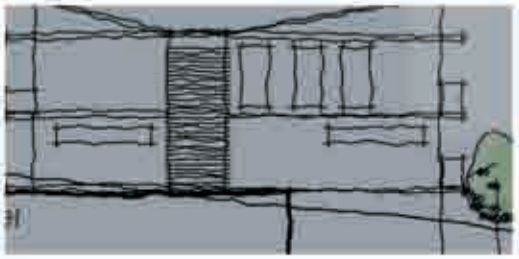
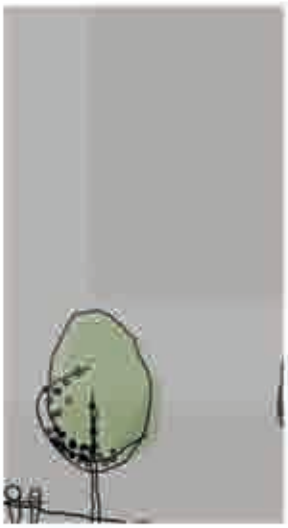
PLANIT CONSULTING

Gateway Planning Proposal

Request to Rezone
Part Lot 2 DP 828280
Tweed Valley Way,
Mooball NSW






Prepared by Planit Consulting - September 2012

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Review and Amendments Schedule – PLANIT CONSULTING PTY LTD

		Date
Author	BL	September 2012
Reviewer	AS	September 2012

Amendments

The content of this report was prepared for the exclusive use of the proponent to accompany a planning report and associated request to rezone.

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Planit Consulting Pty Ltd declares that it does not have, nor expect to have, a beneficial interest in the subject project.

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September 2012

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Part 1.0 – Introduction & Site Context

Planit Consulting have been engaged by R&S Harnett to prepare a planning report associated with a request to rezone Part Lot 2 in DP 828280 (referred to herein as 'the site'), located at Tweed Valley Way, Mooball, as depicted within the aerial extract below.

Figure 1 – Aerial Photograph – Source; Tweed SC GIS Mapping

1.1 Regional Context

The site is located directly adjacent to the southern perimeter of the existing Mooball village on Tweed Valley Way. The village of Mooball is located towards the southern fringe of the Tweed Shire local government area. Some of the key features of the region include (but not limited to):

- It is well serviced by the Pacific Highway, providing regional access to Byron Bay and the Gold Coast.
- Mooball is located approximately 25 kilometres (20 minute drive) north of Byron Bay, 20 kilometres (15 minute drive) to Murwillumbah and approximately 30 kilometres (30 minute drive) to Coolangatta / Gold Coast airport.
- Coolangatta is the major commercial, institutional and entertainment centre servicing the region.

- Murwillumbah currently services the subregion with a range of commercial, retail, health, educational, civic and community services and facilities.
- The region is expected to experience significant population growth over the next 25 years.

1.2 Local Context

Mooball is an inland village centred upon the intersection of Tweed Valley Way and Pottsville-Mooball Road. The site is located on the southern side of Tweed Valley Way to the west of the existing Mooball village as depicted within **Figure 1 – Aerial Photograph.**

The village of Mooball comprises of small scale residential development and local services including a hotel, general store/video/newsagent, butcher, post office, cafe/gallery, bottleshop, real estate agent, hairdresser, laundromat, hardware store and mechanic/smash repairs. Community services and recreation facilities are located within the neighbouring village of Burringbar including a community hall, a pre-school, a sports club and playing fields.

Access to Mooball is provided via Tweed Valley Way (the old Pacific Highway) which links Murwillumbah to Pacific Highway bypass. Pottsville Road provides access to the north, linking Tweed Valley Way with the coastal towns of Pottsville, Bogangar, Hastings Point and Kingscliff.

Mooball is located in close proximity to the coastal areas of the Tweed and Byron Shires offering a range of lifestyle opportunities for future residents.

Given its positioning within the local and regional context and the physical characteristics of the site, it is considered to be well suited for urban and rural residential development. The subject site represents a natural extension of the Mooball village in keeping with Tweed Shire Councils Urban Release Strategy (**Figure 2 – Tweed SC Urban Release Strategy – Area 9**).

Figure 2 – Tweed SC Urban Release Strategy – Area 9

1.3 Background to Request to Rezone

A brief summary of the relevant background information relating to the site is provided below:

- The Tweed Shire Urban Land Release Strategy 2009 identified the site as a 'release area' for 'short term' residential development, adopted in April 2009.
- The Burringbar Scoping Study (2005), undertaken by GHD, was commissioned by Tweed Shire Council and identifies a portion of the site as being capable for future development due to it being '*relatively unconstrained in relation to bushfire, slope and flood and representing a natural continuation of the Mooball Township'.* Notwithstanding this, we note that the Burringbar Scoping Study was prepared as a high level document using GIS mapping. This proposal and supporting specialist studies provides a more detailed site specific analysis which clearly establishes the capability of the remaining area of the site.
- Council strategic officers have acknowledged the previous studies supporting the expansion of Mooball, however recognised the existing servicing constraints and specifically sought to maintain the 'Tweed Valley' character associated with these villages in any future urban release.

- Preliminary investigations of the site's opportunities and constraints have concluded that the subject site is relatively free of constraints and is land that can be developed for residential and rural residential purposes.
- This analysis has also shown that there are steeper sections of the site and vegetated areas that should not be developed. These areas have been preserved and enhanced within the preparation of the detailed masterplan in order to improve the visual and environmental qualities of the site and scenic area in which Mooball is situated.
- The construction of a privately funded on-site Sewerage Treatment Plant (STP) gained in principle support from Tweed Shire Council at a Council meeting held Tuesday 16 November 2010. The subject site is proposed to be serviced by this same STP.

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Part 2.0 – Site Description

The following section provides for a legal description of the site and identifies existing site attributes and ownership arrangements.

2.1 Site Description

The subject site is legally described as Lot 2 DP 828280 and is more commonly referred to as No. 5993 Tweed Valley Way, Mooball. The site is located on the periphery of the Mooball village and south of Tweed Valley Way (See **Fig. 1**).

2.2 Current Zoning

The site is zoned predominately part 1(a) Rural and part 2(d) Village pursuant to the provisions of the TLEP 2000. A zoning extract from the TLEP 2000 has been reproduced below:

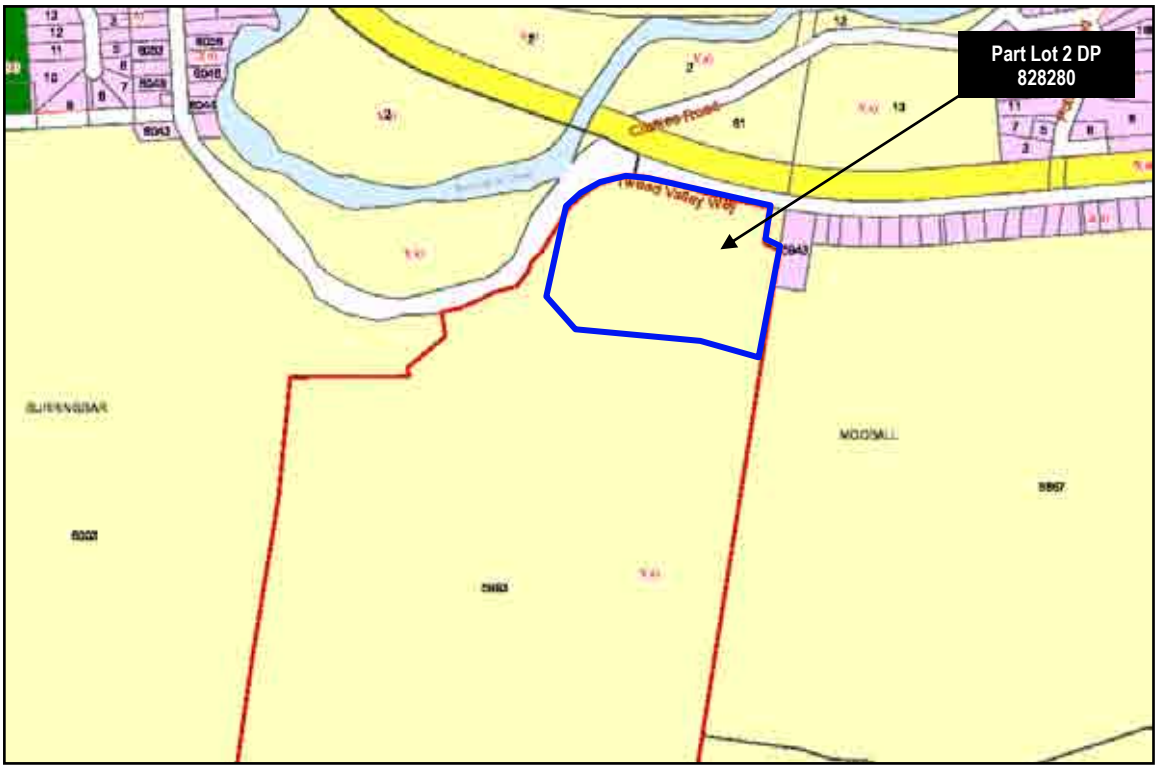

Figure 3 – Land Use Zoning – Source; Tweed SC GIS Mapping

2.3 Key Features

The following key features of the site and immediate surrounds are summarised below:

- The site is under single control.

- The site possesses a total area of 60.31ha, with the subject site Part Lot 2 possessing an area of 5.077 hectares.
- The site currently accommodates a single dwelling, a packing shed and machinery shed.
- The site has historically been used for agricultural purposes, including cattle grazing and banana cultivation; however the site is not classified as 'prime agricultural land'.
- Due to the history of grazing, the subject site is substantially cleared of vegetation. The residue area is substantially vegetated to the south west and southern perimeter of the site.
- Primary access is granted from Tweed Valley Way.
- The site compromises of a gently undulating landscape that rises generally from north to south up to a steep ridgeline which exists along the southern boundary of the site.
- A natural drainage line exists through the central portion of the site.
- The site has significant visual connections to the surrounding landscape setting with local rural views across agricultural land and expansive district views from the main ridgelines of the site.
- The surrounding land uses comprise the village to the northeast and agricultural properties to the east, west and south.

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Part 3.0 – Constraints and Opportunities Analysis

The following section outlines Constraints and Opportunities in relation the suitability of the site to be redeveloped in a residential nature.

3.1 Constraints

The following constraints have been identified for the site:

- The site is currently not connected to reticulated water and sewerage however appropriate servicing is to be achieved (as discussed below) at the cost of the proponent.
- Potential impacts on adjoining residential properties to the northeast. Future development will need to respect the existing interface with these properties and the general character of the area.
- Potential traffic impacts on the local road network given the intended population increase. Access for the proposed future development on the site has been designed to minimise any potential traffic impacts by way of integrating with key existing facilities.
- Potential visual impacts within the landscape, given the natural slope and elevation of parts of the site. Particular attention has been given to the elevated areas of the subject site in order to protect the existing visual amenity when viewed from the surrounding area.
- Land with a high degree of slope, located primarily in the southern and eastern portions of the site. Preservation of these areas has been proposed in order to minimise land degradation and protect the scenic quality of the site. Further detail in relation to topographic design responses can be found within Section 4.0 of this report.
- Part of the site in the south west contains remnant vegetation communities which have been retained as part of the redevelopment proposal. Camphor laurels that are evident on-site will be removed. The stand of hoop pines in the south western portion of the subject site is to be retained.
- Parts of the site in the south west and southern perimeter are identified as Bushfire Prone Land. As a result the applicable bushfire planning controls have been used to ensure safety and mitigate any potential bushfire risks.

3.2 Opportunities

An analysis of the site and immediate surrounds identified the following key development opportunities:

- Given the single control of ownership and the significant size of the property, the part site has been able to be masterplanned in a coordinated and integrated manner.
- The site directly adjoins existing urban footprint providing opportunities for an orderly and economic expansion of the village.
- The land directly east of the subject site is currently under Council assessment for rezoning purposes and this development will dovetail with the proposed road and infrastructure layout.

- The site provides an opportunity for increased population growth without the impacts usually associated with coastal towns or areas.
- Private Investment of the provision of sewer and water required to facilitate the development of the site.
- The site is not classified as 'prime agricultural land'.
- The site is substantially cleared of vegetation; all of the Hoop Pines on-site will be retained.
- A large portion of the site is unconstrained by bushfire, slope and flooding.
- The road design and engineering detail provides for minimal impact upon the existing lay of the land and will not be detrimental to the Mooball ridgeline.
- The site is within 5 minutes walking distance to the Mooball village.
- There is potential to provide increased housing choice and lifestyle opportunities to reflect local demand, providing both urban and rural residential allotments.
- A significant amount of vegetation to be retained and pest species (predominantly camphor laurels) will be removed from the site.
- Potential to improve the riparian environment on the site, including water quality, by providing appropriate species along drainage lines, the removal of weed species and the stabilisation of banks.
- The previous studies undertaken by specialist consultants support the use of the site for urban and rural residential purposes.
- The site is identified as a 'short term' release area within Councils Residential Land release strategy.
- The site is identified as a 'release area' within the Burringbar Scoping Study prepared by GHD for Tweed Shire Council.
- The Far North Coast Regional Strategy provides an opportunity for the site to be considered for urban development as it is located within the Burringbar-Mooball 'inland village' and is consistent with the Sustainability Criteria contained in the Strategy.

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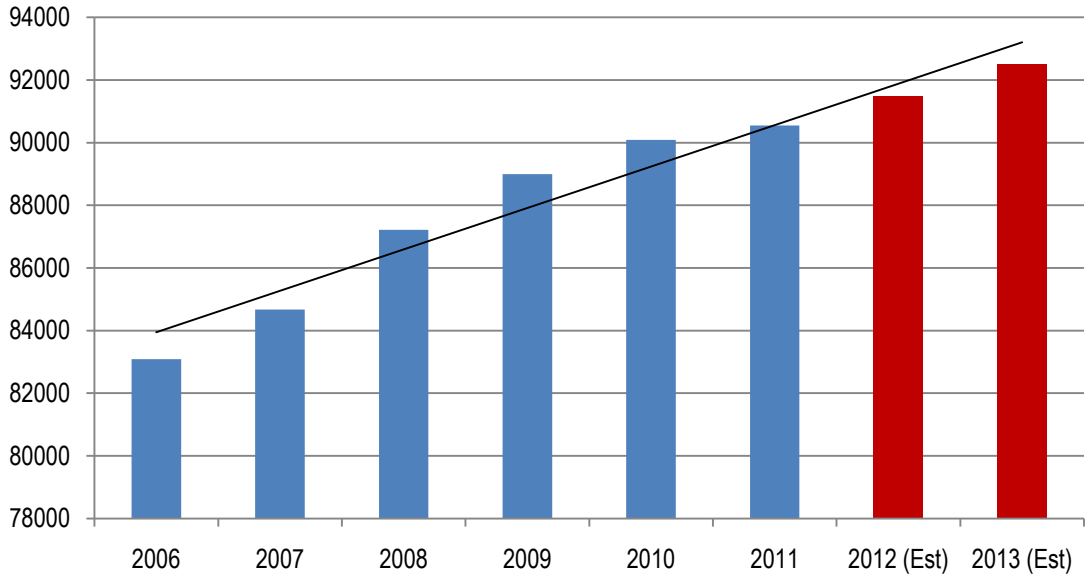
Part 4.0 – Site Suitability & Design Response

In order to demonstrate that the site is capable of accommodating urban and rural residential development, consideration has been given to a number of key issues. These are outlined and addressed in the following subsections of this report.

4.1 Population Growth

The Tweed Shire has experienced steady population growth over the past 6 years and this trend looks set to continue into the future (See **Table 1**). As a result of these increasing population numbers, the Tweed Shire must ensure that suitable sites for residential land release are made available for public purchase. The subject site represents a logical expansion of the existing village and will breathe life back into the Mooball Township, which has suffered in terms of both trade and population since the Pacific Highway was realigned as a bypass.

Tweed Shire LGA Total Population 2006 - 2011



The proposed rezoning site would yield a total of 32 lots of varying shapes and sizes. The release of the land for residential use would ensure that ample single dwelling land parcels are available within the Tweed property market that would cater for the continued growth of population.

4.2 Essential Services

Cozens Regan Williams Prove Engineering has undertaken a preliminary wastewater and water supply investigation to establish the anticipated service levels required by the proposed development of the site (See **Appendix C – Engineering Design Report**). The key findings of this report are provided below:

- There is minimal water and no sewer infrastructure available to service the development. On-site water and sewer infrastructure will therefore be required. It is proposed that the Sirex facility as part of PP10/007 will provide the necessary water and sewer infrastructure for the development.
- Water connection to the site can be provided from Tweed Shire's Sleepy Hollow Reservoir. The subject site will need to have its own reservoir to supply the Peak Instantaneous Demand on the site. The development will be serviced by a suitably sized potable reticulation system fed by the new reservoir. The potable water network will be complimented by a recycled water reticulation network.
- The proposed development will dovetail with adjacent planning proposal area which is to be serviced by the total package wastewater treatment plant. In keeping with this, the appropriate infrastructure will be incorporated so that this plant services the entire land release. Please refer to **Appendix C – Engineering Design Report** which describes the proposal and the facilities to be provided.

As a result of these findings and recommendations, the Sewerage Treatment Plant (STP) as part of 10/007 is proposed to service the site as illustrated within the **Concept Masterplan** (**Appendix A**). This is seen to be a unique but appropriate servicing arrangement, which is proposed to be located within the north-east corner of the adjacent site, in order to minimise any potential effects that may arise from its operation.

It is to be noted that existing access and drainage easements, which are identified within **Appendix A**, are proposed to be relocated to be within proposed road reserves or other appropriate areas.

4.3 Flooding, Drainage and Stormwater

Cozens Regan Williams Prove Engineering has undertaken a preliminary investigation of the flooding, drainage and stormwater constraints affecting the site. Further detail is included within **Appendix C – Engineering Design Report**.

A summary of the key findings is provided below:

- There is a main drainage path running through the site which will be used to drain to the northern boundary of the site for proposed discharge.
- The existing infrastructure will need to be upgraded to accommodate the extra flows generated by the increase in impervious areas of the site, or the peak developed flows from the site will need to be limited to the same as the existing flows.
- The required stormwater detention volumes can be attained within the open spaces of the development site.
- A number of stormwater quality management measures are able to be implemented into the proposed development to assist in treating stormwater runoff.
- The proposed water sensitive urban design strategy for the development involves the collection of stormwater from the roofs of the proposed residential allotments for storage in water tanks for domestic non-potable use.

The retention of stormwater will be provided to compensate for the increased runoff caused by the proposed development to ensure a 'zero impact' on the downstream recipients is maintained.

An additional point to note from the finding of this report is that a detailed flooding analysis will need to be carried out as part of the rezoning process for the site in order ensure zero flooding impacts upon the surrounding area as a result of the proposed development.

The findings of this report have been considered and incorporated within the **Concept Masterplan** (**Appendix A**).

These design responses to the existing environmental attributes of the site are considered to be appropriate and ensure the natural features of the site are successfully incorporated into the overall land use proposal.

4.4 Ecology

Planit Consulting have undertaken a **Preliminary Ecological Assessment** for the site which assesses the potential impact of the intended development on the ecological systems of the area and recommends potential measures to retain significant habitats on the site. In this regard, please see **Appendix D - Preliminary Ecological Assessment.**

A summary of the key finding of this assessment is provided below:

'Following a review of the existing vegetation and habitats it is considered that the site is primarily of low ecological significance and thus has few ecological constraints to future development. The next phase of the scoping exercise should be undertaken in association with other disciplines (i.e. hydraulic, geotechnical, land-use planning etc) to ensure through a reiterative design process that final development designs do not encroach into areas identified as warranting retention investigation.'

The findings and recommendations within the report have been incorporated into the overall development layout. For example the prominent trees (Hoop Pines) and existing vegetation communities are to be retained upon the site as identified within the **Concept Masterplan** (**Appendix A**).

4.5 Traffic and Access

Access to the site is proposed at the north eastern corner of the subject site via Tweed Valley Way. A turning lane arrangement is proposed as demonstrated within **Appendix E – Traffic Impact Assessment**.

A Traffic Impact Assessment was undertaken to assess the suitability of the proposed urban development in relation to traffic and access. The assessment found that by using capacity analysis techniques, the proposed access from Tweed Valley Way will operate satisfactorily for the foreseeable future. The increased demand as a result of the proposed development will result in minimal delays and vehicle queuing on all approaches and movements.

The assessment also concluded that the existing road system is able to cater for the traffic demands of the proposed urban development and that the proposed internal road network and open space provisions facilitate safe and efficient travel paths for pedestrians and cyclists. This **Traffic Impact Assessment** is attached within **Appendix E** of this proposal.

4.6 Bushfire

Pursuant to Tweed Shire Council's Bushfire Prone Lands map, the site and land immediately adjoining the site contains Bushfire Prone Land. As a result, Planit Consulting have undertaken a **Preliminary Bushfire Risk Assessment** which provides an assessment of the vegetation, slope and bushfire hazard affecting the site. This assessment recommends measures required to satisfy the bushfire protection requirements for a residential development (See **Appendix F**).

The assessment considers the bushfire risk for the site to be low and unlikely to greatly affect or limit the potential for the proposed residential development. The proposal satisfies the Planning for Bushfire Protection Guidelines 2006 and there are no constraints which would prevent the Rural Fire Service from issuing their concurrence to enable the development to proceed at the appropriate time.

4.7 Acid Sulfate Soils

The site is mapped as containing no Acid Sulfate Soils pursuant to Council's online mapping. In this regard, Acid Sulfate Soils are not deemed a constraint to the development potential of the site.

4.8 Site Contamination

SEPP 55 provides a state wide planning approach to the remediation of contaminated land. This policy aims to promote the remediation of contaminated land for the purpose of reducing the risk of harm to human health or any other aspect of the environment. Contaminated land is constrained for certain types of development.

The proponent and long term landholder has produced a **SEPP 55 Statutory Declaration**, attached within **Appendix B**, which states the following:

'The property legally referred to as Lot 2 DP 828280,
No. 5993 Tweed Valley Way, Mooball has not been subject to any uses that under the provisions of State Environmental Planning Policy No. 55 would cause detriment or contamination to the soil profile of the site or on any of the surrounding properties.
The site has not been used for the storage of any hazardous chemicals, intensive agriculture, banana farming or cattle dipping. The site has only been used for cattle grazing.'

The site is not considered to have been put through any uses that would result in potential site contamination.

We provide the following preliminary contamination assessment in accordance with *SEPP 55 – Remediation of Land*.

We confirm the following details of the property:

Address: Part Lot 2 in DP 828280 and more commonly known as No. 5993 Tweed Valley Way, Mooball NSW

Lot Size: 60.31ha (Part Lot 2 - 5.077ha)

History: The site has previously been used for cattle grazing as per the attached **Statutory Declaration** contained within **Appendix B.**

Proposed development: Rezoning for residential purposes.

A contaminated site checklist has been prepared for the Part Lot and is provided in the table below:

Checklist Parameters	Description
Describe all land uses and activities to which the site has been put, including the current use.	The site has previously been and is currently used as grazing land for cattle. No further uses have been noted by the proponent.
Is the proponent aware of the uses to which properties adjoining the site have been put? If so, please specify.	Please see above and attached **Statutory Declaration** within **Appendix B.**
Do any of the current or past uses correlate with the potentially contaminating activities set out in the ANZECC/NHMRC "Guidelines for the Assessment and Management of Contaminated Sites"?	No.

If the answer to question 3 is yes has there been any testing or assessment of the site and, if so, what are the results?	N/A.
Are you aware of any contamination on the site?	No.
Has any remediation work been taken in respect to contamination, which is or may have been present on the site? (Carried out voluntarily or ordered by government agency)	No.

Summary

The information provided above is consistent with the requirements of SEPP 55 – Remediation of Land. The results of this desktop assessment indicate that the subject property has not been subject to any potentially contaminating activities listed under Table 1 of the NSW Contaminated Lands Planning Guidelines or as set out in ANZECC/NHMRC *"Guidelines for the Assessment and Management of Contaminated Sites"*.

Given the above it is highly unlikely that the site would pose a risk of contamination to the proposed development of the site and the proposal is considered to be consistent with the relevant provisions of both Clause 39 of TLEP 2000 and SEPP No.55.

4.9 Cultural Heritage

Everick Heritage Consultants have undertaken a **Preliminary Cultural Heritage Assessment** of Indigenous and non-Indigenous cultural heritage upon the site, which can be found under **Appendix G**. A summary of the key findings from this assessment are provided below:

- No Aboriginal Objects or Places were identified within the Project Area.
- No areas were identified that were considered reasonably likely to contain Potential Archaeological Deposits (PADs).
- Consultation with the Tweed Byron LALC identified no places of cultural (spiritual) significance.
- No items of historic heritage significance were identified within the Project Area.

In turn, it is considered that the proposal will not compromise items of cultural or heritage significance.

4.10 Landscape and Visual Amenity

Parts of the site are visible from Tweed Valley Way, the Pacific Highway and from land to the north. In particular, the ridgeline which exists along the southern perimeter of the site is visible and represents a significant feature in the landscape. As such, the masterplan has had specific regard to the elevated areas to protect the visual amenity of the site, particularly when viewed from areas located outside of the site. This will also be addressed further through the implementation of site specific design controls.

The retention of existing significant vegetation communities on the site, together with the provision of appropriate landscaping treatment will protect and further enhance the visual amenity of the site.

In this regard a **Visual Analysis** has been undertaken an incorporated within the concept masterplan found under **Appendix A – Concept Masterplan**.

4.11 Compatibility with Surrounding Land Uses

The use of the site for residential purposes is considered to be compatible with the established land uses surrounding the site, as summarised below:

- The site lends itself to residential development due to its location and connectivity to the existing Mooball village, large areas of cleared land and undulating topography with a semi-rural character.
- The proposed use of the site for residential purposes is considered to be more compatible with the adjoining land uses than that of the current use of the site. This is due to the potential conflicts between the village and any intensive agricultural uses currently permitted on the site.
- It provides for a range of future housing types that are foreseen to integrate with the existing urban village and will respect the scenic quality of the site when viewed from adjoining land.
- There are no identified constraints on the site or on adjoining sites that render the proposed use unsuitable for the site.

Design responses extrapolated from the NSW DPI '*Living and Working in Rural Areas'* have been incorporated into the design of Concept Masterplan in order to mitigate any potential for land use conflict upon the site. The implementation of agricultural and conservation buffers is proposed in order to mitigate the risk of land use conflict with these adjoining properties.

4.12 Community Facilities and Open Space

The site is located within walking distance of the Mooball village and conveniently located adjacent to Tweed Valley Way which provides direct access to Burringbar and Murwillumbah. Burringbar provides some local community services and facilities, including, but not limited to:

- Community Hall.
- Pre-school.
- Sports club.
- Playing fields.

Additionally community services and facilities are provided in the nearby subregional centre of Murwillumbah. Murwillumbah provides for a range of community services and facilities, including, but not limited to:

- Health
- Education
- Recreation
- Cultural
- Community development.

The proposed **Concept Masterplan (Appendix A)** portrays that the proposal provides for adequate open space provisions for future residents. As previously discussed above, approximately 52% of the site is being retained by way of dedication to Rural Landscape, Environmental Conservation or Public Recreation. More specifically, the 'Circulation' plan within Appendix A, demonstrates that approximately 95% of allotments are within 400m radius from Public Open Space Recreational Parks.

Specifically, please refer to the Recreational Public Open Space sheet within Appendix A. This sheet provides close detail of the most northern proposed recreational park, whilst the associated cross section identifies individual components such as the retention of trees, on-grade slides, shelters and a playground, which together demonstrates an efficient and effective space that is sympathetic to the natural topography of the site.

A further pertinent point to note is that the overall development allows for potential for required community facilitates to be constructed upon the site, such as a child care facilities, which will in turn prove to be a benefit to the immediate and surrounding communities.

In summary, the design of the proposal provides for:

- Adequate access to community services and facilities,
- Adequate and practicable open space provisions for future residents, and
- Potential for additional community facilities to be development on site.

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Part 5.0 – Justification for Proposal (Gateway Assessment)

5.1 Objectives of the Planning Proposal

The primary objective of this planning proposal is to provide evidence to support the notion of rezoning the subject site as per that proposed within the zoning plan found under **Appendix A**.

5.2 Justification for the Planning Proposal

5.2.1 Is the planning proposal a result of any strategic study or report?

Yes. The planning proposal is a result of and is supported by the following strategic studies, strategies and reports:

Tweed Shire Urban Land Release Strategy 2009:

The Urban Release Strategy was adopted by Council and endorsed by the Director of Planning as a direction for urban growth in the region. The Strategy identifies a number of villages as being appropriate for expansion for rural residential purposes.

In this respect, Mooball and more specifically the majority of the site is identified as a 'short' term urban release area, as identified within **Figure 2.**

The strategy also identifies an 80% yield for this area, which can be seen within the below excerpt.

Potential Urban Locality	Gross Area (ha)	Net Area (ha)	Approximate Years supply (@ 56.5 ha per yr shire wide demand)	Timing for commencement of rezoning	Comment
Mooball (Area 9)	46	37	0.65	Short Term	Assumes 80% of land will yield lots

Tweed Strategic Plan 2004-2024:

This plan sets broad directions as to how Council will go about managing the Shire over the next 20 years. One of the key Strategic Directions in relation to managing rural change is stated in Section 6 the Strategy, which states: *Suitable villages will be identified for possible expansion linked to provision of improved infrastructure and services. Locality plans will be to guide such expansion. Burringbar-Mooball will be given high priority.*

Burringbar Scoping Study 2005:

The scoping study was undertaken by GHD and commissioned by Tweed Shire Council. It identifies the subject site as being capable for future development due to it being '*relatively unconstrained in relation to bushfire, slope and flood and representing a natural continuation of the Mooball Township'*. Notwithstanding this, we note that the Burringbar Scoping Study was prepared as a high level document using GIS mapping. This report and supporting specialist studies provide a more detailed site specific analysis which clearly establishes the capability of the remaining area of

the site. In this regard, please refer to **Appendix A**, whereby a development Masterplan has been prepared taking into consideration all relevant constraints upon the site.

Feedback from Councils Strategic Planning Officers:

Council strategic officers have acknowledged the previous studies supporting the expansion of Mooball, however it was also acknowledged that the existing servicing constraints and specifically sought to maintain the 'Tweed Valley' character associated with these villages in any future urban release.

Detailed reports have also been prepared to address the issues raised by Tweed Shire Council's Planning Reform Unit.

Engineering Design Report: Appendix C – produced by Cozens Regan Williams Prove

Preliminary Ecological Assessment: Appendix D – produced by Planit Consulting

Traffic Impact Assessment: Appendix E – produced by CRG

Preliminary Bushfire Risk Assessment: Appendix F – produced by Planit Consulting

Cultural Heritage Assessment: Appendix G – produced by Everick Heritage Consultants

Community Benefit Statement: Appendix H – produced by Planit Consulting

5.2.2 Is the planning proposal the best means of achieving the objectives or intended outcomes, or is there a better way?

The proposed LEP amendment is the most appropriate method to ensure that the lands highest and best use is achieved. To ensure that this occurs in a timely fashion the gateway process is the best suited planning mechanism.

5.2.3 Is there a net community benefit?

A net community benefit will be achieved as the proposal will provide residential land and a meaningful contribution to the dwelling targets required to be achieved by Tweed Shire Council in fulfilling the objectives of the Regional Strategy. Additionally, the proposal will benefit the community by way of contributions paid as a result of the development of the subject land, which will be allocated to a wide range of services and community facilities. A **Community Benefit Statement** has been prepared and is attached within **Appendix H.**

5.2.4 Relationship to strategic planning framework

Is the planning proposal consistent with the objectives and actions contained within the applicable regional or sub – regional strategy (including the Sydney Metropolitan Strategy and exhibited draft strategies)?
Far North Coast Regional Strategy

The Far North Coast Regional Strategy was adopted by the Minister for Planning in January 2007. The purpose of the Regional Strategy is to manage the region's expected high growth rate in a sustainable manner. The Regional Strategy aims to protect the unique environmental assets, cultural values and natural resources of the region while ensuring the future planning maintains the character of the region and provides for economic opportunities. The strategy indicates that, future growth will be managed by preventing the spread of coastal development, thereby ensuring adequate land is available and appropriately located to sustainably accommodate the projected housing, employment and environmental needs of the region's population over the next 25 years.

The following Sustainability Criteria allows Government to take a strong position in relation to matters of urban settlement in the Far North Coast, confident in the knowledge that development proposal can still be considered even though they be outside of the regional strategy process. The Sustainability Criteria represent a clear, transparent list of matters that any new proposal will be assessed against.

Therefore, please find below an assessment of the proposal in relation to the Sustainability Criteria:

Sustainability Criteria	Response
1. Infrastructure Provision Mechanisms in place to ensure utilities, transport, open space and communication are provided in a timely and efficient way.	Utilities and communication services are available from the adjacent established urban area to the northeast of the subject site. The connection and establishment of these services will be at the cost of the proponent. In terms of open space, we believe adequate open space is proposed within the overall development. The adjoining lands are currently under planning proposal for residential development. As the adjacent site is considerably larger than the subject, the lack of open space and park provisions is deemed to be offset by the satisfactory parks to be developed nearby.
2. Access Accessible transport options for efficient and sustainable travel between homes, jobs, services and recreation to be existing or provided.	Tweed Valley Way (formally Pacific Highway) possesses capacity to facilitate the proposal. As concluded within the **Traffic Impact Assessment** (**Appendix E**) the proposed road network and open space provisions facilitate safe and efficient travel paths for pedestrians and cyclists. Connectivity is optimized through minimal use of cul-de-sac streets. Footpaths will be provided along all internal roads, with the exception of access laneways, in accordance with Council's requirements.
3. Housing Diversity Provide a range of housing choices to ensure a broad population can be housed.	The proposal will provide for and facilitate a range of housing choices that will in turn ensure a broad population can be housed. Additionally the proposal assists in achieving increasing the much needed housing stock within the Far North Coast.

4. Employment Lands Provide regional/local employment opportunities to support the Far North Coast's expanding role in the wider regional and NSW economies.	The proposal would provide for construction, development and property related jobs for skilled workers within the Far North Coast. The proposal would see job creation related to approval, construction, sales and ongoing maintenance of the proposed development in turn creating employment and assisting to achieve the subregional employment projections.
5. Avoidance of Risk Land use conflicts, and risk to human health and life, avoided.	The proposal mitigates the potential for land use conflict as it will integrate with the existing Tweed Local Environmental Plan 2000 and the directly adjacent urban land. The proposal is not on land identified as flood prone or on lands at risk of land slip. The proposal is supported by a **Preliminary Bushfire Risk Assessment** which details the design measures and controls used to reduce the risk of bushfire attack. Further detail of this report can be found within **Appendix F.**
6. Natural Resources Natural resource limits not exceeded/environmental footprint minimised.	Due to the size and scale of the proposal, it will not place unacceptable demand upon the natural environment and resources nor will it place unacceptable pressure on infrastructure capacity. In this respect, the most sustainable practices would be incorporated into the development of the site. Additionally, the site is not identified as significant agricultural land.
7. Environmental Protection Protect and enhance biodiversity, air quality, heritage, and waterway health.	The proposal sees no removal of significant flora and fauna. Camphor Laurels which are evident throughout the Mooball area will be removed as part of the future works and the Hoop Pines on-site will be protected and retained. A **Preliminary Ecological Assessment** has been prepared and is attached within **Appendix D**.
8. Quality and Equity in Services Quality health, education, legal, recreational, cultural and community development and other government services are accessible.	The subject lands are within close proximity to a public and private school, recreational facilities within surrounding suburbs such as Burringbar. Additionally the subject site is located within reasonable proximity to health, legal and cultural services within the Tweed

	region.

The relevant aims of the strategy are:

- *Limit development in places constrained by coastal processes, flooding, wetlands, important farmland, and landscapes of high scenic, cultural and conservation value.*
- *Protect the coast from overdevelopment by identifying a 'Coastal Area' (generally land east of the Pacific Highway) which limits the spread of urban development by reducing additional future housing within this area. (This will ensure a more even spread of population across the Region and assist in strengthening the growth of non-coastal towns and centres.)*
- *Provide appropriately located rural residential opportunities around existing settlements (excluding the Coastal Area).*
- *Encourage growth of non coastal towns and villages by identifying potential lands for new housing and industry to boost local economies without compromising environmental values or quality of life.*

These aims have been implemented within the **Concept Masterplan** which can be viewed within **Appendix A.**

Given that the site is located in the non-coastal area and the proposal is consistent with the Sustainability Criteria of the Strategy, the land can be re-zoned for urban and rural residential purposes under the provisions of the FNCRS.

5.2.5 Is the planning proposal consistent with the local council's Community Strategic Plan, or other local strategic plan?

At its meeting of 17 March 2009, Council resolved to adopt the Tweed Urban and Employment Lands Release Strategy 2009. The subject land is located within an existing urban area and in this respect deemed to be consistent with the provisions of this strategic plan.

The 4/24 Strategy replaces and updates the Tweed Shire 2000+ Strategic Plan. It sets broad directions for the next two decades and provides a framework for more detailed plans and policies. It applies to the whole Tweed Shire. The purpose of Tweed 4/24 is to:

- To update the Tweed 2000+ Strategic Plan and strengthen arrangements for implementation;
- To guide sustainable growth and change;
- To safeguard the Tweed's quality of life and environment;
- To enable all key players (Council, other government agencies, businesses and community organizations) to work together in achieving shared goals; and
- To assist Council in setting priorities in its Management Plan and budget.

The proposal is considered not to compromise the envisaged outcomes of Tweed 4/24 and therefore it is considered consistent with Councils strategic documents.

5.2.6 Is the planning proposal consistent with applicable state environmental planning policies?

State Environmental Planning Policies – SEPPs

The following SEPPs are applicable to this proposal:

SEPP - North Coast Regional Environmental Plan

NB. As of 1 July 2009, regional environmental plans (REPs) are no longer part of the hierarchy of environmental planning instruments in NSW. The removal of the REP layer was intended to simplify the State's planning system. The North Coast Regional Environmental Plan is now deemed to be a SEPP. Notwithstanding, given the title remains, the contents of the NCREP 1988 (in the context of this proposal) are addressed below.

Clause 20 requires that a rural land release strategy be prepared by Council prior to the rezoning of any rural residential or small holding development. In this respect, it is argued that due to the size and scale of proposed rezoning (5.077 hectares) and additionally the residential nature of land directly adjoining the subject site, the rezoning would be seen as a minor amendment to the LEP and in turn a rural land release strategy would not be deemed necessary in this instance.

The clause goes on to state that in identifying land suitable for rural housing, any such strategy is to give preference to areas which:

(a) are physically capable of supporting rural housing, and
(b) are close to existing settlements which already have services and community facilities, or can otherwise be efficiently and economically serviced, and
(c) are physically suitable for septic disposal, and
(d) are not required or likely to be required for future urban expansion of existing settlements, and
(e) do not comprise prime crop or pasture land, and
(f) are not subject to significant environmental hazard, and
(g) are not of significant value for the conservation of wildlife.

In this respect, the subject site satisfies the above requirements through its location, topography, proximity to infrastructure and services and proposed rural zoning pursuant to the Draft TLEP 2010.

Clause 58 requires consideration, within the context of any proposal to make a Draft LEP, to consider the efficient usage and or augmentation requirements of services including water, sewer, public transport, pedestrian facilities and cycleways. It is considered that the intent of this clause will be clearly considered and met within the detail contained within any future rezoning submission/development application.

The request to rezone the subject lands is considered able to be undertaken in a manner consistent with the SEPP - North Coast Regional Environmental Plan.

SEPP 44 Koala Habitat Protection

The planning proposal for the site will not remove any trees listed within the SEPP as koala food trees. Only camphor laurels will be removed as part of the site establishment. A **Preliminary Ecological Assessment** has been undertaken which assesses the potential impact of the development (See **Appendix D**). This report assesses the ecological systems in the surrounding area and recommends measures to retain any significant habitats on the site.

These findings have been implemented within the **Concept Masterplan** which can be viewed within **Appendix A**.

SEPP 55 Remediation of Land

SEPP 55 provides a state wide planning approach to the remediation of contaminated land. This policy aims to promote the remediation of contaminated land for the purpose of reducing the risk of harm to human health or any other aspect of the environment. Contaminated land is constrained for certain types of development.

The proponent and long term landholder has produced a **SEPP 55 Statutory Declaration**, attached within **Appendix B**, which states the following:

'The property legally referred to as Lot 2 DP 828280, No. 5993 Tweed Valley Way, Mooball has not been subject to any uses that under the provisions of State Environmental Planning Policy No. 55 would cause detriment or contamination to the soil profile of the site or on any of the surrounding properties. The site has not been used for the storage of any hazardous chemicals, intensive agriculture, banana farming or cattle dipping. The site has only been used for cattle grazing.'

The site is not considered to have been put through any uses that would result in potential site contamination. As a result, no further contamination assessment is considered to be required.

5.2.7 Is the planning proposal consistent with applicable Ministerial Directions (s.117 directions)?

The proposal is consistent with all relevant Section 117 directions. This is addressed in the table below:

117 Direction	Is it relevant?	Is proposal consistent?	Comments
1.1 - Employment & Resources	The objectives of this direction are to encourage employment growth in suitable locations & protect employment land in business and industrial zones, & support the viability of identified strategic centres.	Yes	The proposal to increase densities upon the subject site will strengthen the viability of the nearby commercial centres due to the close proximity of the subject site to employment lands and industrial zones.
1.3 – Mining Petroleum and Extractive Industries	The objective of this direction is to ensure that the future extraction of State or regionally significant reserves of coal, other minerals, petroleum and extractive materials are not compromised by inappropriate development.	Yes	No known extractive industries have been undertaken upon the site. No mineral deposits are known to exist on the subject property.
1.5 – Rural Lands	The objective of this direction is to protect the agricultural production value of rural land and to facilitate the orderly and economic development of rural lands for rural and related purposes. This direction applies to planning proposals where land in a rural zone is affected.	No. Non-compliance and justification is cited within the direction.	The site is identified as part of the Tweed SC Urban Release Lands (Area 9) and will not have a significant impact upon the remainder of the allotment or the capacity for the surrounding allotments to be used for agricultural purposes.

2.1- Environment Protection Zones	The objective of this direction is to protect and conserve environmentally sensitive areas.	Yes	The proposal would not result in the disturbance of any environmentally sensitive lands.
2.2 - Coastal Protection	The objective of this direction is to implement the principles in the NSW Coastal Policy.	Yes	The proposal in no way comprises the objectives of the NSW coastal policy. The site is not within the Coastal Zone.
2.3 - Heritage Conservation	The objective of this direction is to conserve items, areas, objects and places of environmental heritage significance and indigenous heritage significance.	Yes	There are no apparent items of heritage on the site as concluded within the **Cultural Heritage Assessment** attached within **Appendix H.**
3.1 - Residential Zones	The objectives of this direction are to encourage a variety and choice of housing types to provide for existing and future housing needs, to make efficient use of existing infrastructure and services and ensure that new housing has appropriate access to infrastructure and services, and to minimise the impact of residential development on the environment and resource lands	Yes	The proposal will facilitate an increase in housing choice within the locality while having minimal impact on the environment. The proposal incorporates a number of different lot sizes and shapes. The large lot sizes are due to the slope constraints of the site and are not specifically designed for medium density development. Notwithstanding this the proposed 2(d) zoning is a broad zone and there would be potential for purchasers to erect duplex and multi dwelling development with Council's support.
3.2 - Caravan Parks and Manufactured Home Estates	The objectives of this direction are to provide for a variety of housing types, and to provide opportunities for caravan parks and manufactured home estates.	Yes	While it is unlikely the site will be developed or is suitable for such an estate the proposed zoning does not preclude such a development.

3.3 - Home Occupations	The objective of this direction is to encourage the carrying out of low-impact small businesses in dwelling houses.	Yes	The proposed zonings will allow home occupations.
3.4 - Integrating Land Use and Transport	The objective of this direction is to ensure that urban structures, building forms, land use locations, development designs, subdivision and street layouts achieve the certain planning objectives relating to access, transport and the like.	Yes	The site is well located and within proximity to existing commercial and residential areas. The proposal will have access to efficient transport, cycle options and the like. The subject site will be interconnected with the adjacent planning proposal area to the east. Pedestrian, cycle and vehicle connectivity is outlined within **Appendix A – Concept Masterplan.**
4.4 - Planning for Bushfire Protection	The objectives of this direction are to protect life, property and the environment from bush fire hazards, by discouraging the establishment of incompatible land uses in bush fire prone areas, and to encourage sound management of bush fire prone areas.	Yes	Council's Bushfire Prone Lands Map identifies the south and south western portions of the site as Bushfire Prone Land. As such, an assessment of the requirements of the Planning for Bushfire Protection guidelines has been undertaken (See **Appendix F – Preliminary Bushfire Risk Assessment**). The design provisions have been incorporated into the concept Masterplan, thus this provision is not deemed to be a constraint in relation to the redevelopment of the site.

5.1 - Implementation of Regional Strategies	The objective of this direction is to give legal effect to the vision, land use strategy, policies, outcomes and actions contained in regional strategies – in this instance the Far North Coast Regional Strategy.	Yes	The proposal is considered entirely consistent with the Far North Coast Regional Strategy as identified above.

5.2.8 Environmental, social and economic impact.

Is there any likelihood that critical habitat or threatened species, populations or ecological communities, or their habitats, will be adversely affected as a result of the proposal?

As outlined within the **Preliminary Ecological Assessment** the planning proposal for the subject site will not have a detrimental impact upon the surrounding environment (See **Appendix D**). It is concluded that no critical habitat or threatened species, populations or ecological communities, or their habitats will be adversely affected as a result of the proposal.

Are there any other likely environmental effects as a result of the planning proposal and how are they proposed to be managed?

Based on initial analysis there does not appear to be any insurmountable environmental issues that suggest that the project should not proceed to the next stage.

5.2.9 State and Commonwealth interests.

Is there adequate public infrastructure for the planning proposal?

It is considered that the proposal will not result in any significant demand on public infrastructure.

As previously discussed, power, telecommunications and water are available to the site; whilst stormwater and sewerage infrastructure will be created on site to adequately service the proposal. In terms of sewerage services, it is pertinent to note that a Sewerage Treatment Plant (STP) will be privately funded. The proposed STP will also accommodate for non-potable (recycled) water that will used for the purposes of toilet flushing and grey water systems. In this regard, there is adequate public and private infrastructure to service the planning proposal.

Road Access

Primary access to the estate is proposed from the north eastern corner of the site (See **Appendix A – Concept Masterplan**. Secondary access will be provided from the adjacent property to the east and will allow for interconnectivity between the developed areas. A left-in / left-out only intersection with a right hand turning lane is proposed for Tweed Valley Way, as detailed within **Appendix E –Traffic Impact Assessment**.

Traffic Demand

Due to the size and scale of the proposal, it is considered that the proposal will not result in a significant increase in demand on the existing traffic network.

In this regard, the **Traffic Impact Assessment** (**Appendix E**) concludes that capacity analysis using SIDRA indicates that the proposed Tweed Valley Way intersection will operate satisfactorily for the foreseeable future with the proposed development traffic.

5.2.10 What are the views of State and Commonwealth public authorities consulted in accordance with the gateway determination?

Following the initial determination of the gateway process, formal inquiries and comments from the relevant authorities shall be sought and considered.

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Part 6.0 – Community Consultation

The planning proposal is considered to satisfy the test of a "medium impact planning proposal" and will require public consultation for a period of 14 days. It is noted that the planning proposal is:

- consistent with the pattern of surrounding land use zones & land uses;
- consistent with the Consolidated Tweed Development Control Plan;
- consistent with the strategic planning framework;
- does not represent any significant infrastructure issues;
- does not involve reclassification of public land; and
- represents a logical extension of the Mooball Village.

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Part 7.0 – Statement of Commitments

The following commitments are proposed to provide accountability and depth to the current work to date. This statement of commitments is a 'live' list and additional commitments can be added which may result from discussions with relevant authorities.

- Creation and adoption of site specific Development Control Plan consistent with the master planning to date;
- Creation and adoption of site specific Development Control Plan to incorporate the following:

  a) Precinct Specific Design Controls;
  b) Regeneration and Rehabilitation commitments;
  c) Open space controls;
  d) Road network and access arrangements;

- Implementation of Water Sensitive Urban Design (WSUD) principles;

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Part 8.0 – Conclusion

The above report demonstrates the capability and appropriateness of the site to accommodate future residential development. In this respect, the development of the site is consistent with strategic planning policy, in particular the opportunities for development contained within the Far North Coast Regional Strategy.

The development of the site will provide a meaningful contribution to the dwelling targets required to be achieved by Tweed Shire Council to fulfil the objectives of the Regional Strategy.

In summary, this planning report and associated rezoning request demonstrates that the site is well suited for residential development and represents a natural extension of the Mooball village.

PLANIT CONSULTING PTY LTD

September 2012

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Appendix A – Concept Masterplan

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Appendix B – SEPP 55 Statutory Declaration

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Appendix C – Engineering Design Report

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Appendix D – Preliminary Ecological Report

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Appendix E – Traffic Impact Assessment

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Appendix F – Preliminary Bushfire Risk Assessment

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Appendix G – Preliminary Cultural Heritage Report

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Appendix H – Community Benefit Statement

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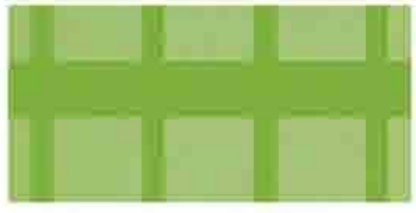
CONCEPTUAL MASTERPLAN FOR PROPOSED REZONING

Part Lot 2 DP 828280
No. 5993 Tweed Valley Way, Mooball, NSW

Prepared for Rob & Sue Hamett September 2012



PLANIT CONSULTING

Concept Masterplan

This subject site is located to the immediate south-west of the the existing Mooball village on Tweed Valley Way (● ● ● ●)

Mooball is an inland village centred upon the intersection of Tweed Valley Way and Pottsville Road (● ● ● ●)

This site is located on the southern side of Tweed Valley Way directly adjacent to the existing Mooball village

The village of Mooball is located towards the southern fringe of the Tweed Shire local government area. Some of the key features of the region include (but not limited to):

- It is well serviced by the Pacific Highway (● ● ● ●) providing regional access to Byron Bay and the Gold Coast.

- Mooball is located approximately 25 kilometres (20 minute drive) north of Byron Bay, 20 kilometres (15 minute drive)) to Murwillumbah and approximately 30 kilometres (30 minute drive) to Coolangatta / Gold Coast airport.

- Coolangatta is the major commercial, institutional and entertainment centre servicing the region.

- Murwillumbah currently services the subregion with a range of commercial, retail, health, educational, civic and community services and facilities.

- The region is expected to experience significant population growth over the next 25 years.

Subject Site

Site Context Plan

Part Lot 2 DP 828280 – No. 5993 Tweed Valley Way, Mooball NSW

Scale: As shown | Drawing No: MB_SA_01 | Date: September 2012

north

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Concept Masterplan

Site Analysis: Context

Part Lot 2 DP 828280 – No. 5993 Tweed Valley Way, Mooball NSW

Scale: 1:10,000 @ A3 | Drawing No: MB_SA_02 | Date: September 2012

Level 1 3247 Gold Coast Hwy
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Concept Masterplan

Subject Site

KEY

This plan has been created to highlight the opportunities and constraints that have been taken into account when designing the subdivision. The submitted subdivision design is considered the most effective layout to achieve the intent of the Planning Proposal.

1. The steep interface between the site and Tweed Valley Way to the west inhibits the creation of a secondary access. It is considered that the proposed primary access to the sites northeast and the interconnection with the adjacent PP10/007 lands will provide sufficient access for residents, visitors and emergency services.

2. The steep west facing portion of the site has not been included within the subdivision design. Limited options regarding driveway design and solar access are noted.

