ARDILL PAYNE & PARTNERS

Civil & Structural Engineers Project Managers & Town Planner

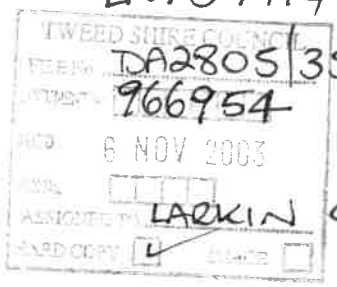
ABN 11 386 152 212

Bill Payne BE, MIE Aust. Graeme McKenzie BE, MIE Aust. Evan Elford L & ESD

TC:LT 5017lt-gc193

4 November 2003

LN: 37914



General Manager
Tweed Shire Council
PO Box 816
MURWILLUMBAH NSW 2484

ATTENTION: Chris Larkin

Dear Sir

RE: Black Rocks Estate
Koala Management Plan

We refer to Development Application 1152/2001 DA, in particular condition 91a, and to discussions held between Richard Cowan, Chris Larkin from Tweed Shire Council, and Tony Cromack from Ardill Payne & Partners.

Condition 91a of the consent requests details of preventative measures to prevent domestic animals entering the Koala Habitat, and koalas entering the residential area, via Kellehers Road.

We attach revised Koala Management Plan dated September 2003, as amended by James Warren & Associates to satisfy condition 91a.

James Warren, in Section 3.1, estimates that the Black Rocks site may currently support between one and three koalas. In Section 4.1, various management strategies are recommended to protect the koala population with respect to the impact of Kellehers Road on the Koala Habitat. These include exclusion fencing, advisory signage, speed restrictions and controls on the ownership of dogs and cats.

Section 4.1.1 of the Plan notes "...there is a break in the Koala Fence at Kellehers Road to allow access to the Black Rocks Estate from the west. It is considered that the likelihood of koalas entering Stages 8 – 10 through the break in the fence at Kellehers Road is minimal due to the low levels of koala activity recorded in forested areas on the western side of the proposed Koala Fence line in Stage 10 and the fact that there will be no koala food trees within the development area."

79 Tamar Street
PO Box 20
BALLINA NSW 2478

Ph: 02 6686 3280
Fax: 02 6686 7920
E-mail: info@ardillpayne.com.au

The Plan continues "...mature koalas with established home ranges are unlikely to roam into the developed area of the Black Rocks Estate ..... it is possible, though unlikely, that a wandering juvenile may enter the development from Kellehers Road."

In discussions with Council's Planner, Chris Larkin, we were advised that Council wants a structural control at the break in the fence at Kellehers Road.

In this regard we present two possible options:-

Option A - to install structural control such as a "Koala Grid" (similar principal as a stock grid, with modification to suit domestic animals and koalas) across Kellehers Road, with koala fencing to the ends of the grid.

Option B - to construct a koala underpass under Kellehers Road, with koala fencing along the boundary of Kellehers Road. The koala underpass would also serve as a drainage culvert.

Both Options are shown on the attached sketch.

Despite the Koala Management Plan's recommendations that strategies to restrict koala movements at Kellehers Road are of a "non-structural" type, our client agrees to investigate the above options.

In the meantime, it is proposed by our client to provide a bond in the amount of $10,000.00 to cover the installation of Option A. This bond will be lodged with Council prior to the release of the Linen Plan for Stage 8a.

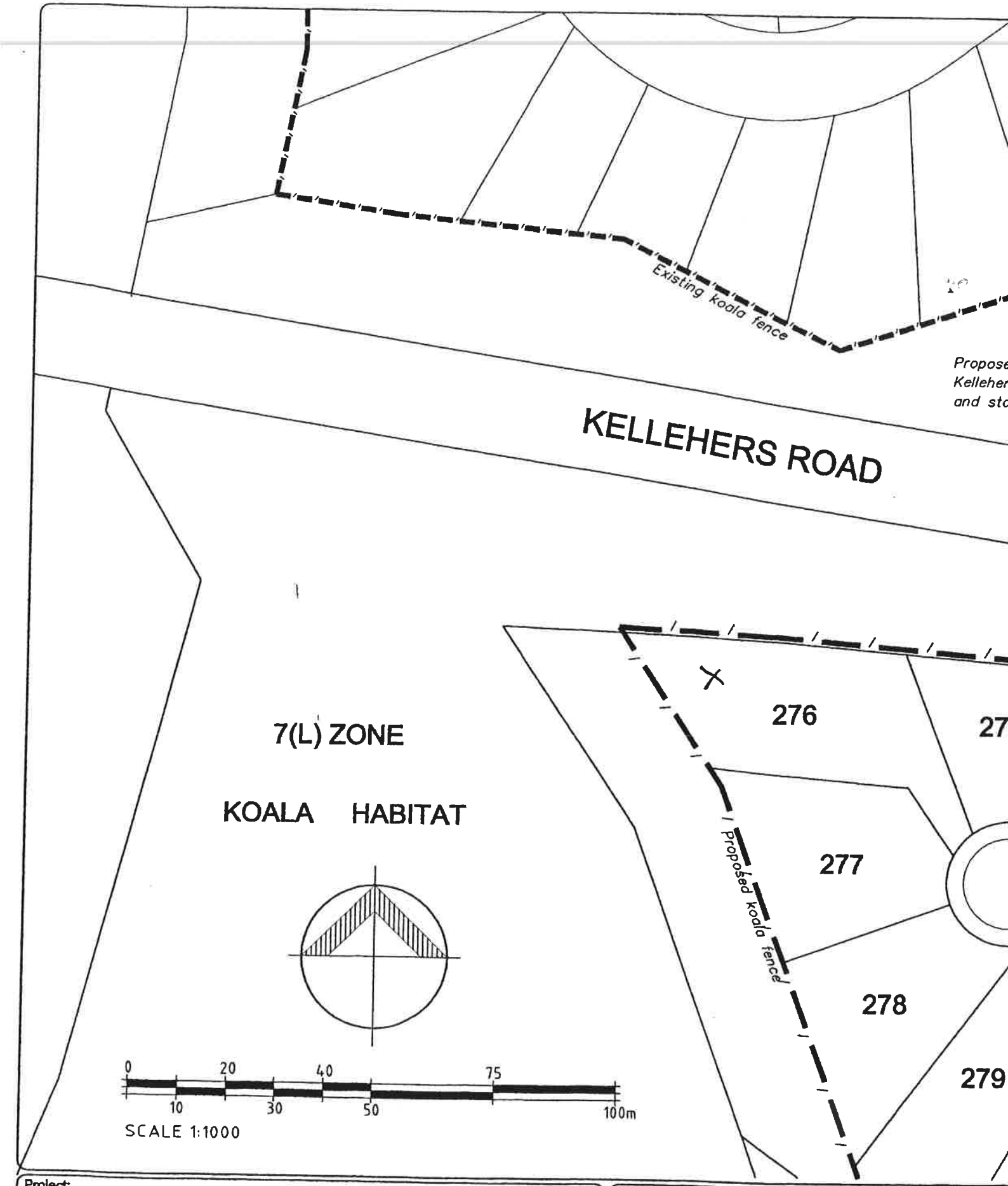
We understand from our discussions with Council that the lodgement of a bond is acceptable to Council, on the basis that the agreed method of koala control at Kellehers Road is constructed prior to the release of the Linen Plan for any further stages.

Please confirm that the bond amount and our proposal is acceptable to Council, so that arrangements for the bond can be initiated.

