GOVERNMENT OF
WESTERN AUSTRALIA

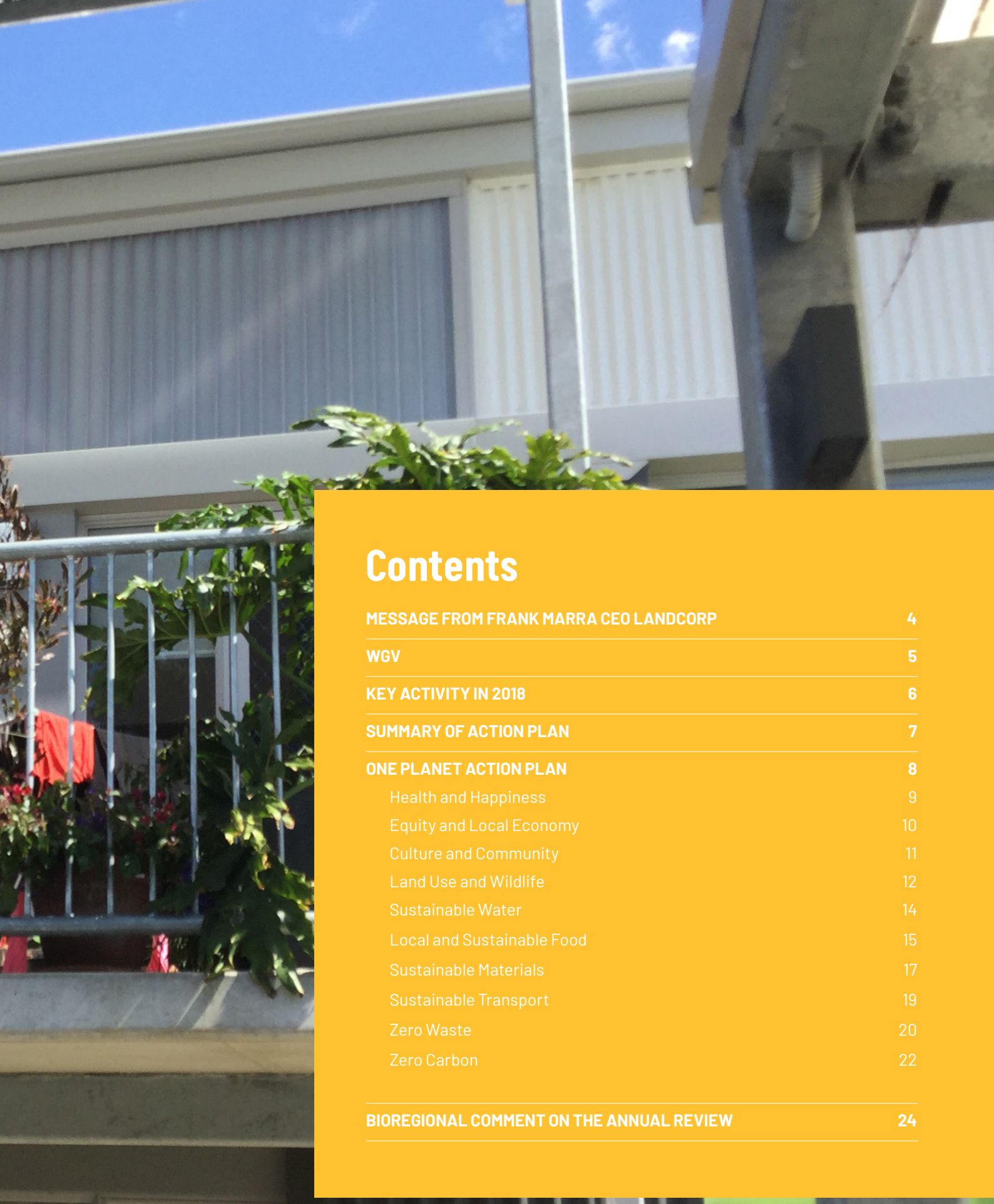
WGV

One Planet Action Plan

2019/20 Review

Shaping our State's future

DevelopmentWA



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Message from the Chief Executive

As the land development agency responsible for delivering WGV at White Gum Valley, we are very proud to have achieved Western Australia's first internationally endorsed One Planet Community back in 2016.

As one of our 'Innovation Through Demonstration' projects, WGV was the focus of a four year 'living laboratory' research program with the Cooperative Research Centre for Low Carbon Living to monitor the performance of the estate's building typologies and renewable energy technologies, particularly the Gen Y Demonstration House, and to share the results with the wider community and industry.

This review represents the fourth and final review of WGV's annual progress for 2019/20 in delivering on the One Planet principles and the results are very rewarding.

WGV is a zero-carbon development that has already created a strong sustainability culture amongst its residents and set a benchmark for the industry locally and globally. WGV is the product of collaboration between State and Local Government private developers, and the community to deliver a more sustainability form of urban infill development.

For a small project WGV has a wide range of housing typologies onsite – and yet the actual (not modelled) data shows that the site is a net exporter of electricity. Water management has been just as successful, with a 65% reduction in scheme water use compared with the Perth metro average. A truly Waterwise development exemplar. A third of the single lots are timber frame, which is relatively rare in Perth, so these houses have very low embodied carbon as well as a zero-carbon operational footprint – a fantastic achievement.

