



Small, Smart, Sustainable Housing Village
Workshop Outcomes Report
15 November 2019

**Deicke
Richards**



Our master planning work brings together design knowledge and experience, along with recognised expertise as facilitators of collaborative design workshops.

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Document prepared by Deicke Richards
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This report was prepared with the assistance of Tweed Shire Council and members of the Tweed Shire community.

gall architects

**BLIGH
TANNER**

< BE•Collective >

BÜRO TWO
ARCHITECTURE

Introduction

Purpose of this report

This report is a summary of the 'enquiry by design' workshop that was held at Tweed Shire Council building in Murwillumbah on Friday 23 August 2019.

The Enquiry by Design (EbD) workshop explored the feasibility, scale and nature of a Small, Smart, Sustainable Housing Village (SSSH) on the Council owned site on Wardrop Valley Road. The issues raised and addressed during the workshop will form the basis for developing the site design concept plan.

The EbD workshop sits within the Concept Plan Stage in the overall project process as illustrated in the adjacent diagram. The workshop gathered initial site information on the chosen test site and established design principles that can inform the development of the concept design. After review and feedback this plan can be developed to Schematic Design. The Schematic Design phase with test the conceptual design to a level that it can be costed. This information can then be confidently used to inform the Business and Management stage which will determine detailed costings for all elements of the projects. Funding models options can then be appraised along with management approaches.

The workshop participants included the Mayor and a number of Councillors, council officers across a number of council departments including:

- Executive leadership team
- Engineering
- Town Planning & Urban Design Services
- Economic Development
- Communications & Engagement
- Probity – Conflict of Interests

As well as the consultant team including architects, engineers and urban designers.

Consultant Team

Eloise Atkinson, Deicke Richards	Project Director, facilitator
Cameron Davies, Deicke Richards	Urban design lead
Jim Gall, Gall Architects	Architectural design lead, sustainable building design
Alan Hoban, Bligh Tanner	Engineer, integrated water management
John Tuxworth, BE Collective	Engineer, energy and ESD services
Justin Twohill, Buro Two	Architect-local knowledge and sustainable design
Himanthi Mendis, Bligh Tanner	Civil engineer

Key Project Stages

Extent of Design Consultant Engagement

Step 1 Project Inception

- PROJECT INCEPTION
- FUNDING ALLOCATED TO DEVELOP CONCEPT
- PROBITY PLAN
- DESIGN CONSULTANT APPOINTED
- FORM INTERNAL WORKING GROUP



Step 2 Concept Design

- SITE & CONTEXT ANALYSIS
- REVIEW OF CASE STUDIES
- ENQUIRY BY DESIGN, WORKSHOP REPORT, DESIGN PRINCIPLES
- TSC FORM EXTERNAL WORKING GROUP
- CONCEPT DESIGN OF SITE LAYOUT, SAMPLE FLOOR PLANS, PRESENTATION MATERIALS
- REVIEW & FEEDBACK



Step 3 Schematic Design

- SCHEMATIC DESIGN OF SITE LAYOUT
- DESIGN OF SAMPLE FLOOR PLANS
- PROOF OF CONCEPT OF ONSITE SYSTEMS
- SCHEMATIC DESIGN COST ESTIMATION
- REVIEW & FEEDBACK



Step 4 Business and Management Plan

- DETAILED COSTING
- BUSINESS PLANNING CONSULTANT APPOINTED
- FUNDING MODEL OPTIONS
- MANAGEMENT OPTIONS
- REVIEW AND FEEDBACK



Step 5 Procurement and Construction

- APPROVALS PROCESS
- CONTRACTOR APPOINTMENT
- SITE AND CIVIL WORKS
- BUILDING WORK
- CERTIFICATION / OCCUPATION / HANDOVER

Introduction

What is Enquiry by Design (EbD)?

The 'enquiry by design' workshop process is a collaborative, engaging and inclusive process that literally brings stakeholders to the table. It is a powerful consultation tool where there are diverse or competing interests and passionately held beliefs.

The EbD is an interactive, consultative and creative process that requires and includes the knowledge of the client and multiple experts. The workshop provides an opportunity to gather all the necessary information regarding an existing site and the proposed brief, and to rapidly test design options. It brings together people with a range of expertise and knowledge to build solutions that will deliver on Council's objectives and aspirations.

The design workshop is a cost effective and time efficient way to develop consensus and understanding, especially where there are complex criteria to consider. It is a structured process that brings clarity to the issues of the project, including the aspirations of clients and stakeholders, physical, social and climatic factors, and the planning and policy context.

Time	Task	Team
8.30-10.00am Team Site Visit		
8.30	Leave Council Chambers for site	Design Team and Council Officers
8.50-9.40	Site visit	Design Team and Council Officers
9.40-10.00	Travel back to Council	Design Team and Council Officers
10.15-10.30am Welcome and introductions		
10.20-10.30	Project Background and Objectives	Cr Ron Cooper
10.30-12.00pm Session 1 – Background Briefing		
	Short presentations addressing the various technical site issues including: <ul style="list-style-type: none"> - Landscape and ecology - Integrated water management - Onsite wastewater management - Onsite energy solutions - Caravan park regulations Presentation on Australia and international exemplars- what we can learn	Jim Gall Alan Hoban John Tuxworth Eloise Atkinson
12.00-1.00pm Lunch and discussion		
1.00-4.00pm Sessiion 2 – Design Session		
	Participant will break into 3-4 groups. Each group will have a scenario to investigate in order to test options on the site and to develop design principles. These will include: <ul style="list-style-type: none"> - Productive Community - Connected Community - Sustainable Footprint - Settlement Patterns Each group will be facilitated by a design team member.	Facilitated by Eloise Atkinson All participants Cameron Davies Justin Twohill Jim Gall John Tuxworth
4.00-5.00pm Session 3 – Reporting back and pin up		
	Reporting back and pin up	All groups
5.00-5.15pm Next Steps and Close		

Introduction

Workshop brief

The 'enquiry by design' workshop aimed to understand the opportunities and constraints of a Small, Smart, Sustainable Housing Village on the site on Wardrop Valley Road that would inform a concept design upon which a feasibility would be appraised.

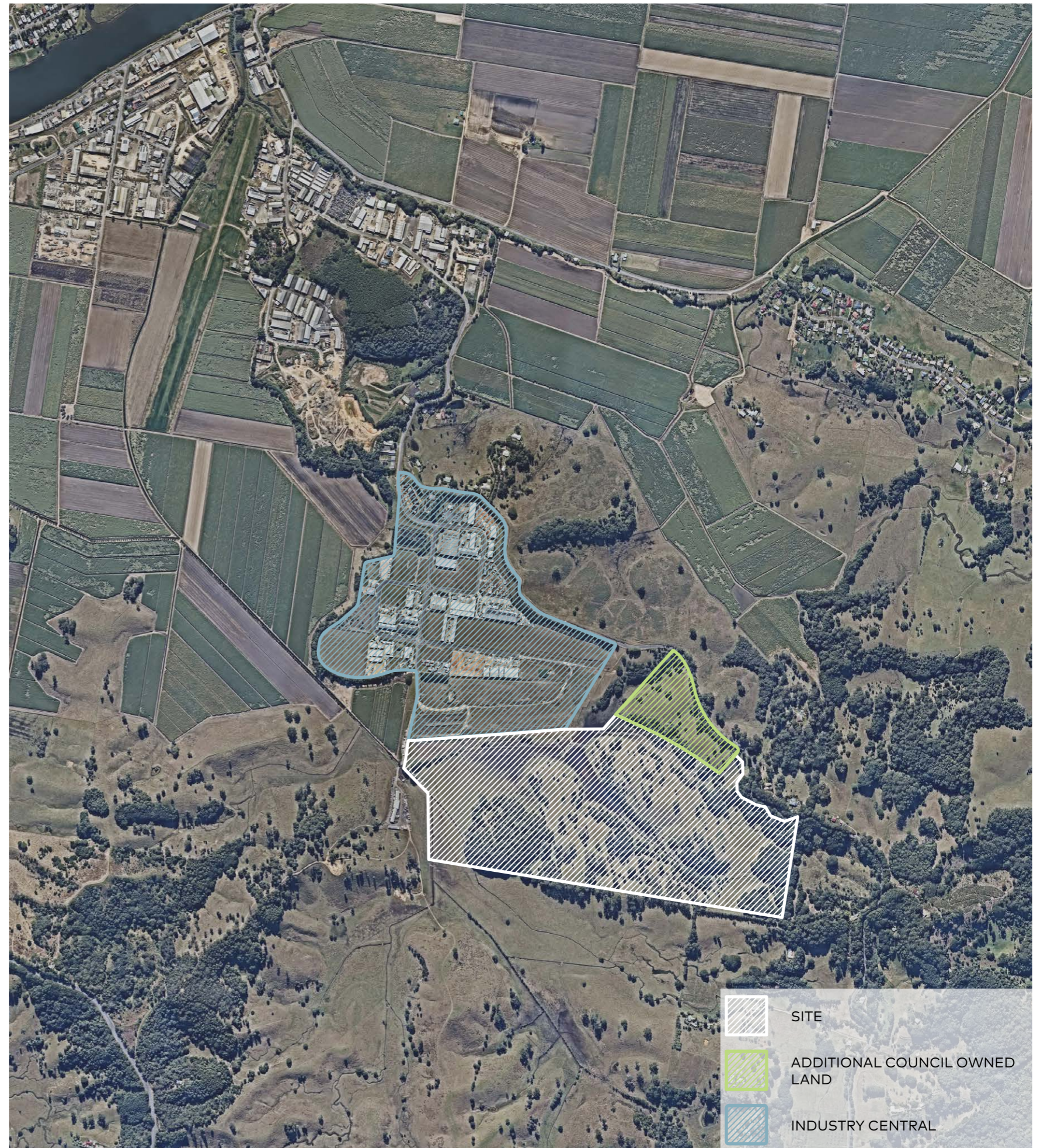
The site is approximately 69 hectares with significant challenges around flooding, vegetation and topography. During the workshop the additional Council owned land, that is currently being considered for rural residential as part of the planning proposal process, was explored as part of the village. This land is approximately 4 hectares.

The brief allowed for between 100-200 dwellings on the site. A range of smaller scaled dwellings would be explored to address affordability for people on low incomes, those who may have come from social disadvantage and also those typically unable to afford more conventional housing such as young people and first home buyers. To allow for diversity some short term holiday rental could also be provided. While there is no defined size for 'tiny houses', they are generally considered to be around 35m². The workshop considered dwellings up to 75m². As the housing needs to allow for modification and expansion in the future, modular construction may be beneficial.

One of the aims of the village is to provide a socially inclusive community with consideration around sustainable design, food production, environmental custodianship and small scaled and localised economic and employment opportunities. The workshop groups considered community facilities that would increase engagement and cooperation among residents. Some groups also explored connections, both physical and economic, with the wider Murwillumbah community.

Affordability is not only about the cost of the home, but also the cost of living. These costs can be reduced by lowering ongoing energy and water costs, transport costs and also through reducing the cost of food through on site food production. The groups explored these options and also opportunities for collective and individual income generation on the site to meet the brief for some level of economic sustainability.

Given that the site is currently not serviced by sewer and has no available electricity and water supply, the workshop considered sustainable design initiatives using green energy sources and integrated water management and wastewater management. This met the brief both for affordable living and for environmental sustainability. Active methods of transport within the site and to surrounding areas, were also explored.



Introduction

Site Context and Analysis

The site is located at the eastern end of Wardrop Valley within an Arcadian landscape typical of the Tweed hinterland. The nearest significant town of Murwillumbah is located to the west and accessed via Wardrop Valley Road.

To the north is the future expansion area of an Industrial Central. There are future initiatives to expand this key employment area northwards with a greater mix of strategic employment uses and a northern diversion of Wardrop Valley Road. To the north of the site is Wardrop Valley Road. There are future initiatives for redevelopment of parcels either side with consideration for residential uses. To the west of the site is a densely vegetated patch of vegetation that extends to Wardrop Valley Road. To the south of the site is further vegetation and rural farm land. To the east is a flood plain and crop growing.

The site itself is steeply undulating with slopes varying generally between 1:10 and 1:4 gradients. The more level areas are generally located on ridges and within the flood effected lower slopes. Between them is steep grassed mid slopes with scattered vegetation. There are significant stands of vegetation on the eastern and southern upper slopes of the site. Together these could be enhanced to provide an east west habitat corridor across the southern boundary of the site. While the flood plain is significantly modified from its natural state there are opportunities for ecological recovery.

Vegetation to the south and west is identified as Bush Fire Prone with buffer requirements extending into the site. These buffer requirements will need to be confirmed through a thorough bush fire assessment.

Vehicle access to the site is limited to a short frontage on Wardrop Valley Road due to slope constraints and flooding impacts. Vehicle sightlines at this location are hindered by the existing road geometry and dense vegetation adjoining, and within, the road verge. Access from this point to the remainder of the site will require some modification of the existing flood plain. There are also existing flood effected maintenance tracks that access the site from Industrial Central to the west.