3. Larger lot sizes will be applied where the slope of the land is greater than 12 degrees to ensure development reflects and respects the natural landform. Where land is between 12 - 18 degrees, a minimum lot size of 1,200m2 has been proposed. This reflects contemporary subdivision planning and testing undertaken by the Planning Reform Unit within the other urban release areas. Isolated pockets of land that are greater than 18 degrees slope are proposed to incorporate a minimum lot size of 2,000m2.

4. The existing topography has been incorporated to site a large stormwater swale. This will reduce the level of sheet flow on-site during rainfall events.

5. Substantial site distances for traffic entering and exiting the site have been incorporated. This allows for traffic travelling east along Tweed Valley Way to have ample braking space.

6. Smaller lots have been created on the gentler slopes that are adjacent to Tweed Valley Way. All created lots allow for the opportunity to build with a northerly aspect. Lots that gain access directly from Tweed Valley Way have been assessed for traffic compliance in the attached Traffic Impact Assessment.

7. To avoid significant visual impact upon the Mooball area, it is noted that no structures are to be built higher than the 50m AHD line as detailed on the plan.

8. The positioning of the primary site entrance/exit in the northeast corner of the site is considered the most appropriate in terms of road safety and achievable site distances for vehicles.

9. The interconnection of the site with the adjacent PP10/007 lands will ensure free flowing traffic movement and provide a secondary access point for emergency services. The footpath will also allow future residents of the site to utilise the open space and park areas of PP10/007.

10. The prevailing wind within Mooball is most commonly from a southeasterly direction. All allotments will be able to design dwellings that maximise the prevailing wind in summer and solar access in the winter.

0m 50m 75m 100m 150m

Scale Bar

Site Analysis

Part Lot 2 DP 828280 – No. 5993 Tweed Valley Way, Mooball NSW

Scale: As shown | Drawing No: MB_SA_03 | Date: September 2012

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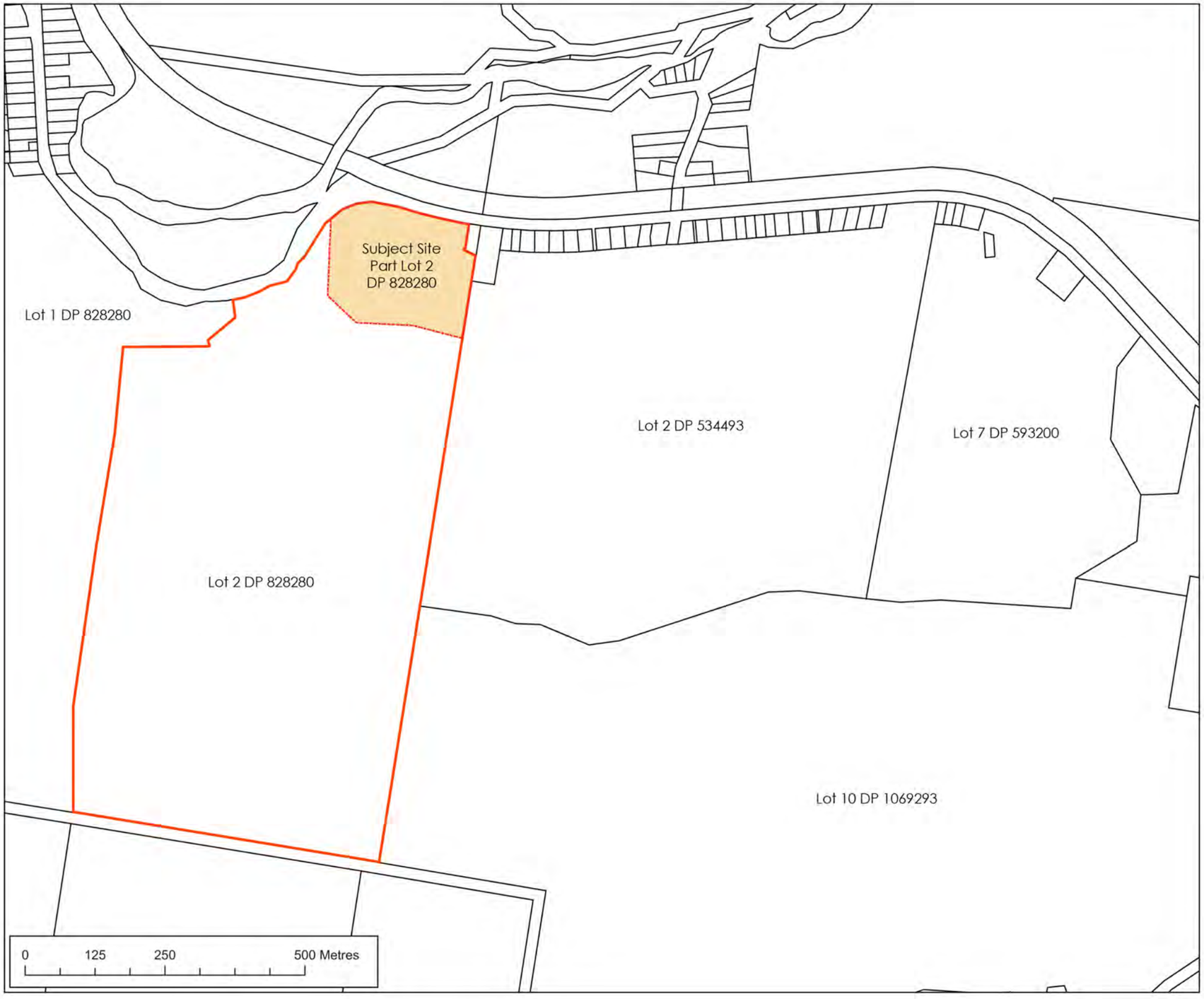

Subject Site

The subject site is a 5.077ha part of Lot 2 DP 828280 (Total Area: 60.31ha). The extents of this 'Subject Site' have been determined by the portion of Lot 2 DP 828280 that falls within the 'Tweed Urban and Emplyment Lands Release Strategy 2009'. Refer also to Plan MB_SA_03 'Site Analysis' for further factors that contributed to the determination of the rezoning extent.

Base Data Provided By:

Cadastre: 19 March, 2012
© Land and Property Management Authority (LPMA) and Tweed Shire Council.

Boundaries shown should be considered approximate only.

DO NOT SCALE
COPY ONLY - NOT CERTIFIED

Map Projection: Universal Tranverse Mercator
Horizontal Datum: Geodetic Datum of Australia 1994
Grid: Map Grid of Australia, Zone 56

GDA

Date Printed: 19 March, 2012
Author: Your name Here - Unit name
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TWEED SHIRE COUNCIL

Subject Site

Part Lot 2 DP 828280 – No. 5993 Tweed Valley Way, Mooball NSW

Scale: As shown | Drawing No: MB_SA_04 | Date: September 2012

north

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PLANIT CONSULTING

Concept Masterplan

Subject Site

Area identified in 'Tweed Urban and Emplyment Lands Release Strategy 2009'.

Topography

10m Contours shown

Slope

< 8.0 degrees

8-18 degrees

> 18 degrees

Topographic data provided by Fugro

0m 50m 75m 100m 150m

Scale Bar

Slope Analysis and Potential Development Layout

Part Lot 2 DP 828280 – No. 5993 Tweed Valley Way, Mooball NSW

Scale: As shown | Drawing No: MB_SA_05 | Date: September 2012

north

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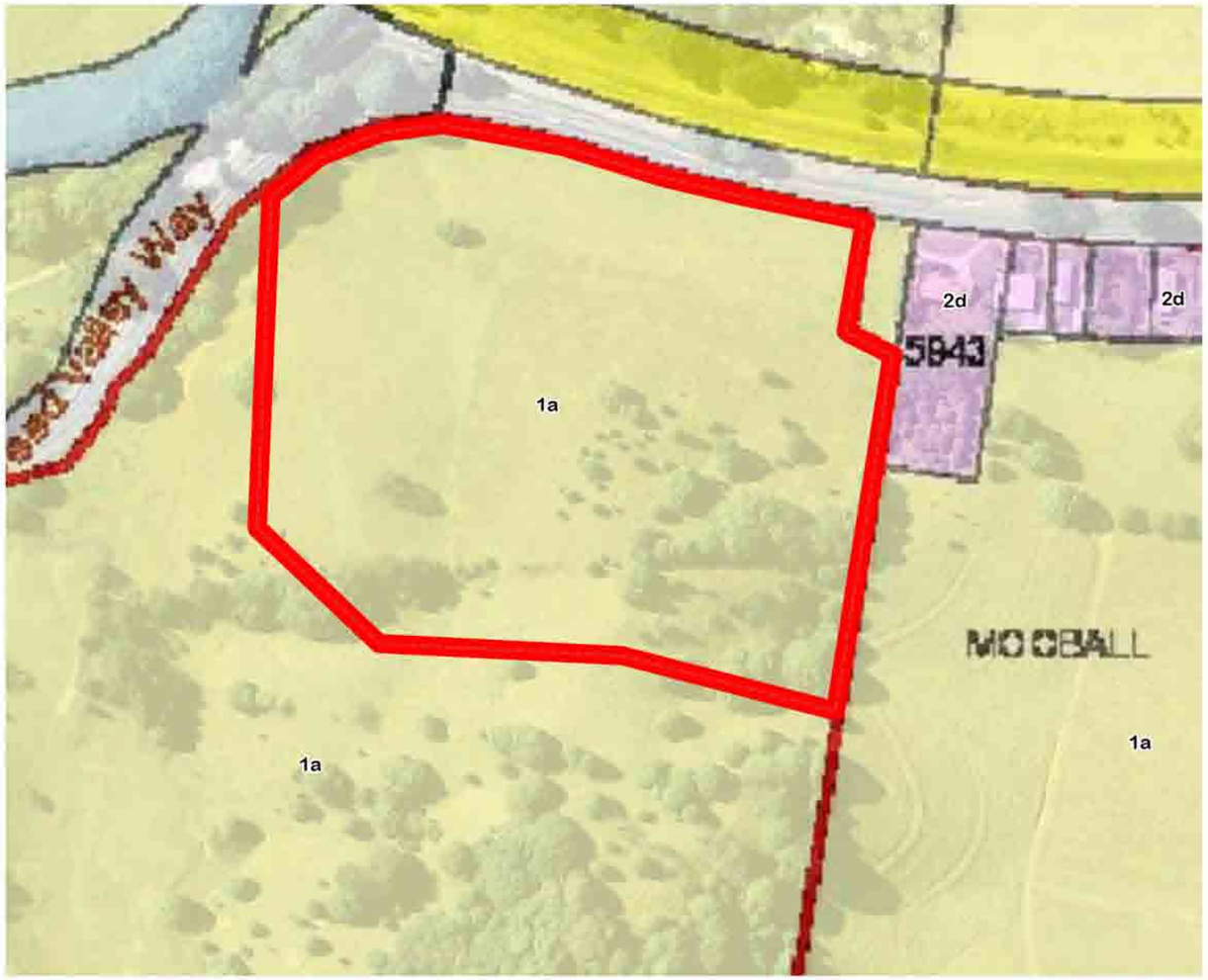
Concept Masterplan



Existing Zoning – Tweed Local Environmental Plan 2000

Legend

- Subject Site
- 1a Rural
- 2d Village

Draft Tweed Local Environmental Plan 2010

Legend

- Subject Site
- RU2 Rural Landscape
- RU5 Village

Zoning Plan: Existing 2000 / Draft 2010

Part Lot 2 DP 828280 – No. 5993 Tweed Valley Way, Mooball NSW

Scale: As shown | Drawing No: MB_SA_06 | Date: September 2012

north

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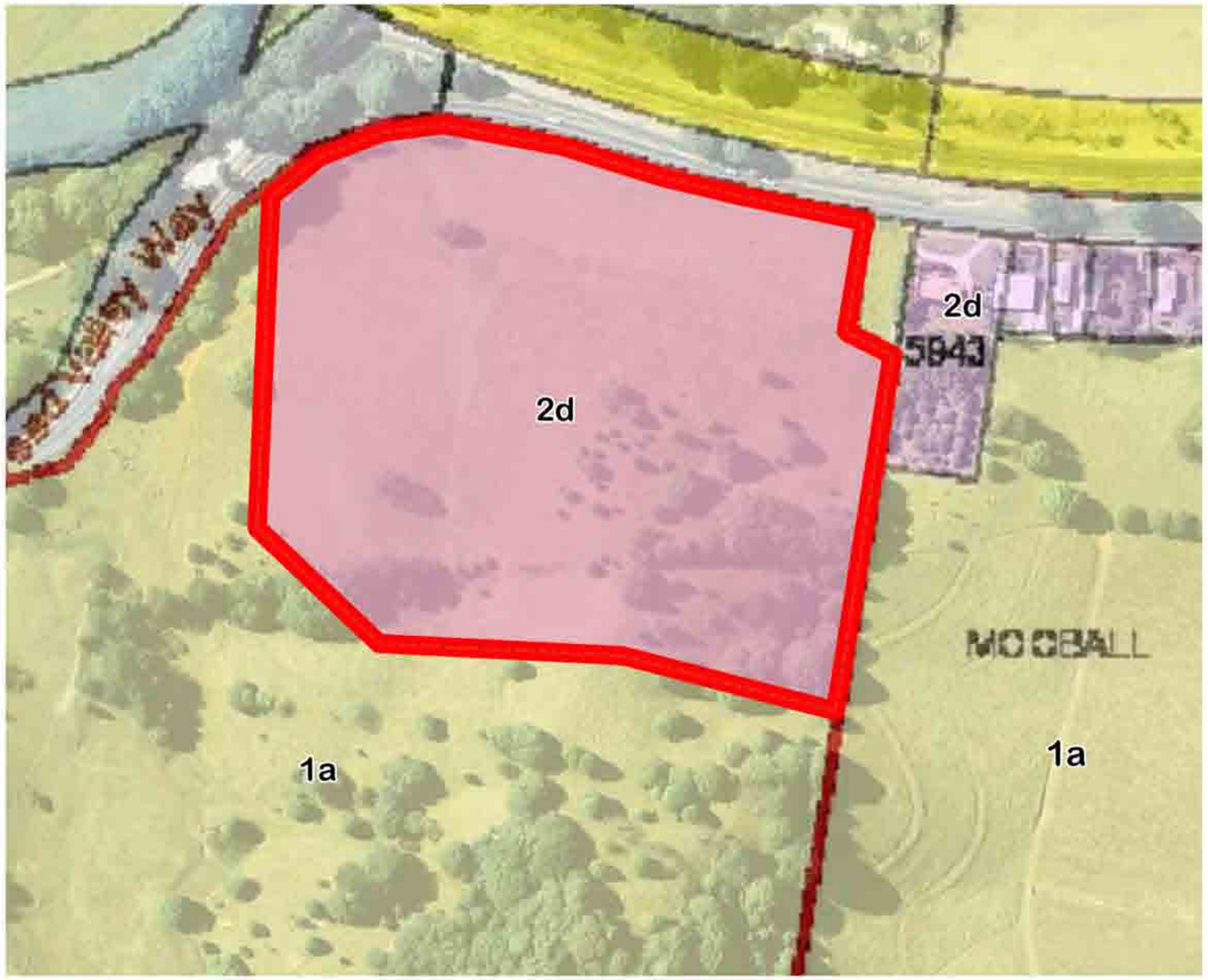
PLANIT CONSULTING

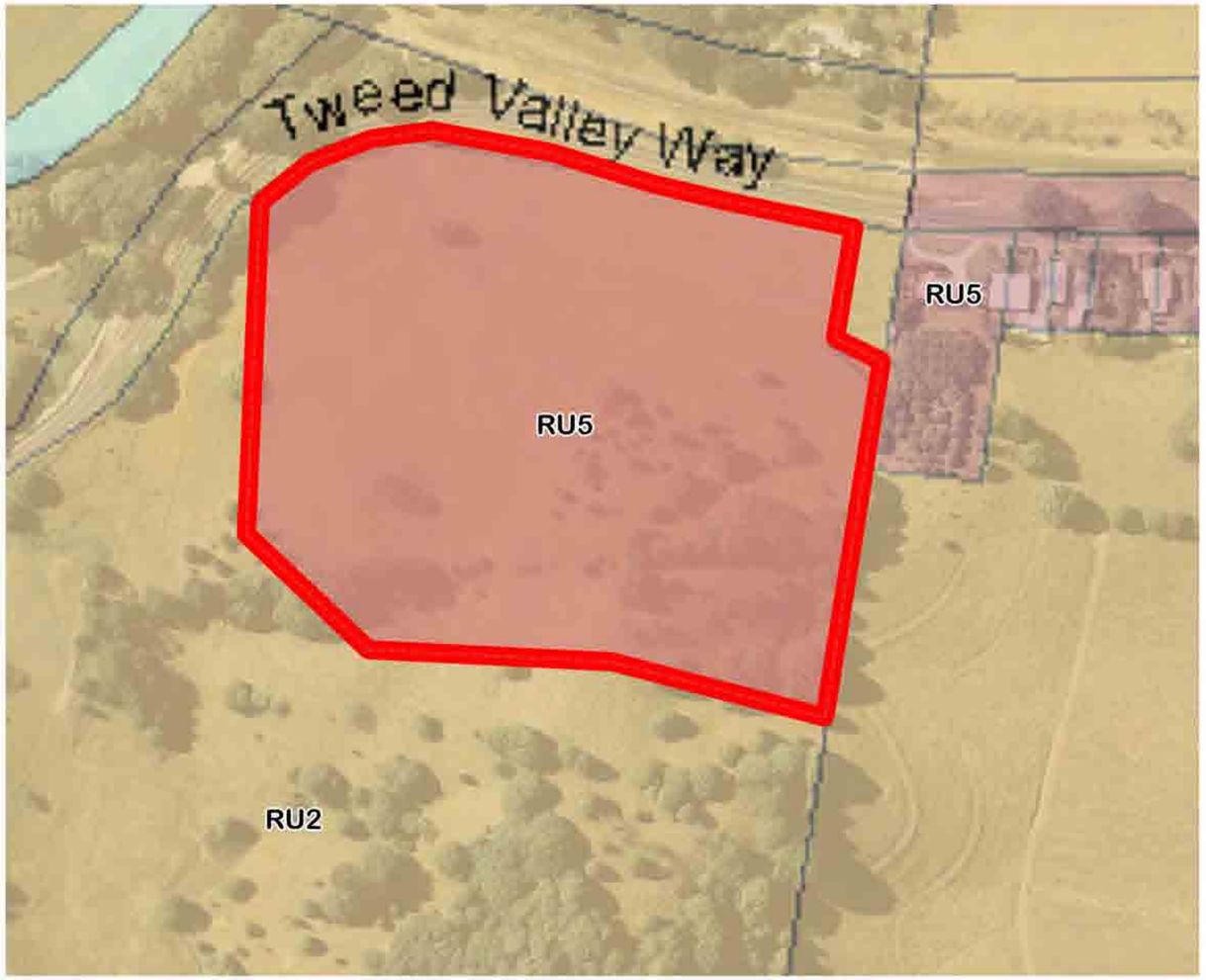
Concept Masterplan



Proposed Rezoning – Tweed Local Environmental Plan 2000

Legend

- Subject Site
- 1a Rural
- 2d Village



Proposed RezoningTweed Local Environmental Plan 2010

Legend

- Subject Site
- RU2 Rural Landscape
- RU5 Village

Proposed Rezoning Plan: Existing 2000 / Draft 2010

Part Lot 2 DP 828280 – No. 5993 Tweed Valley Way, Mooball NSW

Scale: As shown | Drawing No: MB_SA_07 | Date: September 2012

north

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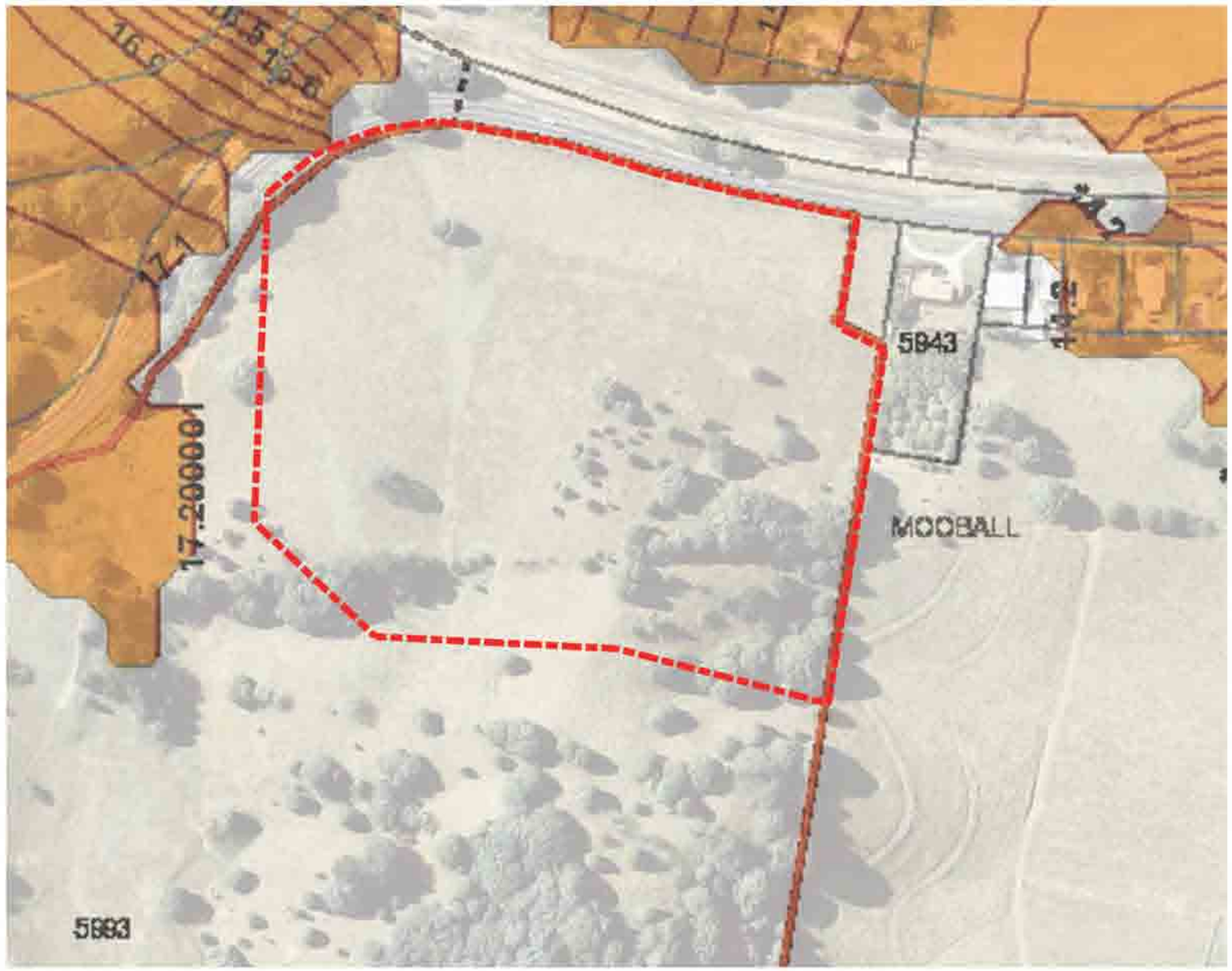
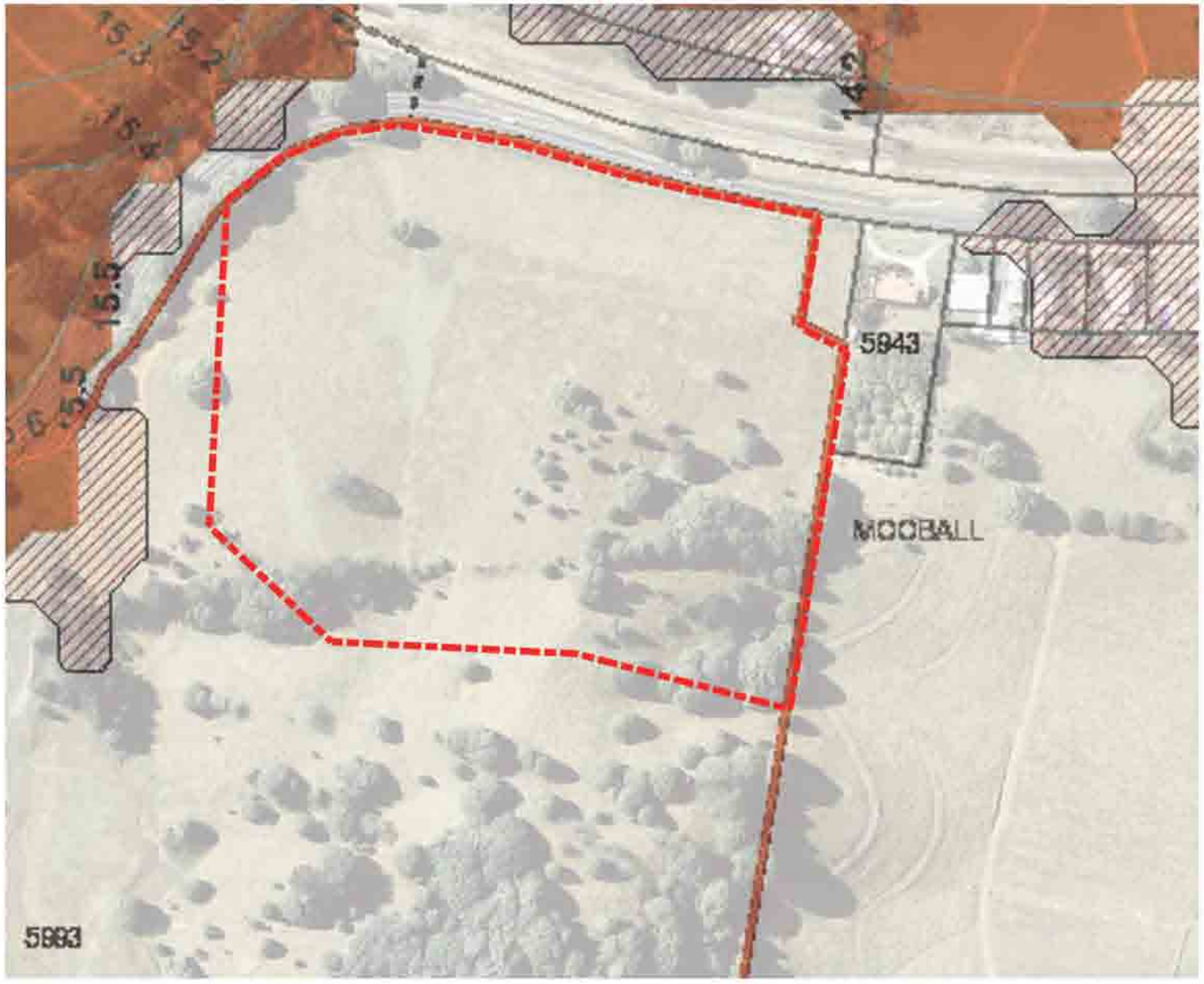


Flood Prone Land
Probable Maximum Flood Level

Subject Site

- 1.0 to 5.0
- 5.0 to 10.0
- 10.0 to 15.0
- 15.0 to 20.0
- 20.0 to 25.0
- 25.0 to 30.0
- 30.0 to 35.0
- 35.0 to 40.0



Flood Prone Land
Design Flood Level Mapping

Subject Site

- 6.0 to 6.5
- 6.5 to 7.0
- 7.0 to 7.5
- 7.5 to 8.0
- 8.0 to 8.5
- 8.5 to 9.0
- 9.0 to 9.5
- > 9.5

Constraints and Opportunities: Flood Prone Mapping

Part Lot 2 DP 828280 – No. 5993 Tweed Valley Way, Mooball NSW

Scale: As shown | Drawing No: MB_SA_08 | Date: September 2012

north

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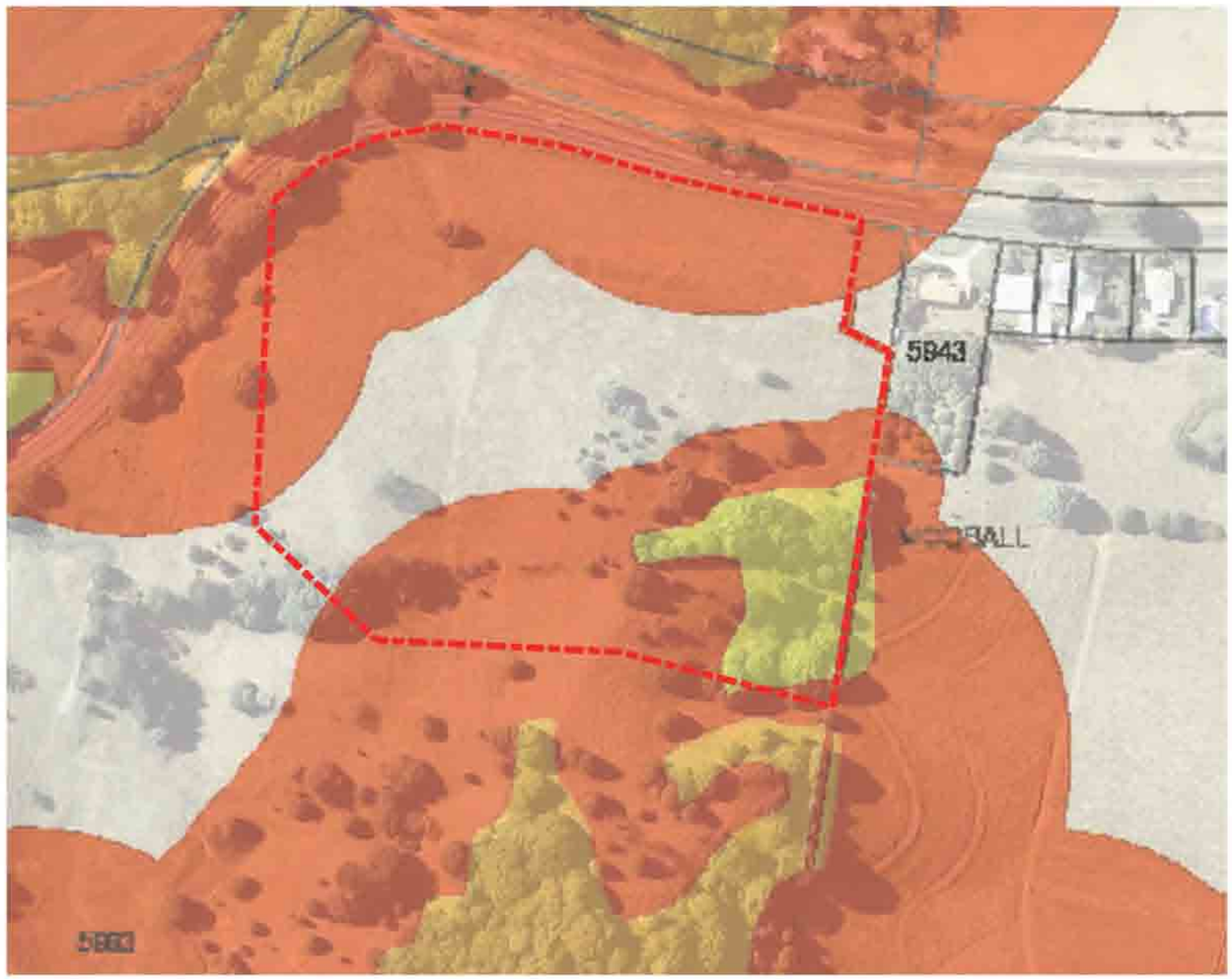
Concept Masterplan

Flood Mapping
Flood Prone Land - High Flow Mapping

ARI 100 year (AEP 1%) flood
- <= 0.3 'Low Flow Area'
- > 0.3 'High Flow Area'

Subject Site



Bushfire Mapping
Bushfire prone Land Mapping

- Bush Fire Prone Veg Cat 1
- Bush Fire Prone Veg Cat 2
- Bush Fire Prone Buffer 30m and 100m

Subject Site

Constraints and Opportunities: High Flow and Bushfire Prone Land Mapping

Part Lot 2 DP 828280 – No. 5993 Tweed Valley Way, Mooball NSW

Scale: As shown | Drawing No: MB_SA_09 | Date: September 2012

north

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Soil Mapping
Acid Sulfate Soil Mapping

- Class 1 Any Works
- Class 2 Works below the ground surface
- Class 3 Works beyond 1 metre below the natural ground surface
- Class 4 Works beyond 2 metres below the natural ground surface
- Class 5 Works within 500 metres of adjacent class 1, 2, 3 or 4 land which are likey to lower the watertable below 1 metre AHD in class 1, 2, 3 or 4 land.

Subject Site

Vegetation
Vegetation Community Mapping

- Estuarine Complexes
- Foredune Complex
- Heathlands
- Highly Modified / Disturbed
- Melaleuca and Swamp She-oak Forests
- Miscellaneous Map Units
- Rainforest and Riparian Communities
- Sclerophyll Forests / Woodlands on Sand Substrates and Alluvium
- Sclerophyll Open Forests on Bedrock Substrates
- Sedgelands and Related Communities

Subject Site

Constraints and Opportunities: Vegetation Community and Acid Sulfate Soils Mapping

Part Lot 2 DP 828280 – No. 5993 Tweed Valley Way, Mooball NSW

Scale: As shown | Drawing No: MB_SA_10 | Date: September 2012

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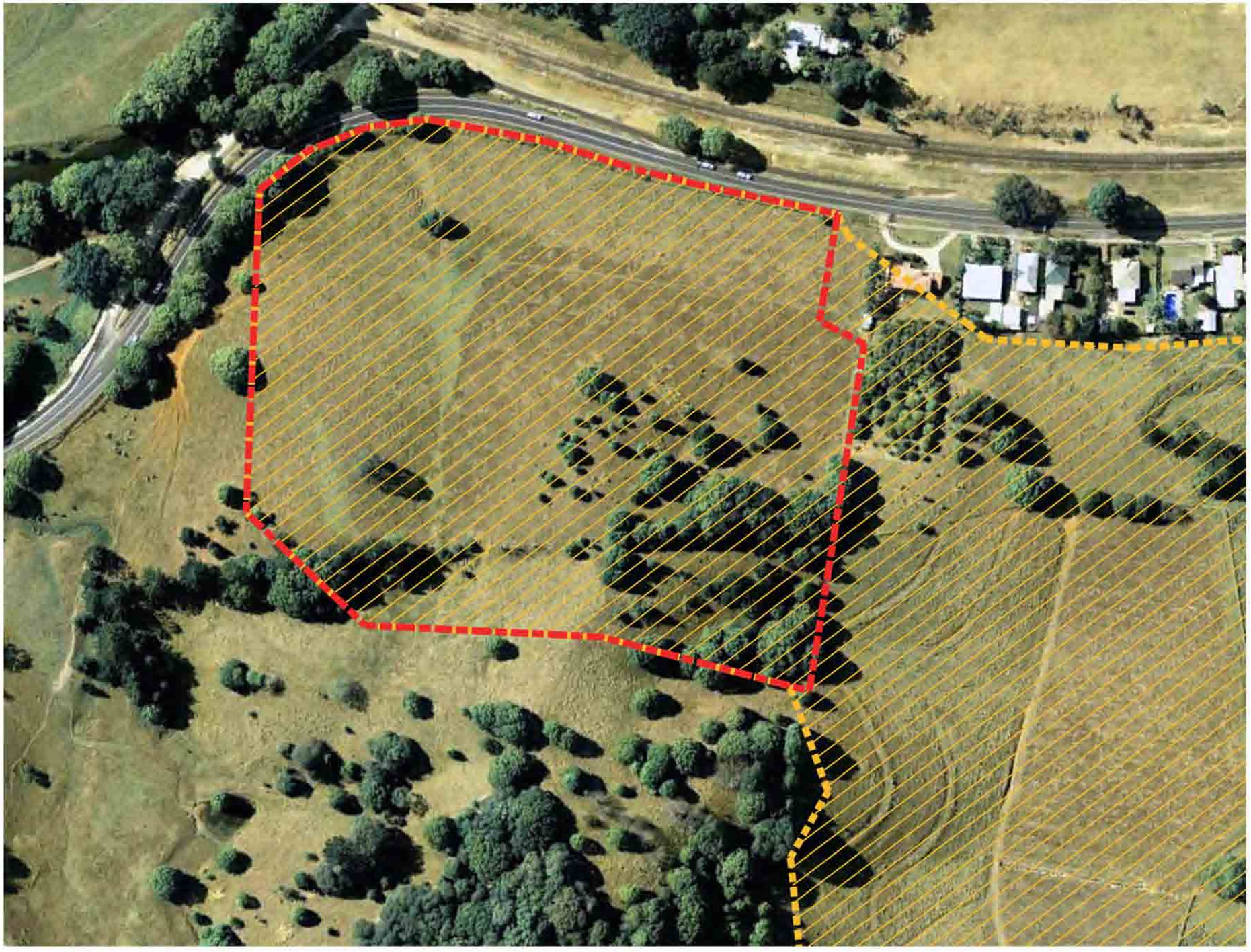
Concept Masterplan



Subject Site

Area identified in Tweed Urban and Employment Lands Release Strategy 2009

0m 50m 75m 100m 150m

Scale Bar

Context Plan
Subject Site and PP10/007 Lands

Tweed Urban and Employment Lands Release Strategy 2009

Part Lot 2 DP 828280 – No. 5993 Tweed Valley Way, Mooball NSW

Scale: As shown | Drawing No: MB_SA_11 | Date: September 2012

north

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Subject Site

Data provided by Essential Energy:

Pole

Underground Earth or Wires

Critical Underground Cable

Data provided by TSC DBYD:

Water Pipe

Single Hydrant

Sewer Rising Mains Location

Scour Valve

Gate Valve

0m 50m 75m 100m 150m

Scale Bar

Existing Site Features: Easements, Infrastructure and Design Constraints

Part Lot 2 DP 828280 – No. 5993 Tweed Valley Way, Mooball NSW

Scale: As shown | Drawing No: MB_SA_12 | Date: September 2012

north

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Concept Masterplan

Proposed Subdivision Plan

Part Lot 2 DP 828280 – No. 5993 Tweed Valley Way, Mooball NSW

Scale: 1:1000 @ A3 | Drawing No: MB_SA_16 | Date: September 2012

north

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Concept Masterplan

Legend

Subject Site

Adjacent Site (Indicative Layout 2010)

1. **Internal Road Network**
   Internal road network, based on site constraints analysis to achieve minimum earthworks and increase the potential to retain existing vegetation
2. **Residential Lots**
   Residential lots
3. **Public Open Space Recreation Park**
   Community Park approx 7,500m2. Location of Park to increase retention of ecologically significant vegetation, predominately flat land with 75% road frontage. Refer to POS Detail sheet for indicative embellishments and layout
4. **Environmental Conservation 1**
   Conservation area associated with existing drainage line and riparian vegetation communities. Minimum of 25 metre buffer from drainage low flow point (50 metres total)
5. **Stormwater Treatment**
   Potential location of Stormwater Treatment device (these fall outside of the 50 metre buffer to site drainage lines)
6. **Environmental Conservation 2**
   Conservation area consisting of ecologically significant vegetation. 100 meter buffer from southern site boundary to be retained and revegetated
7. **Rural Landscape (Public Open Space)**
   Area of unstructured public open space to include walking tracks and lookout points
8. **STP**
   Location of Sewerage Treatment Plant and associated 80m exclusion buffer (••••••••)
9. **Existing Dwelling**
   Existing Dwelling Lot approx 5,000m²
10. **Stormwater Easements**
    Location of stormwater easement as directed by Hydrological Engineer based on existing site topography and proposed structure plan
11. **Pedestrian Circulation**
    Pedestrian circulation based on site topography analysis and internal Road Network

Primary Site Access - Vehicular

Secondary Site Access - Vehicular

Link to Subject Site

Concept Masterplan: Area 9 Urban Release Lands

Part Lot 2 DP 828280 – No. 5993 Tweed Valley Way, Mooball NSW

Scale: As shown | Drawing No: MB_SA_13 | Date: September 2012

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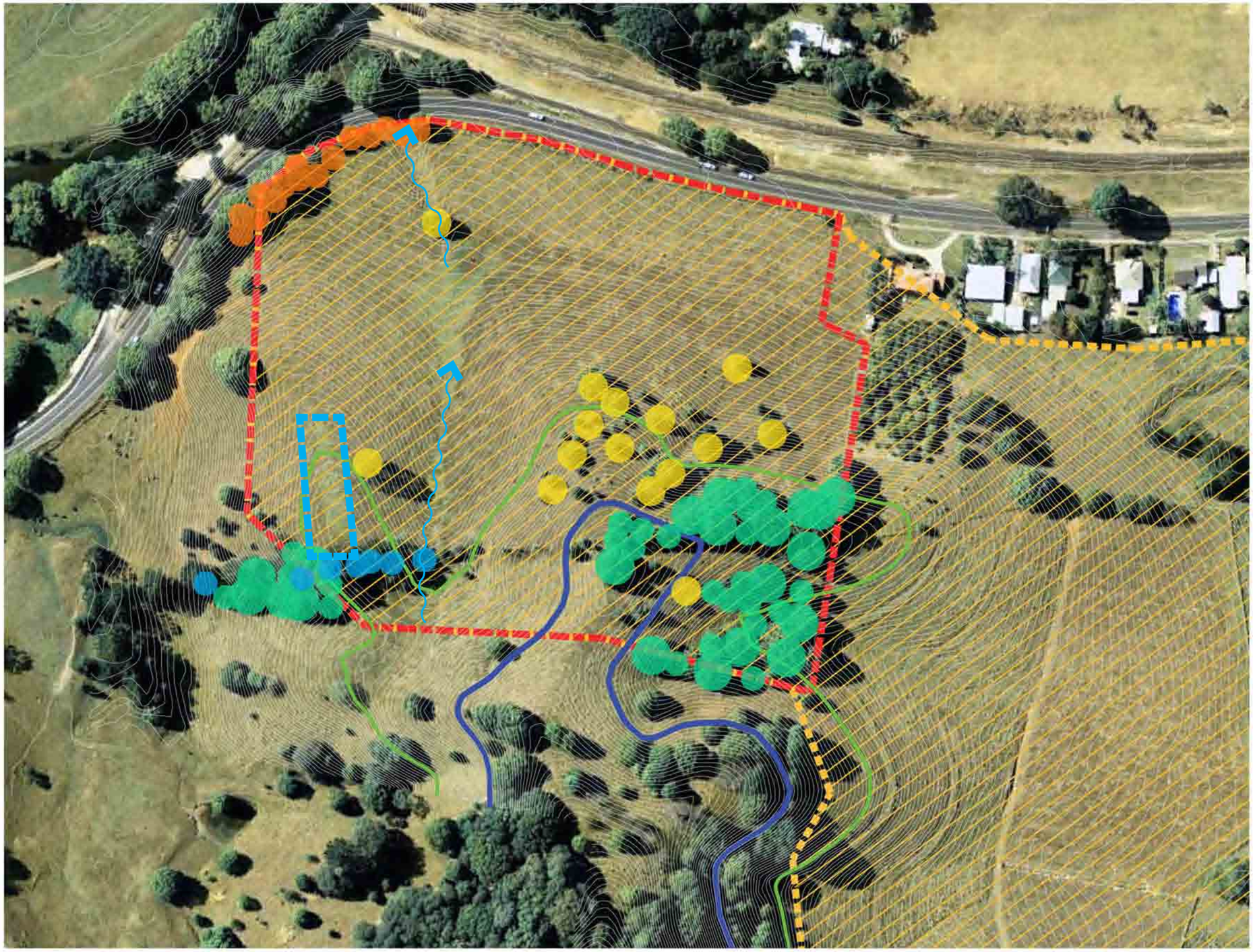
Concept Masterplan



Subject Site

Urban Release Lands

Environmental Constraints

Vegetation survey was performed by Planit Consulting with geo-referenced colour aerial photographs overlaid with contour plans, existing mapped vegetation boundaries and cadastral bases utilized for the initial recognition of community boundaries in the field and adjustments made as deemed necessary.

Communities were then transcribed directly into the GIS program utilising contours, geological information and vegetation boundaries as a referenced background. Where necessary vegetation boundaries were traversed with a hand held GPS loaded into Map Info.

0.5m contours shown (Fugro Data)

40 AHD

50 AHD

Drainage Lines through existing grazing land - no significant site vegetation to be retained

Areas of Camphor Laurel Removal

Scattered rainforest Trees to be retained (Refer to Flaura & Fauna Report Planit Consulting)

Vegetation Community 2
Low / Mid / High Open to Closed Camphor Laurel, Early Regrowth Rainforest to be retained

Hoop Pines (Araucaria cunninghamiana) to be retained

Heriatge Area of Interest
Data provided by Everick Heritage Consultants

0m 50m 75m 100m 150m

Scale Bar

Opportunities and Constraints: Existing Site Features

Part Lot 2 DP 828280 – No. 5993 Tweed Valley Way, Mooball NSW

Scale: As shown | Drawing No: MB_SA_14 | Date: September 2012

north

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Concept Masterplan

Subject Site

Primary Site Access off Tweed Valley Way

Vehicular connection to adjacent proposed development site

Swale Easement

Yield
32 Lots
refer to Plan for Lot Areas

Existing stand of vegetation to be retained. refer also to site analysis / constraints plans.

