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Beranghi Co-operative

Land Management Plan

2005

TABLE OF CONTENTS

List of Figures and Tables.

Appendices.

1. AIMS

This proposal aims to facilitate the environmentally sensitive staged development of a rural land-sharing community, the maximum capacity being eighty individual dwelling sites. The development is designed to provide for a diversity of lifestyle needs within an integrated permaculture system and not inconsistent with existing land use, zoning and the general character of the local environment. It is also designed to actively enhance and protect local flora and fauna, and provide an alternative to negative trends in development and unsustainable living practices.

Under Section 6 of the Beranghi Co-operative Rules, its objectives are stated as follows:

"The objects of the co-operative shall be:

(a) To acquire land for the purposes of providing low cost rural residential housing for members.
(b) To promote the development of a community of artists, musicians, artisans and craftspeople.
(c) To promote the production and disposal of agricultural products of members and other persons.
(d) To promote the principles and methods of permaculture in agriculture and horticulture.
(e) To promote and encourage a community where members and their families can become self-sufficient.
(f) To provide a setting where rural resettlement in hamlets and village clusters can evolve.
(g) To promote and encourage rural employment in socially and environmentally useful work.
(h) To preserve and protect flora and fauna on land acquired for such purpose." (Rules of Beranghi Co-operative 1998:5).

1.1 Rural low-cost housing

The first aim of the Co-operative is to provide rural low-cost housing for its members, thus the rural bushland character of the property will be maintained as much as

possible to meet this aim and to provide for visual amenity. The development seeks to reduce financial costs through correct planning, staging and design of the proposed development.

1.2 Sustainability

Whilst there are many definitions of sustainability and what constitutes a 'sustainable' development, one of the simplest definitions is that a 'sustainable' system is one that produces more energy than it needs in its lifetime, that is, it can provide for its own energy needs. However, if the 'surplus' energy is not productively used, it is classified as waste; thus a concept of sustainable development must take an integrated approach. Sustainability requires a long-term approach, and one of perpetuity. Thus, in the design and staging of the proposed development it is necessary to project as far as possible into the future, and to consider, in the initial planning stages, aims that may only be fully realised 50 years into the future. Such a view of perpetuity discourages a 'walkaway' attitude evident in many past urban and rural developments.

Such a large and complex development as this one must, however, allow for change and adaptation within its governing guidelines, in order to meet its aims of sustainability and as part of a necessarily reciprocal relationship between ongoing design and implementation. Thus the staging of the management plan aims to facilitate such future adjustments, whilst being a realistic guideline for the growth of the Co-operative.

1.3 Self-sufficiency

The development is also aimed at allowing members to gain a large degree of self-sufficiency. The basis for community self-sufficiency will be through the application of permaculture principles. Well summarised in *Permaculture International Journal* (1994) permaculture is:

> "a practical concept applicable from urban to rural environments. It enables people to establish productive environments providing for food, energy, shelter, material and non-material needs, as well as the social and economic infrastructure that supports them. The concept was first developed by Bill

> Mollison and David Holmgren in Tasmania in 1974, and has since formed the basis of a philosophy utilised in the development of sustainable communities throughout Australia and the world. Permaculture . . . aims to create systems that will sustain not only for the present, but also for future generations. From a philosophy of co-operation with nature and each other, of caring for the earth and people, Permaculture presents an approach to designing environments which have the diversity, stability and resilience of natural ecosystems. This approach also addresses the need to regenerate damaged land and preserve existing ecosystems. Permaculture encourages the individual to be resourceful and self-reliant, and become a conscious part of the solution to the many problems which face us, both locally and globally."

Self-sufficiency aims at reducing reliance on public services and localising natural resource-use to correctly regulate, monitor, and accordingly adjust such use. Self-sufficiency may also alleviate economic pressure on individuals, or supplement general income.

1.4 Community-oriented goals

Activities in permaculture and the arts will be the means of enhancing and showcasing the Co-operative's creative outlets as well as being a means of self-reliance. The development will necessarily interact with the wider community of the Macleay valley and mid-north coast, with the possibility of regional, national and global links. Artistic and education centres may be a long-term focus of the community's communal areas, which may incorporate studios and workshops, rehearsal and performance facilities, or other venues for hire, use and interaction by Co-operative members and the wider community.

Whilst the aim of the development is primarily residential, it seeks to interact with the wider community on economic terms in order to sustainably maintain a functioning permaculture system and residential community. Such economic interaction will focus on eco-tourism, education, training and research in sustainable living.

Permaculture is currently one of the fastest growing industries worldwide (Permaculture Research Institute: 2003). Organisations such as the Permaculture Research Institute and Permaculture International, in Northern NSW, and the Bill Mollison Institute in Tasmania have shown that permaculture education and research centres have become world-acclaimed institutes of learning, producing a new generation of world-class urban and rural designers, educators, agriculturalists, horticulturalists, scientists, innovators, planners, community workers, and social development practitioners. With their mixture of research and practical implementation, and opportunities for global, national and regional exchange, such centres have revitalised the social and economic aspects of many rural communities. Co-operatives all over Australia are providing well-needed alternatives to urban sprawl and socially and economically degraded lifestyles, pioneering practical solutions to current trends in social and ecological breakdown. As vital repositories for the future, it is crucial that such enterprises are both carefully planned and emphatically supported.

1.5 Social and environmental regeneration and revitalisation

Rural Settlement – guidelines for rural settlement on the North Coast (1994:3) states:

