DUNGOG DEVELOPMENT CONTROL PLAN No 1

PART D.8

BOATFALLS RURAL RESIDENTIAL ESTATE

D.8 – BOATFALLS RURAL RESIDENTIAL ESTATE

8.1 APPLICATION

This Local Area Plan applies to all land within the Boatfalls Rural Residential Estate as shown edged heavy black on the Development Control Plan map (**Figure 1**).

The land to which this plan applies comprises an area of 105 hectares and is zoned R5 Large Lot Residential and E3 Environmental Management pursuant to Dungog LEP 2014. The site has the potential to create a community comprising some 66 dwellings, set in a rural landscape.

8.2 AIM AND OBJECTIVES

The aims of the Plan are:-

a) To attain a high quality rural residential precinct which exhibits a good visual presence and environmental sustainability.
b) To provide guidelines for property owners in respect to the design and siting of dwellings, structures, property access, and protection of environmental values of the site.
c) To encourage development which is sympathetic to the environmental qualities and land capability of the site.
d) To provide site planning guidelines including measures to be taken to reduce erosion and minimise the loss of native vegetation.
e) To ensure development occurs in an orderly and cost effective manner and in accordance with sound planning principles.
f) To ensure that development occurs in a manner that achieves and satisfies the requirements of *Planning for Bushfire Protection 2006*.
g) To encourage building designs which are aesthetically pleasing, energy efficient and bushfire resistant.
h) To retain the visual amenity of the site by maximising the retention of existing vegetation and the incorporation of appropriately selected landscaping.
i) To ensure site clearing is minimised and watercourses are protected and enhanced through appropriate landscaping.
j) To provide guidance in respect to appropriate on-site effluent disposal systems.

8.3 SUBDIVISION

The concept road layout and subdivision design is shown in **Figure 2**. Internal roads are to be designed in accordance with Council's subdivision guidelines. At a minimum, the following elements are to be incorporated into the design:-

1) Roads to be designed in accordance with Council's Roads Management Strategy, Policy C3.18 Provision of Rural Road Services, AUSPEC documentation and relevant Austroads Standards, where applicable. Roads to be designed where

possible to reflect land topography.

2) All lots to accommodate an unconstrained area of 3000m^2 within which a dwelling, effluent disposal area and Asset Protection Zone (APZ) can be located having regard to other provisions of this Plan. This area shall not be subject to hazards such as erosion; landslip; poor drainage; flooding; or vegetation/habitat assets; scenic amenity; buffer areas; or the like and is capable of on-site disposal of domestic effluent within the criteria set in Clause 2.6.5.
3) Vegetated screen 10m wide along the Limeburners Creek Road frontage.
4) The provisions of NSW Rural Fire Service – *Planning for Bushfire Protection 2006*.
5) Aboveground electricity supply to all lots.
6) Underground telecommunication services to all lots.
7) Cats and dogs to be kept within the residence or in a secure enclosure at all times.
8) Prohibit the use of motorbikes and other recreational vehicles in constrained areas.
9) Boundary fencing to be limited to timber post and rail/wire rural type fencing which permits the movement of native fauna across the site and is free from 'netting type' material.
10) Stormwater management in accordance with Council's requirements.
11) Minimising native Vegetation removal through sensitive design and maximisation of the cleared lands for urban development. Incentives for this are provided via the provision of reduced boundary setbacks for structures.

8.4 ENVIRONMENTAL MANAGEMENT

An environmental management plan is to be prepared for the construction phase for each stage of the development where roadworks are required to be constructed (*EMP Construction Phase*). The EMP is to provide:-

- A framework for the control of likely environmental impacts from building construction activities, including practical and achievable performance requirements, a system of monitoring and reporting corrective and preventative action;
- A framework for the control of likely environmental impacts from Rural Lifestyle development, including practical and achievable performance requirements, a system of monitoring and reporting corrective and preventative action; and
- the community with assurance by demonstration that the management of this construction project is conducted in an environmentally acceptable manner.

Those matters to be included in the *EMP - Construction Phase* are to include:-

- Copies of relevant development consents and construction certificates;
- Approved engineering plans;
- Approved landscape plan;
- Sedimentation controls;
- Contractors contact details include key personnel responsible for the construction – site manager, contractors, etc;
- Location of compound and management of equipment and wastes generated by the compound;

- Management of transport to/from and within the site;
- Rehabilitation of compound at completion;
- Awareness and training of senior staff of environmental issues likely to occur on site;
- Incident management and reporting;
- Emergency contacts;
- Minimisation of noise; dust; traffic; sediment discharge; spillage of fuels; impact on native vegetation; waterways and heritage, waste and weed management;
- Verification, monitoring & recording; and
- Management of complaints.

Environmental management of the property will become the responsibility of each title holder following the sale of the land from the developer to the purchaser. As the environmental attributes of each allotment differs, a standard set of requirements have been prepared. These requirements apply to all lots except where stated.

8.5 ENVIRONMENTAL MANAGEMENT REQUIREMENTS

8.5.1 Landscaping & Rehabilitation

The property owner is responsible for ensuring the landscaping located on the allotment which has been provided by the developer in accordance with an approved landscape plan, is maintained in perpetuity. The landowner is also responsible for maintaining the grass on the verge and any trees located on the verge.

Landowners are encouraged to undertake additional plantings sourced from the list of plants indigenous to the local area as listed in **Appendix 1**. Plans submitted with an application for a Construction Certificate are required to be accompanied with a site landscape plan detailing additional landscaping works.

The ongoing use of the land must be managed to achieve the following objective:-

Objective

To manage and maintain landscaping and landscaped areas within the estate in accordance with the approved landscape management plan.

Procedures

1) Limit the use of chemical sprays to prevent plant growth.
2) Maintain landscaped areas by selective pruning, including roots, stems, branches etc, to inhibit vegetation excessive propagation (see details of maintenance obligations below).
3) Ensure that any material transported to the site is weed free.
4) Use work methods that will minimise spread of weeds.
5) Imported soils and/or vehicles should be free of seeds or viable plant material.
6) Remove any noxious weeds and dispose of appropriately.
7) Remnant and riparian vegetation on the site is to be retained.
8) Landscaping should maximise vegetation that is indigenous to the area and

designed in a way that is appropriate to the landscape.

9) Landscaping of lots should minimise the use of exotic trees or shrubs. No environmental weeds should be used in any landscape plan.
10) Where vegetation is required to be removed to achieve a required APZ, in lieu of vegetation removal, building material and/or construction standards should be increased.

8.5.2 Landscape Plan Maintenance Requirements

The obligation of protecting and maintaining the landscape works including the Endangered Ecological Community vegetation shall transfer to the land owner/s at the completion of the Developer's one (1) year maintenance period and be applied by the land owner/s in accordance with this document and the approved Landscape Management Plan.

Street Trees - At the end of the one (1) year maintenance period of the last stage of the estate, the Developer shall remove all tree guards from the site at which time control of all landscape elements within the road reserve shall transfer to Dungog Shire Council.

8.5.3 Stormwater Management, Flooding and Dams

Objective

To control, minimise or prevent the release of contaminants to the drainage system and waterways.

