metre of floor area for 88 apartments. It is known as the first social housing scheme to participate in a Green Star PILOT program.

ESD Initiatives
- 4 kilowatt photovoltaic system.
- Gas-boosted solar hot water systems.
- Optimising site orientation and layout of buildings to achieve high levels of solar access, cross ventilation and access to views.
- Close proximity to public transport.
- Bicycle storage facilities and no car parking.
- Large rainwater tank and water efficient fixtures and fittings.
- 80% of construction waste to be recycled.
- Community garden.

Commercial Benefit
- „Triple bottom line“ (environmentally, economically and socially) sustainable outcomes.
- „Proof of concept“ in 5 Star Green Star Multi Residential developments on a small budget.
- Sustainable housing for low-income demographic.
- First sustainable housing to achieve Green Star rating in Australia.
Aurora, Epping North, Victoria

Developer
VicUrban

Profile
VicUrban’s Aurora is a planned community for 8,800 residents in the next 15 years. The district will be comprised of residential house and land packages, schools, public transport, town centres and parkland.

ESD Initiatives
- 32 “energy smart” house and land packages.
- Minimum 6 star energy efficient rating on all houses.
- Every home to reduce drinking water consumption to a third of the average in Melbourne.
- Biodiversity protection (restoration of Edgars Creek).
- Recycled water for homes and parklands.
- Water efficient taps and fixtures.
- Passive solar design (heating, cross ventilation cooling, shading and glazing).
- Open space planning (recreational parks, five schools, two town centres, shops and offices).

Commercial Benefit
- Marketing value of “green homes”.
- Limited release of “energy smart” homes, and varying house and land packages for increased pricing choice and affordability.
- Urban Development Institute of Australia (UDIA) State Award for Environmental Excellence.
VicUrban@Officer, Victoria

Developer
VicUrban

Profile
VicUrban@Officer is one of 16 Clinton Climate Initiative (CCI) projects across the world. The 340 hectare site will contain 6,000 homes for up to 15,000 people. The project has completed its structure plan and is currently undergoing master planning and community consultation.

ESD Initiatives
- Connection to existing Officer Train Station.
- High performance passively designed buildings to reduce energy (electricity, heating and cooling) and water demand.
- 7-star energy designed homes.
- Investigation of local production of energy through low and renewable energy supply (tri-generation, solar, biogas, ground source heat pumps, and emerging fuel cell technology).
- Testing of green vehicles and its use within the precinct.
- Local travel network for cycling and pedestrians.
- Third-pipe water recycling.
- WSUDs.

Commercial Benefit
- Marketing value of „green homes“.
- High profile project through an international scheme (CCI).
- Energy savings for residents.
- Pioneering precinct-scale sustainable development.
Appendix A

Workshop Outputs
## A1 ESD Solutions - Workshop Notes

### A1.1 Water

<table>
<thead>
<tr>
<th>Opportunities</th>
<th>Constraints</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Stormwater (irrigation, internal, export and two pipes)</td>
<td>• Class A water constraints</td>
</tr>
<tr>
<td>• Community benefit</td>
<td>• Location</td>
</tr>
<tr>
<td>• Bigger stormwater harvesting scheme</td>
<td>• Cost</td>
</tr>
<tr>
<td>• New track design</td>
<td>• Use treatment</td>
</tr>
<tr>
<td>• Vertical drainage</td>
<td>• Maintenance</td>
</tr>
<tr>
<td>• Biodiversity / wetlands</td>
<td>• Birds / wildlife</td>
</tr>
<tr>
<td>• Passive treatment</td>
<td>• Retailer / Contract</td>
</tr>
<tr>
<td>• Storage / treatment / amenity</td>
<td>• Policy</td>
</tr>
<tr>
<td>• Improved GHG</td>
<td></td>
</tr>
<tr>
<td>• Overlooking wetlands / lake (residential)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Risks</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Amenity</td>
<td>• One storage</td>
</tr>
<tr>
<td>• Recreation</td>
<td>• External catchment</td>
</tr>
<tr>
<td>• Irrigation</td>
<td></td>
</tr>
<tr>
<td>• TKN, P reduction</td>
<td></td>
</tr>
<tr>
<td>• Flow detention</td>
<td></td>
</tr>
<tr>
<td>• Downstream</td>
<td></td>
</tr>
<tr>
<td>• Cost off-set</td>
<td></td>
</tr>
<tr>
<td>• Solid commercial basis</td>
<td></td>
</tr>
<tr>
<td>• Maintain ovals (community)</td>
<td></td>
</tr>
<tr>
<td>• Community benefits / marketing</td>
<td></td>
</tr>
</tbody>
</table>
## A1.2 Energy