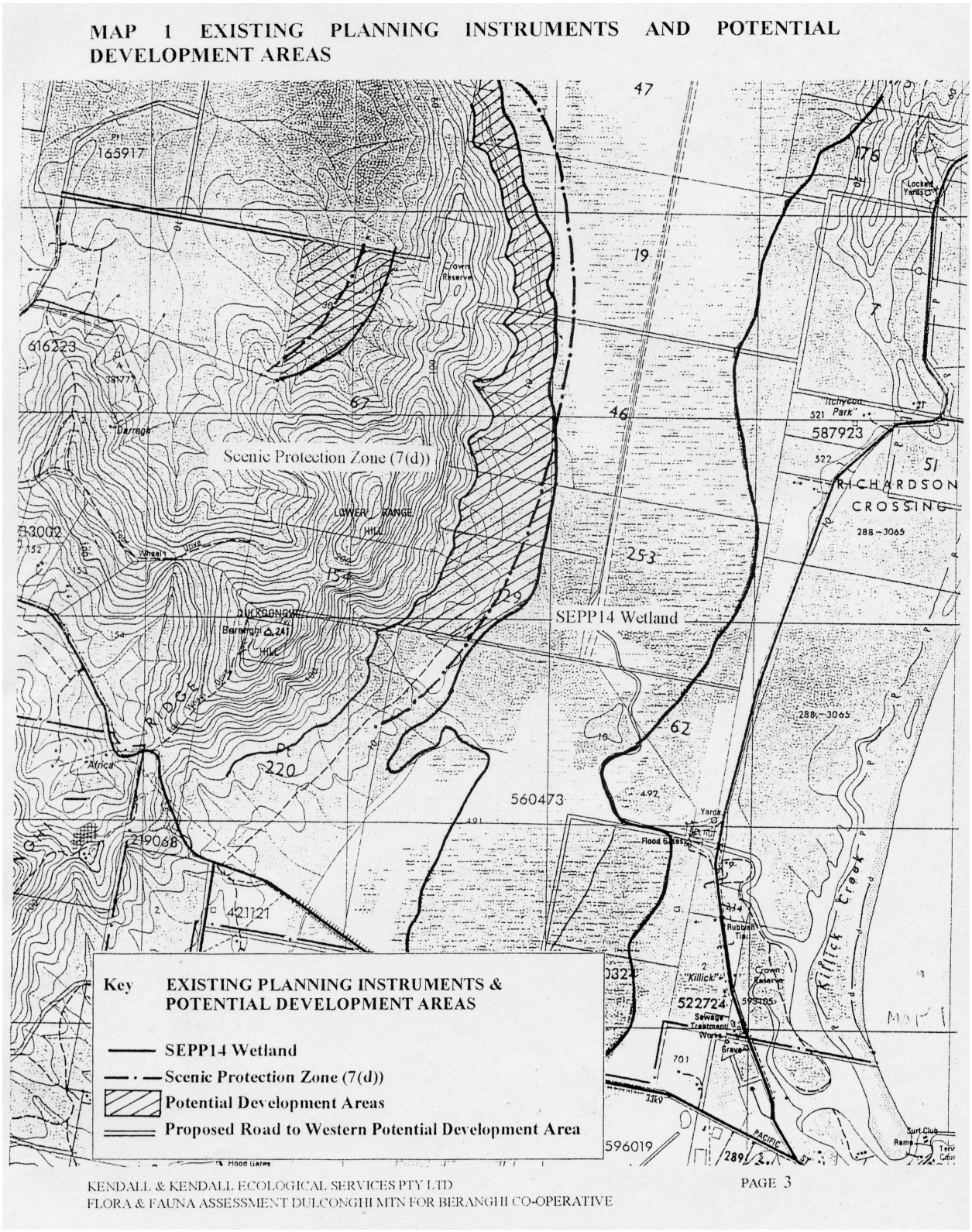
> "Rural residential living . . . has the potential to provide a diversity of lifestyle options and contribute to the character, economy and social fabric of the region. . . to revitalise rural communities, assist in the regeneration of natural vegetation systems and develop new forms of agricultural production."

It is eventually the integration, to various extents, of all these aims, that the Co-operative seeks to achieve, as a positive contribution towards the sustainable and flourishing future of rural settlement on the Mid-North Coast. As both example and educator, the development aims to redress some of the social and ecological problems inherent in current and historical practices of development; namely, the degradation of native flora and fauna communities, soil and water loss, urban sprawl, negative visual impacts, and poor energy efficiency.

The opportunity for social events and public interface is also in line with enhancing the social fabric of the local community, and it is hoped that, once established, the

development may be a positive contribution to the social and economic fabric of the region.

Figure 2.1


MAP 1 EXISTING PLANNING INSTRUMENTS AND POTENTIAL DEVELOPMENT AREAS
Scenic Protection Zone (7(d))
SEPP14 Wetland
Key
EXISTING PLANNING INSTRUMENTS & POTENTIAL DEVELOPMENT AREAS
SEPP14 Wetland
Scenic Protection Zone (7(d))
Potential Development Areas
Proposed Road to Western Potential Development Area
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FLORA & FAUNA ASSESSMENT DULCONGHI MTN FOR BERANGHI CO-OPERATIVE
PAGE 3

2. OVERVIEW

2.1 Property overview.

Beranghi co-operative consists of Lots 129, 253, 46, 19, 47, 67 and 154 of DP 754400 in the Parish of Beranghi. The two dominant landforms within the property are a gazetted SEPP 14 wetland which covers most of the Eastern portions; and the Dulkoonghi Range, which rises to an elevation of 230m above sea level. The land mass in total is 1638 acres, approximately 2.5 km from the mid-north coastal town of Crescent Head in NSW.

Forest Type assessments and Flora and Fauna assessments may be viewed in Appendix C.

2.2 Previous land use.

Originally a part of an extensive 'gold lease' in the late 1800's (which covered much of the coastal swamps in the immediate area), the land has since been logged and grazed extensively for over 100 years. As a result much of the existing flora and fauna are only indicators of a much richer biodiversity that once existed on the land.
The Eastern portions are also the site of flood mitigation works. Scotts Drain runs for approximately 2.5 km through the Eastern portions (46, 47, 19, 253) of the property, regulated by floodgates at Ryan's Cut and further south on Loftus road.
The existing clearing on Lot 129 was once site of a commercial passionfruit farm.

2.3 Climatic Overview.

An overview of climate for the region is taken from Atkinson (1999) *Soil Landscapes of the Kempsey-Korogora Point* and from statistics compiled by the Australian Department of Meteorology.

The property is located within a warm temperate to sub-tropical climatic zone, which is typical of much of northern NSW. The property lies 1.5km from the ocean at its closest point. The mean annual rainfall for the Crescent Head area is 1439mm

(Atkinson 1999:5). It may be noted that the average annual rainfall for the area is the third-highest in the region due in part to its direct maritime influence.

The geography of the property creates a wetter microclimate on the eastern, ocean-facing slopes of the property, and a generally drier character on the western side of the Dulkoonghi Range. The Dulkoonghi Range creates a slight rain-shadow effect by intercepting the prevailing south-easterly rain and concentrating precipitation on the eastern side of the Range.

