ONE PLANET LIVING | A framework by Bioregional

Kings Farm Close, Longcot
One Planet Action Plan

September 2018

Contents

Message from Oxford Advanced Living

"We believe that developers need to take responsibility for their impact on the environment and the local community. While it is clear that we need more housing in the UK, this should not be delivered at the expense of quality and the impact on the environment should be minimised. Modern construction technologies, such as those used by Greencore Construction, provide a simple way to significantly reduce our carbon footprint, while also delivering modern comfortable homes, fit for the 21st century. Faced with this opportunity, all developers should be asking the question "why wouldn't we?"

The processes and philosophy provided by Bioregional support our goal of delivering homes rather than houses, where the new residents can engage fully with the local community and create a catalyst for new thinking on sustainability, with a positive impact on the whole village and a general increase in wellbeing."

Message from Bioregional

"We are delighted to have been working alongside Oxford Advanced Living and Greencore Construction for the last few years. We are excited to apply the One Planet Living framework to this new development in Longcot. We hope that the One Planet Action Plan highlights how smaller, rural developments can be ambitious, innovative and forward-thinking in how we tackle the sustainability issues of today"

1. The development site

The site is located in the small Oxfordshire Village of Longcot, which has a population of just over 600 and is close to the A420 that links Oxford and Swindon.

The development site is found to the north of the village along the Kings Lane. The proposal consists of 15 new build units with 6 affordable and 9 private units. Within the development there is a small amount of public open space.

The site is in the corner of a field that has mainly been used for pasture, and a key objective must be to deliver a space that has significantly more biodiversity than the low level achieved in an open field. The development should enhance the living standard of human occupants and deliver an attractive environment for flora and fauna. In this way there can be a net gain for biodiversity, offsetting the small amount of green field that has been lost.

2. Oxford Advanced Living and Greencore Construction

Oxford Advanced Living is a local Oxfordshire developer which works closely with sustainable housebuilder Greencore Construction.

Greencore specialises in helping small developers and self-builders in Oxfordshire build high performance, low carbon buildings using natural materials. These

homes are designed to provide better health in the home, thanks to improved indoor air quality and living comfort, and significant environmental and energy-saving benefits. Greencore targets the double low carbon target of near zero carbon footprint and low energy costs for the residents.

3. What is One Planet Living

We only have one Planet Earth, but as a global society we're living as if we have several planets and consuming in ways which cannot be sustained. That means that a lot of things must change. But we also know that if we work together we can enjoy just as much comfort, more security and better health, while living lives that are enriching, fulfilling and sustainable.

One Planet Living sets out to make this transition. It is a framework and an initiative which grew out of the experience of developing the pioneering BedZED eco-village in south London, UK in the early 2000s. Today there are One Planet Communities and Destinations in Europe, North America, Africa and Australia.

One Planet Living is a simple framework which enables everyone – from the general public to professionals – to collaborate on a sustainability strategy drawing on everyone's insights, skills and experience. It is based on ten guiding principles of sustainability which we can use to create holistic, joined-up solutions:

Health and happiness	Encouraging active, social, meaningful lives to promote good health and wellbeing
Equity and local economy	Creating safe, equitable places to live and work which support local prosperity and international fair trade
Culture and community	Nurturing local identity and heritage, empowering communities and promoting a culture of sustainable living
Land and nature	Protecting and restoring land for the benefit of people and wildlife
Sustainable water	Using water efficiently, protecting local water resources and reducing flooding and drought
Local and sustainable food	Promoting sustainable humane farming and healthy diets high in local, seasonal organic food and vegetable protein
Travel and transport	Reducing the need to travel, encouraging walking, cycling and low carbon transport
Materials and products	Using materials from sustainable sources and promoting products which help people reduce consumption.
Zero waste	Reducing consumption, re-using and recycling to achieve zero waste and zero pollution
Zero carbon energy	Making buildings and manufacturing energy efficient and supplying all energy with renewables

Figure 1: *The 10 One Planet Principles*

a. Measuring our impact

One Planet Living uses the concepts of Planetary Boundaries and ecological and carbon footprinting as headline indicators for environmental sustainability.