Procedures

1) Separate all animal enclosures and holding pens from permanent or semi-permanent watercourses and major drainage lines to reduce flows of polluted storm water into watercourses.
2) Rationalise the use of fertilisers and animal manures to prevent degradation of receiving waters and water quality in streams.
3) Clearly understand the water requirements of your property prior to undertaking any major works.
4) On-site water treatment disposal areas shall not be within 40m of a watercourse or drainage channel.
5) Ensure motor vehicles, plant or machinery is washed away from watercourses or drainage lines and on a permeable surface. This will restrict detergents, grease and solids from entering waterways and allow them to be filtered by the existing ground cover.
6) Domestic vehicle or machinery repairs should be carried out in a bunded area. Any waste oil is to be collected and stored before being disposed off-site.
7) As opposed to allowing excessive organic matter to accumulate in residential areas and be eventually swept into the waterways, the material can be collected and composted.
8) When cleaning hard stand areas like driveways and footpaths, sweep rather than hose. This reduces the amount of sediment entering the stormwater system.
9) Avoid using pesticides and herbicides in rain or wind periods.

10) Landscape using native plants as they require less water and fertiliser than their introduced counterparts.
11) Carry out the correct sediment and erosion control initiatives as detailed below.

8.5.4 Flora and Fauna

In relation to the native flora and fauna, the development and ongoing use of the land must be managed to achieve the following objective:

Objectives

k) To control, minimise or prevent the destruction of native vegetation, limit the overall impact of the development on vegetation and native fauna, and prevent the spread of noxious weeds;
l) To prevent adverse impacts on native fauna, including threatened species; and
m) To manage pets/companion animals so as to prevent adverse impacts on local biodiversity and the amenity of existing and future owners and residents.

Procedures

1) Minimise soil compaction or disturbance. All disturbed areas must be rehabilitated with saved topsoil and salvaged plants.
2) All native vegetation within the riparian areas should be retained in accordance with the approved Landscape Management Plan.
3) Native grasses should be planted in preference to exotic grasses to retain the native vegetation of an area and to reduce maintenance and resources needed by exotic grasses, such as fertilisers and excessive watering.
4) Pockets of regenerating bushland and young trees must be protected during any building construction work with suitable protective fencing and restricted access, including material stockpiling.
5) Minimise the use of pesticides and herbicides around areas of native vegetation.
6) Hollow bearing trees are important to the protection of native fauna and every effort should be made to minimize their removal. Where this is unavoidable, care should be taken to ensure the protection of any species which may be roosting in the tree prior to removal. Where the presence of fauna is known, the services of a qualified ecologist should be employed to advise on the best method of removing the tree. Nest boxes attached to remaining trees will assist in mitigating impact caused by the removal of hollow bearing trees.
7) All native fauna (including snakes) are protected. Animals shall not be unnecessarily disturbed or harmed.
8) Feeding of native animals is prohibited.
9) Minimise movement of vehicles through sensitive areas.
10) When operating motor vehicles or gardening machinery take particular care not to harm native fauna.
11) All boundary fencing to be of a type that allows for the unrestricted movement of native animals through the site, e.g. five strand plain wire rural fencing; no netting.

8.5.5 Management of Waterways and Riparian Zones

In relation to the native vegetation located within and adjacent to watercourses and dams, the development and ongoing use of the land must be managed to achieve the following objective:-

Objective

To protect and enhance habitat for native fauna and the ecology of those areas containing threatened species, to assist in maintaining the quality of water leaving the site and to maintain the rural character of the estate.

Procedures

1) All remnant and planted riparian vegetation within the estate, including around dams, is to be retained, enhanced and protected, unless a separate approval from the Hunter-Central Rivers Catchment Management Authority has been obtained.
2) Minimise the use of pesticides, herbicides and fertilizers around areas of native vegetation.
3) Planting of appropriate native trees along watercourses and around dams for bank stability and erosion control is encouraged.
4) Do not remove streamside vegetation (this includes reeds, trees and grasses), unless directed as part of an approved catchment and waterway management program.
5) Control rabbits or other pests to allow effective regeneration.
6) Involvement of lot owners in voluntary groups such as Landcare is encouraged to promote community involvement and an awareness of environmental issues.

8.5.6 Livestock Management

Objective

To manage pets / companion animals to prevent adverse impacts on native fauna and on existing and future owners and residents of land within the Estate.

Procedures

1) All pets are to be kept in accordance with the Dungog Shire Council Companion Animal Management Plan 2007.
2) When not under the effective control of an adult, all cats and dogs must be kept within residences or within secure enclosures at all times.
3) Ensure the keeping of livestock does not contribute to a decline in water quality, spread of noxious and environmental weeds, contribute to unreasonable noise and odours, create unmanageable effluent and wastewater pollutants via nutrient run off or create soil compaction and erosion.
4) Horses, bovines, goats, sheep, and other introduced grazing animals are not permitted within the native vegetation offset area of the PVP.
5) In order to reduce land use conflict and environmental issues, livestock are to be stocked at the appropriate densities in accordance with the Department of Industry and Investment guidelines.

Relevant Supporting Documentation

For further detail in relation to management of companion animals refer to the *Companion Animals Act 1998* and to *Dungog Shire Council's Companion Animal Management Plan 2007*.

8.5.7 Bushfire Management

The site located within a bush fire area and in accordance with legislative requirements a bushfire threat assessment was prepared in 2012. The bushfire assessment concluded that the proposal is located in an area of low to moderate bushfire risk and meets the requirements of the NSW Rural Fire Service. All allotments have been constructed so as to comprise an area of land which is clear of native vegetation for the location of a sizable dwelling together with the required Asset Protection Zone (APZ).

An Asset Protection Zone (APZ) is an area between a bush fire hazard and the building, which is managed to minimise fuel loads, inhibit a fire path and reduce the effects of heat, flame, ember and smoke attack. Put simply it keeps the effects of the fire away from the building. The size of the APZ is based on vegetation type, slope and levels of construction. The APZ's provided above are indicative only. Every development application submitted for a dwelling on a lot must be accompanied by a Bushfire Threat Assessment (BTA) which determines the required APZ. The NSW Rural Fire Service provides guidelines for the preparation of a BTA and the creation and maintenance of APZ's (www.rfs.nsw.gov.au).

When preparing a development application for the erection of a dwelling house, it is a requirement that the provisions of RFS Guidelines be followed.

8.5.8 Visual amenity

Objective

To ensure buildings are appropriate within their setting and complimentary to the rural environment.

Procedures

1) Dwellings should be located, designed and constructed of appropriate materials to not be visually obtrusive or detract from the rural character of the area.
2) Dwellings must be designed to reflect the local landform, colours and materials present on the site and surrounds. Typically, low building forms, timber and corrugated iron reflect the rural character of the area. Roof pitches should not exceed 30 degrees.
3) Dwellings are to be sited so as to comply with the provisions of Clause 16.
4) Limit cuts and bench construction for house sites, outbuildings and access driveways. Minimise ground disturbance generally and utilise erosion controls measures around disturbed areas.
5) Keep tall native vegetation plantations an appropriate distance away from the main dwelling.