Yours faithfully

T Cromack
ARDILL PAYNE & PARTNERS

encl. Koala Management Plan
Sketches



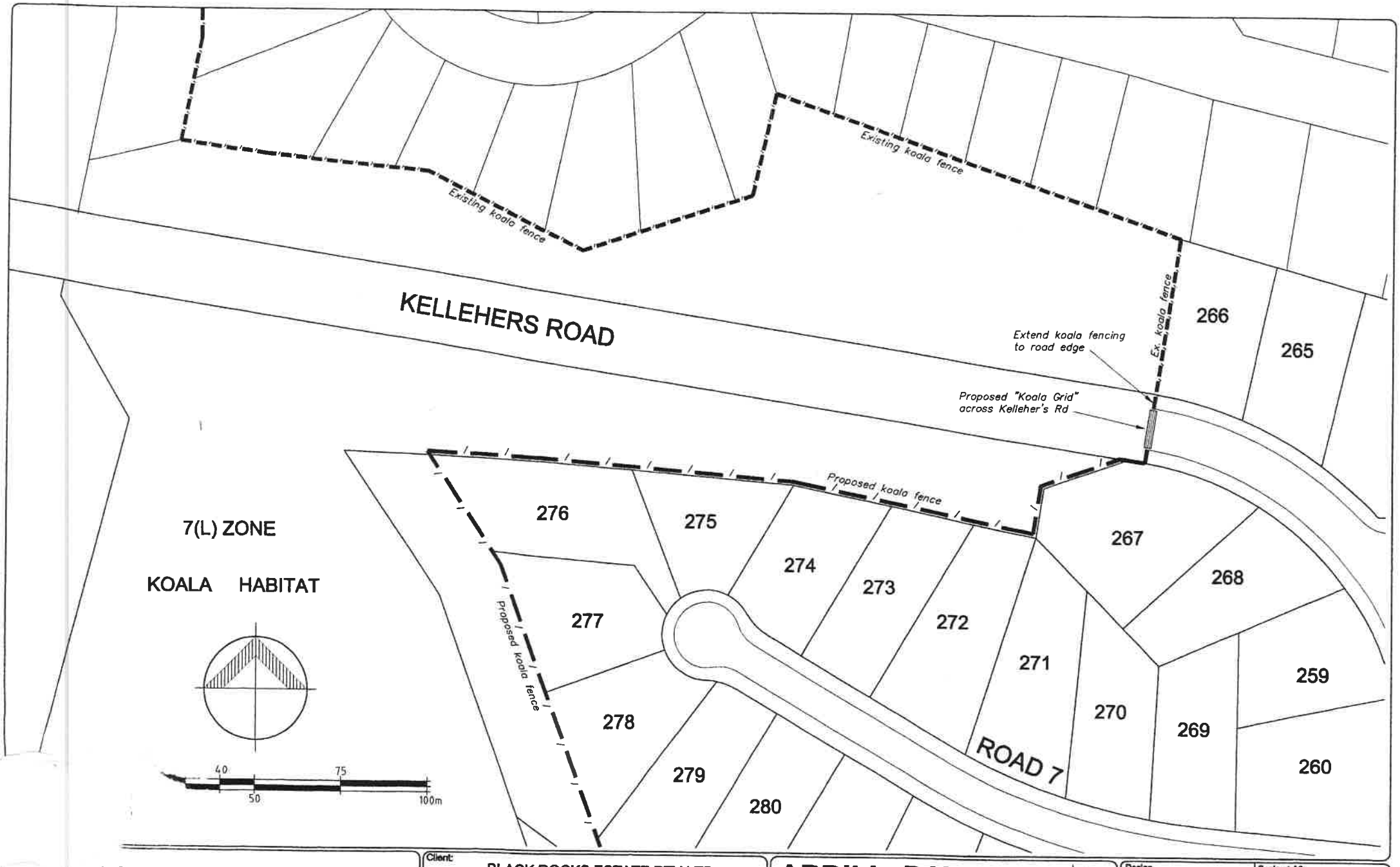
Project:

BLACK ROCKS ESTATE
STAGES 8, 9 and 10
POTTSVILLE

Client: BLACK ROCKS ESTATE PTY LTD

Title:

KOALA MANAGEMENT OPTION
KELLEHER'S ROAD



BLACK ROCKS ESTATE
STAGES 8, 9 and 10
POTTSVILLE

Client: BLACK ROCKS ESTATE PTY LTD

Title: KOALA MANAGEMENT OPTION A
K LEHER'S ROAD

ARDILL PAYNE & PARTNERS

Consulting Civil & Structural Engineers Project Managers & Town Planners

79 Tamar Street
P.O. Box 20
BALLINA NSW 2478

Telephone: 02 6686 3280
Facsimile: 02 6686 7920
Email: info@ardillpayne.com.au

Design	T.J.C.	Scale at A3	1: 1000
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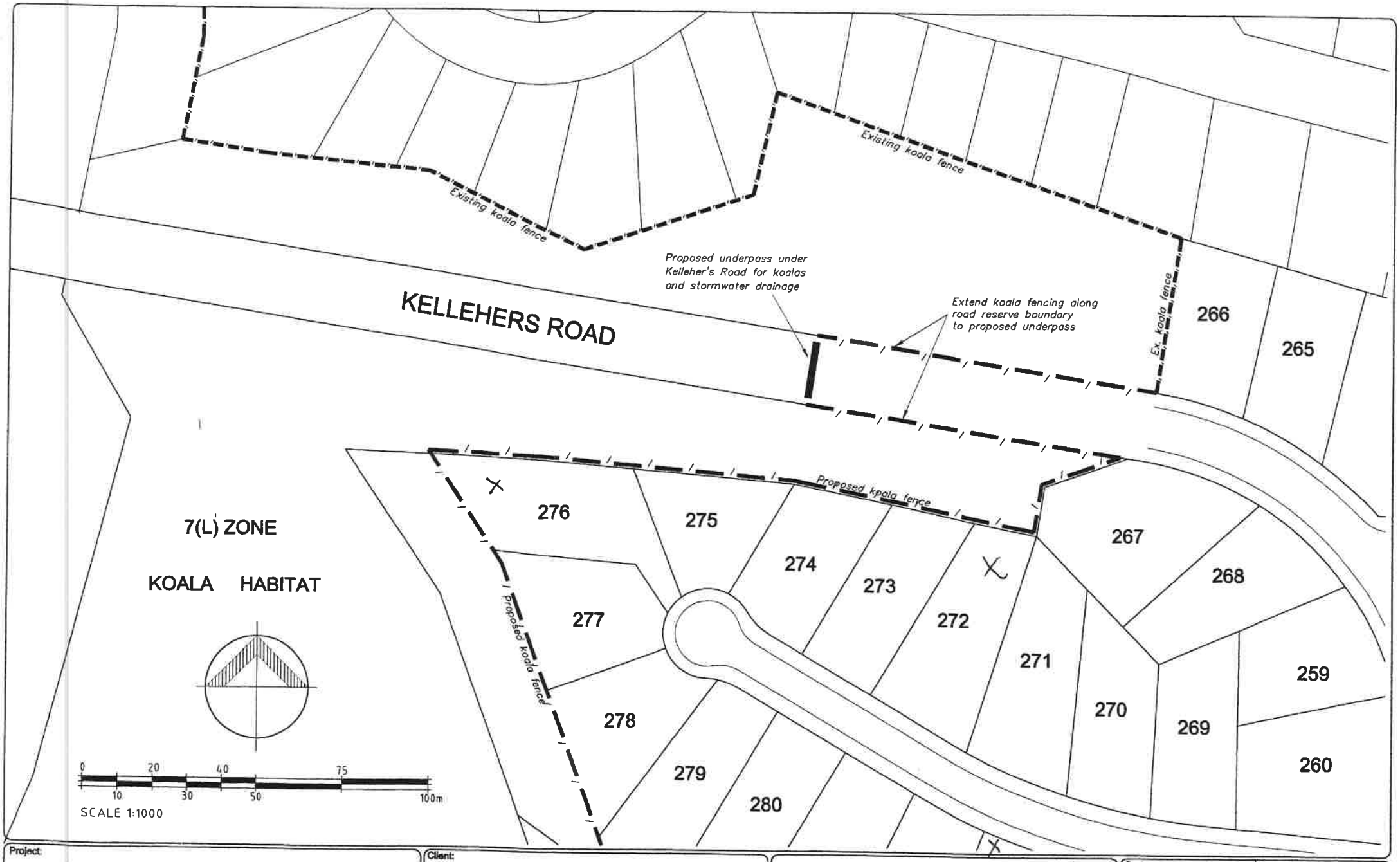

Project:

BLACK ROCKS ESTATE STAGES 8, 9 and 10 POTTSVILLE

Client: BLACK ROCKS ESTATE PTY LTD

Title: KOALA MANAGEMENT OPTION B
'LLEHER'S ROAD

ARDILL PAYNE & PARTNERS

Consulting Civil & Structural Engineers Project Managers & Town Planners

79 Tamar Street
P.O. Box 20
BALLINA NSW 2478

Telephone: 02 6686 3280
Facsimile: 02 6686 7920
Email: info@ardillpayne.com.au

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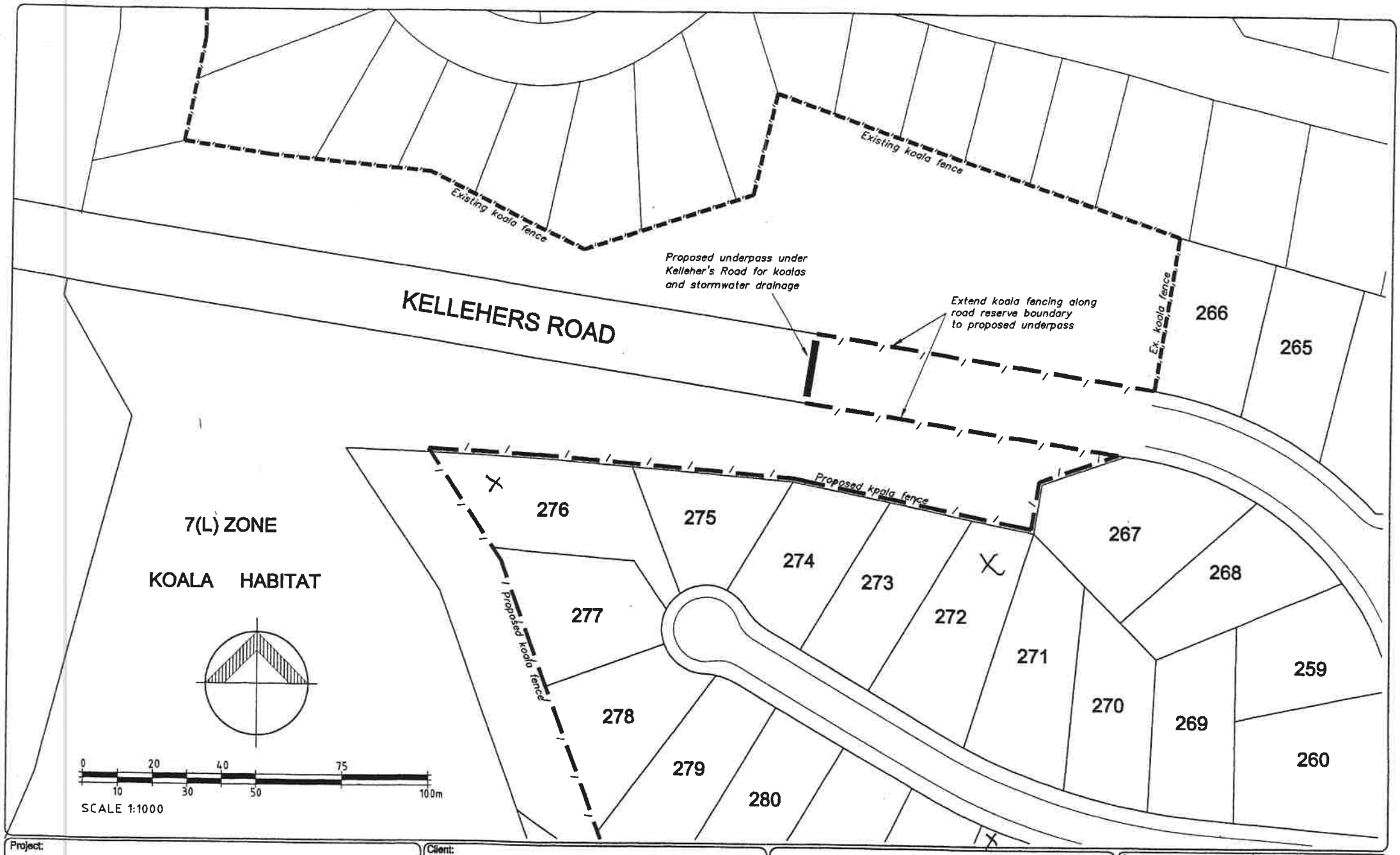

Project:

BLACK ROCKS ESTATE
STAGES 8, 9 and 10
POTTSVILLE

Client: BLACK ROCKS ESTATE PTY LTD

Title: KOALA MANAGEMENT OPTION B
KELLEHER'S ROAD

ARDILL PAYNE & PARTNERS

Consulting Civil & Structural Engineers Project Managers & Town Planners

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P.O. Box 20
BALLINA NSW 2478

Telephone: 02 6686 3280
Facsimile: 02 6686 7920
Email: info@ardillpayne.com.au

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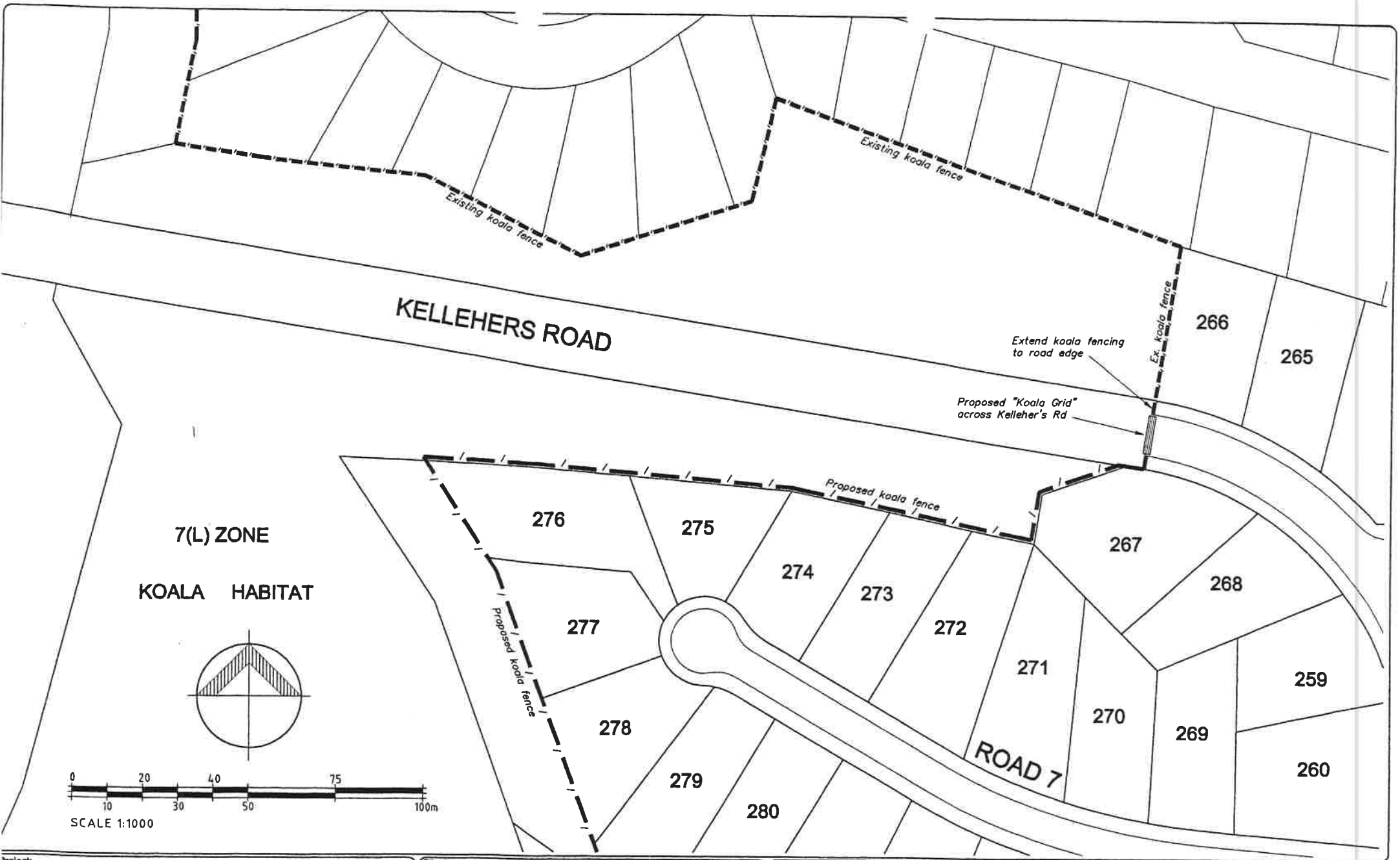

Project:

BLACK ROCKS ESTATE
STAGES 8, 9 and 10
POTTSVILLE

Client: BLACK ROCKS ESTATE PTY LTD

Title: KOALA MANAGEMENT OPTION A
KELLEHER'S ROAD

ARDILL PAYNE & PARTNERS

Consulting Civil & Structural Engineers Project Managers & Town Planners

79 Tamar Street
P.O. Box 20
BALLINA NSW 2478

Telephone: 02 6686 3280
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		Issue	

JAMES WARREN & Associates Pty Ltd

ENVIRONMENTAL CONSULTANTS

KOALA MANAGEMENT PLAN

BLACK ROCKS ESTATE

POTTSVILLE

SEPTEMBER 2003

A REPORT TO BLACK ROCKS ESTATE PTY. LTD.
(FORMERLY POTTSVILLE DEVELOPMENT CORPORATION PTY. LTD.)