<table>
<thead>
<tr>
<th>Opportunities</th>
<th>Constraints</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wind power</td>
<td>Flexibility?</td>
</tr>
<tr>
<td>Exporter of energy through Trigeneration</td>
<td>Light pollution</td>
</tr>
<tr>
<td>Benefits of staged process of Trigeneration</td>
<td>Heating and cooling demands may increase</td>
</tr>
<tr>
<td>Facade / integrated solar panels</td>
<td>Partitioned and zoned energy</td>
</tr>
<tr>
<td>Electric vehicles</td>
<td>Visual appeal of solar in middle of course</td>
</tr>
<tr>
<td>Solar for grandstand</td>
<td>Mixed-use energy demand / supply</td>
</tr>
<tr>
<td>Passive design elements</td>
<td>Existing compatibility with new infrastructure</td>
</tr>
<tr>
<td>Mixed-use energy demand / supply</td>
<td>Education / metering visibility</td>
</tr>
<tr>
<td>State funding and grants</td>
<td>High cost of adoption of innovation</td>
</tr>
<tr>
<td>Efficient lighting</td>
<td>Changing government policies</td>
</tr>
<tr>
<td>Partnerships with players to deliver</td>
<td>Old infrastructure</td>
</tr>
<tr>
<td>Decreased energy demand from light dimming</td>
<td>Energy supply / demand interface</td>
</tr>
<tr>
<td>Constant use of grandstand</td>
<td>High energy peaks during major events</td>
</tr>
<tr>
<td>Economies of scale</td>
<td></td>
</tr>
<tr>
<td>Educational project</td>
<td></td>
</tr>
</tbody>
</table>

### Benefits

- Reputation for club
- Long-term planning
- High visibility of technology success
- Narrow carbon footprint
- Selling point / increased market value
- Commercial return
- Marketing value of “green” energy

### Risks

- Changing innovation and technology
- Increasing body corporate fees
- Market value and affordability
- Conflicting commercial drivers with innovation
- High visibility of technology failure
- Encourage high-use of energy
- Changing government policy
- Sub-station limitations
- PV and the racing course
### A1.3 Waste

<table>
<thead>
<tr>
<th>Opportunities</th>
<th>Constraints</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Automation</td>
<td>- Space constraints</td>
</tr>
<tr>
<td>- Authority expectation</td>
<td>- Ownerships (waste)</td>
</tr>
<tr>
<td>- Economies of scale</td>
<td>- Waste targets</td>
</tr>
<tr>
<td>- Marketing (Green)</td>
<td>- Resource management</td>
</tr>
<tr>
<td>- Long-term opportunities</td>
<td>- Stage development</td>
</tr>
<tr>
<td>- Land availability</td>
<td>- Changing policies</td>
</tr>
<tr>
<td>- Recycling quality</td>
<td></td>
</tr>
<tr>
<td>- Logistic automation</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Risks</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Marketing value (green)</td>
<td>- Increasing body corporate fees</td>
</tr>
<tr>
<td>- Landscaping aspect for residential</td>
<td>- Affordability (residential)</td>
</tr>
<tr>
<td>- Community</td>
<td>- Changing government policy</td>
</tr>
<tr>
<td>- Awareness and education</td>
<td></td>
</tr>
<tr>
<td>- Body corporate</td>
<td></td>
</tr>
</tbody>
</table>