8.5.9 Erosion and sediment control

Objective

To avoid the adverse impacts associated with uncontrolled clearing of land and inappropriate construction techniques.

Procedures

1) Any filling to a depth greater than 200mm is to be compacted to a 95% standard in accordance with AS1289-E(1.1).
2) For any disturbed or filled land, appropriate sediment and erosion control measures shall be utilised and maintained until adequate grass cover has been established.
3) Identify existing areas affected by soil or water erosion and undertake mitigation measures. Improving vegetation cover in gully heads and around erosion-prone areas can assist in minimising soil loss.
4) Planting of appropriate native trees along water courses for bank stability and erosion control is encouraged.
5) All on-site roads shall be constructed so as to minimise surface run-off and sedimentation of watercourses. Open swale drains shall be used to trap overflow and drain the road surface.
6) Alignment of all roads and access tracks shall follow contours, minimise the need for batters, and avoid unnecessary crossings of draining lines.

8.5.10 Fencing

Objectives

- To allow for the passage of native fauna; and
- To avoid adverse impacts on environmentally sensitive areas.

PROCEDURES

1) All boundary fencing is to be constructed in a manner to allow for the movement through the site by native fauna.
2) For visual amenity purposes ensure rural fencing is generally consistent in design and scale.
3) Fencing off the areas of the site if they are susceptible to over grazing, pedestrian or development pressure.
4) Those areas of the site that have been fenced for the purpose of protecting recently planted areas of native vegetation are to be maintained.

8.5.11 Minimising Edge Effects of Wallaroo State Forest

The environmental integrity of the adjoining Wallaroo State Forest could be impacted if landowners whose properties so adjoin, fail to properly manage their land in a sustainable manner. As the Forest presents a high bush fire risk, landowners must ensure an APZ in excess of 20m is maintained at all times. Landowners should not deposit waste material into the Forest or allow domestic animals to access to forest.

This provision only applies to Lots 110, 111 and 112 in DP 1195463, Lots 123, 124 and 126 in DP 1220678 and Lots 132 to 136 in DP 1232974.

8.6 RESIDENTIAL DEVELOPMENT

8.6.1 Dwelling-Houses and Other Structures - Planning Principles

a) All new structures are to be sited so as to comply with the following setbacks:-

- 50m from Limeburners Creek Road
- 15 metres from internal roads
- 10m from side and rear boundaries
- 40m from a watercourse
- Outside of constrained areas (**Figure 3**)

b) All new habitable structures are to be sited so as to lie above the 1 in 100 year flood level. Finished floor levels of habitable buildings shall be at least 500mm above the 1 in 100 year flood level.

c) All non-habitable structures are to be constructed above the 1 in 20 year flood level.

d) New dwellings are to be sited and designed so as to:-

(i) respect the visual privacy and views enjoyed from existing and potential dwellings within the Estate.
(ii) Avoid potential for erosion, sedimentation and contamination of watercourses and water storage areas, and
(iii) minimise the removal of native vegetation.
(iv) reflect a high quality of finish and be of a scale which compliments the character of the rural setting.
(v) encourage energy efficient housing and solar design
(vi) protect the riparian environment of watercourses by the incorporation of appropriate water management and erosion controls.
(vii) encourage housing which is of a design which reduces exposure to the risks of bushfire.
(viii) ensure building colours be limited to earthy tones with no highly reflective materials.
(ix) ensure a potable water tank with a minimum storage capacity of 40,000 litres plus a static water supply for firefighting purposes of 10,000 litres for lots up to 1hectare in area, and 20,000 litres for lots in excess of 1 hectare in area.

8.6.2 Building Siting and Design

Each of the allotments has unique physical characteristics and prior to commencing the design of a dwelling, owners should have prepared a detailed site assessment. Constrained areas are shown on **Figure 3**. This assessment and site plan is required to be submitted with applications for development on each allotment. An example of a Site Plan is provided as **Figure 4**.

The elements which need to be taken into consideration when preparing the plan are:-

- Land contours and slope – a detailed site survey at 0.5m contour intervals with the locations of large trees and creek lines shown.
- Location of existing areas of native vegetation.
- Topographical features – e.g. rock outcrops, unique trees, old access tracks, vehicle entry point, boundaries, slope, drainage lines, etc.
- Bushfire Asset Protection Zones in accordance with RFS requirements.
- Location of existing services.
- Preferred route of access road, road grade and site drainage.
- Areas which will be retained in their natural state – e.g. < 20m either side of watercourses, existing treed areas outside of the 'building area', trees, etc
- View corridors and location of buildings on adjoining properties.
- Landscaping proposed to mitigate visual impact of the dwelling on the site.
- Type of entry treatment, e.g. entry statement and front fencing detail.
- Relative RL of proposed dwelling and building platforms.
- Proposed storm water drainage of hard surface areas.
- Proposed location and size of any dams and water tanks.
- Proposed location and type of on-site effluent disposal system and irrigation areas.
- Proposed location of services from road to dwelling/building and if underground or overhead supply.

8.6.3 Specific Controls

Building Design

- All structures, i.e. dwelling-houses, garages, sheds, fencing, shall be designed having consideration to the rural character of the area, the topography and landscape features of the site. Particular consideration will need to be given to building location, solar access, form, colour and construction materials. Applicants will be required to demonstrate that these considerations have been taken into account.
- Council encourages the construction of non-obtrusive structures which fit well within the landscape.
- Buildings should be designed to accommodate the topography of the site and should not require cut or fill in excess of 1 metre in depth.
- Buildings should be designed to be energy efficient through the use of insulation, correct orientation on the site, passive solar design, cross ventilation and other energy saving technologies. In particular dwellings should be designed to locate living rooms to take advantage of winter solar radiation, whilst the design should minimise the extent that summer solar radiation enters windows on the northern and western facades of buildings. Dwellings are required to meet an acceptable energy rating as determined by BASIX.
- The design and height of the dwelling must respond to the natural and built features of the area.
- Building materials must comply with bushfire safety standards.

- The dwelling and outbuildings must generally be of muted colours to blend with the surrounding natural setting.
- The use of verandas and awnings are encouraged to reduce the apparent bulk of dwellings.
- Garages on the front façade of dwellings must be articulated.
- Fences, screens and retaining walls must be compatible with the overall building and landscape design.

Building Materials

- Roofing materials should be non-reflective.
- Wall materials should be earthy tones.

Specific Controls

- Each allotment contains an unconstrained area in excess of 3000m2. This area is considered sufficient to accommodate a large dwelling, effluent disposal areas, and asset protection zone.
- Dwellings and on-site sewerage disposal areas must comply with set-back requirements.
- In preparing site plans, all buildings should be located within the unconstrained area of the lot. Areas not used for buildings, outbuildings, recreational facilities and driveways should be set aside for landscaping using species native to the area, and for small scale agricultural pursuits. A list of these species appears as **Appendix 1.** Details of the landscaping must be shown on the site plan submitted with the development application for each allotment.
- Provision to be made for cats and dogs to be contained within the allotment when not on a leash.

8.6.4 Bushfire Controls

All development must satisfy the provisions of *Planning for Bushfire Protection 2006* including provisions of asset protection zone, water supply, building construction and access standards.