Brisbane Office
Suite 2, 1404 Logan Road
MT GRAVATT CENTRAL QLD 4122
PH: 07 3349 5666

Head Office
PO Box 490
ALSTONVILLE NSW 2477
PH: 02 6628 6778

Sunshine Coast Office
E-mail: sunshine@jwarren.com.au

PH: 0419 232 581

1.0 Introduction

1.1 BACKGROUND

A 1986-87 survey of Koalas (*Phascolarctos cinereus*) within New South Wales (Reed *et al* 1988) identified the North Coast of NSW as one of the richest Koala sites in the State. It concluded that *"the Koala population in New South Wales has suffered major contraction in range since European settlement and will contract further, as remaining localities continue to be modified by land clearing, fire, continued stocking and urban expansion."*

Furthermore Phillips (1990), states that the locality where most Koalas are found (ie. the northern coastal region of NSW), seems destined for intensive urban expansion and tourist development over the next decade which will clearly pose a direct threat to the Koalas in this area.

An assessment of the provisions of State Environmental Planning Policy No. 44 (Koala Habitat Protection) indicated that the site supports potential Koala habitat, and may support Core Koala Habitat. There is therefore a statutory requirement for the preparation of a Koala Plan of Management.

1.2 THE SUBJECT SITE

The Subject site is the Black Rocks Estate at Pottsville (**FIGURE 1**).

1.2.1 Site Vegetation and Koala Feed Trees

The Subject site and surrounding area is characterised by several vegetation types including;

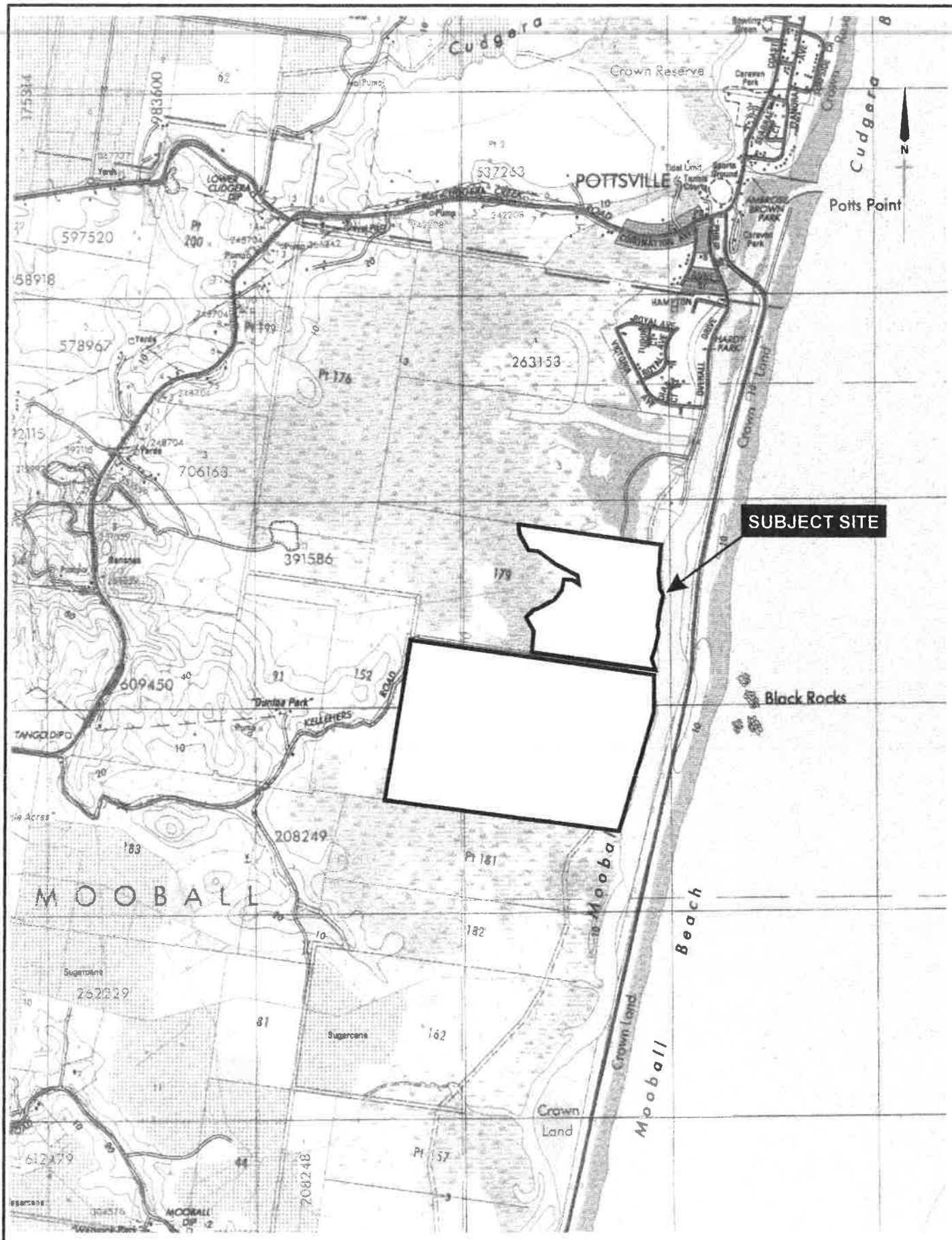
- Swamp Sclerophyll forests
- Tall Wet Sclerophyll and rainforest
- Tall Dry Sclerophyll Forest
- Mixed Mid-high Regrowth forest
- Estuarine Communities
- Sedgeland, Grassland and Fernland

A vegetation plan for the Subject site and surrounding area is included as **FIGURE 2.**

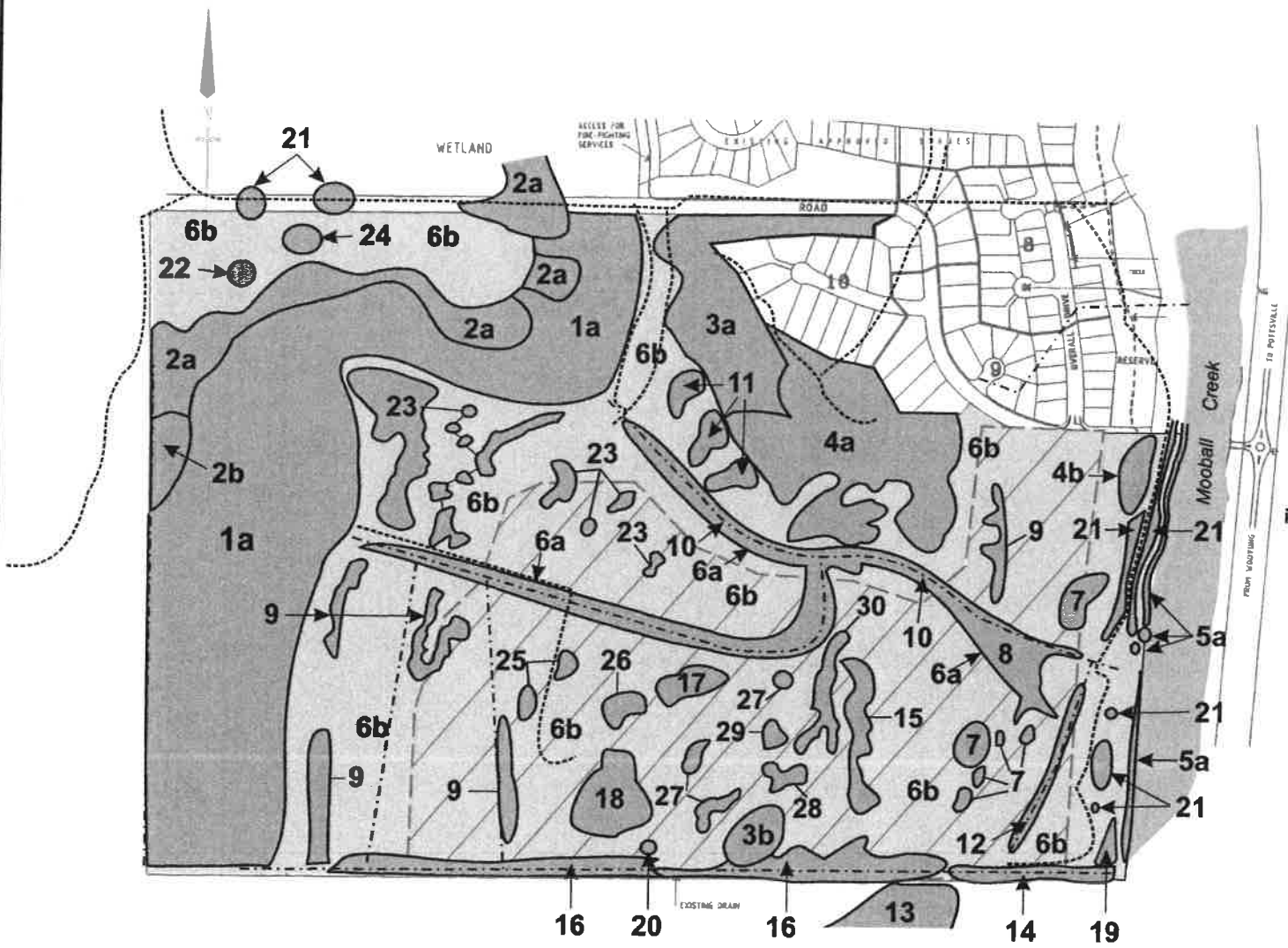
The majority of preferred Koala feed trees present in the Study area are restricted to the central dunal ridge in the tall dry forest communities. This area includes Secondary Class A Koala Habitat (Phillips and Callaghan 1996), with the primary feed tree Forest Red Gum (*E. tereticornis*) and Secondary Class B Koala Habitat with the primary feed tree Swamp Mahogany (*Eucalyptus robusta*). These trees showed low signs of usage.

