

Environmental Sustainability Development Report





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Mirvac Projects Proposed Residential Development

To be built at:

2 Fig Tree Drive Sydney Olympic Park NSW 2127

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This report has been prepared by Efficient Living Pty Ltd on behalf of our client Mirvac Projects. Efficient Living prepares all reports in accordance with the BASIX Thermal Comfort Protocol and is backed by professional indemnity insurance. This report takes into account our client's instructions and preferred building inclusions

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1. Introduction

Efficient Living has been engaged by Mirvac to author this Environmentally Sustainable Development Report that outlines actions to be undertaken by Mirvac for their development at 2 Fig Tree Drive, Sydney Olympic Park.

This report will illustrate how Mirvac are integrating energy efficient technologies and sustainable practices in line with their sustainability plan, 'This Changes Everything' which informs their approach to the 2 Fig Tree Drive, Sydney Olympic Park development providing a framework for place making, design, construction, community building and economic development. Mirvac will deliver a new residential precinct with an aim to create new benchmarks in sustainable living, utilising the four areas of focus:





1.2

Project Description

11 August 2015



The project consists of 422 residential units and approximately 1,500m² of retail space (GFA) across 4 mid and high-rise buildings. It is part of a wider development goal for Sydney Olympic Park Authority to see the area become an exciting community with increased thoroughfares, public transport, public spaces, shops and facilities as outlined in the Sydney Olympic Park Master Plan 2030 and the State Environmental Planning Policy (Major Development) 2005.

Site Description

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The subject site is located 16km west of the centre of Sydney City in the flourishing Sydney Olympic Park area. The proposed development is bounded by Fig Tree Drive and Australia Avenue. The site is in close proximity to Bicentennial The Park, Olympic precinct, entertainment commercial offices, restaurants, the Direct Factory Outlet centre and Olympic Park train station, Parramatta River and Parramatta Road.

1.4 Local Topography and Climate Parramatta River is 1km away from the site to the north, the ocean 19km to the east and the Blue Mountains 46km to the west. The surrounding topography is relatively flat on the river floodplain however coastal breezes will be unlikely to reach the site. Typically winds in the Sydney area will come from the north-east and to a lesser extent the south but this site will be surrounded by numerous tall buildings and will be subjected to turbulent breezes through the buildings and a mild urban heat island effect. The site falls into climate zone 56 of the NatHERS software, meaning that it is in a temperate climate that is likely to experience mild to warm summers and cool winters. Generally there will be a greater need for winter heating than summer cooling in this area.



2. Reimagining Resources

One of the basic tenants of sustainability is to minimise the use of natural resources and the Fig Tree development will be looking at every potential area where resource consumption can be reduced. These primarily include water management, energy consumption and waste management.

There are many approaches to successful water management. The obvious aims are to reduce the total consumption of potable water, limit the amount of water lost through inefficiencies and finally capture and use as much rainwater as is feasibly possible. By complying with the BASIX requirements for water Mirvac are already saving at least 40% more potable water than the average Pre-BASIX development in NSW.

The BASIX study is completed at a preliminary stage in design development and as such; rainwater tank volumes, harvested roof areas, extent of native planting, flow rates of taps, showers and number of car washing bays are committed to at a minimum level. In many cases Mirvac's final built product has achieved targets over the required water savings in the BASIX certificates.

Similarly in terms of energy, wide spread acceptance of global warming from world leaders has meant every country has to make their own commitment to reduced greenhouse gas emissions. Energy consumption within homes is a major contributor to Australia's total energy foot print. As part of the Department of Planning's response to achieving reduced energy consumption in new buildings the BASIX tool was introduced.

Energy efficiency in new buildings in NSW is significantly higher than that of the other Australian states and territories.

2.1 Water Conservation

There are many approaches to successful water management. The obvious aims are to reduce the total consumption of potable water, limit the amount of water lost through inefficiencies and finally capture and use as much rainwater as is feasibly possible. By complying with the BASIX requirements for water Mirvac are already saving at least 40% more potable water than the average Pre-BASIX development in NSW.

As a part of the sustainability strategy 'This Changes Everything' Mirvac have committed to extensively reducing their consumption of energy, water, materials and waste with the aim of being net positive by 2030. This emphasis on resource reduction is also applied to Mirvac's residential developments which aim to provide ongoing environment and cost savings to residents.

Measures have been implemented into the Fig Tree development to ensure that the



project delivers water, energy and waste reductions through a mixture of passive design and efficient systems relevant to the site and built form.