Planetary Boundaries is a set of nine Earth system processes the boundaries of which define a "safe operating space for humanity". The scientists behind the concept assert that once human activity has passed certain thresholds or tipping points, defined as "planetary boundaries", there is a risk of "irreversible and abrupt environmental change". For example, when greenhouse gas emissions in the atmosphere reach a certain level this will trigger new natural phenomena, such as the melting of permafrost, which will further increase the greenhouse gas emissions in the atmosphere.

Ecological footprinting is a way of accounting for humanity's wide range of demands on the Earth's productive land and sea. Globally the world's population is consuming the earth's natural resources at a rate 50 % higher than the planet can replenish or absorb. Ecological footprinting shows that if everyone in the world consumed as many natural resources as the average person in Western Europe, three planets would be needed to support humanity.

Carbon footprinting measures CO_2 and other greenhouse gases emitted from human activity such as burning fossil fuels and agricultural practices. Well over half of our global ecological footprint comes from our carbon emissions. We know that humanity is warming the earth and changing the climate by putting carbon dioxide and other 'greenhouse gases' into the atmosphere, where they trap more and more heat as their concentrations build up. Scientists agree that we have to radically reduce our output of these gases if we are to limit the risks of dangerous changes in the climate.

At the Paris Climate Summit in 2015 world leaders agreed that the increase in global average temperatures should be kept well below 2°C from their pre-industrial levels, with a 1.5°C safety limit recognised as preferable. To avoid a two degree rise global greenhouse gas emissions need to be reduced by 50% from 1990 levels by 2050. In order for this to happen CO_2 emissions will have to be no more than 0.8 tonnes per person per annum by 2050.

b. One Planet Communities Network

The Goals and Guidance (G&G) for One Planet Communities is a document produced by Bioregional which gives guidance to developers and architects on how to design, construct and manage a development that will enable residents to live One Planet lifestyles.

A global network of One Planet Communities has been developed using this guidance:

- These are mostly new-build residential-led developments that have committed to achieving the highest standards of sustainability across the 10 principles of One Planet Living.
- Sustainability strategies for these developments are assessed by Bioregional to check their alignment with the G&G for One Planet Communities.

- Once they have been reviewed, agreed and a management plan adopted the sustainability strategy can be published. Bioregional will create a page on the One Planet Living website and the project can announce that it is using the One Planet Principles.
- Communities that meet the highest levels of sustainability can be endorsed as National or Planetary Leaders and can use the One Planet Communities logo.

4. Oxford Advanced Living's approach to One Planet Living

If everyone on earth consumed resources at the same rate as western Europeans, we would need three planet earths to support humanity. Rooted in the science and metrics of ecological and carbon footprinting, One Planet Living is a vision of a world in which people enjoy happy, healthy lives within their fair share of the earth's resources, leaving space for wildlife and wilderness.

Figure 2: *The 'three planet problem'*

The Kings Farm Close development in the village of Longcot has been designed to be a place where people can lead genuinely sustainable lifestyles.

This is more than simply designing green, energy efficient buildings. To be truly successful, the commitment to living sustainably will need to continue once the development is built and residents move in.

Oxford Advanced Living (OAL) has partnered with Greencore Construction, a low carbon house builder. Greencore has developed the Biond timber frame system for modern construction. Biond is a 21st century offsite construction process which delivers a superstructure of closed panel timber frame insulated with hemp-lime and wood fibre to deliver high performance homes at a reasonable cost. It provides the following health, wellbeing and low carbon features:

- High thermal performance: The hemp-lime and wood fibre insulation in the homes, coupled with a mechanical ventilation and heat recovery (MVHR) system, helps to maintain a comfortable indoor temperature in all weathers, and will require less energy for heating than most other new homes.
- Intelligent humidity control: The MVHR installation is designed to remove moist air from bathrooms and kitchens and send dry air to living areas such as bedrooms and social areas.
- Improved indoor air quality: The discrete and easy-to-run MVHR unit makes sure there is a constant flow of fresh air into the homes. The unit can be fitted with filters to block pollen and other irritants.

- Natural construction materials: Greencore minimise, and where possible eliminate, the use of harmful chemicals - such as volatile organic compounds (VOCs) - in all the homes.
- Low carbon: Through the use of timber, hemp and wood fibre a large amount of carbon is locked up in the structure of the house, creating a negative carbon footprint. Even considering the other materials used (such as concrete in the foundation, plastic piping and wiring) the overall result is a near zero carbon footprint for the entire house. Furthermore, the high thermal performance will reduce the need for energy to heat the homes and deliver an additional carbon saving.