There are views from the upper slopes of the site outwards to the west towards Murwillumbah. There are also views within the site between ridgelines and across the lower slopes.

Overall the site presents as a picturesque sheltered rural landscape with a complex range of largely topographical driven constraints. Opportunities for change within the site will need to balance architectural and infrastructure impacts with visual amenity and landscape character.

Site Risks and Constraints

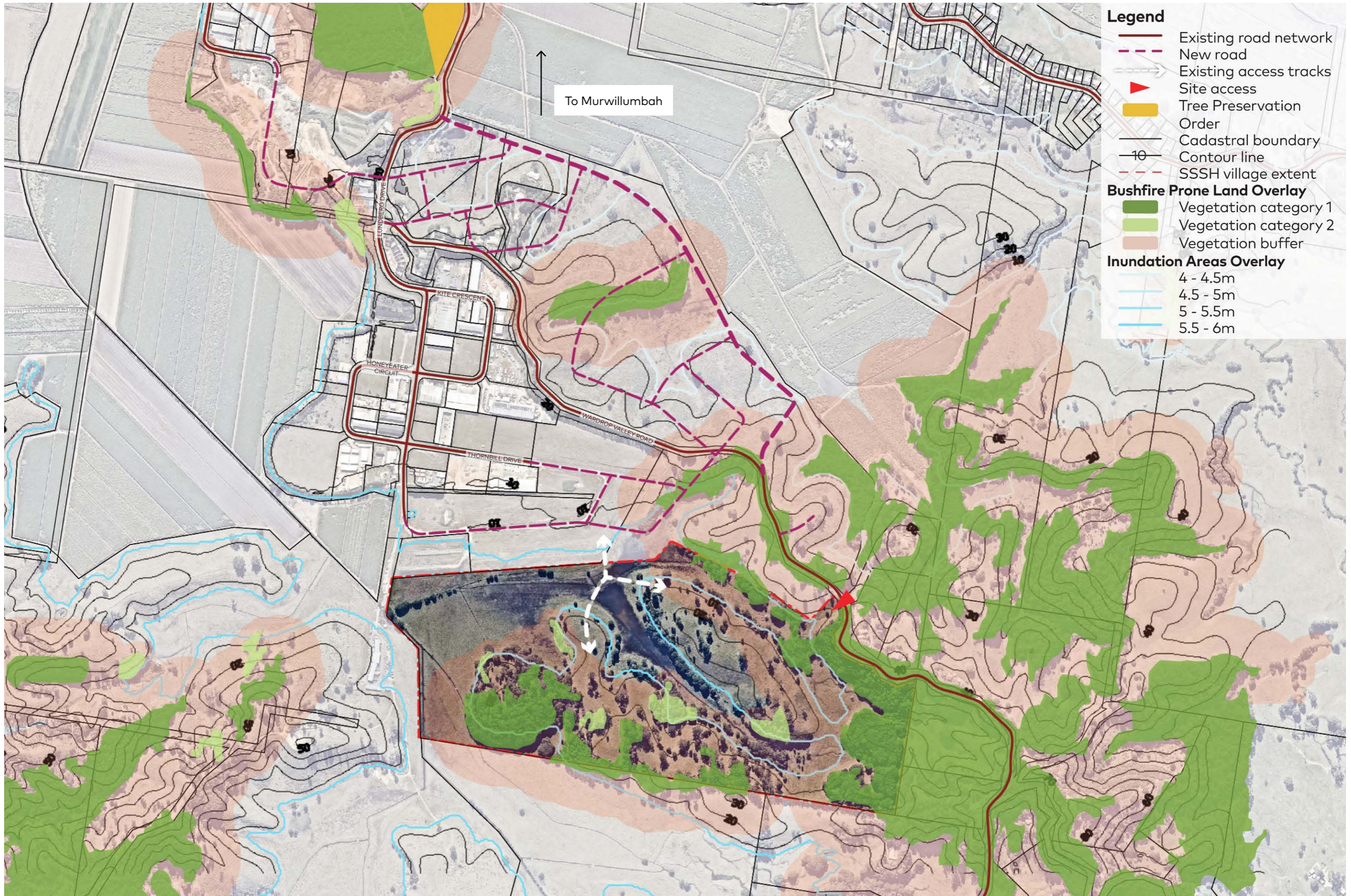
The small, smart, sustainable housing village has risks that are related to the model and funding but there are also risks associated with the Wardrop Valley Road site. These include cost and access for road infrastructure, the significant slope, bushfire hazard and flooding constraints.

Access to the site is limited and vulnerable to flooding events. The nature of the site allows only one access point from Wardrop Valley Road into the site with very poor sight lines. Once within the site the lead-in accessway would need to cross an existing flood plain before it can connect with viable residential sites. Any secondary access would be through the industrial estate and needs to traverse the flood area and significant slope to provide access to the residential opportunities on ridgelines. Due to these risks it may not be possible to regard this as a formal access point therefor reducing the number of access points to the site to one only.

The significant slope has cost implications for any civil work, building work and also makes disability access across the site challenging. The topography disaggregates the areas where dwellings can be built. Thus increases the extent of access roads to the residential areas.

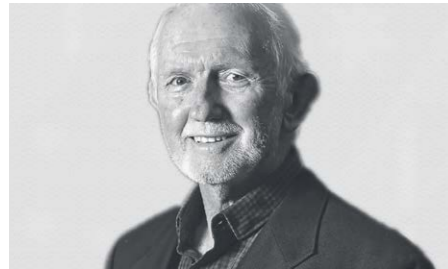
The site has bushfire hazards that are not totally understood at this stage. It may be possible to design this risk out of the project, but this will not be known until a Bush Fire Assessment is completed.

Finally the flooding constraints within the site represent maintenance risk to any infrastructure within the flood effected areas. While residential areas would be located out of the flood zone, the secondary access and agriculture initiatives would be affected by any flooding. There could potentially be a loss of income generation opportunities where agriculture is located in these areas. This could have a significant effect on a low income community.



- Legend**
- Existing road network
 - - - New road
 - Existing access tracks
 - ▲ Site access
 - Tree Preservation Order
 - Cadastral boundary
 - Contour line
 - - - SSSH village extent
- Bushfire Prone Land Overlay**
- Vegetation category 1
 - Vegetation category 2
 - Vegetation buffer
- Inundation Areas Overlay**
- 4 - 4.5m
 - 4.5 - 5m
 - 5 - 5.5m
 - 5.5 - 6m

Overview of presentations



Councillor Ron Cooper – Tweed Shire Council

Project vision

Councillor Cooper outlined his vision for the project in the context of the significant demand for social and affordable housing in the Tweed. The concept is to develop a low rental, financially and environmentally sustainable village. The residential development would provide for a mix of social housing tenants, down-sizers as well as those looking to live a more sustainable life both environmentally and socially. Stable, affordable and safe housing is essential for individuals and families to lead a fully engaged life. The issue of the risk of homelessness is one that effects young people, families and increasingly older people – particularly women.

The land at Wardrop Valley Road provides the opportunity to explore a community that could be completely off grid as the site, owned by council has no water supply or electricity. The site has natural beauty and regeneration opportunities that can provide a different type of housing option for those who generally have few housing choices.

The features of the village could include:

- Between 100 and 200 small, modular houses
- A variety of building styles, sizes and colours
- Solar power with battery backup
- Wastewater recycling
- Composting toilets
- Rainwater harvesting
- Community spaces including a hall for arts and activities
- Spaces for visiting medicos, social workers, after-school tutors and pastoral care providers
- Productive activities as part of village life
- Community gardens – for residents and sold at markets as well as at the village gate
- An on-site men's shed.

A concept plan and business plan are essential to determine the viability of the project but doing nothing about the housing problem is harmful for the community.



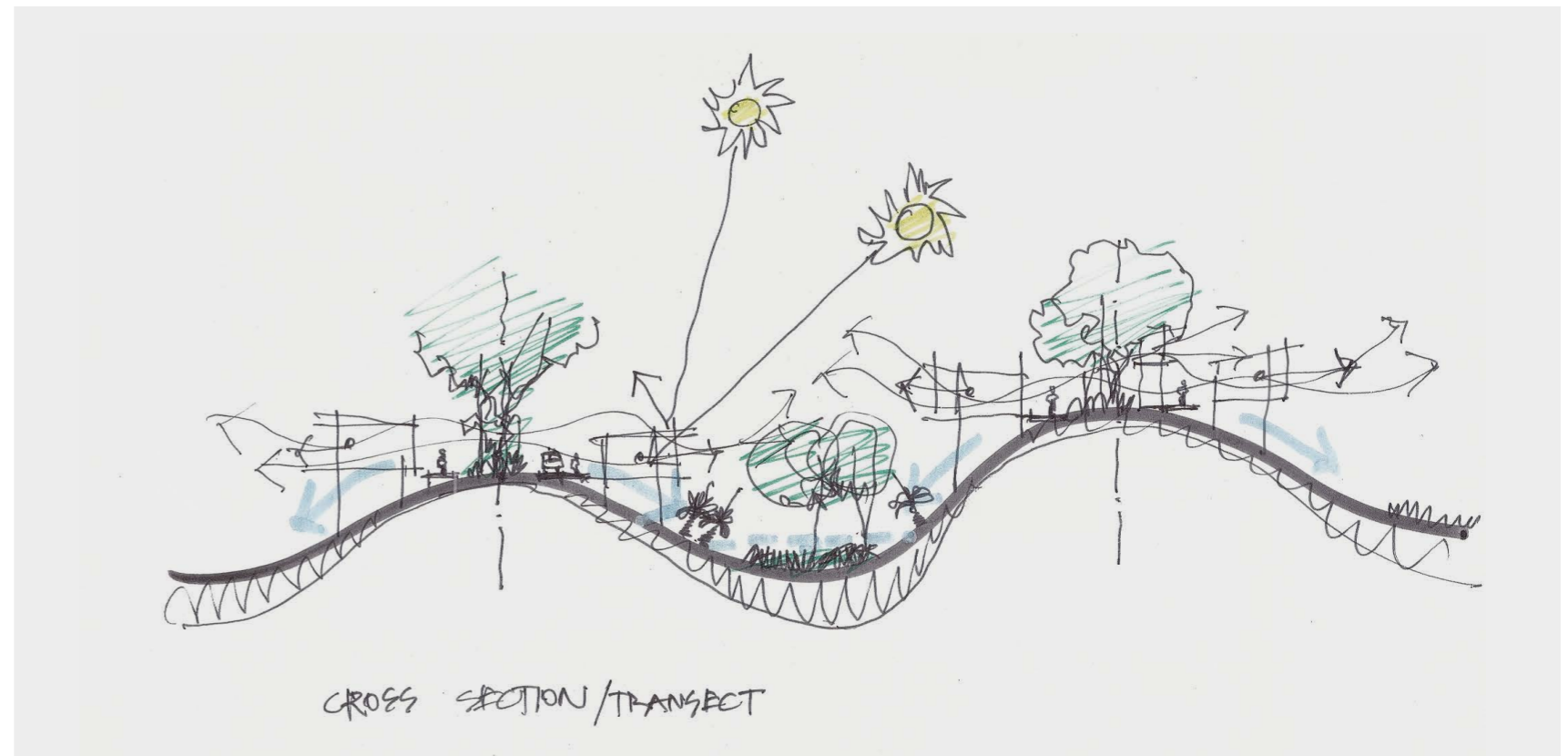
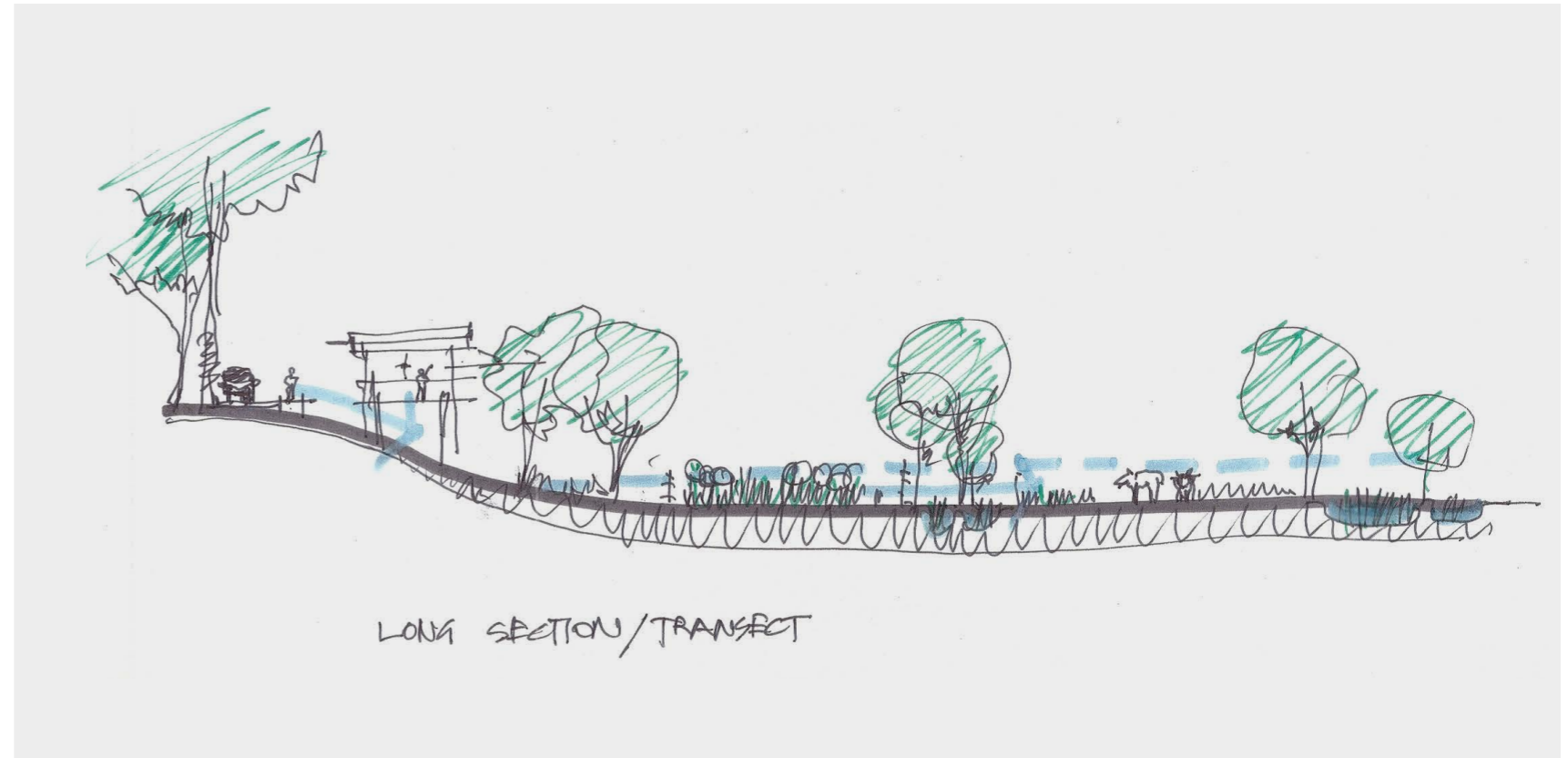
Jim Gall – Gall Architects
Landscape and ecology