The Sustainable Housing for Artists and Creatives (SHAC) has proved to be a hub of community activity for not only WGV residents but the broader community as well. The effort to educate residents such as Sustainability workshops, has helped create a community with a strong sense of not only belonging but sharing. This ranges from sharing tools, lawnmowers and surplus food produce to families co-owning an electric vehicle. The site has been successful in reducing car ownership and encouraging food growing.

We continue to embed the key principles of the One Planet framework into new projects such as East Village at Knutsford, a stone's throw from WGV to ensure our development legacy stands the test of time.

WGV

This Innovation through Demonstration project has transformed the Kim Beazley Special School site and provided a diverse range of housing styles and living options, including; apartments, townhouses, maisonettes, and single dwellings, delivering more than 80 dwellings. Sited on Stevens Street, opposite Booyeembara Park and Fremantle public and private golf courses, the two hectare site is now a residential estate which is sympathetic to the community and environmental aspirations of the surrounding suburb.

This 2019/2020 One Planet Living (OPL) review has been conducted by Dr Jessica Breadsell from the Curtin University Sustainability Policy (CUSP) Institute. Data collection to inform this review included a survey distributed to all households within WGV (response rate 25 per cent, n=18 individual survey responses) and a small focus group held for residents (n=2). The surveys and focus group notices were distributed to all residents of WGV through email, letter drop and social media posts on the WGV Eco Village Facebook group in September and October 2020. Questions were grouped under the themes of the OPL targets and indicators. A waste audit of all single lot houses and the Gen-Y apartment block was undertaken over a two week period in November 2020 to address the Zero Waste targets. During these audits, data on the number of car spaces per dwelling at WGV was also collected.

Desktop data collection from previously published research work undertaken during the five year longitudinal study of WGV by Curtin University was also included in this report. This includes the results of the performance modelling of the energy and water systems in the dwellings and insights collected on multiple OPL targets throughout the interviews and workbooks completed by a cohort of residents across all housing typologies before and after they moved into WGV.

Key Activity in 2019/20

Project component	Type of units	2016	2017	2018	2019/20
Sustainable Housing for Artists and Creatives (SHAC)	12 x 1, 2 and 3 bedroom apartments plus 2 artist studios	Broke ground: August	• Completed: July • Opening event: August	• Complete	• All units occupied
Gen-Y House	3 x I bed Apartments	Broke ground	• 290 visitors when open • Sold April 2017	• Completed	• All units occupied
Evermore	24 x 1,2 &3 bedroom apartments	Planning application made	• Under construction	• Completed in August 2018 • First occupants in August 2018 • Approximately 15 of 24 units sold	• All units occupied
Single lots - 24 lots	Standard townhouses (20)	First design meetings with residents	• 4 occupied	• All sold	• Most units are occupied or in final stages of construction • Gen Y and Djildit completed and occupied • Share house occupied
	Twin maisonettes	All sold	• 4 nearing completion	• Most units are occupied or under construction	
	A share-house and two compact multi-unit plots (Gen Y and Djildit) Under construction		• Under construction	• Under construction	
Baugruppe			• Advertising and sales	• DevelopmentWA expected to fund balance of apartments ensuring that it will proceed	• Subdivided into lots for single houses and a smaller • Baugruppen to occur in 2021
Townhouse plot - lot 11	6 x Standard townhouses		• Redesign and application in processs	• New planning prosposal submitted	• Subdivision into six lots approved. All lots sold and two builds completed

Housing Updates 2019/2020

- Lot 11, originally a maisonette site, has been subdivided into six lots with one lot of common property, all have been purchased with two completed build of house.
- The Baugruppen lot has had difficulty securing interest and investment, it will be subdivided into smaller lots, similar to lot 11, with some houses and a smaller Baugruppen site.
- As of November 2020, there were 65 dwellings completed, including 24 houses, two multi-units, three Gen Y, 12 SHAC and 24 Evermore apartments.