### A1.4 Transport

<table>
<thead>
<tr>
<th>Opportunities</th>
<th>Constraints</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Improved pedestrian amenity and desire lines</td>
<td>- Racecourse functions business would limit park and ride facility and distance from train</td>
</tr>
<tr>
<td>- Joining tramline (Pascoe Vale Rd via Wilson St)</td>
<td>- Constraints at intersections</td>
</tr>
<tr>
<td>- Park and Ride facility at racecourse</td>
<td>- Space to connect bicycle link to create trail</td>
</tr>
<tr>
<td>- Reduce car parking and increase yield of development</td>
<td>- Limited space in Wilson and Dean St</td>
</tr>
<tr>
<td>- Access to public transport and trail (Dean and Wilson St)</td>
<td></td>
</tr>
<tr>
<td>- Secure bicycle parking</td>
<td></td>
</tr>
<tr>
<td>- Car share</td>
<td></td>
</tr>
<tr>
<td>- Bicycle path to Moonee Ponds Rail</td>
<td></td>
</tr>
<tr>
<td>- Upgrade interchange and connection between tram, train and bus</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Risks</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Reduced car park and increased yield</td>
<td>- Congestion from new residential density</td>
</tr>
<tr>
<td>- Secure bicycle storage, bicycle ownership, and activation of street edge</td>
<td>- Attracting a mixed demographic</td>
</tr>
<tr>
<td>- Car share and reduced parking needs</td>
<td>- Race track security / restricted access</td>
</tr>
<tr>
<td></td>
<td>- Pollution and noise</td>
</tr>
<tr>
<td></td>
<td>- Impact of the development</td>
</tr>
</tbody>
</table>
Appendix B

Sustainability Solution Assessment Summaries
## B1 Energy Solutions Assessment Summary

### ENERGY

<table>
<thead>
<tr>
<th>Initiative</th>
<th>Description</th>
<th>Technical Feasibility</th>
<th>Commercial Return</th>
<th>Initial and Ongoing Investment</th>
<th>Environmental</th>
<th>Social</th>
<th>Total Score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Description</td>
<td>Score</td>
<td>Description</td>
<td>Score</td>
<td>Description</td>
<td>Score</td>
</tr>
<tr>
<td>Cogeneration / Tri-generation</td>
<td>Cogeneration simultaneously produces heat and electricity using natural gas. For tri-generation, cooling is additionally produced by using an absorption chiller. District heating and cooling networks are implemented to reticulate heating and cooling throughout precincts.</td>
<td>The technology is currently viable and used in Victoria. It can be applied to medium to high density housing, and club facilities. It is particularly beneficial when thermal demand in winter is accompanied by great cooling demand in summer, like in Victoria. Connection to the grid is still required for times of peak demand or when electricity is required in the absence of a heat demand.</td>
<td>3</td>
<td>Shorter payback periods upon significant year round demand for heating and hot water. Savings from energy costs to the home owner will occur as grid electricity and gas prices continue to increase. MVRC can also charge a premium to property for this benefit.</td>
<td>3</td>
<td>High initial capital outlays are expected. A plant will be required, and additional infrastructure for a thermal network will be required (cooling and heating pipes). Additionally, the plant will need to be operated and maintained, either through a third party or the owner.</td>
<td>3</td>
</tr>
<tr>
<td>Solar PV (Building-mounted)</td>
<td>Solar Photovoltaic (PV) converts solar energy from sun into usable electricity. PV cells are classed either as crystalline or amorphous (thin film). Building-mounted arrays of PV panels will convert solar energy from the sun into electricity. In this case, PV panels can be mounted to the roofs of residential housing, or club facilities, such as the grandstand. It is possible to also include integrated street lighting solar luminaries.</td>
<td>Solar PV is a commonly used and proven technology. Electricity generation capability depends on orientation. The optimal operation when array faces north, tilted at an angle equal to the site latitude minus 10 degrees (37.5°-10° for Melbourne), with good access to sunlight. However, electricity from the grid is still required for significant periods during the year.</td>
<td>3</td>
<td>There are opportunities for solar PV to connect to national grid. Under a feed-in tariff, commercial returns can be made in the form of energy cost savings, as grid electricity prices continue to increase. MVRC can also charge a premium to property for this benefit.</td>
<td>3</td>
<td>Capital costs are generally comparatively high for PV panels. Government rebates can lower this initial cost. However, any changes to government rebates will impacts capital costs. The approximate capital cost of $5000-6000 per kW. Generally, one single-unit residential home will be sized with a 1.5kW solar panel.</td>
<td>2</td>
</tr>
<tr>
<td>Solar Hot Water</td>
<td>Solar Photovoltaic (PV) converts solar energy from sun into usable heat. Solar hot water systems use evacuated solar tubes or flat plate solar panels and are generally installed with a gas or electric booster. They come in either instantaneous or storage type booster systems.</td>
<td>Solar Hot Water is a commonly used and proven technology. Electricity generation capability depends on orientation (see above).</td>
<td>3</td>
<td>Commercial returns are made in the form of energy savings to the home owner. The energy generated can be high, leading to short payback periods. It should be also noted that solar hot water may be a legislative requirement on all new residential buildings in the next few years.</td>
<td>3</td>
<td>These are typically two to three times the cost of traditional instantaneous hot water systems. Government rebates can lower this initial cost. However, any changes to government rebates will impacts capital costs. The approximate capital cost of $2,000-$3,000 per kW per house.</td>
<td>3</td>
</tr>
<tr>
<td>Initiative</td>
<td>Description</td>
<td>Technical Feasibility</td>
<td>Commercial Return</td>
<td>Initial and Ongoing Investment</td>
<td>Environmental</td>
<td>Social</td>
<td>Total Score</td>
</tr>
<tr>
<td>------------</td>
<td>-------------</td>
<td>-----------------------</td>
<td>-------------------</td>
<td>-------------------------------</td>
<td>---------------</td>
<td>--------</td>
<td>-------------</td>
</tr>
<tr>
<td>Wind</td>
<td></td>
<td>Description</td>
<td>Score</td>
<td>Description</td>
<td>Score</td>
<td>Description</td>
<td>Score</td>
</tr>
<tr>
<td>Passive Solar Design</td>
<td>Passive solar design comprises of building design to maximise solar orientation, shading, and passive heating and cooling. Design in such a way results in a more energy efficient building, reducing the demand for artificial heating and cooling. Technical, this is a very feasible option and should be undertaken alongside any building design. For the master plan, building location, orientation and effective planning can assist passive solar design.</td>
<td>3</td>
<td>Passive solar design is relatively inexpensive and can be built into the design of buildings. Inclusion of</td>
<td>3</td>
<td>Initial investment requires additional design costs for building design. The ongoing cost of investment is minimal, as this is usually included only in the design stage.</td>
<td>3</td>
<td>Reduces demand for energy use, providing positive environmental outcomes. Passive design can be a visual sign of sustainability. The public also easily associates with „green” design, although they may not be aware of specific technical passive design initiatives.</td>
</tr>
<tr>
<td>Biomass Generation (Anaerobic Digestion)</td>
<td>See Waste</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>Biomass Generation (Incineration)</td>
<td>See Waste</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>9</td>
</tr>
</tbody>
</table>
# B2 Water Solutions Assessment Summary