The Biond panels can also be recycled at the end of their life. Treated timber can be repurposed or incinerated in high temperature furnaces to produce energy. The hemp and lime can be crushed and spread over fields to improve the PH balance and to provide organic material. The wood fibre can be incinerated in bio mass boilers to generate energy.

Additionally, OAL have partnered with Sovereign Housing Association (the affordable housing provider), the local parish council and will partner with other nearby community groups to ensure future residents of Kings Farm Close are supported to change their lifestyles and embrace One Planet Living.

All residents will receive a One Planet welcome pack and the opportunity to attend a welcome 'One Planet' event that will provide information and resources to encourage them to:

- operate their home efficiently to reduce running costs
- grow and eat healthy and sustainable food
- access sustainable transport options in the local area
- join and engage with local community initiatives and groups
- access the services and opportunities available in the local community and surroundings to reduce over-consumption
- reduce the impact of the other services they rely on e.g. hospitals and shops

A management company will be created to maintain the green, public spaces and other features such as the sewerage pumping station. There is the possibility that this company could be community owned and could take ownership of this action plan.

In return for embracing a sustainable lifestyle and committing to the vision of One Planet Living, residents of the Kings Farm Close development could be rewarded with reduced cost of living, through lower energy and water bills and a healthier lifestyle.

5. Daily Life at Kings Farm Close

The aim: "To create a thriving community that offers a sustainable way of life for all."

Sustainable living is often synonymous with expense, inconvenience and giving up the things we enjoy, but this development will make it easy and enjoyable

for people to live and work more sustainably. The result is more time for the things that matter, greater affordability and stronger, more resilient communities.

So, what will it be like living there?
The following offers a series of illustrations of how life might be for several different groups of residents. This was explored during the One Planet Action Plan workshop. The purpose of this exercise is to demonstrate how this development could promote a better quality of life for all. Scenarios are given for a retired couple and a family with young children.

Young, working family

When we wake in the morning the house is really comfortable, we never notice that the house is too warm or too cold – even in the height of summer or winter. The homes are beautiful and very quiet - well designed for noisy children!

We were a little nervous about moving to Kings Farm Close at first as we were not really into the 'green' thing, but we wanted to bring our children up in a place where they could play outdoors, have access to countryside and where I could walk them to school.

We both work in Oxford, so we lift share with one other resident. Again, we were initially apprehensive that this wouldn't work out, but the lift-sharing app makes things simple. We are now exploring the opportunity of buying or leasing an electric car, we like the fact our home already has a charging point and we could charge it at a fraction of the cost of putting diesel in the tank!

The home is ideal for home working and we love the peace and quiet in Longcot. We get so much done without being distracted by traffic and noise! There is a strong community feel and we often say hello to our neighbours when we are using the open spaces and walking to school. The children love that we have fruit trees in our garden and right on our doorstep, both for climbing and the free fruit!

Retired Couple

We recently moved here from Swindon; we wanted a smaller place with more green space and a stronger sense of community. We know more of our neighbours here and spend more time socialising than we have in years - there are just more opportunities to meet new people.

We love to be part of a range of community activities and we really enjoyed the welcome event. We had the opportunity to meet a local cycling group and we have decided to both join the local ramblers group. We have even heard that a village wide tool-sharing club is being created. We think this is a great idea; we love that we could borrow tools that we wouldn't ordinarily purchase, and even get help from our neighbours.

Our house is the perfect size for us, thoughtfully designed so we get sunlight throughout the day and is comfortable without costing a fortune to heat.

It's great to be somewhere the grandkids can visit at weekends and play outdoors safely.

6. Summary One Planet Action Plan

A summary of the One Planet Action for the Kings Farm Close development is provided below.