Scattered rainforest Trees
(Refer to Flaura & Fauna Report Planit Consulting)

Hoop Pines (Araucaria cunninghamiana)

Proposed Street Trees
Hoop Pines (Araucaria cunninghamiana)

0m 50m 75m 100m 150m
Scale Bar

Masterplan Callout 01

Part Lot 2 DP 828280 – No. 5993 Tweed Valley Way, Mooball NSW

Scale: As shown | Drawing No: MB_SA_15 | Date: September 2012

north

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PLANIT CONSULTING

Concept Masterplan

Subject Site

Traffic Arrangement Data provided by CRG Traffic Engineers

Masterplan Callout 02: Traffic Arrangement

Part Lot 2 DP 828280 – No. 5993 Tweed Valley Way, Mooball NSW

Scale: As shown | Drawing No: MB_SA_16 | Date: September 2012

north

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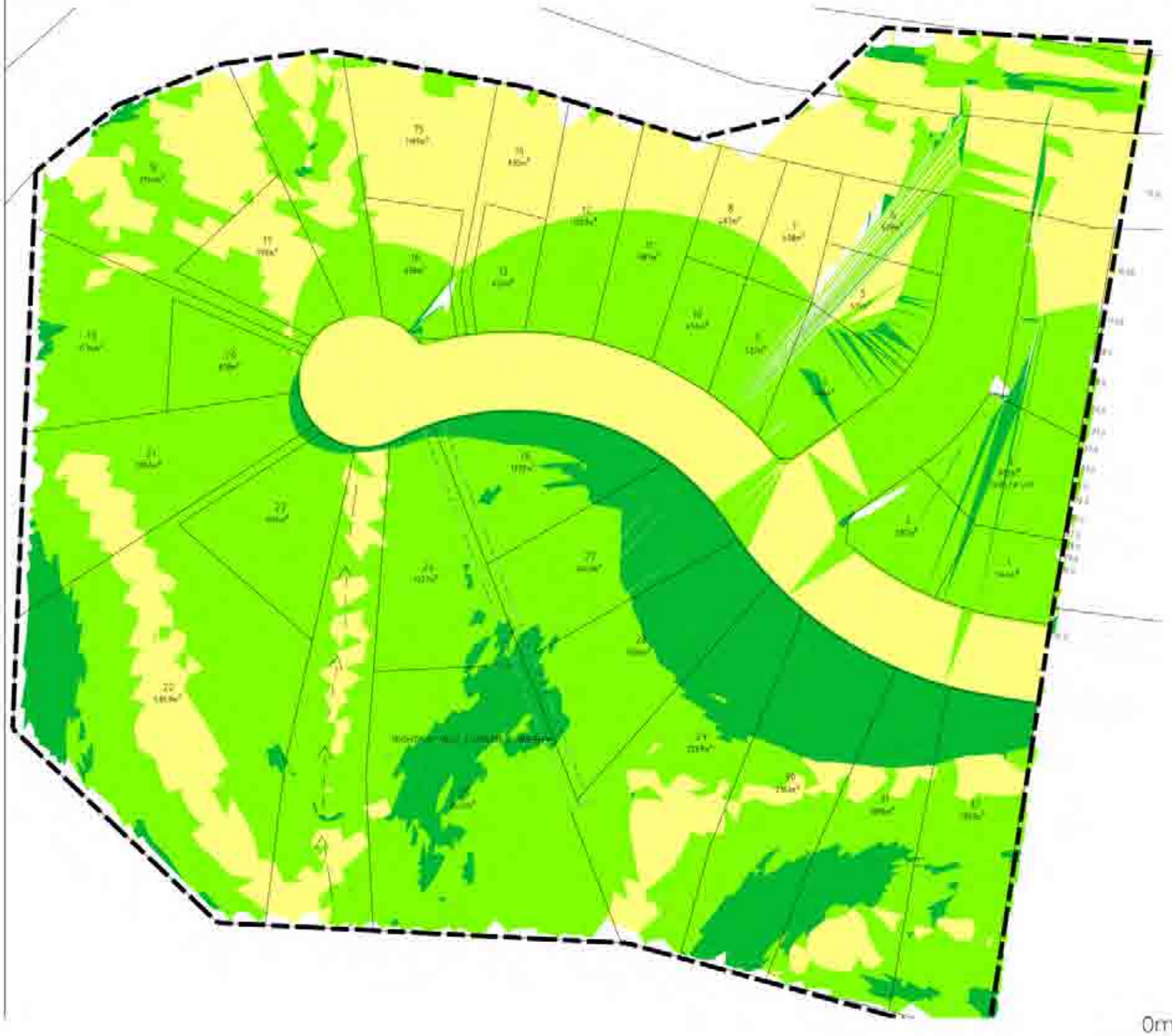
Topography



Slope (Degrees)

- < 8.0
- 8 - 18
- > 18

Base Source - CRWP Engineers Report 2012

0m 50m 200m

Scale Bar 1:5000 at full size A3

Slope: Indicative Architectural Type Analysis

Slope Analysis

Part Lot 2 DP 828280 - No. 5993 Tweed Valley Way, Mooball NSW

Scale: As shown | Drawing No: MB_SA_17 | Date: September 2012

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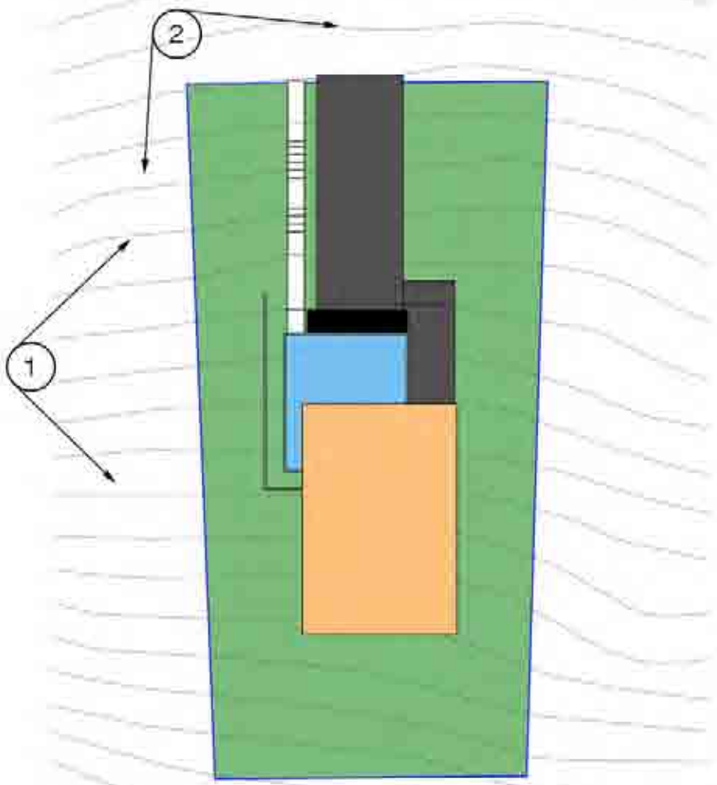
admin@planitconsulting.com.au

PLANIT CONSULTING

Plan 01 - Indicative Architectural Type

Based on **SLOPE @ 20% / 11.3 degrees**



Indicative Architectural Type

Image 1 - Indicative Perspective 01

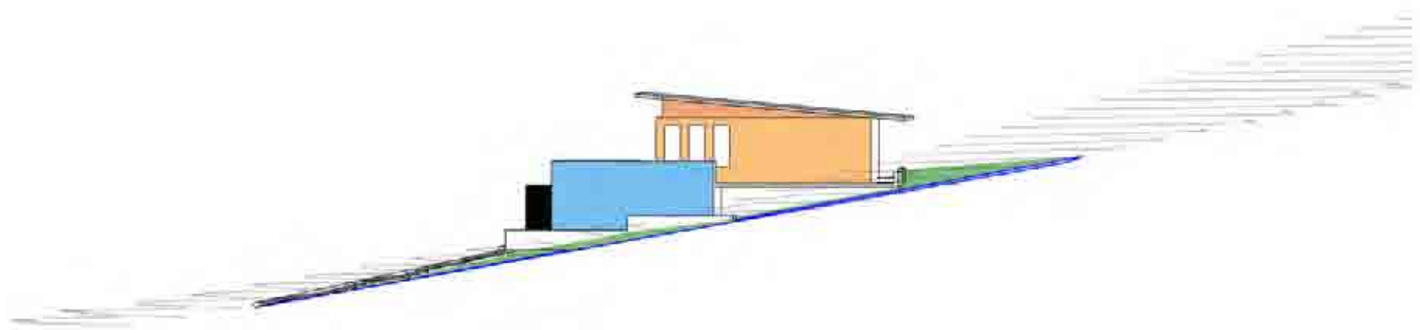


Image 2 – Indicative Perspective 02

Slope Analysis: Indicative Architectural Solutions (Slope: 20% / 11.3 degrees)

Part Lot 2 DP 828280 – No. 5993 Tweed Valley Way, Mooball NSW

Scale: As shown | Drawing No: MB_SA_18 | Date: September 2012

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Plan 01 - Indicative Architectural Type

Based on **SLOPE @ 25% / 14.40 degrees**

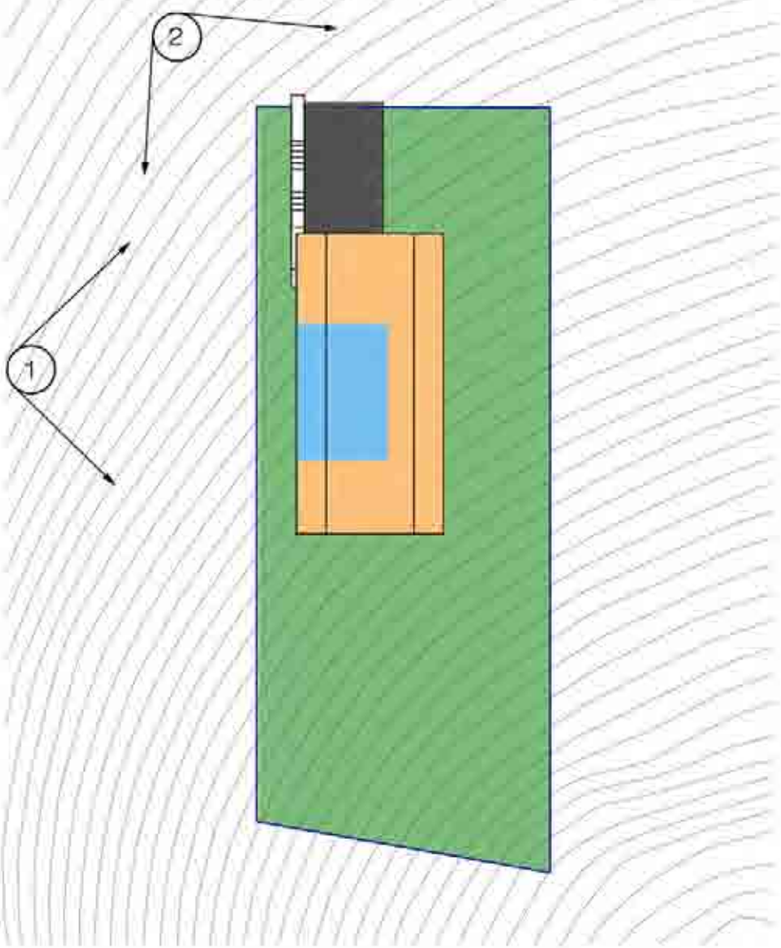


Image 1 - Indicative Perspective 01

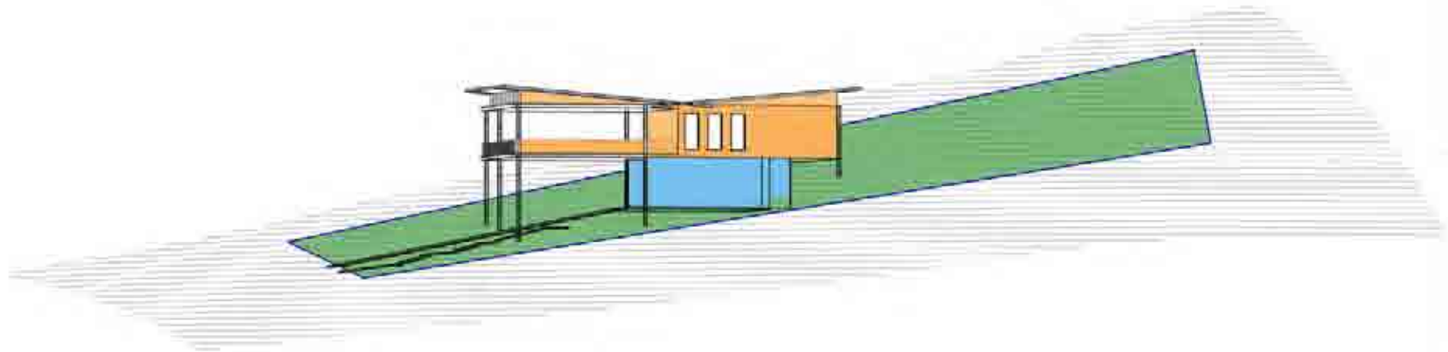
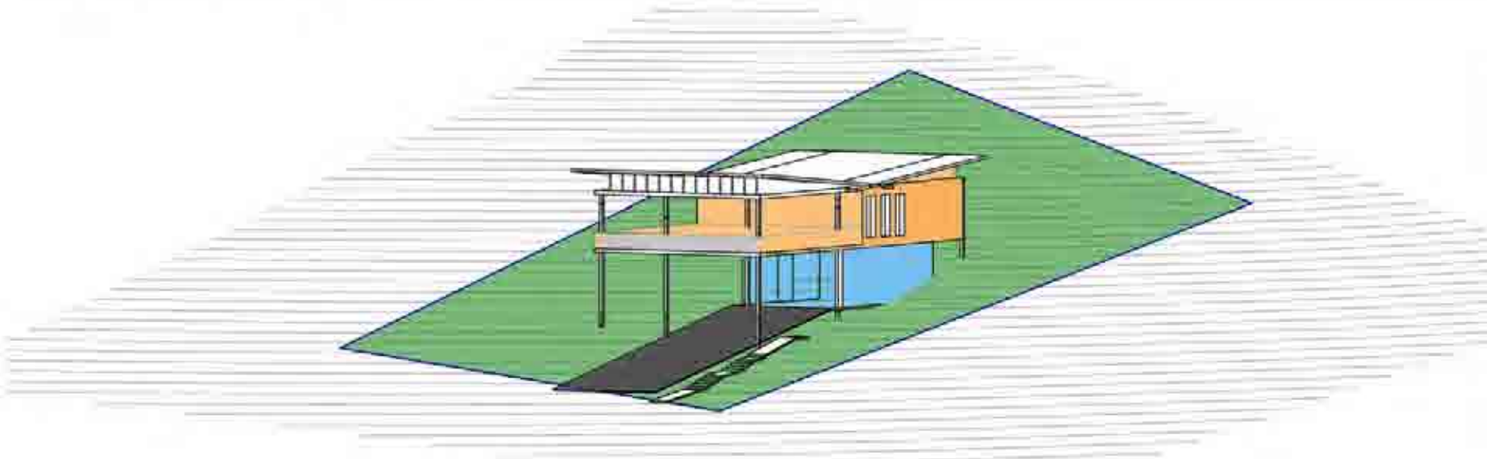


Image 2 - Indicative Perspective 02



Indicative Architectural Type

Slope Analysis: Indicative Architectural Solutions (Slope: 25% / 14.40 degrees)

Part Lot 2 DP 828280 – No. 5993 Tweed Valley Way, Mooball NSW

Scale: As shown | Drawing No: MB_SA_19 | Date: September 2012

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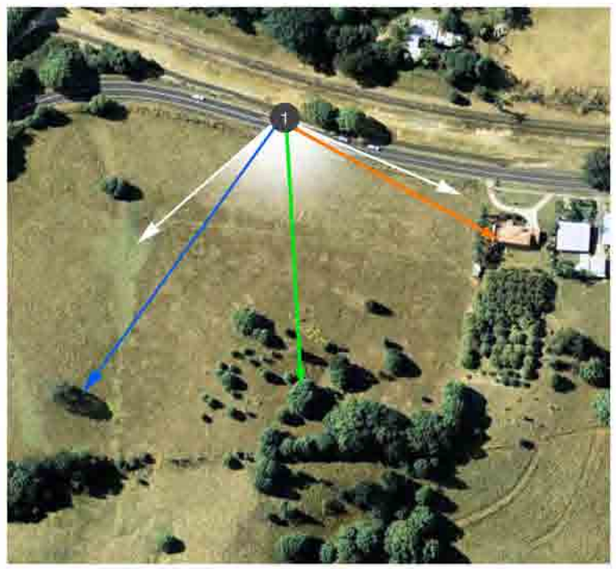
Concept Masterplan



Panoramic View 01 View taken from the northern side of Tweed Valley Way at elevation 16.00 AHD. This view is centred viewing to the immediate south (refer to the Green Arrow for reference) towards the most elevated point of the subject site. This high-point is at elevation 53.50 AHD with the hill rising at an average slope of 18.75% (refer also to Slope Analysis Plan). This image shows the existing character of the land as pastoral grass land with scattered Camphor laurel Araucaria and rainforest species saplings. The existing Araucaria cunnighamiana (Hoop Pine) is referenced by the Blue Arrow and is located within the existing gully. This gully and associated Hoop Pines are proposed to be retained as detailed within the Proposed Layout Plan and will form the drainage reserve.
The most westerly dwelling located along this portion of Tweed Valley Way is visible to the left hand side of this image (refer to Orange Arrow). This strip of dwelling lots to Tweed Valley Way are comprised of average 600-800m2 lots. The proposed layout would present as a continuation of this residential character.

Panoramic View 02
View taken from the southern side of Tweed Valley Way at elevation 15.50 AHD. This view is centred viewing to the south west . View to the westerly portion of the site is obscured by the ridge line (◇◇◇◇◇◇◇◇◇◇) with the Araucaria cunnighamiana (Hoop Pine) visible beyond this.

Visual Analysis: Existing Site Images

Part Lot 2 DP 828280 – No. 5993 Tweed Valley Way, Mooball NSW

Scale: As shown | Drawing No: MB_SA_20 | Date: September 2012

north

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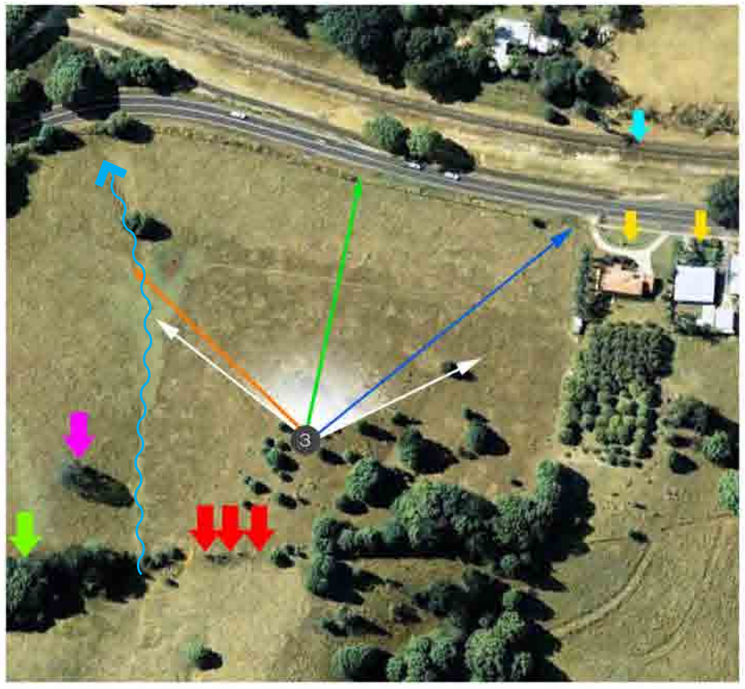
Concept Masterplan



Context Plan

Image 01 View taken from elevation 45.00 AHD viewing to the south west. This view shows the remnant vegetation visible along the horizon line with a stand of dead Camphor laurel speies in the foreground. These Camphor laurel trees are located within the drainage reserve as detailed within the proposed layout.

Image 02 View taken from elevation 45.50 AHD viewing to the south west. This view highlights two of the existing trees on site that are to be retained. These trees are also referenced on the Existing Vegetation Plan. With reference to Masterpan Callout 01, these trees would both be located within Lot 22. The drainage reserve appears in the foreground of this image (~~>)

Panoramic View 03
View taken from the southern side of Tweed Valley Way at elevation 43.50 AHD. This viw looks to the north from within the subject site with the vegetated ridgeline of the retained busland visible in the distance. The Orange Arrow highl;ghts the location of the Vegetation Community 2 vegetation (Low / Mid / High Open to Closed Camphor Laurel, Early Regrowth Rainforest) to be retained along the north west perimeter of the subject site. The row of dwellings to Tweed Valley Way are visible in the right hand side of the image (➡). The railway line that runs parralel to Tweed Valley Way is also visible (➡).

Visual Analysis: Existing Site Images

Part Lot 2 DP 828280 – No. 5993 Tweed Valley Way, Mooball NSW

Scale: As shown | Drawing No: MB_SA_21 | Date: September 2012

north

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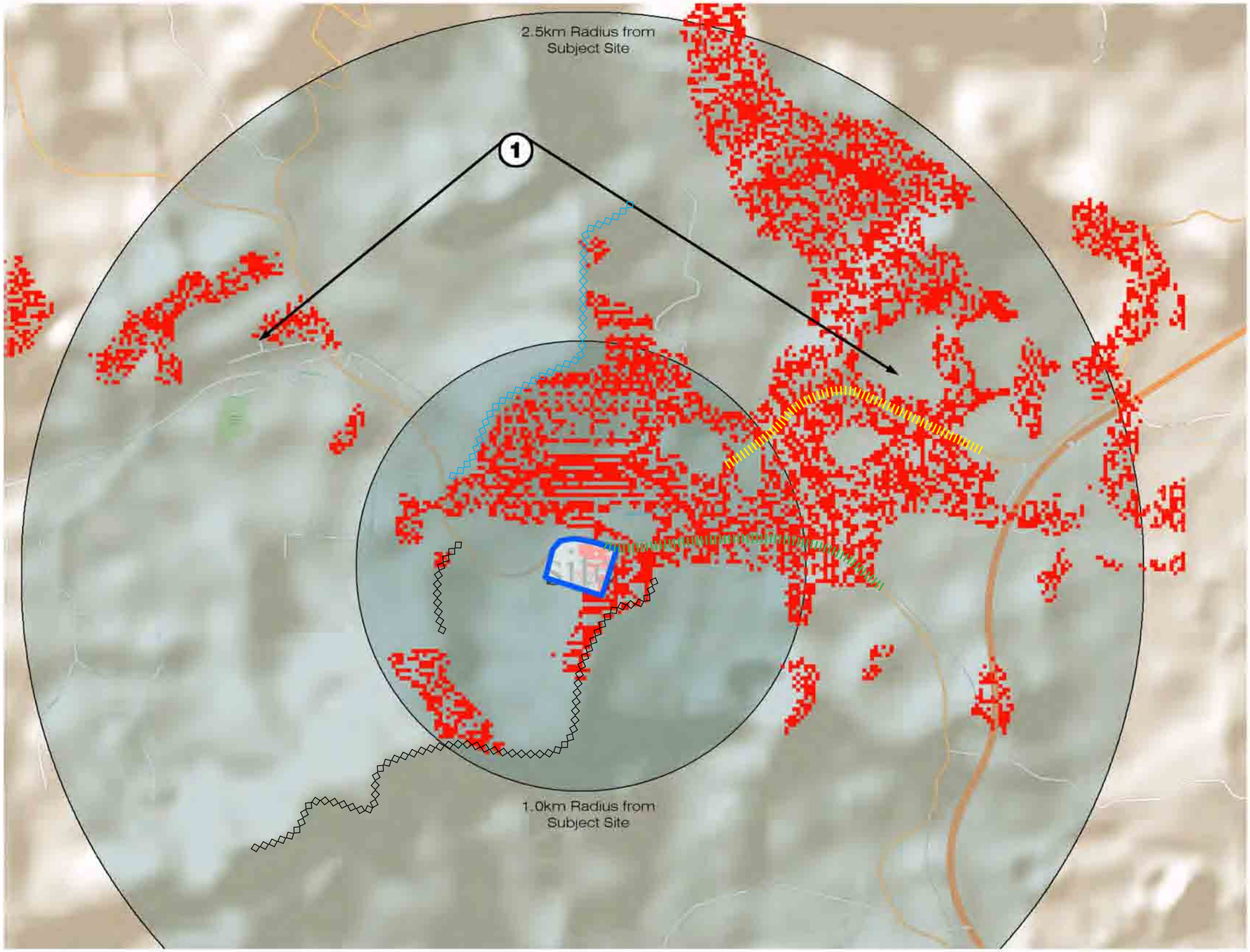
Concept Masterplan



Subject Site

Primary View Shed

A view shed analysis of the subject site and the immediate surrounds was conducted using Aster GDEM Elevation Data to determine the probable visual exposure of the subject site to the surrounding area. The view shed was constrained to a diameter of 3km for the purposes of this investigation.

This mapping does not take in account the visual mitigation properties of existing vegetation stands and is based on topographic data only.

The prominent ridge lines located to the south west of the site (◇◇◇◇◇◇) combined with the ridge line to the north west (◇◇◇◇◇◇) results in limiting the visual exposure of the site to the low laying land to the north east, in particular along the transport corridors of Pottsville Rd (|||||||||||||||||) and Tweed valley Way (|||||||||||||||||).

With reference to 'View Shed Analysis Aerial Overlay Plan' this primary view shed is also concentrated to the low laying agricultural land to the north of Tweed valley Way as well as the southerly facing slopes of the agricultural land to the immediate north of the subject site.

In summary, despite the raised elevation of the subject site, the view shed analysis suggest that the visual exposure of the subject site is limited due to the raised elevation of the surrounding region. Visual mitigation measure including the proposed planting of tall screening trees (Araucaria cunninghamiana) within the streetscape of the subject site (refer to the Masterplan Callout 01) would further limit the visual impact of the proposed development. These trees are a regional character tree and are evident throughout the Visual Analysis: Existing Site Images. All Araucaria cunninghamiana located within the subject site are to be retained, refer to 'Opportunities and Constraints: Existing Site Features.

① **Aerial Isonometric Visual TopographicViewpoint**
Refer View Shed Analysis 02

View Shed Analysis Plan 01
Base Data: Aster GDEM Elevation Data

Visual Shed Analysis 01

Part Lot 2 DP 828280 – No. 5993 Tweed Valley Way, Mooball NSW

Scale: As shown | Drawing No: MB_SA_22 | Date: September 2012

north

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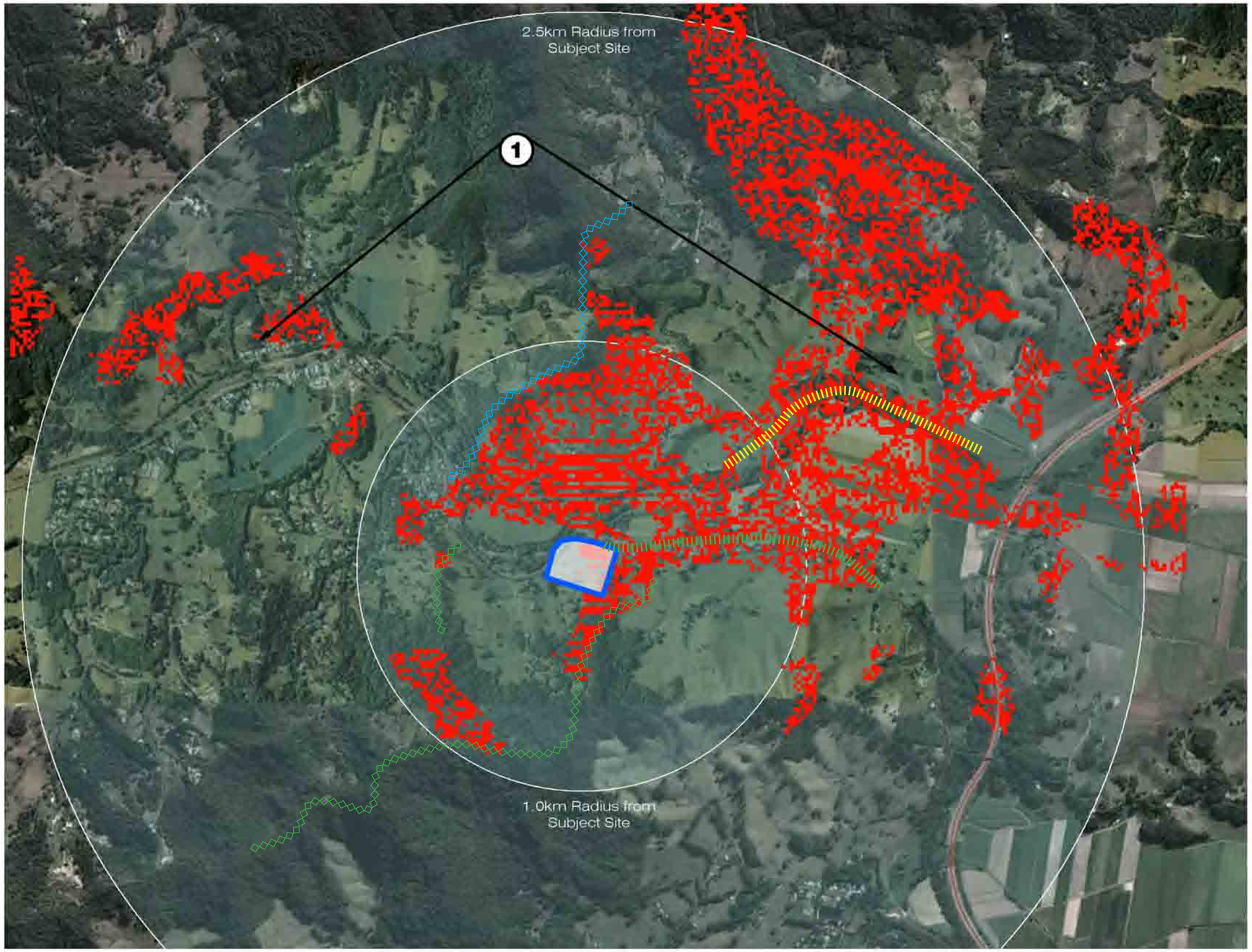
Concept Masterplan



View Shed Analysis Plan 01 Aerial Overlay
Base Data: Aster GDEM Elevation Data; Aerial Google Earth

Subject Site

Primary View Shed

A view shed analysis of the site and the immediate surrounds was conducted using Aster GDEM Elevation Data to determine the probable visual exposure of the subject site to the surrounding area. The view shed was constrained to a diameter of 3km for the purposes of this investigation.

This mapping does not take in account the visual mitigation properties of existing vegetation stands and is based on topographic data only.

The prominent ridge lines located to the south west of the site (◇◇◇◇◇◇) combined with the ridge line to the north west (◇◇◇◇◇◇) results in limiting the visual exposure of the site to the low laying land to the north east, in particular along the transport corridors of Pottsville Rd (|||||||||||||||||) and Tweed valley Way (|||||||||||||||||).

This primary view shed is also concentrated to the low laying agricultural land to the north of Tweed Valley Way as well as the southerly facing slopes of the agricultural land to the immediate north of the subject site.

In summary, despite the raised elevation of the subject site, the view shed analysis suggest that the visual exposure of the subject site is limited due to the raised elevation of the surrounding region. Visual mitigation measures including the proposed planting of tall screening trees (Araucaria cunninghamiana) within the streetscape of the subject site (refer to the Masterplan Callout 01) would further limit the visual impact of the proposed development. These trees are a regional character tree and are evident throughout the Visual Analysis: Existing Site Images. All Araucaria cunninghamiana located within the subject site are to be retained, refer to 'Opportunities and Constraints: Existing Site Features'.

① **Aerial Isonometric Visual TopographicViewpoint**
Refer View Shed Analysis 02

Visual Shed Analysis 01: Aerial Overlay

Part Lot 2 DP 828280 – No. 5993 Tweed Valley Way, Mooball NSW

Scale: As shown | Drawing No: MB_SA_23 | Date: September 2012

north

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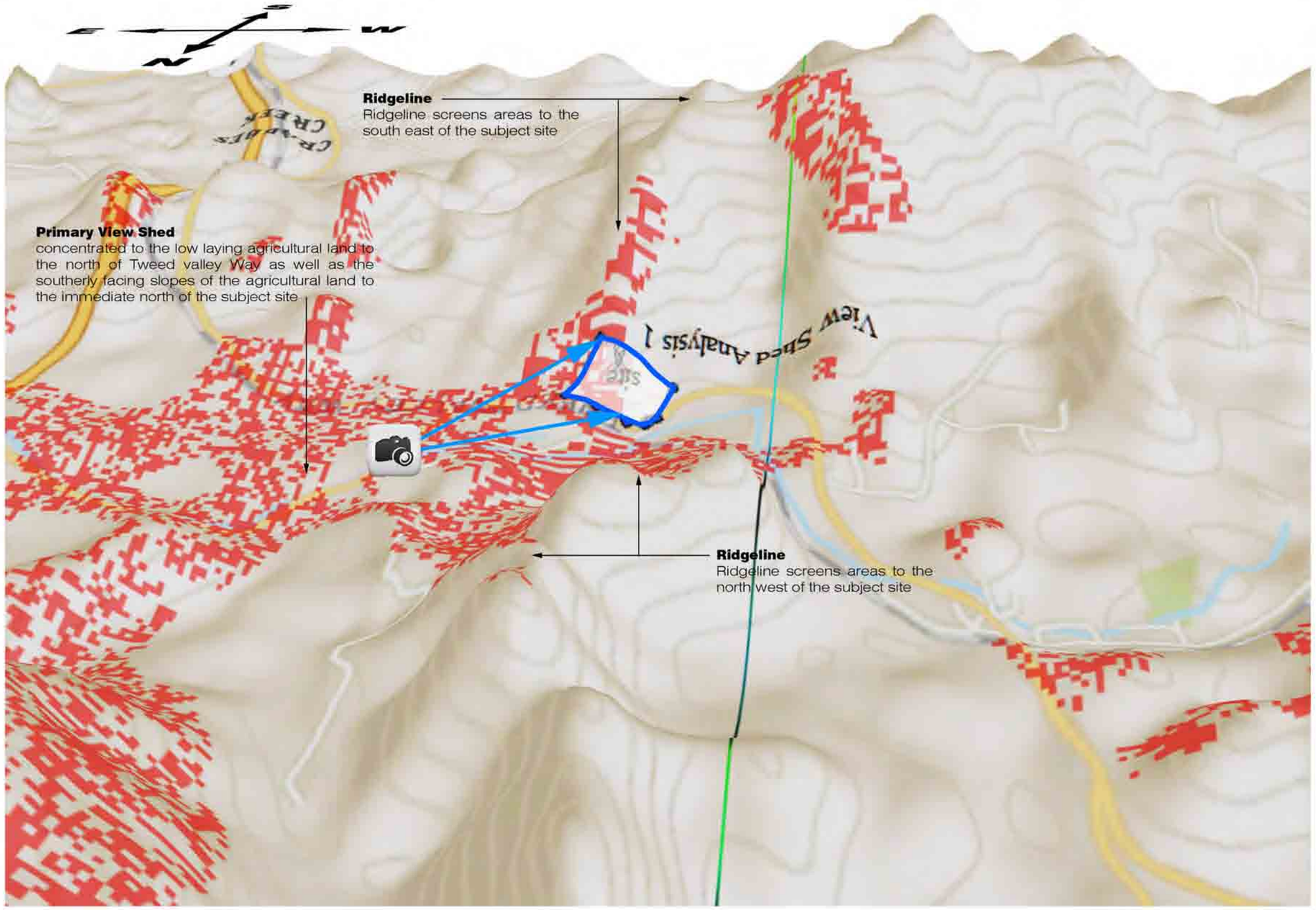
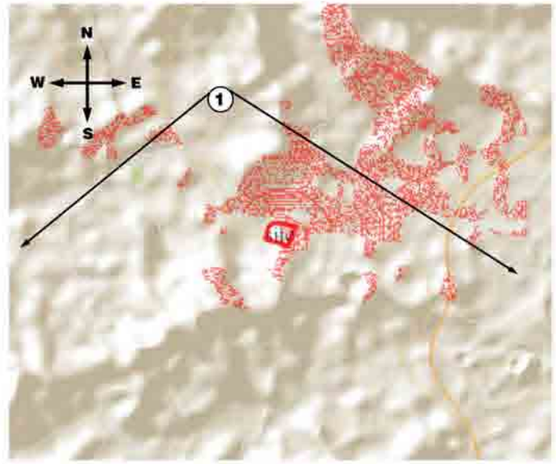
Concept Masterplan



Aerial Isonometric Visual Topographic Map 01
Base Data: Aster GDEM Elevation Data



Viewpoint Context Plan

Subject Site

Primary View Shed

Aerial Isonometric Visual Topographic Map 01

With reference to the above context plan, this view illustrates the impact of the surrounding topography on limiting the visual exposure of the site. The prominent ridgelines to the north west and the south west act to contain the view shed to the north east.

Site Photo
Refer to map for location

Visual Shed Analysis: Visual Topographic Map 01

Part Lot 2 DP 828280 – No. 5993 Tweed Valley Way, Mooball NSW

Scale: As shown | Drawing No: MB_SA_23 | Date: September 2012

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admin@planitconsulting.com.au
PLANIT CONSULTING

STATUTORY DECLARATION

TO WHOM IT MAY CONCERN,

I the undersigned, Robert Edward Harnett of No. 5993 Tweed Valley Way, Mooball in the State of New South Wales do hereby and solemnly declare and affirm that:

The property legally referred to as Lot 2 DP 828280, No. 5993 Tweed Valley Way, Mooball has not been subject to any uses that under the provisions of State Environmental Planning Policy No. 55 would cause detriment or contamination to the soil profile of the site or on any of the surrounding properties.

The site has not been used for the storage of any hazardous chemicals, intensive agriculture, banana farming or cattle dipping. In the early 1970's a cover crop of sweet potatoes was grown on a small portion of this land. This site has only been used for cattle grazing before and after this cover crop and no traces of any hazardous chemicals have been detected in the testing of cattle sold from this property.

I make this solemn declaration conscientiously believing the same to be true and by virtue of the provisions of the Oaths Act 1900.

NAME: ROBERT EDWARD HARNETT SIGNATURE: Robert Harnett

Declared at BURRINGBAR in the state of New South Wales this 12TH day of SEPTEMBER 2012.

Before me

Name of Witness: MEREDITH CLARKE

Signature of Witness: .....

Address of Witness: 676 UPPER BURRINGBAR RD UPPER BURRINGBAR NSW 2483

Title or Qualification of Witness: .....

MEREDITH JOANNE CLARKE
A JUSTICE OF THE PEACE
IN AND FOR THE STATE OF N.S.W.
No: 197054

COZENS · REGAN
WILLIAMS · PROVE PTY LTD
INCORPORATED IN QUEENSLAND ACN 009 914 274 ABN 23 009 914 274

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CIVIL ENGINEERING REPORT

Proposed Residential Development
Lot 2 DP828280
Tweed Valley Way, Mooball

Prepared by:

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Director
Cozens Regan Williams Prove Pty Ltd

Date:
June 2012
Revision:
August 2012

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PROPOSED RESIDENTIAL DEVELOPMENT
TWEED VALLEY WAY, MOOBALL

TABLE OF CONTENTS

1.0 INTRODUCTION

This report has been prepared in support of a Rezoning Application on behalf of Mr R & S Harnett for a proposed residential land development at Mooball.

This Civil Engineering Report summarises our various preliminary investigations and designs into the existing services. The Report addresses the existing engineering constraints and proposes solutions which are tailored to enable practical and cost effective development of the project.

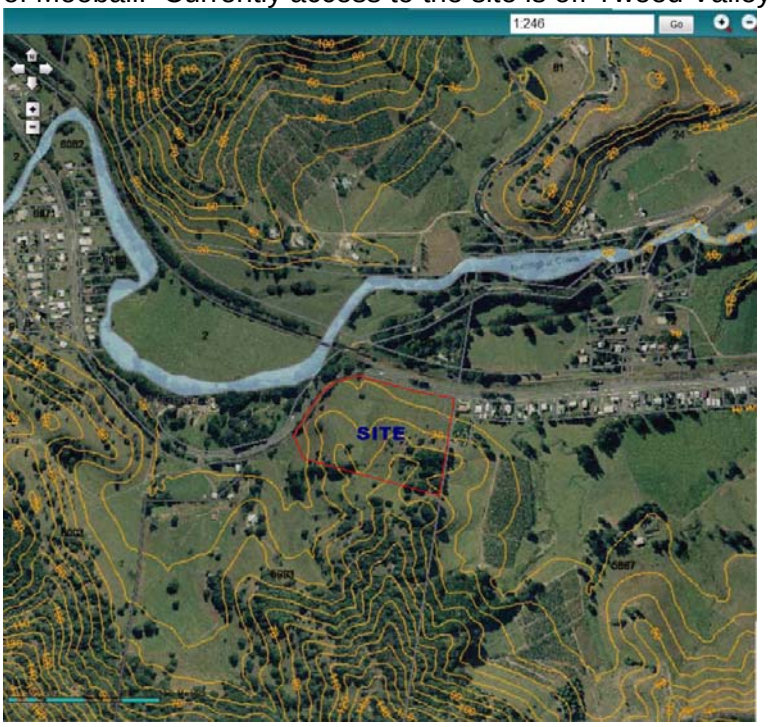
The works described will be subject to further detail design and approvals by Tweed Shire Council.

2.0 THE SITE

2.1 LOCATION

The site is located on Tweed Valley Way, Mooball. The property is described as Lot 2 DP828280 and has a land area of 60.31ha of which only a portion is to be used for the proposed development. The Part Lot has an area of approximately 5.077ha.

The proposed works involve the creation of residential allotments. The site is surrounded by existing rural properties and existing residential allotments that make up the township of Mooball. Currently access to the site is off Tweed Valley Way.



3.0 PLAN OF DEVELOPMENT

3.1 THE PROPOSAL

The proposal is to rezone the existing land to residential allotments. The proposed plan is attached in Appendix A.

3.2 EXISTING DESIGNATION

The site is currently zoned as 1(a) Rural pursuant to the Tweed Local Environmental Plan 2000.

3.3 TOPOGRAPHY

The site has a ridge on the southern side of the proposed development area with levels ranging from RL52 to RL16. Existing gullies discharge to the North West corner of the site and the eastern boundary.

A slope analysis for the existing conditions and the proposed final surface after development has been undertaken and details contained in Appendix B .

The slope analysis indicates that the slopes range from 10-20% for the majority of the site for the pre and post development options. There are some sections of the site that are greater than the 25% and generally these areas are to be left in their existing state.

3.4 VEGETATION

The property is used for agricultural purposes. The majority of the site has been cleared of vegetation and is cover in grass.

An assessment of the vegetation on site has been prepared by Planit Consulting and forms part of the Planning Proposal Application.

4.0 EARTHWORKS

The earthworks proposed for the development will require cut to fill earthworks. The earthworks generally comply with Council's policy "D6 – Site Regrading", having depths of cut/fill in the order of 0-2m. The intersection of Road 1 and Road 2 requires 4-5m of cut to ensure construction of a safe intersection. Terraced retaining walls are proposed along the Road 2 alignment to limit the extent of the earthworks. No access to these lost is proposed along his road frontage. No benching of the individual sites is proposed.

All earthworks will be done to Level 1 Geotechnical Supervision and in accordance with an Erosion and Sediment Control Plan and standard requirements.

A preliminary geotechnical investigation is to be carried out prior to the rezoning of the lands.

5.0 FLOODING

The site has been assessed and has been determined as unaffected by regional flooding.

In accordance with the "Tweed Development Control Plan: Section A3 – Development of Flood Liable Land – Map 25", the highest flood level is approximately RL12.0AHD. It is noted that the site is above this level.

6.0 STORMWATER

The site has two overland discharge points. No pipe outlets exist for the site. The legal point of discharge is Tweed Valley Way.

The site will be drained by conventional in ground and overland flow drainage systems for the minor and major discharge events. The pipe systems will directed to landscaping and Water Sensitive Urban Design (WSUD) devices. The latest WSUD principles shall be implemented on the site.

The pipe drainage system is to be directed through landscaping areas to facilitate nutrient stripping prior to discharge from the site.

Overland flow paths will remain the same and unchanged as will the existing discharge points.

Retention of the stormwater will be required to be provided to ensure that there is no nett increase in the stormwater site discharge. The mitigation is to be provided by the implementation of basin areas located within the site.

7.0 SEWERAGE RETICULATION

Council records show that there is no existing external sewerage infrastructure connected to this site and that the existing system has insufficient capacity. It is therefore intended to enter into a contract "Sirex" to provide a total package of a reticulated sewerage system connected to each property and a waste water treatment plant to cater for the proposed development. As the rezoning lands are adjacent to the PP10/007 site, Sirex have acknowledged that an extension of infrastructure will be possible.

The waste water treatment is to be designed to provide class A+ quality effluent that can be utilised as recycled water. The installation of a pressurised recycled water system for water reuse and fire fighting will significantly reduce the demand for potable water.

8.0 WATER RETICULATION

Council records show that an existing 150mm diameter water main is located in Tweed Valley Way. This main services the township of Mooball.

The existing water main has limited capacity and will be unable to service the development during peak demand periods. It is therefore proposed that to extract potable water from the existing water main in Tweed Valley Way during the off peak periods and store this water in internal reservoirs, pressurised and reticulated to each property within the development. This supply is to be supplemented by installing a recycled water reticulation system that is also connected to each allotment.

The recycled water is be generated from the onsite sewerage treatment system. Sirex will be contracted to provide this service.

All future dwellings are envisaged to be serviced by a roof capture rain water tank system to provide drinking water.

Fire fighting water is to be provided on the recycled system.

9.0 OTHER SERVICES

Country Energy and Telecom domestic services are available from existing underground reticulation which runs along the front of the site and can be used to service the proposed development.

Upgrading of these services may be required and will be the subject of further assessment associated with further approvals.

10.0 CONCLUSION

This civil engineering report, to support a rezoning application, has shown that the proposed residential development on Lot 2 DP828280 for this site can be serviced and constructed using suitable engineering solutions to Council's requirements. All preliminary comments and assumptions are subject to confirmation by detail design.

APPENDIX A

Concept Plan

MOOBALL ROAD, MOOBALL

PROPOSED SUBDIVISION PLAN

SCALE:	1/1000 @ A3
DRAWN:	ZP
DATE:	07/12
REV:	01
DRAW NO.:	MOODALRD_SUBPLAN_01
CHECKED:	AS

NORTH

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admin@planitconsulting.com.au
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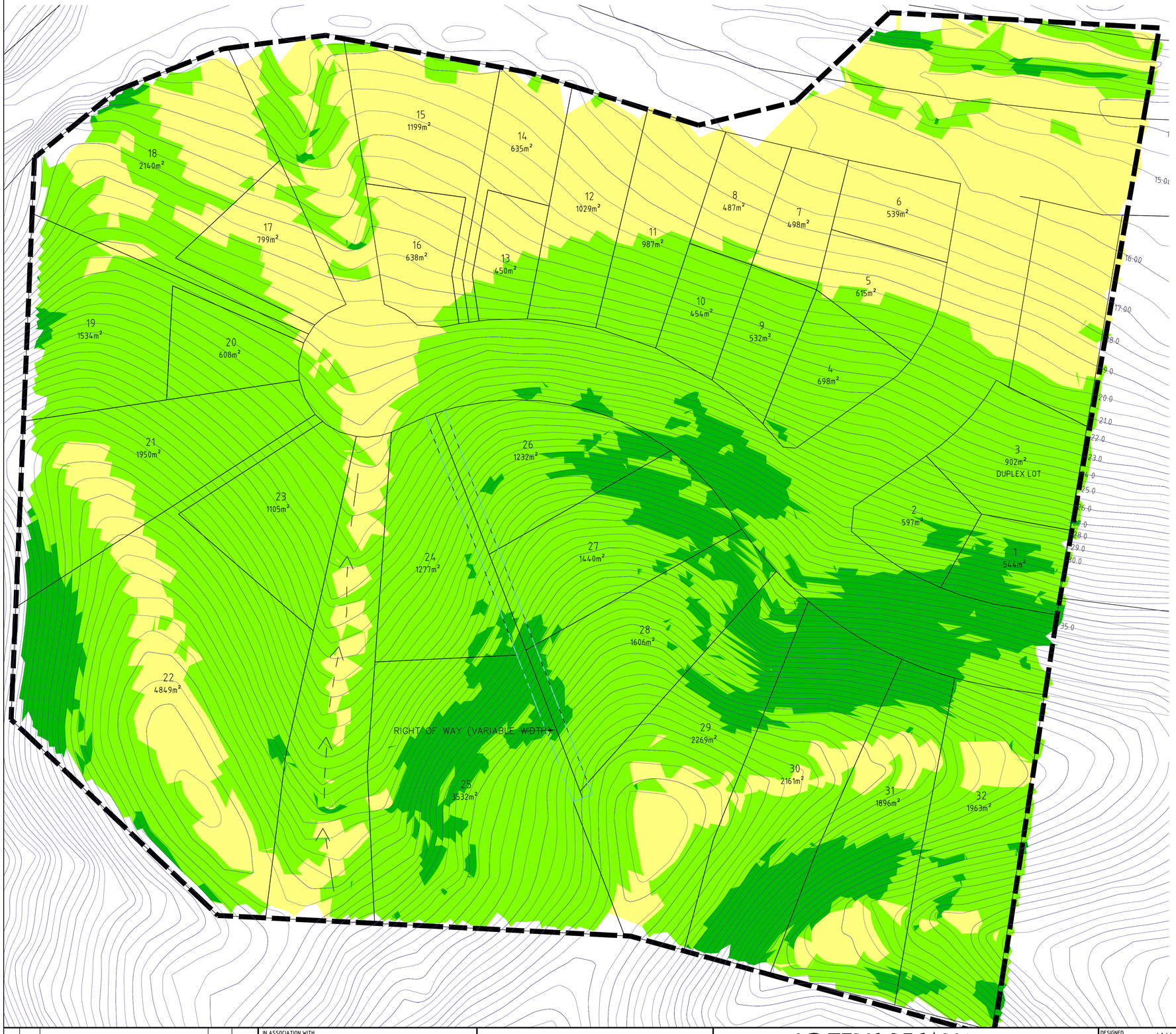
APPENDIX B

Slope Analysis Plan



Slopes Table

No.	Slope	Colour
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2	8 -18 DEGREES	
3	> 18 DEGREES	

No.	DATE	ISSUE	REVISED	CHECKED
A	???	ORIGINAL ISSUE	????	????

IN ASSOCIATION WITH

PRELIMINARY
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SCALE A

SCALE B

DATUM ????

SCALES SHOWN ARE AT A1 SIZE

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DESIGNED J.A.W.
DRAWN D.P.G.
CHECKED J.A.W.

APPROVED FOR AND ON BEHALF OF COZENS REGAN WILLIAMS PROVE PTY LTD (RPEQ No 4)

(RPEQ No 4536)

CLIENT Mr R & S Harnett

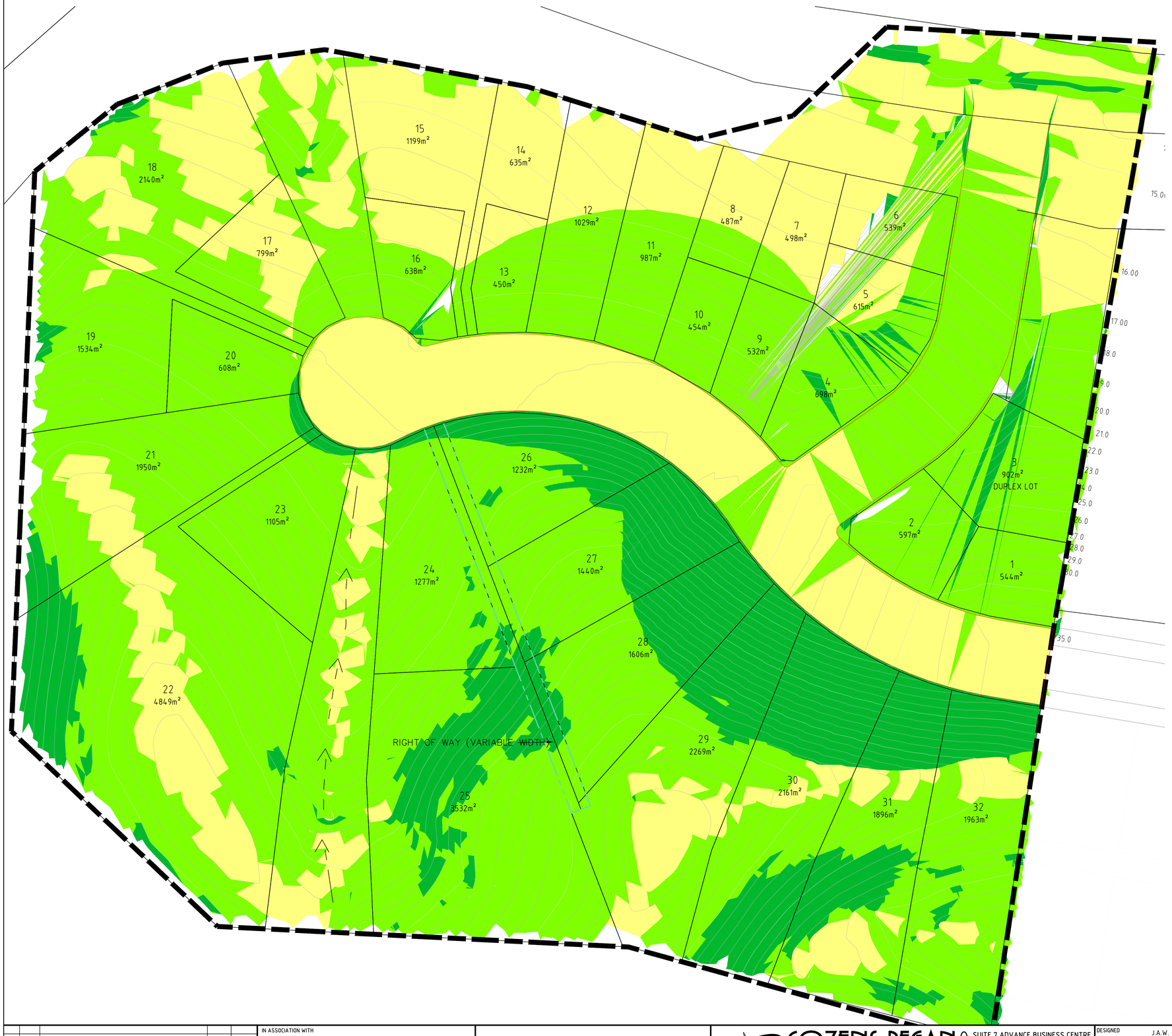
PROJECT
MOOBALL RESIDENTIAL SUBDIVISION
TWEED VALLEY WAY, MOOBALL

EXISTING SURFACE SLOPE ANAYLSIS

JOB NO. P.15.41

DRAWING NO. Sk.6

ISSUE A



Slopes Table

No.	Slope	Colour
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SCALE B

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CLIENT Mr R & S Harnett

PROJECT MOOBALL RESIDENTIAL SUBDIVISION
TWEED VALLEY WAY, MOOBALL
CONCEPT FINISHED SURFACE SLOPE ANAYLSIS

JOB NO. P.15.41

DRAWING NO. Sk.7

ISSUE A

FIGURES

No.	DATE	ISSUE	REVISED	CHECKED
B	09/12	LAYOUT AMENDED	D.P.G.	J.A.W.
A	06/12	ORIGINAL ISSUE	D.P.G.	J.A.W.