The design of the dwelling and precautionary measures taken by the residents in the lead up to the bushfire danger period are the most important elements for ensuring a dwelling does not burn down during a bushfire. A number of publications are available for information on house design and safety precautions. Information should be obtained from the NSW Rural Fire Service website:-

- Everyone's Guide to Bushfire Control.
- Everyone's Guide to Bushfire Prevention in Urban Bushland Areas.
- Everyone's Guide to House Design and Modification in Bushfire Prone Areas.
- Planning for Bushfire Protection: A guide for land use planners, fire authorities, developers and home owners.

It has been proven that certain building materials and designs offer better protection and resistance to bushfire and should be investigated for use in new house designs.

Residents are advised to contact the NSW Rural Fire Service about appropriate hazard reduction measures and regimes for areas surrounding their dwelling.

8.6.5 On-Site Effluent Disposal Systems

All lots have the capability of managing effluent via means of an aerated/spray irrigated waste disposal system. An on-site effluent disposal assessment was undertaken for the whole site and recommended the following design criteria:-

- Required irrigation area of 1050m2 for a four bedroom dwelling with a reserve area of 1050m^2 which is to be set aside in the event of failure of the primary disposal area.
- Additional design details are included as **Appendix 2** – Extracts from On-site Effluent Disposal Investigation 838 & 840 Limeburners Creek Road – Ecobiological June 2012.

A separate application to install and operate an on-site sewage management system must be submitted to Council for approval prior to any development requiring sewage disposal occurring on any lot within the subdivision.

The design of on- site sewage management systems should have regard to the design specifications provided in the geo-technical report prepared by Ecobiological (June 2012).

8.6.6 Dams

Dams shall be designed and constructed in accordance with the requirements of the Department of primary Industries – NSW Office of Water (NOW). The location of proposed dams must be shown on the site plan.

8.6.7 Household Waste Disposal

All dwellings are required to have household wastes removed via Councils domestic waste collection service.

8.6.8 Recreational Motorbikes

Unregistered motorbikes are not permitted to be used on any allotments.

APPENDIX 1 - SPECIES NATIVE TO THE LOCAL AREA

Table 4. Flora of Subject Site

FAMILY	Scientific Name	Author	Common Name	Form	
Family AMARANTHACEAE	*Alternanthera denticulata*	R.Br.	Lesser Joyweed	herb	X
Family ASTERACEAE	* *Bidens pilosa*	L.	Cobbler's Pegs	bush	
Family ASTERACEAE	*Chrysocephalum apiculatum*	(Labill.) Steetz	Yellow Buttons	herb	
Family ASTERACEAE	* *Conyza albida*	Willd. & Sprengel	Tall Fleabane	bush	
Family ASTERACEAE	* *Hypochoeris radicata*	L.	Flatweed	herb	
Family ASTERACEAE	* *Senecio madagascariensis*	Poiet	Fireweed	bush	
Family ASTERACEAE	* *Xanthium occidentale*	Bertol.	Noogoora Burr	herb	
Family ASTERACEAE	* *Onorpordum acanthium acanthium*	L.	Scotch Thistle	herb	X
Family CYPERACEAE	*Carex appressa*	R.Br.			X
Family CYPERACEAE	*Carex sp.*				
Family CYPERACEAE	* *Cyperus brevifolius*	(Rottb.) Hassk.			X
Family CYPERACEAE	*Eleocharis cylindrostachys*	Boeck.		rush	X
Family CYPERACEAE	*Eleocharis sphacelata*	R.Br.	Tall Spike Rush	rush	X
Family FABACEAE - FABOIDEAE	* *Trifolium repens*	L.	White Clover	herb	X
Family FABACEAE - FABOIDEAE	*Daviesia genistifolia*	Cunn. ex Benth.	Broom Bitter Pea	shrub	
Family JUNCACEAE	*Juncus sp.*				X
Family JUNCAGINACEAE	*Triglochin procerum*	R.Br.	Water Ribbons	aquatic herb	X
Family LOMANDRACEAE	*Lomandra longifolia*	Labill.	Lomandra	herb	
Family LOMANDRACEAE	*Lomandra filiformis*	(Thunb.) Britten	Wattle Mat Rush	herb	
Family MALVACEAE	* *Sida rhombifolia*	L.	Paddy's Lucerne	shrub	
Family MYRTACEAE	*Angophora floribunda*	(Smith) Sweet	Rough-barked Apple	tree	
Family MYRTACEAE	*Corymbia maculata*	(Hook)	Spotted Gum	tree	X
Family MYRTACEAE	*Eucalyptus amplifolia subsp. amplifolia*	Naudin	Cabbage Gum	tree	
Family MYRTACEAE	*Eucalyptus carnea*	R. Baker	Thick-leaved Mahogany	tree	
Family MYRTACEAE	*Eucalyptus fibrosa*	F.Muell.	Broad-leaved Ironbark (I	tree	
Family MYRTACEAE	*Eucalyptus moluccanna*	Roxb.	Grey Box	tree	
Family MYRTACEAE	*Eucalyptus punctata*	DC.	A Grey Gum	tree	
Family MYRTACEAE	*Eucalyptus sideraphloia*	Benth.	Grey Ironbark	tree	X
Family MYRTACEAE	*Leptospermum sp.*			shrub	
Family MYRTACEAE	*Melaleuca linariifolia*	Smith	Snow in Summer	shrub or tree	X
Family MYRTACEAE	*Melaleuca styphelioides*	Smith	Prickly-leaved Tea Tree	tree	
Family ONAGRACEAE	*Ludwigea peploides montevidensis*	(Kunth) Raven	Water Primrose	herb	
Family PHORMIACEAE	*Dianella caerulea*	Sims	Blue Flax Lily	herb	
Family PLANTAGINACEAE	*Plantago sp.*			herb	
Family POACEAE	* *Axonopus affinis*	Chase	Narrow-leaved Carpet G	Grass	
Family POACEAE	* *Bromus carthariticus*	Vahl.	Prairie grass	Grass	
Family POACEAE	*Cynodon sp.*		Couch Grass	grass	X
Family POACEAE	* *Paspalum dilatatum*	Poir.	Paspalum	grass	X
Family POACEAE	*Paspalum distichum*	L.	Water Couch	grass	X
Family POACEAE	* *Pennisetum clandestinum*	Hochst. ex Chiov.	Kikuyu Grass	grass	X
Family POACEAE	* *Sporobolus sp.*		Parramatta Grass	grass	
Family POACEAE	*Imperata cylindrica var. major*	(Nees) C.E. Hubb.	Blady Grass	grass	X
Family POLYGANACEAE	*Persicaria hydropiper*	(L.) Spach	Water Pepper	herb	X
Family POLYGONACEAE	*Rumex brownii*	Campd.	Swamp Dock	herb	
Family POLYGONACEAE	* *Rumex crispus*	L.	Curled Dock	herb	X
Family RANUNCULACEAE	*Ranunculus inundatus*	R.Br. Ex DC.	buttercup	herb	X
Family RANUNCULACEAE	*Ranunculus lappaceus*	Smith	Common Buttercup	herb	X
Family ROSACEAE	* *Rubus fruticosus species aggregate*		Blackberry	scrambler	
Family TYPHACEAE	*Typha orientalis*	C. Presl	Cumbungi	aquatic herb	X
Family VERBENACEAE	* *Verbena bonariensis*	L.	Purpletop	herb	X
Family VERBENACEAE	* *Verbena rigida*	Sprengel	Veined Verbena	herb	

APPENDIX 2 - EXTRACTS FROM ON-SITE EFFLUENT DISPOSAL INVESTIGATION, 838 & 840 LIMEBURNERS CREEK ROAD CLARENCE TOWN – ECOBIOLOGICAL, JUNE 2012.