The proposed development is an opportunity to regenerate the site and to increase the value and economic contribution of the site while improving its biophysical systems. The present is full of things that were (thought) impossible in the past. We should not be limited by the present systems but work from foundational principles (biophysical, social, economic, cultural, psychological) and imagine a sustainable/sustaining community on the site.

Principles:

- Do not build on the top of the ridges. These are for movement and gathering. Build houses around and below the ridges which will require suspended structural systems and encourage lightweight and modular buildings.
- Make use of the good soils in the valleys: regeneration and agriculture.
- Manage and make use of the natural hydrology of the site. Trees are good "pumps". Development will capture and use rainwater. Water treatment systems for black and grey water and for stormwater (detention, pond cleaning, etc.) can restore/maintain the site hydrology.
- Plant for regeneration and for production (agriculture, silviculture) ecosystems. This will improve flora/fauna regeneration.
- Carefully plant and design/location of buildings to minimise the risks of and from fire.

These biophysical strategies will generate social/economic activities and an attractive place that is desirable.





Alan Hoban – Bligh Tanner
Integrated water management and onsite wastewater management

Water

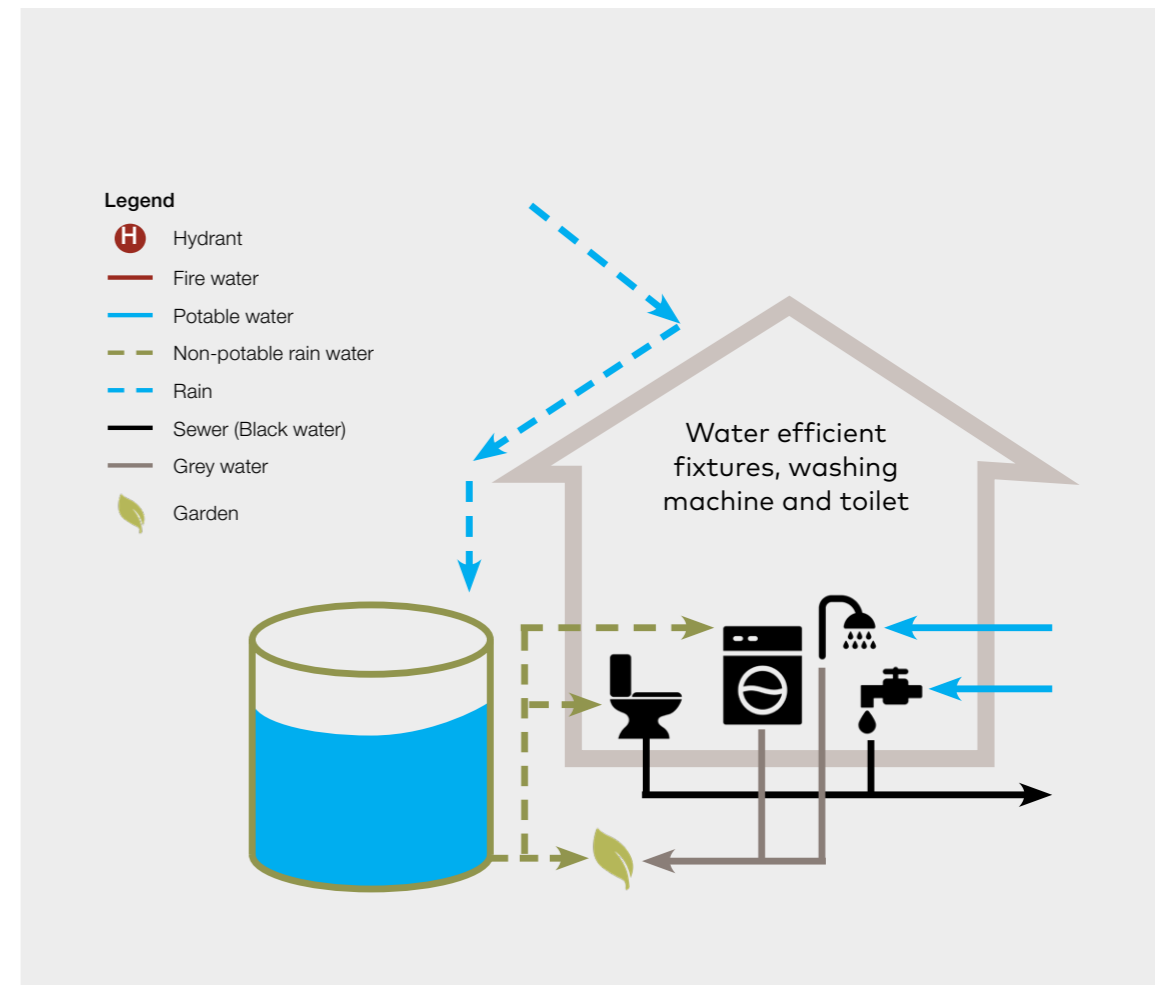
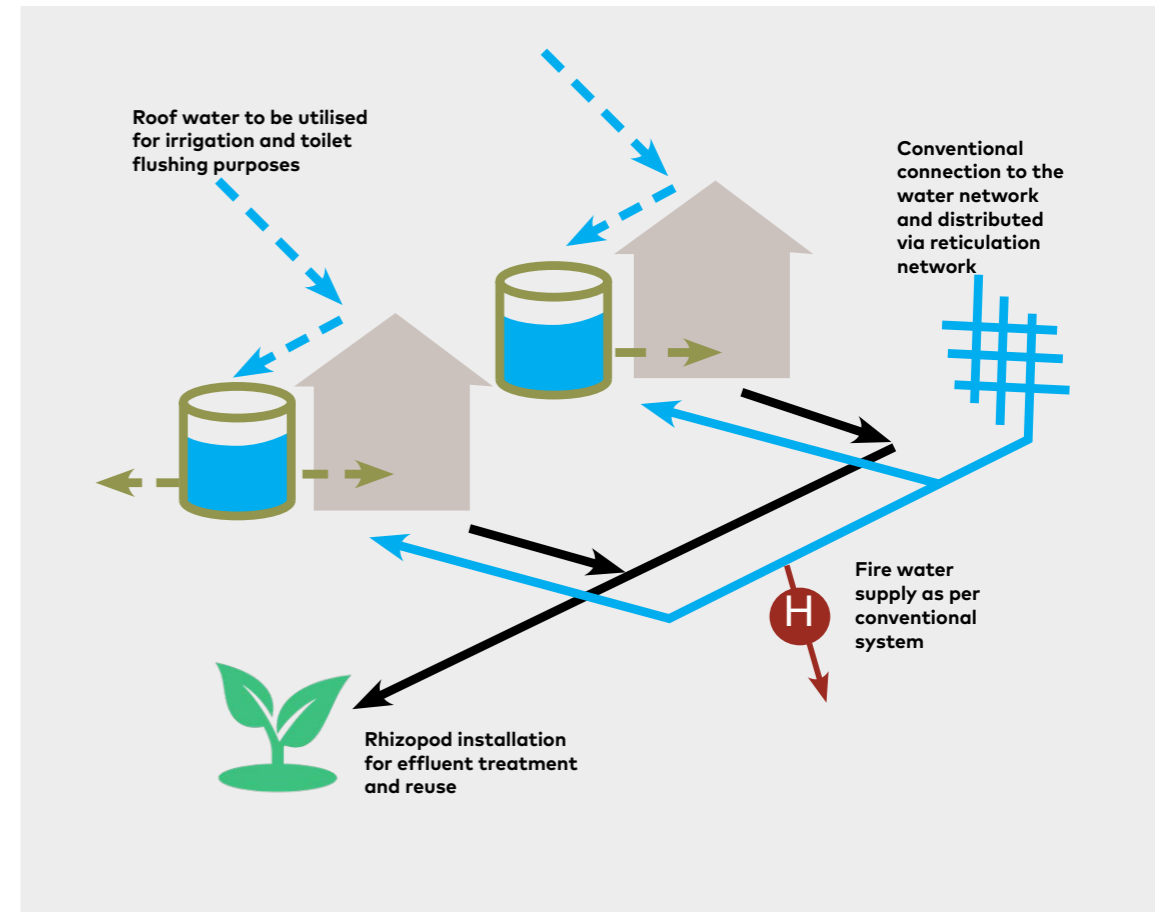
- Given town water will be reticulated to the adjoining industrial site, this presents a cost effective option of supplying the site with potable water and firefighting supply. The costs of providing this infrastructure including required pipework, pumps and storage tanks will need to be considered in more detail.
- A communal roofwater harvesting scheme, could be used to provide potable water provided adequate treatment and management of the drinking water scheme was in place. If the site did not have access to town water, this would be the preferred option.
- Drinking from tank water would introduce significant regulatory and compliance issues and is not a preferred solution.
- Rainwater tanks are recommended for non-potable supply to be used for gardens, toilets and washing machines, to increase the self-reliance of the community and also to minimise site runoff (due to downstream drainage issues).
- Availability of bore water, and its quality, would need to be investigated further to understand its potential.

Wastewater

- Wastewater infrastructure will be updated as part of the planned expansion of the adjoining industrial central site. This presents an opportunity or option to either reticulate the site or make provision for a 'fail safe' connection to the site. The costs of providing this reticulated infrastructure would need to be considered in more detail against the costs and ongoing maintenance of on-site systems including Rhyzone system and conventional septic systems.
- Foam flush WC
- The low lying wet areas constrain the area available for on site irrigation/transpiration with wastewater.
- Diverting greywater to landscaped areas can assist in reducing the wastewater that needs to be treated and managed.
- A Rhizopod system may be appropriate for wastewater treatment as it minimises groundwater infiltration and maximises loss to evapotranspiration.

Recommended scheme

- Grey water – Roof water from individual dwellings and communal buildings to be utilised for irrigation, toilet flushing and washing machines
- Black water – Rhizodod installation for effluent treatment from WCs and showers, and reuse for fertiliser
- Potable Water – Conventional connection to the water networks and distributed via reticulation network to kitchen, shower and bathroom taps
- Fire water – Supply as per conventional system.





John Tuxworth – Built Environment Collective
Onsite energy options and Onsite waste management

Flood prone areas may be used for wind or solar installation as this land cannot be built on.