1.2.2 Important Proximate Habitat

The most significant habitat in the locality occurs within the Pottsville wetlands. This area connects to the north of the Subject site and contains extensive area of Secondary Class B habitat and Primary Habitat (Phillips



SOURCE: Pottsville Topographic Map SCALE: 1 : 25 000 @ A4 JAMES WARREN & ASSOCIATES PTY LIMITED Environmental Consultants	CLIENT Ardill Payne & Partners PROJECT Koala Management Plan Black Rocks Estate Kellehers Road, Pottsville Shire of Tweed	**FIGURE 1** PREPARED: VJA DATE: 01 October 2003 FILE: 98049-kmp-locality.cdr	TITLE **LOCALITY PLAN**



LEGEND - GENERAL

Area proposed for rezoning

Existing drain or swale

Existing track

LEGEND - KEY TO VEGETATION ASSOCIATIONS

1a Tall Open Swamp Sclerophyll Forest (*Melaleuca quinquenervia*). Also includes Clumps 11 & 13.

2a Tall Closed Wet Sclerophyll Forest (*Lophostemon confertus*)

2b Tall Closed Subtropical Rainforest (*Archontophoenix cunninghamiana* and mixed species)

3a Tall Dry Sclerophyll Woodland (*Eucalyptus tereticornis +/- Corymbia intermedia*)

3b Tall Dry Sclerophyll Woodland (*Eucalyptus robusta*) Also includes Clumps 20, 26, 27, 28 & 29.

4a Mid-high Closed Forest (Mixed regrowth)

4b Mid-high Open Forest (*Banksia integrifolia +/- Casuarina glauca*) Also includes Clumps 7, 8, 10, 15 and 30.

5a Low Closed Forest (*Aegiceras corniculatum* with emergent *Avicennia marina* var. *australasica*)

6a Mid-high Mixed Tree Species with Sedgeland / Rushland / Fernland in and around drains. Also includes species found in Clump 1

6b Open Grasslands with scattered trees

and Callaghan 1996). To the north of the Subject site Pottsville wetlands is severed by an infrequently used dirt road (Kellehers Road). At present this road is considered unlikely to represent a major barrier to Koala movement given a very low traffic volume and the presence of scattered trees on both sides.

A wetland area to the south-east of the Subject site also provides Koala habitat. This area is very tenuously linked to the Subject site by scattered trees. Although significant numbers of Koalas are unlikely to move through the subject site from this area, occasional movements may occur.

1.3 THE NEED FOR A KOALA MANAGEMENT STRATEGY

In order to assess the impact of the development on Koala population and/or habitat, it is necessary to address a number of criteria. These criteria are the same as those contained in SEPP 44. Detailed site analysis showed that the study area contains potential Koala habitat. More than 15% of the trees in the upper strata of the site vegetation were those species listed in Schedule 2 of the policy (i.e. Forest red gum and Swamp mahogany). The site may support Core Koala habitat as defined by the policy.

Recent research on the Koala (e.g. Lee *et al* 1990, Lunney *et al* 1990, Reed *et al* 1990), has provided a state-wide context on which to base such local Koala Management Plans/Strategies. Key points include:

Within New South Wales, Koalas are now recognised as a Vulnerable species under the recently enacted Threatened Species Conservation Act. The Koala has been included in Schedule 2 for the following reasons:

- Koala population and distribution has been severely reduced.
- Recovery potential is considered poor.
- Threatening processes are considered to be severe.
- Koalas are ecological specialists, feeding principally on the leaves of particular eucalypt species.
- Most of the states remaining Koalas occur as a series of fragmented populations in the north coast region, from the Hunter River to the New South Wales border.
- Koalas appear largely dependent on areas of fertile soils and either high rainfall or adequate soil moisture. The majority of such lands have already been cleared for agriculture or settled at densities which eventually eliminate Koalas.
- Only 24% of Koala sightings obtained by the 1986-87 New South Wales Koala Survey were in National Parks, Nature Reserves or State Forests (Reed *et al* 1988). The majority were on private lands in New South Wales, where their conservation is a community concern and the responsibility of which falls largely with local government.

2 MANAGEMENT PLAN RATIONALE

The Subject site has been assessed as supporting core Koala habitat as defined in SEPP 44 - Koala Habitat Protection. The overall percentage of Schedule 2 feed trees in the upper or lower strata of the tree components is greater than 15%. There is therefore a requirement for the preparation of a Koala plan of management.

The matters addressed in this Koala plan of management include, but are not restricted to:

1. An estimate of Koala population size.
2. Identification of preferred feed tree species for the locality and extent of resource available.
3. An assessment of the regional distribution of Koalas and the extent of alternative habitat available to compensate for that to be affected by the actions.
4. Identification of linkages of core Koala habitat to other adjacent areas of habitat and movement of Koalas between areas of habitat, including provision of strategies to enhance and manage these corridors.
5. Identification of major threatening processes such as disease, clearance of habitat, road kill and dog attack which impact on the population as well as provision of methods for reducing these impacts.
6. Provision of detailed proposals for amelioration of impacts on Koala populations from any anticipated development within zones of core Koala habitat.
7. Identification of any opportunities to increase size or improve condition of existing core habitat, this should include lands adjacent to areas of identified core Koala habitat.
8. The plan should state clearly what it aims to achieve (for example, maintaining or expanding the current population size or habitat area).
9. The plan should state criteria against which achievement of these objectives is to be measured (for example, a specified population size in a specific time frame or the abatement of threats to the populations).
10. The plan should also have provisions for continuing monitoring, review and reporting. This should include an identification of who will undertake further work and how it will be funded.

3 MANAGEMENT PLAN ANALYSIS

3.1 ESTIMATION OF THE SIZE OF THE KOALA POPULATION

The Subject site forms part of a relative continuous band of vegetation stretching from the southern portions of the Subject site north into Pottsville Wetlands. The local population of Koalas is considered to be those occurring between the Subject site and those in the adjacent Pottsville Wetlands.

Gilmore *et al* (1985) describes a number of vegetation communities in the Pottsville Wetlands which contain the primary Koala feed trees Forest Red Gum and Swamp Mahogany. These communities are likely to provide high quality habitat for Koalas. Many of the remaining communities also contain species of secondary importance (as described by Phillips and Callaghan, 1996). Phillips and Callaghan (1996) map most of the Pottsville Wetlands as secondary Koala Habitat Class A Habitat. It was determined that Secondary Class Habitat supports between 0.08 and 0.16 Koala/hectare (*ibid*). The Pottsville Wetlands may therefore support between thirty (30) and sixty (60) Koalas.