## WATER Initiative

<table>
<thead>
<tr>
<th>Initiative</th>
<th>Description</th>
<th>Technical Feasibility</th>
<th>Commercial Return</th>
<th>Initial and Ongoing Investment</th>
<th>Environmental</th>
<th>Social</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Expand Existing Stormwater Harvesting Scheme</strong></td>
<td>Based on information provided by CWW the existing and highly successfully stormwater harvesting scheme could be expanded. Arup notes that part of the existing dam will need to be relocated for the realigned track. An expanded scheme could either export water off site „community water gifting” or additional treatment could be added to enable the use of water in existing and new facilities (e.g. toilet flushing, wash down etc.).</td>
<td>Highly feasible. Dam needs to be relocated due to track realignment. During these earth works a deeper dam could be installed (subject to ground conditions)</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td><strong>Mandate Water Efficient Fittings</strong></td>
<td>Mandate the use of water efficient (6 star) fittings in all new and retrofitted buildings from the new grandstand to all residential buildings. The WELS water-using products are toilets, urinals, some taps, showers, registered flow controllers, clothes washers and dishwashers. Other products are being examined for possible future inclusion in the scheme.</td>
<td>Technically feasible. Products exist, function well and have been independently tested and verified.</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td><strong>Rainwater Tanks to Laundry Use</strong></td>
<td>Arup understands a commercial laundry is on site. Rainwater could be captured from existing and new grandstand roof areas and provided to the laundry for washing cycles. Arup are aware that water efficient laundering machine has been installed which recycles the final rinse water providing this as the initial rinse for the next cycle.</td>
<td>Technically feasible as long as larger roof areas are nearby to the laundry. Further water balancing required to size appropriate size storage tanks to balance the system. Minimal treatment required for roof water.</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

## Description

- **Technical Feasibility:**
  - Based on information provided by CWW the existing and highly successfully stormwater harvesting scheme could be expanded. Arup notes that part of the existing dam will need to be relocated for the realigned track. An expanded scheme could either export water off site „community water gifting” or additional treatment could be added to enable the use of water in existing and new facilities (e.g. toilet flushing, wash down etc.).
  - Highly feasible. Dam needs to be relocated due to track realignment. During these earth works a deeper dam could be installed (subject to ground conditions).