4.1 Site Investigation

Site investigations revealed that the typical subsurface profile consisted of a very dark grey/brown sandy clay loam to varying depths, overlying a grey/brown to yellow/brown sandy clay with orange mottle to varying depths, overlying orange weathered sandstone. Orange weathered sandstone was not encountered within TP 3, 7 and 6; however, it was encountered at depths varying between 0.3 and 0.8m in TP 1, 2, 4 and 5.

Neither surface water nor groundwater was encountered during the investigation.

The results of the soil analysis on the representative soil samples taken from Test Pit 1, 5, 6 and 7 are shown in Table 2 below.

Table 2: Soil sampling results

Sample	CEC	Na	K	Ca	Mg	Al	P Sorp (mgP/kg)	pH	EAT1	ESP2 %	EC (dS/m)
TP1	2.25	0.11	0.07	1.31	0.71	0.05	-	5.3	2	4.88	0.2
TP5	5.65	0.47	0.11	2.92	2.12	0.03	309.4	5.2	2	8.32	0.4
TP6	13.67	1.11	0.3	3.07	9.17	0.02	314.4	5.4	2	8.12	0.8
TP7	5.32	0.24	0.12	2.92	2.04	0	209.5	6	4	4.51	0.4

4.2 Disposal Area Calculations

The on-site effluent disposal area calculated by each of the 5 methods described in Table 1, for a 4 and 5-bedroom residence, is summarised below in Table 3. The water usage is based on 140L/day per person with a 4 bedroom dwelling having 7 people and a 5 bedroom dwelling having 8 people. Worked examples of each calculation are shown in the Disposal Area Calculation Sheet in the attachments.

Table 3: On-site Effluent Disposal Irrigation Areas & Storage Volumes.

Method	4-Bedroom Dwelling		5-Bedroom Dwelling	
	Required Irrigation Area (m2)	**Wet Weather Storage**	**Required Irrigation**	**Wet Weather**
Nitrogen Loading Method 10mg/L	392	48	448	54
Phosphorus Loading Method 8mg/L	667	11	762	12
Minimum Area Method	335	67	383	77
Nominated Area Method	1050	0	1200	0
AS 1547 Method	343	63	392	72

The "*On-site Sewage Management for Single Households*" guideline recommends that wet weather storage be provided to store run-off that will occur when the combination of rainfall and effluent exceeds the capacity of the site to absorb water.

Section 6 describes the above results in relation to the treatment and disposal systems recommended for the site.

These figures may be revised upon receipt of effluent treatment data from accredited systems with different total nitrogen and phosphorus contents. Council may choose to reduce or waive the requirement for wet weather storage.

5. Limitations to on-site Effluent Disposal

Table 6 of "*On-site Sewage Management for Single Households*" provides a soil assessment rating system for on-site effluent disposal systems. When the results from the site investigations and soil analysis are compared to this table, a number of minor, moderate or major limitations to the on-site irrigation of treated effluent on the subject site can be identified. These limitations are given in Table 4 below.

Table 4: Minor, Moderate and Major Limitations to the On-site Irrigation of Treated Effluent.

Soil Feature	Limitation
pH	Moderate
Depth to bedrock	Ranges from Minor to Major
Cation Exchange Capacity (CEC)	Ranges from Minor to Moderate
Exchangeable Sodium Percentage (ESP)	Ranges from Minor to Moderate
Electrical Conductivity (EC)	Minor
Permeability	Moderate
EAT	Moderate to Major

The soil across the entire site has a low pH. By raising the pH and therefore reducing the acidity of the soil improved plant growth can be achieved. The pH may be adjusted by an annual application of lime at 400g/m2.

Effective disposal is also limited to the shallow depth of the soil. The depth of soil over the disposal area must be increased in accordance with AS/NZS 1547 for the selected system to the minimum depths of:-

- Mounds - Not applicable as mounds are designed to overcome shallow soil limitations;
- Subsurface irrigation - Requires minimum of 0.4m and preferably 0.6m of soil below the bottom of the dripper lines; and
- Surface irrigation - Requires a minimum of 0.4m and preferably 0.6m depth of soil.

The above depths of soil must include a 150mm layer of topsoil on the surface to promote vegetation growth (Table 4.2B2 AS/NZS 1547:2000). Imported soil should be of equal or better quality than that on site. The imported soil will need to be compacted to 95% relative dry density ratio to ensure that it does not subside or erode.

The soil also has minor to moderate limitations with respect to Cation Exchange Capacity (CEC) and exchangeable sodium percentage. It is therefore recommended no remediation works are required for these two soil limitations.

The soil has displayed high clay dispersion properties, which can lead to the blockage of pores by the dispersed clay particles, reducing the soil permeability. This may be overcome by an application of gypsum at 1kg/m2 during construction. It has been estimated that the gypsum will be effective for about 10 years at this application rate.

The moderately low soil permeability may produce excessive runoff or waterlogging of the effluent disposal area. The design irrigation rate for effluent disposal should be reduced to less than 20mm/week in order to avoid waterlogging or re-surfacing of disposed effluent.

6. Conclusions –Treatment and Disposal Options

Based on our evaluation of the site and the identified soil profile, the lots are suitable for the on-site disposal of effluent from:-

A. An aerated waste water treatment system, or
B. A septic tank system with an aerobic sand filter, or
C. A septic tank system with an effluent landscape mound.

All systems should be installed and managed in accordance with the requirements of *AS 1547* and "*On-site Sewage Management for Single Households*". Effluent may be disposed of by either surface spray irrigation, surface drip and trickle irrigation or subsurface irrigation, subject to limitations of the selected treatment systems.

The systems described below incorporate a reserve effluent disposal area. A reserve effluent disposal area is recommended by *AS 1547* and is equivalent to 100% of the area of the primary disposal area. The purpose of the reserve disposal area is to rest the primary

disposal area, or for duplication of the disposal area if unforeseen circumstances require this at some time in the future. The reserve disposal area is to be protected from any development that would prevent its use in the future. The reserve disposal area may be reduced or even eliminated if improved waste water treatment systems are installed, alternative land application systems are used or where the site and soil evaluation supports a reduction in area.

6.1. Aerated Waste Water Treatment System –Surface Spray or Drip and Trickle Disposal

An aerated wastewater treatment system producing effluent with a total nitrogen content of 10 mg/L and a total phosphorus content of 8 mg/L, with treated effluent being disposed of via surface spray or drip and trickle irrigation will require a primary and back up reserve disposal area each of 1050 m2 for a 4 bedroom dwelling and 1200 m2 for a 5 bedroom dwelling.