The subject site supports 6-8 hectares of secondary Koala habitat and based on these density estimates may currently support between one (1) and three (3) individuals.

3.2 PREFERED FOOD TREE SPECIES

Phillips and Callaghan (1996) found the following species to be utilised on Quaternary alluvials and sands on the Tweed Coast (**TABLE 1**).

TABLE 1

TREE SPECIES UTILISED BY KOALAS ON QUATERNARY ALLUVIALS AND SANDS - TWEED SHIRE.

Common Name	***Scientific Name***
Pink Bloodwood	*Corymbia intermedia*
Tallowwood	*Eucalyptus microcorys*
Swamp Mahogany	*Eucalyptus robusta*
Scribbly Gum	*Eucalyptus signata*
Forest Red Gum	*Eucalyptus tereticornis*
Swamp Mahogany x Forest Red Gum	*Eucalyptus patentrinervis*
Coast Banksia	*Banksia integrifolia*
Cypress Pine	*Callitris columellaris*
Forest Oak	*Casuarina glauca*
Willow Bottlebrush	*Callistemon salignus*
Blueberry Ash	*Eleocarpus reticulatus*
Brushbox	*Lophostemon confertus*
Swamp Box	*Lophostemon suaveolens*
Broad-leaved Paperbark	*Melaleuca quinquenervia*
Flax-leaved Paperbark	*Melaleuca linariifolia*

The AKF (1995) found that nineteen species of trees (8 species of Eucalypt and 11 non Eucalypt) were used by the Searanch Koala population. Amongst the Eucalypts, Tallowwood, Swamp Mahogany and Small-fruited Grey Gum were found to be most heavily utilised. Of the non Eucalypts, Swamp Oak was most significant, whilst Broad-leaved Paperbark and Brushbox were also used to lesser degrees.

WWC (1996) surveys within the locality and including the Black Rocks site, found that Koalas showed preference for the following feed trees.

- Forest Red Gum (*Eucalyptus tereticornis*)
- Grey Gum (*E. punctata*)
- Swamp Mahogany (*E. robusta*), and
- Tallowwood (*E. microcorys*)

These surveys (WWC 1996) also found that secondary browse species used by the local population include:

- Pink Bloodwood (*Corymbia intermedia*)
- White Mahogany (*Eucalyptus acmenoides*)

JWA (2000) found that Koalas at the Kings Forest site north of Pottsville utilised the following species preferentially:

- Swamp mahogany (*E. robusta*)
- Swamp turpentine (*L. suaveolens*)
- Scribbly gum (*E. racemosa*)
- Broad-leaved paperbark (*M. quinquenervia*)

Detailed field survey at the Subject site revealed that the Koalas are preferentially selecting both Swamp Mahogany (*Eucalyptus robusta*) and Forest Red Gum (*Eucalyptus tereticornis*). Both species showed signs of low to moderate use in the Subject site, although most evidence was found in the north of the Subject site in areas dominated by Forest Red Gum. Tallowwood (*Eucalyptus microcorys*) was not found to be utilised, although this species occurs at very low densities, and hence may not be a true reflection of usage patterns of these species.

3.3 REGIONAL DISTRIBUTION AND CORRIDORS

3.3.1 Regional Distribution and Extent of Alternate Habitat

The Koala may occur at densities of up to 10 animals per hectare in some coastal woodlands (Lee and Martin 1988).

There are large areas of known Koala habitat in the locality. To the immediate northwest of the Subject site lies Pottsville Wetlands, which is dominated by Secondary Class B habitat with patches of Primary habitat (Phillips and Callaghan 1996). This area is linked to habitat in Koala Beach by a narrow corridor.

The population is unlikely to be uniformly distributed throughout the Subject site and Pottsville Wetlands. However, the narrow connection between this area and habitat further north, is likely to be used by transient and dispersing individuals.

It is estimated that there is between 100 and 150 hectares of suitable Koala habitat within a five kilometre radius of the site. The proposed development will see the removal of 0.5 hectares of Koala habitat constituting 0.003% of the total available habitat within the locality. This habitat will be replaced by larger regeneration area adjacent to the SEPP 14 Wetland on the Subject site. However, it is important to note that it will be several years before feed trees in this habitat are sufficient in size to support Koalas.

3.3.2 Corridors

A popular approach to the management of Koalas in northern New South Wales is to establish corridors by suitable tree planting programs to link areas with existing Koala populations. Previous studies of movement and habitat use (e.g. Robinson and Russell 1978; Martin 1983 and 1985; Hindell *et al* 1985) have concentrated on the animals themselves and on food-tree preferences but no clear picture exists of the requirement for effective corridors (Moon 1988).

Eberhard (1978) and Gall (1980) separate populations of Koalas into three groups: residents, nomads and dispersing young. Upon reaching maturity (1-2 years) the young may remain for a time within the colony, even persisting until their third year (Eberhard 1978), but they usually disperse and become nomads. They may travel many kilometres (Gall 1980). This is the group which would most depend upon adequate corridors.

Gall (1980) found that three dispersing Koalas had moved distances of 1, 4 and 11 km and were capable of ranging widely. Sometimes animals go for random wanders (Smith 1979) and may disappear from a colony for a time (Gall 1981).

Individual animals show different food-tree preferences (Hindell *et al* 1985) and attachment to a single tree is common. Site attachment is strong in resident Koalas (Smith 1979) and home ranges may consist of about 15 suitable trees of which three or four are regularly browsed (Eberhard 1978). Many available trees of a preferred species are never used (Robinson and Russell 1978). In some areas Koalas may prefer a single species (Moon 1988).

The distribution of vegetation in the locality indicates that Koala movements are likely to occur predominantly in a northerly direction. Movements to a small patch of Secondary Class B habitat to the south of the Subject site may occur, but are likely to be limited.

The Subject site is considered likely to represent the southern limit for the majority of Koala movements in the locality. However, movements to the south may occur and should be considered. North of the Subject site

provides good quality habitat for Koalas and links between this and the Pottsville wetlands will not to be affected by the development.

Major barriers to movement of Koalas in the locality are the Kellehers and Pottsville-Mooball Road, Mooball Creek and large areas of Agricultural land, particularly to the south and west of the Subject site.

3.4 THREATENING PROCESSES

A number of environmental pressures have been identified as having a significant impact on Koala populations in eastern Australia (Phillips 1990). These include:

(a) Habitat Removal/Modification

In a paper submitted for Koala Summit - Managing Koalas in New South Wales, Reed *et al* (1988) identify habitat loss as the key problem for the long-term survival of Koalas.

A 1986 survey of the distribution of Koalas (*Ibid*) revealed that the majority of Koalas occurred on the North Coast of New South Wales, although their distribution west of the Great Divide and in the southern portion of the state was extensive but highly fragmented. The relatively widespread distribution 'masks' the significant losses of Koala habitat since European settlement and reflects the preferential selection of tree species by Koalas. The preferred species typically are restricted to higher nutrient soils of which substantial portions have been converted to farmland and residential development.

The increase in population of coastal areas in particular, has caused a habitat conflict with Koalas. The removal of high quality Koala habitat to accommodate development forces Koalas to occupy sub-optimal habitat and causes fragmentation of core populations and reduces dispersal options.

(b) Bushfire

Koalas are sedentary animals and not especially mobile and therefore, stand little chance of surviving large-scale bushfires. Generally fires restricted to the leaf-litter and the shrub layer of the forest are not fatal to Koalas however Phillips (1990) notes that removal of the shrub layer (e.g. as a result of a fire), has the effect of discounting many of the insectivorous birds from the area and thus allowing foliage-eating insects such as Christmas Beetles, to place pressure on the food trees used by Koalas.

Regeneration of fire-affected areas is typically slow and they may remain unsuitable for Koalas for several (at least 5) years.

(c) Drought

The effects of drought are most likely to be felt by Koala populations living in the more arid areas west of the Great Dividing Range. In general, however, drought causes loss of leaves and loss of leaf quality, which can deleteriously impact upon Koala populations.

(d) Vehicular Collisions

The impact of motor vehicles on Koalas nation-wide is clearly significant although virtually impossible to quantify (Phillips 1990). The construction of roads through Koala habitat or between habitat areas forces Koalas to regularly cross roads as part of their natural foraging behaviour in dispersing.