Calculations are made on the following assumptions

- 200 dwellings, 2 person per dwelling, 400 people total
- Typical household appliances
- Solar HW with heat pump storage, LPG stove/oven- expected daily demand 7.8kWh per dwelling per day
- 2.1 MWh / day for the entire site
- Additional 30% allowance for site facilities

Energy options

- Solar- 168% of daily demand
- Wind-10% of daily demand
- Small scale geothermal-50% of daily demand
- Solar Hydrogen-133% of daily demand

Relative Cost- Capital cost per KWh/day

- Solar- \$880
- Wind-\$13 000
- Small scale geothermal-\$545
- Solar Hydrogen-\$900

While Solar is more cost effective, a Solar Hydrogen system requires less storage and can generate hydrogen to be used as fuel.

Waste

Average 2.7 person household generates 460kg of waste per year

Types of waste

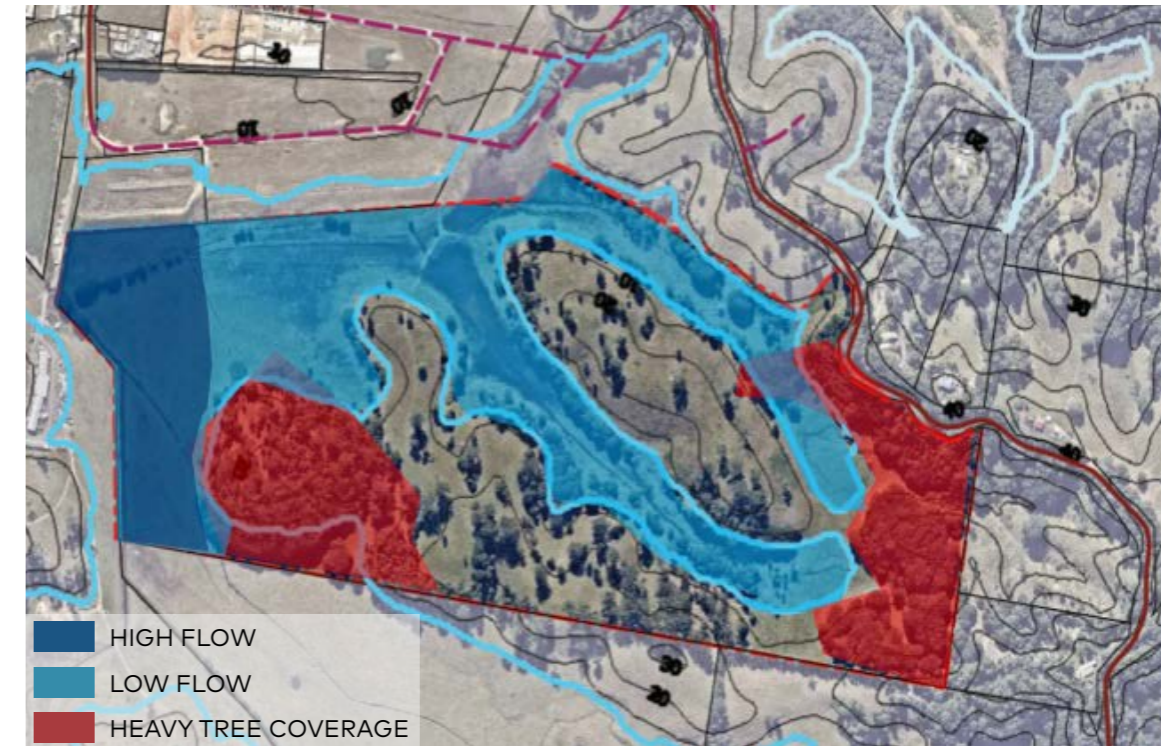
1. Bio-degradable waste
2. Recyclable/Reusable waste
3. Non-recyclable waste

Each waste category has their own options for sustainable collection and disposal.

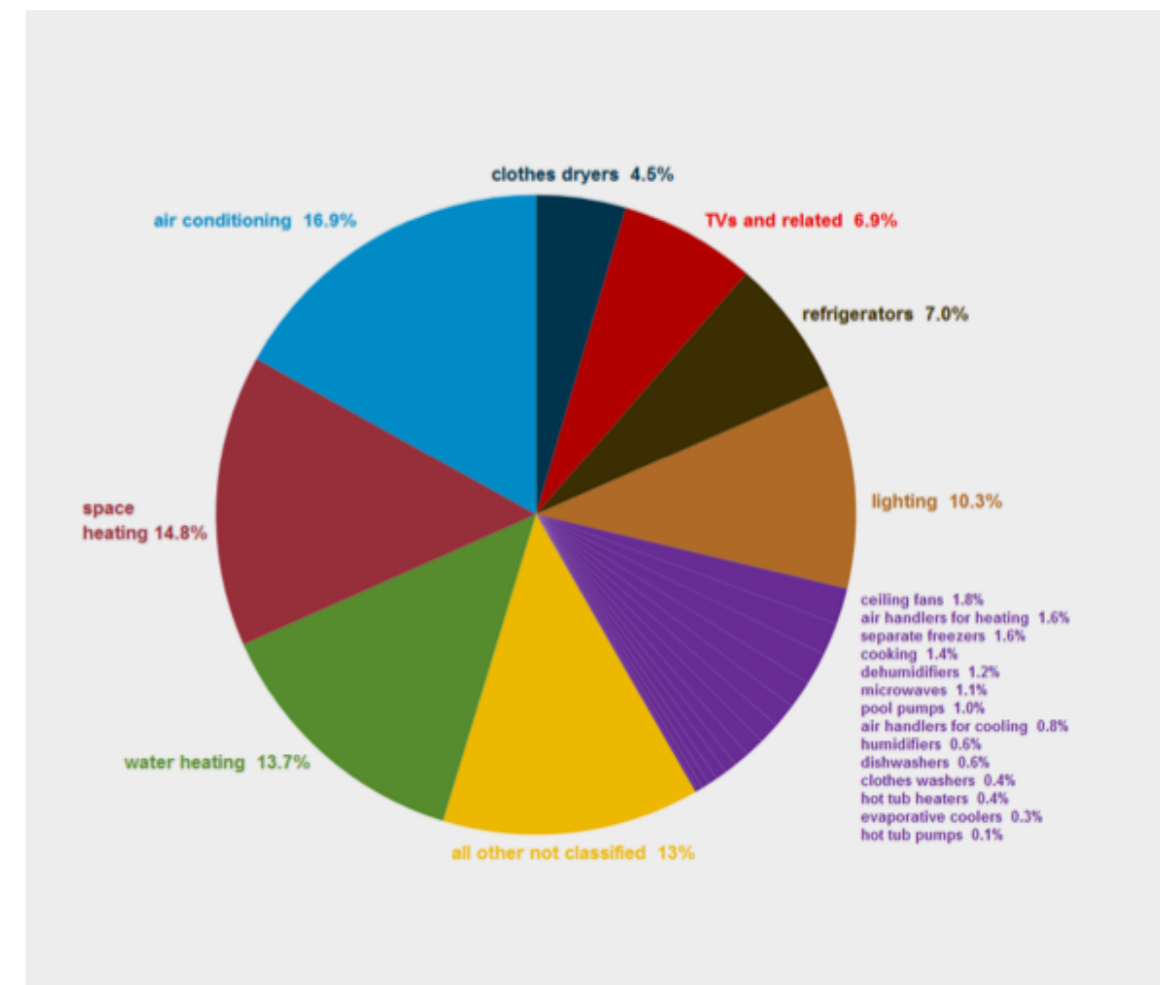
Non-recyclable waste to be taken off site

Onsite management

- Organic and food waste maybe be managed separately & disposed on site (or sold)
- Organic waste: mulch or bio-fuel
- Food waste: compost



Site flood prone areas



Typical Energy demand



Eloise Atkinson
International and national exemplars

The presentation looked at a number of examples in Australia and overseas that could provide some insights for the SSSH Village from a housing, community development, financing or governance point of view. All examples had sustainability – economic, environmental and social – as a core focus of the project. The projects included a tiny housing community in Texas, tiny home prototypes, Eco Villages in Australia, self-build projects from the UK and a number of eco-tourism businesses.

The exemplars were chosen as they each have something to learn for the Tweed Small Smart Sustainable Village concept. These lessons include:

- The exemplars demonstrate that consideration needs to be given in creating housing for people who traditionally have few housing options, innovation and not experimentation is the key.
- To set the context for the project, the housing continuum was explained. This continuum moves from crisis and transitional accommodation through to social and affordable rental housing right through to home ownership (refer image at right). The intention for the SSSH Village is that it would provide long-term rental accommodation across some of the continuum to meet the needs of people on low incomes. The village would provide accommodation for those on very low incomes and those requiring transitional accommodation. Crisis accommodation would not be considered until the community was well established.





Site photo looking west to Wollumbin (Mount Warning)

Design sessions outcomes

Participants were divided into four groups and each group was facilitated by a member of the consultant team. Each group was given a different scenario that would allow for a slightly different approach to the brief.

The scenarios are outlined below:

Productive Community

What are the opportunities within the master plan to generate income and achieve self-sufficiency economically?

- Farming
- Making
- Tourism
- Education and community programmes and events.

Connected Community

How does the site connect to the Murwillumbah region?

What are the community facilities and programmes delivered on site?
How does the community connect on site with each other?

Sustainable Footprint

What does the ultimate sustainable community look like on this site?

What environmental value needs to be protected and what are the opportunities to improve these on the site?

Settlement Patterns

What is the human settlement pattern? What is the on-site connectivity?

What were the common themes?

- All schemes respected the topography, vegetation and flooding areas
- Access to the site difficult- road off Wardrop Valley Road
- Internal access- loop road along ridges
- Site boundary- three of four groups went beyond the site boundary to achieve connectivity through the site
- Easiest place to build is on the 'additional' Council land off Wardrop Valley Road
- All schemes used sloping land for agriculture
- Flood areas used for regeneration
- Housing off ridge line
- Off grid energy and water possible.

Where are the differences?

- 'Sustainable Footprint' group kept all housing on the first ridge while other groups stretched across two ridges
- 'Sustainable Footprint' group focused on wildlife corridors and maintaining significant productive and recreation area
- 'Settlement Patterns' group introduced a 'commercial centre'
- 'Connected Community' group challenged 'ghetto' and looked to spread affordable housing through the rural residential area.
- 'Connected Community' group challenged the opportunity for a community space – 100-200 dwellings will not support a community centre.



Productive Community presentation



Connected Community discussions



Sustainable Footprint presentation



Site photo of grass trees in gully

Design sessions outcomes

Productive Community

Name	Role
Jim Gall	Facilitator – Gall Architects
Warren Polglase	Councillor
Ray Musgrave	Acting Manager – Land and Economic Development
David McNicoll	Manager – Building and Environmental Health
Vince Connell	Director – Planning and Regulation

What are the opportunities within the master plan to generate income and achieve self-sufficiency economically? Farming, Making, Tourism and Education and community programmes and events.



Productive Community Facilitated by Jim Gall

Management

Residents involvement in the overall management of the village is important. Discussion was based on observations of existing successful relocatable home communities such as Noble Park, where community members took on leadership/organiser roles and were able to develop strong communities around activities (internal and external), events, shared spaces etc.

It was noted that the management should be in private hands, but it shouldn't be provided by an external group but rather by residents invested in the community. Whole of life cycle costings and ongoing management and maintenance of the village are key considerations. The significant establishment costs as well as the ongoing costs were of concern to the group. There was discussion that the proposed village structure where Council retains ownership and residents pay rent would not work on a financial and housing affordability basis. Options for residents to have a financial stake through investing or buying into the village, were explored.

Skills

There will be members of the community who bring skills important to the development and ongoing economic/social activities of the development/community. Included in these skills will be the ability to pass on these skills through education, training, demonstration.

To an extent there will be a 2-way interaction between the activities of the community/site and the skills that come into the community. But key skills will relate to the basic economic/social activities carried out in the development.

Activities

- Building, especially self-build: reduces costs of homes.
- Site regeneration: tree "offset".
- Silviculture: tree and CO2 "offset" and trading economic possibilities.
- Cattle: for meat and dairy.
- Recycling: possibly on site but probably part of a larger system. The larger system might be demonstrated/catalysed by the activities on site.
- Eco-tourism: localised and a "front door" for experience and interpretation (biophysical and cultural) of the region. The site could provide "RV heaven" campsite(s) and/or "micro-cabins eco-park".

- Education and training: for community development within the site and connected externally. A successful development will be attractive to people outside the community and they will want to learn how it's done. So, teaching others to "replicate" the development/community will be an important economic generator.
- Food production: farms, allotments and community gardens in the lower, more fertile parts of the site, that can flood and "personal" production within owned sites. Exchange of products between community members and with people outside the development will be important. The community should establish a nutrient metabolism within the site.
- Maintenance: with skills developed this will provide jobs for the community on site.
- Industry: depending on the skills imported, the community could accommodate on site, a range of small-scale, "smart", high-value industries in digital/communications technologies, making, music, arts, etc. The development could demonstrate the sustaining economic opportunities of shifting from quantity to quality and from material to experiential, as a basis for creating economic value.