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SCALE B

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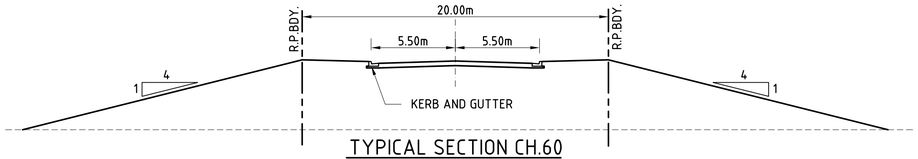
CLIENT MR R. & S. HARNETT

PROJECT
MOOBALL RESIDENTIAL SUBDIVISION
TWEED VALLEY WAY, MOOBALL
EARTHWORKS CONCEPT PLAN

JOB NO. P.15.41

DRAWING NO. Sk.5

ISSUE A|B



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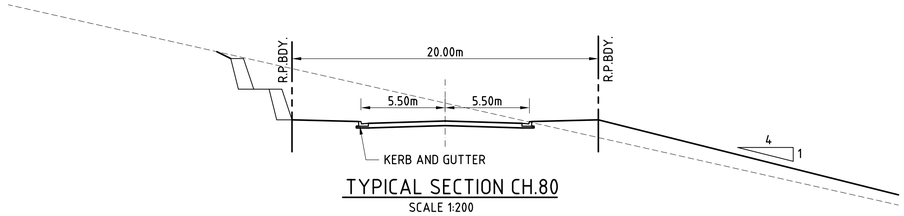

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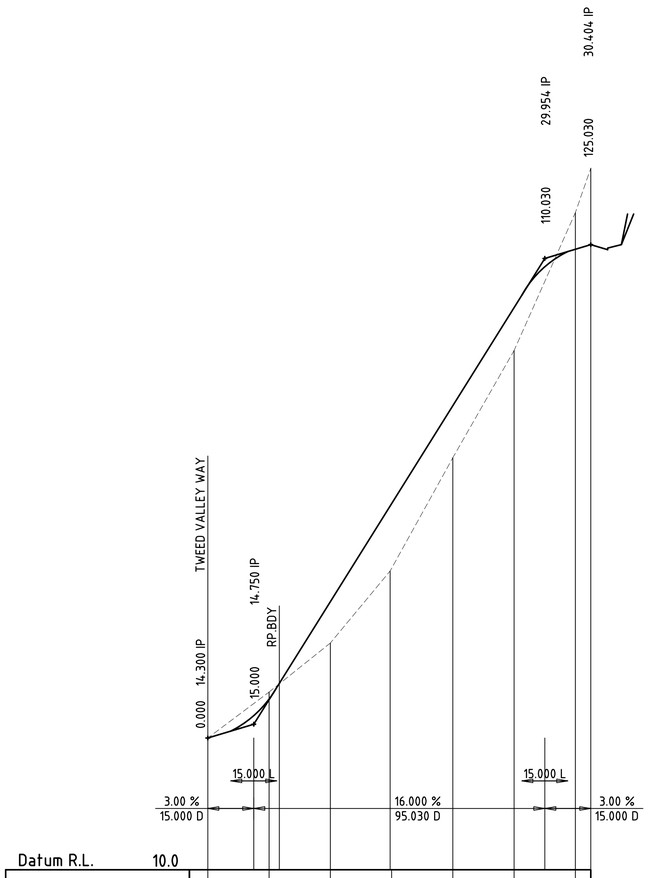

Datum R.L. 10.0

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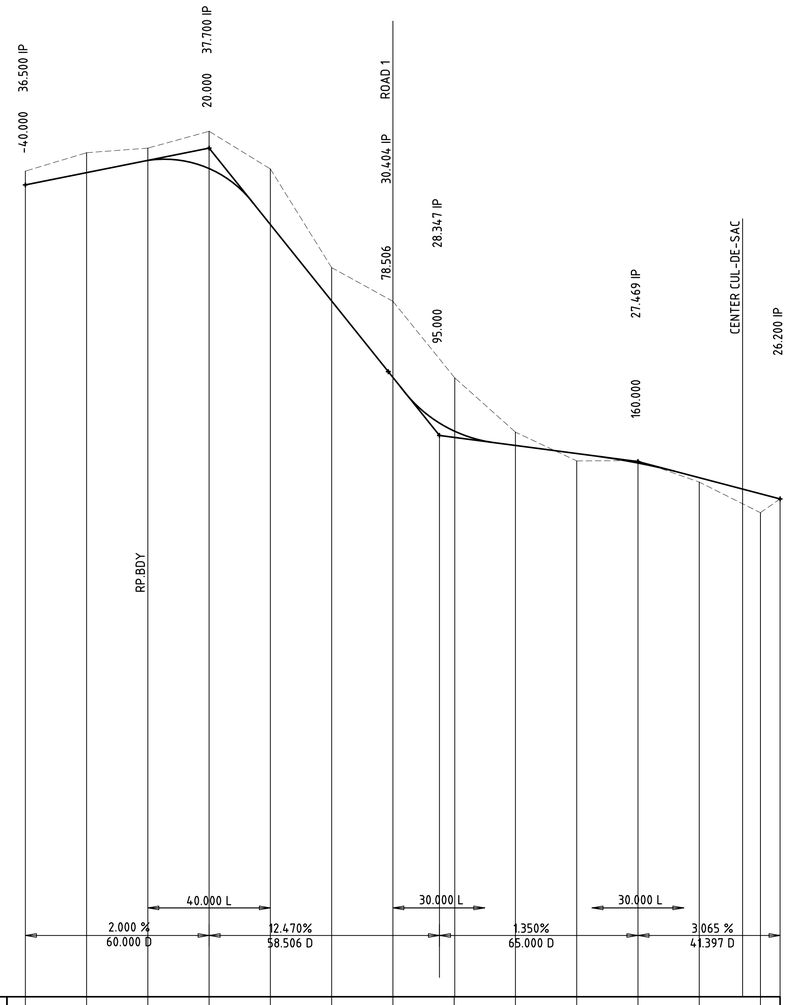
SURFACE LEVELS	14.300	15.800	17.400	19.750	23.450	26.950	31.450	32.900
PEGGED CHAINAGE	0.000	20.000	40.000	60.000	80.000	100.000	120.000	125.030
PEGGED HORIZONTAL	0.000							

ROAD 1



Datum R.L. 10.0

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SURFACE LEVELS	36.950	37.550	37.700	38.250	37.020	33.800	32.700	30.200	28.430	27.490	27.500	26.800	25.800	26.250
PEGGED CHAINAGE	-40.000	-20.000	0.000	20.000	40.000	60.000	80.000	100.000	120.000	140.000	160.000	180.000	200.000	206.397
PEGGED HORIZONTAL			0.000											

ROAD 2

No.	DATE	ISSUE	REVISED	CHECKED
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SCALE A 0 10 20 30 40 50 — 1 : 1000 HORIZ.

SCALE B 0 1 2 3 4 5 — 1 : 100 VERT.

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CLIENT MR R. & S. HARNETT

PROJECT MOOBALL RESIDENTIAL SUBDIVISION
TWEED VALLEY WAY, MOOBALL
OPTION 1

JOB NO. P.15.41

DRAWING NO. Sk.3

ISSUE A

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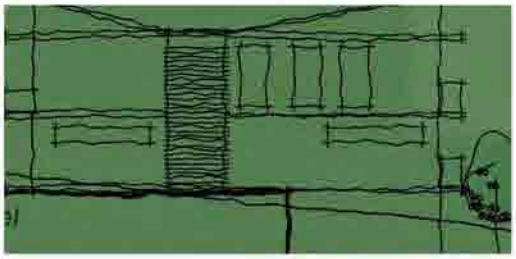
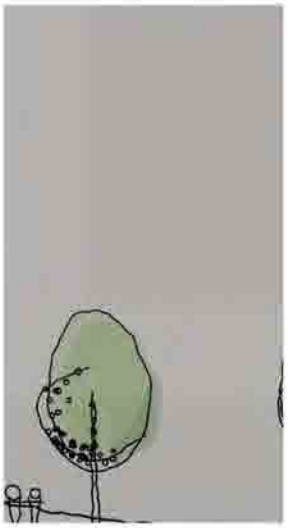
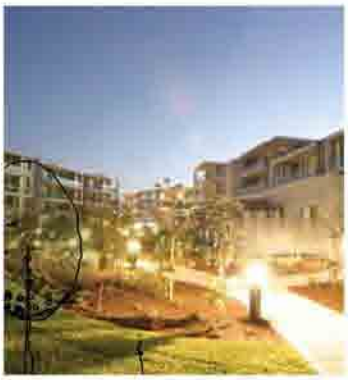
PLANIT CONSULTING

Preliminary Review of Terrestrial Flora & Fauna Values

Tweed Valley Way, Mooball
prepared for Rob and Sue Harnett





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Document Control

Issue	Date	Description	Prepared By	Checked By
A	11/4/12	Internal issue	GD	AS

1.0 INTRODUCTION

Planit Consulting has been commissioned by Rob and Sue Harnett to prepare preliminary terrestrial flora and fauna assessment documentation over land situated at Tweed Valley Way, Mooball (refer Figure 1). This report outlines the results of brief flora and fauna investigations and describes vegetation types, habitat associations and preliminary ecological values of the subject property. This information is intended to be utilized as a scoping document identifying potential ecological constraints associated with future intended development of the land. The preliminary constraints identified to date, when considered in association with scoping studies of additional disciplines (i.e. geotechnical, hydraulic, traffic, land use planning etc), should generate the framework for determining an appropriate pattern of development or use over the subject land.

2.0 SITE DESCRIPTION & LOCATION

The subject property incorporates part **Lot xxxxxx** which is accessed via Tweed Valley Way in Mooball. The area of the property investigated is the northeastern corner which is identified as a potential 'urban release' area (refer Figure 1). This area (as identified in Figures 1 and 2) shall hereafter be referred to as 'the site.'

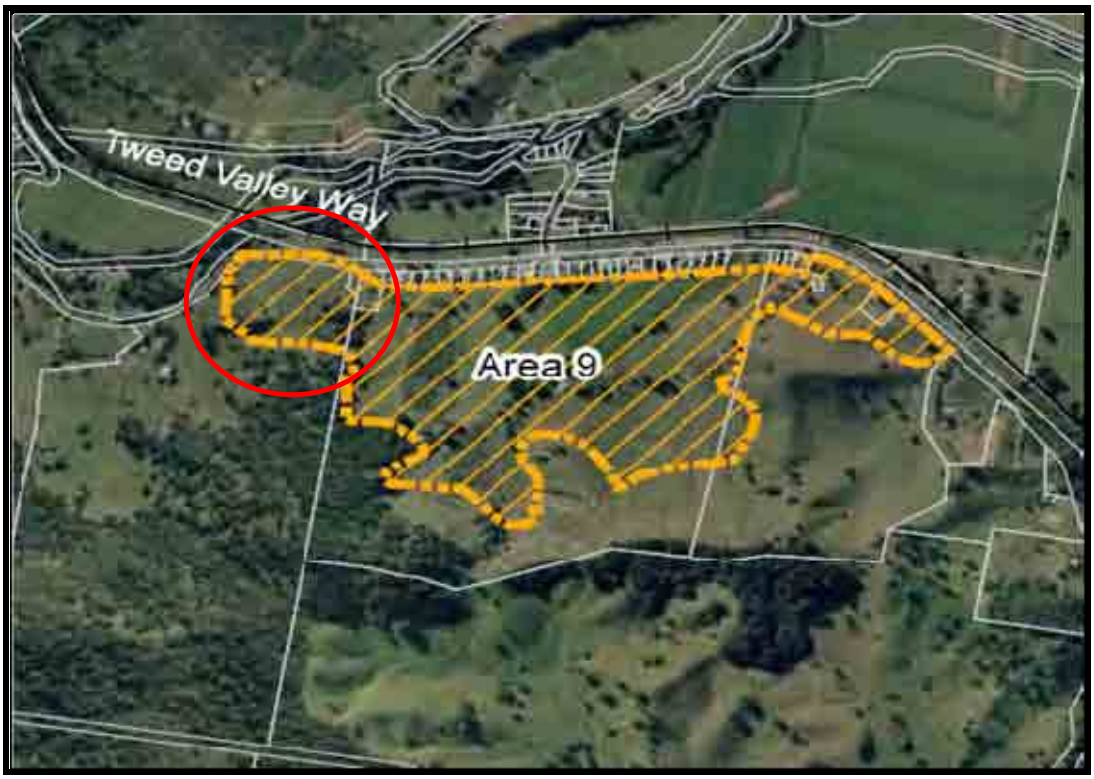


FIGURE 1: EXTENT OF AREA 9 POTENTIAL URBAN RELEASE LANDS
SOURCE: GHD, 2008: FIGURE 18

FIGURE 2: SITE LOCATION & AERIAL PHOTOGRAPH (2009)
SOURCE: http://mapping.tweed.nsw.gov.au/tweedmaps/

2.1 EXISTING USE AND RESULTANT VEGETATION

The site is relatively small in extent (~6ha) and is currently occupied primarily by pasture grassland in association with the ongoing pastoral use. Several tracks and stock watering sites associated with the cattle graze were also noted. Trees are sparsely scattered throughout the paddocks with a narrow band of primarily camphor laurels located adjacent the northwestern boundary (i.e. adjacent Tweed Valley Way). No patches of native remnant vegetation occur on the site. Comparison of the existing tree coverage with the available 2009 aerial photograph indicates that numerous previously occurring camphor laurels have been removed from the site between 2009 and 2012.

The relevant TSC VMP Mapping notes the site to be cleared of vegetation with a small area of Vegetation Type 1004 Camphor Laurel Dominant Open to Closed Forest adjacent the western boundary.

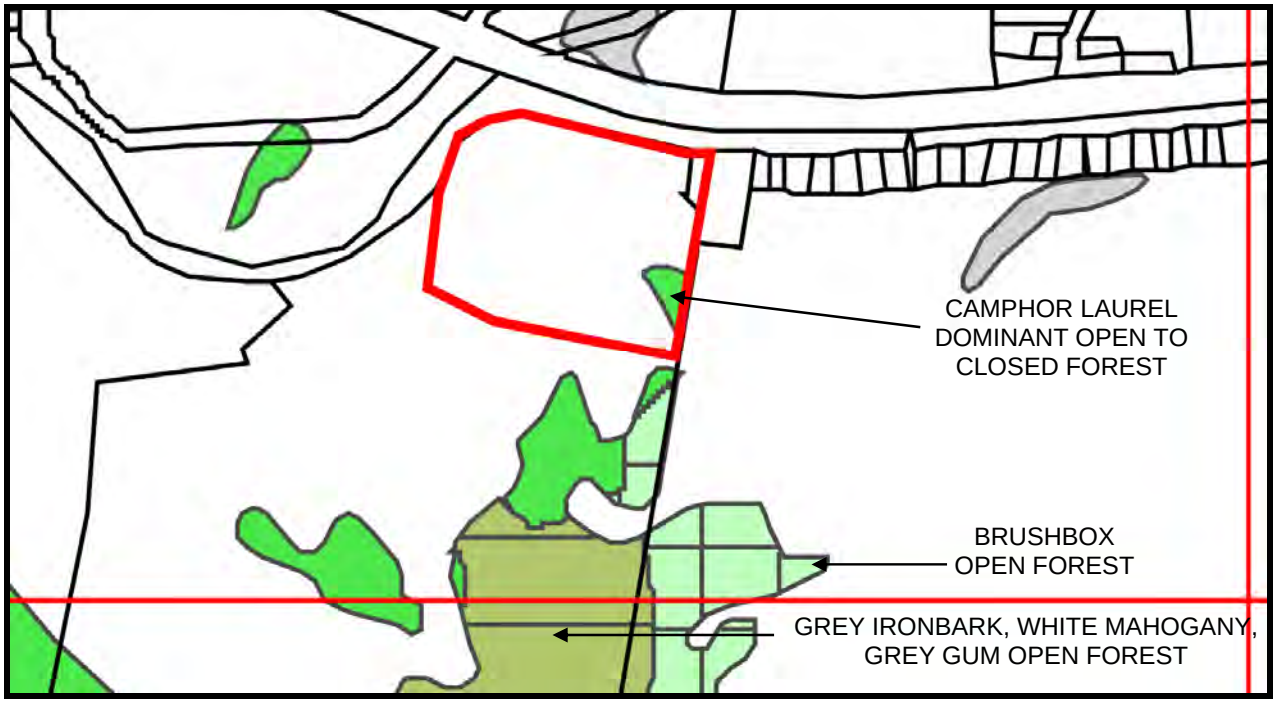


FIGURE 3: TWVMP MAP 2: VEGETATION TYPE
(SOURCE: TWEED VMP, 2004)

FIGURE 3A: TWEED LEP MAP: VEGETATION
SOURCE: http://www.tweed.nsw.gov.au/modules/propertymaster
/default.aspx?page=wrapper&key=42378

FIGURE 3b: LOCATIONS OF PREVIOUS CAMPHOR LAUREL REMOVAL

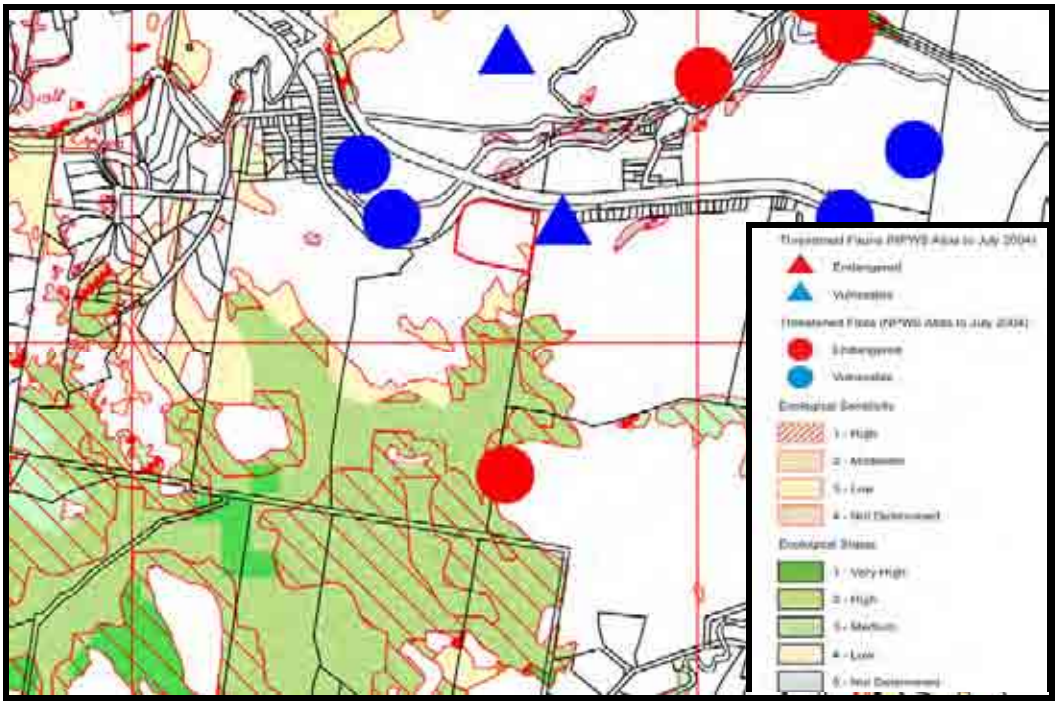


FIGURE 3C: TWVMP MAP 4: ECOLOGICAL VALUES
(SOURCE: TWEED VMP, 2004)

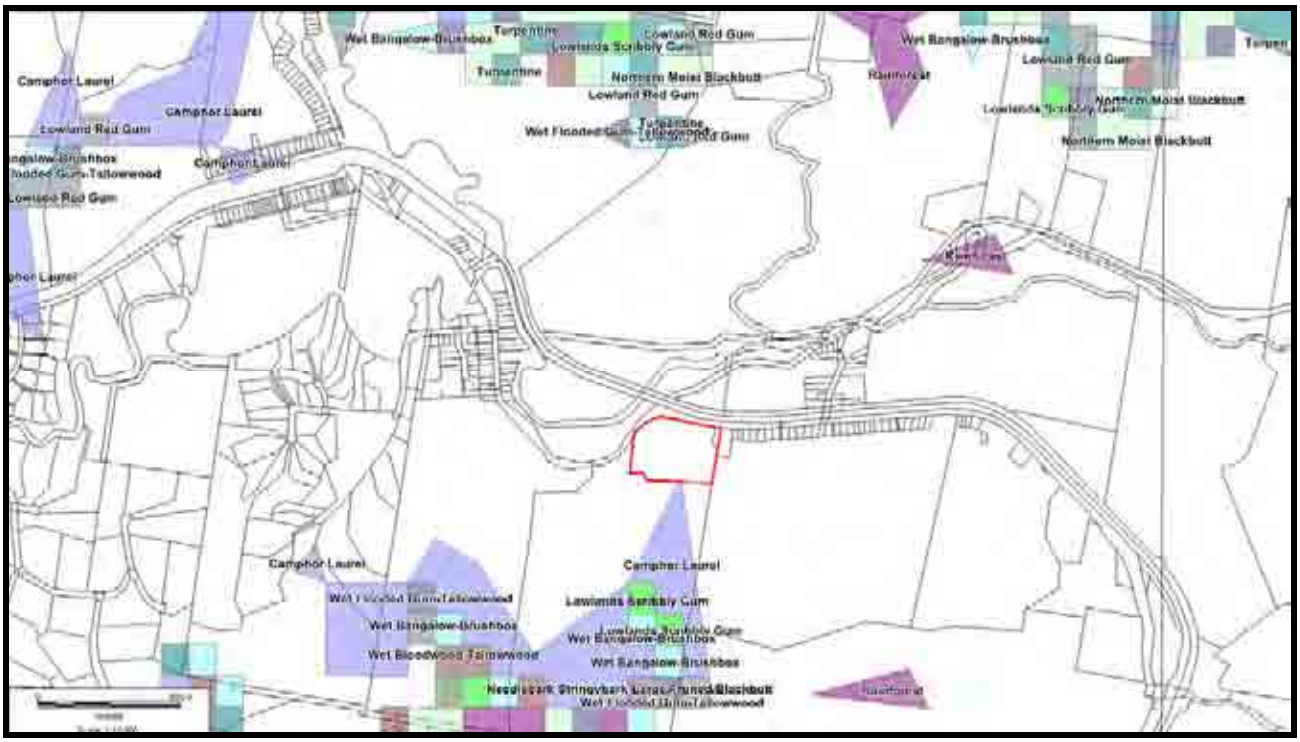


FIGURE 3D: UPPER NORTH EAST CRA FOREST ECOSYSTEM LAYER
DATA SOURCE: NPWS, 2005

2.2 PROJECT DESCRIPTION

The project is intended to be a residential subdivision containing lots of various sizes. A residential concept plan is contained within Attachment 3.

2.3 SOIL LANDSCAPES

A review of Tweed VMP Map 5: Soils notes one soil landscape over the site:

Erosional Soil Landscapes Erosional landscapes have been primarily sculpted by erosive action of running water. Streams are well defined and competent to transport their sediment load. Soil depth is usually shallow (with occasional deep patches) and mode of origin is variable and complex. Soils may be either absent, derived from water washed parent materials or derived from in situ weathered bedrock. Erosional soil landscapes usually include tors, benches, and areas of rock outcrop. Evidence of mass movement is rare. This group consists of the following soil landscape units; Billinudgel (bi), Burringbar (bu), Byrrill (by), Frogs Hollow (fh), Green Pigeon (gp), Kunghur (ku), Limpinwood (li), Mount Terragon (mt) and wollumbin (wl). The Mebbin (me) unit is considered as an Erosional/Colluvial landscape.

Such areas are described in more detail within 'Soil Landscapes of the Murwillumbah Tweed Heads' (Morland, 1996) and mapped as:

- Billinudgel Erosional Landscape (bi)

Location: Low hills on the metasediments of the Neranleigh-Fernvale Group. Occurs throughout the Burringbar Hills, generally on the margins.

Geology: Palaeozoic Neranleigh-Fernvale Group. Thinly bedded fissile shales, siltstones and sandstones with occasional more massive greywackes, volcanic tuffs, agglomerates, sandstones and massive cobble conglomerates.

Topography: Rolling low hills that abut the higher and steeper Burringbar soil landscape. Relief is 50-100m and slopes range from 10-20%, with some localised steeper (>33%) areas. Elevation ranges from near sea level to 100m. Slope length is generally moderate (200-300m) and slopes shave is siple, occasionally waning. Ridges and crests are narrow.

Soils: deep (>100cm) moderately well-drained Red Podzolic Soils on crests, moderately deep (70-100cm) moderately well-drained Yellow Earths and Yellow Podzolic Soils on slopes; better drained areas (Morand 1996; 53-55 + map).

Tweed VMP Map 5 provides similar information to Morland (1996) and also identifies the site as containing steep land.

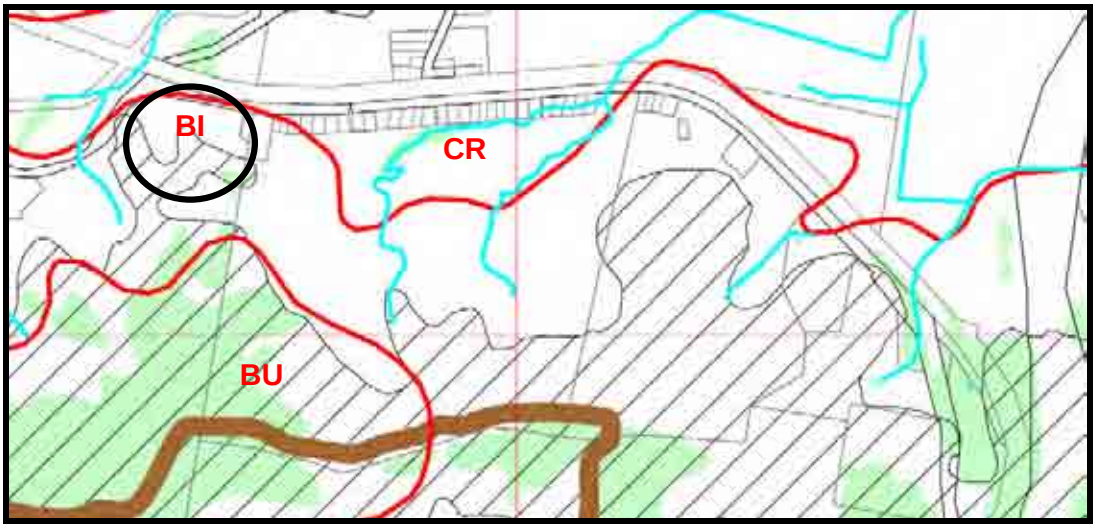


FIGURE 4: TWEED VMP MAP 4: SOIL LANDSCAPE, STEEP LAND AND DRAINAGE LINES MAPPING

2.4 EXISTING DRAINAGE

Currently site drainage occurs as sheet flow from the slopes into two broad and grassed overland flow paths (one to the north, one to the east).

2.5 AIMS OF STUDY

The aim of this report is inspect the site and:

- Review and describe the existing flora, vegetation communities, fauna assemblage and associated habitats of the site and adjoining areas,
- Determine the occurrence, or potential occurrence, threatened species, populations, their habitats or endangered ecological communities as a result of brief survey and literature review,
- Identify preliminary ecological constraints relevant to the future development or use of the land including potential presence of threatened species, populations, endangered communities, areas of high biodiversity, riparian corridors, wetlands, wildlife corridors, poorly conserved ecosystems etc
- Prepare ecological status/constraints map

2.6 DEFINITIONS, TERMINOLOGY AND NOMENCLATURE

For the purposes of this assessment the following definitions apply:

Site: refers to the extent of the lands forming the boundaries of the site as described in Section 2.0 and displayed in Figure 2.

Study Area: refers to the site and additional areas which could be potentially affected by the development directly or indirectly. In this case the study area is considered to be that area incorporating the site and buffered by a zone of 50m (to allow for potential offsite impacts such as edge effects, silt deposition, transfer of dust from construction equipment travel on roadways, potential uncontrolled domestic animal predation from residential allotments [if created onsite] etc). It is acknowledged that any secondary impacts associated with water quality reduction may have impact further downstream of the site if unmitigated.

FIGURE 5: MAP OF STUDY AREA

Locality: the area within a 10km radius of the centre of the site

Nomenclature for all plant species contained within this document follow Harden (1992, 1993, 2000 & 2003) The Flora of NSW Volumes 1-4. Scientific names for plants are used primarily in the document to avoid any confusion associated with use of common or descriptive plan names.

Nomenclature for all animal species contained within this document follows those utilised by the Department of the Environment and Climate Change/National Parks and Wildlife Service (2012) in association with the Atlas of NSW Wildlife. Scientific names for fauna are used primarily in the document to avoid any confusion associated with use of common or descriptive animal names.

2.7 REPORT STRUCTURE

The structure and content of this flora and fauna assessment is as follows:

- Section 1: introductory statement
- Section 2: details the site description, location and outlines general background information relating to the project and this report including the aims and objectives
- Section 3: details the methodology for the brief flora survey and resultant species, community descriptions and mapping
- Section 4: details the methodology for brief fauna survey and resultant species records and descriptions of the recorded assemblage
- Section 5: describes and discusses the recorded and potentially occurring scheduled communities, populations and species of conservation significance
- Section 6: provides a summary of the areas of preliminary ecological significance as determined through this report and provides a preliminary map of ecological status.

3.0 VEGETATION ASSESSMENT

To classify and identify vegetation communities and species which occur on-site, the following methodology was applied:

- Desktop analysis including:

i. Review of Council's Planning Scheme Mapping & Associated Reporting (i.e. Tweed LEP 2000 Maps, Tweed VMP Maps 1-7)

ii. Review of existing vegetation community documentation to confirm dominant elements, forest descriptions and conservation status of mapped forested remnants/ecosystems including:

   - Forestry Commission NSW (1989) *Research Note 17: Forest Types in NSW*.
   - National Parks and Wildlife Service (1999) *Forest ecosystem classification and mapping for the upper and lower north east cra regions*. CRA Unit-Northern Zone.
   - DECC (2008) *BioMetric: Terrestrial Biodiversity Tool for the NSW Property Vegetation Planning System: Definitions of Vegetation Types for CMA Areas* (online @ http://www.environment.nsw.gov.au/projects/BiometricTool.htm)
   - Keith, D. (2004) *Ocean Shores to Desert Dunes*. The native vegetation of NSW. DECC, Hurstville.
   - Ecograph (2004) *Tweed Vegetation Management Strategy*. Ecograph, Limpinwood.
   - Sheringham, P.R., Dr. Benwell, A., Gilmour, P., Graham, M.S., Westaway, J., Weber, L., Bailey, D., & Price, R. (2008). *Targeted Vegetation Survey of Floodplains and Lower Slopes on the Far North Coast*. A report prepared by the Department of Environment and Climate Change for the Comprehensive Coastal Assessment. Department of Environment and Climate Change (NSW), Coffs Harbour, NSW.

iii. Review of threatened flora species and endangered ecological communities listed as occurring within the Murwillumbah (Qld - Southeast Hills and Ranges) CMA sub-region of the Northern Rivers CMA (http://threatenedspecies.environment.nsw.gov.au/tsprofile/cma_subregion_list.aspx?id=15

iv. Review of search of the Atlas of NSW Wildlife database within a search area 10km surrounding the site to review threatened plant records

v. Review of Environment Australia Protected Matters data within a search area 10km surrounding the site to review threatened plant records

vi. Review of SEPP Mapping (Coastal Wetlands, Littoral Rainforest) mapping to determine the indicative presence/absence of regional forest ecosystems reflective of wetland (marine, estuarine, riverine, lacustrine and/or palustrine) communities and/or Littoral Rainforests.

vii. Review of the following legislation to ensure the latest lists of threatened species and communities were noted as well as investigating the existence of any relevant recovery plans, threat abatement plans, key threatening

processes or any preliminary determinations which may be applicable to the site and/or the proposed use/action:

- *Threatened Species Conservation Act (1995)*
- *Environment Protection and Biodiversity Conservation Act (1999)*

- Site survey including:

  i. Random Meander/Diversity Searches:

  Random searches recording all species observed was undertaken in accordance with Cropper (1993) and DEC (2004). Knowledge of known habitat of protected and uncommon floral species was utilized to target such species.

  Searches were undertaken over 3 person hours on 10th April 2012. As the vegetation inspections were related to preliminary constraints reporting additional systematic techniques such as belt transects and quadrats were not performed. The primary purpose of the vegetation inspections was to identify broad vegetation communities and identify poorly conserved vegetation types and scheduled endangered ecological communities.

The above survey techniques were developed in order to:

- Validate or modify existing vegetation mapping;
- Identify floral species existing within areas investigated;
- Estimate Crown Cover (Walker and Hopkins, 1998, Nelder, 2004. EPA, 2005) to determine vegetation structure designations;
- Estimate average height of canopy trees;
- Identify senescent trees;
- Determine species dominance within ecologically dominant layer;
- Determine incidence of weed invasion and disturbance over the site and within vegetation strata;
- Determine incidence of species listed as endangered, vulnerable or rare under the *Threatened Species Conservation Act;*
- Determine incidence of species listed as endangered or vulnerable under the *Environment Protection and Biodiversity Conservation Act 1999*

Structural Analysis

In this instance the dominant stratum (grass, shrub or tree) height was estimated occularly by experienced observers. Height classes were then selected from classifications provided in Walker & Hopkins (in McDonald et al, 1998).

Crown cover % for the dominant layer was also estimated using the mean of two experienced observers. *Structural formation classes* were determined via an assessment of growth form and crown cover % information as per Walker & Hopkins (1998).

Table 1: Height Classes & Names for Various Growth Forms (sensu Walker & Hopkins, 1998: Table 15)					
Height		**Growth Form**			
Height Class	**Height Range (m)**	**Trees, vines, palms**	**shrub, heath shrub, chenopod shrub, mallee (tree or shrub form), cycads**	**tussock grass, hummock grass, forbs, rushes, sedges, ferns, Xanthorrhoea**	**Sod grasses, mosses, lichens, liverworts**
9	>35.01	Extremely tall	N/A	N/A	N/A
8	20.01-35	Very Tall	N/A	N/A	N/A
7	12.01-20	Tall	N/A	N/A	N/A
6	6.01-12	Mid-high	Extremely tall	N/A	N/A
5	3.01-6	Low	Very tall	Extremely tall	N/A
4	1.01-3	Dwarf	Tall	Very tall	N/A
3	0.51-1	N/A	Mid-high	Tall	Extremely tall
2	0.26-0.5	N/A	Low	Mid-high	Tall
1	<0.25	N/A	Dwarf	Low	Low

Table 2: Structural formation classes defined by growth form and crown separation (Walker & Hopkins, 1998: Tables 14a & 17)						
Crown Separation	*D Closed or dense*	*M Mid-dense*	*S Sparse*	*B Very sparse*	*I Isolated plants*	*L Isolated clumps*
Field criteria	*Touching - overlap*	*Touching - slight separation*	*Clearly separated*	*Well separated*	*Isolated*	*Isolated*
Crown separation ratio	<0	0-0.25	0.25-1	1-20	>20	>20
Crown Cover %	81-100%	52-81%	20-52%	0.2-20%	<0.2%	<0.2%
Growth Form	Structural Formation Classes					
T Tree	Closed forest	Open forest	Woodland	Open woodland	Isolated trees	Isolated clump of trees
M Tree mallee	Closed mallee forest	Open mallee forest	Mallee woodland	Open mallee woodland	Isolated mallee trees	Isolated clump of mallee trees
S Shrub	Closed shrubland	Shrubland	Open shrubland	Sparse shrubland	Isolated shrubs	Isolated clump of mallee shrubs
Y Mallee shrub	Closed mallee shrubland	Mallee shrubland	Open mallee shrubland	Sparse mallee shrubland	Isolated mallee shrubs	Isolated clump of mallee shrubs
Z Heath shrub	Closed heathland	Heathland	Open heath	Sparse heath	Isolated heath shrubs	Isolated clump of heath shrubs
C Chenopod shrub	Closed chenopod shrubland	Chenopod shrubland	Open chenopod shrubland	Sparse chenopod shrubland	Isolated chenopod shrubs	Isolated clump of chenopod shrubs

Table 3: Structural formation classes for ground covers (Walker & Hopkins, 1998: Table 14b))						
Crown class	*D Closed or dense*	*M Mid-dense*	*S Sparse*	*B Very sparse*	*I Isolated plants*	*L Isolated clumps*
Foliage cover	>70	30-70	10-30	<10	<1	<1
Growth Form	Structural Formation Classes					
G Tussock grass	Closed grassland	Grassland	Open grassland	Sparse grassland	Isolated grasses	Isolated clump of tussock grasses
H Hummock grass	Closed hummock grassland	Hummock grassland	Open hummock grassland	Sparse hummock grassland	Isolated hummock grasses	Isolated clump of hummock grasses
D Sod grass	Closed sod grassland	Sod grassland	Open sod grassland	Sparse sod grassland	Isolated sod grasses	Isolated clump of sod grasses
V Sedge	Closed sedgeland	Sedgeland	Open sedgeland	Sparse sedgeland	Isolated sedges	Isolated clump of sedges
R Rush	Closed rushland	Rushland	Open rushland	Sparse rushland	Isolated rushes	Isolated clump of rushes
F Forb	Closed forbland	Forbland	Open forbland	Sparse forbland	Isolated forbs	Isolated clump of forbs
E Fern	Closed fernland	Fernland	Open fernland	Sparse fernland	Isolated ferns	Isolated clump of ferns
O Moss	Closed mossland	Mossland	Open mossland	Sparse mossland	Isolated mosses	Isolated clump of mosses
L Vine	Closed vineland	Vineland	Open vineland	Sparse vineland	Isolated vines	Isolated clump of vines

It is noted that Qld EPA (2005) and Nelder et al (2004) have recently provided Structural formation Class Tables which vary slightly from Tables 1 and 2 above. This table is displayed below:

Table 4: Structural formation classes for woody plant communities qualified by height: (classes defined by growth form, height and cover) [sensu EPA, 2005]				
Foliage projective cover	70-100%	30-70%	10-30%	<10%
Crown separation	closed or dense	mid-dense	sparse	very sparse
Field criteria	touching-overlap	touching - slight separation	clearly separated	well separated
Crown separation ratio	<0	0-0.25	0.25-1	1-20
Crown cover %	81-100%	52-81%	20-52%	0.2-20%
Growth form	*Structural Formation Classes (qualified by height)*			
trees > 30m	tall closed-forest	tall open-forest	tall woodland	tall open-woodland
trees 10 – 30m	closed-forest	open-forest	woodland	open-woodland
trees < 10m	low closed-forest	low open-forest	low woodland	low open-woodland
shrubs 2 – 8m	closed-scrub	open-scrub	tall shrubland	tall open-shrubland
shrubs 1 – 2m	closed-heath	open-heath	shrubland	open-shrubland
shrubs <1m	-	-	dwarf shrubland	dwarf open-shrubland

3.1 VEGETATION SURVEY RESULTS

As a result of flora surveying two (2) vegetation communities were identified on site and are described separately below. Where possible, identified communities have been compared to recognized documents such as Forest Types in NSW (1989), CRA Forest Ecosystems (1999) and the Tweed VMP (2004).

Displayed vegetation maps have been compiled using Mapinfo geographic information system (GIS) software (Ver. 11). Information utilized has included:

- Provided site boundaries, contours and aerial photographs.
- Tweed VMP (2004) vegetation community mapping (VMP MAP 2) boundaries rasterised and registered to property boundaries and aerial photographs
- Upper North East CRA Forest Ecosystem Layer metadata (online @ http://maps.environment.nsw.gov.au/terms.aspx?file=forest_ecosystems_upper_north_east.zip)
- Wetlands of New South Wales metadata (online @ http://maps.environment.nsw.gov.au/terms.aspx?file=nsw_wetlands.zip)

Vegetation survey was performed as outlined above with geo-referenced colour aerial photographs overlaid with contour plans, existing mapped vegetation boundaries and cadastre boundaries utilized for the initial recognition of community boundaries in the field and adjustments noted as necessary. Communities (refer below) were then transcribed directly into the GIS program utilizing the aerials, geological information and vegetation boundaries as a reference background. Where necessary vegetation boundaries were traversed with a hand held GPS (Garmin GPSMap 62S) and loaded into Mapinfo with existing boundaries rectified where necessary.

VEGETATION COMMUNITY 1: TALL CLOSED GRASSLAND/PASTURE INCLUDING SCATTERED TREES [G3D]

This community occupies the majority of the site which has been historically managed for grazing/pastoral and rural purposes. The area occupied by the community is currently cattle grazed with several tracks established and stock watering points noted. The community has been previously altered from the likely pre-existing rainforest to a pasture grassland/weed shrubland mosaic in which the

remnant vegetation has been removed, although several semi-mature to mature trees are retained within the paddocks, principally on ridges.

The paddock is dominated by a variety of established pasture and environmental weed grasses (*Axonopus compressus, Pennisetum clandestinum, Cynodon dactylon, Melinis repens, Setaria sphacelata, Panicum maximum, Digitaria parviflora, Chloris gayana, Andropogon virginicus, Paspalum dilatatum*) etc. Height is dependent upon location with the grazing rotation but at the time of inspection most areas were in the 500-1250mm height range.

As is typical of a paddock environment self sown woody and herbaceous pasture weeds are also common including Balloon Cotton (*Gomphocarpus physocarpus*), Flannel Weed (*Sida cordifolia*), Lantana (*Lantana camara*), Mickey Mouse Plant (*Ochna serrulata*), Paddy's Lucerne (*Sida rhombifolia*), Blue Billygoat Weed (*Ageratum houstonianum)*, Crofton weed (*Ageratina adenophora*), Fireweed (*Senecio madagascariensis*), Rattlepod (*Crotalaria spectabilis*), Thickhead (*Crassocephalum crepidioides*), White Glycine (*Neonotonia wightii*), Siratro (*Macroptilium atropurpureum*), Easter Cassia (*Senna pendula*), Privet (*Ligustrum sinense*), Wild Tobacco (*Solanum mauritianum*), Mistflower (*Ageratum riparia*), Stinking Roger (*Tagetes minuta*), Green Amaranth (*Amaranthus viridis*), Umbrella Tree (*Schefflera actinophylla*), Cobblers Pegs (*Bidens pilosa*) etc.

Notwithstanding the above, rainforest trees remain scattered throughout the paddocks within the 5-15m height range although several trees exceed 15m. Such trees recorded include Hoop Pine (*Araucaria cunninghamii*), Foam Bark (*Jagera pseudorhus*), Teak (*Flindersia australis),* Bumpy Ash (*F. schottiana*), Wild Quince *(Guioa semiglauca)*, Boxwood (*Denhamia celastroides*), Red Kamala (*Mallotus philippensis*), Silky Oak (*Grevillea robusta*), Riberry (*Syzygium luehmannii*) and Blackwood (*Acacia melanoxlyon*). Camphor Laurel (*Cinnamomum camphora*) is also present as is common within the Tweed Valleys.

Several small dead trees occur central to the site indicative of previous Camphor Laurel management. As discussed comparison of the existing tree coverage with the available 2009 aerial photograph indicates that numerous previously occurring camphor laurels have been removed from the site between 2009 and 2012 with such areas now occupied by grassland.

Equivalent vegetation communities

Forest Types in NSW 1989:	Code 216_Improved Pasture and Cropland Code 220_Cleared/Partially Cleared
CRA Forest Ecosystems 1999:	Code 173_Cleared/Partially Cleared
Tweed VMP 2004:	Code 1099_Substantially Cleared of Native Vegetation

Biometric Vegetation Database NRCMA: No equivalent
Keith (2004) Ocean Shores-Desert Dunes: No equivalent
Vegetation Condition Code (per DCP Table A5-2): Code 3: Heavily Modified/ Disturbed/Poor Condition

VEGETATION COMMUNITY 2: LOW/MID-HIGH OPEN TO CLOSED CAMPHOR LAUREL+/-EARLY REGROWTH RAINFOREST [T5-6M-D]

This community is restricted to the northwestern corner of the site and is mostly located offsite within the Tweed Valley Way road reserve. The closed canopy layer generally ranges from 5-8m in height and is dominated by Camphor Laurel with early regrowth rainforest species such as Macaranga *(Macaranga tanarius),* Blackwood *(Acacia melanoxylon),* Foambark (*Jagera pseudorhus*), Red Kamala (*Mallotus discolor*), Wild Quince (*Guioa semiglauca*), Hoop Pine (*Araucaria cunninghamii*),

Steelwood (*Toechima dasyrrhache*), Bumpy Ash (*Flindersia schottiana*), Riberry (*Syzygium luehmannii*) and Boxwood (*Denhamia celastroides*) also present.

Native vine species were noted including Cockspur Thorn (*Maclura cochinchinensis*), Snake Vine (*Hibbertia scandens*) and Burny Vine (*Trophis scandens*). The shrub and ground layers are predominantly populated by weed species such as Lantana (*Lantana camara),* Camphor Laurel (*Cinnamomum camphora*) saplings, Small-leaved Privet (*Ligustrum sinense*), Mickey Mouse Plant (*Ochna serrulata)* and other pasture grasses/herbaceous weeds listed within the paddock community above (Vegetation Community 1) which also dominate the road verges proximate to the site.

Equivalent vegetation communities

Forest Types in NSW 1989:	Code 221_Introduced Scrub
CRA Forest Ecosystems 1999:	Code 201_Camphor Laurel/168 Rainforest
Tweed VMP 2004:	Code 1004_Camphor Laurel Dominant Closed to Open Forest/1002 Early Regrowth Rainforest

Biometric Vegetation Database NRCMA: No equivalent

Keith (2004) Ocean Shores-Desert Dunes: No equivalent

Vegetation Condition Code (per DCP Table A5-2): Code 3: Heavily Modified/ Disturbed/Poor Condition

NOTES:

Vegetation maps have been compiled using Mapinfo geographic information system (GIS) software (Ver. 11). Information utilized has included:

- Data including contours, site boundaries and aerial photographs provided by the consulting planner
- Tweed VMP (2004) vegetation community mapping (VMP MAP 2) boundaries rasterised and registered to property boundaries and aerial photographs

2009 Aerial photograph sourced from http://mapping.tweed.nsw.gov.au/tweedmaps/

Vegetation survey was performed as outlined (Section 3 of Report) with geo-referenced colour aerial photographs overlaid with contour plans, for the initial recognition of community boundaries in the field and adjustments noted as necessary. Communities (refer Section 3 of Report) were then transcribed directly into the GIS program utilizing the aerials, contours, geological information and vegetation boundaries as a reference background.

Where necessary vegetation boundaries were traversed with a hand held GPS (Garmin GPSMap 62s) and loaded into Mapinfo with existing boundaries rectified where necessary.

FIGURE 6: PRELIMINARY VEGETATION COMMUNITY MAPPING

- SITE BOUNDARY
- VEGETATION COMMUNITY 1: TALL CLOSED GRASSLAND/ PASTURE INCLUDING SCATTERED TREES [G3D]
- VEGETATION COMMUNITY 2: LOW/MID-HIGH OPEN TO CLOSED CAMPHOR LAUREL+/-EARLY REGROWTH RAINFOREST [T5-6M-D]
- AREAS OF PREVIOUS CAMPHOR LAUREL REMOVAL

3.2 REGIONAL SIGNIFICANCE & CONSERVATION STATUS

As discussed in Section 3.1 above, the mapped vegetation communities over the site can be partially or fully compared to the regional forest ecosystems defined within the 1999 CRA document. With regard to these forest types the Tweed VMP (2004) document provides the following information (refer Table 5):

TABLE 5: Vegetation Codes & Classification			Regional Conservation Status (based on CRA targets current to Feb 2002 sourced from Tweed VMP 2004)												
Site Vegetation Community Descriptions (refer Section 3.1 and Vegetation Community Map)	**Tweed Vegetation Code**	**Tweed Vegetation Type**	**CRA Forest Ecosystem Code**	**CRA Forest Ecosystem**	**R & E Status**	**Pre 1750 UNE area (ha)**	**Current UNE area (ha)**	**Current Tweed area (ha; based on CRA Forest Ecosystem modelling)**	**Depletion Status (% remaining)**	**Percent Locally Endemic (Tweed area/UNE area)**	**target %**	**Percent Target Met (Feb 2002)**	**NPWS Private Lands Priority**	**Derived Regional Vegetation Status Code (based on CRA % Target Met and other info)**	**Additional Notes**
	Vegcode	**Vegtype**	**CRA_code**	**CRA_FE**	**RE_ status**	**1750 UNEha**	**UNE_ha**	**TWD_CRA _HA**	**Z_ remain**	**Z_Endem**	**Target_Z**	**Z_Target _Met**	**NPWS Priv**	**RegVegStat**	
COMMUNITY 1: TALL CLOSED GRASSLAND/ PASTURE INCLUDING SCATTERED TREES	1099	Substantially Cleared of Native Vegetation	173	Cleared-Partially Cleared	#N/A	-9999.0	-9999.0	2247	-9999.0	-9999.0	-9999.0	-99990		7	This community is primarily disturbed/ modified as a result of historical clearing and ongoing use as a grazing/rural use operation. Scattered individual remnant rainforest trees occur throughout the paddocks (particularly hoop pines) which warrant future investigation potential.
COMMUNITY 2: LOW/MID-HIGH OPEN TO CLOSED CAMPHOR LAUREL+/-EARLY REGROWTH RAINFOREST	1004	Camphor Laurel Dominant Closed to Open Forest	201	Camphor Laurel	#N/A	-9999.0	10381.0	2274.0	-9999.0	-9999.0	-9999.0	-9999.0		4	This community is highly dominated by weeds, is regrowth in nature and is highly fragmented. Notwithstanding, as the area does contain components of early regrowth rainforest its retention is warranted. Its location in the landscape likely provides high visual values when viewed from Tweed Valley Way.
	1002	Early Regrowth Rainforest	168	Rainforest	E	-9999	152911	18648	-9999	11.7	100	68.5		2	

Definitions:

Tweed Vegetation Code/Type: Provides a forest type and code as per Tweed VMP 2004

CRA Forest Ecosystem Code: Provides a forest type ecosystem number as per *Forest Ecosystem Classification and Mapping for Upper and Lower Northeast CRA Regions 1999*

CRA Forest Type: Most analogous forest type compared to those listed within *Forest Ecosystem Classification and Mapping for Upper and Lower Northeast CRA Regions 1999*

Pre 1750 UNE Area: Extent of forest type present pre 1750 as listed within *Forest Ecosystem Classification and Mapping for Upper and Lower Northeast CRA Regions 1999*

Current UNE Area: Amount of forest type remaining as listed within *Forest Ecosystem Classification and Mapping for Upper and Lower Northeast CRA Regions 1999*

R & E Conservation Status: Application of JANIS (1997) criteria for the recognition of rare, endangered and vulnerable ecosystems as below:

Status	Description
Endangered	Where less than 10% of its former range or the total area has contracted to less than 10% of its former area, or where 90% of its area is in small patches which are subject to threatening processes and unlikely to persist.
Vulnerable	Where a reduction of 70% within a bioregional context and which remains subject to threatening processes or [which is] not depleted but subject to continuing and significant threatening processes which may reduce its extent.
Rare	Where its geographic distribution involves a total range of generally less than 10,000ha, a total area of generally less than 1000ha or patch sizes of generally less than 100ha, where such patches do not aggregate to significant areas.

Current Tweed Area: Extent area of forest type remaining within Tweed Shire

Depletion Status: % of current UNE forest area remaining from Pre 1750 area.

Percent Locally Endemic: % of current UNE forest area remaining within Tweed Shire

Target %: JANIS (1997) specified minimum benchmarks for the proportion of each forest ecosystem which should be protected within the CAR reserve system as follows:

- As a general criterion, 15% of the pre-1750 distribution of each forest ecosystem should be protected in the CAR reserve system;
- Where forest ecosystems are recognized as vulnerable, then at least 60% of their remaining extent should be reserved
- All remaining occurrences of rare and endangered forest ecosystems should be reserved or protected by other means as far as is practicable; and
- To ensure representativeness, the reserve system should, as far as possible, sample the full range of biological variation within each forest ecosystem, by sampling the range of environmental variation typical of its geographic range.

Target Met?: Describes whether the JANIS targets have been met by the National Parks Estate as at February 2002.
Derived Vegetation Status: Status of forest ecosystem within Tweed Shire per Table 3.4 TVMP 2004.

Figures and data sourced from TVMP 2004.

4.0 FAUNA ASSESSMENT

This section describes the site's fauna and associated habitat as identified through brief fauna surveying. The methodology applied to arrive at the species list is outlined and significant species have been identified where relevant. As this is a preliminary scoping exercise a full fauna survey has not yet been commissioned and these results are to be considered interim in nature and not a full list of the assemblage of the site.

4.1 METHODOLOGY

- Desktop analysis including:

i. Review of Council's Planning Scheme Mapping & Associated Reporting (i.e. Tweed LEP 2000 Maps, Draft LEP Amendment No 21 Mapping, Tweed VMP Maps 1-7)

ii. Review of threatened fauna species and endangered populations listed as occurring within the Murwillumbah (Qld - Southeast Hills and Ranges) CMA sub-region of the Northern Rivers CMA (http://threatenedspecies.environment.nsw.gov.au/tsprofile/cma_subregion_list.aspx?id=15

iii. Review of search of the Atlas of NSW Wildlife database within a search area 10km surrounding the site to review threatened plant records

iv. Review of Environment Australia Protected Matters data within a search area 10km surrounding the site to review threatened plant records

v. Review of the following legislation to ensure the latest lists of threatened species and communities were noted as well as investigating the existence of any relevant recovery plans, threat abatement plans, key threatening processes or any preliminary determinations which may be applicable to the site and/or the proposed use/action:

    - *Threatened Species Conservation Act (1995)*
    - *Environment Protection and Biodiversity Conservation Act (1999)*

- Field survey of the flora communities located within and immediately adjacent to the site (in accordance with Section 3 above) to review habitat values;
- The following fauna field survey methods were implemented over three hours on 10th April 2012:

    - Active searches were conducted for key habitat components and potential habitat components for threatened species;
    - Binocular search and identification of all fauna heard or sighted;
    - Opportunistic sightings/audible identifications were conducted and recorded whilst all survey works were being undertaken;
    - Ground strata searches and rock/timber/leaf litter rolls and examination for reptiles and frogs;
    - Bird identification searches comprised walked transects through each vegetation community;

- Ground track/trace survey was performed including:
  - Scat/pellet examination
  - Scratch/trace examination of trees
  - Diggings, burrow, trace and track examination
  - Humus/debris/crevice examination
  - Examination and assessment of tree hollows, hanging bark, termite mounds, flowering/fruiting trees etc

4.2.1 SURVEY LIMITATIONS

Whilst the duration of flora surveys and inspections of the property are considered appropriate for the intended purpose of an ecological constraints scoping exercise, it was not practical to intensively search all areas of the site (~6ha). Additional undetected threatened or other native flora species may be present on the property. Seasonal surveys would also be necessary to detect flora species that are dormant or inconspicuous for part of the year (i.e. from the Asteraceae, Orchidaceae, Cyperaceae, Poaceae etc). Some of these species (dormant or non flowering) may have been undetected or under-represented within the survey period. Further ungerminated seed of various species may have been present within the soil seed bank.