- All shower roses will deliver a maximum of 9L per minute which corresponds to 3 star water efficiency
- Dual flush toilets will be fitted at a 4 star level throughout, which use 75% less water per flush than an average toilet and perform as effectively as an average toilet when the bowl shape is correctly matched.
- All apartments will have 4.0 star kitchen taps which use 66% less water per minute than average tap fittings, and 5.0 star bathroom taps.
- All dishwashers provided are WELS (Water Efficiency Labelling and Standards) approved at a 4.5 stars for one bedroom apartments, 5.0 stars for two bedroom apartments and 5.5 stars for three bedroom apartments.

Rain collection

The harvesting of rain water is of key importance in all new developments as it reduces storm water loads, assists garden maintenance especially at times of water restrictions and reduces reliance on potable water supplies. Collection of the main roof areas will be made into a total of at least 10,000L of storage for local irrigation purposes.

Recycled Water

The Sydney Olympic Park Authority provide a recognised, recycled water scheme that treats waste water within the area for reuse in non-potable applications. Mirvac have elected to pursue this water saving initiative by providing the recycled water to all toilets and cold taps to provide to clothes washing machines. While these specifications are accounted for within BASIX, Mirvac have gone above and beyond the BASIX capabilities by also deciding to use this water source for a car wash bay and for use within the fire sprinkler testing service to further improve water efficiency.

Native Planting

There is now wide spread acceptance of the importance of planting appropriately for a particular area. 360 degrees landscape consultants were engaged to complete the landscape design and the vast majority of all plants nominated are to be robust and easy to maintain species. Many of the plant species have been selected specifically because they will require low water usage after they become established, reducing the amount of recycled water required for irrigation.







2.2 A detailed thermal comfort analysis has been undertaken on the development using Energy Conservation BERS Pro Plus, thermal simulation software approved under the NatHERS scheme. BASIX sets minimum heating and cooling caps for all new buildings.

Thermal comfort deals with how comfortable a person will feel within a space and whether, given the conditions around them, they may feel too hot or too cold. For the purpose of analysis thermal comfort is quantified in megajoules per metres squared (MJ/m²) per annum and is calculated by how often a particular design falls outside of a comfortable temperature range thus requiring mechanical heating or cooling to return it to the suitable temperature.

The thermal comfort results of the Fig Tree Development far exceed the required targets set by BASIX as a result of intelligent building design to allow for good control of natural ventilation and solar access.

Building Performance	BASIX Requirements	Improvements
Average Heating: 45 MJ/m2	Average Heating: 51 MJ/m2	12% less heating energy required
Average Cooling: 15 MJ/m2	Average Cooling: 45 MJ/m2	66% less cooling energy required

These reductions in heating and cooling loads directly relate to significant savings in energy required to air-condition the units with-in this development.

Natural Ventilation

Natural ventilation is an important component in reducing reliance on mechanical heating and air conditioning and this development will be taking full advantage of the regular and substantial breezes available, coming across the Parramatta River. The majority of apartments have at least two rooms that open onto balconies where large sash openings will permit refreshing air flow. 68% of the units below level 10 are suitably structured to allow for natural ventilation, which exceeds the minimum requirement of 60% of apartments. Apartments above level 9 are subject to greater exposure to breezes and should be even better placed to take advantage of cross ventilation.

Passive Solar Design

Aside from providing ventilation control the glazing on this building will also provide increased natural light penetration and simple control over solar heat gain through the adoption of external, shading screens to selected facades. The clear glazing being installed will be particularly beneficial during the winter months when natural light levels and external temperatures are low as it will allow for the greatest amount of solar heat gain.

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Given that the development is rectangular in nature and that there are four buildings throughout the development, there is no general orientation. However in Sydney, where heating loads are more prominent than cooling, eastern, western and northern facing units are favourable. Within this development only 4.7% of units are classified as not complying with minimum solar access to private open space due to either being south facing or overshadowed which is an excellent result for a dense, urban development of this design and size.

High mass walls, floors and ceilings will work harmoniously with the generous solar access to provide excellent thermal mass performance. Over 70% of the units will have over 2 hours of direct sunlight to glazing and 91% of those will have complying durations of sunlight to private open space. This will be particularly beneficial in winter when the dominant high heating loads can be offset with this stored, solar energy.

All external walls will be insulated which has a significant impact on the indoor comfort for every unit. Rooftop units will have insulation applied to the slab so the thermal performance of the top floor dwellings is not impacted by insulation losses from downlights, service ducts etc.