(e) Dog Nuisance

Koalas moving between habitat areas sometimes encounter domestic dogs. The prevalence of Koala injuries and deaths resulting from altercations with dogs is growing and, in urban areas and adjoining forest habitat, individual or packs of uncontrolled dogs have a serious impact on Koala populations.

(f) Disease

Disease may be a major threat to the Pottsville Koala population. Animals most at risk are those which occupy disturbed or isolated habitats which are subject to human related disturbance. Many animals within the population occupy quality habitat subject to minimal disturbance. However, Koalas occurring in more fragmented habitats (such as the northern portions of the site) are likely to be highly stressed.

At various times, most of the above mentioned threatening processes could impact on the Koala population(s) in the Black Rocks locality.

4 MANAGEMENT STRATEGIES

4.1 MANAGEMENT STRATEGIES

The following processes are likely to be threats to the continued survival of the population in the Black Rocks Estate area:

- Disease
- Dog attack
- Vehicle collisions
- Upgrading the arterial road network
- The continuing fragmentation and destruction of remaining habitat

Management strategies for the Subject site have considered these threats and a number of additional risks for Koalas associated with the urban environment. All recommendations are consistent with the previous Koala Management plan for the area (WWC 1996 as amended by James Warren & Associates in 1999).

4.1.1 Exclusion Fencing

Koalas should be discouraged from entering developed areas where fatalities due to vehicle collision, drowning and dog mauling are possible. This may be achieved by:

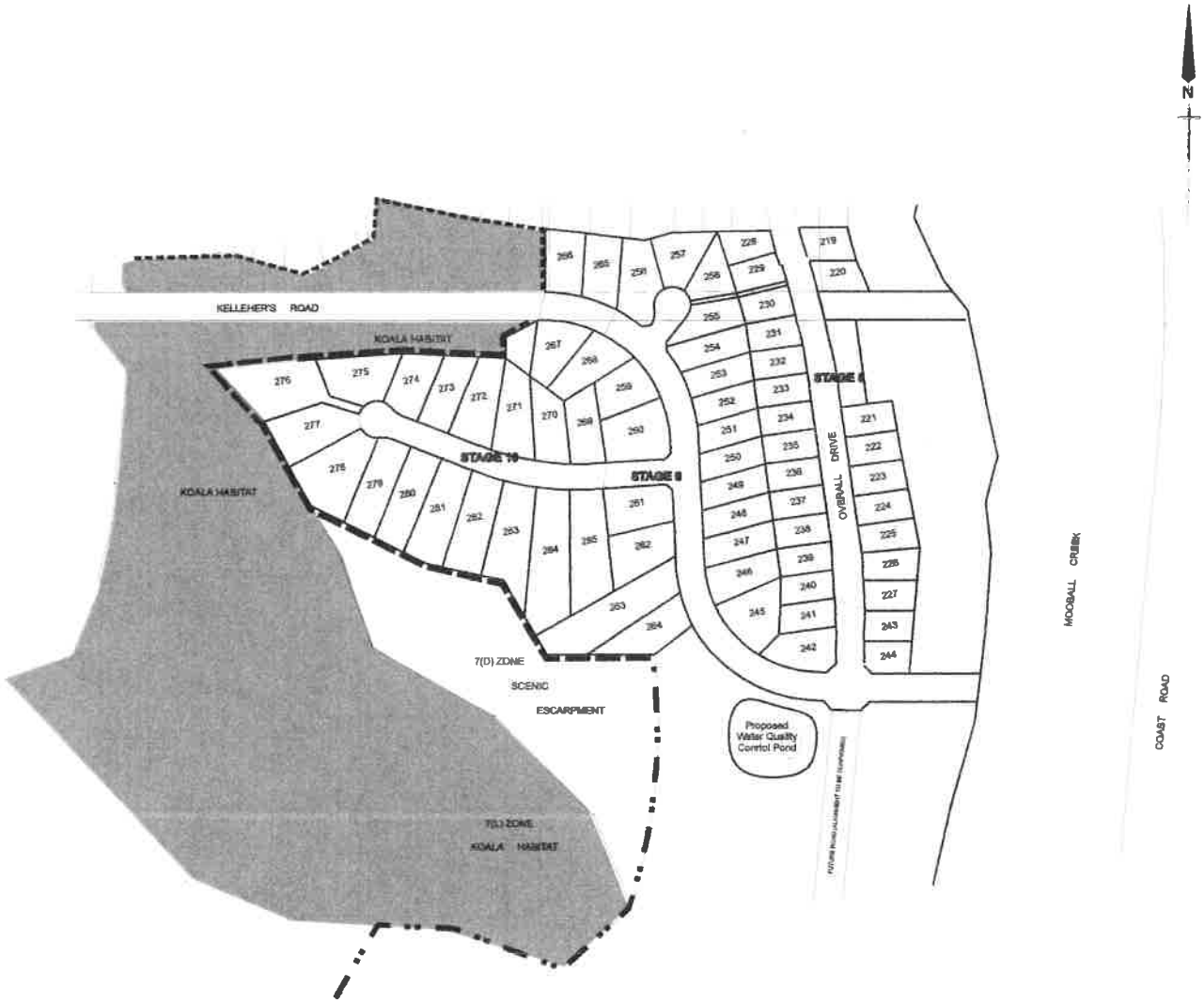
Recommendation 1: All areas of Koala habitat should be separated from residential areas by a Koala proof fence. Consequently a continuous fence should be constructed between the development, and

- the east-west corridor regeneration area (along the southern drain)
- SEPP 14 Wetland No. 54 and the 30 metre regeneration area
- Land currently zoned Koala Habitat along the central dunal ridge that currently supports communities dominated by Forest red gum.

The location of the Koala proof fence is shown as **FIGURE 3**. There is a break in the Koala fence at Kelleher's Road to allow access to the Black Rocks Estate from the west.

It is considered that the likelihood of Koalas entering Stages 8-10 through the break in the Koala fence at Kelleher's Road is minimal due to the low levels of Koala activity recorded in forested areas on the western side of the proposed Koala fence line in Stage 10 and the fact that there will be no Koala food trees within the development area.

Mature koalas with established home ranges are unlikely to roam into the developed area of the Black Rocks Estate. Dispersing juveniles roam more widely in search of a home range. It is possible, though unlikely, that a wandering juvenile may enter the development area from Kelleher's Road.



Existing koala habitat

Existing koala fence

Proposed koala fence to be completed as part of the current proposal

Proposed koala fence to be completed as part of future rezoning proposals

SOURCE: Base: Ardill Payne & Partners Dwg No. P.01 Issue B File BR8910 SCALE: 1 : 5000 @ A4 *JAMES WARREN & ASSOCIATES PTY LIMITED* *Environmental Consultants*	CLIENT Ardill Payne & Partners PROJECT Koala Management Plan Black Rocks Estate Kellehers Road, Pottsville Shire of Tweed	**FIGURE 3** **PREPARED: VJA** **DATE: 01 October 2003** **FILE: 98049-kmp-koala_fence.cdr**	TITLE **KOALA FENCE**

There is no evidence that Koalas have recently accessed existing stages of the Black Rocks Estate despite their being no Koala fencing on the southern boundary near Kellehers Road.

In the unlikely event a Koala does enter the residential area, it should be able to climb the Koala fence at the rear of individual lots from the development side as there is no tin sheeting along the base of this side of the fence and in the future any Koala fencing will be of the same construction.

Recommendation 2: No Koala feed trees should be planted within any residential area.

4.1.2 Swimming Pools

All pools with smooth straight sides provide a risk to Koalas. Although Koalas are good swimmers, without any means of climbing out of the pool (gently sloping surface, rope, hose or ladder) they may become exhausted and drown.

All swimming pools should be suitably fenced to exclude Koalas.

4.1.3 Fences

Koalas are able to climb most surfaces, however, fences with smooth surfaces (eg. metal) can act as a barrier to ease of movement. Koalas may be trapped against such barriers by domestic dogs.

There will be a gap in the Koala fence at Kelleher's Road to allow traffic through. Any Koalas entering the development area via Kellehers Road will be able to climb the exclusion fence from the development side to re-enter habitat areas to the west. Aggressive breeds of dogs will be banned and all dogs will be strictly controlled.

Recommendation 3: Koala-proof fencing should be installed as shown in **FIGURE 3** to prevent entry of Koalas into developed areas of the Black Rocks Estate.