Whilst the sampling methodology of the fauna survey is considered appropriate for the intended purpose of an ecological constraints scoping exercise, it is acknowledged that the entire seasonal fauna assemblage is unlikely to be recorded. Sampling over extended timeframes and incorporating additional techniques required by the DECC (2004) guidelines would be necessary to establish a more extensive fauna species list relevant to the site.

It is also accepted that although assessments of habitat and species ecology does provide an additional measure to anticipate the presence of species (as a surrogate for its actual observation), there is no absolute certainty to the absence of a species from marginal or potential habitat. Additionally, there may be some species that may utilise the habitats within the site but have remained undetected due to their rarity, elusive nature or the sporadic utilisation of the habitats (i.e. the Long-nosed Potoroo, Common Planigale and Dunnart are elusive species that are difficult to trap or observe directly; the Black-necked Stork, Powerful Owl, Spotted-tail Quoll and Red Goshawk may only visit an area occasionally within a much larger home-range; the Swift Parrot and Regent Honeyeater may only visit an area during peak flowering periods etc).

The conclusions of this report are therefore based upon data obtained through the brief survey which are likely to be incomplete. It is to be acknowledged that the survey implemented is inadequate to perform complete assessments of the fauna assemblage of the site or make conclusions regarding the presence or absence of threatened fauna. It should also be acknowledged that site conditions, including the presence of threatened species, can change over time.

The above limitations have been taken into account and the likelihood of threatened such species occurring within the site assessed through habitat assessment, records of the species within the locality and aspects of species ecology (refer Section 5).

4.2.2 LICENCING

The following issued licences are relevant to the survey undertaken:

TABLE 6: RELEVANT LICENCES				
Authority	**Licence/Permit**	**Title**	**Expiration**	**Permit No.**
NSW DPI	Animal Research Authority	Fauna Surveying, Trapping & Release	30 June 2011	01/1537
NSW DPI	Animal Care & Ethics Committee	Fauna Surveying, Trapping & Release	30 June 2011	01/1537
NSW National Parks & Wildlife Service	Scientific Licence	Flora & Fauna	30 April 2011	S11892

4.3 HABITAT STRATIFICATION/ASSESSMENT

Prior to the commencement of the abovementioned survey works on site a broad habitat assessment was conducted in association with vegetation survey works. The purpose of this overview was to determine which species were likely to be present based on available habitat components and to target areas for surveying of protected fauna species. The site incorporated the following broad habitat types as a result of previous land use, vegetation types (refer Section 3), surrounding uses and hydraulic regime:

MODIFIED/GRAZING AREAS

These areas dominate the site in association with the grazed pasture grassland and rural uses. The habitat is almost entirely modified and occupied by pasture/environmental flora species with the exception of sparsely scattered native trees retained within the paddock. Whilst overall habitat values are reduced (from the previously occurring remnant forests) as a result of the historical pastoral use of the lands, the paddock/pasture areas still provide potential habitat for fauna due to:

- Presence of fruiting rainforest flora species (including camphor laurel) which may provide foraging resources for threatened birds and bats

- Dense grassland and weed thickets providing potential refuge for small terrestrial mammals, lizards, snakes and small grassland birds

CAMPHOR LAUREL/EARLY REGROWTH RAINFOREST AREAS

Camphor Laurel is present as a dominant element to the northwest of the site adjacent Tweed Valley Way. Whilst noted as an environmental weed and potentially reduced fauna habitat (due to its uniform structural arrangement) the camphor laurel patches do provide a variety of habitat values which are an improvement from the surrounding pasture (i.e. increased shade, shelter and protection, roosting / perch sites, nesting sites and food from camphor laurels and other species).

Additionally, Camphor Laurel fruit is considered an important winter food source for at least 27 native bird species and assists with the dispersal and migration of rainforest birds in the region (Date et al. 1991; Gosper 1994). In turn, these bird assemblages assist with the recruitment of rainforest plants to Camphor Laurel and regenerating forests (Catterall *et al.* 2004).

Camphor Laurel forest also provides wildlife habitat/ corridors and 'stepping stones' between native habitats of a landscape (Neilan, 2004; Date et. al. 1991, Recher et. al. 1995, Date et. al. 1996).

Specific additional habitat features/elements are briefly identified in the below table:

TABLE 7: HABITAT ELEMENTS	
Habitat Element/Feature	**Comment**
Hollow bearing trees	Five dead camphor laurel trees which may contain unobserved hollows
Presence of koala habitat and/or favoured koala trees	Absent
Presence of caves, culverts or disused buildings suitable for roosting of microchiropteran bat species	Absent
Presence of scratches or feeding scars on tree trunks	Not recorded.
Presence of megabat roosting sites	Not recorded.
Presence of creeklines, estuaries, mudflats, mangroves and/or riparian vegetation	Absent

TABLE 7: HABITAT ELEMENTS	
Habitat Element/Feature	**Comment**
Presence of dams, ponds, lakes and/or other natural or constructed permanent water sources	Absent
Presence of dense understorey and ground cover vegetation	Prevalent throughout the paddock/pasture grassland
Presence of deep leaf litter layer and/or debris (fallen logs etc)	Present in the northwestern narrow copse of Camphor Laurel/Early Regrowth Rainforest
Presence of fruiting flora species	Camphor Laure common plus scattered rainforest trees present within the pasture areas.
Presence of flowering species	Typical prolific flowering trees (Eucalypt, Melaleuca, Corymbia, Banksia etc) are absent. *Acacia melanoxylon* occasionally present. Flowering species (although not prolific as associated with Myrtaceae and Mimosaceae family species) also present within Vegetation Community 2 (Camphor Laurel/Early Regrowth Rainforest)
Presence of interconnected vegetation remnants (internal and external to site)	Absent
Presence of large stick nests indicative of raptor presence	Not recorded.
Presence of extensive forested (core) habitat with limited exposure to clearing, fragmentation or associated 'edge effects'	Absent.
Presence of rocky outcrops and/or extensive exposed rocky areas favouring reptile populations	Absent. Occasional rocks/boulders present within the paddock (mostly on the central ridgeline)

In addition to the above the geographic and habitat features component of the DECC (2009) Biobank Tool for development sites was also assessed to assist in assessing geographic/habitat features which may indicate presence of certain species of threatened fauna:

TABLE 8: GEOGRAPHIC/HABITAT FEATURES	PRESENT WITHIN 40M OF SITE?
damp or swampy areas in rainforest, eucalypt or paperbark forest	No
Hollow-bearing trees, bridges, caves or artificial structures within 200 m of riparian zone	Yes
land below ~300 m in altitude, and containing rainforest and eucalypt forest/regrowth on soils derived from metasediments	Yes
land containing brackish or freshwater wetlands	No
land containing caves or similar structures	No
land containing rainforest, eucalypt, paperbark and/or mangrove forests	No
land containing rainforest, moist eucalypt or swamp forest	No
land containing riverine and subtropical rainforest	No
land within 100 m of semi-permanent or ephemeral ponds or depressions containing leaf litter	no
land within 40 m of fresh/brackish/saline waters of larger rivers or creeks; estuaries, coastal lagoons, lakes and/or inshore marine waters	No

TABLE 8: GEOGRAPHIC/HABITAT FEATURES	PRESENT WITHIN 40M OF SITE?
land within 40 m of freshwater and estuarine wetlands, in areas of permanent water and dense vegetation or emergent aquatic vegetation	No
land within 40 m of rainforest, coastal scrub, riparian or estuarine communities	No
land within 40 m of swamps, wet or dry heaths or sedge grasslands	No
littoral or riverine rainforest or regrowth	No
littoral rainforest, lowland rainforest or open forest	No
lowland subtropical rainforest in moist situations	No
lowland subtropical rainforest or dry subtropical rainforest with Brush Box overstorey	No
lowland, riverine or littoral rainforest, including small remnants	No
poorly drained, infertile soils	No
rainforest or riparian areas	Yes
rainforest, eucalypt forest, heathland, marshland, grassland or rocky areas	Yes
riverine and subtropical rainforest	No
riverine or lowland subtropical rainforest	No
seasonally inundated paperbark swamps or forest red gum open forest	No
swampy or moist sites	Yes
wet eucalypt forest or edges of rainforest	No
land east of Nimbin in Richmond - Tweed (Qld - Scenic Rim) (Part A) CMA subregion	Yes
land east of Tyalgum in Richmond - Tweed (Qld - Scenic Rim) (Part A) CMA subregion	Yes
land north of Ballina in Clarence Lowlands CMA subregion	Yes
land north of Coraki in Clarence Lowlands CMA subregion	Yes
land north of Evans Head in Clarence Lowlands CMA subregion	Yes
land north of Richmond River in Clarence Lowlands CMA subregion	Yes
land north of the Gwydir Highway in Clarence Sandstones CMA subregion	Yes
land within 10 km of coast in Yuraygir CMA subregion	No
land within 15 km of eastern boundary of Richmond - Tweed A subregion in Richmond - Tweed (Qld - Scenic Rim) (Part A) CMA subregion	No
land within 20 km of Mt Nullum in Richmond - Tweed (Qld - Scenic Rim) (Part A) CMA subregion	No
land within 45 km of coast in Richmond - Tweed (Qld - Scenic Rim) (Part A) CMA subregion	Yes
land within 5 km of coast in Yuraygir CMA subregion	No

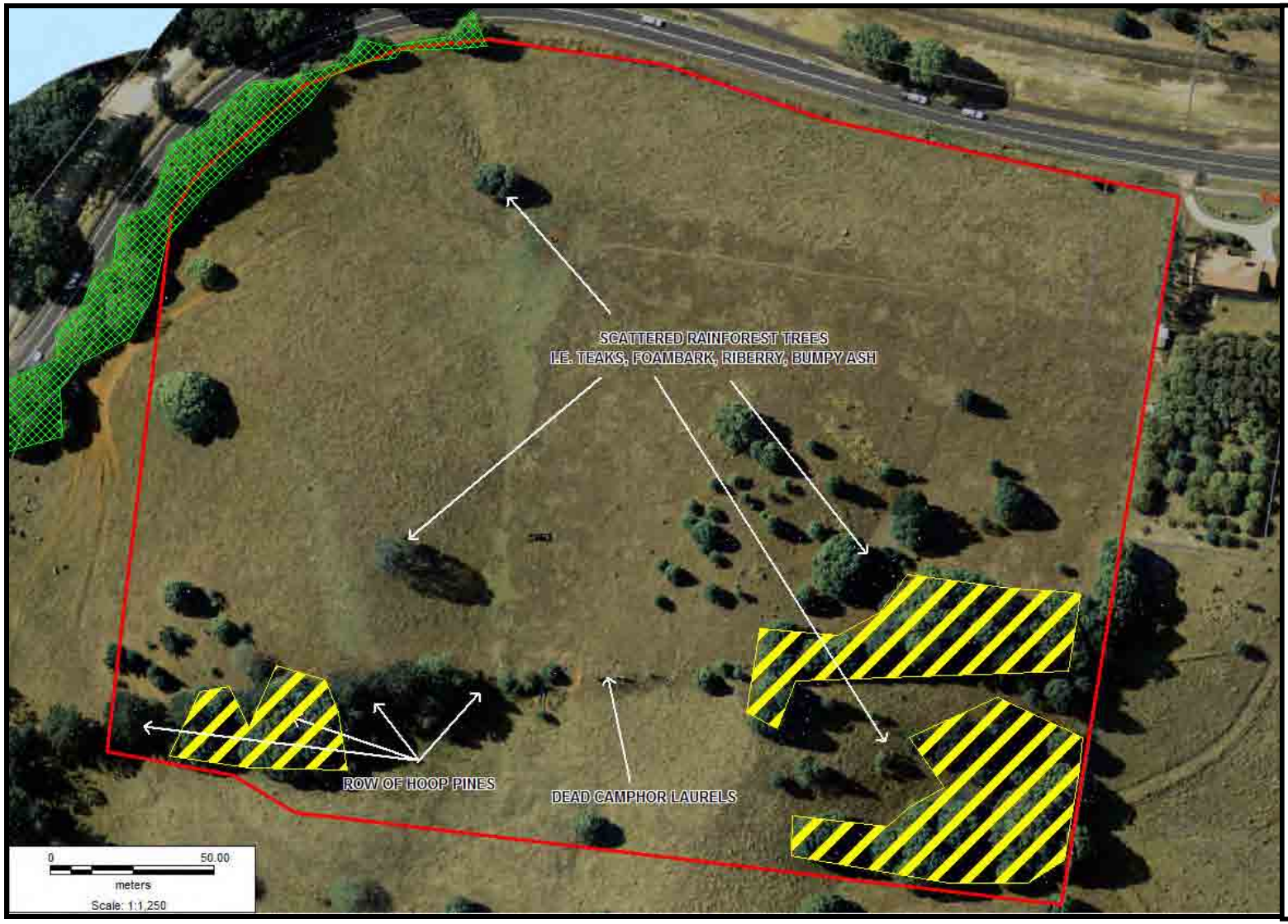


FIGURE 7: BROAD HABITAT STRATIFICATION

MODIFIED/GRAZING AREAS

CAMPHOR LAUREL/EARLY REGROWTH RAINFOREST AREAS

AREAS ON 2009 AERIAL PHOTOGRAPH FROM WHICH CAMPHOR LAURELS HAVE BEEN REMOVED

4.3.1 SITE SURVEY RESULTS

The following section(s) list the fauna species recorded on the subject site during surveying and lists the methods by which each species was identified. Results are grouped by the Class of species recorded. Those techniques utilised to record fauna are listed below and correlate with the acronyms included within the Survey Methods column of the grouped Survey Results tables.

Survey Method Codes:

O	Direct Observation
SL	Direct Observation with Spotlight
Sc	Scat
C	Call (Audible) Detection and/or response to playback
HT	Hair tube/funnel
Scr	Scrape
Scrt	Scratch
Sh	Shell/Shell Fragment/Skeleton
Trk	Track/Trace
T	Trapped/hand captured
Ana	ANABAT Detection
Rk	Road-kill
PSA	Predator scat analysis
*	All birds were either directly observed through diurnal survey, spotlighting or call identification.
**	Introduced/feral species
***	Recorded in adjacent areas or circling overhead
BOLDED	Species recorded on the property to the east by Planit (2010)

MAMMALS

FAMILY	SCIENTIFIC NAME	COMMON NAME	METHOD
Bovidae	***Bos Taurus*	Cattle	O, Trk, Sc
Canidae	*****Canis lupus***	**Dog**	**O, Trk, Sc**
Macropodidae	***Macropus spp***	**Unidentified Wallaby**	**Trk, Sc**
Peramelidae	***Isoodon spp***	**Unidentified Bandicoot**	**Trk**
Pteripodidae	***Pteropus alecto***	**Black Flying-fox**	**SL**
Phalangeridae	***Trichosurus vulpecula***	**Brushtail Possum**	**SL**
Vesptertilionidae	***Myotis macropus***	**Southern Myotis**	**Ana**
Vesptertilionidae	***Miniopterus australis***	**Little Bentwing**	**Ana**
Vesptertilionidae	***Rhinolophus megaphyllus***	**Eastern Horseshoe Bat**	**Ana**
Vesptertilionidae	***Vespadelus pumilus***	**Eastern Forest Bat**	**Ana**

REPTILES

FAMILY	SCIENTIFIC NAME	COMMON NAME	METHOD
Agamidae	***Physignathus lesueurii***	**Water Dragon**	**O**
Boidae	***Morelia spilota***	**Carpet Python**	**SL**
Elapidae	*Pseudechis porphyriacus*	Red-bellied Black Snake	O
Scincidae	*Cryptoblepharus virgatus*	Wall Skink	O,T
Scincidae	*Lampropholis delicata*	Grass Skink	O,T
Varanidae	***Varanus varius***	**Lace Monitor**	**O**

BIRDS*

Family	Species Name	Common Name
Acanthizidae	***Sericornis frontalis***	**White-browed Scrub-wren**
Accipitridae	***Accipiter cirrcephalus***	**Collared Sparrowhawk**
Alcedinidae	*Dacelo novaeguineae*	Laughing Kookaburra
Anatidae	***Anas superciliosa***	**Pacific black duck**
Anatidae	***Chenonetta jubata***	**Wood Duck**
Ardeidae	*Ardea ibis*	Cattle Egret
Ardeidae	***Ardea intermedia***	**Intermediate Egret**
Ardeidae	***Ardea novaehollandiae***	**White-Faced Heron**
Artamidae	***Cracticus nigrogularis***	**Pied butcherbird**
Artamidae	*Craticus torquatus*	Grey butcherbird
Artamidae	*Gymnorhina tibicen*	Australian magpie
Artamidae	*Strepera graculina*	Pied Currawong
Cacatuidae	***Cacatua galerita***	**Sulphur-crested Cockatoo**
Cacatuidae	***Cacatua roseicapilla***	**Galah**
Campephagidae	*Coracina novaehollandiae*	Black-faced cuckoo-shrike
Centropodidae	*Centropus phasianinus*	Pheasant Coucal
Charadriidae	***Vanellus miles***	**Masked lapwing**
Cisticolidae	*Cisticola exilis*	Golden-headed Cisticola
Columbidae	***Ocyphaps lophotes***	**Crested Pigeon**
Columbidae	***Chalcophaps indica***	**Emerald Dove**
Columbidae	***Geopelia striata***	**Peaceful Dove**
Columbidae	***Leucosarcia pictata***	**Wonga Pigeon**
Columbidae	*Macropygia amboinensis*	Brown Cuckoo-dove
Corvidae	*Corvus orru*	Torresian crow
Dicruridae	***Dicrurus bracteatus***	**Spangled drongo**
Dicruridae	*Grallina cyanoleuca*	Magpie-lark
Estrildidae	*Neochimia temporalis*	Red-browed Finch
Eupetidae	***Psophodes olivaceus***	**Eastern whipbird**
Hirundinidae	*Hirundo neoxena*	Welcome swallow
Maluridae	*Malurus melanocephalus*	Red-backed Fairy-wren
Megaluridae	*Megalurus timoriensis*	Tawny grassbird
Megapodiidae	***Alectura lathami***	**Brush turkey**
Meliphagidae	***Entomyzon cyanotis***	**Blue-faced honeyeater**
Meliphagidae	***Lichmera indistincta***	**Brown Honeyeater**
Meliphagidae	*Manorina melanocephala*	**Noisy miner
Meliphagidae	*Meliphaga lewinii*	Lewin's honeyeater
Meliphagidae	*Philemon corniculatus*	Noisy Friarbird
Monarchidae	***Myiagra cyanoleuca***	**Satin flycatcher**
Monarchidae	***Myiagra inquieta***	**Restless flycatcher**
Oriolidae	***Oriolus sagittatus***	**Olive-backed Oriole**
Oriolidae	***Sphecotheres vieilloti***	**Figbird**
Pachycephalidae	***Pachycephala rufiventris***	**Rufous whistler**
Pardalotidae	***Pardalotus striatus***	**Striated pardalote**
Psittacidae	***Alisterus scapularis***	**King parrot**
Psittacidae	***Platycercus eximius***	**Eastern rosella**
Psittacidae	***Trichoglossus chlorolepidotus***	**Scaly-breasted lorikeet**
Psittacidae	*Trichoglossus haematodus*	Rainbow lorikeet
Rallidae	***Porphyrio porphyrio***	**Purple swamphen**
Rhipiduridae	*Rhipidura albiscapa*	Grey fantail
Rhipiduridae	***Rhipidura leucophrys***	**Willie Wagtail**
Strigidae	***Ninox novaeseelandiae***	**Southern Boobook**
Threskiornithidae	***Threskiornis molucca***	**Australian white ibis**
Timaliidae	***Zosterops lateralis***	**Silvereye**

AMPHIBIANS

FAMILY	SCIENTIFIC NAME	COMMON NAME	METHOD
Bufonidae	**Bufo marinus*	Cane toad	O
Hylidae	***Litoria fallax***	**Eastern Sedgefrog**	**C, SL**
Hylidae	***Litoria carulea***	**Green Treefrog**	**SL**
Myobatrachidae	***Limnodynastes peronii***	**Striped Marshfrog**	**C**
Myobatrachidae	***Uperoleia fusca***	**Dusky Toadlet**	**SL, C**

4.4 DISCUSSION OF SURVEY RESULTS

4.4.1 BIRDS

Twenty (20) species of bird were recorded during surveys of the subject site during the brief survey undertaken. No species scheduled as endangered or vulnerable under the *Threatened Species Conservation Act 1995* were recorded.

The diurnal bird species recorded included:

- Insectivores which forage for invertebrates in the leaves, branches and bark of trees, in the air spaces provided by canopy gaps, and amongst litter, woody debris and grasses/groundcovers (i.e. fairy wrens, whistlers, fantails, tawny grassbird, scrub-wren, cisticola etc)
- Nectar feeders (i.e. lorikeets, honeyeaters etc)
- Large omnivores (i.e. butcherbirds, magpies, crows etc)
- Granivores (finches)

Subsequent to the inspections undertaken, it is considered that the site exhibits habitat generally suitable for grassland/pasture birds, common forest/woodland birds and generalist species typically found within modified habitats (i.e. magpies, crows, minors etc). Doves, pigeons, orioles and figbirds are very likely to utilize the camphor laurel forest during peak fruiting periods. The highest diversity of avifauna species is likely to occur within this northwestern patch which exhibits the highest levels of native floristic and structural diversity available on the site.

Whilst nocturnal works were not performed the tawny frogmouth and southern boobook may utilize the site and are commonly heard vocalizing within the Tweed Valley. The barn owl may also hunt for mice and rats within the pasture and is regularly encountered at night when driving along roadways within the locality.

The potential occurrence of threatened bird species is discussed within Section 5 below.

4.4.2 MAMMALS

A total of one (1) mammal species were recorded on the subject site. No species listed as vulnerable or endangered under the *Threatened Species Conservation Act 1995* were recorded on the site. An additional nine (9) mammals species have been recorded from the lands immediately to the east (Planit, 2010)

Ground-dwelling Mammals

All terrestrial mammals require vegetated cover for shelter and to facilitate movement. Small terrestrial mammals prefer areas within a complex vegetation structure which is dense within the lower strata and subsequently provides shelter/nesting sites and refuge from predators. Larger terrestrial mammals (larger wallabies, kangaroos) also generally require dense cover for refuge but tend to favour more open areas for grazing/feeding.

Suitable structural forest variation and/or dense understorey components were present within areas of rank grass growth in the paddock/pasture areas. These areas provide simplified habitat with little structural diversity and additional favoured woodland/forest habitats associated with remnant native forests are absent. Whilst trapping was not performed common native species such as the bandicoot, echidna and bush rat may occur. Non-native species such as the black rat, house mouse and hare are likely to be abundant as is typical of a farming property.

More specialized species such as the planigale, antechinus and melomys are less likely to occur as a result of an absence of favoured habitat types. Generally native small ground mammals are highly susceptible to urbanization/habitat modification due to several factors including reduced resources, fragmentation and increased predation from native and introduced animals (particularly domestic cats). Degradation and simplification of native forest remnants is also known to be detrimental to small mammal populations with disturbed remnants supporting fewer native species (Holland and Bennett, 2007). Extinction of this group of mammals from small fragments is common (How and Dell, 2000).

Open and grassed areas present are suitable for a variety of macropods with the Grey Kangaroo and Red-necked Wallaby commonly encountered within the locality.

Arboreal Mammals

Arboreal mammals previously noted to occur within the vicinity of the site are all noted to be hollow dependent with the exception of the Koala and the Ringtail Possum (which does utilize hollows but will also construct leaf dreys) (Strahan eds, 2002; Gibbons and Lindenmayer, 2002). It is widely accepted that a reduction in senescent trees is a limiting factor in hollow dependent arboreal mammal populations (Smith and Lindenmayer, 1998; Gibbons and Lindenmayer, 2002; Lindenmayer, 2002; Lunney, 1987).

The habitat value for hollow-dependent arboreal mammals over the site is considered to be low given the absence of senescent trees and associated Eucalypt Forest/Woodland habitats. The Brushtail Possum has been previously recorded on the site to the east (Planit, 20101).

Flying Mammals

Whilst nocturnal survey works were not conducted the Black Flying Fox is likely to utilize the site and has been recorded on lands to the immediate east (Planit, 2010). No bat roosting was recorded onsite with a colony of flying foxes noted to roost approximately 9.5km to the southeast at Marshalls Creek. During peak fruiting periods the threatened Grey-headed Flying-fox is likely to forage on site although the Common Blossom Bat is considered unlikely due to an absence of Coastal Banksia, Heath and/or Littoral Rainforest habitats.

Anabat Detection survey also recorded the following bat species on lands to the east:

- Little Bent-wing Bat
- Southern Myotis
- Eastern Horseshoe Bat
- Eastern Forest Bat

It is considered that the site contains a variety of suitable foraging spaces for mircrochiropteran bats (i.e. the open paddock areas provide 'uncluttered' space; the ecotonal areas between paddocks and camphor laurel forest fringing Tweed Valley Way provide 'edge' space'; the lower canopy zone of the camphor laurel patch provides 'cluttered' space [per Schnitzerler and Kalko, 2001]). Foraging within or traversal of the site by additional common bats such as the White-striped Freetail or Goulds Wattled Bat is considered reasonably likely.

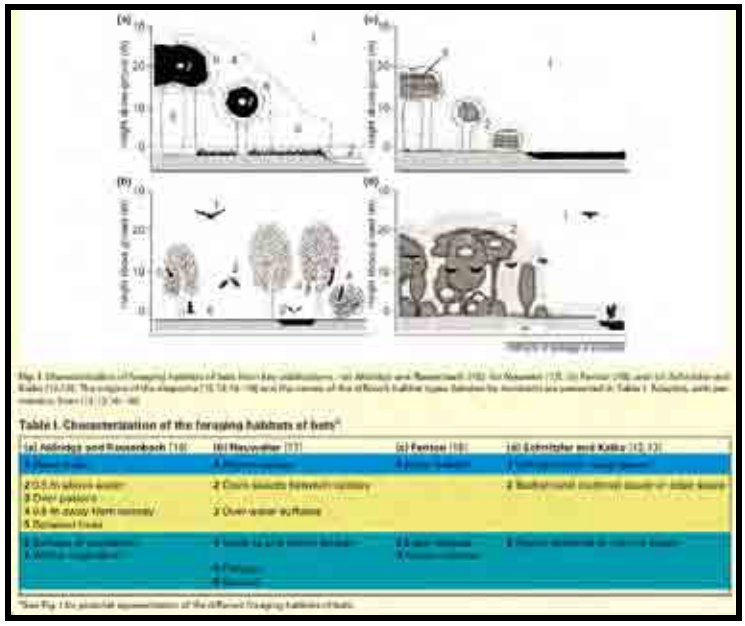


FIGURE 8: REVIEW OF MICRO-BAT FORAGING HABITATS
(SOURCED FROM SCHNITZLER ET AL, 2003)

A review of the bats recorded within the locality indicates that tree cavities and caves/crevices are necessary for roosting/breeding. In addition to providing shelter, maternity places and retreats for hibernation, roosts are also important places for social interactions among bats. The availability of suitable roosts is therefore critical for the survival of forest bats (Herr, 1998). Within the site it is considered that caves/mines are absent and potential tree hollow/cavity breeding sites are scarce (small unobserved hollows within dead camphor laurels may be present). Palm fronds which are suitable for species such as the Eastern Long-eared Bat are absent as are farm buildings and sheds which are potentially suitable for various species (i.e. Gould's Wattled Bat, Yellow-bellied Sheathtail Bat, Eastern Broad-nosed Bat).

TABLE 9: ROOSTING TYPES OF PREVIOUSLY RECORDED MICRO-BATS IN THE LOCALITY*

Species Name	Common Name	Roost Type
Minopterus australis	Little Bentwing Bat	Caves and mines, Tree Cavities
Myotis macropus	Large-footed Myotis/ Southern Myotis	Caves, tree hollows, amongst vegetation, under bridges, mines, tunnels and storm water drains
Vespadelus pumilus	Eastern Forest Bat	Tree cavities
Rhinolophus megaphyllus	Eastern Horseshoe Bat	Caves, mines, culverts, boulders and occasionally houses

* sourced from Lumsden, 2004; Herr, 1998; DEC, 2005; Richards & Martin, 2001; Birt et al, 2001; Rhodes & Richards, 2008; Rohdes and Wardell-Johnson, 2006; Rhodes, 2006; Richards, Reardon and Pennay, 2008; Lumsden, Bennett and Silins, 2002; Aust. Museum, 1999; NPWS, 2004; Richards in Van Dyck and Strahan, 2008; Tidemann & Parnaby in Van Dyck and Strahan, 2008; Law and Anderson, 2000.

4.4.3 REPTILES

A total of three (3) reptile species were recorded on the subject site. No species listed as endangered or vulnerable under the *Threatened Species Conservation Act 1995* were recorded.

Within the site a small variety of lizards and snakes were recorded all of which are considered to be common species. Additional terrestrial snake species are likely to be encountered within with the dense pasture grassland. Such rank grassland areas are likely to provide habitat for associated prey species such as rats, mice and lizards.

4.4.4 AMPHIBIANS

One (1) introduced toad species was recorded on the subject site. No species listed as endangered or vulnerable under the *Threatened Species Conservation Act 1995* were recorded. An additional four frog species were recorded on the site to the immediate east during previous surveys (Planit, 2010).

The site is considered to contain limited amphibian habitat due to the absence of swamps, creeks, rainforest/wet sclerophyll forest, rivers, dams or areas of permanent fresh standing water. The grassland areas may provide habitat for a small variety of common and/or generalist species typical to modified environments such as *Limnodynastes peronii, Litoria fallax, L. nasuta* etc. The more sheltered camphor laurel forest area provides additional potential habitat for common treefrogs such as *Litoria gracilenta,* and *L. caerulea*.

The recorded frog species recorded on the adjacent site to the east (Planit, 2010) can be attributed to adult and breeding habitat guilds (per Ecotone, 2007) based upon habitat information (Cogger, 1992; Robinson, 1998; Barker et al, 1995) and breeding information (Anstis, 2002, Tyler, 1999).

TABLE 10: FROG HABITAT GUILDS

Species	Common Name	Adult Habitat	Breeding Habitat
Litoria caerulea	Green Treefrog	tree frog & ground	Ephemeral pool/lentic. Highly adaptable. Roadside ditches, flooded grassland. Ponds, swamps and water troughs.
Limnodynastes peronii	Striped Marshfrog	Ground	Permanent-temporary pools/lentic. Dams, flooded grassland, roadside ditches, still pools of streams and suburban gardens.
Uperoleia fusca	Dusky Toadlet	Ground	Permanent-temporary pools/lentic Ponds, swamps, temporary ditches, flooded grassland and similar sites surrounded by grasses or other vegetation
Litoria fallax	Eastern Sedgefrog	tree frog & ground	Permanent-temporary pools/lentic. Dams, ponds and swamps especially those with emergent reeds.

5.0 DISCUSSION OF RECORDED & POTENTIALLY OCCURRING SCHEDULED COMMUNITIES, POPULATIONS AND SPECIES OF CONSERVATION SIGNIFICANCE

5.1 ENDANGERED ECOLOGICAL COMMUNITIES

No EECs are considered to be present on the site.

5.2 ENDANGERED POPULATIONS

Endangered populations are listed under Schedule 1, Part 2 of the *Threatened Species Conservation Act 1995*. No endangered populations are considered to occur on or proximate to the study area with the closest being the 'Cobaki Lakes and Tweed Heads West population of the Long-nosed Potoroo *Potorous tridactylus* (Kerr 1792) in the Tweed local government area.' Future development of the site is considered unlikely to impact upon this population.

5.3 THREATENED FLORA SPECIES

No flora species listed as vulnerable under Schedules 1 and 2 of the *Threatened Species Conservation Act 1995* were observed on the site. Further survey during flowering/fruiting periods will be necessary to confirm the presence or absence of threatened flora species within the narrow camphor laurel forest area to the north west fringing Tweed Valley Way although it is noted that this area will be retained in association with the Concept Plan and as such any threatened fauna occurring within will also be retained and protected from developmental impacts.

A search of the *NPWS 'Atlas of NSW Wildlife'* has determined that twenty-seven species of threatened flora have been previously recorded within the locality (search area 153.43277, -28.50449, 153.54255, -28.40449). Brief searches throughout the occurring vegetation communities within the site were undertaken to confirm the presence or absence of these species which are tabulated below.

Based on habitat assessment and the known distribution of these species within the NENSW bioregion, fifteen of these species are considered unlikely to be present within the site. It is considered that suitable or potential habitat occurs for fourteen of the listed species, however, they were not detected during preliminary field survey.

TABLE 11: POTENTIALLY OCCURING THREATENED FLORA			
Species Name	**Preferred Habitat**	**TSCA Status**	**Expected Impact**
Acacia bakeri	This tree is found in or near lowland subtropical rainforest, in adjacent eucalypt forest and in regrowth. (DECC, 2005)	V	Not recorded. No impact expected. Favoured habitat considered to be absent. Potential habitat (paddocks on deep soils) is however present and the species is known from disturbed areas (pers. obs.). However, no stems were recorded. This species is known from the locality further to the north adjacent Pottsville Road (Parker, 2009)
Acronychia littoralis	Scented Acronychia occurs from Fraser Island in Queensland to Port Macquarie in NSW. In 1996, the species occurred at 42 sites (Benwell, 1996). Most populations occur in NSW, between Ballina and Tweed Heads. The two Queensland populations include two trees at the Gold Coast and a few individuals in Great Sandy National Park (NP) (EPA, 2007). In NSW, populations are conserved in Bongil Bongil NP, Bundjalung NP, Broken Head Nature Reserve (NR), Cape Byron NR, Brunswick Heads NR, Cudgen Lake NR and Cooloola NP. Scented Acronychia is found on sand in humid, high rainfall zones (greater than 1600 mm), within 2 km of the ocean. The species occurs in transition zones between littoral rainforest and swamp sclerophyll forest; between littoral and coastal cypress pine communities; and margins of littoral forest and cleared land (Harden, 2002). Associated species include *Lophostemon confertus*, *Banksia integrifolia*, *Callitris columellaris*, *Araucaria cunninghamii*, *Eucalyptus intermedia* and *Melaleuca quinquenervia* (Benwell, 1996). Former habitat has been reduced as a result of coastal development, sand mining, waterlogging and land clearing for agriculture (Hunter et al., 1992; Benwell, 1996) [in DSEWPC, 2008:1-2]	E1	Not recorded. No impact expected. Favoured habitat is considered to be absent from the site.
Archidendron hendersonii	This tree is has been recorded from riverine and lowland subtropical rainforest and littoral rainforest from north Queensland south to the Richmond River in north-east NSW. It is found on a variety of soils including coastal sands and those derived from basalt and metasediments (DECC, 2005).	V	Not recorded. No impact expected. Favoured habitat considered to be absent. Potential habitat (paddocks on deep soils) is however present and the species is known from disturbed areas (pers. obs.). However, no stems were recorded.

Arthraxon hispidus	"In NSW and Queensland, Hairy-joint Grass is found in or on the edges of rainforest and in wet eucalypt forest, often near creeks or swamps (Queensland CRA/RFA Steering Committee, 1997, 1998; DECC NSW, 2005), as well as woodland (Queensland Herbarium, 2008). In south-east Queensland, Hairy-joint Grass has also been recorded growing around freshwater springs on coastal foreshore dunes, in shaded small gullies, on creek banks, and on sandy alluvium in creek beds in open forests (Queensland CRA/RFA Steering Committee, 1997, 1998), and also with bog mosses in mound springs (Queensland Herbarium, 2008)" [Department of the Environment, Water, Heritage and the Arts 2008:1-2]	V	Not recorded. No impact expected. Favoured habitat is considered to be absent from the site.
Bosistoa transversa	This species occurs within wowland subtropical rainforest up to 300m in altitude from Maryborough in Queensland south to the Nightcap Range north of Lismore in north-east NSW (DECC, 2005)	V	Not recorded. No impact expected. Favoured habitat is considered to be absent from the site.
Cassia brewsteri var.marksiana	This species is known from Brunswick Heads, around Murwillumbah, and north into south-east Queensland as far as Beenleigh where it occurs within Littoral and riverine rainforest, and in regrowth vegetation on farmland and along roadsides (DECC., 2005)	E1	Not recorded. No impact expected. Favoured habitat considered to be absent. Potential habitat (paddocks on deep soils) is however present and the species is known from disturbed areas (pers. obs.). However, no stems were recorded.
Corokia whiteana	This species is restricted to three locations in NENSW where it is found in the ecotone between wet eucalypt forest and warm temperate rainforest (inland) and in brusbox forest associated with littoral rainforest (NPWS, 2002).	V	Not recorded. Favoured habitat is considered to be absent from the site.
Cryptocarya foetida	Stinking Cryptocarya is known from Iluka, NSW, to Fraser Island and east of Gympie, southern Queensland where it occurs within littoral rainforest, usually on sandy soils, but mature trees are also known on basalt soils. (DECC, 2005; DSEWPC, 2008)	V	Not recorded. No impact expected. Favoured habitat considered to be absent. Potential habitat (paddocks on deep soils) is present and the species is known from disturbed areas (pers. obs.). However, no stems were recorded.

Davidsonia jerseyana	The Davidson's Plum is restricted to the Brunswick and Tweed River catchments of the north coast of NSW. The southern-most confirmed record of the species is located near Mullumbimby. Records extend only a short distance inland on the Brunswick River. The northern-most and westernmost confirmed record is at Chillingham. There is an unconfirmed record further north near the border gate at Tomewin (Watson 1987). There are no confirmed records for southern Queensland. The species has been documented as occurring at a total of 118 point locations, which can be roughly grouped into 24 naturally occurring sub-populations, The Davidson's Plum is found in coastal and lowland subtropical rainforest and wet sclerophyll forest, often with an overstorey including *Lophostemon confertus* (Brush Box), *Araucaria cunninghamii* (Hoop Pine) and/or eucalypt species. Species commonly occurring at Davidson's Plum sites include *Acacia bakeri* (Marblewood), *Cupaniopsis newmanii* (Longleaved Tuckeroo), *Endiandra globosa* (Black Walnut), *Eucalyptus microcorys* (Tallowwood), *Flindersia bennettiana* (Bennett's Ash), *Flindersia schottiana* (Cudgerie), *Pentaceras australe* (Crow's Ash), *Synoum glandulosum* (Scentless Rosewood) and the introduced *Cinnamomum camphora* (Camphor Laurel) (McKinley & Stewart 1999). Several sub-populations of the Davidson's Plum are known from areas of regrowth rainforest with a high percentage of Camphor Laurel, *Lantana camara* (Lantana) and other exotic weeds. Some trees are isolated in paddocks or in road reserves (McKinley & Stewart 1999) [in NPWS, 2004)	E1	Not recorded. No impact expected. Favoured habitat considered to be absent. Potential habitat (paddocks on deep soils) is present and the species is known from disturbed areas (pers. obs.). The camphor laurel forest/woodland fringing Tweed Valley Way in the north west of the site also represents potential habitat for the species. However, no stems were recorded.
Davidsonia johnsonii	The Smooth Davidsonia is distributed from the Tallebudgera and Numinbah Valleys in Queensland to Tintenbar, near Ballina in NSW. Most locations are close to the coast, but two isolated locations are 25–30 km inland at Nimbin and Terania Creek. Current records suggest that the Smooth Davidsonia is found mainly in wet sclerophyll forests, with a smaller number of sites known from subtropical rainforest (complex notophyll vine forest) (McKinley & Stewart 1999). Records of individuals have also been made from land that has been cleared in the past. Plants still persist in these areas as isolated clumps in paddocks or in regrowth dominated by Lantana (*Lantana camara*) and other weed species (NPWS, 2004: 3-5).	E1	Not recorded. No impact expected. Favoured habitat considered to be absent. Potential habitat (paddocks on deep soils) is present and the species is known from disturbed areas (pers. obs.). However, no stems were recorded.
Dendrocnide moroides	The gympie stinger occurs in lowland rainforest, especially in gaps or other disturbed sites from north Queensland, where it is fairly common, south to the Clarence River in north-east NSW. It is very rare in the southern-most part of its range (DECC, 2005)	E1	Not recorded. No impact expected. Favoured habitat is considered to be absent from the site.
Diploglottis campbellii	"The forest types in which the species occurs varies from lowland subtropical rainforest to drier subtropical rainforest with a *Lophostemon confertus* (Brush Box) open overstorey. Hunter *et al*. (1992) showed that the species occurs on basalt-derived soils and also on poorer soils such as those derived from quartz monzonite" (NPWS, 2004: 6).	E1	Not recorded. No impact expected. Favoured habitat is considered to be absent from the site.

Diospyros major var ebenus	This species occurs in the understorey of riverine or lowland subtropical rainforest in SEQLD and northern NSW (NPWS, 2002).	E1	Not recorded. No impact expected. Favoured habitat considered to be absent. Potential habitat (paddocks on deep soils) is present and the species is known from disturbed areas (pers. obs.). However, no stems were recorded.
Elaeocarpus williamsianus	*'Elaeocarpus williamsianus* is only known to occur within the Byron and Tweed local government areas. Six populations occur on privately owned lands, one population occurs within a road reserve managed by Byron Shire Council and two sites occur in conservation reserves. These reserves are Mooball National Park and Inner Pocket Nature Reserve. *Elaeocarpus williamsianus* occurs along the coastal range within Notophyll vine rainforests and wet sclerophyll ecotones on metasediment-derived soils (Hunter *et al.* 1991). The species is typically found on steep and eroding slopes at low altitude in gullies, toe slopes, steep drops adjacent to creeks and the headwater areas of creeks. Common dominant canopy species include Camphor Laurel *(Cinnimomum camphora),* Brush Box (*Lophostemon confertus)* and Flooded Gum *(Eucalyptus grandis)*. Other dominant species include Lantana *(Lantana cammara* and Black Apple (*Planchonella australis).'* (Kooyman, 2003 in DECC, 2004:4-5).	E1	Not recorded. No impact expected. Favoured habitat is considered to be absent from the site.
Elyonurus citreus	Within NSW this species grows in sandy soils near rivers or along the coast in wallum areas or sand dunes from localities south of Casino, north-west of Grafton, near Cudgen Lake on the Tweed coast and in Yuraygir National Park (DECC, 2005 online @ http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10267)	E1	Not recorded. Favoured habitat is considered to be absent from the site.
Endiandra floydii	'The Crystal Creek Walnut is known from Pimpama, just north of the Queensland Gold Coast, south to Byron Hills, six km south of Cape Byron, NSW. Several large populations are known. Two are in the ranges to the north of Murwillumbah, where numerous other smaller occurrences are also found. At least 50 individuals are known from the Urliup Road area (Barry & Thomas 1994) and 40–50 trees have been reported from Crystal Creek (R. Cremer pers. comm.). A further concentration of plants is in Mooball National Park where nearly 80 individuals have been recorded (NPWS survey data, 1997). The Crystal Creek Walnut occurs in subtropical (including littoral) rainforest or wet sclerophyll forest, often with *Lophostemon confertus* (Brush Box) in the canopy and occasionally with *Araucaria cunninghamii* (Hoop Pine) emergents. Disturbed and regrowth sites may include *Cinnamomum camphora* (Camphor Laurel) and *Lantana camara* (Lantana) as weed components. Most locations are on soils derived from paleozoic metamorphics, sometimes with basalt nearby. A small number of sites are on alluvium or sand. Sheltered locations are apparently preferred, and landforms including ridgelines, slopes, gullies and creek flats have been documented. The altitude varies between close to sea level up to 430 m above sea level (Floyd 1989)' (in DEC, 2004: 3)	E1	Not recorded. No impact expected. The camphor laurel forest/woodland fringing Tweed Valley Way in the north west of the site represents potential habitat for the species. However, no stems were recorded.

Endiandra muelleri subsp. bracteata	The Green-leaved Rose Walnut is known from north-eastern NSW, north from the Clarence River (where a specimen from Maclean was employed in Hyland's 1989 description) to southern and central Queensland (Hyland 1989). Records are usually from the poorer soils derived from sedimentary, metamorphic or acid volcanic rocks. Vegetation includes subtropical and warm temperate rainforests and Brush Box forests, including regrowth and highly modified forms of these habitats. The altitude varies from near sea-level to 800 m. The accurate characterisation of the habitat of the individual taxa must await resolution of the taxonomic problems that confound existing data (NPWS, 2004: 4-5).	E1	Not recorded. No impact expected. Favoured habitat is considered to be absent from the site.
Fontainea australis	Southern Fontainea is known from the Tweed Valley and a few locations in the upper reaches of the Richmond Valley in NSW (DECC, 2005a), north to Currumbin Valley and Springbrook National Park (NP) in southern Queensland (Barry & Thomas, 1994; Queensland Herbarium, 2008). Recorded occurrences in NSW include Nightcap NP, Numinbah Nature Reserve (NR), Goonengerry State Forest, Limpinwood NR, Mount Warning NP, Inverell Shire, and the Border Ranges (Floyd, 1989; Briggs & Leigh, 1996; NSW NPWS, 2004; Inverell Shire Council, 2006; NHT, 2006). Southern Fontainea occurs in lowland subtropical rainforest and complex notophyll vine forest on basaltic alluvial flats and well drained, bright reddish-brown alluvial clay loam (Jessup & Guymer, 1985; Floyd, 1989; Barry & Thomas, 1994). It has been recorded at higher altitudes in the Nightcap Range (NSW NPWS, 2002). Southern Fontainea has been recorded growing in White Booyong (*Heritiera trifoliolata*) Subtropical Rainforest Alliance (Floyd, 1989), and in vine forests with *Eucalyptus grandis* emergents (Barry & Thomas, 1994). Associated species include *Caldcluvia paniculosa*, *Dendrocnide excelsa*, *Dysoxylum fraserianum*, *Mischocarpus lachnocarpus*, *Planchonella australis*, *Sloanea woollsii*, and *Syzygium francisii* at Natural Bridge NP (Barry & Thomas 1994) and White Booyong, *Syzygium hodgkinsoniae*, *Endiandra pubens*, *Dendrocnide photinophylla*, *Acmena ingens*, *Diploglottis cunninghamii*, and *Diospyros mabacea* at Oxley River (BRI, n.d.) [in DSEWPC, 2008: 1-2].	V	Not recorded. No impact expected. Favoured habitat is considered to be absent from the site.
Hicksbeachia pinnatifolia	This species is known from Subtropical rainforest, moist eucalypt forest and Brush Box forest in Coastal areas of north-east NSW from the Nambucca Valley north to south-east Queensland (source DEC, 2005 online @ http://www.threatenedspecies .environment.nsw.gov.au/tsprofile/profile.aspx?id=10405)	V	Not recorded. No impact expected. Favoured habitat considered to be absent. Potential habitat (paddocks on deep soils) is present and the species is known from disturbed areas (pers. obs.). However, no stems were recorded. This species is known from the locality further to the north adjacent Pottsville Road (Parker, 2009)

Isoglossa eranthemoides	This species is known from the understorey of lowland subtropical rainforest, in moist situations on floodplains and slopes where the underlying soils are derived from basalt, metasediments or gabbro (DECC, 2005).	E1	Not recorded. No impact expected. Favoured habitat is considered to be absent from the site.
Lepiderema pulchella	This species occurs within Lowland subtropical rainforest and is largely confined to infertile metasediments in the Tweed Valley (NPWS, 2002).	V	Not recorded. No impact expected. The camphor laurel forest/woodland fringing Tweed Valley Way in the north west of the site represents potential habitat for the species. However, no stems were recorded.
Macadamia tetraphylla	This species of nut tree is confined chiefly to the Richmond and Tweed Rivers in north-east NSW, extending just across the border into Queensland where it occurs within subtropical rainforest, particularly on basaltic soils. (Williams, Harden and McDonald, UNE, 1984; DECC, 2005). The species is also commonly noted as a paddock tree on soils of basaltic influence and as an ornamental or orchard tree associated with residential and/or rural activities (pers.obs.).	V	Not recorded. No impact expected. Favoured habitat considered to be absent. This species is commonly associated with cultivated areas, gardens and paddocks/farming lands on red soils (pers. obs.) However, no stems were recorded. This species is known from the locality further to the north adjacent Pottsville Road (Parker, 2009)
Marsdenia longiloba	"Clear Milkvine is known from scattered sites on the NSW north coast from Hastings River northwards to Mount Nebo in Queensland (Forster, 1996). Clear Milkvine grows in open eucalypt forest, or margins of subtropical and warm temperate rainforest, and in areas of rocky outcrops (Forster, 1996; DECC, 2005a). Associated species include *Eucalyptus crebra*, *E. microcorys*, *E. acmenoides*, *E. saligna*, *E. propinqua*, *Corymbia intermedia* and *Lophostemon confertus* (QDNR, 2000)" (in Department of Sustainability, Environment, Water, Population and Communities, 2008).	E1	Not recorded. No impact expected. Favoured habitat is considered to be absent from the site.

Ochrosia moorei	The range of this species extends from Richmond River in NSW through to the McPherson Ranges, Queensland (Forster, 1996). In 1994 the NSW population was estimated at 50 (Barry & Thomas, 1994; Quinn et al., 1995). Southern Ochrosia grows in riverine and lowland warm subtropical rainforest (Floyd, 1989) and complex notophyll vine forest in soils of volcanic origin (Forster 1993, 1996). This species is often found on hillsides near drainage lines, at elevations of 100–1000 m above sea level. Soils are deep, alluvial or basalt derived, well-drained, and reddish-brown to dark brown. Associated species include *Argyodendron trifoliolatum*, *Dysoxylum fraserianum*, *Dendrocnide excelsa*, *Syzygium crebrinerve*, *Aphananthe philippinensis*, *Capparis arborea*, *Pouteria australis*, *Ficus* spp., *Citriobatus* spp., *Caldcluvia paniculosa*, *Diploglottis australis*, *Polyscias elegans*, *Orites excelsa*, *Sloanea woollsii*, *Rapanea subsessilis*, *Ardisia bakeri*, *Triunia youngiana* and *Wilkiea austroqueenslandica* (Barry & Thomas, 1994; Quinn et al., 1995) [DSEWPC, 2008: 1].	E2	Not recorded. No impact expected Favoured habitat is considered to be absent from the site.
Randia moorei	The known range of the Spiny Gardenia extends from Lismore on the north coast of NSW, northwards to the Logan River, southern Queensland (Quinn *et al.* 1995). The Spiny Gardenia occurs in subtropical, riverine, littoral and dry rainforest and sometimes along moist scrubby watercourses. In NSW the species is often found in Hoop Pine (*Araucaria cunninghamii*) - Brush Box (*Lophostemon confertus*) forest with other rainforest elements present in the understorey. Although plants are typically found within rainforest or in Hoop Pine - Brush Box forest, at Terranora in Tweed Shire and on the southern slopes of Mount Chincogan in Byron Shire, the Spiny Gardenia occurs as a scattered remnant shrub in open grazing land that was formerly rainforest (NPWS, 2004: 3-4).	E1	Not recorded. No impact expected Favoured habitat considered to be absent. Potential habitat (paddocks on deep soils) is present and the species is known from disturbed areas (pers. obs.). However, no stems were recorded.
Syzygium hodgkinsoniae	This tree occurs in riverine rainforest on rich alluvial or basaltic soils, from the Richmond River in NSW to Gympie, Queensland, with a disjunct occurrence in north Queensland (Floyd, 1989; NSW NPWS, 2002). The species occurs mostly as scattered individuals along watercourses, where the habitat is frequently limited and degraded (Landmark Ecological Services, Ecograph & Terrafocus, 1999) [DSEWPC, 2008: 2].	V	Not recorded. No impact expected Favoured habitat is considered to be absent from the site.
Syzygium moorei	The Durobby occurs in warm, protected, fertile soils in riverine and gully rainforests at low altitudes, along sections of the Richmond, Brunswick and Tweed Rivers in NSW, as well as at three sites in Upper Mudgeeraba Creek and Upper Tallebudgera Creek in south-east Queensland (Floyd, 1989). Rose Apple is most commonly found in Subtropical Rainforest *Argyrodendron trifoliatum* Alliance, including sub-alliance 1 (*Argyrodendron trifoliatum*) on lowland krasnozem; suballiance 2 (*Toona-Flindersia* spp.) on lowland alluvium; and sub-alliance 6 (*Archontophoenix-Livistona*) on alluvium with excess moisture (Floyd, 1990). Stands of the *A. trifoliatum* Alliance originally occurred on the best potential agricultural land, so consequently was mostly cleared, with the exception of small patches occurring in floodprone, stony or poorly drained soils (DSEWPC, 2008:1-2).	V	Not recorded. No impact expected Favoured habitat considered to be absent. Potential habitat (paddocks on deep soils) is present and the species is known from disturbed areas (pers. obs.). However, no stems were recorded. The species has been recorded on the property to the east (Planit, 2010). This species is known from the locality further to the north adjacent Pottsville Road (Parker, 2009)

5.4 THREATENED FAUNA SPECIES

A search of the *NPWS 'Atlas of NSW Wildlife'* has determined that thirty-four species of threatened fauna have been previously within the locality (search area 153.43277, -28.50449, 153.54255, -28.40449). During investigation none of these species were encountered although it is acknowledged that very brief and non-systematic searches were performed in association with this preliminary review.