- **Commercial Return:**
  - The existing system is believed to provide water in the vicinity of 41c/KL – significantly cheaper than potable water.
  - Further offsetting of potable water use pays for itself due to reduced water bills.
  - Other water gifted to the community cannot be sold. CWW involvement could be pursued to come up with a model of providing water off-site.
  - The dam requires reconfiguration already. If additional uses of harvested water beyond irrigation are pursued then additional treatment would be required to ensure water is safe for exposure to humans. Third pipe required in new facilities and residential buildings. The dam could be further enhanced with plantings to improve amenity and act as a passive treatment system for stormwater flows in conjunction with other WSUD systems in the new landscape created by the redevelopment.

- **Environmental:**
  - The existing scheme treats urban stormwater via a gross pollutant trap removing solid litter and sediments which would otherwise discharge to the nearby creek. Any further expansion will have positive impacts on downstream water services as well as providing fit-for-purpose water reducing mains water demand.

- **Social:**
  - Gifting of water will provide nearby community facilities with a free source of water saving money and ensuring the survival or green spaces in times of restriction.

## Description

- **Technical Feasibility:**
  - Mandate the use of water efficient (6 star) fittings in all new and retrofitted buildings from the new grandstand to all residential buildings. The WELS water-using products are toilets, urinals, some taps, showers, registered flow controllers, clothes washers and dishwashers. Other products are being examined for possible future inclusion in the scheme.
  - Technically feasible. Products exist, function well and have been independently tested and verified.

- **Commercial Return:**
  - Potential premium prices for residential dwellings that provide high quality water saving devices.
  - Use of water saving devices could enable to installation of other smaller systems e.g. hot water.
  - Similar investment quantum as traditional products. Toilets could also potentially be fed from an alternative water source. No ongoing investment required.

- **Environmental:**
  - Reduces potable water usage.
  - Reduces hot water usage lowering emissions.

- **Social:**
  - Provide society with choice in the marketplace in green developments.

## Description

- **Technical Feasibility:**
  - Arup understands a commercial laundry is on site. Rainwater could be captured from existing and new grandstand roof areas and provided to the laundry for washing cycles. Arup are aware that water efficient laundering machine has been installed which recycles the final rinse water providing this as the initial rinse for the next cycle.
  - Technically feasible as long as larger roof areas are nearby to the laundry. Further water balancing required to size appropriate size storage tanks to balance the system. Minimal treatment required for roof water.

- **Commercial Return:**
  - Return from reduced water bills. Depending on roof area and the storage required payback of 5-10 years could be expected. Funding could potentially be sourced from CWW to reduce payback.

- **Environmental:**
  - Installation of tanks and pump is required. Typical ongoing maintenance fairly limited and could be incorporated into existing maintenance processes.

- **Social:**
  - Could provide visual means to raccegoers of water conservation efforts encouraging more wide spread adoption.
<table>
<thead>
<tr>
<th>Initiative</th>
<th>Description</th>
<th>Technical Feasibility</th>
<th>Commercial Return</th>
<th>Initial and Ongoing Investment</th>
<th>Environmental</th>
<th>Social</th>
<th>Total Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sewer Mining</td>
<td>It is understood that a Melbourne Water sewer main is located in the Tullamarine Freeway reserve adjacent to the racecourse. This could be mined for an alternative water source and directed to non-potable uses.</td>
<td>Technically feasible depending on flows and water quality. Third party access issues and regulation are still in development.</td>
<td>2</td>
<td>Limited opportunity for commercial return as water cannot be on sold. Water produced is likely more expensive than potable and the existing stormwater harvesting scheme.</td>
<td>1</td>
<td>High upfront costs and ongoing maintenance to ensure the quality of the water. Likely undertaken by a third party provider.</td>
<td>1</td>
</tr>
</tbody>
</table>
### TRANSPORT Solutions Assessment Summary