The area has a marked spring dry season and summer-autumn wet period, with about 60% of the average annual rainfall occurring in the five month period between December and April. Relatively dry conditions are experienced between July and November with only about 30% of rainfall occurring in this five-month period. Although the area shows one of the lowest rainfall erosivity in the region (as compared to the Kempsey foothills, or Banda Banda mountains, for example), erosive rains generally occur in the four months from December to March. Erosion can be significantly reduced if soil is not exposed over this period.

Mean daily maximum temperature ranges from 27 – 28˚C in summer to 18 – 20˚C in winter. Hot conditions in summer can be associated with dry north-easterly winds. In winter, strong south-easterly fronts bring cold weather and associated night-time frosts, which generally only affect the lowlands. Wind directions show a strong seasonal pattern. Summer winds near the coast are predominantly on-shore from the north-east. Afternoon sea-breezes are typically 15 – 25 km/hr, gusting to 50 km / hr. Strong easterly and north – easterly winds associated with deep cyclonic depressions off the NSW north coast can sometimes exceed 100 km / hr on the coast. Stable conditions occur late in autumn and early winter. Very hot, dry north-westerly winds may occur for several consecutive days in summer, producing severe to extreme fire hazard conditions

Climate is a primary design consideration that is often overlooked. It is crucial to both temporal and spatial design considerations, including the application of solar aspect and passive solar design, placement of windbreaks, the use of appropriate materials

and technology, water storage, land carrying capacity, agricultural productivity, fire protection and the social aspects of design.

2.3 Design Overview.

The whole development is consistently designed to be a model for sustainable rural residential development within the limitations of the land and the Co-operative's social and economic resource base. It seeks to create opportunities for community living in a rural atmosphere in harmony with the environment, through a practical application of permaculture principles. This involves productive use of the land, sustainable development, energy conservation and use of renewable resources; restoration and protection of natural ecosystems, and living styles which foster self-reliance and co-operative management.

The proposed development aims to facilitate the development of clustered residential housing with a maximum permanent residency being 80 shareholders. The development is concentrated in two main areas of the lands related to this proposal – the 'Eastern' development area which follows the Eastern foothills of the Dulkoonghi Range, and concentrated between the 10m and 30m contour line – and the 'Western' Development area, which is concentrated in the north-western corner of Lot 67.

These development areas represent approximately 10 per cent (or 160 acres) of the total land mass, with approximately 90 per cent (or 1440 acres) of the land mass being reserved as 'conservation areas'. Conservation areas are areas where permanent residential dwellings are prohibited, however, activities in compliance with local planning instruments and zoning may be permitted. These conservation areas include all mountain slopes above the 30m contour line, and the SEPP 14 wetland which covers the majority of Lots 47, 19, 46 and 253.

It must be noted that a further 25 per cent of development areas are conserved as creek or gully buffer zones, environmental and visual buffer zones, natural recreation areas, and fire protection zones.

Residential development areas are marked as potential sites for residential dwellings and are to be utilised by members for domestic purposes, not inconsistent with local planning instruments and Co-operative by-laws, and in order to realise the aims as stated in Section 1.1.

Communal development zones are areas marked for community enterprise and development.

The land marked for potential development is considered the most suitable for development because of its gentle slopes, accessibility, and potential for productive permaculture systems. Both the Eastern and Western development areas incorporate 'communal' areas for activities in arts and permaculture, public interface, ecotourism, education and recreation. Communal areas are positioned as near as possible to the entrances to the property, to minimise vehicular impact and to retain the privacy of residential housing. They are designed to become the administrative and economic centres of the development areas, and allow for recreation, social events and community interaction, with provision for future consideration of eco-tourism facilities and public interface. These areas will also be the development's 'service centres,' with laundry, community facilities and permaculture gardens.

Residential sites are arranged into clusters, or villages, and up to four dwellings may make shared use of a greywater system, recreation area, permaculture garden, and large tanks and dams for non-potable water supplies. The cluster arrangement of residential housing aims to foster and facilitate community living and economise both infrastructure costs and the use of natural resources, namely in water collection, greywater management, and fire safety, whilst minimising and localising the impact on the environment. Cluster houses will be designed to consider privacy, solar aspect, prevailing winds, existing vegetation, heating & cooling, thermal mass, water supply and clothes drying in an energy efficient and ecologically sensitive manner.

As demonstrated in Figure 2.2 "Staged concept Plan showing Site Release and Primary Activities," development is staged into 0-5 year, 5-15 year, 15-25 year and 'long term' 25-50 year time zones. This allows for a consideration of short-term needs and long-term goals. It also facilitates a sustainable ecological and economic

development process, and allows for the necessary ongoing processes of monitoring and revision. During the first three stages, considered ‘development’ stages, 25 dwelling sites will be released during each stage, bringing the maximum capacity of permanent residential dwellings to 75 in 25 years’ time. The staggered nature of the development will ensure the local area and natural ecosystems are not unduly disrupted by a sudden and dramatic increase in development. The last stage is considered a ‘consolidation’ stage.

3. WATER.

A Geotechnical report was been carried out by Dr Timothy Cohen and is attached as Appendix A. The following section represents a summary and overview of development design characteristics related to water use, collection, monitoring and conservation, and effluent disposal.

3.1 Water collection.

No public water supply runs to the site.

Individual dwellings will be serviced by rainwater tanks (1000 gallon or greater) for potable domestic water collection. Water storage tanks on communal dwellings will provide communal domestic water supplies in those areas. Maintenance of gutterings and rooflines on communal buildings will be carried out by members at times determined by a village Council or the Co-operative Board. In the case of private dwellings, it is up to individuals to maintain gutterings and rooflines.

Dams will provide water for use in fire-prevention and control, and for communal, personal and agricultural purposes. The enormous conservation zone acts as a clean catchment area. Multiple and multi-use dam systems are encouraged over single, large dams.

Impact on the environment will be minimised when siting and constructing dams. If in the event of a dam being constructed within a valley, water is to be directed via the spillway back into the natural gully.

The majority of the water supply will be sited uphill from the development to allow for gravity-feeding.

3.1.2 Existing water catchment

Existing water storage facilities include:

(1) dam (‹ 1ML) located within the proposed Eastern development area.
(2) water storage tanks located within the proposed Eastern development area with a capacity of 1000 Gallons each.
(2) dams located within the Western primitive campground (both ‹ 1 ML)
(1)1500 Gallon water tank on agricultural shed servicing Western primitive campground.