Summary of Action Plan

One Planet Principle	Headline goals and targets	2020 Status and progress
Health and Happiness	Foster a strong sense of community	Surveyed residents know a range of 5-80 people by name, average 30 residents/person
	Foster a healthy community	85 per cent of residents surveyed undertaking regular exercise
Equity and Local Economy	Ensure a diversity of housing type and tenure	Seven different dwelling typologies completed. Baugruppen site is being subdivided and a smaller Baugruppen will be located along with single residential lots
	Encourage residents to engage in fair trade and local economy programmes.	Interviewed residents use local shops and markets weekly, with an average of 20 per cent of products purchased by surveyed residents being fair trade items
Culture and Community	Create a culture of sustainability	Curtin research program completed. Surveyed residents report attending approx. 15 sustainability related events per person per year
	Create a culturally vibrant community	Frequent events, workshops at SHAC, gardening events site wide. Surveyed residents report attending approx. 22 community events per person per year
Land Use and Wildlife	Create two new habitats	Sump Park and Green Link habitats complete
	Contribute to an increase in biodiversity	Nestboxes occupied 87 per cent of the time during monitoring by five different bird species including both target species
Sustainable Water	Reduced potable water use by 75 per cent	65 percent average reduction in potable water use achieved across WGV to 70l/p/day
	Reduce flooding risk – 100 per cent of stormwater treated onsite	All stomwater is treated onsite through underground drainage infiltration cells
Local and Sustainable Food	Access to food growing space (100 per cent of dwellings)	All units have access to food growing spaces – with 89% of surveyed residents growing some food
	Edible landscaping (30 per cent of landscape trees)	30 per cent of planted trees are fruit trees with ten or more varieties present across WGV. Lemon trees are the most popular and regularly utilised tree
	Encourage sustainable and healthy purchasing habits	72 per cent of households surveyed shop locally and/or use home grown produce for fresh fruit, vegetables and local meat. The average total food shop of surveyed households is 27 per cent locally purchased or home grown
Materials and Products	Reduced embodied energy of construction	All housing types have initiatives in this area – 1/3rd of single lots are lightweight frame
	Sustainable materials in operation	A high rate of sharing was identified between residents in interviews and surveys. This included tools, food, plants and cars
Sustainable Transport	Enable a sustainable transport carbon footprint	EV charging stations at SHAC and Evermore, some residents report sharing car rides to shops or events. Three households have bought an EV to share
	Reduced private car ownership	Approximately 1.3 spaces per household, surveyed residents report average 1.3 cars/household
Zero Waste	Maximise construction waste recycling (95 per cent)	80-90 per cent achieved
	Reduction in household waste in operation (30 per cent)	67-87 per cent reduction in household waste
	Recycling rate of household waste (70 per cent)	Average diversion of waste from landfill rates of 74 per cent across WGV single lot dwellings
Zero carbon	Maximise energy efficiency (34 per cent reduction)	Reduction of 27-57 per cent
	Renewable energy generation (100 per cent renewable energy)	Across the year, there is a site wide net export of energy, exceeding this target

One Planet
Action Plan

As the land developer DevelopmentWA (formerly LandCorp) does not ultimately construct the buildings, but has made every effort to facilitate the creation of a community where it will be possible to live a One Planet Lifestyle. The key mechanisms that DevelopmentWA have utilised include:

Design Mechanisms

- Design Guidelines for both the single lots and the apartment sites including:
    - Mandatory inclusions
    - Suggested considerations for buildings and gardens, in guidance and free design workshops
- Developer brief and engagement: the brief for developers of the apartment sites and DevelopmentWA partnerships with Curtin University Sustainability Policy Institute (CUSP) and Australian Renewable Energy Agency (ARENA) on how to best achieve objectives

Incentives and guidance

- WGV Sustainability Upgrade Package:
    - Single lots: An upgraded solar PV system from 1.5kW to 3.5kW system to cover annual energy consumption, a rain tank plumbed into the house, mandatory third pipe system for garden irrigation, a mature shade tree
    - Apartments: Funding application for PV and battery system in place throgh ARENA grant
- Design Workshops: both group and one-on-one sessions with buyers

Community engagement

- Guide for Residents provided when they moved into WGV outlining the OPL framework and providing additional sustainability resources for them
- Links to community groups provided in Residents Guide as an alternative to an intranet
- Partnership with City of Fremantle to maximise community engagement
- CUSP research program titled "Mainstreaming Low Carbon Housing Precincts- the WGV Living Laboratory" was undertaken from 2015 to 2020, analyzing the technical and social aspects of WGV

Health and Happiness

	Goal	Target	Baseline	2020 status
HH1	Foster a strong sense of community	> nine neighbours known by name	n/a	Surveyed residents know a range of 5-80 people by name, average 30 people/person
HH2	Foster a healthy community	> 50 per cent of people taking regular exercise	n/a	85 per cent of residents surveyed undertook regular exercise

Key developments

- Through the resident survey, residents identified that they knew between 5-80 neighbours by name.
- 85 per cent of residents surveyed reported meeting the Australian Government recommendations for weekly exercise. Most people responded that they walk around WGV and surrounding neighbourhood, utilising the green spaces. Cycling, gardening, running and yoga were identified as popular activities.
- Sense of community was a strong motivating factor for most residents moving into WGV as reported in the five year monitoring project run by CUSP.

Equity and Local Economy

	Goal	Indicator	Baseline	2018 status
EQ1	Ensure a diversity of housing type and tenure	> five housing types > 10 per cent affordable	One-two housing types	Cooperative Housing (SHAC), Gen-Y house, single and multi- unit self-build all completed, including a privately run share house. Baugruppen project will include a range of one, two & three bedroom unit sizes.
EQ2	Encourage residents to engage in fair trade and local economy programmes	Percentage of residents considering this in purchase decisions		72 per cent of households surveyed shop locally and/or use home grown produce for fresh fruit, vegetables and local meat. The average total food shop of surveyed households is 27 per cent locally purchased or home grown.