Air Conditioning

Detailed thermal analysis has been completed on this development and the results show that there is lower dependence on air-conditioning in these buildings than on an average residential dwelling. Accelerated wind speeds due to the heights of the buildings, proximity to the Parramatta River, covered balconies, external shading structures and high thermal mass all play a part to creating living environments that will naturally stay very comfortable year round. The landscaped public access areas and greenery within the central view corridor should also help to alleviate any urban heat island effect from surrounding roads, cars and buildings.

For the occasional day when additional heating and cooling will be required individual, reverse cycle, air-conditioning units have been provided.

The total cooling loads on this building are 66% lower than the allowable loads set by BASIX. The total heating loads on this building are 12% lower than the allowable loads set by BASIX.

Photovoltaics

Photovoltaic solar panels are a very efficient way of harnessing the suns energy and using it to power energy consuming devices. Mirvac are committed to exploring the viability of photovoltaic deployment on some rooves subject to detail design. If installed they will used to provide electricity for the common areas of the project.



Lighting

Lighting throughout the Fig Tree Development has been considered from an energy efficiency point of view and designed with low watt fittings such as LED and control strategies to ensure energy consumption is kept to a minimum.

Lighting within units

Compact fluorescent lights (CFL's) or LED's will be used in all bedrooms, bathrooms, hallways and laundries. Skylights will be employed where available and will increase the availability of natural light while also increasing the ability to purge warm air from the unit during summer months.

Lighting within common areas

The car park areas will have fluorescent lighting. These will have selected lights on at all times for safety reasons and only when someone moves into the space, motion sensors will activate the rest of the lighting.

All service rooms will have fluorescent lighting with switching to suit the usage patterns of the space.

All common hallways within the development will have LED lighting and as per the car park area, low level lighting will stay on all the times until someone moves into the space and motion sensors will activate the rest of the lighting. The BASIX hallway lighting requirement specifies an LED lighting solution for this area to further reduce energy requirements and ongoing maintenance costs as the life of an LED light hugely exceeds that of comparable halogen or fluorescent light fitting.

The lighting to the common, outdoor areas will have daylight sensors to ensure that artificial lighting levels are synchronised with dynamic natural light levels to maximise energy efficiency and the safety and productivity of the communal space.

Hot Water

Hot water heating is always one of the highest energy consumers in any residential dwelling. A multi-unit development has the benefit of grouping the hot water needs of the buildings into a central plant.

The hot water heating system will be delivered through two or three centralised gas fired boilers for the buildings. Heat losses through the ring main and supply risers can be significant and Mirvac will be using at a minimum, industry standard insulation to the ring main.

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2.3 Low Volatile Organic Compounds (VOC) Materials

Material Selection and Waste Management Paints, glues and sealants are the major cause of poor indoor air quality in a newly constructed dwelling and often contain ingredients that can lead to fatigue, headaches and more serious conditions such as Multiple Chemical Sensitivity. These issues can be drastically reduced by selecting products that are low in volatile organic compounds (VOCs) and enhancing natural ventilation.

Mirvac is committed to reducing the impact of VOCs on the quality of the indoor environment by selecting products that contain low levels of VOCs. This includes readily available and commercially favourable paints such as Taubmans Pure Performance.

Waste Management Plan for Construction

Mirvac is aiming to reduce the amount of waste to land fill by adopting the waste management hierarchy of avoid > reuse > recycle > dispose in the civil and infrastructure phases. The following outlines waste management procedures to be carried out to assist in reducing waste. Waste generated during the construction of the project shall be avoided or recycled wherever practical. Waste targets are >80% diversion of waste from landfill by recycling, reuse, design or other methods.

Waste Management Plan for Operations

The waste management plan for this development is intended to reach the following outcomes:

- Avoid the unnecessary generation of waste
- Minimise the amount of waste that will be end up in landfill
- Recover, reuse and recycle as much waste generated on site as possible
- Strive to achieve the waste minimisation targets and procedures required by council

In a residential building the success of the waste management plan is highly influenced by the behavioural practices of the residents and their active participation. This development aims for successful integration through an education program on how to correctly dispose of waste and by providing mechanised chute doors for both garbage and recycling in each building.

Furthermore, there will be provision for less common wastes such as bulky goods, electronic, liquid waste and chemicals, the disposal of which will be organised by residents through the building manager. Composting has also been considered, and residents will be permitted to purchase and install their own apartment style compost bins.





3. Shaping the Future of Place

Mirvac are undertaking a holistic and integrated approach to place making, built form and planning processes to ensure that they deliver an authentic infrastructure experience. This includes looking at all aspects of transport, the impacts and methods to reduce all forms of pollution, encouraging the increased biodiversity of both flora and fauna and how public open spaces can act in a favourable way on the health and happiness of residents.