3.3 Permanent lakes or creeks

The proposed development will not source water from permanent creeks or lakes in the area.

3.4 Other users

No other users in the vicinity will be affected by the construction of water systems nor the consumption of available water.

3.5 Water conservation.

The proposed development seeks to facilitate self-reliance and frugality in relation to the use of all natural resources. Following permaculture principles, the proposed development seeks to utilise appropriate technology and practices, ensuring that all by-products of any activity within the system are used productively by another part of the system. This includes the use and re-use of all water.

Water conservation may be applied by one of, or a combination of, the use of water reticulation, greywater recycling, drip systems, and private and communal dry-compost toilet systems. Water conservation techniques will aim at minimising impact on communal water supplies and the available water within the ecosystem.

Reed-bed systems, swales and appropriate management of grey-water ensures domestic water-use is kept site-specific for monitoring and management.

Buffer-zones around gullies and between dwelling sites allow for clean water to feed and replenish the wetland and provides for minimum disturbance of natural ecosystems.

3.6 Control measures for the purposes of water quality and conservation include:

a) A cluster / semi-communal dwelling arrangement used to its advantage in the collection, pumping, distribution, monitoring and conservation of water.
b) Communal laundry facilities (2) located in the 'gateway' communal areas of both the Eastern and Western development areas.
c) The prohibition of hazardous chemicals and pollutants on the land.
d) Dry composting toilets installed in all individual and communal dwellings.
e) The installation of water-saving shower-heads and taps in all households, as recommended by DCP31
f) A combination of timed sprinkler systems (used at appropriate hours) and drip-feed systems (reducing water wasteage associated with sprinkler systems) in agricultural activities.
g) The maximisation of water recycling by water reticulation and the diversion of greywater to appropriate greywater systems
h) Swales, constructed on-contour along appropriate slopes (not more than 17 degrees), to collect and divert run-off and slow groundwater.
i) The establishment and maintenance of a 1440 acre (approx) conservation zone above both proposed development sites, providing an enormous uncontaminated water catchment.
j) The installation of water outlets approximately 200mm above tank bottom which allows for particles to settle at tank bottom
k) Dam systems which may make use of sand or gravel filtration systems, or the use of living plants or aquaculture to clean and filtrate water.
l) The use of light exclusion and surface water stabilisation in ponds and dams to reduce turbidity and algae.
m) An ongoing maintenance program and water monitoring strategy carried out by all members.

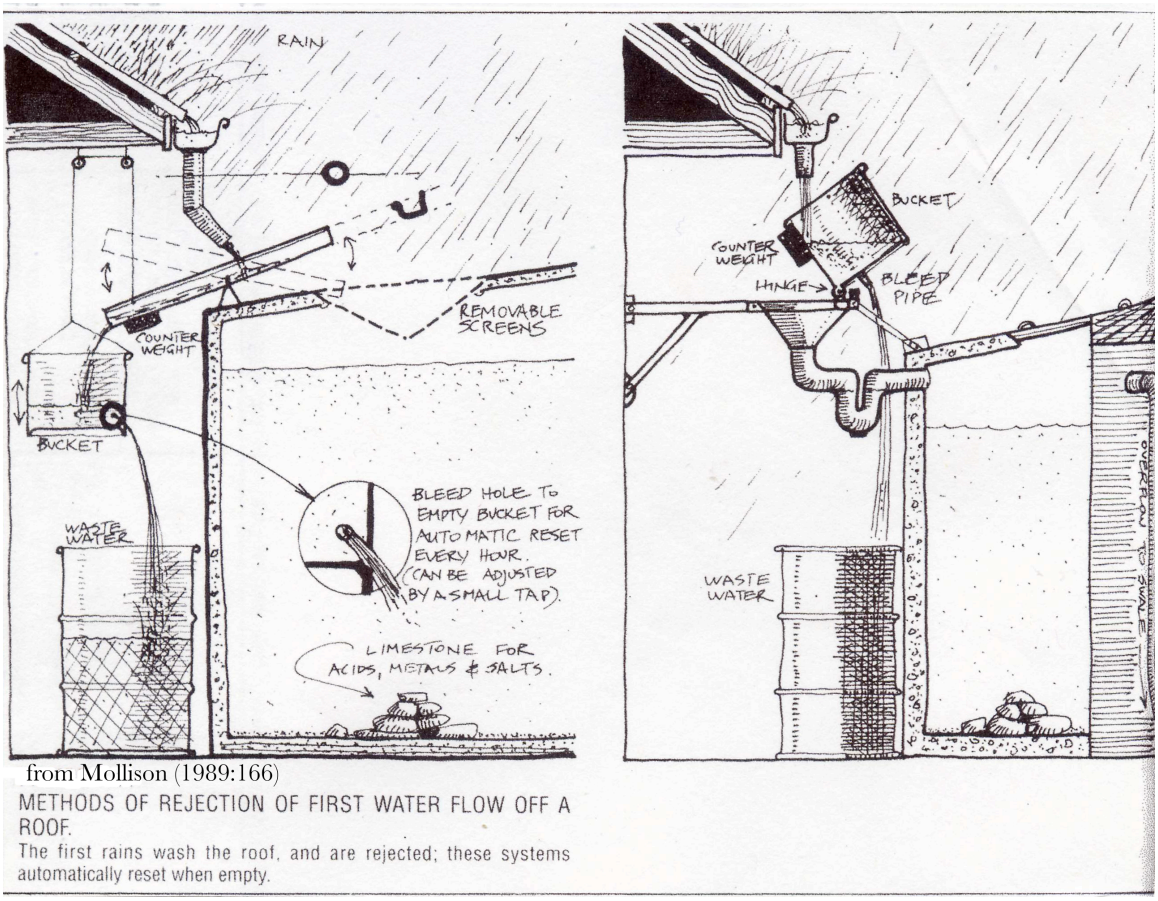
3.6 Domestic potable water monitoring and testing.

In *Permaculture Design Manual* (1989:172) Mollison writes,

> "The most common contaminants associated with drinking water are:
>
> Turbidity – silt and fine particles suspended in the water
>
> Bacterial or Organic pollution – from sewerage, and as decay products ie, e.coli
>
> Metallic Pollutants – such as chromium, cadmium, lead, mercury
>
> Biocides – ie. Dioxin, Aldrin, Dieldrin, 2,4-d, PCB, organophosphates etc
>
> Excessive fertiliser – especially nitrogenous compounds, phosphates, sodium and potassium salts
>
> Acids or acid-forming compounds."