Key developments

- SHAC (12 units) is a government subsidised affordable housing development for low income earners. Gen-Y (three units) was built on a 250sqm lot and affordable against market prices for the local area. Along with the Evermore apartments, they each have shared services between the dwellings to reduce costs for energy and water services. Evermore also has 25 per cent wheelchair accessible units.
- Evermore apartments are all sold and occupied, however market turnover is occurring with new owners or renters in some apartments. SHAC and the share house are occupied, some single lot houses have flat mates. All other single lots have either finished being built or are close to completion.
- The Baugruppen development has encountered problems acquiring funding and interested parties. The site will now be subdivided into smaller lots for single houses and a multi-unit site for a smaller Baugruppen development. This will take considerable time to achieve, planning and design nine months, construction 18 months.
- Lot 11 has been subdivided into six lots. Two have completed their build and are occupied, the other four are sold but building has not yet commenced.
- In the resident survey, an average of 22 per cent of items purchased by households were reported as fair trade. Residents surveyed reported a range of 0-70 per cent of food or groceries coming from local shops, markets or home grown produce. Use of local markets and shops is frequent with some consideration of organic or sustainability sourced meat, eggs and seafood occurring.
- Many residents reported in the survey that they changed to working from home arrangements during COVID-19 social distancing measures in March to June 2020. Most people had not worked from home previously, some have continued some form since the social distancing restrictions have lifted.

Culture and Community

	Goal	Target	Baseline	2020 status
CC1	Create a culture of sustainability	High levels on participation rates in sustainability related events		Curtin PhD research program to assess the technical and social aspects of WGV has been completed, with involvement of WGV residents. Approx. average attendance at 15 sustainability related events per person per year as reported in the survey by residents
CC2	Create a culturally vibrant community	Number of onsite cultural events per year (>5)		Frequent SHAC community dinners, SHAC organised events and workshops and Evermore organised gardening events. Average attendance per person at 22 community events in 2020 as reported by surveyed residents.

Key developments

- The WGV Eco Village Facebook group and SHAC Facebook group continue to have frequent postings and engagement by residents. These posts relate to events, sustainability news or tips and sharing of items or produce between residents. Approximately 80 per cent of residents surveyed indicated they were a part of the group. Both of these Facebook groups are open to individuals outside of WGV as well to promote sharing and engagement in activities. The WGV Eco Village group, along with other social media and directly talking with people, is the main way residents keep in touch with each other as reported in the surveys, focus group and interviews.
- Some residents in the interviews and focus group expressed a desire to have more communication opportunities within WGV that are not via the Facebook groups for those who do not use the platform regularly. A community notice board was suggested by residents.
- SHAC continues to host a number of creative events, some sustainability focused, each month, including art shows, workshops and entertainment events that are well attended.
- According to residents surveyed and in the focus group, the COVID-19 social distancing measures did reduce the number of events held at WGV and community interaction but this has mostly returned to pre-COVID levels since.

Land use and Wildlife

	Goal	Target	Baseline	2020 status
Lu1	Create a culture of sustainability	Two new habitats	Low ecological value	Sump Park and Green Link complete
Lu2	Contribute to an increase in biodiversity	Number of species, population of species (20 per cent and 10 per cent increase)	Brownfield site of low ecological value	Nestboxes were used 87 per cent of the time by five species in total, with the two target species occupying them 69 per cent of the time

Key developments

- A Green Link that connects the front verges of single lot households within WGV and the surrounding streets has been completed and the Sump Park continues to thrive. Residents report enjoyment in walking through the park for exercise or travel in the survey, focus group and interviews. The BBQ park area and the sump are the most utilised features as reported by residents in the survey.
- Gardening events hosted within WGV and in the local park are well attended, these are coordinated by residents in SHAC and Evermore.
- To assess the site biodiversity, nestbox monitoring occurred for three years over 2016-2019, with eight nestboxes of two different designs being located within WGV and eight in the neighbouring golf course. Six out of eight nestboxes in WGV had confirmed breeding activity during the monitoring periods, some being used repeatedly over subsequent seasons, with nine breeding occurrences confirmed in total.
- There were two target bird species for these nestboxes, the Australian Ringneck and the Striated Pardalote. These two species were observed in the nestboxes 69 per cent of the time and they used both designs of nestbox to a similar degree during monitoring. However three other species outside the target species (Rainbow Lorikeet, bees and ants) were also observed to use the nestboxes, while Galahs were frequently seen around the nestboxes but never recorded using them.

Adult Australian Ringneck in constructed box (left) and feathered Australian Ringneck chick at entrance of installed log (right)

SHAC

CREATIVE SPACES
FOR CREATIVE PEOPLE

Biodiversity ReVIVAL

a SHAC PROJECT

ART EXHIBITION: Colab2 Gallery, SHAC, 3 Cower Mews, White Gum Valley (behind Sullivan Hall) **Open: Sat 19th Sept. Until: Wed 30th Sept.**
Times: 11am - 4pm Fri, Sat, Sun (or by appointment Lynne 0476 302 269)

SUSTAINABILITY DAY: Sullivan Hall, cnr Stevens and Nannine St, WGV.
Bookings by EVENTBRITE. (Limited space available). Adult Entry Fee $10.