One Planet Principle	Outcome	Key strategies
Health and happiness	Opportunities for community involvement are created	Create communal areas where people can meet, socialise and exercise; Deliver an OPL welcome event; Create a community website (or social media page) in conjunction with the Parish Council
	Residents are satisfied with the physical conditions of their homes	Ensure high levels of natural light and thermal comfort in the homes through design; Monitor test homes to highlight temperature ranges; Provide guidance on how best to keep homes cool in hot weather; Provide guidance on how to effectively operate MVHR systems
	Residents are happy with their lives	Create safe, open play areas and communal spaces; Set up a neighbourhood watch group; Promote local social activities and clubs in welcome pack and event
Equity and local economy	40% of housing will be affordable	Include a minimum of 40% affordable housing in design
	Local companies and tradesman used for the construction phase	Use local tradesman and companies within the offsite construction process and during onsite and fit out phase; Promote local services through welcome event; Through S106 provide £20,000 to the local district council for local leisure and community facilities, and provide £4,500 to the local district council towards the provision of public art in the vicinity
Culture and community	A socially inclusive society	Research community space ideas; Support volunteer and community groups; Use a tenure blind approach where possible; Encourage engagement with the wider community e.g. through shrivenham.org; Through section 106 provide £45,000 to the local county council to be used towards the expansion of Longcot and Fernham primary school
	A culture of sustainability	Host an OPL welcome event; Agree with the management company to uphold the OPAP; OPL online tenancy test for affordable homes
Land and nature	An increase in biodiversity and open space	Remove invasive plant species; Draft a biodiversity plan which investigates areas for tree and wildflower planting;

		Introduce passive obstacles to prevent vehicle encroachment onto grassland; Introduce features to support wildlife
	Foster a love for nature through education and by increasing opportunities to interact with the natural world	Provision of learning resources to educate and encourage support for local biodiversity; Encourage and facilitate the creation of volunteering groups e.g. a gardening club; Promote local wildlife trust
Sustainable water	Reduced potable water consumption	Install low water consumption fittings and meters; Provide water butts
	Reduce likelihood of flooding	Installation of underground attenuation tanks to absorb rainwater from severe storms and release it slowly into the nearby drainage ditch.
Local and sustainable food	Access to food growing space for each household	Provide capacity in gardens for growing food and opportunity for communal orchards and access to allotments within public realm; Food growing guidance at OPL open day; Introduce the concept of communal eating once a week to create a sustainable food culture and encourage food growing
	Edible fruit bearing trees and shrubs planted onsite	Design edible landscaping throughout the site
Travel and transport	Live-work spaces in homes	Design in live-work spaces in each household
	Reduced trips by private car	Provide secure bike facilities e.g. sheds; Engage local cycling clubs and invite to OPL welcome event; Through section 106 provide £20,000 to the local county council to be used towards the upgrading of bus facilities serving Longcot; Engage Oxfordshire County Council about improving bus stop
	Residents actively using lift share app or car club to reduce emissions associated with transport	Enable car sharing opportunity for residents and construction workers e.g. via a lift share app
	Increased ownership and use of low carbon / electric vehicles	Provide electric car charging infrastructure in each home; Promote EVs at welcome event
Materials and products	Culture of reducing and reusing within the development is created and embedded	Engage with Community Action Groups to provide swap shops / upcycling events / restart parties;
	Reduced embodied carbon of buildings	Undertake sample carbon audit on materials; Construct using Greencore's Biond system; Select materials based on eco credentials; Limit the use of plastics in the construction process
Zero waste	Residential waste recycling maximised	Provide accessible recycling facilities; Create a plan for generating a culture of zero waste; including: Support formation of zero waste community group that helps residents maximise recycling opportunities; Set up a waste monitoring project with members of the community or the secondary school;

		Through section 106 provide £5,270 to the local district council to be used towards the provision of waste and recycling bins in the development
	Construction waste recycling is maximised 90% of construction waste is diverted from landfill	Partner with waste management company that sorts and recycles waste; Engage Oxford wood recycling or RAW workshop (local organisation) to take waste wood away; Reduce waste by using offsite construction
Zero carbon energy	Houses will achieve Passivhaus energy performance	Use a 'fabric first' approach – to ensure well insulated and airtight buildings; Target an air tightness score of 1, where standard practice is 3; Install LED lights throughout; Install washing lines or drying frames; Install high energy efficiency class appliances; Promote energy conservation to residents; Conduct a whole house carbon audit
	All energy used is from a green/renewable energy provider	Understand business case for installing PV; Pre-plan accessibility and futureproofing issues for later PV installation; Offer PV as an additional extra to private buyers; Explore community ESCO opportunity; Invite local green suppliers to OPL welcome event