In accordance with the recommendations of the Geotech and Effluent Report prepared for Beranghi Co-operative, and the *Australian Drinking water Guidelines* (1996) the Co-operative has devised an ongoing, internal water monitoring strategy which will be carried out by residents on an ongoing basis to monitor and ensure the quality of drinking water. This will involve:

a) seasonal water testing in designated areas, as determined by a Village Council, or Co-operative Board, and carried out by members quarterly
b) the obligation on all residents to maintain all gutterings and rooflines
c) Rejection of first-flow water if deemed necessary on domestic roof catchments: "Granted that roof areas can themselves be contaminated by birds, dust, or industry (or by the paints or metals in the roofs themselves) the first precaution is to reject the first flow-off of water, and use it on gardens or in swales" (Mollison 1989:166). Two methods for doing so are shown in Figure 3.1 "Rejection of first-flow water."
d) The utilisation of appropriate technology in the selection of building materials (ie. roofing iron etc).
e) Ongoing maintenance of all greywater treatment systems or land application areas and regular visual checks. Signs of failure include: surface ponding and run-off of treated wastewater, soil quality deterioration, poor vegetation growth and unusual odours



from Mollison (1989:166)

METHODS OF REJECTION OF FIRST WATER FLOW OFF A ROOF.

The first rains wash the roof, and are rejected; these systems automatically reset when empty.

Figure 3.1 Method for rejection of first-flow water

3.7 Run-off

For the purposes of controlling and preventing excess water run-off, the proposed development will

a) Capture, store and use all water from hard surfaces such as roads, roofs and paths
b) Minimise large areas of tarmac or concrete
c) Provide adequate on-site waste management systems which meet the maximum needs of the community Use water diversion humps in internal

access roads to divert water into appropriate areas, such as dams, swales or gardens

d) Minimise soil movement during construction and agricultural activities
e) Cover-crop exposed soil immediately after earthworks
f) Use existing roads and tracks.
g) Provide and encourage the use of communal car-parks rather than individual roads to individual dwellings

3.8 Greywater management

The proposed development seeks to keep site specific the majority of its greywater, whilst, in the case of the Eastern development zone, allowing natural water movement between the mountain catchment and the SEPP 14 wetland. The majority of greywater will be produced by home activities such as dish-washing, cooking and showering.

Figure 3.2 shows a working greywater treatment system using a reed-bed design;

Figure 3.3 “Greywater treatment systems” is a summary of greywater treatment systems considered appropriate for the development and permitted under local planning regulations.

3.9 Dry composting toilets

Dry composting toilets will contain and compost all solid human waste. Composting toilets will be compulsory in all individual and communal dwellings. They will be properly installed under regulatory guidelines, correctly maintained and visually checked.

3.10 Management of permanent water systems.

The Co-operative recognises the opportunity to work in co-operation with organisations towards improving and monitoring the water quality of permanent water systems. The two permanent water systems on Co-operative lands are the SEPP 14 wetland, covering most of the eastern parts of Lots 129, 253, 46 and 19; and a canal,

called Scotts Drain, which runs in a north-south direction through the abovementioned portions.

3.10.1 SEPP 14 wetlands

As part of the Co-operative's overall aims, the Co-operative seeks to revitalise conservation areas on the property, including a major wetland mapped under SEPP 14. The guidelines under the *Environmental Protection and Assessment Act* form a groundwork for this. Currently, the water quality of the wetland is considered adequate-to-poor, with acid-sulphate soils and a history of poor ecological management through overgrazing, bushfire and the construction of a canal for at least 2km through its centre, the benefits of which in terms of water quality are dubious.

The Co-operative aims to undertake ameliorative measures in the wetland through revegetation and conservation - replanting of appropriate indigenous species will enhance the existing vegetative buffer between the wetland and the proposed Eastern development zone. Currently enquiries are underway in linking this wetland with the RAMSAR convention on wetlands, under which JAMBA and CAMBA (the Japanese and Canadian migratory birds agreements respectively) provide for an international recognition and protection of wetlands of high heritage value, particularly for migratory birds.

3.10.2 Scotts Drain

Scotts Drain runs for approximately 2.5 kilometres through the Eastern portions of the property. It is part of a network of flood mitigation works carried out by numerous authorities over the last century. The primary purpose of the canal systems are in facilitating the flow of water from permanent wetlands, generally for agricultural purposes. Many negative environmental affects have been documented, particularly over the last decade, including the presence of acid sulphate soils. Whilst the future management of Scotts Drain is outside the scope of this document, it is hoped that the aims and nature of the proposed development may intersect with wider community concerns and initiatives regarding the health and sustainability of our coastal wetlands.

As a landholder affected by flood mitigation works, the Co-operative seeks to be an active participant in local community and government initiatives for the long-term management of Scotts drain, Killick creek estuary and the surrounding wetlands.

4. WASTE.

4.1 Waste minimisation and waste management

The Co-operative considers waste minimisation as the first step in preventing and / or managing waste on site. The Co-operative by-laws provide practical guidelines for the management of waste on site. They indicate waste minimisation, recycling, composting, and re-use of resources as priorities.

There is no domestic rubbish collection service.

Non-biodegradable pesticides, herbicides, fertilisers, household chemicals, and any other pollutants are prohibited on the land.

All domestic household rubbish is considered of individual responsibility, and is to be transferred by individuals to a waste transfer facility. Domestic waste produced by communal activities on the land will be collected in bins provided at communal areas, and sorted appropriately into plastics, aluminium, paper/compostables and unrecyclable waste. Recyclable and unrecyclable waste will be transferred by roster system to the nearest waste transfer facility (Kempsey Shire Council Landfill) at least once a month, or when the bins are full, whichever comes first. In communal areas, compostable waste will be composted in an approved facility for use on the communal permaculture gardens. Individuals must compost their own biodegradeable material for use either on their private gardens or in the closest communal facility. Abandoned or unregistered vehicles are not to be left on the property without approval of the Co-operative board.

4.1.2 Chemicals and pollutants

Inorganic or hazardous chemicals / pollutants are not permitted on the land.

4.1.3 Soil and groundwater

Refer to section 3.

4.1.4 Solid human waste

All toilets will be dry composting toilets – Rotaloo or Clivus Mulstrum are suitable approved composting systems.