Sat 19th Sep, 11am – 3pm

A PROGRAM OF PRESENTATIONS AND POETRY
with the theme of Biodiversity Revival
Tea, coffee and a light lunch available from 1pm

shacfreo.com

Sustainable Water

	Goal	Target	Baseline	2020 status
SW1	Reduced potable water use	50 l/p/day (75 per cent reduction over baseline)	200l/p/d	A reduction of 65 per cent potable water use was achieved across WGV. Different housing typologies achieved varying levels of reduced usage, including: Single lots: 51 per cent reduction Attached: 73 per cent reduction Apartment: 75 per cent reduction
SW2	Reduce likelihood of flooding	100 per cent of stormwater treated onsite	100 per cent onsite infiltration	Underground drainage infiltration cells and Sump Park completed

Key developments

- A reduction of 65 per cent was achieved across WGV dwellings, compared to the Perth average. This consists of 73 per cent mains water reduction in attached dwellings, 75 per cent mains water reduction in apartments and 51 per cent mains water reduction in single dwellings compared to the Perth average.
- Water efficient appliance standards have an immediate impact on the reduction of mains water use. Smaller household size in apartments is also likely to contribute to the large water use reductions compared with the single dwellings. The lower reduction in single dwellings may also be to do with some dwellings not choosing to connect to the community groundwater bore, having larger gardens or not yet having a fully operational rainwater tank. There is a noticeable decline in mains water consumption over winter, supporting this assumption. Landscape initiatives and smaller garden sizes, with efficient irrigation systems has also mitigated this effect compared with the typical Perth home. Across WGV, 77 per cent of water is consumed indoors with 23 per cent used in outdoor irrigation purposes, compared with 42 per cent used in outdoors Perth wide.
- Each household has access to a monitoring system for their energy and water levels, accessed via a webpage. This provides real-time information on their household consumption levels and shows an average level of the same typology and sitewide level also to allow comparison with similar households. Residents can also view their use of solar PV or battery energy. In the resident survey and interviews, households identified that they used the dashboard monitoring system around billing time, every two months.
- During the COVID-19 social distancing measures, there was a self-reported increase in water use due to residents staying at home more. Consumption has returned to pre-COVID-19 levels since.

Local and Sustainable Food

	Goal	Target	Baseline	2020 status
LSF1	Access to food growing space	100 per cent of households		All units have access to food growing, 89 per cent of surveyed households reported they use it
LSF2	Edible landscaping	30 per cent of landscape trees edible	Nil	30 per cent of planted trees are fruit trees of over 10 varieties. Lemon trees harvested most by residents
LSF3	Encourage sustainable and healthy purchasing habits	High percentage of households		Information about sustainable and healthy purchasing habits was included in the Residents Guide. Most surveyed residents shop local or use home grown produce for fresh fruit, vegetables and local meat.

Key developments

- 89 per cent of residents surveyed use their private food growing space in some form, from herbs to vegetables and fruit trees and there is a strong culture of sharing excess produce within WGV.
- Evermore and SHAC apartments have access to shared food growing space, however some of the single houses reported in the survey that they do not have much adequate space available.
- The space next to SHAC where the Old Fremantle Men's shed used to be is currently used by some WGV residents as a shared gardening space with planter boxes.
- The edible food trees within WGV are valued for their lemons and more variety has been requested by residents in the survey.

Sustainable Materials

	Goal	Target	Baseline	2020 status
SM1	Reduced embodied energy of construction	30 per cent reduction over baseline (Tonnes CO2eq)		One third of the single lots are built using lightweight frame techniques
SM2	Sustainable materials in operation	High participation rate in key initiatives		Information provided in the Resident's Guide. Interviews and survey's show a high rate of sharing between residents for tools, food, plants and cars.

Key developments

- There is an open sharing culture between residents for a range of items from food, tools, plants, cars, furniture, household items and lawn mowers to looking after neighbours pets and getting shared food delivery each week. This is facilitated through the Facebook group, signs out the front of their houses or personal interaction with residents.
- Three households in Evermore and SHAC have privately purchased an EV which they share and charge in the Evermore charging station.
- As reported by residents in the survey and focus group, COVID-19 reduced some sharing practices but they have returned to pre-COVID social distancing levels since.

Sustainable Transport

	Goal	Target	Baseline	2020 status
ST1	Enable a sustainable transport carbon footprint	< 1 tonne co2eq/capita	3.85 Tonnes CO2 Per capita (Garnaut Report)	EV charging stations at SHAC and Evermore. Car-pooling between residents to shops and events has been reported
ST2	Reduced private car ownership	< 1 car park space per household	Unrestricted?	Approximately 1.3 spaces per household, surveyed residents average 1.3 cars/ household