7. Kings Farm Close Longcot One Planet Action Plan

Kings Farm Close is a small development in a relatively rural location. Its scale means the developer is limited on what can be achieved by the development alone, for example, solving the local public transport issues, or creating new community facilities. However, we feel this development has shown leadership through the high-quality fabric of the homes, use of local companies and labour, reduced waste and sustainable materials during the construction process and the creation of community spaces within the public realm.

a. Health and happiness

Encouraging active, sociable, meaningful lives to promote good health and wellbeing

	Outcome	**Target / indicator**	**Baseline**
HH1	Opportunities for community involvement are created	>70% residents feel actively involved in their community	
HH2	Residents are satisfied with the physical conditions of their homes	>80% of residents satisfied with the indoor temperature, ventilation and air quality of their homes	

HH3	Residents are happy with their lives	>75% of residents say they're 'happier' than where they lived before	

i. Key strategies

Under the Health and Happiness principle a key strategy for achieving the outcomes is creating communal areas where people can meet, socialise and exercise. This includes safe play areas for children and spaces onsite where residents can gather e.g. picnic benches. A neighbourhood watch group can be set up which would help to lower any risk of crime.

A community (village-wide) website would facilitate connections between residents and could include a social calendar, a community group email and newsletters. This would be developed in conjunction with the parish council. Another key strategy for creating a strong, social community is delivering a welcome event for the residents which incorporates OPL. This would be open to the wider community and would enable initial connections between the new and current communities to be made.

High levels of comfort within the properties regarding light availability, temperature and ventilation is an important consideration in the design of the development. Residents will be provided with information on how to operate the MVHR systems in hot and cold weather and monitoring of the temperature ranges within test homes will be undertaken.

b. Equity and local economy

Creating safe, equitable places to live and work which support local prosperity and international fair trade

	Outcome	**Target / indicator**	**Baseline**
Eq1	40% of housing will be affordable	40% of housing will be affordable	Vale of White Horse Local Plan Policy 24 – 35% affordable housing
Eq2	Local companies and tradesman used for the construction phase	Percentage of construction done by construction companies based locally	

i. Key strategies

The aim to incorporate 40% of homes as affordable will be included within the design of the development. During the construction phases local tradesman and construction companies will be used during the offsite construction process and

onsite including the fit-out phase. Greencore is a local housebuilder, based in Oxfordshire that utilises local labour in its factory.

c. Culture and community

Nurturing local identity and heritage, empowering communities and promoting a culture of sustainable living

	Outcome	Target / indicator	Baseline
CC1	Create a socially inclusive society	Number of people participating in community activities or events in the past twelve months	
CC2	A culture of sustainability is created	85% of residents familiar with, or inducted in, the concept and principles One Planet Living	

i. Key strategies

Creating an active, social community engaged with sustainability and One Planet Living are the key priorities under this principle. Most of the actions to achieve these outcomes occur once construction is complete and residents move in. A number of strategies look to create a socially inclusive society:

- Volunteer and community groups will be encouraged through welcome events and through supports from Sovereign, the likely registered social landlord
- Community space ideas such as picnic benches will be explored at the design stage.
- Residents will be directed to shrivenham.org where they can sign up and connect with the wider community.
- A tenure blind approach will help all residents feel equal
- Forge links with the local Transition Town movement in Wantage and other community groups through the welcome pack and event

A key strategy to induct the new residents into sustainability is hosting an OPL welcome event in partnership with Sovereign, this would also provide residents with an opportunity to meet one another and make initial connections. If and when a management company is set up it should agree to uphold the One Planet Action Plan long term. To help secure residents that engage with and support OPL and the sustainability of the development Sovereign could explore the use of an online tenancy test where OPL is a key focus.

d. Land and Nature

Protecting and restoring land for the benefit of people and wildlife

	Outcome	Target / indicator	Baseline
LW1	Contribute to an increase in biodiversity and open space	20% increase in the number of species within the development 20% of land area open space	
LW2	Foster a love for nature through education and by increasing opportunities to interact with the natural world	50% participation rate in nature-related activities programs e.g. gardening clubs	

i. Key strategies

The existing site is green field, principally a pastoral farming field. Protecting existing habitats and creating new ones will contribute to the increase in biodiversity targeted by this development. Existing habitats will be protected by removing any invasive plant species and planting trees with low water demand. Passive obstacles will also be introduced to prevent vehicles parking on common grassland. Areas for new wildflower meadows and trees will be identified at the design stage and included within a biodiversity plan for the site. To support wildlife, various features such as log piles and roosting boxes will be introduced.