The interactions between these activities is important and should be facilitated/managed within the community.

It was considered important that the development not become an isolated low-income community. It must be fully connected to the wider community. It should be a desirable place to live, not a small/affordable house "fall-back" place. It must have social/economic diversity. The extent to which residents are connected physically, socially and economically to the community/site may vary.

Alternate uses

The appropriateness of the site for this village was questioned due to the remoteness to the Murwillumbah town centre and lack of services close to the site, as well as the cost of establishing infrastructure. If this use is not right, what is the alternative use? A more conventional rural residential development with profit generated to fund affordable housing project(s) elsewhere was considered.



Design sessions outcomes

Connected Community

Name	Role
Justin Twohill	Facilitator – Buro Two Architects
Pryce Allsop	Councillor
Chantelle Howse	Coordinator – Community Development
Jonathon Lynch	Urban Designer
Anthony Burnham	Acting Director – Engineering

How does the site connect to the Murwillumbah region?

What are the community facilities and programmes delivered on site?

How does the community connect on site with each other?



Connected Community Facilitated by Justin Twohill

The sites urban planning needs more holistic consideration

The Wardrop Valley SSSH Village site forms part of a potentially larger group of residential land release. Rather than seeing the site as currently isolated, it potentially forms part of a larger group of residential types (small and larger lot). The associated support buildings and community assets are better planned to support the whole. Its relationship to the planned industry land expansion and associated 'hub' needs exploration, as this forms part of the entry to the area. With the current planning proposal for additional employment generating land uses which would include a mixed use precinct, the site may be located close to a range of day-to-day retail, commercial services and employment although the timing of this is currently unknown. The subject site needs to 'flow' into the adjacent rural residential area and not be seen as separate.

Further clarity required regarding the people Who housing is planned for

If the village is to provide housing for those currently homeless, a number of support services may be needed including counsellors, psychologist's, health etc, and these services require extra buildings if isolated from a town centre. If the intention is to provide affordable housing for low income earners without complex needs, then requirements may be different.

The development has the opportunity to create a difference model of affordable or social housing that does not replace affordable housing within the town centre but offers an affordable rental option with lifestyle and connection to the land and a sense of environmental custodianship.

Discussion also questioned whether the best option was to create 'a community of affordable housing, or would affordable housing be better dispersed through a larger housing strategy?'

Connection to and from Murwillumbah needs consideration

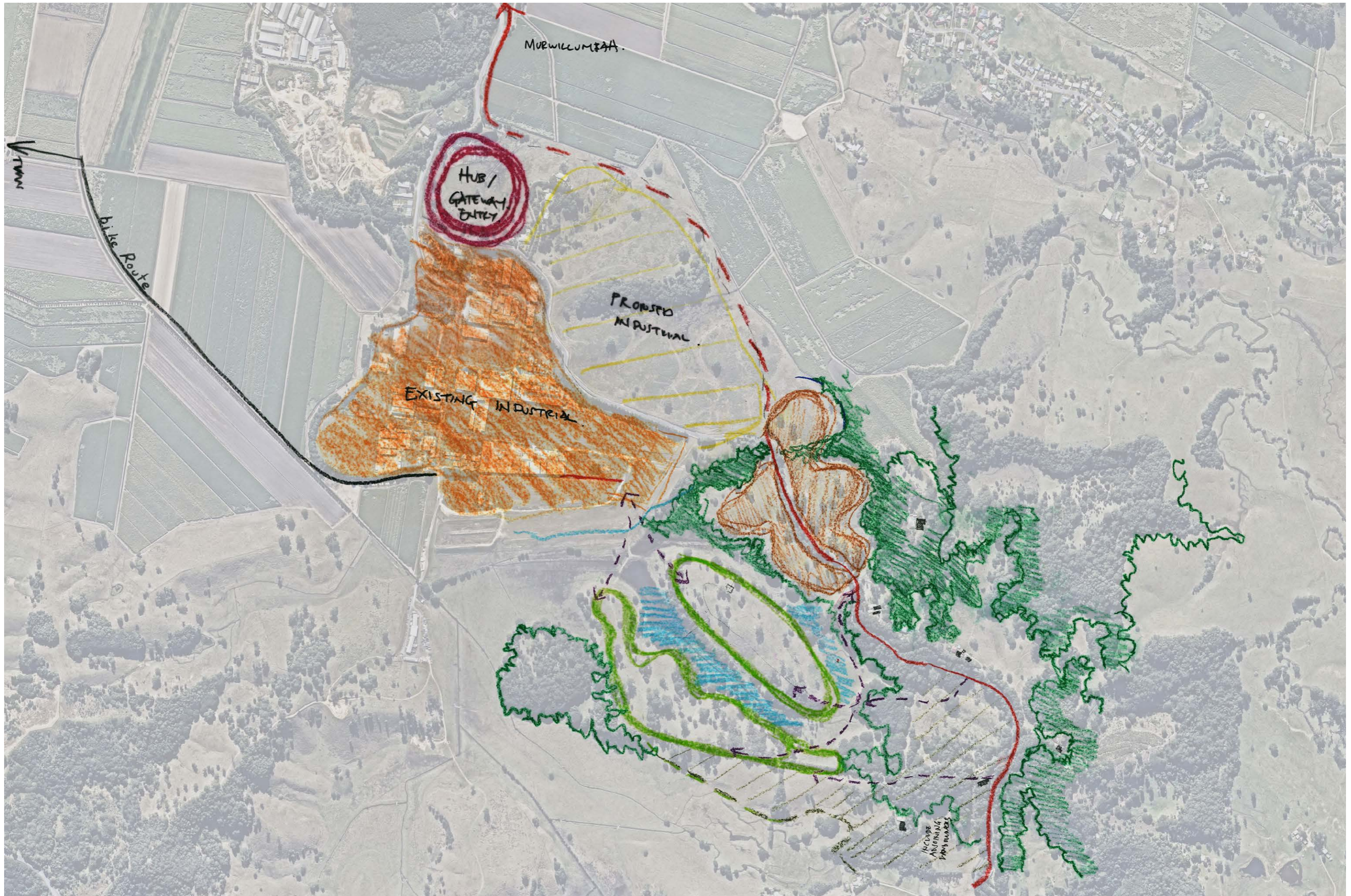
The site is accessible to those with a car, although travelling through the industry could be problematic (increased car load with truck movement) and access via Wardrop Valley road would be essential. Easy connection for pedestrians, bike, electric vehicle through the industrial area to the Gateway hub is also very important. There is good opportunity for the interlinkage of bike paths to intersect with the Rail Trail to the west and IGA to the north. Pathways could be widened and graded for golf cart access. Utilisation of unformed road reserves could open up (passive) movement network. Public transport connection may be viable once further housing is established. Car share was also discussed and supported.

Future residents need to access and utilise the retail, commercial, social and community offerings of Murwillumbah and there is opportunity to explore opportunities to establish reasons for the residents of Murwillumbah to connect to or want to visit the Village. This could include creation of open space areas, mountain bike and walking trails or the creation of an amphitheatre or outdoor performance space venue. The beautiful aspect, views and pockets of native vegetation are the big attractions for others wanting experience this site. It is essential that the Murwillumbah community consider the village as a part of their community not something separate.

Use of community buildings needs consideration

According to TSC Community Services Team, there is currently an oversupply of some community facilities within the Murwillumbah area. Council facilities on this site would be contrary to current Council policy on future community infrastructure planning. The preference would be that residents utilise existing social and community infrastructure and networks including outreach programs within Murwillumbah.

Any communal buildings on site would need to be managed and funded for the community by the community. If the community buildings can be associated / embedded with other communal activities that were discussed they may be seen as less of a liability (eg cross over of uses, such as a space that could be used for yoga, knitting session, communal laundry, market garden etc within any buildings that may be needed).



Design sessions outcomes

Sustainable Footprint

Name	Role
Alan Hoban	Facilitator – Bligh Tanner
John Tuxworth	Facilitator – BE Collective
Katie Milne	Mayor
Troy Green	General Manager
Robert Noakes	Senior Building Surveyor
Scott Hetherington	Senior Program Leader – Biodiversity

What does the ultimate sustainable community look like on this site?

What environmental value needs to be protected and what are the opportunities to improve these on the site?



Sustainable Footprint Facilitated by Alan Hoban and John Tuxworth

The group worked to maximise the environmental value of the site. There is increasing koala populations in the area and connecting up habitat is important. The ridgeline along the southern border could be quite beneficial in this regard.

The low lying marshland has potential to be of significant ecological value, as it already has some key wetland plant species and migratory birds. The wetland area could also be expanded (subject to hydrologic analyses) and could be funded through wetland offsets as it is difficult to find suitable offset sites.

Peak 1% AEP flood levels affect a significant amount of the site, however a better understanding of the behaviour of minor, more frequent flood events may be helpful to inform site uses.

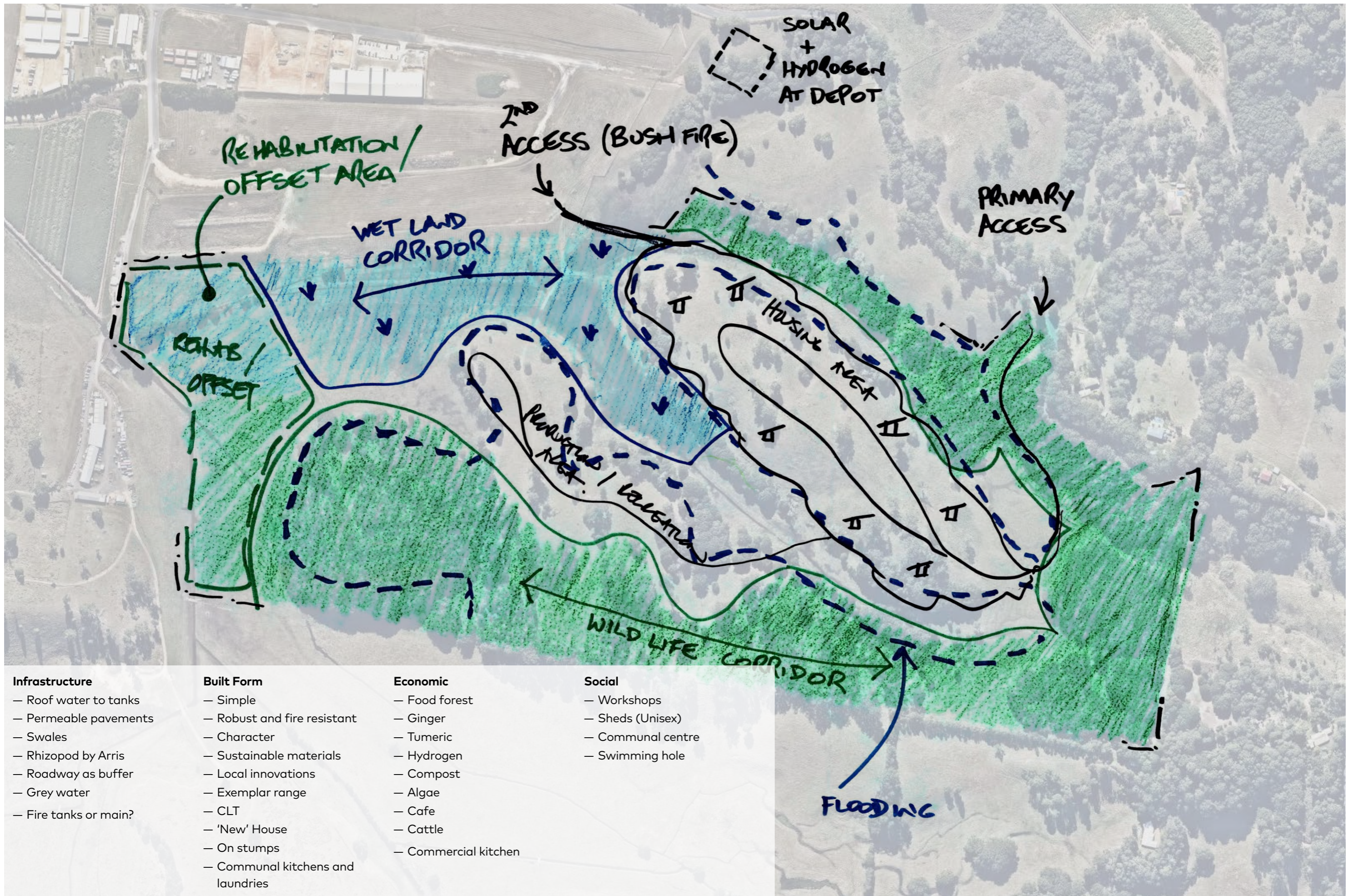
Preliminary access is from the least steep location along Wardrop Valley Road. A secondary access will be required for fire evacuation and will need to be located adjacent to the industrial land. A functional crossing of the 'wetland' will be problematic and possibly expensive but will be required.