Key developments

- As of November 2020, there were 86 car spaces for 65 dwellings, equating to 1.3 spaces per household. There are 46 additional car spaces around WGV, of which about 20 are filled overnight. Almost every standalone house has a double garage, however it is not known if there are two cars in these houses.
- Survey results report an average of 1.3 cars per household.
- The EV car share arrangement with Synergy at SHAC has finished and the car removed. The charging station remains and Evermore has one EV charging station also.
- Three households in Evermore and SHAC have privately purchased an EV and share it amongst themselves for their private transport needs.
- In survey's and interviews with residents, they report that they car share to the shops or to attend events. Some residents will walk or cycle for local trips.
- In surveys, seven per cent of resident's reported walking to work during the week. 24 per cent used walking as a form of transport for other trips more than two days/week, whilst 16 per cent walked less than two days/week.
- 18 per cent of surveyed residents reported cycling to work, 17 per cent cycle for non-work trips more than two days/week and 24 per cent cycled for non-work tripcs less than two days/week
- Public transport (bus and train) is used by 21 per cent of surveyed residents to get to work, 20 per cent in non-work trips more than two days/week and 48 per cent of surveyed residents use public transport in non-work trips less than two days week.
- Bicycle racks have been installed at SHAC and Evermore and are well used. Some standalone houses have bicycles stored in their garages.
- Survey results show that the self-reported frequency of travel by residents decreased during COVID-19 social distancing and work from home measures and has mostly resumed to previous levels by November 2020.

Zero Waste

	Goal	Indicator	Baseline	2020 status
ZW1	Maximise construction waste recycling	> 95 per cent recycled	38 per cent State Waste Strategy 2012	Households that used the Earth Care Recycling scheme during con-struction achieved about 90 per cent, while the Evermore apart-ments achieved 80 per cent recy-cling of construction waste.
ZW2	Reduction in household waste in operation	30 per cent reduction (kg waste / capita)	Using 2014/2015 baseline	In the single lot houses there is an average of 67 per cent reduction in waste. In the attached households there is an average of 87 per cent reduction in waste.
ZW3	Recycling rate of household waste	>70 per cent recycling rate	45 per cent diversion from landfill using 2014/2015 baseline waste figures	The single lot houses have an average of 17 per cent waste recycling rate with an average of 75 per cent of total waste diverted from landfill. The attached household have an average of 20 per cent waste recycling rate with an average of 73 per cent of total waste diverted from landfill.

Key developments

- All households except SHAC and Evermore had a Food Organics Garden Organics (FOGO) recycling bin system introduced in late 2019. SHAC and Evermore have collective recycling and general waste bins per complex.
- SHAC and Evermore have an additional separate waste management system that is independently implemented by the residents. This system manages soft plastics, cans, bottle, and cardboard. Some residents mentioned in interviews taking on the role of waste champions helping other residents learn about the system and label the bins/collection areas.
- SHAC and Evermore also each have a communal compost systems to use on gardens and some standalone households have their own compost systems or use FOGO.
- Greenbatch bins have recently been acquired by a residents for use by all households. These are used for glass, plastic and cans. Residents may be placing these items in these bins instead of their household recycling bin, impacting household waste reduction figures.
- A waste audit of the single lot and attached households was undertaken in November 2020, measuring household waste generation for WGV[1] against 2014/2015 levels for the Perth metropolitan region. This found that for the single lot houses, there was a 67 per cent reduction of total waste per household compared with 2014/2015 baselines levels of waste in the Perth metropolitan region. The attached household have a 87 per cent reduction in total waste to the baseline levels of waste.

[1]SHAC and Evermore were excluded from the waste audit due to incomplete data.

Waste types	Average FOGO kg/person/year	Average Recycling kg/ person/year	Average General waste kg/person/ year	Total average waste kg/person/ year
Detached houses	512	116	165	794
Detached houses	167	62	86	3126
Detached houses	NA	1228	1209	2437

Key developments

- For the single lot houses, 17 per cent of their household waste is recycled and 58 per cent is FOGO, totaling 75 per cent of total waste being diverted from landfill. The attached household have 20 per cent of their household waste recycled, with 53 per cent of their waste composed of FOGO, totaling 73 per cent of total waste being diverted from landfill.
- Contamination levels in the household bins was also measured during the waste audit and reported as no contamination, level 1 contamination (1 or 2 contaminated items), level 2 contamination (3-4 items) or level 5 (more than 5 items). FOGO bins had a 32 per cent level 1 contamination rate, five per cent level 2 and 11 percent level 3. All level 1 contamination consisted of the wrong sort of bags being used to hold the food waste. The level 2 and 3 contamination was non-food or organic waste in the bin. The recycling bins had a higher level of contamination, mostly due to items not being washed, lids remaining on bottles, unrecyclable coffee cups and long life tetra cartons. There was a level 1 contamination rate of 72 per cent, no level 2 and 11 per cent level 3. These contamination levels can be addressed through better education of residents on appropriate items to place in the bins.

Zero Carbon

	Goal	Indicator	Baseline	2020 status
ZC1	Maximise energy efficiency	Sitewide 34 per cent reduction over baseline (kWh/m2/yr)	6-star NATHERS, Gas hot water, Standard air conditioning (2-star, single phase), Standard lighting	Performance monitoring shows the single lot houses have a 29 per cent reduction in energy, the attached households have a 27 per cent reduction and the apartment households have a 57 per cent reduction in en-ergy use
ZC2	Renewable energy generation	Meet 100 per cent demand net/year	0-14 per cent	There is a site wide net export of 3.5 kWh of energy per dwelling per day across the year, exceeding this target. The apartments import some energy each day but other dwellings are net exporters.