4.2 Potential volume and type of waste

The potential volumes and types of waste produced by the proposed development are set out in the table below, which specifies type and volume of waste at each stage of development.

Figure 4.2 – "POTENTIAL VOLUME AND TYPES OF WASTE (av. tonne weight p/a)"

Maximum yearly output based on full carrying capacity of Co-operative.

TYPE OF WASTE	VOLUME (Av. tonne weight p/a)
domestic household rubbish (from communal and residential dwellings)	6
organic waste	neutralised on-site
solid human waste *total	neutralised on-site
recyclables *total	20.8
waste products from building / industrial activity	n/a
air pollution	0
effluent	as shown below

Typical wastewater /effluent output based on average household size and daily water use.

Daily maximum effluent output is calculated taking into account:

a) the maximum carrying capacity of the Co-operative being 80 households and 6 communal dwellings.
b) Households having an average of 2 1/2 bedrooms or 3 residents.
c) Domestic household water being supplied via rainwater catchment tanks.
d) Composting toilets installed in all households.
e) Effluent to be treated by on-site greywater treatment systems,
f) Any leechate from composting toilets diverted into greywater treatment systems (if appropriate)

Typical household wastewater flow 90 L pp per day.
Typical Co-operative household flow 75 L pp per day
Typical combined Co-operative wastewater flow 6000 L per day.

(source: ANZS1547:2000 in Appendix 4.2D "On-site Domestic Wastewater Management: 2000.")

5. SOILS, GEOLOGY AND LANDSCAPE CHARACTERISTICS

5.1 Soil types & Geology

A Geotechnical Report was carried out by Dr Timothy Cohen and is included with these documents as Appendix A.

The property covers a variety of soil landscapes ranging from the steeper rocky outcrops of Dulkoonghi ridge at 230m, to the low Belmore Swamp. The soils of Beranghi are dominated by three major soil groups: Crescent Head (Ch), Beranghi (Be) and Belmore (terms taken from Atkinson: 2000). In general, the Crescent Head soil types are found on the steeper slopes and ridges, the Beranghi soil type is found on the footslopes and the Belmore soil occupies the swamp areas (see Figure 3.5 – Map Showing Soil Types and Location).

The proposed Development will be limited to the lower foothills of the Dulkoonghi Range. Development is therefore excluded from the steeper slopes of both sides of the ridges, and the extensive wetland area.

The dominant soils within these development areas are characterised by conglomerates and lithic sandstones. The soils in these areas are generally of moderate depths (60-100cm) of stony Lithosols, Soloths and Red and Yellow Podzolic soils.

5.2 Erosion and Landslides

There is no risk of landslides on the sites of the proposed development.
The proposed development does seek to follow Best Practice guidelines during all construction works, to prevent soil erosion.

Measures to prevent and control soil erosion may include:

a) minimum disturbance of soil and vegetation in the construction of dwellings, agriculture and other infrastructure

b) the maintenance and regeneration of native flora in conservation zones by the planting of appropriate indigenous flora
c) the implementation of stable permaculture systems, requiring minimal soil disturbance and minimal water movement
d) the prohibition of hard-hoofed animals (open to review in specified areas)
e) minimising internal roads and vehicular use; encouraging the use of a communal vehicle for property maintenance; car-pooling etc
f) the appropriate use of culverts, retaining walls, swales, dry mounds and other water diversion devices
g) the capturing, storage and use of all water from hard surfaces such as roads, roofs, paths etc
h) correct management of water from domestic use
i) establishment and maintenance of wind-breaks in buffer zones
j) the planting of native grasses and other suitable cover-crops immediately following all earthworks (appropriate crops are vetch, cow-pea (caluna), dunn pea, millet, rye, clover, mixed native grass seed, and sweet potato.)

5.3 Soil contamination

No soil contamination is known.

5.4 Minerals and Deposits

There are no known mineral or extractive deposits on or adjacent to the proposed development areas.

5.5 Slopes greater than 18 degrees

All slopes greater than 18 degrees are excluded from development.

6. BUSHFIRE PREVENTION AND CONTROL

6.1 Bushfire Risk Assessment

The nature of the land's ecology and the history of bushfire in the area makes the possibility of a bushfire on the property high. Therefore bushfire prevention and management strategies are of utmost priority to the co-operative and to the integrity of the proposed development. Its proximity to the local town makes the issue of fire prevention and control not only an issue for the co-operative but for the entire community. Permanent residence on the land and adequate access to all portions of the property will allow for utmost vigilance on this issue. In planning for bushfire prevention, the co-operative takes the guidelines outlined in the *Planning for Bushfire Protection (1991)* issued by the Department of Bush Fire Service as a point of departure.

The vegetative communities within the Western development area are identified by Kendall & Kendall (2000) as including / being adjacent to: Paperbark swamp sclerophyll forest, Blackbutt dominated dry sclerophyll forest and Mixed Dry sclerophyll forest (Kendall & Kendall 2000:4).

The eastern part of the proposed development included / is adjacent to Blackbutt dominated dry sclerophyll forest, Flooded gum wet sclerophyll forest, Mixed dry sclerophyll forest and cleared grassland (Kendall & Kendall 2000:6).

All of these forest communities are mapped as 'open' forest, reaching a canopy of 10-30 metres.

In both areas the degree of slope fluctuates between zero and ten degrees.

In the case of the Western area, the aspect of the slope is N-NW facing, and in the East NE-E-SE-facing. (see table 4.1 of *Planning for Bushfire Protection* for Type 1 Assessment guidelines).

