

SAFELINK – REST RECOVER EMPOWER

Project Summary

The Project Rest Recover Empower (RRE) aims to provide a purpose-built refuge for women and children experiencing domestic and family violence (DFV). The 6372 ft² (592 m²) attached housing complex will meet the desperate need for dedicated refuge housing in the Victorian community, providing a place of stability and support for families who are forced to escape from dangerous family situations. A 2015 Australian Royal Commission into Family Violence has prompted a focus on improving the support for victims of DFV, with Victoria committing to a Family Violence Housing Blitz to increase the number and range of crisis and emergency accommodation. In 2020, Victoria committed a further \$AUD 5.3 billion (\$USD 4 billion) to social housing, a portion of which will go towards housing for victims of DFV. We designed RRE as safe, temporary accommodation to meet the needs of our Design Partner (Kara House, a non-profit organisation which provides temporary housing for victims of domestic violence). Each of the 8 client units (+ 1 staff unit) in the complex integrates flexible layouts to maximise occupancy and to adapt to the high turnover rates associated with the facility. As a government-funded facility, the net-zero design will set a precedent for future projects, as well as ensuring minimal ongoing funding and maintenance.



Figure 1. Rendered site layout view from road. There are two attached unit blocks, with a multipurpose/office space and a communal garden in the center.

Design Strategy

Our goals for the RRE complex were to create a purpose-built space with a flexible layout and high security while ensuring ease of operations that appeals to stakeholders. Our design has the 'Occupancy Maximiser Layout', a flexible occupancy layout allowing a standard two-bedroom unit to become a one- or three-bedroom unit using a secure operable wall. In addition to the housing units, there are two indoor multipurpose spaces for occupant support including study, therapy, play, arts, interview and staff areas, and an outdoor communal garden and play area. Passive and active security measures have been implemented, including integrating the facade into the surrounding community, to ensure occupants feel secure, safe, and comfortable. The refuge was designed to be easy to maintain and operate for Kara House to respond to the client turnover rate of 4-6 weeks. Centralised building systems are designed to perform optimally all year-round during which the refuge operates. Finally, we are striving to appeal to all stakeholders by lowering operating and maintenance costs, and to demonstrate an attainable net-zero standard for government-funded refuge buildings.

Project Data

- **Location:** 115-119 Clayton Road, Oakleigh East, 3166, Victoria, Australia
- **Climate Zone:** 6, Mild Temperate (US equivalent zone 3c)
- **Building Size:** 6,372 ft² (592 m²) **Lot Size:** 23,411 ft² (2,175m²)
- **Layout:** 8 units (19 bedrooms, 11 bathrooms, 2 stories) + Multipurpose/Staff Area
- **Occupants:** 8 Women, 18 Children, 1 Overnight Staff
- **Estimated unit utility cost:** \$USD 38/month (\$AUD 50/month)
- **Estimated site operational cost:** \$USD 8,552/year (\$AUD 11,200/year)
- **HERS:** 48 (without PV); -22 (with PV)

Technical Specifications

- **Window U-value:** 0.26 BTU/hr·ft²·°F
- **Wall, foundation, and roof R values:** 20, 13, 72 ft²·°F·hr/BTU, respectively
- **On-site solar photovoltaics:** 31.8 kW DC roof-mounted
- **Solar Battery:** 4x10 kWh
- **HVAC:** Reverse-cycle ducted air-source heat pump for heating and cooling; heat recovery ventilator (HRV)



Figure 2. Split view of the interior layout of a standard 2-bedroom unit, showing downstairs (left) and upstairs (right).

Project Highlights

Architecture

The *Occupancy Maximizer Layout* accommodates for varying family sizes by changing which unit can access the upstairs bedroom. The accessibility unit is designed to the Platinum Level of the Liveable Housing Australia Design Guidelines (similar to Americans with Disabilities Act Standards for Accessible Design) to meet the varied needs of clients. Additionally, passive safety features of the RRE complex include an inconspicuous design that blends into the neighbourhood and a communal open space that promotes a sense of community.

Engineering

RRE's dual plumbing system reduces annual mains water consumption by using collected and recycled rainwater for non-potable demands, such as toilet flushing and clothes washing. Additionally, native vegetation, water-efficient appliances, low flow taps and showers, and grey water for irrigation, will all be used. The units are designed with centralised utilities to decrease plumbing infrastructure. The complex uses security cameras and sensors in all access and critical points for security.

Market Analysis

There is a high demand for refuge housing since DFV cost Australia \$AUD 22 billion (\$USD 16.7B) in 2015. In 2016, \$AUD152 million (\$USD114M) was committed to the Family Violence Housing Blitz, to fund refuge housing projects such as this. This design reduces ongoing utility and maintenance costs which reduces the burden on fundraising and maximises the use of government funding. The building cost estimates are within the \$AUD 3.5 million (\$USD 2.67M) budget, as advised by Kara House.

Durability and Resilience

The selected insulating materials prioritise both acoustic and thermal insulation suitable for Melbourne's mild climate. Cross-laminated timber (CLT) will be used as a support structure as it is resistant to moisture and fire. Stored harvested rainwater and permeable paving materials will provide drought resilience and manage stormwater, respectively. Native plants in the sensory garden will minimise maintenance. Solar batteries will allow RRE to be self-sufficient during utility outages and hail-resistant solar panels increase durability.

Embodied Environmental Impact

Installation of a Unipod slab design and Wagner's Earth Friendly Concrete allowed for a reduction of embodied emissions of the foundation slab by more than 65%. Recycled materials were prioritised, including Comcork flooring which can be locally sourced in Australia and is 100% recyclable. Light weight construction with CLT panels reduces building time and material wastage. A slightly oversized solar array limits reliance on the local grid and offsets 59 tons of CO² each year.

Integrated Performance

The orientation of each unit maximises the northern facade (as necessary in the Southern Hemisphere) to support passive lighting and heating. This design also maximises north-facing roof space for solar power generation. A common floor plan is mirrored between the left and right attached unit blocks, maintaining effective daylight provision in high frequency living areas. Native trees create shading of the outdoor spaces and ensure privacy, without requiring excessive water or maintenance.

Occupant Experience

Consultation with Kara House ensures the design meets the specific needs of the occupants and staff. Alongside purpose-built units, the complex includes indoor and outdoor multipurpose areas to facilitate client recovery, through rehabilitation and therapy programs. Dedicated office spaces, storage, and a unit for staff to stay on-site, are included to meet the facility requirements and to enable operability of the refuge.

Comfort and Environmental Quality

Air source heat pumps are used for the facility's hot water and for heating & cooling separately. Reverse-cycle ducted air conditioning maintain a comfortable internal temperature within the units. A HRV with F7 filters maintains internal air quality. Acoustic insulation ensures soundproofing between the dwellings, especially in the operable walls.

Energy Performance

Energy requirements are minimised through energy efficient appliances and energy use load shifting for periods of peak renewable energy generation. On-site renewable electricity generation will consist of a 31.8 kW solar panel array, as well as 4 x 10kWh solar battery, to cover the facility's energy requirements. A virtual power plant allows solar energy to be exported to Kara House's neighbouring transition homes, further reducing overall operational costs.