Key developments

- All typologies use less energy than the Perth average, with the apartments achieving the most reduction of 57 per cent on average. Single lot dwellings have an average 39 per cent reduction, while attached dwellings on average are a 37 per cent reduction to the Perth average. This reduction is due to a combination of energy efficient household design maximizing solar passive heating and cooling, energy efficient lighting and appliances and some behavior change of residents in their daily actions.
- Site wide there is a net export of energy of 3.5 kWh/dwelling/day across the year. The single lot dwellings, attached dwellings and the Gen Y apartments achieve net zero energy status where they are generating more energy than they use, exporting 12 kWh/day, 10 kWh/day and 06 kWh/day respectively. SHAC and Evermore apartments are close to net zero energy, importing 3.8 kWh/day and 5.7 kWh/day respectively. The large excess of solar PV energy generated and exported during summer offsets the input of grid energy needed during the winter when consecutive days of cloudy weather minimizes the solar PV energy produced.
- The apartment buildings have shared solar PV and battery storage systems. Work is ongoing to optimize the sharing of solar energy between households, provision of common property energy needs and to reduce grid exportation.
- The design of the dwellings reduces the need for mechanical heating or cooling. Some variation in the temperatures levels of apartment dwellings on higher floors has been observed in the CUSP research.
- The self-reported use of the dashboard monitoring system occurs more frequently than for water, being used every month by some residents. This indicates a higher level of interest in monitoring energy use than water by residents, possibly due to the presence of the solar PV and battery systems resulting in a financial and environmental gain for residents.
- Self-reported energy use during the COVID-19 social distancing period was higher due to residents being home more. This may have resulted in the solar PV systems energy being consumed more instead of exporting it back to the grid or the battery.

The Sustainable Development Goals

The Sustainable Development Goals (SDGs) are a set of 17 Goals and 169 targets developed by the United Nations to be achieved globally by 2030. They are wide ranging, universal and require action at all levels of government, business and society to be achieved. The One Planet Living principles aligns strongly with goals 11 and 12, creating sustainable cities and communities and responsible consumption and production, however there are links between all the goals and principles.

One Planet Principle	Headline goals and targets	Sustainable Development Goals
Health and Happiness	Foster a strong sense of community	SDGs 3 and 11
	Foster a healthy community	
Equity and Local Economy	Ensure a diversity of housing type and tenure	SDGs 7, 8, 10, 11, 12, 16 and 17
	Encourage residents to engage in fair trade and local economy programmes	
Culture and Community	Create a culture of sustainability	SDGs 4, 11, 12, 16 and 17
	Create a culturally vibrant community	
Land Use and Wildlife	Create two new habitats	SDGs 9, 11, 13, 14 and 15
	Contribute to an increase in biodiversity	
Sustainable Water	Reduced potable water use by 75 per cent	SDGs 6, 9, 12 and 14
	Reduce flooding risk – 100 per cent of stormwater treated onsite	
Local and Sustainable Food	Access to food growing space (100 per cent of dwellings)	SDGs 2, 10, 11, 12, 13 and 15
	Edible landscaping (30 per cent of landscape trees)	
	Encourage sustainable and healthy purchasing habits	
Sustainable Materials	Reduced embodied energy of construction	SDGs 8, 9, 11, 12 and 13
	Sustainable materials in operation	
Sustainable Transport	Enable a sustainable transport carbon footprint	SDGs 3, 9, 11, 12 and 13
	Reduced private car ownership	
Zero Waste	Maximise construction waste recycling (95 per cent)	SDGs 9, 11, 12 and 13
	Reduction in household waste in operation (30 per cent)	
	Recycling rate of household waste (70 per cent)	
Zero carbon	Maximise energy efficiency (34 per cent reduction)	SDGs 7, 9, 11, 12 and 13
	Renewable energy generation (100 per cent renewable energy)	

WGV by DevelopmentWA
Annual Review

Bioregional
Championing a better way to live

Bioregional comment on the Annual Review

Given the challenges we have all faced in 2020 it is so inspiring to see a project that continues to exceed its incredibly high levels of ambition. WGV has excelled in three areas technical performance, sustainability culture and wider influence.

Technical performance
For a small project WGV has a wide range of housing typologies onsite – and yet the actual (not modelled) data shows that the site is a net exporter of electricity. Water management has been just as successful, with a 65% reduction in use and 100% treatment of stormwater onsite. In terms of the energy and carbon emissions required to manufacture the building materials (embodied carbon), a third of the single lots are timber frame, which is relatively rare in Australia, so these houses have very low embodied carbon as well as a zero-carbon operational footprint – a fantastic achievement.

Culture of sustainability
The effort put into raising awareness amongst the residents, primarily through sustainability workshops, has helped create a community with a strong sense of sharing. This ranges from families co-owning an electric vehicle to simply sharing tools, lawnmowers and surplus food produce. The site has been successful in reducing car ownership and encouraging food growing.

That said, food and transport consumption patterns are not aligned with what the planet can sustain. Further initiatives are required to reduce the use of fossil-fuel-powered vehicles and encourage a shift to plant-based diets.

Wider influence
For such a relatively small development WGV is having a significant impact:

- On site, the multi-unit Gen Y house has inspired at least three other lots being developed as multi-units – with associated efficient use of materials and reduced parking.