Housing is limited to one ridge allowing the other ridge to be used for regeneration and productive areas. Circulation roadway are required but cut/fill associated with the roads due to steep site needs to be minimised. The housing is robust and fire resistance, uses sustainable materials, is on stumps to reduce need for cut and fill, uses local innovation and has communal kitchens and laundries. The level areas on the top of the ridge are used for open space, community activities and communal buildings.

The community is supported by off grid energy, water and waste water management. The location of communal power generation/storage could on site, or at the Council depot with potential for enhanced commercialisation. Rhizopods (by Arris), permeable pavements, rainwater collection and grey water use are all possible on the site.

Sustainable economic opportunities include creating a food forest, growing turmeric and ginger, using the flood area for cultivating algae, producing hydrogen and creating compost.

Community or communal buildings and public space are provided and may include a water feature. Communal buildings would need to be funded and managed separately from the broader Council community facility assets.



Infrastructure

- Roof water to tanks
- Permeable pavements
- Swales
- Rhizopod by Arris
- Roadway as buffer
- Grey water
- Fire tanks or main?

Built Form

- Simple
- Robust and fire resistant
- Character
- Sustainable materials
- Local innovations
- Exemplar range
- CLT
- 'New' House
- On stumps
- Communal kitchens and laundries

Economic

- Food forest
- Ginger
- Turmeric
- Hydrogen
- Compost
- Algae
- Cafe
- Cattle
- Commercial kitchen

Social

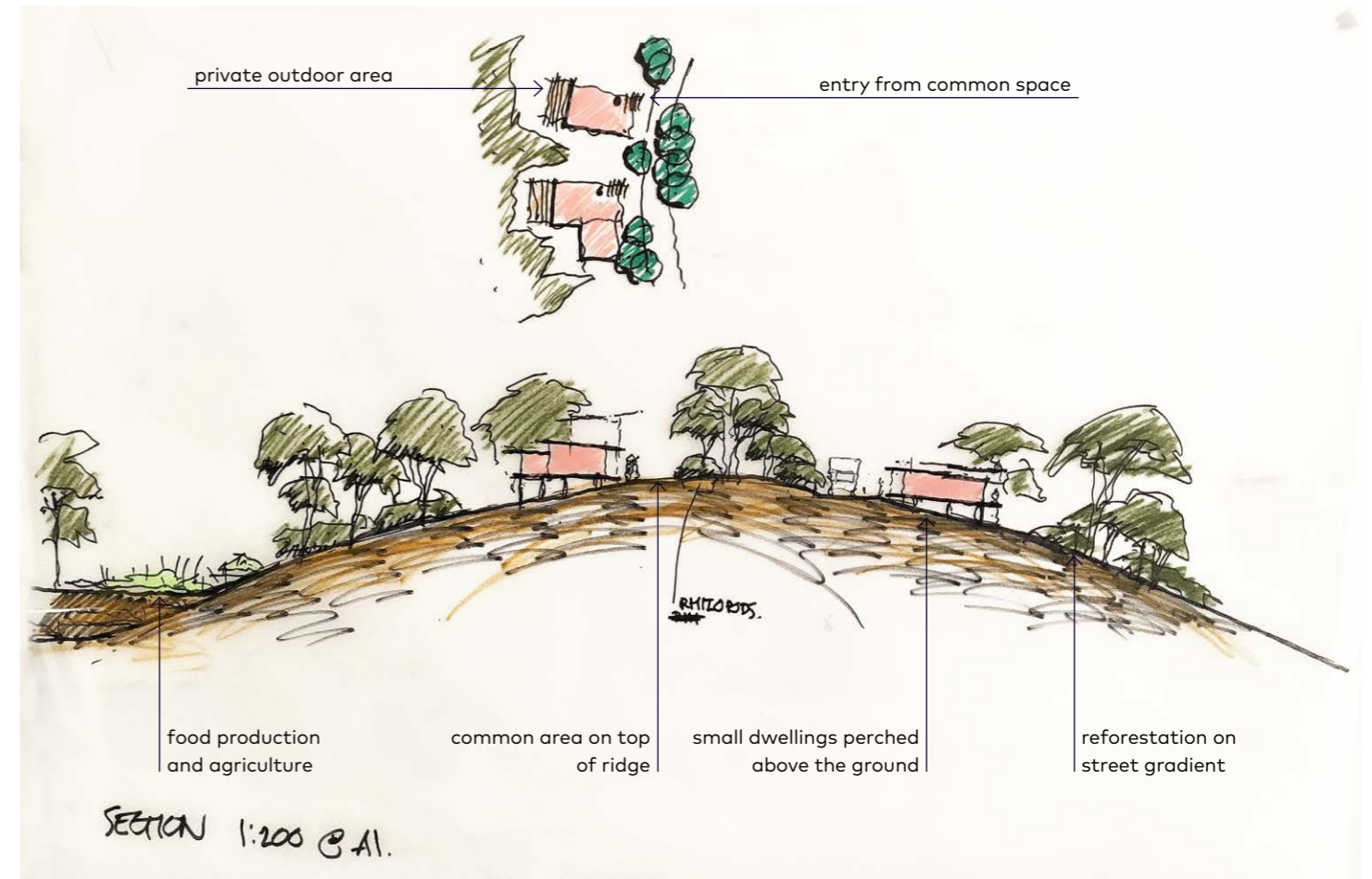
- Workshops
- Sheds (Unisex)
- Communal centre
- Swimming hole

Design sessions outcomes

Settlement Patterns

Name	Role
Cameron Davies	Facilitator – Deicke Richards
Himantha Mendis	Bligh Tanner
Ron Cooper	Councillor
Iain Lonsdale	Unit Coordinator – Strategic Planning and Urban Design
Danny Rose	Manager – Roads and Stormwater
Monica Kelly (Prevention Partners NSW)	Probity Adviser – Specialist Consultant

What is the human settlement pattern? What is the on-site connectivity?



Settlement Patterns Facilitated by Cameron Davies

This group explored the following aspects of the project:

- The additional Council land was used to investigate what is possible on Wardrop Valley Road
- Access to the site is difficult without this parcel of land
- Community uses and businesses should be on Wardrop Valley Road as this is where the 'movement economy' happens
- Housing, tightly clustered on the ridge can provide community and is the easiest place to build
- 10m wide lots allow for 300 dwellings which demonstrate a maximised density
- Steep land below the ridge can be used for reforestation
- Less steep land can be used for agriculture and food production
- Autonomous vehicles are a reality and can contribute to reduced parking.

The following areas were discussed:

- Design for active, community and public transport modes included:
 - + Interconnecting pathways suitable for bicycles
 - + Internal communal transport (small electric vehicles / people carriers)
 - + Community mini bus
 - + Interconnecting peripheral nodes / interchange for public transport
 - + Minimise car ownership and need for extensive internal roads and car parking
- Key environmental and sustainability initiatives included:
 - + Wetland restoration
 - + Vegetation regeneration and management
 - + Utilise natural land form and drainage for terraced based agriculture / food production
 - + Retain mature trees
 - + Maximise urban water sensitive design
 - + Incorporate water harvesting and reuse

- Design principles related to buildings included:
 - + Clustered housing around communal open space
 - + Utilise ridge/slope for house siting
 - + Dwellings face toward communal areas
 - + Prefabricated buildings
 - + Thermally responsive materials
 - + Modular design to allow adaptation (size)
 - + Maximise solar orientation / passive design
 - + Leasable business floor space
 - + Community infrastructure (e.g., halls / community garden)
- Governance and ongoing site management included:
 - + Centralised housing management body
 - + Minimise car ownership and need for extensive internal roads and car parking





Design principles

This set of design principles has been developed for the site but can also be used to assess other sites. It incorporates good urban design principles around community and connectedness as well as good sustainability principles around respect for topography, vegetation, water and orientation.

Innovation not experimentation

- The community harnesses innovative principles to provide affordability, environmental custodianship and resilience for its residents.
- Unproven principles are not harnessed when they have the potential to place residents at risk.

Community and connection

- Community facilities and activities support the sustainable housing community.
- Community facilities / communal buildings which are funded and managed by the community for the community are highly visible on site and easily accessible by residents as well as visitors.
- There are multiple points of connectivity to and within the site.
- Connections support active transport including opportunities for car share, community transport, electric vehicles, passive movement including walking and cycling trails and emergency access.

Affordability

- Housing is affordable, compact, resilient and touches the ground lightly.
- Modular and relocatable housing models are supported within the community.
- Housing diversity in type and size to meet varying resident and family needs and accessibility requirements.
- House siting allows opportunities to extend as families grow.
- Housing has good passive design and low running costs for occupants.
- There are opportunities for creating income from home garden, home business
- There are opportunities for creating income from home- garden, home business

Sustainability

- Energy is produced on site and includes a combination of solar and hydrogen
- Household water consumption is minimised and includes reduced water toilets
- Rainwater is collected and reused on site
- Food is produced on site through a combination of horticulture, food forests and aquaculture.
- Environmental values are enhanced through reforested habitat corridors, wetland restoration and erosion management.

Character

- The existing tranquil landscape character of the area is preserved and enhanced.
- Housing character reflects the environmental and architectural values of the broader community.

Governance

- The community has a governance structure led by Council or a Not for Profit Organisation
- The community is managed through a community housing provider or co-operative
- Housing tenure supports sustainability and affordability objectives. There are opportunities for a mix of tenure including - social rental, affordable rental, affordable home ownership (shared equity), market rental, short term rental

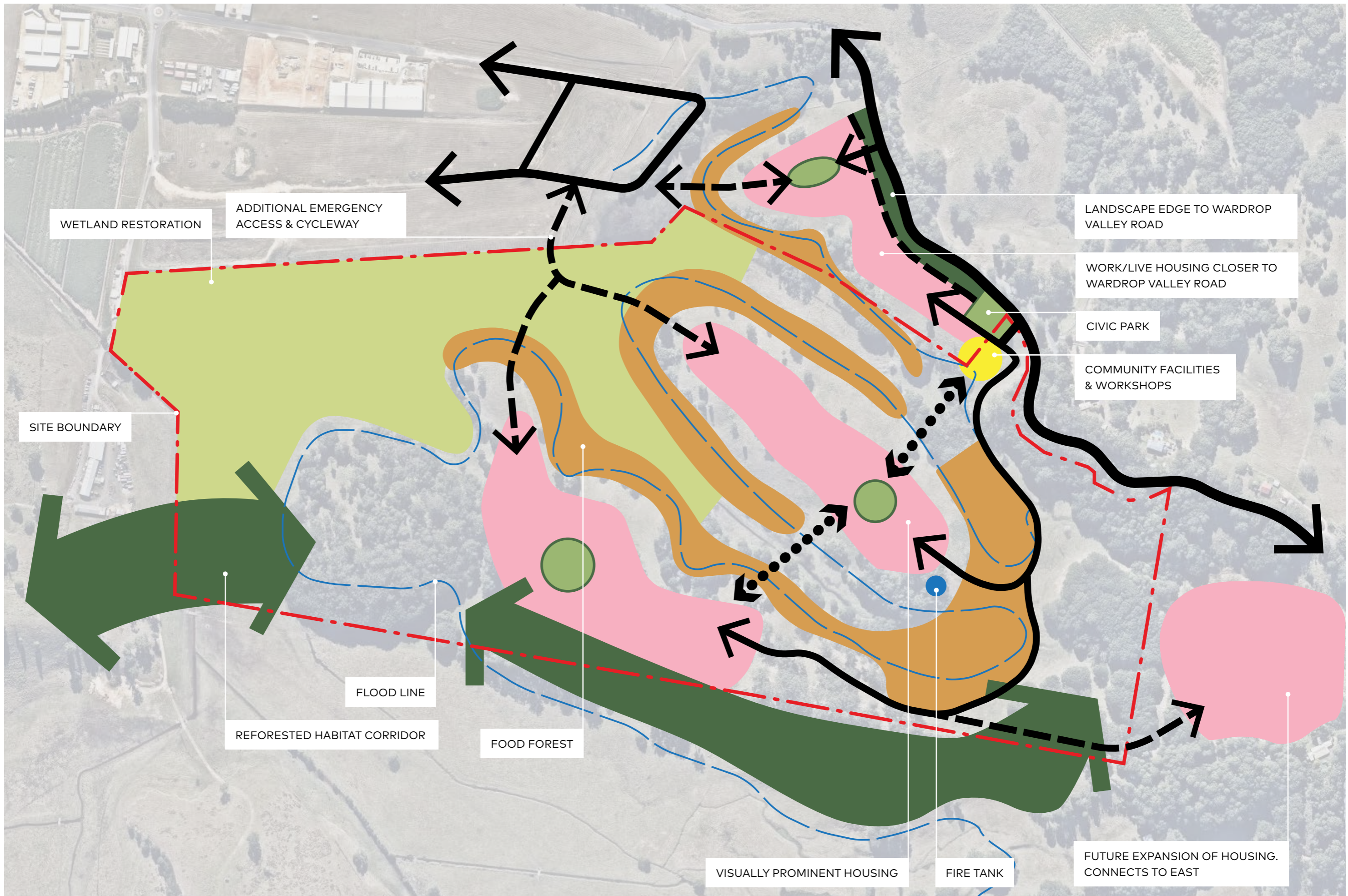
Infrastructure

- In consideration of infrastructure cost efficiencies utilise existing or close proximity infrastructure connections where available including town water supply and a failsafe sewage connection.
- Solar energy is produced and stored onsite.