3.1 **Public Transport**

Transport The proposed site is well serviced by nearby public transport. Bus stops are located on Australia Avenue and Olympic Boulevard with services running to all of the nearby major centres such as Parramatta (#525), Burwood (#450, #525, #526), Chatswood (#533), Strathfield (#X25) and Lidcombe (#410).

The site is located within 500m walking distance to the Olympic Park Railway Station, which offers frequent services to Lidcombe Station (every 10 minutes during weekday and weekend peak periods). Train services between Lidcombe Station and Central Station run on average every 5-10 minutes during weekday peaks. Concord West Railway Station is also located nearby within an 18 minute walk through the adjacent parklands and provides connections to the T1 Northern Line with trains running every 15 minutes between Central and Concord West.

Car Sharing Services

The proximity of the development from local office space, DFO Outlet Centre and public transport facilities will likely reduce the necessity for tenants to use private motor vehicles. Nearby councils such as the City of Canada Bay Council have indicated that *"each share car replaces between 8 and 23 private car parking spaces."* Furthermore, car share spaces will not only reduce requirements for car parking but will result in higher local air quality, reduced traffic in the vicinity and will encourage community interaction.

The Fig Tree Development will provide 2 Car Share spaces within the development.

Pedestrian and Bicycle Access

The area boasts significant access to pedestrian and bicycle pathways. Bicentennial Parklands are less than 1km from the development and have 40 hectares of mangroves, open fields, walking and running paths, cycling and skating paths and gardens.

Sydney Olympic Park has over 35 kilometres of cycleways which form part of various

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scenic bike circuits. These tracks are utilised by recreational riders as well as experienced cyclists. In addition to these routes, on-road cycleways are located along Australia Avenue, Sarah Durack Avenue and Dawn Fraser Avenue.



Bicycle parking Facilities

Allocation of 604 bicycle parking spaces has been provided within the site that provide for residents, residential visitors, retail employees and retail visitors.

Motorcycle Parking

3.2

Pollution

Motorcycles have considerably better fuel efficiency than cars and contribute far less pollution to the environment. The development will provide 25 dedicated motorcycle parking spaces which will provide additional encouragement for residents to make use of these smaller and more efficient vehicles.

The reduction of all varieties of pollution will be an important part of the 'This Changes Everything' framework through the adoption of some of the following initiatives:

- Water Pollution: There will be improved stormwater quality at discharge via the use of storm filters, which is particularly important given the nearby, sensitive mangroves.
- Air pollution: The majority of local air pollution created on the site will come from vehicular sources and through the provision for car sharing spaces, bicycle storage, motorcycle parking and high density housing with retail facilities,

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vehicular activity has been minimised along with the associated emissions.

- Noise pollution: Acoustic treatment to glazing and building systems to minimise noise from the nearby rail corridor, adjoining properties, people attending nearby major events and vehicle noise.
- Light pollution: Care will be taken to ensure that all public lighting systems will project light onto nearby buildings or surfaces rather than into the sky.
- 3.3 Natural vegetation has been carefully selected to be compatible with locally found flora and fauna including the sensitive, native wetlands nearby. Two majestic s are to be retained and another to be relocated so that some of the existing bio-habitat will continue sustaining local biodiversity.

This natural vegetation will likely result in low water requirements and will also help to provide a soft, safe environment for the children. Vegetation will also encourage local bio-diversity such as birds, provide shade and dampen noise to units above.

3.4 Gardens

Public Open Spaces

The Fig Tree Development intends to create two spaces where residents can retreat from the noisy suburban environment and congregate in a tranquil, landscaped space. Being large, accessible elements of the development, it will encourage a sense of community and belonging within the local area.

This initiative will help create a sense of community within the complex with more opportunities for neighbours to meet and socialise. Outdoor furniture will accompany this space to make a relaxed and enjoyable zone for all residents to enjoy.

Community Space

In the interest of community integration, Mirvac will be providing a communal room facility for the exclusive use of residents with covered spill out space to encourage integration and harmony for residents.

Play Areas

Play areas enhance the creativity and enjoyment of children by encouraging intriguing play and learning opportunities and are a significant drawcard for bringing the younger residents together in a fun, social atmosphere.





4. Smarter Thinking

Mirvac are taking sustainability beyond the typical approach by recognising the importance of the interaction between technology and behaviour. It is no longer good enough to simply install efficient appliances and installations and assume that residents and contractors will operate them effectively.