4.1.4 Traffic and Signage

The construction of roads adjacent to Koala habitat may result in increased mortality due to vehicular collisions. As Koalas will be excluded from the development envelope it is considered that traffic controls/restrictions are not required within the Black Rocks Estate.

Traffic along Kelleher's Road does represent a threat to Koalas moving through habitat areas to the west of the developed areas of the Black Rocks Estate.

Recommendation 4: Two signs should be erected along Kelleher's Road to warn motorists of Koalas crossing the road. Traffic speeds should be limited to 50km/hr where Koala habitat occurs adjacent to Kellehers Road.

4.1.5 Fire

Koalas are sedentary animals and not especially mobile and therefore, stand little chance of surviving intense bushfires. The aims of strategies should be a reduction in the fire risk to Koalas (ie. reduction in the potential for high intensity fires).

Recommendation 5: A fire management plan should be prepared in liaison with the NPWS and Council's Fire Control Officer, in order to ensure that the plan meets the standards for both human and Koala protection.

4.1.6 Habitat loss/Habitat enhancement

The forested portions of the site are known to be utilised by Koalas. Removal of preferred browse species from these areas constitutes a loss of known habitat.

Recommendation 6: Any Koala food trees lost as a result of development on the Black Rocks Estate should be replaced by seedlings planted in suitable areas on the western side of the Koala proof fence.

All tree seedlings should be planted at a minimum of three (3) metre centres. All seedlings to be fertilised with a general N:P:K fertiliser at the time of planting only. Plants are to be watered regularly (twice per week in Spring and Summer) for a period of three (3) months.

The aim of embellishment plantings should be to ensure that there is no net loss of Koala habitat.

Koala feed trees must be carefully monitored to ensure that they are not being overgrazed, and actions taken to protect them to maturity should evidence of overgrazing be found.

All embellishment plantings should be planted immediately after consent so that they are near sustainable usage size as soon as possible.

4.1.7 Dogs

The most effective method of reducing dog attacks on Koalas is considered to be through the promotion of responsible dog ownership.

Recommendation 7: There is some potential for any Koalas entering the site to be attacked by dogs. Cats are not known to attack Koalas.

It is not practical to allow traffic along Kellehers Road while, at the same time, preventing domestic animals from using Kellehers Road to access forested areas. It is therefore recommended that:

- The 88B instrument include a clause that only small dogs be allowed to be kept as pets by residents. All dogs should be contained within fenced boundary lots or enclosures and on a leash at all times when outside of any developed lot. No dogs of the following breeds (including part breeds) be allowed: German Shepherd, Doberman, Rottweiler, Bull terrier and Pit bull terrier.
- Cats be totally prohibited from the development.

It is considered that, even if a Koala does enter the Stage 9 & 10 area, the banning of large aggressive breeds and the containment of smaller dogs within a lot should ensure that the Koala is highly unlikely to be killed or injured.

Recommendation 8: Dog owners should be made aware of their responsibilities under the Dog Act (1966), and the penalties which may be imposed if the act is breached.

Recommendation 9: Signs on Kellehers Road should be erected to make users of Kellehers Road aware that Koalas occur in the vicinity of the site. This may encourage responsible management practices.

4.1.8 Research and Monitoring

One objective of this plan of management is to ensure that a reduction in the Koala population does not occur as a result of the proposed development. Monitoring of Koala activity is required to determine the effectiveness of management strategies. It is considered that the area proposed to be rezoned at present may support up to one animal. The home ranges of these animals may be affected by the proposed development.

Land to the north of the Subject site is likely to support a more substantial population and individuals from this area may currently range into the area proposed to be rezoned.

Recommendation 10: All tree plantings will require management for a number of years to ensure their survival and to ensure that Koalas do not destroy them by overgrazing immature plants. An assessment should be made after three (3) years to determine if further maintenance of seedlings is required.

Recommendation 11: James Warren & Associates should make observations at appropriate times every twelve (12) months for three (3) years to assess the breeding status of the Koalas occurring in SEPP 14 Wetland No. 54 and the adjacent Koala Habitat Area. Reports should be provided to Council and they should keep records of any monitoring activity.

4.1.9 Protection of Koalas during construction

Koalas may be harmed or killed during site clearing or other construction activities.

Recommendation 12: James Warren and Associates should complete pre-clearing surveys for Koalas. Surveys will need to be undertaken prior to installation of the exclusion fence to determine if Koalas are present in the construction zone. If so, the animals should be relocated to conservation zones.

5 MANAGEMENT PLAN OBJECTIVES

The objectives of the management plan are:

- To ensure that the proposed development does not significantly affect areas of habitat known, or likely to be important for the local Koala population.
- To ensure there is no reduction in Koala numbers resulting from the development.
- To ensure that activities generated as a result of the proposed development (e.g. additional traffic, introduction of dogs) do not significantly impact on the local Koala population.
- To embellish, by way of planting preferred feed trees, the habitat value of the land surrounding the area proposed for rezone.
- To ensure that movement corridors for the local Koala population are maintained or improved.

The criteria against which the objectives and amelioration measures can be measured are:

Objective	Amelioration
Conservation of Koala population	For Council to agree with and approve management strategies outlined in this document
Embellish the habitat value of the site.	Any Koala food trees lost as a result of development on the Black Rocks Estate should be replaced by seedlings planted in suitable areas on the western side of the Koala proof fence.
Monitoring of usage in retained habitat	Formal searches should be undertaken by James Warren & Associates in retained habitat for females with back young every twelve (12) months for at least three (3) breeding seasons following development.
Assessment of adverse impacts on Koala population	Information on all dead or injured Koalas should be forwarded to the local office of NPWS.

6 REFERENCES

Australian Koala Foundation (1995) "Koala Management Study for Goonellabah and East Lismore".

Eberhard, I.H (1978) "Ecology of the Koala in Australia" *In*: The Ecology of Arboreal Folivores. Smithsonian Institution Press, pp315-328.

Gall, B.C (1980) "Aspects of the Ecology of the Koala in Tucki Tucki Nature Reserve, NSW" Aust.Wildl.Res. 7, 167-176.

Gilmore, A. M., Milledge, D and Hogan, F. (1985) "Environmental Study of Wetland South of Pottsville NSW - Wildlife Survey"

Hindell, M.A. et al (1985) "Tree species selection by free-ranging Koala populations in Victoria" *Aust.Wildl.Res.* **12**, 137-144.

James Warren (2000), Species Impact Statement for Proposed Kings Forest Development. A report to Narui Gold Coast.

Lee, A.K et al (1990) "The Biology of the Koala" Surrey Beatty and Sons.

Lee, A. and Martin, R.(1988) "The Koala: a natural history". NSW University Press, Kensington.

Lunney, D et al (1990) "Proceedings of the Koala Summit held at the University of Sydney November 1988" NSW National Parks and Wildlife Service.

Martin, R.W. (1983) "Food Preference, Defoliation and Population Decline in a Population of Koala at Walkerville, Victoria".

Moon, C (1988) "Koala Corridors - A Case Study from Lismore", in Koala Summitt Managing Koalas in NSW. National Parks and Wildlife Service.

Phillips, S. & Callaghan, J. (1996) Tweed Coast Koala Habitat Atlas.

Phillips, W (1990) "Koalas The Little Australian We'd All Hate to Lose" Australian National Parks and Wildlife Service.

Reed, P.C. et al (1988) "A 1967-87 Survey of the Koala, *Phascolarctos cinereus* in New South Wales and an Ecological Interpretation of its Distribution" A Paper presented to the Third Symposium on the Biology of the Koala, Melbourne February 1988.

Reed, P.C., Lunney, D. & Walder, P. (1990) " A 1986-1987 survey of the Koala *Phascolarctos cinereus* (Goldfuss) in New South Wales and an ecological interpretation of its distribution". In Biology of the Koala. Lee A.K, Handasyde K.A. and Sanspn G.D (ed) pp55-74. Surrey Beatty & Sons, Sydney.

Robinson and Russell (1978) "The Koala in South Australia" In: the Koala - Proceedings of the Taronga Symposium.

Smith, M.T.A (1979) "Notes on reproduction and growth in the Koala" *Aust. Wildl.Res* **6**, 5-12.

Woodward-Clyde (1996) "Koala Management Plan - Black Rocks Estate" For Pottsville Development Corporation Pty Limited.