A review of available habitats and the ecology of the database listed species (i.e. range, preferred habitat, home range etc) indicate that it is unlikely that all of these previously recorded species in the locality would rely on the habitats of the subject site or be significantly affected by any proposed development of the site.

Subsequently threatened species are considered unlikely to be significantly affected by a future development of the site for one or more of the following reasons:

- Core/favoured habitats were not recorded in the site
- Resources used by the species are unlikely to be adversely affected or only likely to be minimally affected by a future proposal (i.e. as presented in Attachment 3).

TABLE 12: POTENTIAL OCCURRENCE OF THREATENED FAUNA			
Species	**Potential occurrence based upon known habitat and range**	**Notes**	**Potential for the species or associated habitat to be impacted upon by proposal**
White-eared Monarch (*Monarcha leucotis*)	Unlikely	This species generally occurs within Coastal/Subtropical/Littoral Rainforests and occasionally Eucalypt/Riparian Forest, Mangroves and Swamp Sclerophyll with mesomorphic understorey along the eastern coast of Australia from Cape York to the Tweed River (Readers Digest, 2002; DEC, 2005). The Tweed Birds Observers (2005) do note that the species has been sighted along the Terranora Broadwater (online @http://www. bigvolcano. com.au/custom/birdos/media/brochure/brochure.htm). It has also been recorded within Mangrove habitats within the Tugan Bypass study area (Ecopro, 2004). Favoured habitat for the monarch is considered to be absent from the site.	Preferred habitat for this species is considered to be absent from the site. At this stage it is considered that this species is unlikely to be significantly affected by future development (in accordance with the concept plan presented in Attachment 3).
Bush-hen (*Amaurornis olivaceus*)	Unlikley	This species favors coastal rivers and inlets from the Clarence River, north. It prefers densely overgrown margins of permanent terrestrial freshwater wetlands such as creeks and rivers, billabongs, ponds, swamps, waterholes, dams, lakes and roadside ditches (Muranyi and Baverstock, 1996). Three Bush-hens were recorded from Swamp Mahogany Forest in areas NE of the Cobaki Broadwater in association with fauna survey works undertaken in association with the Tugan Bypass SIS (Ecopro, 2004). PB (2008) has also recorded the bush hen at Banora Point within early regrowth rainforest west of Martinelli Avenue. Potential habitat for the bush hen is considered to be absent from the site.	Preferred habitat for this species is considered to be absent from the site. At this stage it is considered that this species is unlikely to be significantly affected by future development (in accordance with the concept plan presented in Attachment 3).
Black-necked Stork (*Ephippiorhynchus asiaticus*)	Unlikley	The species is generally associated with wetlands, mudflats, mangroves, swamps and floodplains while it may also sometimes be found in open woodland environs where a grassy understorey is present (NPWS, 2002, Readers Digest, 2002; DEC, 2005). Irrigated lands are also occasionally a foraging resource and it has also been recorded foraging in artificial wetlands of sewerage treatment plants (ERM, 2001). The species has also been recorded foraging within grassed paddocks and stock watering/irrigation dams within farming areas (pers. obs.). Favoured habitat for the stork is considered to be absent from the site although marginal habitat is present in the form of grassed gully areas which would contain overland flow/runoff during peak rainfall periods.	Preferred habitat for this species is considered to be absent from the site. At this stage it is considered that this species is unlikely to be significantly affected by future development (in accordance with the concept plan presented in Attachment 3).

Glossy Black-Cockatoo (*Calyptorhynchus lathami*)	Unlikley	Glossy Black Cockatoos are uncommon parrots found in scattered localities in the forests and woodlands of eastern Australia and Kangaroo Island (Forshaw, 1981). The eastern subspecies of Glossy Black Cockatoos seems thinly distributed through its range with the highest densities occurring in south-eastern Queensland and north-eastern New South Wales (Forshaw, 1989). The main habitat of the eastern subspecies is *Eucalyptus* woodlands and forest with moderate-high densities of *Allocasuarina* which are required for feeding (Clout, 1989; Park & Borsboom, 1996; Forshaw & Cooper, 1989; Crome & Shields, 1992; Cleland & Sims, 1968; Garnett, 1992b; Blakers *et al*, 1984). Suitable senescent trees (large hollow within a live or dead Eucalypt: 10-20m, Depth: 40-120cm, Entry: ~21cm: Inside Dia: ~23cm (Forshaw, 1981; Gibbons & Lindenmayer, 2002)) are also required for nesting. Favoured habitat (eucalypt woodland/forest) and suitable nesting trees are absent and the glossy black cockatoo was not recorded onsite. Potential habitats are present in association with Blackbutt Forest/Woodland further to the southeast of the site.	Preferred habitat for this species is considered to be absent from the site. At this stage it is considered that this species is unlikely to be significantly affected by future development (in accordance with the concept plan presented in Attachment 3).
Grey-headed Flying-fox (*Pteropus poliocephalus*)	Likely	This species forages on a variety of fruits, flowers and pollen. It occurs in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps (Eby 1995). It additionally utilises cultivated fruit crops and urban gardens. All fruiting and flowering trees (principally camphor laurels) on the site represent potential habitat for this species and it is considered a likely occurrence during flowering and fruiting periods. No flying fox camps were, however, encountered with the closest known camp being approximately 9.5km to the southeast at Marshalls Creek.	Reduction in areas of marginal habitat (grasslands/ paddock and scattered trees). No roosting areas likely to be impacted. At this stage it is considered that this species is unlikely to be significantly affected by future development (in accordance with the concept plan presented in Attachment 3).
Barred Cuckoo-shrike (*Coracina lineata*)	Possible	This species has been recorded from a variety of habitats including rainforest, eucalypt forests and woodlands, clearings in secondary growth, swamp woodlands and timber along watercourses within Coastal NSW (NPWS, 2002). Foraging requirements include fruiting tree species within in rainforest, wet sclerophyll forest, vegetation remnants or isolated trees (DEC, 2005) and insects captured among foliage (NPWS, 2002). Preferred remnant forest/woodland habitat is absent from the site although secondary forests are along the northwestern boundary within the road reserve (camphor laurel +/- early regrowth rainforest). Scattered fruiting rainforest trees (including camphor laurel) also occur across the site.	Reduction in areas of marginal habitat (grasslands/ paddock and scattered trees). At this stage it is considered that this species is unlikely to be significantly affected by future development (in accordance with the concept plan presented in Attachment 3).

Alberts Lyrebird (*Menura alberti*)	Unlikely	This species is known from moist rainforest areas above 300m proximate to the NSW/QLD border which are characterized by an enclosed canopy, dense rainforest understorey and deep litter layer (Readers Digest, 2002; DECC, 2005; Garnett & Crowley, 2000). They favour areas with Antarctic Beech *Nothofagus moorei* and wet sclerophyll forest with a dense understorey of rainforest plants but are absent from some rainforest types, including complex notophyll vine forest on high nutrient soils (Gilmore, 2000, A. Gilmore) and from dry sclerophyll forest (Robinson and Curtis, 1996, Higgins, in press, Gilmore). They feed on invertebrates on the ground and have a clutch of one, laid in a large domed nest built in trees, on rock escarpments or on the steep sides of gullies (Higgins, in press) [in Garnett & Crowley, 2000]. Favoured habitat for the lyrebird is considered to be absent from the site.	Preferred habitat for this species is considered to be absent from the site. At this stage it is considered that this species is unlikely to be significantly affected by future development (in accordance with the concept plan presented in Attachment 3).
Comb-crested Jacana (*Irediparra gallinacea*)	Unlikley	This species inhabits deep, permanent freshwater lagoons, swamps and dams with abundant aquatic vegetation, especially water-lilies throughout coastal Australia and well inland in the north from the Kimberley to Sydney (DEC, 2005). The jacana is also know from constructed stormwater wetlands and sewerage treatment ponds containing abundant floating vegetation including areas adjacent to urban development (pers. obs.). Favoured habitat for the Jacana is considered to be absent from the site	Preferred habitat for this species is considered to be absent from the site. At this stage it is considered that this species is unlikely to be significantly affected by future development (in accordance with the concept plan presented in Attachment 3).
Common Blossom Bat (*Syconycteris australis*)	Unlikely	This species is one of the smallest members of the flying fox family (Pteropodidae) and is considered to be a specialist pollen feeder favouring Banksia, Melaleuca, Callistemon and certain species of Eucalypt (Strahan eds, 2002). Required habitats include Coastal rainforest, heathlands and Melaleuca swamps. Roosting is noted to occur in Littoral Rainforest with foraging occurring in proximate heathland and melaleuca forest primarily on the flowers of Banksia integrifolia (Law, 1993; 1994; 1996) It is noted that the Blossom Bat is commonly recorded in the coastal area including at Koala Beach to the south (Hannah & Lewis, 2007) with significant habitat plantings also occurring at Casuarina Beach. It is considered that favoured littoral rainforest (roosting) and heathland/melaleuca forest (foraging) habitats are absent from the site.	Preferred habitat for this species is considered to be absent from the site. At this stage it is considered that this species is unlikely to be significantly affected by future development (in accordance with the concept plan presented in Attachment 3).

Common Planigale (*Planigale maculata*)	Unlikely	This species is known to inhabit a broad range of habitats incorporating a dense ground cover layer including rainforest, eucalypt forest, heathland, marshland, grassland and rocky areas (Redhead in Strahan, 2002; Lewis, 2005). In northern NSW, it has been suggested that their distribution often corresponds with the low lying flat and undulating areas of the coastal plains often near intensively settled areas (Gilmore and Parnaby 1994 in Lewis, 2005). A small population of the species has been previously recorded on the northern banks of the Cobaki Broadwater in association with Swamp Mahogany/Brushbox Forest (Ecopro, 2004; Lewis Ecological Surveys, 2004). Although no small mammal trapping surveys have been performed to date it is considered that the site does not contain favoured habitat for the planigale.	Preferred habitat for this species is considered to be absent from the site. At this stage it is considered that this species is unlikely to be significantly affected by future development (in accordance with the concept plan presented in Attachment 3).
Eastern Bentwing (*Miniopterus schreibersii oceanensis*)	Possible	This species usually forages on insects within intact, well timbered forest complexes and have been found to roost within caves, tunnels, stormwater culverts or disused mining areas (Strahan eds, 2002; DEH, 2005). They utilise a broad range of habits including wet and dry sclerophyll forest, open woodland, paperbark forests, rainforests and open grasslands (North & Pasic, 2006). All areas of the site represent potential foraging habitat for the eastern bentwing although roosting areas are considered to be absent.	Reduction in areas of potential foraging habitat (grasslands/ paddock and scattered trees). No roosting areas likely to be impacted. At this stage it is considered that this species is unlikely to be significantly affected by future development (in accordance with the concept plan presented in Attachment 3).
Eastern Long-eared Bat (*Nyctophilus bifax*)	Possible	This species of bat inhabits lowland subtropical rainforest and wet and swamp eucalypt forest, extending into adjacent moist eucalypt forest with coastal rainforest and patches of coastal scrub particularly favoured (DEC, 2005; NPWS, 2002). Roosting occurs within tree-hollows, under bark and/or palm fronds and within dense foliage with a seasonal shift in roost sites from rainforest edges (summer) to the rainforest interior (winter) (NPWS, 2002; Parnaby in Strahan, 2002; Lunney et al, 1995). Favoured habitat for this species, although present in the locality, is considered to be absent from the site although dispersal and foraging may occur as individuals move between offsite rainforest remnants. Several dead camphor laurels may provide small potential roost hollows.	Reduction in areas of marginal potential foraging habitat (grasslands/ paddock and scattered trees). Five dead camphor laurels may contain small unobserved hollows suitable for roosting. At this stage it is considered that this species is unlikely to be significantly affected by future development (in accordance with the concept plan presented in Attachment 3).

Grass Owl (*Tyto longimembris*)	Unlikely	This species is generally recorded within tussock-grasslands but has also been noted to occur within heathland, swamps, coastal dunes, tree-lined creeks, treeless plains, mangrove fringes, grassy gaps between trees and crops and sugar cane plantation (Garnett and Crowley 2000; Pizzey and Knight, 1997). Within these habitats it sources a wide range of prey including birds, insects and terrestrial mammals. However, it feeds predominately on rodents and its population numbers can fluctuate wildly with the rise and fall of prey populations (Olsend and Doran, 2002). The fall of primary prey species following plague events (during which owl breeding increases) can result in widespread dispersal by the Owls with starvation also noted as the forage base reduces (Debus et al, 1998). Within the site it is considered that the rank, tall pasture grasslands provide potential habitat for the grass owl. However these areas were traversed and inspected during survey with no nests or individuals of the species noted.	At this stage it is considered that this species is unlikely to be significantly affected by future development (in accordance with the concept plan presented in Attachment 3).
Little Bentwing Bat (*Miniopterus australis*)	Possible	This species utilises well-timbered habitats including rainforest, *Melaleuca* swamps and dry sclerophyll forests where it It feeds on insects within the canopy and requires caves, mines, stormwater drains and/or tree hollows to roost (Strahan eds, 2002). DECC (2005) note the following additional particulars with regard to the little bentwing bat: • Maternity colonies form in spring. Males and juveniles disperse in summer. • Only five nursery sites /maternity colonies are known in Australia. • Moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, Melaleuca swamps, dense coastal forests and banksia scrub. Generally found in well-timbered areas. • Little Bentwing-bats roost in caves, tunnels, tree hollows, abandoned mines, stormwater drains, culverts, bridges and sometimes buildings during the day, and at night forage for small insects beneath the canopy of densely vegetated habitats. • They often share roosting sites with the Common Bentwing-bat and, in winter, the two species may form mixed clusters. • In NSW the largest maternity colony is in close association with a large maternity colony of Common Bentwing-bats (*M. schreibersii*) and appears to depend on the large colony to provide the high temperatures needed to rear its young. Favoured forest habitats favoured by the little bentwing bat are absent from the site. The species has been recorded on the property to the east (Planit, 2010) within Tall Closed Subtropical Rainforest/Camphor Laurel Forest.	Reduction in areas of potential foraging habitat (grasslands/ paddock and scattered trees). No roosting areas likely to be impacted. At this stage it is considered that this species is unlikely to be significantly affected by future development (in accordance with the concept plan presented in Attachment 3).
Little Lorikeet (*Glossopsitta pusilla*)	Unlikely	"The distribution of the Little Lorikeet extends from just north of Cairns, around the east coast of Australia, to Adelaide. In New South Wales Little Lorikeets are distributed in forests and woodlands from the coast to the western slopes of the Great Dividing Range, extending westwards to the vicinity of Albury, Parkes, Dubbo and Narrabri (Barrett *et al*. 2003). There is no evidence of regular migration, but Little Lorikeets are generally considered to be nomadic (Higgins 1999), with irregular large or small influxes of individuals occurring at any time of year, apparently related to food availability. However, long term investigation of the breeding population on the north-western slopes indicates, that breeding birds are resident from April to December, and even during their non-resident period, they may return to the	Preferred habitat for this species is considered to be absent from the site. At this stage it is considered that

		nest area for short periods if there is some tree-flowering in the vicinity (Courtney & Debus 2006). Little Lorikeets mostly occur in dry, open eucalypt forests and woodlands. They have been recorded from both old-growth and logged forests in the eastern part of their range, and in remnant woodland patches and roadside vegetation on the western slopes. In south-east Queensland (Smyth *et al*. 2002), Little Lorikeets were more likely to occupy forest sites with relatively short to intermediate logging rotations (15–23 years) and sites that have had short intervals (2.5– 4 years) between fires" (DECC, 2009 online @ http://www.environment.nsw.gov.au/determinations/littlelorikeetpd.htm) Favoured habitat for the little lorikeet is considered to be absent from the site.	this species is unlikely to be significantly affected by future development (in accordance with the concept plan presented in Attachment 3).
Long-nosed Potoroo (*Potorous tridactylus*)	Unlikely	Long-nosed Potoroos are generally restricted to areas with an annual rainfall greater than 760 mm where they inhabit dry and wet sclerophyll forests and woodland with a heathy understorey (Johnson in Strahan, 2002; DEC, 2005). The preferred habitat in north eastern NSW is dry and wet open shrubland (Mason 1997, DEC, 2005, Johnston in Strahan, 2002). In all habitats the species requires relatively thick groundcover growing on friable soils (Bennett, 1993). Within these areas the Potoroo digs for its food the main component of which is hypogeal fungi with other important items including hard-bodied arthropods, vascular plant tissues, seeds and fleshy fruits (Bennett & Baxter, 1989; Claridge et al, 1993). It is also noted that a small, disjunct population of Potoroos exists in a small area of Crown land between the northern shore of Cobaki Broadwater and the NSW-Queensland border (Bali et al, 2003; Ecopro, 2004; Warren & Associates, 1992; Hero, 2001). The extensive 2003 survey undertaken by Bali et al notes that "within the Cobaki area, potoroos were most frequently trapped in Scribbly Gum Mallee Heathland followed by, Tree Broom Heathland, Scribbly Gum/Swamp Mahogany Forest, Black She-oak Heathland, Swamp Mahogany Forest and Scribbly Gum Forest. Our results suggest that potoroos prefer Scribbly Gum Mallee Heathland with an understorey of sedges and grasses such as *Restio* spp., *Lomandra* spp. and *Gahnia* spp., which is found along both sides of the Cobaki Lakes" (Bali et al, 2003: 16). Favoured habitat for the potoroo is considered to be absent from the site.	Preferred habitat for this species is considered to be absent from the site. At this stage it is considered that this species is unlikely to be significantly affected by future development (in accordance with the concept plan presented in Attachment 3).
Marbled Frogmouth (*Podargus ocellatus plumiferus*)	Unlikely	This species favours prefers subtropical or warm-temperate rainforest containing deep, wet, sheltered gullies dominated by stands of Bangalow Palms and/or dense rainforest understorey in SEQld and NENSW (DEC, 2005; Smith et al, 1994; Milledge, 1983). Tracking studies undertaken by Smith et al (1994) indicates that the species occupies a moderately large home range (8-10 hectares) which centres around a creek or gullyline although movements were greatly restricted during the breeding season. Roosts sites are in, or on the margins of, rainforest, frequently associated with vines (Smith *et al.*, 1998). Favoured habitat for the marbled frogmouth is considered to be absent from the site.	Preferred habitat for this species is considered to be absent from the site. At this stage it is considered that this species is unlikely to be significantly affected by future development (in accordance with the concept plan presented in Attachment 3).

Masked Owl (*Tyto novaehollandiae*)	Unlikely	The Masked Owl lives in eucalypt forests and woodlands from the coast, where it is most abundant, to the western plains (Kavanagh 2002b in NPWS, 2005). Within suitable habitat that species occupies a range of 5-10km2 where it forages mostly upon rodents and marsupials although this may be supplemented by bandicoots, arboreal mammals (Sugar Glider, Common Ringtail Possum) and some birds with introduced rodents and rabbits becoming important in disturbed environments (Debus, 1993, Kavanagh, 1996; NPWS, 2005). Habitats containing stands of large, hollow bearing eucalypts are also critical to roosting and nesting (NPWS, 2005; Kavanagh and Murray, 1996). Whilst the species has been recorded in the region, the site is unlikely to represent significant habitat within its home range given the absent of suitable forest/woodland and suitable hollow-bearing trees for roosting.	Preferred habitat for this species is considered to be absent from the site. At this stage it is considered that this species is unlikely to be significantly affected by future development (in accordance with the concept plan presented in Attachment 3).
Osprey (*Pandion haliaetus*)	Unlikely	This species is associated with waterbased habitats including estuaries, coastal wetlands, rivers and streams. The Osprey is predominately a coastal raptor frequenting estuaries, bays, inlets, islands and rocky cliffs within all Australian states except for Tasmania and sporadically within Victoria (DEC, 2005; NPWS, 2002). It is noted however, that the species sometimes inhabits inland islands (Pizzey and Knight, 1997; Readers Digest, 2002). Within suitable environment it usually constructs a nest in an overhanging large tree or upon elevated man made structures such as platforms or telegraph poles. The species preys almost exclusively on fish by usually hunting alone and traversing the water's surface for prey which it secures by swooping over the waters surface or plunging below (Readers Digest, 2002; Clancy, 2005). Studies of prey middens on Lizard Island within the Great Barrier Reef also noted that occasional Terns and crustaceans are sourced for food (Smith, 1985). Favoured habitat for this species is considered to be absent from the site.	Preferred habitat for this species is considered to be absent from the site. At this stage it is considered that this species is unlikely to be significantly affected by future development (in accordance with the concept plan presented in Attachment 3).
Red Goshawk (*Erythrotriorchis radiatus*)	Possible	This raptor utilises coastal-subcoastal tall forests/woodlands, savanna traversed by forested rivers and rainforest fringes (Marchant & Higgins, 1993; NPWS, 2002; NPWS, 1999). Nesting is restricted to tall trees within proximity of a creek, river or wetland (NPWS, 1999; NT Parks & Wildlife Commission, 2002). Hunting occurs for medium-large birds within open forests and riparian/gallery forests over a very large home range of up to 200km^2 (Blakers et al., 1984, Aumann and Baker-Gabb, 1991, Czechura and Hobson, 2000; NPWS, 2002). As the Red Goshawk has been previously recorded in the locality and hunts over a very large area it is considered likely that the site falls within the home range of the local population although forested/woodland habitat for potential prey species is scarce.	Reduction in areas of potential foraging habitat (grasslands/ paddock and scattered trees). At this stage it is considered that this species is unlikely to be significantly affected by future development (in accordance with the concept plan presented in Attachment 3).

Regent Honeyeater (*Xanthomyza phrygia*)	Unlikely	The Regent Honeyeater is mostly recorded within box-ironbark eucalypt and riparian associations incorporating River She-oak on the inland slopes of the Great Dividing Range (Menkhorst et al, 1999; NPWS, 1999). Only three key breeding regions are known [north-east Victoria (Chiltern-Albury), and in NSW at Capertee Valley and the Bundarra-Barraba region] although non-breeding flocks have been recorded in flowering coastal Swamp Mahogany and Spotted Gum forests particularly on the central coast and occasionally on the upper north coast (DEC. 2005; Menkhorst et al, 1999). Diet is mostly reliant on nectar from 16 species of Eucalypt and two species of Mistletoe although the preferred sources are three species of eucalypt; Red Ironbark, White Box and Yellow box (Webster & Menkhorst 1992; NPWS, 1999; Menkhorst et al, 1999). Favoured habitat for the species is considered to be absent from the site.	Preferred habitat for this species is considered to be absent from the site. At this stage it is considered that this species is unlikely to be significantly affected by future development (in accordance with the concept plan presented in Attachment 3).
Rose-crowned Fruit Dove (*Ptilinopus regina*)	Possible	This species generally occurs within sub-tropical rainforest, camphor laurel and occasionally wet sclerophyll and swamp forests which contain suitable fruiting species for foraging (DEC, 2005; Recher et al, 1995). As an obligate frugivore a high proportion of fruiting species (figs, lillipillis, laurels etc) is necessary and as such rainforest habitats are favoured. The species is considered a partial migrant and moves north in autumn/winter and returning in spring/summer to breed (Recher et al, 1995). Preferred rainforest/wet sclerophyll habitat is absent from the site with although camphor laurel habitats are present and individual fruiting trees are present within pasture areas areas.	Reduction in areas of marginal habitat (grasslands/ paddock and scattered trees). At this stage it is considered that this species is unlikely to be significantly affected by future development (in accordance with the concept plan presented in Attachment 3).
Scarlet Robin (*Petroica boodang*)	Unlikley	The Scarlet Robin is found in south-eastern Australia (extreme south-east Queensland to Tasmania, western Victoria and south-east South Australia) and south-west Western Australia. In NSW it occupies open forests and woodlands from the coast to the inland slopes (Higgins and Peter 2002). Some dispersing birds may appear in autumn or winter on the eastern fringe of the inland plains. The Scarlet Robin breeds in drier eucalypt forests and temperate woodlands, often on ridges and slopes, within an open understorey of shrubs and grasses and sometimes in open areas. Abundant logs and coarse woody debris are important structural components of its habitat. In autumn and winter it migrates to more open habitats such as grassy open woodland or paddocks with scattered trees. It forages from low perches, feeding on invertebrates taken from the ground, tree trunks, logs and other coarse woody debris. The robin builds an open cup nest of plant fibres and cobwebs, sited in the fork of tree (often a dead branch in a live tree, or in a dead tree or shrub) which is usually more than 2 m above the ground (Higgins and Peter 2002; Debus 2006a,b)" (in DECC, 2009 online @ http://www.environment.nsw.gov.au/determinations/scarletrobinpd.htm) Potential habitat for the Scarlet Robin is present on site in association with the pasture grassland areas although eucalypts and coarse woody debris are absent from these areas. Brief survey of the paddocks failed to encounter the species. Favoured eucalypt forests/woodlands are absent from the site.	Reduction in areas of marginal foraging habitat (grasslands/ paddock and scattered trees). No potential breeding grounds will be affected. At this stage it is considered that this species is unlikely to be significantly affected by future development (in accordance with the concept plan presented in Attachment 3).

Speckled Warbler (*Pyrrholaemus saggitatus*)	Unlikely	"The Speckled Warbler has a patchy distribution throughout south-eastern Queensland, the eastern half of NSW and into Victoria, as far west as the Grampians. The species is most frequently reported from the hills and tablelands of the Great Dividing Range, and rarely from the coast. There has been a decline in population density throughout its range, with the decline exceeding 40% where no vegetation remnants larger than 100ha survive. The Speckled Warbler lives in a wide range of *Eucalyptus* dominated communities that have a grassy understorey, often on rocky ridges or in gullies. Typical habitat includes scattered native tussock grasses, a sparse shrub layer, some eucalypt regrowth and an open canopy and large, relatively undisturbed remnants are required for the species to persist in an area. Pairs are sedentary and occupy a breeding territory of about ten hectares, with a slightly larger home-range when not breeding" (DECC, 2005 online @ http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10722). This species is not listed as occurring within Tweed Shire (NPWS Atlas) but a record occurs from Middle Pocket (Byron Shire) from 1996. It is considered that favoured habitat for this species of warbler is absent from the site.	Preferred habitat for this species is considered to be absent from the site. At this stage it is considered that this species is unlikely to be significantly affected by future development (in accordance with the concept plan presented in Attachment 3).
Southern Myotis (*Myotis macropus*)	Possible	The Myotis roosts within caves, tunnels, hollow-bearing trees, bridges, buildings and dense tree foliage always in close proximity to permanent water (NPWS, 2002; Richards, 2002). It forages over waterbodies where it scoops insects and small fish from the water surface or catches insects aerially (DEH, 2005; Menkhorst, 1996; Richards, 2002). It has been recorded foraging over small creeks, coastal rivers, estuaries, lakes and inland rivers (Law & Anderson, 1999) and other smaller waterbodies including farm dams (Law et al, 1998). Favoured habitats for the myotis are considered to be absent from the site. The species has been recorded on the property to the east (Planit, 2010) flying over farm dams and gullies through the northern paddocks containing standing water.	Loss of five dead camphor laurels which may contain small unobserved hollows suitable for roosting. At this stage it is considered that this species is unlikely to be significantly affected by future development (in accordance with the concept plan presented in Attachment 3).
Spotted-tail Quoll (*Dasyurus maculatus*)	Unlikely	The species has been recorded from a wide range of habitats such as rainforest, open forest, woodland, coastal heathland, and inland riparian forest (Edgar and Belcher, 2002; Forest Practices Board, 2002). Additional habitat requirements include suitable den sites (such as hollow logs, tree hollows, rock outcrops or caves) and an abundance of food (such as birds and small mammals) (NSWNPWS, 1999; Edgar & Belcher, 2001; Belcher, 2000; Jones & Ross, 1996). Habitat range for males has been estimated to be as large as 2000-2200 hectares per individual, while for females, which are more protective of their dens, this value is considerably less at between 700-850 hectares per individual (Belcher, 2000; NPWS, 1999). Population density is therefore naturally quite low and has been estimated at 1 individual per 3 km^2 even within optimal 'core' habitat (Jones & Rose, 1996).	Preferred habitat for this species is considered to be absent from the site. At this stage it is considered that this species is unlikely to be significantly affected by future development (in accordance with the concept plan presented in

		A review of Searle (2006) notes the presence of the quoll within the Numinbah Valley on the northern side of the border ranges within habitats which include subtropical rainforest. Favoured habitat for the species is considered to be absent from the site.	Attachment 3).
Square-tailed Kite (*Lophoictinia isura*)	Unlikely	This species typically prefers the coastal forested and wooded lands of tropical and temperate Australia where it appears to occupy large hunting ranges of more than 100km^2 (Marchant & Higgins 1993; NPWS, 1999; DEC, 2005). A common feature of the kite's habitat is the presence of profuse eucalypt blossom and attendant nectivorous/passerine birds which are the favoured prey of the kite (Readers Digest, 2002, NPWS, 1999). It is considered that generally favoured habitats are absent from the site and it was not recorded during brief survey. If the NPWS 1995 record was of a sedentary species of which a population which persists in the locality (rather than a vagrant) then potential traversal of the site as part of a much larger hunting range cannot be discounted. As this species is considered to be a high mobility taxon (EPA, 2002), would utilise a vaster home range than the site and given the relatively minor amount of vegetation recommended to be cleared (within a pasture/paddock area) in association with a future development, no significant impact to the Kite is anticipated.	Preferred habitat for this species is considered to be absent from the site. At this stage it is considered that this species is unlikely to be significantly affected by future development (in accordance with the concept plan presented in Attachment 3).
Superb Fruit-dove (*Ptilinopus superbus*)	Possible	This species is known from rainforest and adjacent eucalypt forests which contain suitable fruiting species for foraging (DEC, 2005; Recher et al, 1995). As an obligate frugivore a high proportion of fruiting species (figs, palms, lillipillis, laurels etc) is necessary and as such rainforest habitats are favoured where the species spends most of its time in the canopy. The species is considered a partial migrant and moves north in autumn/winter and returning in spring/summer to breed (Recher et al, 1995). Preferred rainforest/eucalypt forest habitat is absent from the site with although camphor laurel habitats are present and individual fruiting trees are present within pasture areas.	Reduction in areas of marginal habitat (grasslands/ paddock and scattered trees). At this stage it is considered that this species is unlikely to be significantly affected by future development (in accordance with the concept plan presented in Attachment 3).
Wompoo Fruit Dove (*Ptilinopus magnificus*)	Unlikely	This species is confined to mature rainforest and adjacent wet sclerophyll environments in eastern Australia from Cape York to around Coffs Harbour. As an obligate fruigivore it requires a high availability of fruiting materials which it generally feeds on in the high canopy (Recher et al, 1995). Breeding in NENSW extends from winter to midsummer with a simple stick platform nest constructed generally below 10m from the ground (Recher et al, 1995). Preferred rainforest/wet sclerophyll habitat is absent from the site with although camphor laurel habitats are present and individual fruiting trees are present within pasture areas.	Reduction in areas of marginal habitat (grasslands/ paddock and scattered trees). At this stage it is considered that this species is unlikely to be significantly affected by future development (in accordance with the concept plan presented in Attachment 3).

Varied Sitella (*Daphoenositta chrysoptera*)	Unlikely	"The Varied Sittella is sedentary and inhabits most of mainland Australia except the treeless deserts and open grasslands, with a nearly continuous distribution in NSW from the coast to the far west (Higgins and Peter 2002; Barrett *et al.* 2003). It inhabits eucalypt forests and woodlands, especially rough-barked species and mature smooth-barked gums with dead branches, mallee and *Acacia* woodland. The Varied Sittella feeds on arthropods gleaned from crevices in rough or decorticating bark, dead branches, standing dead trees, and from small branches and twigs in the tree canopy. It builds a cup-shaped nest of plant fibres and cobweb in an upright tree fork high in the living tree canopy, and often re-uses the same fork or tree in successive years" (DECC, 2009 online @ http://www.environment.nsw.gov.au/determinations/variedsittellapd.htm). Favoured habitat for the Sittella is considered to be absent from the site.	Preferred habitat for this species is considered to be absent from the site. At this stage it is considered that this species is unlikely to be significantly affected by future development (in accordance with the concept plan presented in Attachment 3).
Brush-tailed Phascogale (*Phascogale tapoatafa*)	Unlikely	This species favours dry open eucalypt forest with a sparse groundcover of herbs, grasses, shrubs or leaf litter (NPSW, 1999; DECC, 2005). Studies indicate that home range sizes of animals are very large (females 20-70ha exclusive of other females; males up to 100ha+ overlapping with other males and females) and subsequently individuals occur at low densities within suitable habitat (Soderquist in Strahan eds, 2002; NPWS, 1999; Soderquist et al, 2001; Rhind & Bradely, 2002). Despite male and female ranges overlapping both sexes are predominately solitary (Cuttle, 1982; Soderquist & Ealey, 1994) excluding during the breeding season. Within their home range individuals require multiple, large hollow bearing trees (DBH >80cm) in which to nest (Soderquist et al, 2001; Gibbons & Lindenmayer, 2002). Following the annual breeding season all males die with the phascogale being the largest recorded animal to suffer from male semelparity (Scarff et al, 1998; Soderquiist et al, 2001; Rhind & Bradley, 2002). Gestation lasts about 30 days and weaning up to 20 weeks with mortality usually high during this period (Soderquist in Strahan eds, 2002; NPWS, 1999). The diet of the species consists mainly of arthropods, such as spiders and centipedes, as well as small invertebrates including cockroaches, beetles and bull ants (Cuttle 1982; Scarff et al, 1998). Phascogales will also forage on the ground and eucalypt nectar is extensively utilised when trees are flowering (Traill and Coates 1993; Scarff et al, 1998). It is an occasional predator of domestic/introduced animals such as poultry or rats (Soderquist in Strahan eds, 2002; Troughton, 1941). Favoured habitat for the phascogale is considered to be absent from the site.	Preferred habitat for this species is considered to be absent from the site. At this stage it is considered that this species is unlikely to be significantly affected by future development (in accordance with the concept plan presented in Attachment 3).

Sooty Owl (*Tyto tenebricosa*)	Unlikely	This species is known predominantly from dry, subtropical and warm temperate rainforest and wet sclerophyll forest of the coastal, escarpment and eastern tablelands regions of NSW (Kavanagh 2002; DEC, 2005). The owl is reported as occupying the easternmost one-eighth of NSW (Debus 1994; DEC, 2005). Within this habitat it feeds largely on mammals ranging from small terrestrial species to medium sized arboreal species such as the Common Ringtail Possum, Sugar Glider, Bush Rat and Brown Antechinus (DEC, 2005; Lundie-Jenkins, 1992). Nesting occurs in large hollow trees which are mostly Eucalypts but can include Moreton Bay Figs and Giant Stinging Trees (DEC, 2005). A very large home range has been estimated as "200-800 ha according to habitat productivity; measured as 3000 ha (1000 ha actually used) for one unmated, nonbreeding individual in marginal habitat, and 450+ ha for one adult female in continuous habitat of mesic gullies within dry forest (Kavanagh 1997, Kavanagh and Jackson 1997 in DEC, 2005: 12). Kavanagh & Stanton (2002) further note that small (<200 ha) fragments do not provide a significant reservoir for populations of large forest owl (Sooty, Powerful, Masked) species. It is noted that DEC 2005 in the draft Recovery Plan for the Large Forest Owls summarises the following critical habitat components for the species: <u>Ecological factors required for reproduction</u>: mature forest stands containing large hollow trees, in moist gullies. Multi-layered forest containing a distinct rainforest element of dense mid-storey trees and shrubs. High density and diversity of small forest mammals, some of which are hollow-dependent or require old-growth forest attributes (Schodde and Mason 1980, Debus 1994a, Kavanagh 1997, Higgins 1999). <u>Specific habitat requirements</u>: mosaic of rainforest and moist eucalypt forest in dissected terrain, with sheltered gullies; dense mid-storey; some old hollow trees. (From Debus 1994b, NSW NPWS 1994, Kavanagh *et al*. 1995, Kavanagh 1997, Kavanagh and Jackson 1997.) It is considered that these required habitat components are absent from the site, particularly old growth forest with a high density of hollow-bearing trees. As such the species is considered an unlikely occurrence.	Preferred habitat for this species is considered to be absent from the site. At this stage it is considered that this species is unlikely to be significantly affected by future development (in accordance with the concept plan presented in Attachment 3).

<table>
<tr>
<td>Koala (Phascolarctos cinereus)</td>
<td>Unlikely</td>
<td>
This species primarily occurs within Eucalypt Forest and Woodlands containing a suitable density of favoured food trees within coastal eastern and southeastern Australia. Preferred habitat generally contains a high percentage of primary food trees although underlying geology and soil type can be an important factor. Eucalypt Forests associated with drainage lines and floodplains of richer soil types (i.e. moisture and nutrients) can also be favoured due to feed trees containing higher levels of nutrients and less potential for toxicity (Hindell & Lee, 1990; Moore & Foley, 2000).

Within SEQLD six primary foraging trees were identified by Pahl (1993); Tallowwood (Eucalyptus microcorys), Blue Gum (E. tereticornis), Scribbly Gum (E. racemosa), Grey Gum (E. propinqua), Red Mahogany (E. resinifera) and White Stringybark (E. tindaliae). Further research undertaken by Phillips & Callaghan (1996) in Tweed Shire indicates that Swamp Mahogany (E. robusta) and Blue Gum (E. tereticornis) [including hybrids of the two] on alluvial deposits and Quaternary and Neranleigh-Fernvale Group geomorphologies were considered to be primary habitats. Areas with sub-dominance of these species on Neranleigh-Fernvale alliances supporting Blue Gum (E. tereticornis), Tallowwood (E. microcorys) and/or Grey Gum (E. propinqua) comprise secondary habitat or primary habitat depending on the density of the latter two species. Phillips & Callaghan (1998) also noted Tallowwood to be a primary browse species and two types of Grey Gum (E. propinqua, E. biturbinata) to be secondary browse species in Currumbin.

Recent studies (Biolink, 2007) indicate that Eucalyptus tereticornis, E. microcorys and E. propinqua/E. biturbinata are the most preferred koala food trees throughout the Gold Coast LGA.

Within utilized Eucalypt Forest habitat the koala spends most of its time in distinct home-ranges which may overlap if available habitat area is reduced. Males are territorial but a dominance-hierarchy exists and they may attack during the summer breeding season. Home ranges of the species are considered to be large and can vary dependent upon habitat quality and extent. Studies have shown various home range sizes exist with the males usually larger than the female (Male 135ha, Female: 110ha [Ellis et al, 2002], Male: 34.4ha, Female: 15ha [White, 1999]).

A review of a number of published scientific reports notes that Koala density generally ranges between 0.02 and 1.26 animals per hectare. Densities are considered to vary dependent upon habitat quality, size, connectivity, presence of impediments to movement (stock fences, dogs, roads etc).
<table>
<tr><th>Source</th><th>Study Location</th><th>Habitat Type</th><th>Additional Comments</th><th>Koala/ha</th></tr>
<tr><td>Dique et al, 2003</td><td>Southeast QLD Pine Rivers Shire</td><td>Tall shrubby open forest (Tertiary surfaces) and Tall open forest upon metamorphics</td><td>Stratified by two habitat descriptions ‘urban’ and ‘bushland’</td><td>0-0.76</td></tr>
</table>
</td>
<td>Preferred habitat for this species is considered to be absent from the site.

At this stage it is considered that this species is unlikely to be significantly affected by future development (in accordance with the concept plan presented in Attachment 3).</td>
</tr>
</table>

Source	Study Location	Habitat Type	Additional Comments	Koala/ha
Dique et al, 2004	Southeast QLD Koala Coast ~375sqm of Redland, Logan and Brisbane City shires	Eucalypt Forests. Predominately RE 12.9-10.4 & 12.11.5	Study stratified by habitat descriptions: 'urban', 'remnant bushland', 'bushland' and 'other'. Remnant and bushland areas further stratified by proximity to the centre of the study area (high density=close to centre, low density=further away)	Range 0.02-1.26 Urban: 0.17 +/-0.013 High remnant: 0.70 +/-0.023 Low remnant: 0.20 +-/0.014 High bushland: 0.30+/-0.006 Low bushland: 0.11 +/-0.007 Other: 0
White and Kunst 1990	Southeast QLD Sheldon	Eucalypt Forest		0.4 (0.3-0.46)
Sullivan et a 2004	Southwest QLD	Eucalypt Forest/woodland within the mulgalands	Habitat stratified by floristics and landzone.	0.0007-2.513
Biolink 2007	Coombabah Koala Habitat Area	Mapped gold coast city vegetation (per Ryan et al, 2003) filtered to exclude communities not containing eucalypts	Spot assessment technique for koala faecal pellets. Not based upon koala observation transects per *Dique, 2003; EPA, 2005.*	0.22+/-0.04
Biolink 2007	Coomera-Pimpama Koala Habitat Area	Mapped gold coast city vegetation (per Ryan et al, 2003) filtered to exclude communities not containing eucalypts	Spot assessment technique for koala faecal pellets. Not based upon koala observation transects per *Dique, 2003; EPA, 2005.*	0.23+/-0.03

Favoured habitat (eucalypt woodland/forest) for the koala is considered to be absent from the site.

5.5 CRITICAL HABITAT

Critical habitat listed under the *Threatened Species Conservation Act 1995* includes:

- Bomaderry zieria within the Bomaderry bushland
- Eastern Suburbs Banksia Scrub Endangered Ecological Community
- Wollemia nobilis (the Wollemi pine)
- Gould's Petrel
- Little penguin population in Sydney's North Harbour
- Mitchell's Rainforest Snail in Stotts Island Nature Reserve

The future development of the site is unlikely to impact upon any of these declared critical habitats.

5.6 FAUNA CORRIDORS/LINKAGES

Wildlife corridors can be defined as 'retained and/or restored systems of (linear) habitat which, at a minimum enhance connectivity of wildlife populations and may help them overcome the main consequences of habitat fragmentation' (Wilson & Lindenmayer, 1995). Corridors can assist ecological functioning at a variety of spatial and temporal scales from daily foraging movements of individuals, to broad-scale genetic gradients across biogeographical regions (Parsons Brinkerhoff, 2005).

Corridors serve a number of different functions in terms of biodiversity conservation including:

- providing increased foraging area for wide-ranging species
- providing cover for movement between habitat patches, particularly for cover dependent species and species with poor dispersal ability and enhancing the movement of animals through sub-optimal habitats
- reducing genetic isolation by maintaining continuity between sub-populations in a metapopulation and thereby preventing and /or reversing localised extinction
- facilitating access to a mix of habitats and successional stages to those species which require them for different activities (for example, foraging or breeding)
- providing refuge from disturbances such as fire
- providing habitat in itself (Wilson, A. & Lindenmayer 1995; Lindenmayer, 1994; Bennett, 1999).

How species use the corridor network will depend largely on the home and activity ranges of the species, their habitat requirements and the ecological characteristics of the corridor. For example, some large or mobile species may make direct movements through the corridor network, moving from one patch of habitat to another. These direct movements may be on the scale of a foraging expedition or a migration (Bennett 1990b). Other species may have movements by single individuals punctuated by pauses in the corridor, which can last anything from a small foraging or resting bout to weeks and even months. If the corridor contains sufficient resources to maintain a population, then continuity through the corridor may be through gene flow through the resident population (Bennett 1990b; Wilson, A. & Lindenmayer 1995).

For example a mobile species with a large home range (i.e. koala) may regularly traverse a corridor to move between favoured feeding grounds or in attempt to access mates, whereas a species with a comparably minor home range (i.e. antechinus) may spend its entire life within a portion of the same corridor.

It is noted that the site is not nominated as being within a sub-regional corridor, regional corridor or key habitat area. The Crabbes Creek sub-regional corridor is noted to occur approximately 1000m to the south of the site. Future development of the site is considered highly unlikely to impact upon the function of this mapped corridor.

It is considered that, following a review of the residual habitats, significant terrestrial habitats are absent from the site and the terrestrial corridor value is subsequently low. This is largely considered to be a result of the previously established (and ongoing) use of the land as a rural area and absence of native forests and associated habitats. Certainly it is contended that patches of remnant forest habitat required for the long-term viability of locally occurring terrestrial fauna populations are not linked via this site.

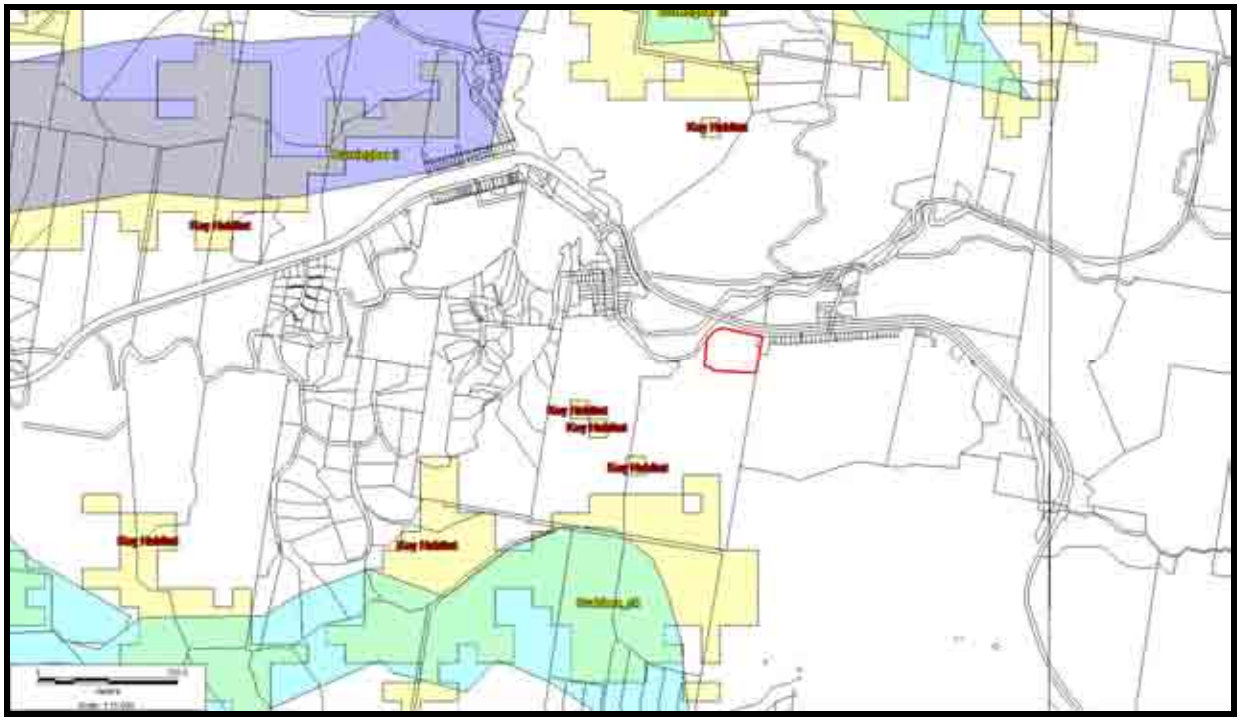
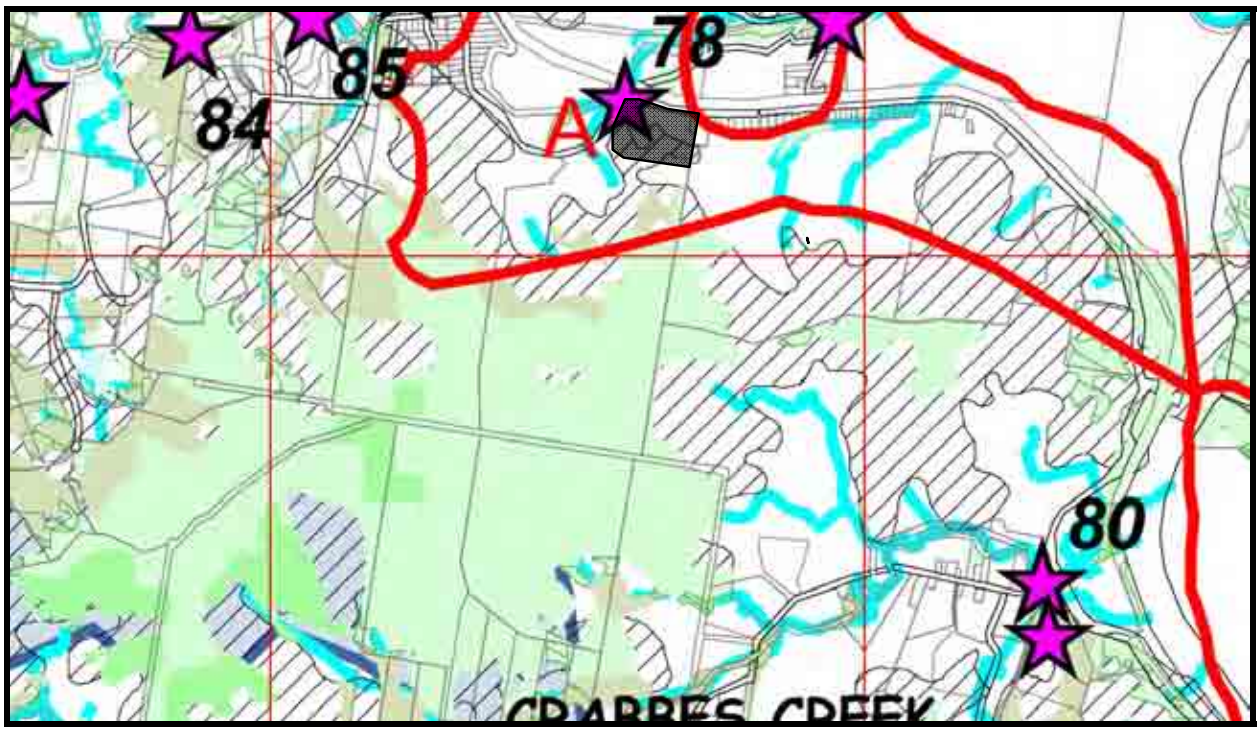


FIGURE 9: KEY HABITATS AND CORRIDORS MAP
(SOURCE: HTTP://MAPS.NATIONALPARKS.NSW.GOV.AU /KEYHABS/DEFAULT.HTM)



STEEP LANDS

HCV BUSHLAND

ECOLOGICALLY SENSITIVE BUSHLAND

RIPARIAN LINKAGES

NPWS SUB-REGIONAL CORRIDOR

FIGURE 10: TWEED VMP MAP 7: REHABILITATION PRIORITIES SHOWING THE PROXIMITY OF THE SITE TO THE SUB-REGIONAL CORRIDOR

5.7 WETLANDS AND WATERWAYS

The site is not mapped as containing riparian linkages (Tweed VMP Map 4), drainage lines (Tweed VMP Map 5) or a major waterway (LEP mapping) although Burringbar Creek is mapped further to the northwest. Overland flow paths are present central to the site in association with broad depressions between adjacent hills occupied by pasture grassland. No aquatic habitats, dams or standing water was noted in these areas although such do occur on lands to the east. Sheet flow from the adjacent hills is likely to drain through these areas during peak rainfall.