<table>
<thead>
<tr>
<th>Initiative</th>
<th>Description</th>
<th>Technical Feasibility</th>
<th>Commercial Return</th>
<th>Initial and Ongoing Investment</th>
<th>Environmental</th>
<th>Social</th>
<th>Total Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pedestrian Permeability</td>
<td>Facilitate shortest pedestrian desire lines to connect with public transport opportunities and in conjunction with Council ensure high pedestrian amenity levels including passive surveillance.</td>
<td>3</td>
<td>Reduced car parking levels and therefore an increase in the number of units.</td>
<td>1</td>
<td>Improvement required to street permeability and some reorientation of development required.</td>
<td>3</td>
<td>Greater propensity to use directly accessible public transport. Reduced emissions from congestion and car traffic.</td>
</tr>
<tr>
<td>and accessibility to public transport stops</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bicycle Connectivity</td>
<td>Safe and equitable connectivity to the Moonee Ponds Creek Trail that allows accessibility for all ages and abilities. Access for commuting to the CBD (7 kilometres), Moonee Ponds Activity Centre and Moonee Ponds Central School.</td>
<td>3</td>
<td>Reduced car parking levels and therefore an increase in the number of units.</td>
<td>1</td>
<td>Requires Council to assist with costs of wider network improvements to better integrate a wider community provision. Additional space and infrastructure provision required.</td>
<td>3</td>
<td>Reduced car reliance, increased active and sustainable transport choice. Reduces the risk of congestion and provides road space for those who must travel by car, freight and public transport.</td>
</tr>
<tr>
<td>Bicycle Parking</td>
<td>Provide secure residential bicycle parking that allows bicycle ownership and therefore bicycle use. Provision needs to be in line with typical bicycle ownership levels (There are approximately 1.5 million bicycles in Melbourne’s 650,000 households – VicRoads 2004)</td>
<td>3</td>
<td>Reduced car parking levels and therefore an increase in the number of units.</td>
<td>1</td>
<td>Initial cost of lockable and secure bicycle parking. Maintenance as part of body corporate arrangement.</td>
<td>3</td>
<td>Allows bicycle ownership and therefore bicycle riding as a mode choice.</td>
</tr>
<tr>
<td>Car Share</td>
<td>Include car share scheme and dedicated parking spaces at convenient locations to reduce the need for car ownership. Architecture of the scheme could be a third party or governed under the body corporate arrangement.</td>
<td>3</td>
<td>Reduced car parking levels and therefore an increase in the number of units.</td>
<td>3</td>
<td>Architecture of the scheme could be a third party or governed under the body corporate arrangement.</td>
<td>3</td>
<td>Reduced car ownership and therefore reduced car use.</td>
</tr>
<tr>
<td>Initiative</td>
<td>Description</td>
<td>Technical Feasibility</td>
<td>Commercial Return</td>
<td>Initial and Ongoing Investment</td>
<td>Environmental</td>
<td>Social</td>
<td>Total Score</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>-----------------------</td>
<td>-------------------</td>
<td>--------------------------------</td>
<td>----------------</td>
<td>--------</td>
<td>-------------</td>
</tr>
<tr>
<td>Lower Car Parking Rates</td>
<td>Given an integrated consideration with ease of pedestrian access, bicycle connections and public transport accessibility, lower car parking levels can be introduced.</td>
<td>Feasible with a high level of pedestrian, bicycle and public transport access.</td>
<td>3 Reduced car parking levels and therefore an increase in the number of units. Can only be achieved in conjunction with improvements to alternative transport modes.</td>
<td>3 Reduced parking provision, no initial or ongoing investment.</td>
<td>3 Reduced car dependence and encouraged active and sustainable transport choice</td>
<td>3 Greater opportunity for social interaction, more active lifestyles, reduced congestion and pollution.</td>
<td>15</td>
</tr>
</tbody>
</table>
## Waste Solutions Assessment Summary