Following type 1 assessment of the proposed development sites *not taking into account any fire control measures* the fire hazard danger on the property

6.2 Measures to prevent wildfire and minimise impact in event of wildfire

Measures to prevent and fight bushfire include:

a) The appropriate siting of the proposed development (see Figure 2.3)
b) The construction / maintenance of fire breaks along all boundary fences of the property and all internal fences. Firebreaks already exist along external fence lines. Internal access and maintenance roads will also function as firebreaks and allow for access
c) Maintenance of fire-trails for spot-firing, fire-fighting, back-burning and as additional fire breaks.
d) Fire-trails, constructed to allow for two-way traffic, being 6m wide (4m with 1m shoulder on either side) and incorporating passing-bays as required.
e) the establishment of an Asset Protection Zone around the proposed development, consisting of an outer and an inner protection zone, as outlined in section 4.2.i-v of *Planning for Bushfire Protection* (2002).
f) The width of the Asset Protection Zone in the Western development area being 35-45m (including width of perimeter fire-trail).
g) The width of the Asset Protection Zone in the Eastern development area being 30-35 metres (including width of perimeter fire-trail)
h) The recommendations of Inner Asset Protection zone being: Minimal fuel load, discontinuous fuel load, trees and shrubs that no not touch or overhang the building, do not deposit excessive amounts of leaf drop and dead wood, and are not located so close to dwellings that they will ignite the dwellings by direct flame contact or heat emission
i) The construction of fire bunkers. The locations and recommendations of fire bunkers are outlines in Appendix B.
j) The provision of a fire truck(s), hose(s) and fire-fighting equipment
k) The provision of adequate reserve water resources for the fighting of wildfire
l) The positioning of dams and ‘wet’ areas around development sites

m) The establishment of fire-retardant vegetative species along buffer-zones between dwellings and between development and conservation zones
n) The provision of first aid information and fire emergency areas in communal areas
o) The carrying out of regular fire drills and bushfire information sessions at times determined by the Co-operative Board
p) The implementation of fire-retardant design systems in the establishment of dwellings and agriculture. For example green walls and earth-covered homes, micro-canal and/or water systems, ponds and water features, the use of swales, windbreaks and circular patterns over rectangular ones.
q) The use of fire-retardant building materials in the construction of all dwellings (For example stone, straw-bale, brick, earth/adobe walls and foundations, metal fly-screens, and non-toxic galvanised iron roofing)
r) The reduction of ground-fuel in Asset Protection Zones
s) The enhancement of local ecology in conservation zones to maintain moisture levels and improve soil ecology which reduces erosion, prevents drought, and enhances microclimatic moisture, thus reducing the possibility and impact of bushfire

6. 3. Consultation

The local bushfire officer, Bryce Laut, accompanied Co-operative members on the land with the aim of recommending measures to prevent and control wildfire in relation to the proposed development. His recommendations are included in the Co-operative's Fire management policy.

6.4. Construction of individual dwellings

It is not necessary for individual dwellings to comply with AS3959-1999 (Building in Bushfire Prone Areas), providing adequate evacuation areas, emergency assembly areas and fire bunkers are provided. These are designed to meet the maximum needs of the community in an emergency fire event.

7. FLORA AND FAUNA.

7.1 Flora and Fauna Communities – Overview

A Flora and Fauna assessment carried out by Kendall & Kendall Ecological Services (2000) (see Appendix C) identifies eight Natural Ecosystems, as marked in Figure 7.1 – Map showing Vegetative Communities.

The proposed development avoids areas mapped as Areas of High Biological Value. Where this is unavoidable, ameliorative measures will apply. It is noted that all forest ecosystems represented within the Co-operative's lands are considered to be adequately represented within the local area.

The Flora and Fauna report also states that "there is no formally identified wildlife refuge, wildlife corridor or wildlife management area on the land" (2000:48) but recognises the wildlife corridor value of the land between Maria River National Park and Hat Head National Park. This value has been somewhat compromised by surrounding development. The proposed buffer and conservation zones seek to retain and enhance this wildlife corridor value. As recommended by the Flora and Fauna Assessment, vegetative buffer zones between residences allow for fauna movement between mountaintop and wetland, particularly during flood events. As shown in Figure 2.3, buffer zones between areas of residential housing, particularly following the gullies, will adequately provide for this movement.

7.1.1 Endangered Flora

No endangered plant species or community are identified on the land.

7.1.2 Endangered Fauna

A number of threatened fauna species have been identified on the property: the Little Bent-wing bat, Koala, Glossy Black Cockatoo, and Grass Owl. There was a possible sighting of a Squirrel Glider.

Kendall & Kendall (2000) also list a further 8 species occurring within 10kms of the land and requiring vegetative communities present on the land: the Brush-tailed Phascogale, Comb-crested Jacana, Golden-tipped bat, Green and Golden Bell Frog, Masked Owl, Osprey, Queensland Blossom Bat, and Yellow-bellied Glider.

7.2 Flora and Fauna Monitoring

It is expected that as enthusiastic and active members of the Co-operative and of the local environment, members will engage in an ongoing process of flora and fauna observation, identification and protection. An internal process of flora and fauna monitoring, including seasonal trapping, observation and revegetation, will be carried out by all residents and compiled for the Co-operative's records. This will include the appointment of a flora and fauna monitoring committee, to be made up of permanent Co-operative residents. The findings of an ongoing monitoring strategy will dictate to a large degree the course of action relating to protection and enhancement of flora and fauna.

A flora and fauna monitoring strategy will include:

a) Classificatory information for use by residents in communal areas (such as a library which includes field guides for birds, mammals and identification logs for local flora)
b) Sighting sheets to be filled out by residents upon sighting rare or endangered flora and fauna, to be collated and kept at the Co-operative office
c) Areas of sighting to be marked clearly by tape and stakes if deemed necessary.
d) A number of nesting boxes to be installed every year from the commencement of permanent residency on the land and visually checked seasonally every year. (Nesting boxes should include an array of designs and styles, to cater for both birds and mammals, and be installed in areas considered appropriate for the animal they are designed for. They should also be realistic in regards to the land's carrying capacity, and be regularly visually checked for signs of habitation by more common or non-native species.)

It is anticipated that all members, by virtue of their residency on the land, will be monitoring flora and fauna on a daily basis as part of their active involvement in the

ecosystem in which they live. There is ample opportunity for individuals, or the Co-operative, at some later date, to sign up as Wildlife Carers or form links with similar organisations. There is also opportunity for the Co-operative's flora and fauna monitoring process to be part of the residential children's, and local school-children's participatory education.

7.3 Flora and fauna protection

It is of high priority to the Co-operative to actively protect and enhance flora and fauna health and biodiversity on the land. The proposed development covers a very minimal area – approx 10% of the property. The demarcation of Conservation zones (see Figure 2.3 – Overview of Proposed Development) with appropriate flora communities to support endangered and other fauna, and to act as corridors, have been established. The total area within conservation zones is approximately 1440 acres.

Whilst the proposed development seeks to be as low-impact as possible, it is projected that the development will have some effect on the local flora and fauna. This may occur through the selective felling of trees for housing purposes, the presence of vehicles, alien noise and human activity.