4.1 Once the site becomes operational, common areas will be managed by building management but the majority of the energy consumption and waste generation will be from residents. It is therefore imperative that the residents are aware of and understand all of the available systems in place within the development for promoting environmental responsibility.

This information will be provided in a concise, easy to understand document that will educate residents on the principles of energy efficiency, water efficiency, responsible waste management and how technology and behaviour go hand in hand in such issues. And of course further to that, how interaction with the passive thermal design of the building is required to create a comfortable indoor environment.

4.2 Technology

Throughout the development, electronic systems will be intelligently controlled in order to realise maximum energy savings.

Carpark ventilation is necessary in accordance with the BCA and the mechanical ventilation systems will be controlled with a monitor to detect high levels of carbon monoxide and a variable speed drive (VSD) being used on the fans, which is more efficient than a single or two-speed drive. Plant rooms, lobbies and hallways will have thermostatically controlled ventilation.

Lighting controls will include daylight sensors on common area, outdoor lighting, time clocks working in combination with motion sensors to all hallways and lobby lighting, lift lights to be connected to lift call buttons and carpark lighting to be controlled by zone switching and motion sensors.



5. Enriching Communities

While BASIX is an excellent tool for encouraging sustainable practices in new residential developments, it is limited in its scope and ability to provide a completely sustainable solution. In order to really go above and beyond, a developer is required to show initiative, responsibility and creativity in order to create a truly sustainable product.

Mirvac have taken on this approach in the Fig Tree Development. The following initiatives have been planned to not only improve the functionality and sustainability of the development but importantly, to ensure that it fits congruously within the Sydney Olympic Park Master Plan 2030 and contributes to a greater sense of community for the Sydney Olympic Park area.

Community Activation

5.1 Residents welcome packages to include information regarding local businesses and amenities. These packages will also include details on community activities, proposals and ideas aimed at enhancing the health and wellbeing of residents.

Inclusion of 60m² communal room facility for the exclusive use of residents with covered spill out space to encourage integration and harmony for residents.

Children's play areas will also be provided and will create an environment for parents to escape the city and bring their children for an interactive and educational experience.

Natural playgrounds enhance the creativity and enjoyment of children by encouraging intriguing play and learning opportunities. Natural vegetation will likely result in low water requirements and will also help to provide a soft, safe environment for the children. Vegetation will also encourage local bio-diversity such as birds, provide shade and dampen noise to units above.

Affordable Housing

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Mirvac will also be delivering 3% of dwellings to the Sydney Olympic Park Authority, at no cost, for the purposes of affordable housing. These will be 'sprinkled' across multiple buildings and floors so as not to promote social exclusion





6. Conclusion

Mirvac have demonstrated through this comprehensive collection of sustainability initiatives that their 'This Changes Everything' approach to the Fig Tree Drive Development will do just that.

Through the process of reimagining resource use in the Fig Tree Development, Mirvac are on track to realise the ultimate goal of being net positive by 2030. Water conservation has been considered throughout every aspect of the development and involves recycled water for toilets and washing, rainwater collection for irrigation and high efficiency fixtures within all dwellings. Energy conservation begins with smart building design and construction to improve passive energy performance and reduce the need for air conditioning and heating. This is built upon through the adoption of high efficiency appliances and particularly through the extensive installation of LED lighting and intelligent control systems. In addition to the consumption of resources, the disposal of resources has also been considered across many aspects of waste management from the demolition of existing material on the site, through the construction phase to the operations phase which will involve waste disposal, recycling and bulky goods disposal.

The Fig Tree Development represents a holistic approach to the creation of a sense of place for the residents and local community. This is achieved by the integration of sustainable transport initiatives, procedures and design principles that see a reduction in pollution, the encouragement for a prospering biodiversity in and around the development and finally, creation of public, open spaces for the residents and community to enjoy and be a part of the future of place.

Mirvac have gone above and beyond the typical 'set and forget' approach to sustainability by understanding that the installation of efficient devices alone is not enough to create a truly smart and sustainable development. Mirvac realise that the ongoing behavioural practices of the residents and caretakers are paramount to successful sustainability and this has been achieved through the combined adoption of education and smart controls for all of the sustainable systems within the development.

Sustainability is not all about reducing environmental footprints but also involves considering the interaction of residents and the community and particularly the benefits that sustainability can bring to them. The Fig Tree Development will improve the day to day efficiency and enjoyment of people's lives by providing close and easy to access retail locations, children's play areas and transport and improving the diversity of the

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community through the provision of affordable housing.

The Fig Tree Development promotes a very outdoor, active and community spirited environment and the architectural form and style of the development fits well within the precinct values and is in line with the vision for sustainable cities of the future.

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