<table>
<thead>
<tr>
<th>Initiative</th>
<th>Description</th>
<th>Technical Feasibility</th>
<th>Commercial Return</th>
<th>Initial and Ongoing Investment</th>
<th>Environmental</th>
<th>Social</th>
<th>Total Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual Waste System (Low-density residential)</td>
<td>Traditional system – waste bins for non recoverable and recoverable waste streams.</td>
<td>The traditional system will use 330litre and 660litre wheelie bins for the collection of all waste stream.</td>
<td>3</td>
<td>No commercial gains. The local authorities will collect and dispose – residents will be charged as part of local tax. Commercial – Race course will pay for collections via the council or 3rd party.</td>
<td>0</td>
<td>No costs required by the developer, residents will be supplied with bins and commercial businesses will pay for their own collections</td>
<td>3</td>
</tr>
<tr>
<td>Manual / Automated Waste System (Medium-density residential)</td>
<td>Modern waste collection system - non recoverable waste is disposed in the automated system and recycling waste is stored on designated levels in wheelie bins. The wheelie bins are collected each week and placed on the lower levels for collection. Non recoverable waste is stored centrally within on-site facility.</td>
<td>Two tier system – single chute for non recoverable waste - automated (see Full Automated Waste System) and waste bins for recyclables.</td>
<td>3</td>
<td>Non recoverable waste collected can be treated on site – anaerobic digestion and composting. Reducing waste to landfill. Authorities will only collect recycle waste.</td>
<td>3</td>
<td>Capital cost for the automated waste system includes: chute, containers, mechanical system (vacuum) and construction costs.</td>
<td>1</td>
</tr>
<tr>
<td>Full Automatic Waste System (High-density residential)</td>
<td>Modern waste collection system – both non recoverable and recoverable waste streams are disposed in the chute system. No additional containers required. All waste is stored centrally within on-site facility.</td>
<td>Twin chute system – Air vacuum technology that uses a chute system for non recoverable and recoverable waste disposal and takes the waste to a central facility.</td>
<td>3</td>
<td>Non recoverable and recoverable waste (recycling) can be treated on site – anaerobic digestion, composting. Recycling waste can be sold to companies</td>
<td>3</td>
<td>Capital cost for the automated waste system includes: chute, containers, mechanical system (vacuum) and construction costs.</td>
<td>0</td>
</tr>
<tr>
<td>Manual / Automated Waste System (Functions / Events)</td>
<td>N on recoverable waste is disposed in the automated system located on street level. Race venue FM team will allocated bins for recycling waste within the functions and retail area</td>
<td>Two tier system – single chute for non recoverable waste - automated (see Full Automated Waste System). Racecourse FM team will organise collections for recyclables and other recoverable waste streams during events.</td>
<td>2</td>
<td>Non recoverable waste collected can be treated on site – anaerobic digestion and composting. Reducing waste to landfill. Collection company will only collect recycling waste.</td>
<td>3</td>
<td>Capital cost for the automated waste system includes: chute, containers, mechanical system (vacuum) and construction costs.</td>
<td>1</td>
</tr>
</tbody>
</table>
## WASTE

<table>
<thead>
<tr>
<th>Initiative Description</th>
<th>Technical Feasibility</th>
<th>Commercial Return</th>
<th>Initial and Ongoing Investment</th>
<th>Environmental Score</th>
<th>Social Score</th>
<th>Total Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full-Automatic Waste System (Functions / Events)</td>
<td>Modern waste collection system – both non recoverable and recoverable waste streams are disposed in the chute system. No additional containers required. All waste is stored centrally within on-site facility.</td>
<td>Twin chute system – Air vacuum technology which uses a chute system for non recoverable and recoverable waste disposal and takes the waste to a central facility. Note: The system would be expanded from the residential areas if chosen.</td>
<td>Non recoverable and recoverable waste (recycling) can be treated on site – anaerobic digestion, composting. Recycling waste can be sold to companies. Reducing the overall waste generated on-site</td>
<td>Capital cost for the automated waste system includes: chute, containers, mechanical system (vacuum) and construction costs.</td>
<td>Both non recoverable and recoverable waste is managed within the system.</td>
<td></td>
</tr>
<tr>
<td>Manual Waste System (Retail)</td>
<td>External contractors collect waste using traditional methods i.e. waste bins</td>
<td>The traditional bins used for the collection of all waste streams.</td>
<td>No commercial gains. Collections via the council or 3rd party.</td>
<td>No costs required but commercial businesses will pay for their own collections</td>
<td>Increase waste to landfill.</td>
<td>No new incentives and no process improvements. No flexibility - long term</td>
</tr>
</tbody>
</table>