The required area was based upon the Nominated Area Method and will require no wet weather storage. The required effluent disposal area may be revised upon receipt of treatment result data from accredited systems with different total nitrogen and phosphorus contents in their effluent.

6.2. Septic Tank with Aerobic Sand Filter

The aerobic sand filter treats effluent from a septic tank to the standards of an aerated waste water treatment system as set out in *AS/NZS 1547: 2000 - On-site Domestic Wastewater Management* and "*On-site Sewage Management for Single Households*" (see attachment). The required plan surface area of the sand filter is calculated by the manufacturer.

The required disposal area will be equivalent to that of a system treating effluent to a standard with a total nitrogen content of 10 mg/L and a total phosphorus content of 12 mg/L. The treated effluent collected from an Aerobic Sand Filter must be disposed of via sub-surface irrigation and will require a primary disposal area and back up disposal area each of 1050 m2 for a 4 bedroom dwelling and 1200 m2 for a 5 bedroom dwelling.

The required area was based upon the Nominated area method, which is the limiting calculation method and will require no wet weather storage.

6.3. Septic Tank with Effluent Landscaped Mound

An Effluent Landscaped Mound is a system, which both treats and disposes of effluent. Effluent is pumped to the mound from a septic tank where it filters through the constructed mound, being treated and disposed of in the one process. The sizing of an Effluent Landscaped Mound is done by a qualified agent of the manufacturer and is calculated using a water balance method to ensure the mound can dispose of the hydraulic load being applied.

6.4. Discussion

There is sufficient available disposal area on all sites to accommodate the required primary and back up reserve disposal areas for all listed Treatment and Disposal systems.

7. On-site Disposal Requirements and Recommendations

The installation and operation of the on-site sewage disposal system should be undertaken in accordance with the following guidelines.

7.1 Buffer Setbacks

The location of the disposal area must be in accordance with the following buffer dimensions for the chosen irrigation method shown in Table 5 below.

Table 5: Buffer Distance Requirements for Drip & Trickle, Spray & Subsurface Disposal Mechanisms

BUFFER DISTANCE (m)						
Feature	**Drip/Trickle**		**Spray**		**Subsurface**	
	Upslope	Downslope	Upslope	Downslope	Upslope	Downslope
Dwelling	6	3	15	15	6	3
Driveway	6	3	6	3	6	3
Path	6	3	3	3	6	3
Pool	6	3	6	6	6	3
Dam	40	40	40	40	40	40
Permanent Water	100	100	100	100	100	100
Intermittent Water	40	40	40	40	40	40
Property Boundary	6	3	6	3	6	3

7.2 Drainage

The surface of the disposal area should be graded to prevent effluent ponding on or running off the disposal area. A raised soil berm should be provided down slope from the disposal area to intercept any rainfall runoff from the disposal area and encourage it to filter through the soil.

An uphill diversion drain must be constructed to protect the disposal area from surface run off from surrounding areas. Upslope subsurface seepage should be intercepted and diverted away from the disposal area by a subsoil drain.

7.3 Installation

The installation of the selected treatment system is to be performed by a qualified agent of the manufacturer.

7.4. Vegetation

The effluent disposal site must to be vegetated before effluent is applied. The vegetation can include grasses, shrubs and trees.

Vegetation should be regularly mowed and pruned to maintain the rate of evapotranspiration. Clippings and weeds removed from the disposal area should be disposed of away from the area to avoid increased nutrient loads on the irrigation area. Likewise, clippings and other vegetation should not be disposed of on the area. Buffer zones (Section 7.1) adjacent to the irrigation area should also be planted with suitable vegetation.

7.5. Effluent Quality

Effluent from the selected wastewater treatment system is to be disposed of on the irrigation area in accordance with the requirements of *AS 1547* and Table 14 of *On-Site Sewage Management for Single Households*. Methods to reduce effluent strength include:-

i. Using the minimum recommended amounts of low phosphate, biodegradable liquid detergents and cleaning agents;
ii. Avoiding large quantities of bleaches, disinfectants and whiteners; and
iii. Minimising the amount of solid waste entering the septic system, especially non-biodegradable items such as plastics.

It is important that the occupant makes a consistent effort to reduce the strength of the treated effluent.

7.6. Maintenance

The disposal system should be regularly checked to ensure that it is operating correctly. Signs of failure include surface ponding, effluent run off, erosion, leaching of the soil, poor vegetation growth including burnt vegetation, odour or the formation of surface crusts.