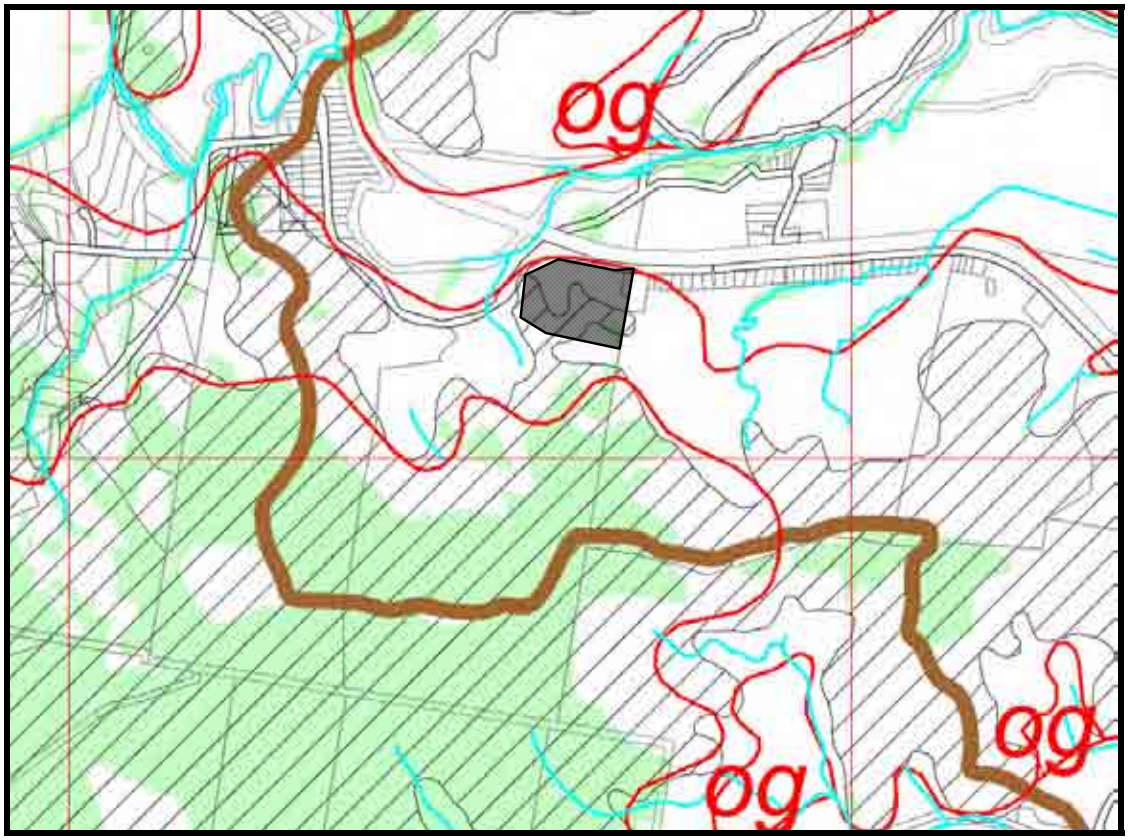


FIGURE 11: TWEED VMP MAP 5: SOIL LANDSCAPE, STEEP LAND AND DRAINAGE LINES MAPPING

6.0 REVIEW OF ECOLOGICAL VALUES

The purpose of this report is to review existing environmental mapping and perform a preliminary ground-truthing exercise to determine ecological values and potential constraints to developing the site for its intended purpose (in this instance a residential development). Areas typically considered to have high ecological value (and subsequent constraints to development or activities) include, but are not limited to areas with confirmed:

- Presence of endangered ecological communities;
- Presence of declared critical habitat;
- Presence of endangered populations (and associated habitat);
- Presence of threatened fauna (and associated habitat) species;
- Presence of threatened flora (and associated habitat) species;
- Presence of inadequately reserved vegetation communities (within UNE region);
- Presence of SEPP 14 Wetlands, SEPP 44 habitat or SEPP 26 Littoral Rainforests;
- Presence of riparian associations, creek lines, wetlands (marine, estuarine, riverine, lacustrine and/or palustrine) and associated habitat;
- Presence of habitats of high flora and/or fauna diversity;
- Presence of significant (regional or sub-regional) fauna corridors/linkages.

The presence or absence (or discussion regarding further data/information requirements) of the above listed constraints are contained within the preceding sections of this report. A summary of the main points is presented below and discussed by Vegetation Community type to provide a definable boundary to each area. Each community is given an ecological status code (low to very high to enable comparison with Tweed VMP, 2004 and utilising Table 3.5 Criteria used to determine ecological status primarily on vegetation community characteristics) based upon the works performed to date;

<u>VEGETATION COMMUNITY 1: TALL CLOSED GRASSLAND/PASTURE INCLUDING SCATTERED TREES</u> [G3D]

- This community is considered to be reflective of Tweed VMP (2004) Code 1099_Substantially Cleared of Native Vegetation;

- This community is primarily disturbed/ modified as a result of historical clearing and ongoing use as a grazing and rural use operation;

- Substantially cleared of native vegetation designated areas cover ~59563ha of the Tweed Shire (TVMP, 2004);

- The mapped area is not considered to be reflective of an endangered ecological community;

- Scattered rainforest trees (principally Hoop Pine) occur within the grassland/pasture areas;

- No threatened plant species were recorded although further surveys are required to confirm the presence/absence of such species;

- No threatened fauna species were encountered within this community although further systematic surveys are required to confirm presence/absence of threatened fauna. It is considered that the community is unlikely to provide significant habitat for threatened fauna due to the absence of remnant bushland habitats and historical impacts associated with pastoral/grazing pursuits;

- The community is not considered to represent or be located within a significant terrestrial wildlife corridor;

- This community is considered to be highly modified/disturbed primarily due to the dominance of non-native flora species and the scarcity of native vegetation and associated habitat.

Ecological Status: Low

N.B. whilst this community is considered to be of low ecological status it does contain items/features of significance (i.e. large rainforest trees [i.e. hoop pines] which warrant retention investigation).

VEGETATION COMMUNITY 2: LOW/MID-HIGH OPEN TO CLOSED CAMPHOR LAUREL+/-EARLY REGROWTH RAINFOREST [T5-6M-D]

- This community is considered to be reflective of Tweed VMP (2004) Code 1004_Camphor Laurel Dominant Closed to Open Forest with species from 1002_ Early Regrowth Rainforest associated or suppressed;

- Camphor Laurel Dominated vegetation communities cover ~3645ha of the Tweed Shire. Early Regrowth Rainforest Communities cover ~2985ha of the Tweed Shire (TVMP, 2004);

- This community is not considered to be reflective of an endangered ecological community;

- Early regrowth rainforest is considered to be adequately reserved within the Upper North East CRA Region (TVMP, 2004);

- No threatened plant species were recorded although further surveys are required to confirm the presence/absence of such species;

- No threatened fauna species were recorded although further systematic surveys are required to confirm presence/absence of threatened fauna. Potential habitat is present for several of the species discussed in Section 5.4 although the presence of all these species is considered unlikely;

- The community is not considered to represent or be located within a significant terrestrial wildlife corridor;

- This community is considered to be highly modified/disturbed primarily due to weed infestation in the lower strata and canopy.

Ecological Status: Low-moderate

In review of the above preliminary analysis it is considered appropriate that the future development of the site consider the retention of the following areas:

- Vegetation Community 2 (Low/Mid-High Open To Closed Camphor Laurel+/- Early Regrowth Rainforest) fringing Tweed Valley Way;

It is also recommended that investigation (in association with earthworks and layout design) be undertaken to retain as many as is practical of the scattered remnant rainforest trees (mostly Hoop Pine) throughout the western portions of the paddock/pasture.

Whilst not nominated as areas of ecological significance the central grassed overland flow path areas may have hydraulic/stormwater management values.

The above comments are expressed diagrammatically within Figure 13 below. It is noted that these preliminary findings are similar to those displayed on Tweed VMP Map 4 (Ecological Values) which identify the site as 'low' ecological status and sensitivity.

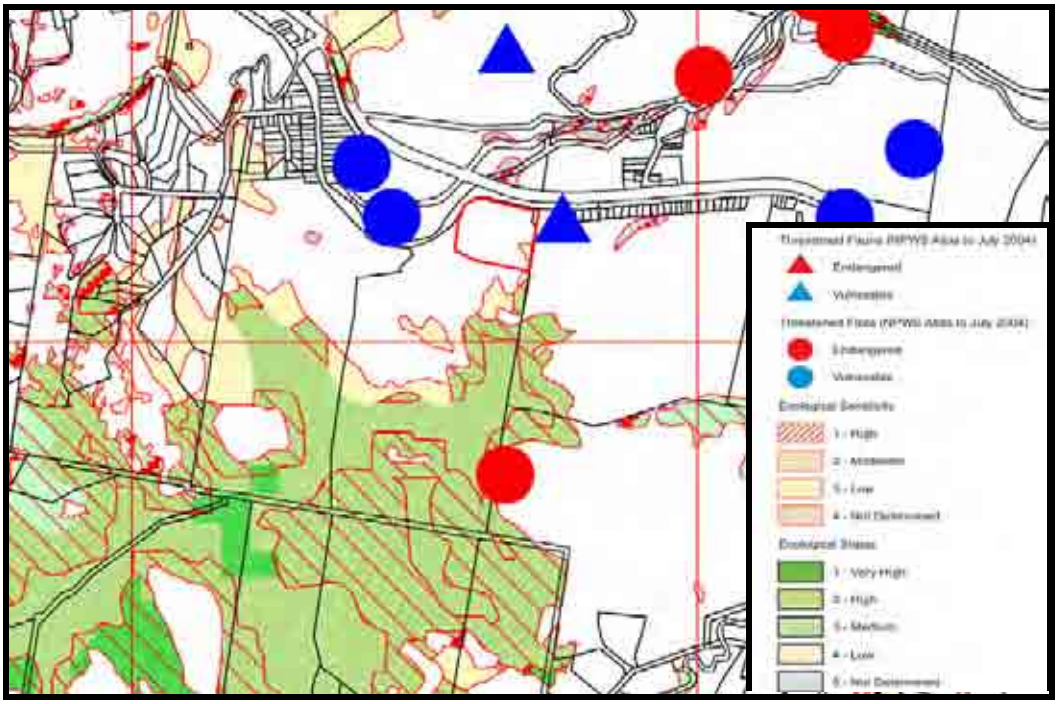


FIGURE 12: TWVMP MAP 4: ECOLOGICAL VALUES
(SOURCE: TWEED VMP, 2004)

NOTES:

Vegetation maps have been compiled using Mapinfo geographic information system (GIS) software (Ver. 11). Information utilized has included:

- Data including contours, site boundaries and aerial photographs provided by the consulting planner
- Tweed VMP (2004) vegetation community mapping (VMP MAP 2) boundaries rasterised and registered to property boundaries and aerial photographs

2009 Aerial photograph sourced from http://mapping.tweed.nsw.gov.au/tweedmaps/

Vegetation survey was performed as outlined (Section 3 of Report) with geo-referenced colour aerial photographs overlaid with contour plans, for the initial recognition of community boundaries in the field and adjustments noted as necessary. Communities (refer Section 3 of Report) were then transcribed directly into the GIS program utilizing the aerials, contours, geological information and vegetation boundaries as a reference background.

Where necessary vegetation boundaries were traversed with a hand held GPS (Garmin GPSMap 62s) and loaded into Mapinfo with existing boundaries rectified where necessary.

FIGURE 13: PRELIMINARY ECOLOGICAL STATUS/CONSTRAINT MAPPING

- SITE BOUNDARY
- LOW STATUS/CONSTRAINT
- LOW-MODERATE STATUS/CONSTRAINT
- HOOP PINE RETENTION INVESTIGATION AREA

N.B. this plan is only to be read in conjunction with Planit (2012) Preliminary Review of Terrestrial Flora and Fauna Values @ Tweed Valley Way, Mooball. This plan is prepared as a preliminary scoping document and is not intended as a detailed ecological survey/constraints anaylsis of the lands. No responsibility will be accepted by the authors for any other use or interpretation from that discussed.

7.0 SUMMARY & CONCLUSIONS

Planit Consulting have been engaged by Rob and Sue Harnett to undertake a preliminary terrestrial flora and fauna assessment of a property intended for residential development located at Tweed Valley Way, Mooball. The assessment has included the following:

- Survey, ground truthing and mapping of vegetation communities and determining preliminary ecological status reflective of reference reports and onsite condition
- Brief survey for faunal species including an assessment of the site's habitats and likelihood of threatened species occurrence
- Preliminary survey and assessments for threatened flora and fauna species, populations and endangered ecological communities
- Providing a flora and fauna assessment report identifying preliminary areas of ecological significance and subsequent development constraints to allow further investigation of development and land use scoping exercises over the land.

Following a review of the existing vegetation and habitats it is considered that the site is primarily of low ecological significance and thus has few ecological constraints to future development. The next phase of the scoping exercise should be undertaken in association with other disciplines (i.e. hydraulic, geotechnical, land-use planning etc) to ensure, through a reiterative design process, that final development designs do not encroach into areas identified as being warranting retention investigation. In this instance such areas are limited to scattered rainforest trees within the western paddock and the camphor laurel/early regrowth rainforest areas fringing Tweed Valley Way.

8.0 ATTACHMENTS

ATTACHMENT 1: PRELIMINARY ECOLOGICAL CONSTRAINTS MAP
ATTACHMENT 2: PRELIMINARY VEGETATION COMMUNITY MAP
ATTACHMENT 3: PROPOSED CONCEPT PLAN

ATTACHMENT 1

PRELIMINARY ECOLOGICAL STATUS/CONSTRAINTS MAPPING

NOTES:

Vegetation maps have been compiled using Mapinfo geographic information system (GIS) software (Ver. 11). Information utilized has included:

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Where necessary vegetation boundaries were traversed with a hand held GPS (Garmin GPSMap 62s) and loaded into Mapinfo with existing boundaries rectified where necessary.

FIGURE 13: PRELIMINARY ECOLOGICAL STATUS/CONSTRAINT MAPPING

- SITE BOUNDARY
- LOW STATUS/CONSTRAINT
- LOW-MODERATE STATUS/CONSTRAINT
- HOOP PINE RETENTION INVESTIGATION AREA

N.B. this plan is only to be read in conjunction with Planit (2012) Preliminary Review of Terrestrial Flora and Fauna Values @ Tweed Valley Way, Mooball

ATTACHMENT 2

PRELIMINARY VEGETATION COMMUNITY MAPPING

NOTES:

Vegetation maps have been compiled using Mapinfo geographic information system (GIS) software (Ver. 11). Information utilized has included:

- Data including contours, site boundaries and aerial photographs provided by the consulting planner
- Tweed VMP (2004) vegetation community mapping (VMP MAP 2) boundaries rasterised and registered to property boundaries and aerial photographs

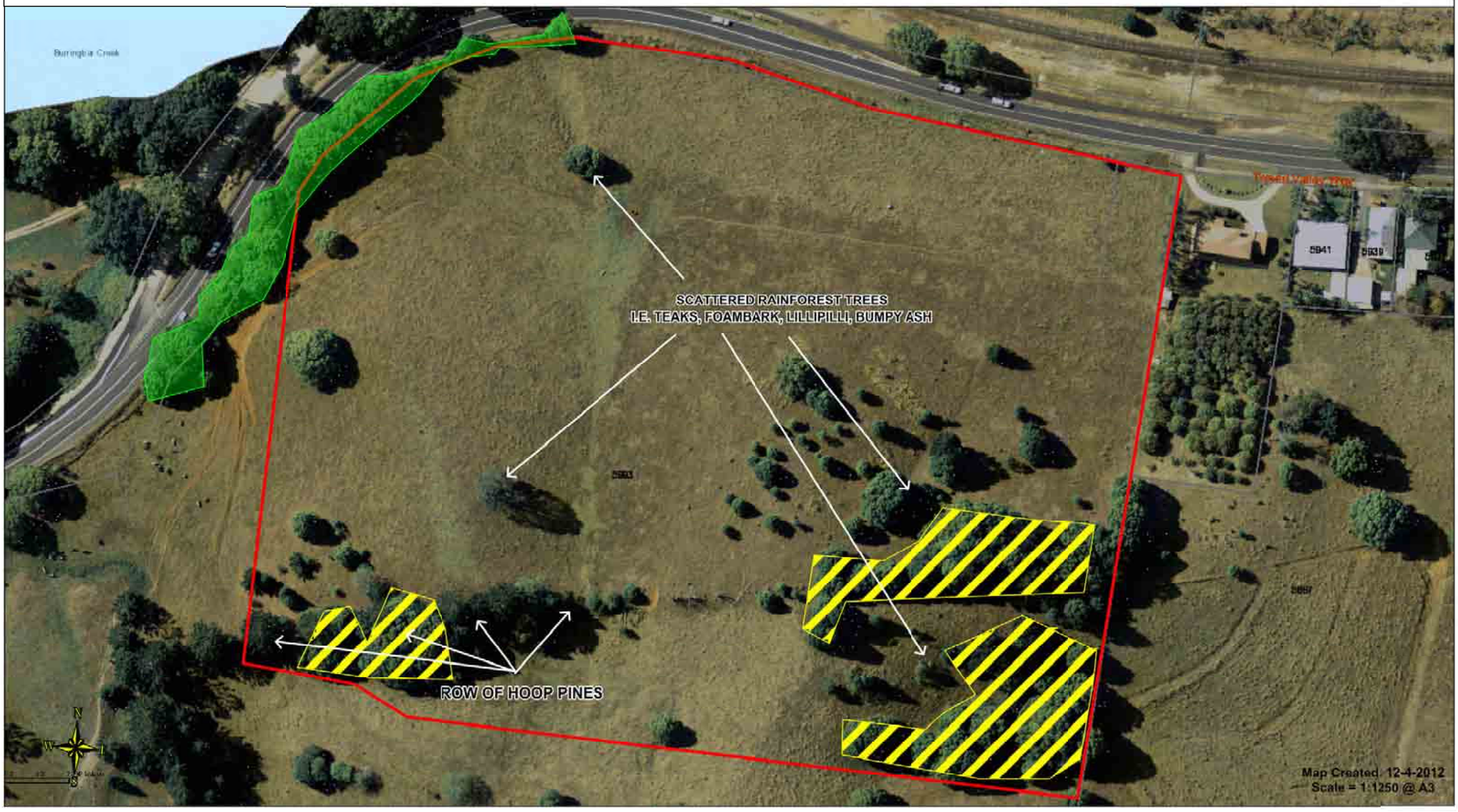
2009 Aerial photograph sourced from http://mapping.tweed.nsw.gov.au/tweedmaps/

Vegetation survey was performed as outlined (Section 3 of Report) with geo-referenced colour aerial photographs overlaid with contour plans, for the initial recognition of community boundaries in the field and adjustments noted as necessary. Communities (refer Section 3 of Report) were then transcribed directly into the GIS program utilizing the aerials, contours, geological information and vegetation boundaries as a reference background.

Where necessary vegetation boundaries were traversed with a hand held GPS (Garmin GPSMap 62s) and loaded into Mapinfo with existing boundaries rectified where necessary.

FIGURE 6: PRELIMINARY VEGETATION COMMUNITY MAPPING

- SITE BOUNDARY
- VEGETATION COMMUNITY 1: TALL CLOSED GRASSLAND/ PASTURE INCLUDING SCATTERED TREES [G3D]
- VEGETATION COMMUNITY 2: LOW/MID-HIGH OPEN TO CLOSED CAMPHOR LAUREL+/-EARLY REGROWTH RAINFOREST [T5-8M-D]
- AREAS OF PREVIOUS CAMPHOR LAUREL REMOVAL



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E: info@crg.net.au **www.crg.net.au**

CRG Traffic Pty Ltd ACN 151 846 847
In association with CRG Acoustics Pty Ltd

11 September 2012
CRG ref#: 12603

Chief Executive Officer
Tweed Shire Council
Tumbulgum Road
Murwillumbah NSW 2484

Dear Sir / Madam,

Proposed Subdivision
Tweed Valley Way, Mooball

CRG has been engaged by the Applicant to assess the access arrangements for the above development with Tweed Valley Way.

1. Proposed Development and Estimated Traffic Generation

An indication of the traffic generation potential of the development proposal is provided by reference to the Roads and Traffic Authority's 'Guide to Traffic Generating Developments' (2002). The following trip generation rates are relevant to this assessment:

Detached Dwellings
Peak Hour: 0.85 trips per dwelling
Daily: 9 trips per dwelling

Application of the above rates to the proposed development plan yields the following traffic generation potential:

Component	Daily	Morning Peak Hour			Afternoon Peak Hour		
		In	Out	Total	In	Out	Total
Detached Dwellings (28)	252	4	20	24	15	9	24

2. Surveyed & Projected Traffic Volumes

CRG carried out traffic counts at the existing intersection Pottsville Road/Tweed Valley Way on Thursday 7th October 2010. The intersection is located approximately 300m east from the proposed access point. A growth rate estimate of 2% per annum has been applied to provide volumes for 2012, summary of the estimated volumes is provided as Figure 2.1. The complete data set for the survey conducted in 2010 is provided as Attachment A.

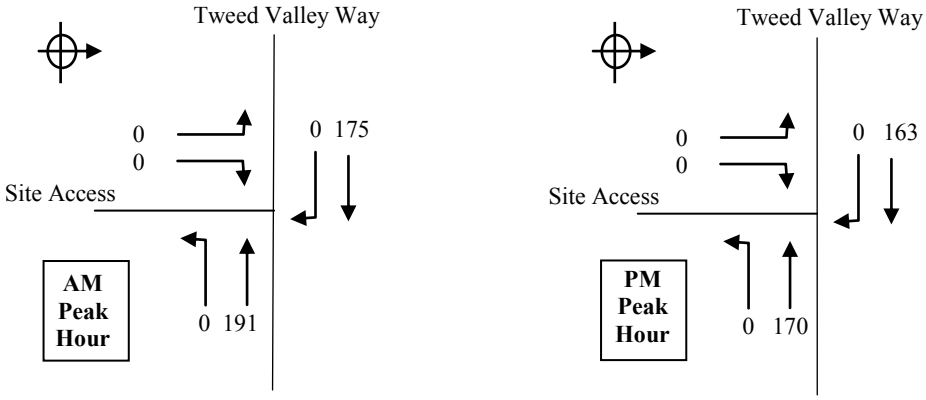


Figure 2.1 – Surveyed Traffic Volumes

Future traffic volumes on Tweed Valley Way have been estimated through application of a 2% per annum growth rate. Resultant traffic estimates for the year 2023 are shown in Figure 2.2.

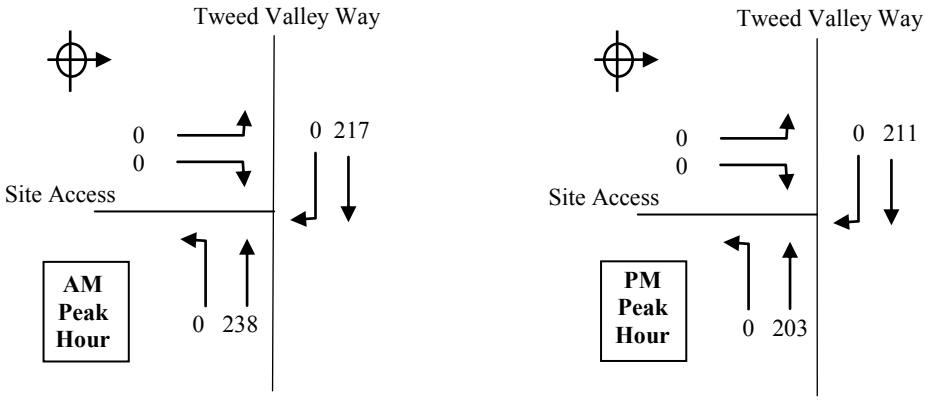


Figure 2.2 – Projected Future Traffic Volumes (Year 2023)

3. Development Traffic Volumes

Based on the surveyed volumes, it is estimated that development traffic will distribute approximately as follows:

To and from the west - 50%
To and from the east - 50%

Resultant estimates of development traffic volumes are shown in Figure 3.1.

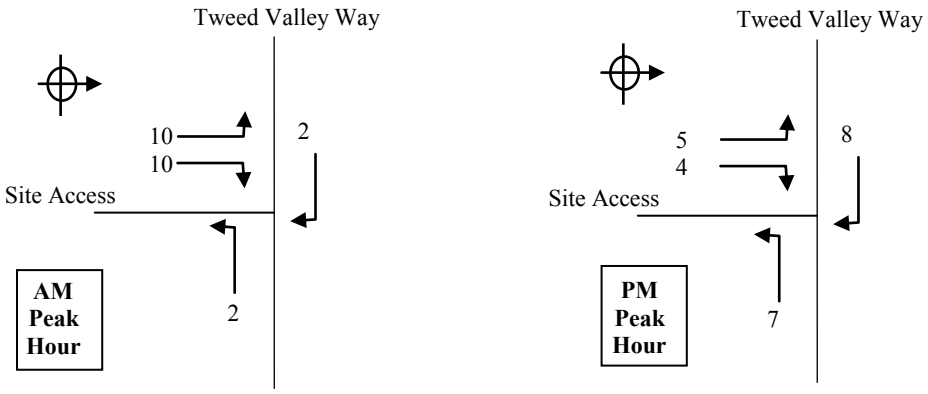


Figure 3.1 – Estimated Development Traffic Volumes

4. Warrants for Turning Lanes

In order to determine the required configuration of the proposed new intersection with Tweed Valley Way, reference is made to Figure 13.22 of the Department of Transport & Main Roads 'Road Planning & Design Manual'.

As shown in Figure 3.1, the proposed development will generate a peak right turn ingress demand of 8 vehicles per hour (vph) while the corresponding major road traffic volume will be 455 vph in 2023.

The proposed development will also generate a peak left turn ingress demand of 7vph with a corresponding major road traffic volume of 203vph.

In accordance with Figure 4.1, the traffic demands warrant the provision of a Type CHR(S) right turn treatment. It is recommended that the site access be designed as shown in Figure 4.2 to include a Type CHR(S) treatment.

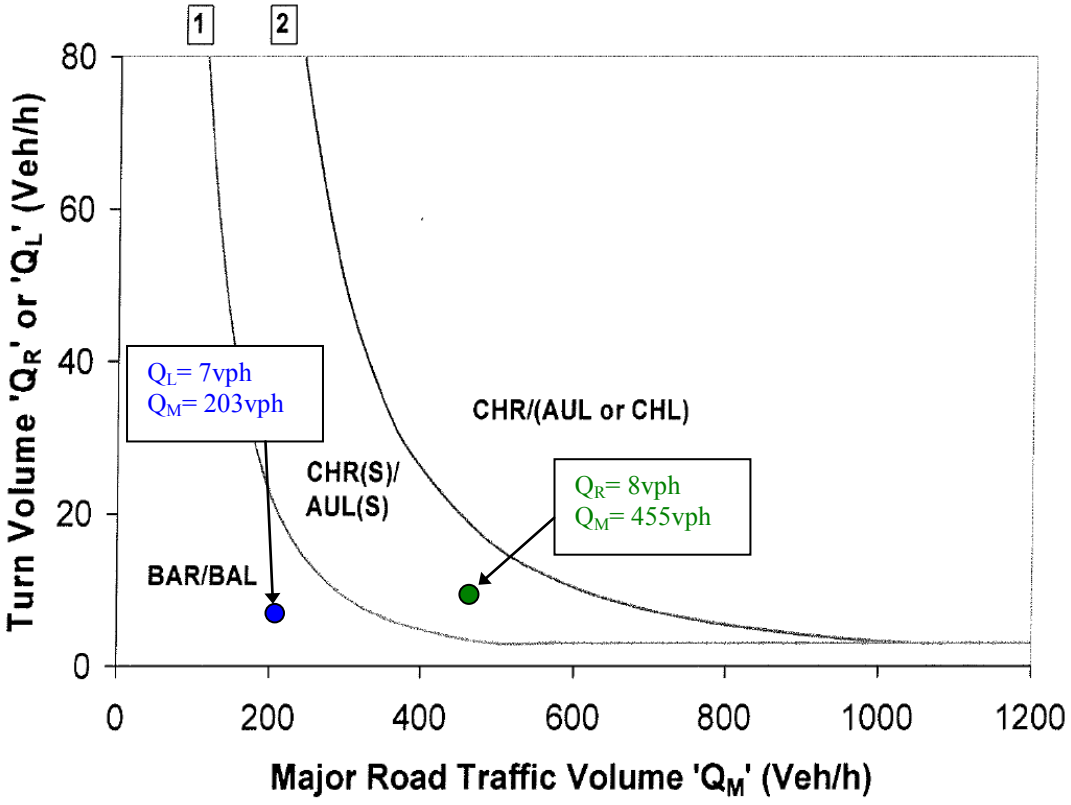


Figure 4.1: Warrants for Turn Treatments at the Proposed New Intersection Based on Year 2021 Design Traffic Volumes (Figure 13.22 from DTMR Road Planning & Design Manual)

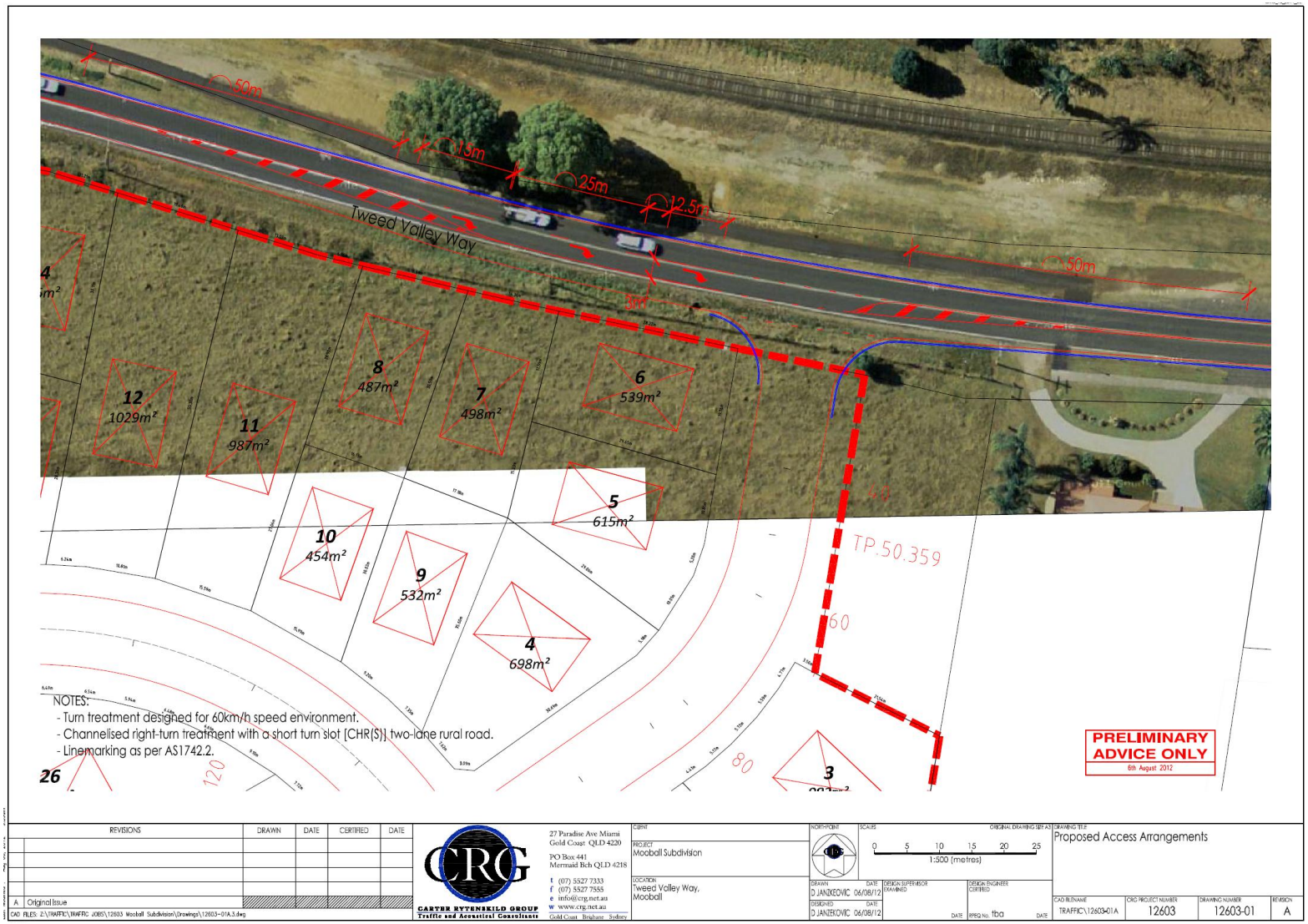


Figure 4.2: Recommended Access Layout

5. Direct Access to proposed Lots 7 & 8

It is proposed that direct access be provided to Lots 7 & 8 from Tweed Valley Way. This arrangement is considered to be satisfactory given that each lot will only generate in the order of 1 vehicle trip per hour.

It is also noted that there are good sight distances, in excess of 130 metres, in each direction on Tweed Valley Way in the vicinity of Lots 7 and 8.

We trust this information will be satisfactory to Council. Please contact the undersigned regarding any queries in relation to this matter.

Yours faithfully,

Luke Rytenskild
BEng RPEQ
Director

Attachment A - Traffic Count

Attachment A – Traffic Count

Traffic Survey

Date: 7/10/2010

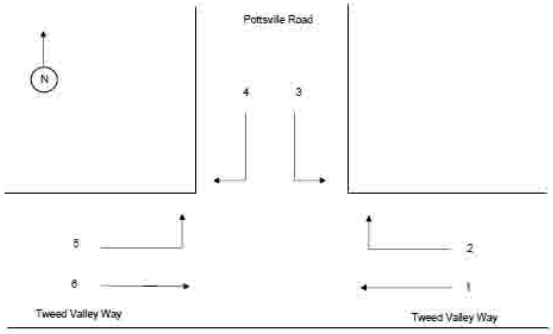
Address: Tweed Valley Way / Pottsville Rd Mooball

Name: Kevin Hughes

TIME	MOVEMENT						
	1	2	3	4	5	6	TOTAL
7:00 - 7:15	9	0	1	1	2	18	**31**
7:15 - 7:30	14	2	0	3	6	28	**53**
7:30 - 7:45	32	2	2	1	10	23	**70**
7:45 - 8:00	18	4	3	6	7	23	**61**
8:00 - 8:15	25	4	3	4	8	37	**81**
8:15 - 8:30	24	2	3	1	4	26	**60**
8:30 - 8:45	21	0	0	6	10	33	**70**
8:45 - 9:00	20	3	6	4	10	26	**69**
9:00 - 9:15	15	2	2	9	7	21	**56**
9:15 - 9:30	17	2	2	8	4	21	**54**
9:30 - 9:45	13	1	2	7	7	28	**58**
9:45 - 10:00	26	2	2	2	8	16	**56**
10:00 - 10:15	19	2	0	8	4	27	**60**
10:15 - 10:30	21	3	1	2	5	27	**59**
10:30 - 10:45	16	1	2	4	7	12	**42**
10:45 - 11:00	17	1	0	4	6	18	**46**
11:00 - 11:15	LUNCH						
11:15 - 11:30							
11:30 - 11:45	17	3	2	5	4	13	**44**
11:45 - 12:00	32	2	0	3	12	18	**67**
12:00 - 12:15	26	0	1	1	8	26	**62**
12:15 - 12:30	19	0	4	2	6	21	**52**
12:30 - 12:45	30	0	3	3	8	29	**73**
12:45 - 1:00	28	1	3	2	2	21	**55**
1:00 - 1:15	24	4	3	6	3	29	**69**
1:15 - 1:30	24	2	1	4	4	19	**54**
1:30 - 1:45	23	2	0	6	5	17	**53**
1:45 - 2:00	26	1	2	6	7	22	**64**
2:00 - 2:15	21	4	2	7	8	23	**65**
2:15 - 2:30	23	2	3	5	6	20	**59**
2:30 - 2:45	BREAK						
2:45 - 3:00							
3:00 - 3:15	32	1	3	12	3	29	**80**
3:15 - 3:30	22	6	2	9	2	25	**66**
3:30 - 3:45	41	4	2	11	3	35	**96**
3:45 - 4:00	27	1	4	7	6	22	**67**
4:00 - 4:15	33	2	0	11	10	35	**91**
4:15 - 4:30	28	4	1	4	10	36	**83**
4:30 - 4:45	24	2	2	8	7	22	**65**
4:45 - 5:00	36	4	1	3	6	23	**73**
5:00 - 5:15	31	4	3	10	5	39	**92**
5:15 - 5:30	28	2	1	7	4	31	**73**

HOURLY SUMMARY

TIME	MOVEMENT						
	1	2	3	4	5	6	TOTAL
7:00 - 8:00	73	8	6	11	25	92	**215**
7:15 - 8:15	89	12	8	14	31	111	**265**
7:30 - 8:30	99	12	11	12	29	109	**272**
7:45 - 8:45	88	10	9	17	29	119	**272**
8:00 - 9:00	90	9	12	15	32	122	**280**
8:15 - 9:15	80	7	11	20	31	106	**255**
8:30 - 9:30	73	7	10	27	31	101	**249**
8:45 - 9:45	65	8	12	28	28	96	**237**
9:00 - 10:00	71	7	8	26	26	86	**224**
9:15 - 10:15	75	7	6	25	23	92	**228**
9:30 - 10:30	79	9	5	19	24	98	**233**
9:45 - 10:45	82	8	5	16	24	82	**217**
10:00 - 11:00	73	7	3	18	22	84	**207**
10:15 - 11:15	LUNCH						
10:30 - 11:30							
10:45 - 11:45							
11:00 - 12:00							
11:15 - 12:15							
11:30 - 12:30	94	5	7	11	30	78	**225**
11:45 - 12:45	107	2	6	9	34	94	**254**
12:00 - 1:00	101	1	11	8	24	97	**242**
12:15 - 1:15	99	5	13	13	19	100	**249**
12:30 - 1:30	104	7	10	15	17	98	**251**
12:45 - 1:45	97	9	7	18	14	86	**231**
1:00 - 2:00	97	9	6	22	19	87	**240**
1:15 - 2:15	94	9	5	23	24	81	**236**
1:30 - 2:30	93	9	7	24	26	82	**241**
1:45 - 2:45	70	7	7	18	21	65	**188**
2:00 - 3:00	44	6	5	12	14	43	**124**
2:15 - 3:15	55	3	6	17	9	49	**139**
2:30 - 3:30	BREAK						
2:45 - 3:45							
3:00 - 4:00	122	12	11	39	14	111	**309**
3:15 - 4:15	123	13	8	38	21	117	**320**
3:30 - 4:30	129	11	7	33	29	128	**337**
3:45 - 4:45	112	9	7	30	33	115	**306**
4:00 - 5:00	121	12	4	26	33	116	**312**
4:15 - 5:15	119	14	7	25	28	120	**313**
4:30 - 5:30	119	12	7	28	22	115	**303**



Traffic Survey

Date: 1/11/2010

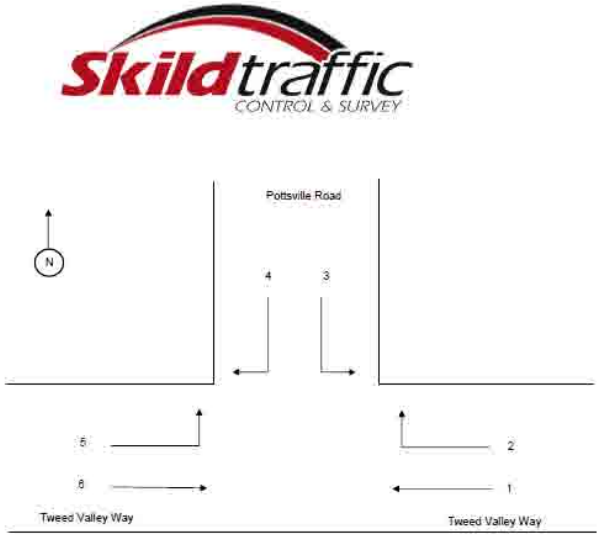
Address: Tweed Valley Way / Pottsville Rd Mooball

Name: Kevin Hughes

TIME	MOVEMENT						
	1	2	3	4	5	6	TOTAL
7:00 - 7:15	15	2	0	0	18	8	**43**
7:15 - 7:30	22	1	1	3	24	8	**59**
7:30 - 7:45	41	4	4	4	29	9	**91**
7:45 - 8:00	26	1	5	9	26	7	**74**
8:00 - 8:15	36	3	3	16	40	8	**106**
8:15 - 8:30	44	1	0	10	27	4	**86**
8:30 - 8:45	25	1	2	7	31	12	**78**
8:45 - 9:00	32	2	1	14	34	12	**95**
9:00 - 9:15	15	1	3	5	24	7	**55**
9:15 - 9:30	18	3	2	6	28	14	**71**
9:30 - 9:45	23	3	0	4	24	10	**64**
9:45 - 10:00	22	4	1	6	18	3	**54**
10:00 - 10:15	24	2	3	6	27	8	**70**
10:15 - 10:30	13	3	3	1	19	6	**45**
10:30 - 10:45	28	2	2	6	12	4	**54**
10:45 - 11:00	22	4	0	8	18	1	**53**
11:00 - 11:15	17	1	2	5	19	9	**53**
11:15 - 11:30	26	2	4	7	26	6	**71**
11:30 - 11:45	17	3	0	4	17	6	**47**
11:45 - 12:00	20	1	1	4	18	7	**51**
12:00 - 12:15							
12:15 - 12:30							
12:30 - 12:45							
12:45 - 1:00							
1:00 - 1:15	20	2	2	4	27	6	**61**
1:15 - 1:30	16	1	1	10	27	9	**64**
1:30 - 1:45	20	1	2	6	19	4	**52**
1:45 - 2:00	21	1	0	7	20	8	**57**
2:00 - 2:15	21	2	1	6	37	8	**75**
2:15 - 2:30	16	0	1	13	16	3	**49**
2:30 - 2:45	34	2	0	5	22	3	**66**
2:45 - 3:00	36	2	3	10	19	5	**75**
3:00 - 3:15	28	1	3	10	13	17	**72**
3:15 - 3:30	20	0	3	7	32	11	**73**
3:30 - 3:45	26	2	4	13	32	6	**83**
3:45 - 4:00	31	2	3	8	36	7	**87**
4:00 - 4:15	33	4	3	7	33	9	**89**
4:15 - 4:30	24	1	1	15	30	10	**81**
4:30 - 4:45	32	3	1	8	28	8	**80**
4:45 - 5:00	36	0	3	10	32	3	**84**
5:00 - 5:15	22	5	4	6	25	4	**66**
5:15 - 5:30	32	2	0	11	29	7	**81**
5:30 - 5:45	35	6	1	11	29	5	**87**
5:45 - 6:00	33	2	0	7	20	5	**67**

HOURLY SUMMARY

TIME	MOVEMENT						
	1	2	3	4	5	6	TOTAL
7:00 - 8:00	104	8	10	16	97	32	**267**
7:15 - 8:15	125	9	13	32	119	32	**330**
7:30 - 8:30	147	9	12	39	122	28	**357**
7:45 - 8:45	131	6	10	42	124	31	**344**
8:00 - 9:00	137	7	6	47	132	36	**365**
8:15 - 9:15	116	5	6	36	116	35	**314**
8:30 - 9:30	90	7	8	32	117	45	**299**
8:45 - 9:45	88	9	6	29	110	43	**285**
9:00 - 10:00	78	11	6	21	94	34	**244**
9:15 - 10:15	87	12	6	22	97	35	**259**
9:30 - 10:30	82	12	7	17	88	27	**233**
9:45 - 10:45	87	11	9	19	76	21	**223**
10:00 - 11:00	87	11	8	21	76	19	**222**
10:15 - 11:15	80	10	7	20	68	20	**205**
10:30 - 11:30	93	9	8	26	75	20	**231**
10:45 - 11:45	82	10	6	24	80	22	**224**
11:00 - 12:00	80	7	7	20	80	28	**222**
11:15 - 12:15							
11:30 - 12:30							
11:45 - 12:45							
12:00 - 1:00							
12:15 - 1:15							
12:30 - 1:30							
12:45 - 1:45							
1:00 - 2:00	77	5	5	27	93	27	**234**
1:15 - 2:15	78	5	4	29	103	29	**248**
1:30 - 2:30	78	4	4	32	92	23	**233**
1:45 - 2:45	92	5	2	31	95	22	**247**
2:00 - 3:00	107	6	5	34	94	19	**265**
2:15 - 3:15	114	5	7	38	70	28	**262**
2:30 - 3:30	118	5	9	32	86	36	**286**
2:45 - 3:45	110	5	13	40	96	39	**303**
3:00 - 4:00	105	5	13	38	113	41	**315**
3:15 - 4:15	110	8	13	35	133	33	**332**
3:30 - 4:30	114	9	11	43	131	32	**340**
3:45 - 4:45	120	10	8	38	127	34	**337**
4:00 - 5:00	125	8	8	40	123	30	**334**
4:15 - 5:15	114	9	9	39	115	25	**311**
4:30 - 5:30	122	10	8	35	114	22	**311**
4:45 - 5:45	125	13	8	38	115	19	**318**
5:00 - 6:00	122	15	5	35	103	21	**301**



PLANIT
CONSULTING

Preliminary Bushfire Risk Assessment

Gateway Planning Proposal
Request to Rezone
Part Lot 2 DP 828280
Tweed Valley Way,
Mooball NSW









Prepared by Planit Consulting - September 2012

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Planit Consulting declares that it does not have, nor expect to have, a beneficial interest in the subject project.

Planit Consulting P/L
September 2012

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Preliminary Bushfire Risk Assessment

Appendices

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SECTION 1

Introduction

1.1 Brief

Planit Consulting has been commissioned by R & S Harnett to prepare and submit a Preliminary Bushfire Risk Assessment to accompany a Planning Proposal application at Part Lot 2 DP 828280.

1.2 Approvals Sought

This report has been compiled as an initial bushfire assessment for the rezoning lands. This report forms the base on which further bushfire assessments will be carried out for the subject site. No formal approvals are sought.

Figure 1 – Aerial Photograph – Source: Tweed SC GIS Mapping

1.3 The Site & Surrounds

The subject site is legally described as Lot 2 DP 828280 and more commonly referred to as No. 5993 Tweed Valley Way, Mooball. It is located on the periphery of the Mooball village and is typically rural-residential in character. The site is surrounded by single dwellings, farm sheds and agricultural holdings.

The site has a total area of 60.31ha, with the part site having an area of 5.077ha. The property is currently used as grazing land on the northern portion. The area to the south remains vacant and undeveloped.

Bushfire Prone Land

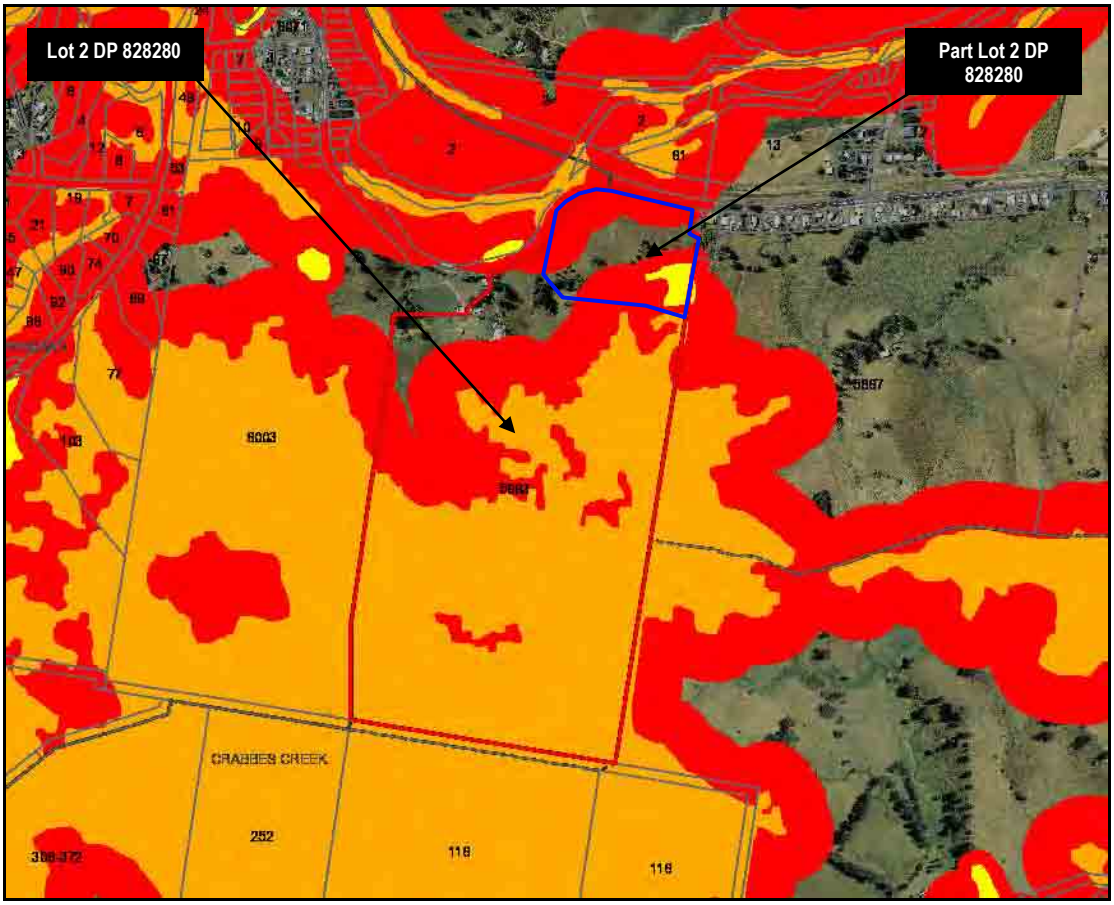

Figure 2 – Bushfire Prone Land – Source: Tweed SC GIS Mapping

In accord with Council's Bushfire Prone Land mapping, portions of the site have been classified as bushfire prone land containing both Category 1 and 2 bushfire prone vegetation (See **Fig. 2**). An assessment of the development sites design response to the surrounding bushfire threat is included within **Section 3 – Bushfire Risk Assessment.**

Vegetation

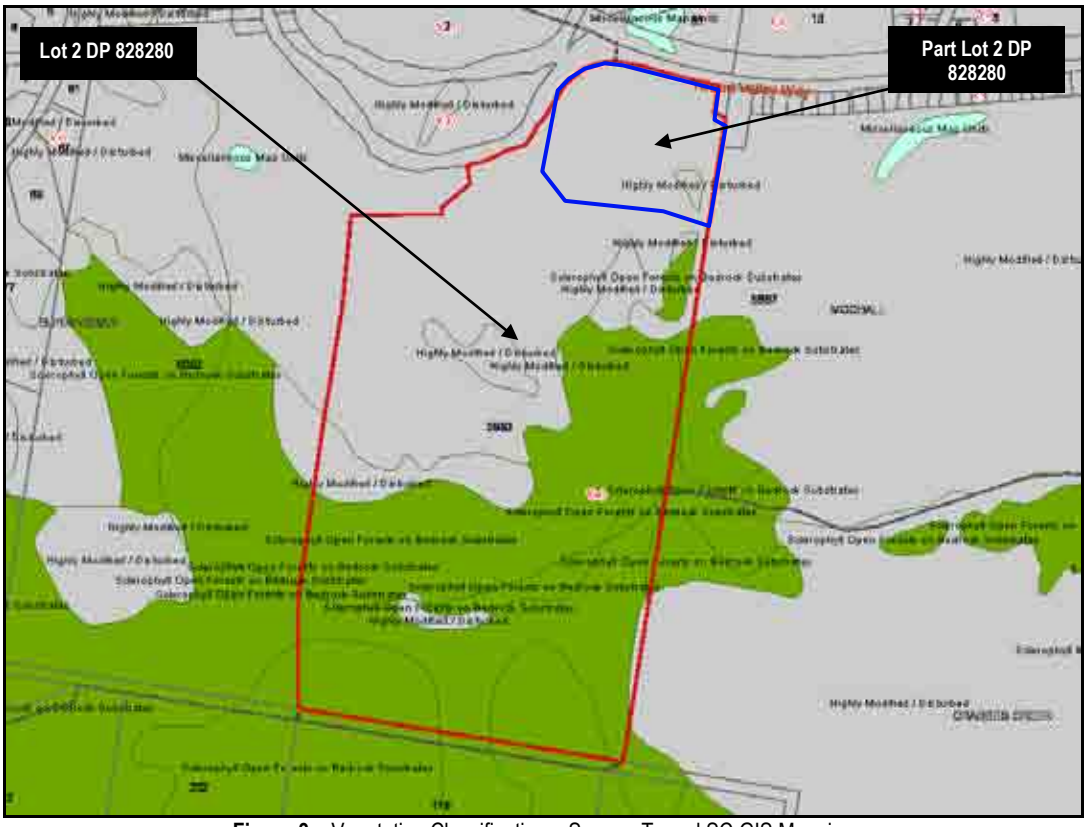

Figure 3 – Vegetation Classification – Source: Tweed SC GIS Mapping

The vegetation on-site has been classified by Tweed SC as 'Sclerophyll Open Forest' with 'Highly Modified and Disturbed' areas (See **Fig. 3**). The vegetation consists predominantly of camphor laurels, with hoop pines and small shrubs and grasses scattered throughout (**See Appendix C – Site Photographs**). Greater detail regarding the on-site vegetation has been included within **Section 3 – Bushfire Risk Assessment.**

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SECTION 2

Further Information

Should Council or the NSW RFS require any additional information, or wish to clarify any matter raised by this proposal or submission made to same, it is requested that Planit Consulting is contacted prior to determination of this application.