Project delivery / buildability

- Project design and planning is fit for purpose.
- Project concept to be fully costed.
- Cost neutral to Council.
- Staging / sequence of development to achieve cost efficiency.
- Minimise site works / waste.
- Fit for purpose project and risk management.





Project Exemplars

Tiny Houses

The Tiny House movement is both a social and architectural movement with a focus on living simply with less. Generally, 'Tiny Houses' are considered to be under 45m² but those on wheels (THOW) can be as small as 11m². The motivation or need to live in a Tiny House can be environmental, economic and/or social.

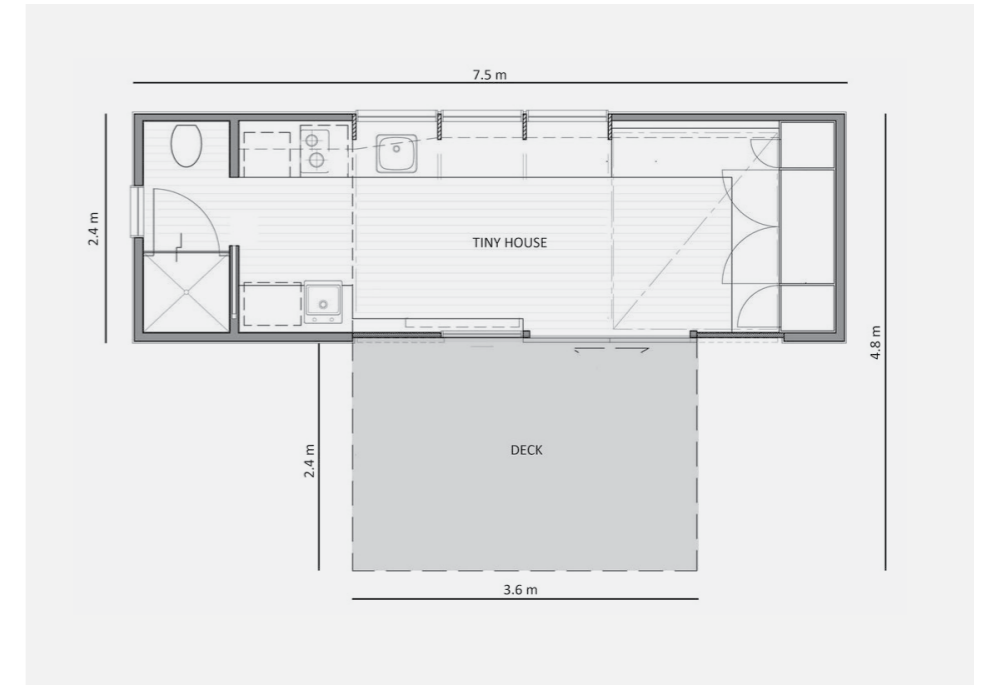
Some of the key benefits can include:

- lower land requirements and efficiency of using existing services and utilities
- fewer materials, opportunity for innovation in using sustainable energy options
- a smaller footprint for some households
- an option for people who want to accumulate less and use fewer resources
- an option for multi-generational families to live near each other and greater social sustainability
- lower cost due to small space
- an option for people to build their own home
- an opportunity to own a home without the financial burden.

With advances in technology, many Tiny Houses are being designed and marketed as self-sufficient dwellings. Solar power, wind power, rainwater tanks and composting toilets can allow the dwellings, that already are efficient to run, to operate off-grid.



The Tiny House Company – Tiny House on Wheels



The Tiny House Company – Tiny House on Wheels

Tiny Houses can also provide a number of tenure options including:

- ownership
- sub-leasing sites
- rent to own
- renting
- community housing management with tenant leases.

There are a number of companies all over the world building tiny homes for permanent downsizers, those living in RV or caravan parks, tourist opportunities (including Airbnb) and for students. There are a number of local tiny home companies designing for the climate in Queensland and NSW.

Though there is much enthusiasm for tiny homes there are a number of barriers. The Griffith University study by Heather Shearer identified the challenges around economic, regulatory and social barriers, high land prices, and nowhere to 'park'. While other issues such as insufficient cash, lack of mortgage finance and inability to insure mobile Tiny Houses were all constraints, onerous planning schemes and building codes, as well as transport restrictions have significantly reduced the uptake.

While there are many examples of high-end Tiny Houses and villages for tourism options, or secondary dwellings, the following examples demonstrate the success of the Tiny House as a solution for marginalised and vulnerable people.

Learnings from Tiny Houses:

- Small dwellings can help to address affordability requiring less land and less materials
- Providing small dwellings can provide for real diversity and a pathway out of homelessness
- Good design can deliver good passive design outcomes that can reduce the cost of living for residents
- Infill sites can be utilised with tiny homes
- There is a lack of clarity about how tiny homes are treated under the NCC
- There are diverse provisions across local government areas that can create barriers
- Community is important so providing opportunities for shared spaces is essential
- When housing vulnerable people, support services are vital the success of the housing
- There are various approaches to finance, management and governance including a potential role for community housing providers and possible body-corporate arrangements

Community First Austin, Texas

- Developed by Mobile Loaves & Fishes (MLF) which is a social outreach ministry that has provided food and services to the homeless since 1998.
- Project has been established for three years and provides affordable housing to the most vulnerable including those with disabilities and those who have been chronically homeless.
- It is a 20 hectares master planned community that provides affordable, permanent housing and a supportive community for men and women.
- The first stage accommodated 230 Tiny Houses and RVs with communal laundry, kitchen and amenities. The second stage that is under construction, will support another 300 dwellings.
- There are a number of economic generators on site which also provide some employment for residents including education opportunities, shop-craft, art work, B & B, cinema, etc.
- Food production for residents – residents can work on site.
- Residents are supported through ministry on site.





Harris Transportable housing Project

- The not-for-profit Launch Housing is a provider of housing and homelessness support services that has negotiated an arrangement with VicRoads, to place moveable dwellings on land reserved for a future road widening.
- Launch Housing is anticipating 57 one-bedroom townhouses on nine parcels of land in Footscray and Maidstone.
- First six dwellings have been completed on Ballarat Road.
- \$4 million was donated by a philanthropic donor.
- Each Tiny House has an open plan ground floor with a kitchenette, bathroom and mezzanine storage space that sits above the bathroom.
- The homes boast a 6-star energy rating and with correct solar orientation, north-facing windows enable economical energy consumption and solar hot water.
- The homes sit on top of a removable surefoot footing system. They have a 50-year lifespan and, if required, can be relocated an unlimited number of times within this period.



Eco Villages

"An ecovillage is an intentional or traditional community using local participatory processes to holistically integrate ecological, economic, social, and cultural dimensions of sustainability in order to regenerate social and natural environments."

Courtesy of the Global Ecovillage Network (GEN)



Bruns Eco Village - Dwelling Clusters



Bruns Eco Village - Precinct Plan

Aldinga Arts Ecovillage

Aldinga Arts Ecovillage in South Australia emerged from the distinct inspirations of the arts, permaculture and environmental sustainability, and the desire to create more cohesive community. It aims to showcase the exploration of new lifestyles for a more humane, sustainable future.

The project:

- Located 40km south of Adelaide
- 25 years old and has over 320 adults and 80 children living there
- Situated on approximately 40 acres (16 hectares) with half of the land dedicated to 180 dwellings/common land and half to the farm
- Registered under the community titles act SA
- Largely owner-occupied model, with some long-term and holiday rentals
- Focused on arts, permaculture
- Maintained through the community participation and inputs of residents through arts and cultural activities, community building, developing and maintaining the common land (including a small farm), looking after village service infrastructure, and being involved in community governance
- Eco features include:
 - + Orchard
 - + Farm
 - + Composting
 - + Rainwater harvest but have town water
 - + Wastewater plant
 - + Council picks up refuse from central area.

Bruns Eco Village

While this Ecovillage is now unlikely to go ahead due to financial issues, it is an interesting model that may still provide some 'learnings' in terms of the physical and ownership model. According to a statement by land owner and BEV co-founder Kelvin Daly, the reason that the BEV project could not be sustained was because their bank had 'reached the threshold of funds that it is willing to lend us and we are unable to spend more borrowed money on a project with an unclear planning pathway and elusive timeline.' Despite exploring other affordable housing models they were unable to make the project viable and after wide professional advice counsel they decide not to proceed in 'the current circumstances'. There was some opposition from neighbours that made the project very challenging.

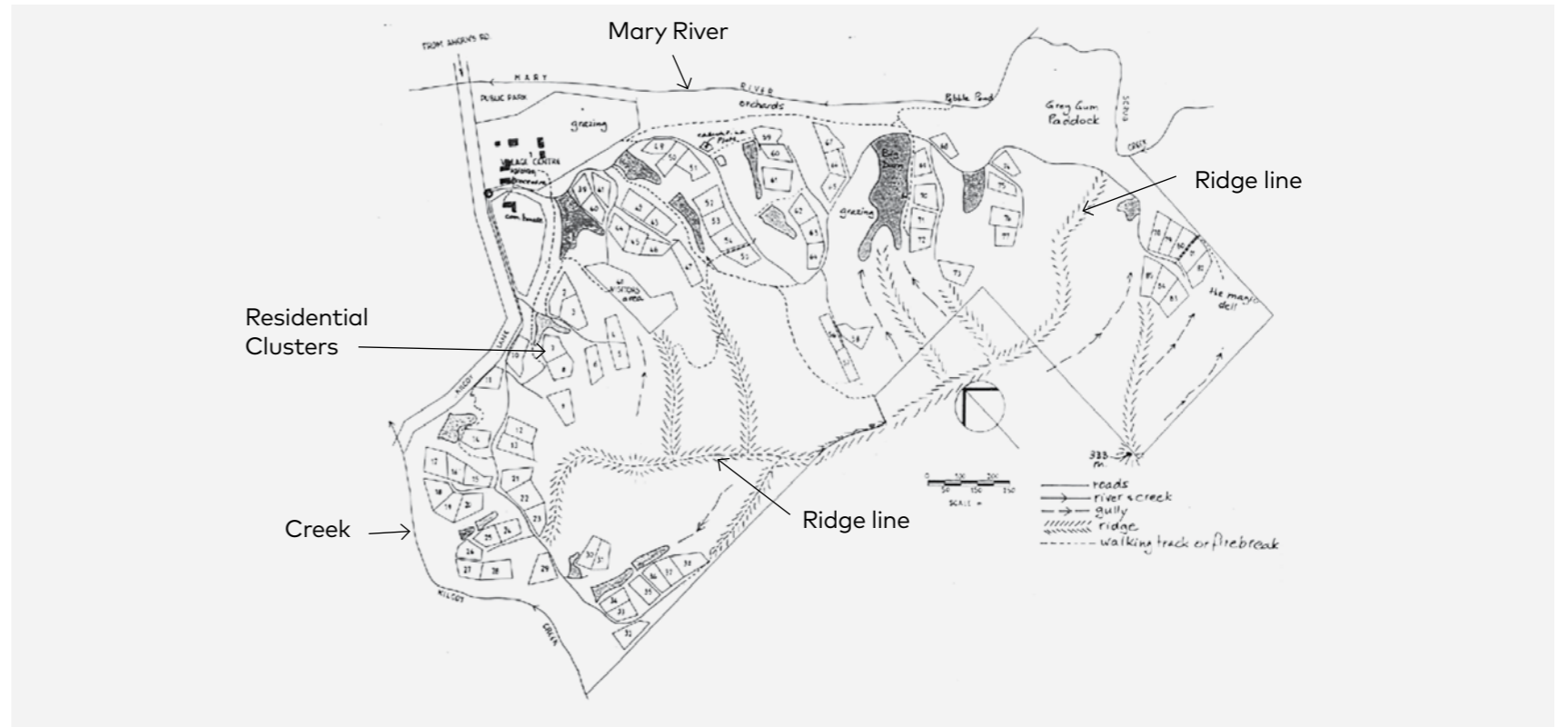
The project:

- Located on land of approximately 105 acres (42 hectares) south of Brunswick Heads
- Developed an innovative Alternative Ownership Model where people can rent and invest simultaneously. Long-term leases allow residents similar rights as ownership.
- Aimed to provide 100% affordable homes in a co-operative owned and run eco village.
- Land is a Community Land Trust (CLT), run and maintained by the co-operative.
- The proposed model is an eco-village made up of housing clusters that each contains a number of dwellings and a common house.
- The village aimed to be a completely self-sustaining community with:
 - + Residential clusters which will meet an affordable housing need and provide nurturing social connection;

- + A food producing and renewable energy precinct to achieve food and energy independence;
- + An educational facility and workshop space for lifelong learning;
- + A light commercial area creating much needed employment; and
- + A wellness facility that provides a holistic health foundation for the community.
- Dwellings designed in clusters. Each housing cluster or hamlet will have its own micro-community with a unique identity and shared values. A common area will provide combined resources for all to use.
- Intentional clusters that cater for younger people, families and older people will be included to ensure the village provides inter-generational sustainable living.
- Eco features include:
 - + Dwellings designed to 7-star NaTHERS rating
 - + 3MW solar farm to provide entire community with renewable energy and produce renewable energy for Byron Shire
 - + Onsite integrated waste management
 - + Self-sustaining captured and recycled water supply
 - + Food production and supply
 - + Support for local wildlife corridors and protection for existing habitats
 - + Individual housing to accommodate extensive food growing gardens and orchards.