Boatfalls Rural Residential Estate - Limeburners Creek Road Clarence Town

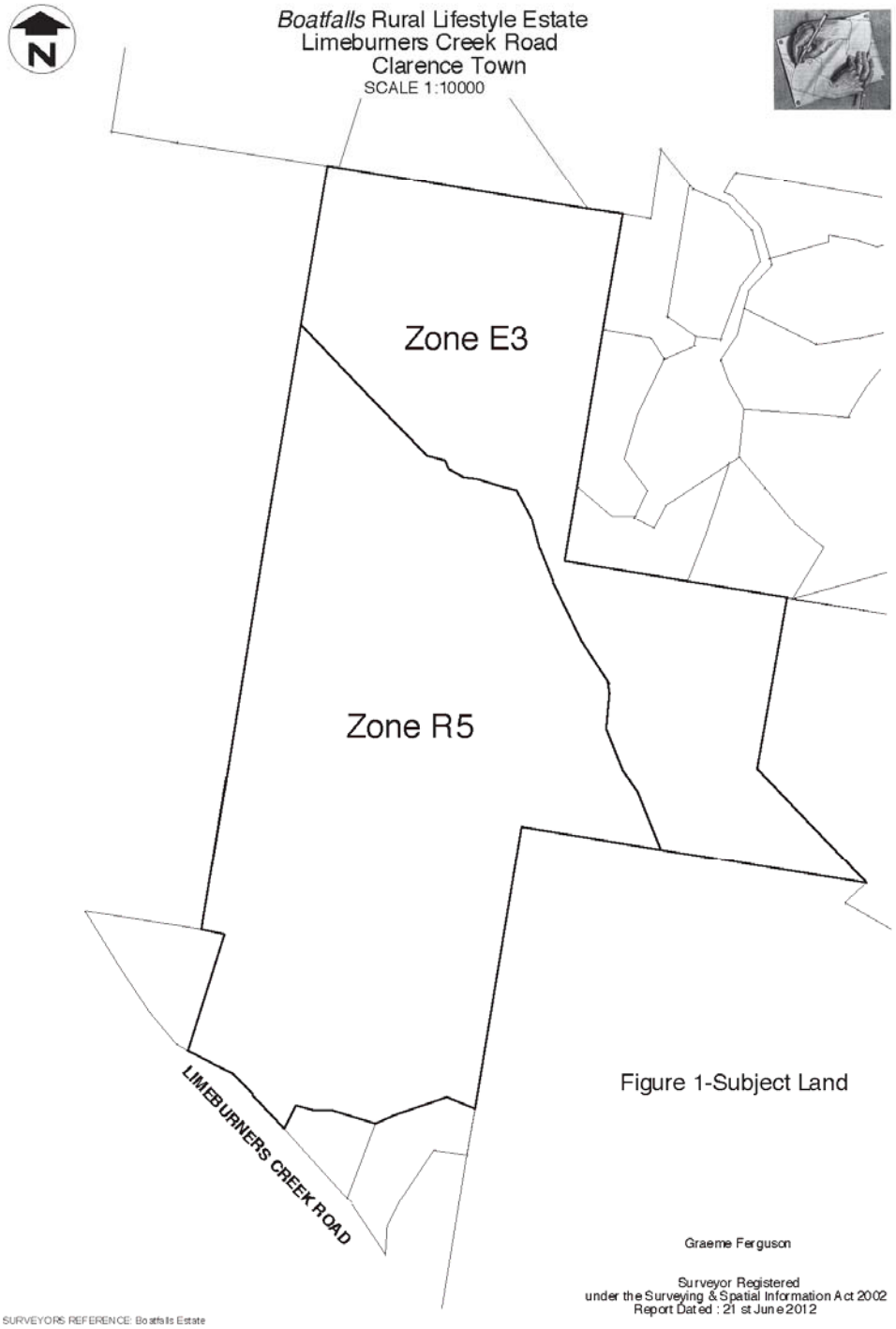


Figure 1-Subject Land

23

Boatfalls Rural Residential Estate - Limeburners Creek Road Clarence Town

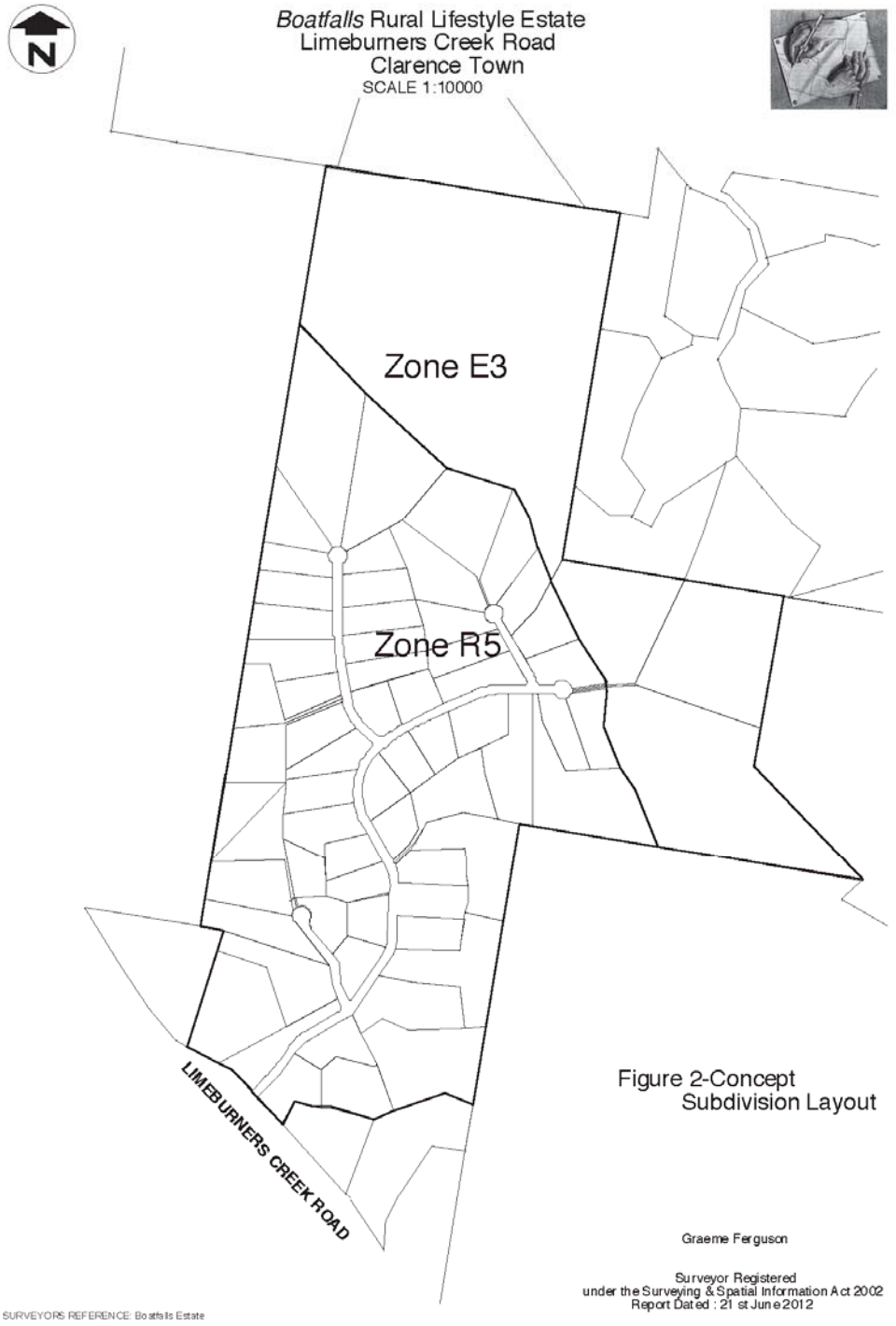


Figure 2-Concept
Subdivision Layout

Graeme Ferguson

Surveyor Registered
under the Surveying & Spatial Information Act 2002
Report Dated : 21 st June 2012