Learning resources will be provided to the residents at the welcome event to educate and encourage them to support local flora and fauna in their gardens. This event would also provide an opportunity for volunteering groups to be set up that support the implementation of the biodiversity plan, for example, a gardening club.

e. Sustainable water

	Outcome	Target / indicator	Baseline
SW1	Reduce potable water use throughout the development	Indoor water consumption of 125 litres/person/day or less Water butt available for each household	125l as per building regulations (110l optional target)
SW2	Reduce likelihood of flooding	Storm water to be captured within the site and released	

		slowly into the ditch to reduce flooding	

Using water efficiently, protecting local water sources and reducing flooding and drought

i. Key strategies

Potable water use will be reduced internally and externally by installing low water consumption fittings such as taps and showers, installing water meters and providing water butts.

A network of underground attenuation tanks has been created and installed on the site. These will absorb all the rainwater from a severe storm and release it slowly into the nearby drainage ditch. The release of storm water will therefore be slower than when it was just a field!

f. Local and sustainable food

Promoting sustainable humane farming and healthy diets in local, seasonal organic food and vegetable protein

	Outcome	**Target / indicator**	**Baseline**
LSF1	Provide access to food growing space for each household	Ratio of food-growing garden spaces to households	
LSF2	Edible fruit bearing trees and shrubs planted onsite	Number of edible fruit-bearing trees and shrubs planted onsite	

i. Key strategies

Residents will be encouraged to grow their own food at the OPL welcome event using the space and facilities provided. All homes will have gardens, these will be designed with the capacity to grow food and orchards/ edible landscaping will be explored for open spaces within the development. There is also the potential for the gardens to be pre-prepared for food growing (i.e. with raised beds).

Once residents move in, a number of key strategies to promote local and sustainable food will be implemented. A community handbook will encourage local food growing and promote veg box schemes. Cooking classes at the local pub will be explored as another means of using fresh, local ingredients and also to inspire residents to grow their own food. Links with Berners Estate Farm will be established.

To minimise food waste onsite composting facilities will be provided onsite. Use of these facilities will be promoted at the OPL welcome event.

g. Travel and transport

Reducing the need to travel, and encouraging walking, cycling and low carbon transport

	Outcome	Target / indicator	Baseline
ST1	Households designed to include live-work spaces	All households have live-work spaces	
ST2	Reduced trips by private car	Percentage of households regularly walking or cycling locally	Approx. 70% journeys by car
ST3	Residents actively using lift share app or car club to reduce emissions associated with transport	50% of residents using Liftshare app / car club	
ST4	Increased ownership and use of low carbon / electric vehicles	20% of vehicles are electric or low/zero carbon (e.g. hybrid or biogas powered)	UK-wide 2-4% of all new car registrations are EV/PHEV

i. Key strategies

The development has to provide 2 spaces per home due to the local planning requirements. This means a total of 30 car-parking spaces. However, a number of strategies will be implemented to reduce journeys by private car. These are outlined below.

Implementing a car share scheme using a lift share app is a key strategy for reducing transport emissions. The scheme could potentially expand to include residents living in wider Longcot.

To encourage more active and sustainable forms of transport bike sheds will be available for residents and cycle routes to Swindon, Oxford and Farringdon will be investigated. Although it is acknowledged that this scale of development can only lightly influence these discussions.

Local walking and cycling groups will be invited to the OPL event which will provide residents with the opportunity to join. During design of the development engagement will commence with OCC about improving the bus stop on the main road and route through the village. Improved public transport will contribute to residents being less reliant on private cars and is a more sustainable transport option.