- Several other sites in Fremantle and Perth, including East Village at Knutsford, have adopted the One Planet Living® framework. The success of these projects has helped the City of Fremantle develop the 'Freo Alternative' – an innovative planning mechanism pushing higher sustainability standards on small sites in suburban areas of the City.
- The involvement of Curtin University and DevelopmentWA's annual progress reports have created a wealth of knowledge for the industry. This has revealed some very useful insights, e.g. the high level of uptake of food-growing spaces has left some residents feeling there is insufficient provision of food growing space, highlighting the need to ensure sufficient access to growing space particularly in tight urban developments.

WGV is a zero-carbon development that has already created a strong sustainability culture amongst its residents and set a benchmark for the industry locally and globally. WGV has made a concerted effort to encourage residents to reduce car use and eat a more sustainable diet, but the gap between cultural norms and what the planet can support is so large that despite these efforts, most residents are probably still consuming more than their fair share of the Earth's resources. We need all developments to be matching the infrastructure standards of WGV and we need collaboration between developers, local and national government and the private sector to ensure that our default consumption patterns match WGV's sustainability performance. Then we will be on the path to One Planet Living®.

Summary table

This is the third peer review of DevelopmentWA's annual progress report in delivering its One Planet Action Plan. While this is a standalone document, it will be best understood if read in conjunction with DevelopmentWA's internal review. Bioregional uses a simple 'traffic-light' approach to review progress in meeting their targets.

Substantially or entirely completed, or with a high degree of certainty over deliverability	
On track for a long-term target or to be implemented in operational phase	
Substantially incomplete, behind schedule or doubt over delivery	

One Planet Principle	Outcome	Indicator & Target	Comment	Status
Health and Happiness	Foster a strong sense of community	On average know > 9 neighbours by name	Performance more than double the target, the culture of sharing demonstrates the strong sense of community.	
	Foster a healthy community	> 50 per cent of people taking regular exercise	Again target comfortably exceeded.	
Equity and Local Economy	Diversity of housing type and tenure	> 5 housing types > 10 per cent affordable housing	It is a shame to see the townhouses reverting to single lots and the Barugruppen site reduced. Nonetheless, seven dwelling typologies represents impressive variety.	
	Encourage fair trade and local economy programmes	per cent of residents considering these in purchasing decisions	WGV construction has provided a boost for the local economy, and this is continuing in operation with >70% of residents shopping locally.	
Culture and Community	Create a culture of sustainability	Number and participation rates in sustainability related events	Surveyed residents attended 15 sustainability-related events each year and a total of 22 events. The sharing culture created shows the impact this has had. It would be interesting to know if dietary habits have changed.	
	Create a culturally vibrant community	> 5 onsite cultural events a year	Frequent events at SHAC and gardening events show the vibrant community.	
Land Use and Wildlife	Create two new habitats	Two new habitats	The 'Sump Park' is already flourishing and the green link is close to completion.	
	Contribute to an increase in biodiversity	Increase in number of species by 20 per cent and populations by 10 per cent	A detailed ecological survey has shown the nestboxes are well occupied by the target bird species, and highlight the benefit of the retained mature trees and of encouraging the residents to plant native species.	
Sustainable Water	Reduced potable water use by 75 per cent	50 litres/ person / day	65% reduction to 70l/p/day. Although not achieving the target it is still an excellent performance.	
	Manage stormwater treated onsite	100 per cent	The 'Sump Park' is delivering this.	
Local and Sustainable Food	Access to food growing space	100 per cent	Everyone has access to growing space – though some residents have commented that the space is limited.	
	Provide 'edible land-scaping'	30 per cent of landscape trees edible	Achieved – mainly citrus and bay trees, but with 10 species. Residents have requested more variety.	
	Encourage sustainable, healthy purchasing.		Given the impact of meat and dairy consumption this is an area to address further through the sustainability culture onsite.	
Travel and Transport	Enable a sustainable transport carbon footprint	1 tCO2eq/ person/yr % commuting by private car	Electric car club trial has ended, but three families have clubbed together to purchase an EV. As with food, an area to try and continue encouraging a behaviour shift.	
	Reduced private car ownership	Car ownership to be < 1 per household	Ownership approx. 1.3, higher than the target due to the increase in single lots, but still well below Perth average/	
Materials and Products	Reduced embodied energy of construction (tonnes CO2eq)	30% reduction over baseline	About one third of lots are using lightweight, often timber frame construction. Other One Planet Living projects (eg Villages Nature Paris) have shown that timber frame reduces embodied carbon over by 50%.	
	Sustainable materials in operation	Participation rates in key initiatives	Interviews show a high level of sharing and cooperation onsite.	
Zero Waste	Maximise construction waste recycling	95 per cent	The site is achieving closer to 85% - double the national average but below the target.	
	Reduction in household waste in operation	30 per cent reduction	Achieved more than double the target	
	Recycling rate of household waste (70 per cent)	70 per cent	Food waste and organic collection has ensured this target is met with low levels of contamination reported	
Zero carbon	Maximise energy efficiency	34 per cent reduction over baseline	Achieving around 27-29% but still a zero-carbon energy site.	
	100 per cent renewable energy	100 per cent	Site is an exporter of energy .	

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