24

Boatfalls Rural Residential Estate - Limeburners Creek Road Clarence Town

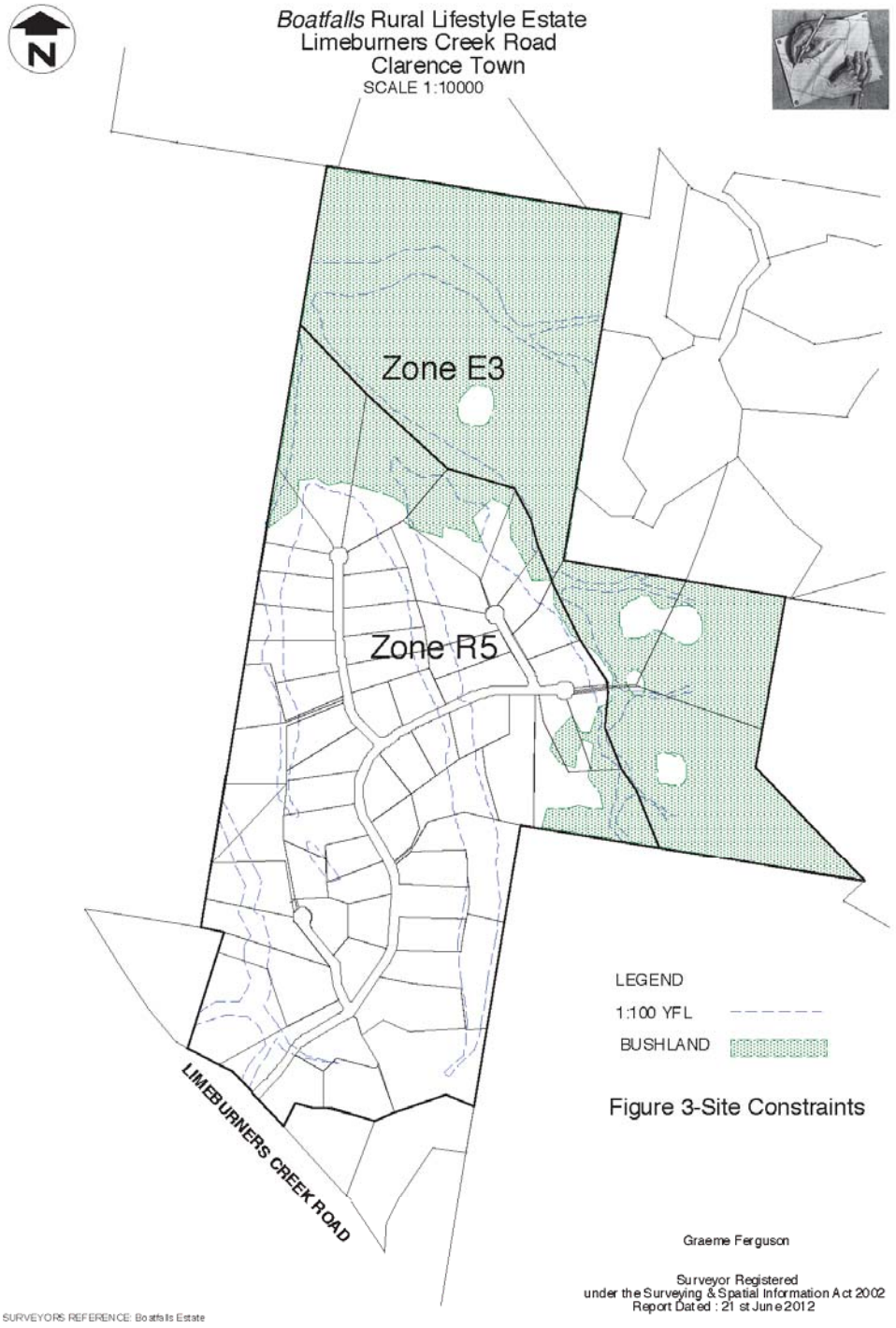
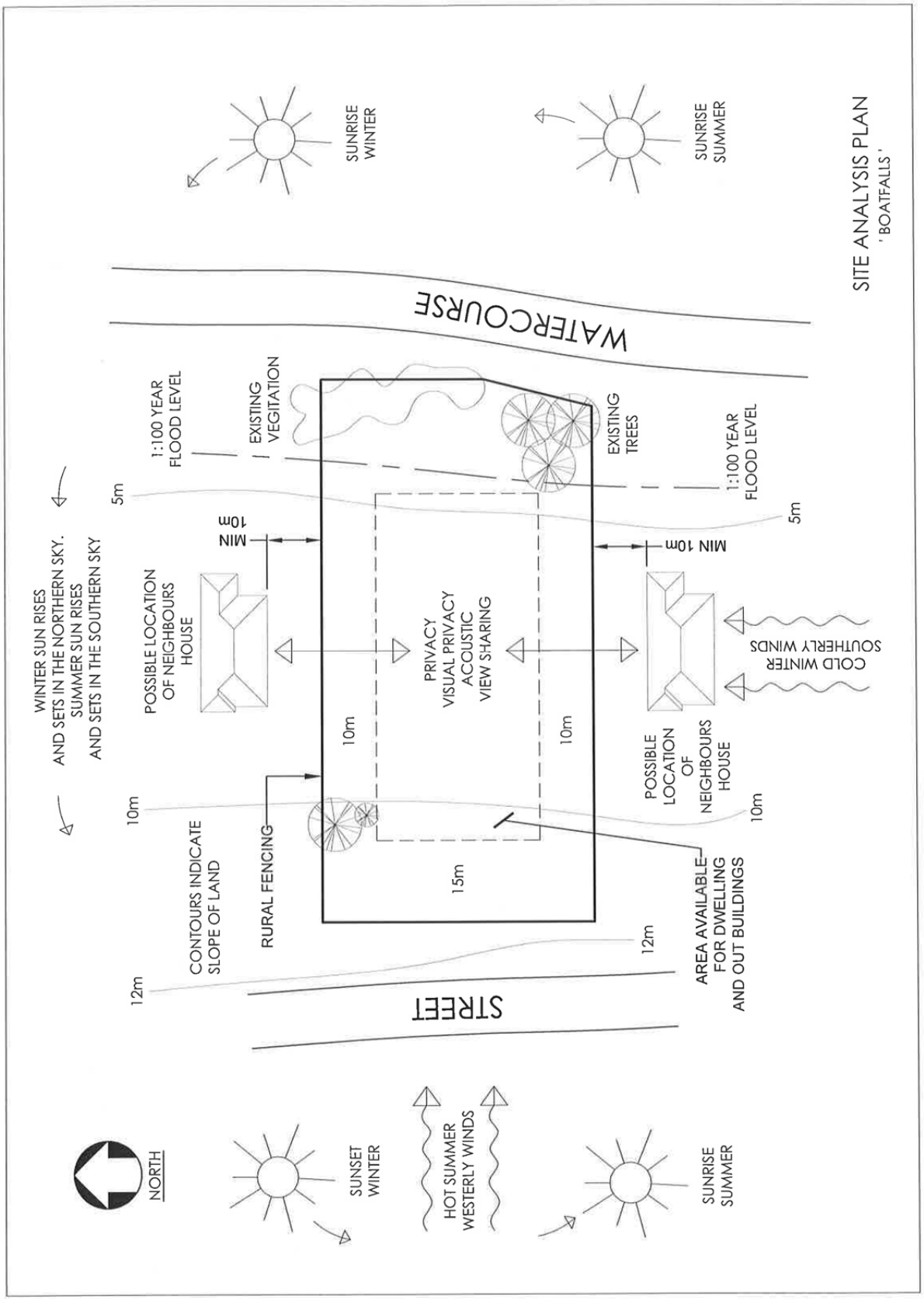


Figure 3-Site Constraints

25


SITE ANALYSIS PLAN
' BOATFALLS '
SUNRISE WINTER
SUNRISE SUMMER
WATERCOURSE
1:100 YEAR FLOOD LEVEL
EXISTING VEGITATION
EXISTING TREES
1:100 YEAR FLOOD LEVEL
5m
5m
MIN 10m
MIN 10m
WINTER SUN RISES AND SETS IN THE NORTHERN SKY.
SUMMER SUN RISES AND SETS IN THE SOUTHERN SKY
POSSIBLE LOCATION OF NEIGHBOURS HOUSE
PRIVACY
VISUAL PRIVACY
ACOUSTIC
VIEW SHARING
COLD WINTER SOUTHERLY WINDS
10m
10m
10m
POSSIBLE LOCATION OF NEIGHBOURS HOUSE
10m
CONTOURS INDICATE SLOPE OF LAND
RURAL FENCING
15m
12m
12m
AREA AVAILABLE FOR DWELLING AND OUT BUILDINGS
STREET
NORTH
SUNSET WINTER
HOT SUMMER WESTERLY WINDS
SUNRISE SUMMER