The infrastructure required to install electric car charging points will be available in each home.

h. Materials and products

Using materials from sustainable sources and promoting products which help people reduce consumption

	Outcome	Target / indicator	Baseline
SM1	Culture of reducing and reusing within the development is created and embedded	60% of households taking part in local sharing scheme	
SM2	Reduced embodied carbon of buildings	Estimated embodied carbon of buildings (Kg CO2e/m2) annualised over the anticipated lifespan of the buildings (e.g. 60 years)	

i. Key strategies

Creating a culture of reducing and reusing within the community will be achieved through setting up swap shops, uprecycling events or restart parties in partnership with the Community Action Group network. This network includes local sustainability groups such as Sustainable Wantage and Abingdon Carbon Cutters as well as specialist groups such as Bicester Green and Cultivate.

The community website would be a way of communicating these events to residents and encouraging them to take part. A communal space for shared tools will help facilitate the sharing of resources.

To reduce embodied carbon a carbon audit on materials will be undertaken at the design stage. The materials selection will be based on eco credentials, and the windows will also be made of timber. The main material component, the Biond product, has a negative carbon footprint, as it locks up the carbon in the timber, hemp and wood fibre. In similar buildings a carbon audit assessed that the overall carbon footprint of a new house (including the concrete substructure) utilising the Biond panel system is around 30kg/m2 which compares very favourably with the figure of around 500kg/m2 for traditional brick and block construction. For a house of 150 sqm this delivers a reduction of around 70 tonnes of CO2.

i. Zero waste

Reducing consumption, reusing and recycling to achieve zero waste and zero pollution

	Outcome	Target / indicator	Baseline
ZW1	Residential waste recycling maximised	70% recycling rate across the community	Approx. 65% across district
ZW2	90% of construction waste is diverted from landfill	90% of waste diverted from landfill during construction	

i. Key strategies

To maximise residential recycling, clearly labelled and accessible recycling facilities will be provided to all residents. A plan for creating a culture of zero waste will be created within the community and could include incentives, contests, reporting on community progress and provision of guidance to residents on waste reduction and recycling. The formation of a community group to help and encourage residents to reduce waste will be supported. Initiatives such as waste audits could be trialled by the group. At the OPL welcome event the take up of the green waste bin will be encouraged. To monitor the waste being generated a project will be set up with members of the community or possibly the secondary school.

At the construction stage waste will be reduced by using offsite construction. A waste management company will sort and recycle waste to prevent any unnecessary waste being sent to landfill.

j. Zero carbon energy

Making buildings and manufacturing energy efficient and supplying all energy with renewables

	Outcome	Target / indicator	Baseline
ZC1	Houses will achieve Passivhaus energy performance	Testing of building fabric will indicate Passivhaus levels have been achieved	X
ZC2	All energy used is from a green/renewable energy provider	60% of annual energy consumed comes from renewable sources	**53%** of UK's power generation now comes from low carbon sources.

i. Key strategies

The dwellings will achieve a high level of energy performance with the target being Passivhaus levels. This will be achieved through implementing a fabric first approach with a very low level of air tightness (target of 1 ACH). Further, energy efficient appliances, LED and outdoor washing lines will be installed throughout the development.

All the homes will be built using the Biond Building System. This is an off-site manufactured, closed panel timber frame system which is insulated with hemp-lime and natural fibre insulation. The combination of the two insulation layers gives a U-value of 0.15W/m^2.K and sequesters carbon to create buildings with very low (near zero) carbon footprints.

It is anticipated that the houses will use less than 20kWhrs/m^2/a of heating energy. This equates to 1,500kWhrs/a (or £45/a*) for the smallest houses and 4,200kWhrs/a (or £126/a*) for the largest houses

The combination of all 15 houses will use around 36,000kWhrs/a of heating energy (or £1,100/a*). This is around 20% of the UK average for a new house.

The heating and hot water needs will be provided by highly efficient condensing gas boilers. Heating will be provided as under-floor heating, both downstairs and in the bathroom upstairs. Heating can also be provided from within the MVHR unit if required.

Energy conservation will be promoted within the community at the welcome event, a possible community website and provision of books and leaflets containing guidance.

To ensure that the target of 60% of annual energy consumed comes from renewable sources an ESCO opportunity will be explored and there will be engagement with residents at the OPL welcome event. In the case of onsite renewable energy generation such as PV, the business and embodied carbon case for installing these would be assessed. Options which will be explored include:

- Future-proofing development for later PV installation
- Offer PV as an optional extra within private sales
- Explore the connection with a land based local PV array