7.3.1 Measures for conservation and enhancement of flora and fauna.

Measures to protect and enhance flora and fauna communities on the land, and ameliorative measures, particularly in relation to known endangered species, include:

a) Retaining native vegetation through the establishment of conservation zones in consultation with the Flora and Fauna survey undertaken by Kendall & Kendall ecological services (2000)
b) Revegetation and replanting of native and locality-specific tree species within conservation zones
c) Provision of nesting boxes for birds, possums, etc
d) Retaining hollow logs and ground cover for ground-dwelling animals
e) Establishment of dams and water systems, which provide vital water supply, particularly in times of drought

f) The prevention and control of bushfire
g) Composting and containment of food scraps to prevent wildlife becoming domesticated or dependant
h) Enforcement of 10km speed zones on all roads
i) Prohibition of cats, dogs and firearms
j) The active promotion of wildlife conservation, monitoring and research, and the maintenance of a flora and fauna monitoring program
k) The control of noxious weeds and animals
l) Retainment of senescent hollow-bearing trees
m) Retainment of species-specific habitat (as outlined in Kendall & Kendall 2000 – Appendix C)
n) The maintenance of external boundary fences
o) Protection of water bodies from pollution by the prohibition of harmful chemicals and pollutants and the implementation of a water monitoring and control strategy, as set out in Section 3.
p) Development and maintenance of wildlife buffer zones and corridors
q) The reporting of illegal bird trapping and egg collecting

8. PROVISION AND MAINTENANCE OF ACCESS, FENCES AND UTILITIES

8.1. Access.

a) Access to the Eastern Development Area

Viable access to portions affected by the proposed Eastern Development area has been severed by the construction of a drainage canal, Scotts Drain.
In a letter dated 13 November 2002, DLWC (Dept Lands) advised that "it would be quite probable that a Court would not grant a 88k easement."
Beranghi Co-op expects to confirm access through the accommodation works provisions of the Public Works Act 1912 (S 91, 92 & 96).

b) Access to the Western Development Area is via a Council Public Road, Berry's Lane.

8.2 Internal Roads

All internal access roads will be constructed to a standard to allow all-weather, two-wheel drive access to all communal areas, residential hamlets and communal car-parks.

8.3 Speed limit

Speed limits on all internal access roads will be 10 km/ph.

8.4 Fences.

The property is currently fully fenced on all boundaries with three strands high tensile plain wire and two strands barbed wire. Internal fencing except where necessary for productive gardens is discouraged.

8.5 Utilities.

8.5.1 Provision of electricity.

In line with the Co-operative's aims at sustainability, the proposed development seeks to take a leadership approach to alternative power regeneration for small communities, incorporating a complementary diversity of stand-alone sustainable power regeneration systems. Currently in its development stages, a progressive power option for Beranghi is being established, whereby it is anticipated that a large portion of energy needs are produced by the Co-operative itself on a renewable basis. In line with aims 1) 2) and 3) of the proposed development, it is projected that at least 75% of homes will be wholly or partly supplied by stand-alone power systems. Such systems most likely would include a mixture of photovoltaic solar systems, wind turbines and micro-hydro systems.

Progressive power options for the Beranghi Co-operative are outlined in Appendix D – Report on Power Options for Beranghi Co-operative.
Figure 8.3 shows photovoltaic system performance for the Mid-North Coast of NSW.

The supply of utilities to the site will naturally follow the pace and nature of development, and also be dictated by the social and economic resource base of the community.

Mains power currently runs within a few metres of the property boundary at its closest point. It is anticipated that mains connection will at the least be established to the Communal development areas. All mains power connections will run underground.

8.5.2 Provision of Telephone Connection

Arrangements will be made for provision of underground telephone cable to dwelling houses which require such connection at construction stage.

8.5.3 Services related to Water and Waste.

No domestic water supply runs to the site.

The site is not serviced by a rubbish collection service.

(Sections 3 & 4 outline Water and Waste in relation to the proposed development.)

9. OTHER ISSUES.

9.1 Acid Sulphate soils.

The proposed development will not infringe on areas marked as affected by Acid Sulfate Soils. However, the Eastern Development areas is located adjacent to an area marked as an Acid-Sulfate Affected Soil area (see *Acid Sulfate Soils Risk Map*).

Effective management of wastewater aims to ensure the stability of groundwater. Regeneration of the SEPP 14 wetland, by decreasing the exposure of acid-sulfate affected soil to air, will reduce the incidence of acid sulphate oxidisation in the immediate area, however, more widespread measures need to be pursued to reduce the problem on a larger scale, particularly in the Belmore River and floodplains.

9.2 Heritage

9.2.1 Anglo-European Heritage.

No site or relic considered of Anglo-European historical significance, at a local, regional, or national level is mapped on the lands.

9.2.2 Indigenous heritage.

The portions of land owned by Beranghi Co-operative have been mapped for Heritage by NPWS. No sites or relics of Indigenous Heritage significance have been recorded on the property. NPWS Officer Brice Laut was consulted in 2002, and following a site inspection, confirmed NPWS's previous findings.

In 1999, Aboriginal elder Ray Kelly accompanied members on Beranghi lands with the intention of mapping, from his knowledge, areas of local Indigenous significance. None were identified. However, in regard to the patrilineal and matrilineal nature of Indigenous knowledge, it may be necessary to have a Senior Aboriginal woman also map the area.

9.3 Visual Impacts

Strict guidelines on height, arrangement, and building materials of dwellings, as well as windbreaks and vegetative 'screens', buffer and conservation zones, will ensure visual amenity of the Dulkoonghi Range is maintained.

As shown in Figure 2.1, part of both the Eastern and Western proposed development areas are covered by a scenic protection zone. As outlined in *Kempsey Local Environment Plan (as amended 1998)* the objectives of the 7D scenic protection zone are:

> "to conserve the environmental and scenic quality of visually significant land by controlling development so that it will accord with the appearance of the landscape" (1988:25).

Activities that are permitted in a 7d scenic protection zone, with development consent, are:

> "Agriculture (other than intensive animal husbandry and aquaculture); dwelling houses; home activities; recreation establishments; roads; tourist facilities; utility installations (other than gas holders or generating works)" (1988:25).

It is considered necessary for the overall integrity of the proposed development that the construction of dwelling houses, roads, recreation establishments, and the carrying out of agriculture and home activities not inconsistent with the aims of the Kempsey LEP be permitted in this Zone. An alternative measure may be to have the 7D scenic protection rezoned in line with the 30m contour line.

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