Market Day



Site Plan

Crystal Waters Eco Village, Conondale, Queensland

Crystal Waters Eco Village is set in 650 acres of bushland at the headwaters of the Mary River near Conondale in Queensland. It is an environmentally and socially responsible rural subdivision, designed using permaculture principles. The Village includes privately owned residential lots and co-operatively owned commercial properties.

- Designed by Permaculture specialists Max Lindegger, Robert Tap, Barry Goodman and Geoff Young, with the first residents moving in during 1987.
- 83 freehold residential lots
- 2 lots for the Community Co-operative occupy 20% of the land, with the remaining 80% being commonly owned and used for agriculture and recreation.
- During early design stages, the design team assessed the land, determining areas which would be residential lots, commercial areas, and common land. Any land with 'special qualities' was designated common land.
- Home to 230 residents of all ages, the community is continually evolving both physically and socially.
- Home sizes and designs vary greatly
- Supports a variety of flora and fauna.
- Many residents are members of the Community Co-operative which manages all public facilities and owns the Village Green and Camping Area.

- The Village Green is the social hub of the community and provides open space for meeting and playing, monthly markets and music performances.
- Crystal Waters Body Corporate is responsible for the maintenance of village roads and shared land use as well as water management.
- Residential lots are grouped together in small clusters of no more than 12 lots, providing opportunities for small social groups to form within the community and to allow creation of buffer zones and wildlife corridors.
- All lots are adjacent to common property and most were planned to overlook the proposed dams.
- The implementation of 'home occupation' zoning, allowing residents to work on the property. As a result, many businesses operate in the Village and provide steady employment for other residents.
- The subdivision was accomplished under the Queensland Building Units and Group Titles Act, 1980 and allowed residents to purchase their own parcel of freehold land.

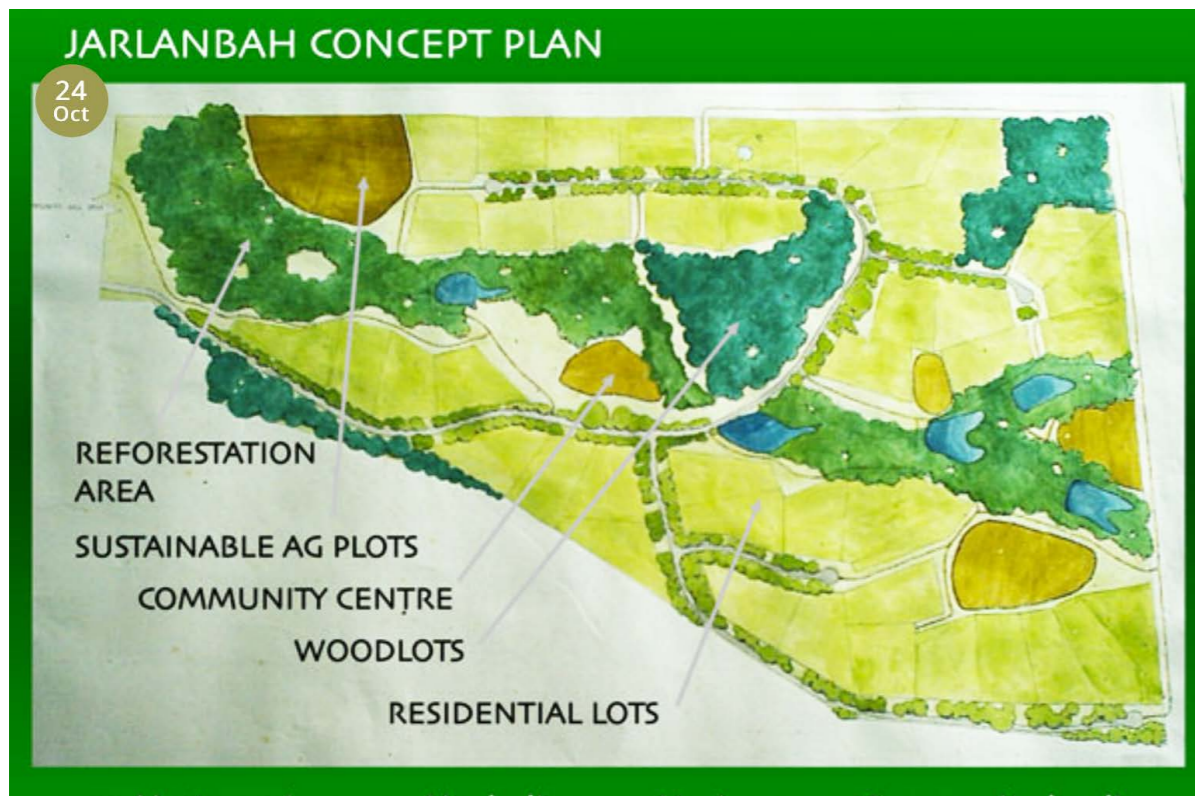
- Eco features include:
 - + Increased diversity of flora and fauna
 - + Most residents maintain productive gardens and orchards
 - + Each site offers a NE or NW aspect and design of dwellings aims to maximise passive solar possibilities
 - + Residents are encouraged to plan the design of their homes using materials with low environmental impacts (eg. rainforest timber is avoided, local and recycled timbers are popular, composite/toxic materials are avoided etc)
 - + On site rainwater collection
 - + On site waste management.



Variety of dwellings



Variety of dwellings



Site Plan

Jarlanbah Permaculture Hamlet, Nimbin, NSW

Jarlanbah Permaculture Hamlet is located 1.5km from Nimbin Village Centre in NSW. It was designed in the early 1990's by permaculture designer Robyn Francis on a 55 acre grazing property that was planned for rezoning to 'rural residential'.

- The design and approval process took 2 years, with road construction and services installation taking place the following year.
- NSW's first rural community title, consisting of 43 freehold residential lots
- In the year 2000, there were 24 households living in the community with 19 lots yet to be occupied (unknown number of current residents)
- Residential lots are 2000 sqm each (half an acre). The remaining 33 acres is designated as community land.
- The community land is managed co-operatively and consists of designated areas for specific uses. The major gully is reserved for sustainable agriculture, rainforest re-generation and 5 dams for wildlife and fighting of fires. There is also a Community Centre and open space area.

– Eco features include:

- + Sited within walking and cycling distance to a well-served town centre resulting in reduced motor vehicle use. There is also a network of grassed tracks that connect areas throughout the community land.
- + By-laws requiring each lot to have a minimum rainwater storage capacity of 45,000 litres for domestic use to ensure water self-reliance. There is no town water or sewage.
- + By-laws provide comprehensive guidelines for sewage and greywater treatment with composting toilets promoted as the preferred option. Treated waste water is recycled for irrigating edible gardens.
- + The village is connected to the main grid however, the system is unique in that the internal lines are community-owned. Electricity connection to each dwelling is 20 amps (significantly lower than the normal 63 amps per household), ensuring the use of energy efficient appliances.
- + The design and layout of the lots were guided by solar access considerations and a set of building standards were developed to ensure application of energy efficient design and to encourage use of appropriate materials.
- + The community strives to be waste neutral.

Learnings from Eco Villages:

- Communal living can address social isolation and lack of connectedness
- Good balance between private and communal spaces is important
- Issue of affordability can be addressed through innovative tenure models but also through shared resources, energy savings and water and waste management
- The villages enable people to live with a smaller environmental footprint
- People have an opportunity to get involved in concept development, landscaping and the design of shared spaces.
- Villages can be a safe and energetic space for children to grow up with young families often attracted to the communal living and access to fresh food and environment.
- Successful connection with wider community can be achieved through inviting others into the village through market days, events and business
- Clustering of housing can enhance social interaction and belonging
- Interesting cooperative and private ownership model
- Planning takes social, economic and environmental sustainability as the basis for design



Church Grove Site Plan



Church Grove housing

Self Build

The practice of self-build is not new. People all over the world have been designing and building their own homes for centuries with input varying from doing the actual building work themselves or with a community, to contracting out all the work to others. In the 1970s, British architect Walter Segal developed a system of self-build housing based on traditional timber building methods.

To address the lack of housing for low income people, Lewisham Borough Council made three small sites, unsuitable for mainstream housing, available for people to build their own homes using the method. Nearly 50 years later the Church Grove project is continuing the self-build principles in London for low-income earners. A guiding principle for the organisation is that residents should be involved in the design and construction of the project and create opportunities for project management and building training.

Learnings from Self build:

- Community development and building skills is essential
- Understanding that community led projects can take a long time to come to fruition
- The extraordinary sense of achievement and belonging, both individual and collective for residents when building their own space delivers more than housing to a community

Church Grove London UK Self Build

The project is led by the Rural Urban Synthesis Society (RUSS) and began on site in 2019 with expected completion in 2020.

The project:

- Includes 33 community-led, low-energy self-build homes on a challenging brownfield site in the London Borough of Lewisham.
- Has a challenging site, involving flood mitigation, decontamination and complicated access constraints.
- RUSS is a Community Land Trust (CLT).
- Aims to support a mixed community of different incomes and ages – and will build homes that vary in size and tenure, including:
 - + Larger shared-ownership or shared equity for families
 - + Social rented homes for families
 - + Co-housing flats for older people down-sizing and
 - + Shared homes available at affordable rents for young people.
- Sets out to involve residents in the design, construction and long-term management of their homes from the start, in order to sow the seeds of a resilient future neighbourhood.

- Aims to provide high quality, truly affordable homes which will require little or no energy to run.
- Provide each resident with the opportunity to self-build as much of their home as possible in order to keep development costs – and therefore purchase prices – low.
- Is arranged in two 4-storey buildings facing south with a green corridor along the river as required by The Environment Agency.
- Homes range from one to four bedroom properties as well as a community hall, office and kitchen to accommodate community meetings, performances and childcare.
- Aims to be a replicable model for affordable housing.

Eco features include:

- Opportunities to grow food
- Rainwater harvest and recycling
- Waste recycling
- Passivhaus designs – dwellings will use little or no energy to run
- 'Fabric first' approach to promote high-quality, high performing robust materials that will drive down life-cycle costs.



Regeneration at Shepards Ground Farm and Village, NSW



The Farm, Byron Bay



Wild Goose, Bristol

Eco Business/Tourism

Many of the exemplar projects generated income on the site by and for the residents. Some of these included:

- Airbnb on site
- Sale of fruit and vegetables produced on site
- Education opportunities around site regeneration
- Recycling opportunity
- Micro businesses.

At Community First, Austin the community run a bed and breakfast as well as a shop seeing art made on site. Other businesses on site include the Car Care service, the forge and the Community Market. As well as generating income this allows the residential community to interact with the wider community and visa versa.

There are other examples of innovative businesses that complement the housing include the Wild Goose Space at The Yard in Ashley Vale Bristol. Three micro businesses are run from the development that provide services but also activate the area and bring the community interaction.

Locally in Northern NSW there are a number of successful eco businesses that focus on the environment and education. At 96 Bangalow the aim is to 'apply regenerative processes to every facet' of their work. They aim to have a positive impact on their site and provide access to local, healthy food. They raise and sell chickens for consumption at a small scale. The Farm at Byron Bay is also a business that has a vision to educate visitors as well and grow produce, deliver organic food to its restaurant and give back to the wider community with project ranging from environmental groups to assisting with produce for meals for those in the local community.

There are many opportunities for income generation that also provide opportunities for residents and visitors to develop skills and a sense of connectedness to the land and community.

Learnings from Eco Business/Tourism:

- Opportunities for income generation on site create employment opportunities for residents to learn new skills
- On site employment reduces financial and environmental cost of travelling to work
- There are opportunities for education for the wider community with good social and environmental outcomes