The relevant contact details are listed below:-

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Offices also at Nobby's Beach and Darwin

SECTION **3**

Bushfire Risk Assessment

The following provides an assessment of the proposed development in accord with the matters under Clause 44 of the Rural Fires Regulations 2008 and the relevant controls of Planning for Bushfire Protection 2006 and AS 3959-2009 applying to the subject site.

NSW Rural Fires Regulations 2008

Clause 44 – Application for a bush fire safety authority

a) a description (including the address) of the property on which the development the subject of the application is proposed to be carried out,

Address: No. 5993 Tweed Valley Way, Mooball NSW

Lot/DP: Part Lot 2 DP 828280

Total Area: 60.31ha (Part Lot – 5.077ha)

Current Use: Single dwelling and two sheds on-site. Cattle grazing and vacant land.

Proposed Development: Part Lot to be rezoned for residential subdivision purposes.

b) a classification of the vegetation on and surrounding the property (out to a distance of 140 metres from the boundaries of the property) in accordance with the system for classification of vegetation contained in Planning for Bush Fire Protection (PFBP 2006),

The site is located on the periphery of the Mooball village and is within an established rural-residential area. As such, large stands of vegetation have become isolated and separated by extensive areas of managed farmland. The major stands of vegetation relating to the proposed development exist to the southwest portion of the Part Lot, with scattered trees and outcrops on-site.

As outlined within **Fig. 3** and **Appendix C – Site Photographs**, the vegetation on and surrounding the allotment has been classified by Tweed Shire Council as 'Sclerophyll Open Forest' with 'Highly Modified and Disturbed' areas. Upon site inspection, this is considered to be the closest possible classification under those listed within the NSW RFS document PFBP 2006.

The vegetation on the allotment is dominated by camphor laurels. A stand of Hoop Pines exists in the south west portion of the Part Lot. The remaining vegetation is made up of scrub and grassed vegetation. Pursuant to the definitions outlined within the NSW RFS document 'Planning for Bushfire Protection 2006' as well as the definitions outlined within David Keith's book 'Ocean Shores to Desert Dunes', the surrounding vegetation is considered the following:

Dry Sclerophyll Forests (Open Forest)

Crowns that touch or overlap (ie foliage cover of 20-50%. Prominent layer of hard leaved shrubs. Infertile soils. Rainfall >500mm. Coast, tablelands and western slopes.

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As a result of this classification, the design responses and separation distances employed throughout this report use the 'Forest' controls that are applicable within PFBP 2006 and AS-3959.

c) an assessment of the slope of the land on and surrounding the property (out to a distance of 100 metres from the boundaries of the property),

The subject site is located amongst the undulating hills that are typical to the Tweed area. As a result there are varying slopes and topographic features on-site. As shown within **Appendix A – Bushfire Risk Assessment Plan,** the predominant bushfire threat to the proposed residential lots exists to the southwest. Isolated and scattered groups of trees and shrubs are located on-site but are not considered substantial enough to be categorised as a potential bushfire threat.

The south westerly stand of vegetation is located along the top of the Mooball ridgeline and therefore is considered to be an upslope for bushfire planning purposes.

This slope has been assumed for the purposes of determining applicable Asset Protection Zones (APZ's) and the BAL construction of each envelope pursuant to AS-3959.

d) identification of any significant environmental features on the property,

The site is not considered to contain any significant environmental features.

e) the details of any threatened species, population or ecological community identified under the Threatened Species Conservation Act 1995 that is known to the applicant to exist on the property,

The site is not considered to contain any threatened species, population or ecological communities as outlined within the Threatened Species Conservation Act 1995.

f) the details and location of any Aboriginal object (within the meaning of the National Parks and Wildlife Act 1974) or Aboriginal place (within the meaning of that Act) that is known to the applicant to be situated on the property,

The site is not considered to contain any Aboriginal objects, places or heritage items as per the definitions of the National Parks and Wildlife Act 1974.

g) a bush fire assessment for the proposed development (including the methodology used in the assessment) that addresses the following matters:

i. the extent to which the development is to provide for setbacks, including asset protection zones,

Upon site inspection, the proposed development area already provides significant setback areas from the nominated bushfire prone vegetation due to the sites current use as managed grazing land. The isolated trees and scrubs strewn throughout the site are not considered a bushfire threat as they do not come in contact with any substantial growth areas.

The employment of Asset Protection Zones (APZ), and the ongoing maintenance of these areas as Inner Protection Area's (IPA's), will serve to improve the existing level of clearance between the building envelope and surrounding bushfire threat. The ongoing maintenance of these zones is considered the appropriate method to protect against a bushfire attack. The maintenance of the IPA is to be in keeping with the NSW RFS '*Standards for Asset Protection Zones'.*

The proposed allotments with direct frontage to the bushfire threat would need to provide APZ's as a means of protection as follows;

Lot No.	APZ Required
22	10m IPA, 10m OPA
24	10m IPA, 10m OPA
25	10m IPA, 10m OPA

These areas have been calculated using the NSW RFS controls and are included within **Appendix B – NSW RFS APZ Calculator Reports**. The proposed APZ arrangement is illustrated within **Appendix A - Bushfire Risk Assessment Plan**.

ii. the siting and adequacy of water supplies for fire fighting,

The subject is proposed for servicing via Council reticulated water. Appropriately spaced water hydrants will be positioned throughout the property to ensure ease of access. Any future dwellings that are built on-site will require the use of rainwater tanks pursuant to state wide BASIX requirements. It is considered that these dwellings will provide emergency services with ample access to a secondary water source in the event of a bushfire attack. A significant cleared area surrounds the building envelopes allowing for significant defendable space and pump operation. It is considered that the subject site has and will have adequate access to water sources for bushfire fighting purposes now and into the future.

iii. the capacity of public roads in the vicinity to handle increased volumes of traffic in the event of a bush fire emergency,

Tweed Valley Way is fully sealed and maintained by Council (**See Appendix C – Site Photographs**). The internal road network will be of the appropriate standard to accommodate increased traffic volumes in the event of a bushfire. The proposal is considered to satisfy this requirement.

iv. whether or not public roads in the vicinity that link with the fire trail network have two-way access,

The site is not serviced by an existing fire trail. The internal road network will provide ample access throughout the entire property. Large areas of open space will allow for indirect access to the bushfire threat. Tweed Valley Way is part of the established road network and is two-way accessible.

v. the adequacy of arrangements for access to and egress from the development site for the purposes of an emergency response,

The subject proposal will incorporate fully formed and sealed internal roads. Easements ensure driveway access to all created building envelopes and defendable space is provided for fire fighting purposes. The site is considered to have ample access and manoeuvring areas for emergency services in the event of a bushfire.

vi. the adequacy of bush fire maintenance plans and fire emergency procedures for the development site,

The proposed APZ arrangement shown in **Appendix A – Bushfire Risk Assessment Plan** would be maintained to the required NSW RFS '*Standards for Asset Protection Zones'*. These areas would be mown on a regular basis, saplings and encroaching shrubs removed upon sighting along with fuel loads

such as fallen leaves and branches. Underscrubbing of all established trees in the vicinity is to be ongoing to prevent ground fire movement.

vii. the construction standards to be used for building elements in the development,

All of the proposed building envelopes have been located with substantial clearance from the vegetation nominated by Tweed Shire Council as bushfire prone. Based on these separation distances the appropriate BAL construction levels have been determined. Note that these levels may be reduced at a later stage due to the ultimate siting and separation at that time. Varying BAL construction is demonstrated on-site and is required to meet the standards outlined within AS3959 - Construction of Buildings in Bushfire Prone Areas.

viii. the adequacy of sprinkler systems and other fire protection measures to be incorporated into the development,

The proposed APZ's, IPA's and OPA's are considered adequate bushfire protection measures for the building envelopes. Ongoing bushfire maintenance ensures that the site is well prepared in the event of a bushfire attack. Further emergency measures may be conditioned by Tweed Shire Council upon the assessment of any future dwelling development applications.

h) ***an assessment of the extent to which the proposed development conforms with or deviates from the standards, specific objectives and performance criteria set out in Chapter 4 (Performance Based Controls) of Planning for Bush Fire Protection.***

The applicable performance controls have been satisfied as per the following;

- Appropriately sized Asset Protection Zones utilizing Inner Protection Areas will be employed on-site and will be managed to NSW RFS '*Standards for Asset Protection Zones'.* The ongoing maintenance and underscrubbing will prevent any spread of ground fire.
- The provision of an appropriately dimensioned driveway access to each lot to ensure that fire fighting can be carried out in the event of a bushfire.
- Each dwelling will be fitted with an ancillary rainwater tank that may be used for fire fighting purposes.
- The removal of the stand of Camphor Laurels which are considered a pest species and create an unnecessary bushfire threat.

The planning proposal and location of envisaged building envelopes is considered to comply with the performance based controls set out within Chapter 4 of PFBP 2006.

SECTION 4

Conclusion

Having reviewed the NSW Rural Fire Service document 'Planning for Bushfire Protection 2006' and the NSW RFS *'Standards for Asset Protection Zones'*, it is submitted that the planning proposal and bushfire protection measures outlined within this report are consistent with the relevant policy and statutory requirements and demonstrates an appropriate development of the land.

All of the requirements set out in Clause 44 of the NSW Rural Fires Regulations 2008 have been satisfied. The planning proposal at No. 5993 Tweed Valley Way, Mooball is considered to warrant Council's support.

BROCK LAMONT
PLANIT CONSULTING PTY LTD
September 2012

APPENDIX **A**

Bushfire Risk Assessment Plan

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Bushfire Risk Assessment Plan
Gateway Planning Proposal / Proposed Rezoning
Part Lot 2 DP 828280
No. 5993 Tweed Valley Way, Mooball NSW

Scale - 1:1000 @ A3
Drawn By - BL
Date - 3September 2012
Ref - FP_MooballBSAPVI

N

Level 2 (1)13 Peart St
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PO Box 1623 Kingscliff NSW 2487
Telephone: 02 6674 5003
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admin@planitconsulting.com.au

PLANIT CONSULTING

APPENDIX **B**

NSW RFS APZ Calculator Reports

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PBP Appendix 2 - APZ Calculator
Inputs:
Site Address:
No. 5993 Tweed Valley Way, Mooball NSW
Calculated By:
Planit Consulting P/L
Development Purposes:
Residential Subdivision
Special Fire Protection
Local Government Area:
Tweed
Located in Alpine Area:
Fire Weather Area/FFDI:
Far North Coast
/80
Vegetation Class:
Forests
Effective Slope:
Upslope/Flat (0 degrees)
Commands:
Calculate
Print
Reset
Help
Outputs:
Asset Protection Zone (APZ):
20
metres
Inner Protection Area (IPA):
10
metres
Outer Protection Area (OPA):
10
metres

APPENDIX **C**

Site Photographs

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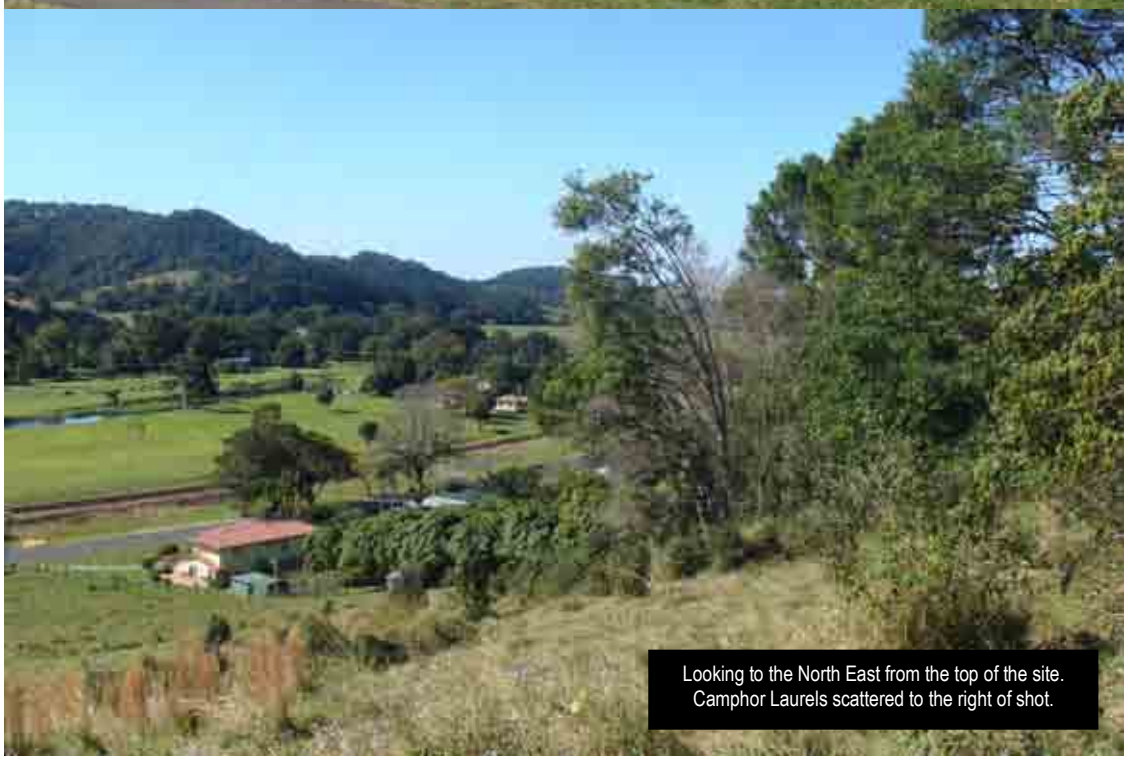
A view of the site from the North West corner on Tweed Valley Way. The site is currently cleared, cattle grazing land.



Looking to the North East from the top of the site. Camphor Laurels scattered to the right of shot.

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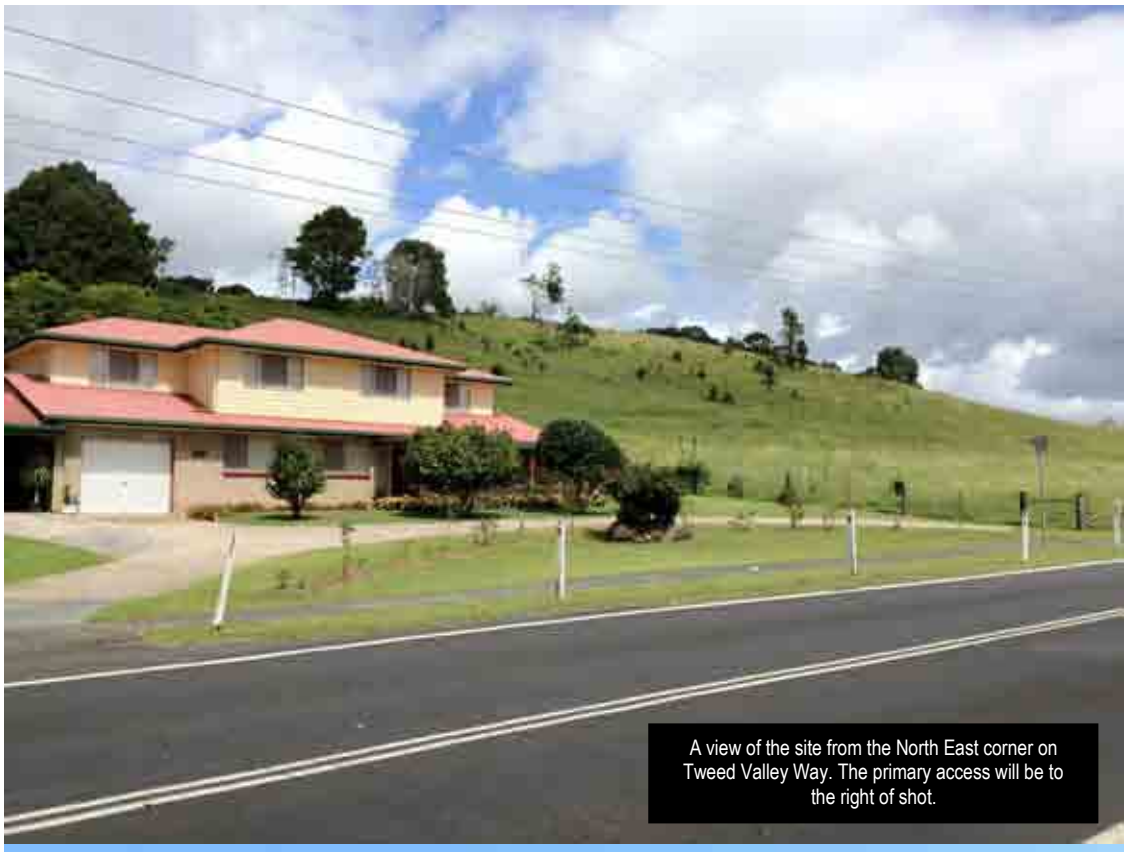

A view of the site from the North East corner on Tweed Valley Way. The primary access will be to the right of shot.

The large Hoop Pines on-site will be retained as part of the planning proposal.

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EVERICK
Heritage Consultants Pty Ltd
ABN 78102206682

AUGUST 2012

CULTURAL HERITAGE ASSESSMENT

TWEED VALLEY WAY
MOOBALL, NSW

REPORT PREPARED FOR
PLANIT CONSULTING

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Red Hill Q 4059
Phone 07 3368 2660 | Fax 07 3368 2440
Email info@everick.com.au

Innovative Heritage Solutions

Report Reference:

Piper, A., Robins, T. Ingram, C and A. Dighton 2012 *Cultural Heritage Due Diligence Assessment for Rezoning Application: Lot 2 on Plan 828280, Mooball, NSW*. Everick Heritage Consultants Pty Ltd unpublished report prepared for Planit Consulting.

Acknowledgements:

Everick would like to acknowledge the following people for their assistance in the production of this report:

Des Williams – Tweed Byron LALC

Tweed Shire Council Aboriginal Advisory Committee

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Document Status:

Rev No.	Version	Author(s)	Amended Sections	Date	Authorised
0	Draft	A. Piper, T. Robins, C. Ingram	All	12.07.12	T. Robins
1	Final	T. Robins	3	19.07.12	T. Robins
2	Final	C. Ingram	3	30.08.12	T. Robins

EXECUTIVE SUMMARY

The following report is a preliminary investigation for Indigenous and non-Indigenous cultural heritage relating to the proposed rezoning of a property at Mooball, NSW ('the Project'). The land subject to assessment is identified as Lot 2 DP828280 ('Project Area') situated on the Tweed Valley Way at Mooball. The intent of this investigation is to identify any archaeological or cultural heritage constraints to the eventual use of the Project Area for residential purposes.

This assessment has been commissioned by Planit Consulting. It involved a literature review, heritage register searches, and consultation with the Aboriginal community. The methods used in this assessment conform with the Office of Environment and Heritage ('OEH') *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (2010) ('Code of Practice'), a checklist for which is discussed in Section 7 of this report.

The methods used for this assessment involved:

(a) preliminary consultation with the Tweed Byron Local Aboriginal Land Council ('Tweed LALC') and the Tweed Shire Councils Aboriginal Advisory Committee ('AAC');
(b) a search of relevant historic and Aboriginal heritage registers;
(c) a review of historic aerial photography and resources relating to past land uses of the Project Area;
(d) a brief review of past archaeological studies of the Project Area and surrounds;
(e) an archaeological survey of the Project Area; and
(f) report on findings and recommended management strategies.

As part of a desktop study, Everick undertook searches of the relevant Aboriginal and historic heritage registers. A search of applicable historic heritage registers did not identify any items of cultural heritage significance within close proximity to the proposed Project Area. A search was conducted on 10 July 2012 and 12 October 2010 of the OEH Aboriginal Heritage Information Management System ('AHIMS'), which identified 27 registered Aboriginal sites within the search area (Figure 4). None of the sites are within 3.5 km of the Project Area. All are located within the Yelgun / Wooyung region, approximately 3.5 km – 5 km to the south east, an area known to be of high regional cultural significance.

A search of the Bundjalung Mapping Project (18 May 2012: Appendix C) identified no sites within or immediately adjacent to the Project Area. One site, a mythological site, was identified approximately 2.5 km to the north of the Project Area. The Project Area is not believed to be within the cultural sphere of influence of this place.

The Tweed LALC were asked to provide written feedback on the contents and recommendations in this report. A draft copy of this report was provided to the AAC and the Tweed Byron LALC for comment. The AAC commented on the report to Tim Robins from Everick Heritage during the AAC meeting held in Tweed Heads on the 3rd August, 2012.

At this meeting, the AAC supported the recommendations made by the Tweed Byron LALC, as described in the following paragraph. The AAC did not put forward any further recommendations or call for further actions, other than to support the call for action as described in the following paragraph.

Results:

There were no Aboriginal archaeological sites identified as a result of the field inspection. No areas with a high or moderate potential to contain scientifically significant Aboriginal cultural material were identified during the site inspection.

There is a broad ridgeline (Area B: Figure 7) running through the western side of the Project Area that has been identified by Tweed Byron LALC Officer Des Williams as a potential Aboriginal campsite. Mr Williams has reached this conclusion due to a number of factors, including his extensive cultural knowledge for the region, the elevated nature of the area in question and its proximity to Burringbar Creek and the ephemeral stream running through the central portion of the Project Area. He is of the opinion that archaeological test excavations are warranted in this area, as it has the potential to contain culturally significant subsurface deposits of Aboriginal Objects.

It must be acknowledged that the area identified by Mr Williams most probably had (and may still have) an increased potential for use as a campsite when compared to the lands that immediately surround it. Everick has given careful consideration to Mr Williams' observations. As noted above, it is quite likely that at least a background scatter of stone tools will be located within this area. Mr Williams is also a particularly knowledgeable person on the heritage of the region. However, it is our considered opinion that, on the evidence available, the archaeological potential of this area does not reach the threshold for seeking an Aboriginal Heritage Impact Permit

or undertaking archaeological test excavations. This is demonstrated by the synthesis of regional assessments and past land use analysis undertaken in this report. This position is consistent with the analysis against the Due Diligence Code detailed below.

It should be noted that while any Aboriginal Objects within the Project Area may be considered of low scientific value, they may have a higher cultural value to the Aboriginal people of the region. It is unusual that the Tweed Byron LALC and Everick disagree on management outcomes. However, this instance highlights the potential for an occasional difference in ascribing significance, as much as any difference in opinions on the archaeological potential for a given area. What is a reasonable threshold for requiring archaeological excavations? Through past consultation with Everick, the Aboriginal community of the Tweed has consistently expressed its anxiety about the continued destruction of their heritage. They have expressed a strong desire to adopt a cautionary approach to managing their heritage. There is nothing unreasonable about this position. However, it is in stark contrast to the current public policy and legal position that has seen – for example – the Due Diligence Code adopted, that applies an extremely low level of caution to managing cultural heritage. This is part of a broader public policy position that aims to see development occur in an efficient manner. The rights and interests of proponents also cannot be ignored, as they are the ones that ultimately must foot the bill for any impact mitigation works.

Balancing the competing cultural, legal, ethical, social and economic interests is no easy task. While the goal must always be to remain objective, there cannot help be a level of subjectivity. It is therefore not suggested that the recommendations in this report are authoritative. However, it is strongly asserted that the recommendations in this report represent a reasonable and acceptable outcome when these interests are balanced. Central to this approach is the recommendation that a monitoring program be implemented. We consider this to be a reasonable approach to facilitate the identification of Aboriginal Objects within the Project Area, given:

(a) the high levels of ground disturbance and erosion, and

(b) the uncertainty over the potential for the Project Area to contain (or retain) any more than a background scatter of Aboriginal Objects.

Recommendations:

Recommendation 1: Monitoring Area

It is recommended that a representative of the Tweed Byron LALC be invited to monitor initial earthworks on the north western ridge top, as shown in Figure 7. The Tweed Byron LALC should be given at least 7 days' notice of the requirement for monitoring. Prior to monitoring commencing, the excavator operator(s) and the Land Council representative should agree on protocols and procedures. This should include an initial scrape to remove grass and vegetation, with minimal subsurface ground disturbance. Subsequent excavation should be under the direction of the Land Council representative. The soils of the Monitoring Area are likely to be relatively shallow, and monitoring to a depth of greater than 0.5 – 1.0 m is considered unlikely to be required.

Recommendation 2: Cultural Inductions

It is recommended that the Proponent engage a representative of the Tweed Byron LALC to provide a cultural heritage induction to all plant operators undertaking initial ground disturbance within the Project Area. The induction should, as a minimum, cover:

(a) basic legislative requirements, including fines for the destruction of Aboriginal cultural heritage;
(b) a discussion on traditional Aboriginal culture, and why the management of Aboriginal cultural heritage is important to Aboriginal peoples;
(c) an introduction on how to identify Aboriginal objects,
(d) a description of portions of the Project Area considered likely to contain Aboriginal Objects; and
(e) a review of the Find Procedures for the project (See Recommendation 4).

Recommendation 3: Aboriginal Human Remains

It is recommended that if human remains are located at any stage during earthworks within the Project Area, all works must halt in the immediate area to prevent any further impacts to the remains. The Site should be cordoned off and the remains themselves should be left untouched. The nearest police station, the Tweed Byron Local Aboriginal Land Council and the OEH Regional Office, Coffs Harbour are to be notified as soon as possible. If the remains are found to be of Aboriginal origin and the police do not wish to investigate the Site for criminal activities, the Aboriginal community and the OEH should be consulted as to how the remains should be dealt with. Work may

only resume after agreement is reached between all notified parties, provided it is in accordance with all parties' statutory obligations.

It is also recommended that in all dealings with Aboriginal human remains, the Proponent should use respectful language, bearing in mind that they are the remains of Aboriginal people rather than scientific specimens.

Recommendation 4: Aboriginal Objects Find Procedure

It is recommended that if it is suspected that Aboriginal material has been uncovered as a result of development activities within the Project Area:

(a) work in the surrounding area is to stop immediately;
(b) a temporary fence is to be erected around the site, with a buffer zone of at least 10 metres around the known edge of the site;
(c) an appropriately qualified archaeological consultant is to be engaged to identify the material; and
(d) if the material is found to be of Aboriginal origin, the Aboriginal community is to be consulted in a manner as outlined in the OEH guidelines: *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (2010).

Recommendation 5: Notifying the OEH

It is recommended that if Aboriginal cultural materials are uncovered as a result of development activities within the Project Area, they are to be registered as Sites in the Aboriginal Heritage Information Management System (AHIMS) managed by the OEH. Any management outcomes for the site will be included in the information provided to the AHIMS.

Recommendation 6: Conservation Principles

It is recommended that all effort must be taken to avoid any impacts on Aboriginal Cultural Heritage values at all stages during the development works. If impacts are unavoidable, mitigation measures should be negotiated between the Proponent, OEH and the Aboriginal community.

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DEFINITIONS

The following definitions apply to the terms used in this report:

AAC means the Tweed Shire Council's Aboriginal Advisory Committee.

Aboriginal Object means any deposit, object or material evidence (not being a handicraft made for sale) relating to the Aboriginal habitation of the area that comprises New South Wales, being habitation before or concurrent with (or both) the occupation of that area by persons of non-Aboriginal extraction, and includes Aboriginal remains.

Aboriginal Place means any place declared to be an Aboriginal place (under s.84 of the NPW Act) by the Minister administering the NPW Act, by order published in the NSW Government Gazette, because the Minister is of the opinion that the place is or was of special significance with respect to Aboriginal culture. It may or may not contain Aboriginal Objects.

ACHCR Guidelines means the OEH *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (2010).

Archaeological Code of Practice means the OEH *Code of Practice for Archaeological Conduct in New South Wales* (2010).

Due Diligence Code means the OEH *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (2010).

EP&A Act means the *Environmental Planning and Assessment Act 1979* (NSW).

NCREP 1988 means the *North Coast Regional Environmental Plan 1988.*

NPW Act means the *National Parks and Wildlife Act 1974* (NSW).

NPW Regulations means the *National Parks and Wildlife Regulations 2009* (NSW).

OEH means the New South Wales Office of Environment and Heritage.

Project Area means the land subject to this assessment identified in Section 1.3 as being within Lot 2 DP828280.

Proposed Works means all activities associated with construction and landscaping within the Project Area (Figures 2), including activities undertaken by subsequent landholders.

Proponent means the owners of Lot 2 DP828280 and all employees and contractors of the Proponent.

The Project means the proposed re-zoning of the land identified as The Project Area as identified in Figure 2.

The Consultant means qualified archaeological staff and/or contractors of Everick Heritage Consultants Pty Ltd.

Tweed LALC means the Tweed Byron Local Aboriginal Land Council.

1. INTRODUCTION

1.1 Purpose of the Archaeological Investigation

The following report is a preliminary (Due Diligence) investigation for Indigenous and non-Indigenous cultural heritage relating to the proposed rezoning of a property at Mooball, NSW (the Project). The land subject to assessment is identified as part of Lot 2 DP828280 (the 'Project Area': Figure 2) situated on the Tweed Valley Way at Mooball. The intent of this investigation is to identify any archaeological or cultural heritage constraints to the eventual use of the Project Area for residential purposes.

1.2 Proponent & Project Brief

Everick Heritage Consultants (The Consultant) was commissioned by Adam Smith of Planit Consulting to undertake this assessment. The brief for this project was to undertake a preliminary heritage assessment of suitable standard to be submitted as a stand-alone report in support of a Rezoning Application to the Tweed Shire Council.

In accordance with the relevant administrative and legislative standards for New South Wales (see Section 2), the methods used for this assessment involved:

(a) preliminary consultation with the Tweed Byron Local Aboriginal Land Council ('Tweed LALC') and the Tweed Shire Councils Aboriginal Advisory Committee;
(b) a search of relevant historic and Aboriginal heritage registers;
(c) a review of historic aerial photography and resources relating to past land uses of the Project Area;
(d) a brief review of past archaeological studies of the Project Area and surrounds;
(e) an archaeological survey; and
(f) report on findings and recommended management strategies.

As this assessment relates to a rezoning application, precise construction details within the Project Area are unknown. However, it is proposed that a mixture of residential lots and open space / parkland will be created, with a series of 'acreage' style lots also being proposed. A fair proportion of the existing vegetation is proposed to be

preserved during development. The engineering plans have yet to be finalised, and at the time of undertaking this assessment the amount of benching, cut or fill required for the development is unknown.

For the purposes of this assessment, it has been assumed that all of the Project Area may be the subject of significant surface and subsurface ground disturbance. However, it should also be noted that a large portion of the site will be subject to fill, which will likely have little if any impact on cultural material in those areas.

1.3 Defining the Project Area

The land subject to assessment, (the Project Area), is situated within the Tweed Shire Council local government area, immediately west of the settlement of Mooball (Figure 1). The area subject to this preliminary investigation comprises of Lot 2 DP828280 (Figure 2). The land is bounded by Tweed Valley Way to the north, with residential allotments adjacent in the north east corner. Large rural allotments bound the Project Area to the east and south. The Project Area is approximately 7.8 ha in area.

1.4 Report Authorship

The archaeological inspection was undertaken by qualified archaeologist Adrian Piper. The desktop study was undertaken by Adrian Piper and Caroline Ingram. Community consultation was undertaken by Tim Robins.

Figure 1: Project Area General Locality

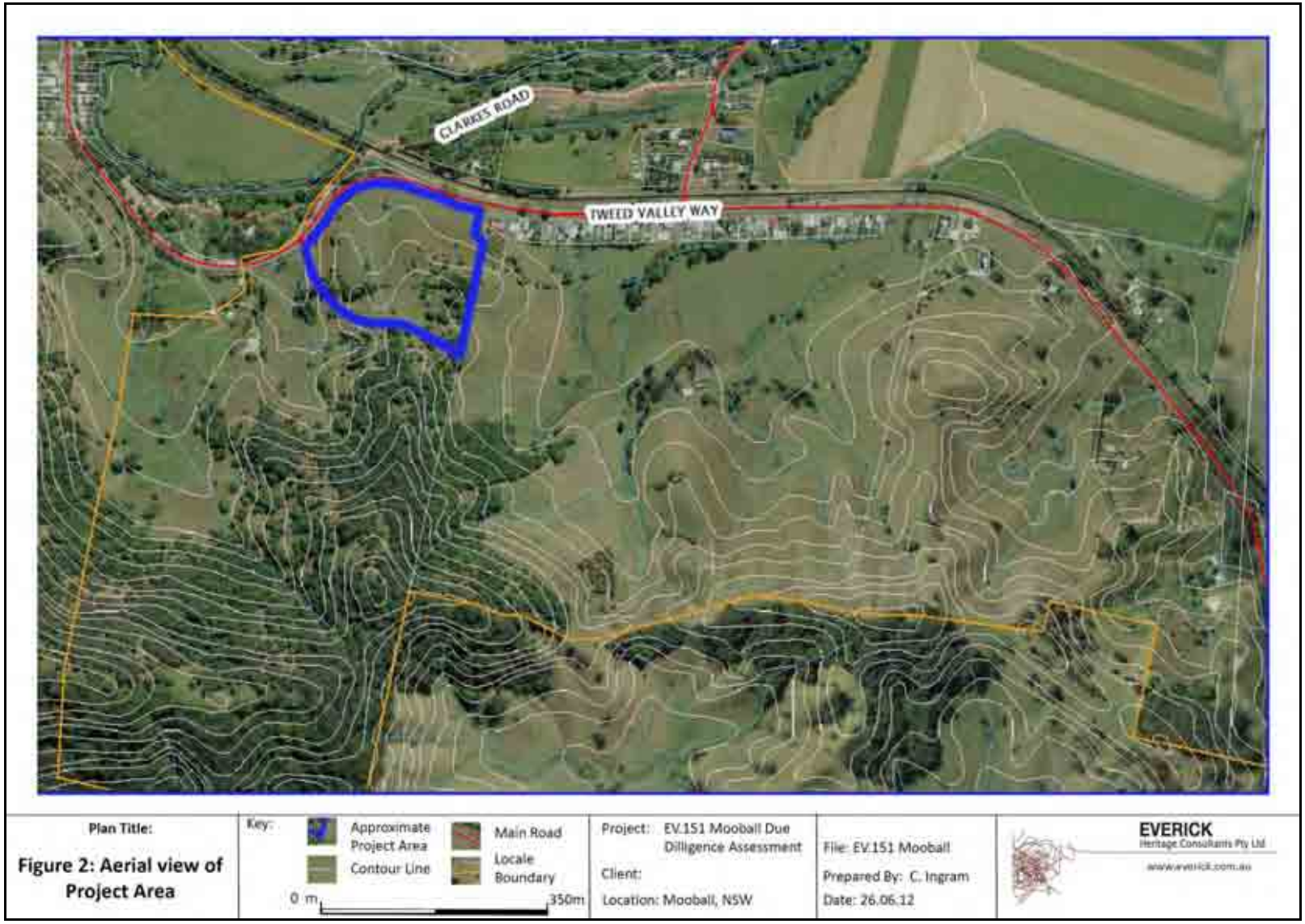

Figure 2: Aerial view of the Project Area and surrounds

2. LEGISLATIVE AND PLANNING CONTEXT

The following legislation provides the context for cultural heritage in NSW: the *National Parks and Wildlife Act 1974* (NSW), the *Environmental Planning and Assessment Act 1979* (NSW) and the *Heritage Act 1977* (NSW) and local council Environmental Plans and Development Control Plans. The Commonwealth also has a role in the protection of nationally significant cultural heritage through the *Environmental Protection and Biodiversity Conservation Act 1999* (Cth), *The Protection of Movable Cultural Heritage Act 1986* (Cth) and the *Historic Shipwrecks Act 1976* (Cth).

For the purposes of this assessment it is the State and local legislation that are relevant. The consent authorities will be the Tweed Shire Council and, where a referral agency is required, the OEH. Approval from the OEH will also be required should the Project impact on identified Aboriginal Objects. The information below lists the legislative and policy framework within which this assessment is set.

As of 1 October 2010, a range of legislative amendments came into operation in New South Wales affecting Aboriginal heritage. The methods used in this assessment have been informed by these legislative amendments, which are discussed in further detail below.

2.1 The *National Parks and Wildlife Act 1974* (NSW) and the *National Parks and Wildlife Regulations 2009* (NSW)

The *National Parks and Wildlife Act 1974* (NSW) (NPW Act) is the primary legislation concerning the identification and protection of Aboriginal cultural heritage. It provides for the management of both Aboriginal Objects and Aboriginal Places. Under the NPW Act, an Aboriginal Object is any deposit, object or material evidence (not being a handicraft made for sale) relating to the Aboriginal habitation of the area, regardless of whether the evidence of habitation occurred before or after non-Aboriginal settlement of the land. This means that every Aboriginal Object – regardless of its size or seeming isolation from other Objects – is protected under the Act.

An Aboriginal Place is an area of particular significance to Aboriginal people which has been *declared* an Aboriginal Place by the Minister. The drafting of this legislation reflects the traditional focus on Objects, rather than on areas of significance such as story places and ceremonial grounds. However, a gradual shift in cultural heritage management practices is occurring towards recognising the value of identifying the significance of areas to

Indigenous peoples beyond their physical attributes. With the introduction of the *National Parks and Wildlife Amendment Act 2010* (NSW) the former offence provisions under Section 86 of 'disturbing', 'moving', 'removing' or 'taking possession' of Aboriginal Objects or Places have been replaced by the new offence of 'harming or desecrating'. The definition of 'harm' is 'destroying, defacing or damaging an Object'. Importantly in the context of the management recommendations in this assessment, harm to an Object that is 'trivial or negligible' will not constitute an offence.

The new amendments also significantly strengthen the penalty provisions. The issue of intent to harm Aboriginal cultural heritage has been formally addressed by separating it from inadvertent harm. The penalty for individuals who inadvertently harm Aboriginal Objects has been set at up to $55,000, while for corporations it is $220,000. Also introduced is the concept of '*circumstances of aggravation*' which allows for harsher penalties (up to $110,000) for individuals who inadvertently harm Aboriginal heritage in the course of undertaking a commercial activity or have a record for committing similar offences. For those who knowingly harm Aboriginal cultural heritage, the penalty will rise substantially. The maximum penalty will be set at $275,000 or one year imprisonment for individuals, while for corporations it will rise to $1,100,000.

Where a land user has or is likely to undertake activities that will harm Aboriginal Objects, the Director General (OEH) has a range of enforcement powers, including stop work orders, interim protection orders and remediation orders. The amended regulations also allow for a number of penalties in support of these provisions. The NPWA also now includes a range of defense provisions for unintentionally harming Aboriginal Objects:

(a) Undertaking activities that are prescribed as '*Low Impact*'.
(b) Acting in accordance with the new *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (2010) ('Due Diligence Code');
(c) Using a consulting archaeologist who correctly applies the OEH *Code of Practice for Archaeological Conduct in New South Wales* (2010) ("Archaeological Code of Practice') (see Appendix B); and
(d) Acting in accordance with an Aboriginal Heritage Impact Permit (AHIP).

2.1.1 'Low Impact Activities'

The new regulations allow for a range of low impact activities to be undertaken without the need to consult the OEH or a consulting archaeologist. Generally, those who undertake activities of this nature will not be committing an offence, even if they inadvertently harm Aboriginal Objects. These activities include:

(a) Maintenance – For example on existing roads and tracks, or on existing utilities such as underground power cables and sewage lines.
(b) Farming and Land Management – for land previously disturbed, activities such as cropping, grazing, bores, fencing, erosions control etc.*
(c) Removal of dead or dying vegetation - only if there is minimal ground disturbance.
(d) Environmental rehabilitation – weed removal, bush regeneration.
(e) Development in accordance with a Development Certificate issued under the EPA Act 1979 (provided the land is previously disturbed).*
(f) Downhole logging, sampling and coring using hand held equipment.
(g) Geochemical surveying, seismic surveying, costeaning or drilling.*

* This defense is only available where the land has been disturbed by previous activity. Disturbance is defined as a clear and observable change to the land's surface, including but not limited to land disturbed by the following: soil ploughing; urban development; rural infrastructure (such as dams and fences); roads, trails and walking tracks; pipelines, transmission lines; and storm water drainage and other similar infrastructure.

2.1.2 Due Diligence Code of Practice for the Protection of Aboriginal Objects

The Due Diligence Code has been applied in Section 7.2 of this assessment. It operates by posing a series of questions for land users before they commence development. These questions are based around assessing previous ground disturbance. An activity will generally be unlikely to harm Aboriginal Objects where it:

(a) will cause no additional ground disturbance; or
(b) is in a developed area; or
(c) is in a significantly disturbed area.

Where these criteria are not fulfilled, further assessment for Aboriginal cultural heritage will typically be required prior to commencing the activity.

2.2. The ACHCR (2010)

The OEH has recently published the *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (2010) (ACHCR). These requirements replaced the former *Interim Community Consultation Requirements for Applicants* (2004) (ICCR) as of 12 April 2010. The ACHCR provides an acceptable framework for conducting Aboriginal community consultation in preparation for Aboriginal Heritage Impact Permits. Proponents are also required to follow the ACHCR where undertaking a project that is likely to impact on cultural heritage and/or where required by the consent authority.

2.3 The Heritage Act 1977 (NSW)

The Heritage Act 1977 (NSW) ('Heritage Act') is aimed at identifying and protecting significant items of historic (as opposed to Aboriginal) cultural heritage. The focus of the legislation is on identifying places of either local or state heritage significance, and protecting them by registration on heritage registers. Significant historic heritage items are afforded little protection (other than at the discretion of councils) where they are not on a heritage register.

Of note are the provisions allowing for interim heritage orders (Part 3), which grants the Minister or the Minister's delegates, (which importantly may include a local government agent) the power to enter a property and provide emergency protection for places that have not yet been put on a heritage register but that may be of local or State significance.

The Heritage Act 1977 (NSW) also makes allowances for the protection of archaeological deposits and relics (Part 6). An archaeological "relic" means any deposit, object or material evidence which relates to the settlement of the area, not being Aboriginal settlement. Importantly, a former requirement for an archaeological relic to be 50 years or older has recently been repealed. The focus is now on the item's potential heritage significance, not its age. As will be discussed below, it is highly unlikely that archaeological relics of significant historic sites are located within the Project Area.

2.4 The Tweed Shire Local Environmental Plan 2000

The Tweed Shire LEP 2000 provides statutory protection for items already listed as being of heritage significance (Schedule 2), items that fall under the ambit of the *Heritage Act 1977* (NSW) and Aboriginal Objects under the *National Parks and Wildlife Act 1974* (NSW). It ensures that essential best practice components of the heritage decision making process are followed.

For listed heritage items, relics and heritage conservation areas, the following action can only be carried out with the consent of the Tweed Shire Council:

a) demolishing, defacing, damaging or moving a heritage item or a building, work, relic, tree or place within a heritage conservation area, or
b) altering a heritage item or a building, work or relic within a heritage conservation area by making structural changes to its exterior, or
c) altering a heritage item or a building, work or relic within a heritage conservation area by making non-structural changes to the detail, fabric, finish or appearance of its exterior, except changes resulting from any maintenance necessary for its ongoing protective care, which does not adversely affect its heritage significance, or
d) moving a relic, or excavating land for the purpose of discovering, exposing or moving a relic, or
e) erecting a building on, or subdividing, land on which a heritage item is located or which is within a heritage conservation area.

In addition, Council may not grant development consent without considering whether the lands contain potential Aboriginal archaeological deposits (Section 44).

2.5 The *State Environment Planning Policy (North Coast Regional Environmental Plan 1988)*

The North Coast Regional Environmental Plan 1988 ('NCREP 1988') recognises the importance of regionally significant heritage items and places to the State of NSW. It provides statutory protection for a select number of state and regionally significant heritage items and places in northern NSW. A "heritage item" means a building, work, relic, tree or place of heritage significance to the North Coast Region specified or described in Schedule 2 or

3 of the NCREP 1988. For these items, the Ballina Shire Council remains the consent authority. Under the NCREP 1988 Council must consider:

- the views of the Heritage Council;
- the heritage significance of the item to the State or region;
- the extent to which the carrying out of the development would affect the heritage significance of the item and its site;
- whether the setting of the item, and in particular, whether any stylistic, horticultural or archaeological features of the setting should be retained;
- measures taken to conserve and preserve the heritage item, including where appropriate, any conservation plan; and
- whether the item constitutes a danger to the users or occupiers.

The main difference between the NCREP 1988 and other Council planning controls is that it focuses on regional significance rather than local significance. It also involves referral to the NSW Heritage Council, regardless of whether the item is on the NSW Heritage Register.

2.6 The NSW Heritage Manual

The NSW Heritage Manual lists an 8-step process that is generally considered a best practice guide to assessing significant items. The process steps are:

1. Summarise what is known about the item.
2. Describe the previous and current uses of the item and the associations it may have to individuals or groups and its meaning for those people.
3. Assess the significance using the NSW heritage criteria.
4. Check if a sound analysis of the item's heritage significance can be made.
5. Determine the item's level of significance.
6. Prepare a succinct statement of heritage significance.
7. Get feedback.
8. Write up the information.

Contrary to common belief, a significant heritage item need not be particularly 'old' (the exception to the rule being the definition of an Archaeological Relic discussed above). Rather, the focus is on identifying what aspects of a particular item may be significant.

The NSW Heritage Manual contains a set of 7 assessment criteria that act as a guide to assessing significance. They are:

- **Criterion (a):** An item is important in the course, or pattern, of NSW's cultural or natural history (or the cultural or natural history of the local area);
- **Criterion (b):** An item has strong or special association with the life or works of a person, or group of persons, of importance in NSW's cultural or natural history (or the cultural or natural history of the local area);
- **Criterion (c):** An item is important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in NSW (or the local area);
- **Criterion (d):** An item has strong or special association with a particular community or cultural group in NSW (or the local area) for social, cultural or spiritual reasons;
- **Criterion (e):** An item has potential to yield information that will contribute to an understanding of NSW's cultural or natural history (or the cultural or natural history of the local area);
- **Criterion (f):** An item possesses uncommon, rare or endangered aspects of NSW's cultural or natural history (or the cultural or natural history of the local area); and
- **Criterion (g):** An item is important in demonstrating the principal characteristics of a class of NSW's
    - cultural or natural places; or
    - cultural or natural environments.

3. COMMUNITY CONSULTATION

Community consultation was first undertaken through the Tweed Byron LALC. Mr Des Williams attended a site inspection on 29 May 2012. Mr Williams identified no sites of high intangible (non-physical) cultural significance within or adjacent to the Project Area. Mr Williams was of the opinion that parts of the Project Area retained the potential to contain Aboriginal Objects. Mr Williams' opinions on the archaeological potential of the Project Area has been discussed in detail in Sections 6 – 8 below.

Everick Operations Manager Tim Robins attended a meeting of the AAC on 4 May 2012 to discuss the proposed rezoning. The members of the AAC supported Mr Williams' request for archaeological excavations over parts of the Project Area. They had no further information to add about potential impacts to cultural heritage. Although a spot at the July 2012 AAC meeting was requested, Everick Heritage were informed that one was unavailable. We have therefore been unable to seek additional comments from the AAC regarding the recommendations of this assessment report.

A draft copy of this report has been provided to the AAC and the Tweed Byron LALC for comment. The AAC commented on the report to Tim Robins from Everick Heritage during the AAC meeting held in Tweed Heads on the 3rd August, 2012.

At this meeting, the AAC supported the recommendations made by the Tweed Byron LALC, and did not put forward any further recommendations or call for further action.

4. REGISTERS: ABORIGINAL AND HISTORIC HERITAGE

4.1 The OEH Aboriginal Heritage Information Management System

Care should be taken when using the AHIMS database to reach conclusions about site prevalence or distribution. For example, a lack of sites in a given area should not be seen as evidence that the area was not occupied by Aboriginal people. It may simply be an indication that it has not been surveyed, or that the survey was undertaken in areas of poor surface visibility. Further, care needs to be taken when looking at the classification of sites. For example, the decision to classify a site an Open Campsite containing shell rather than a Midden can be a highly subjective exercise, the threshold for which may vary between archaeologists.

There may also be errors with the data itself, for example the recording of site information during a period when GPS recorders were not available. Early cultural heritage or archaeological reports often gave inaccurate site locations for this reason. In addition, the characteristics of a site, particular size and contents, can vary over time and today may not reflect the original character of the recording of the site.

Keeping these limitations in mind, a search was conducted on 12 October 2010 of the OEH Aboriginal Heritage Information Management System (AHIMS service number 32722) over 25 km^2 focusing on Mooball, NSW. The search identified 27 registered Aboriginal sites within the search area (Figure 4). None of the sites are within 3.5 km of the Project Area. All are located within the Yelgun / Wooyung region, approximately 3.5 km – 5 km to the south east. This is an area that is known to be of high regional cultural significance. It contains a number of ceremonial sites, including the regionally significant Wooyung Bora Ground. A culturally scarred tree is identified north of the Project Area and west of Pottsville, however, a recent arborist's opinion has cast doubts on the cultural origins of the tree (Everick 2010).

All of the registered sites are located within 3 km of the coast. This bias can partly be explained by the propensity for residential development in this region to be located close to the coast. Residential subdivisions often trigger the need for heritage assessment.

The majority of sites within the search area (20) were recorded as open campsites containing either an isolated artefact or artefact scatter. An additional two (2) sites contained shell and artefact material, and were recorded as middens. A further two (2) sites were recoded as containing shell only, while the remaining three (3) are culturally modified trees.

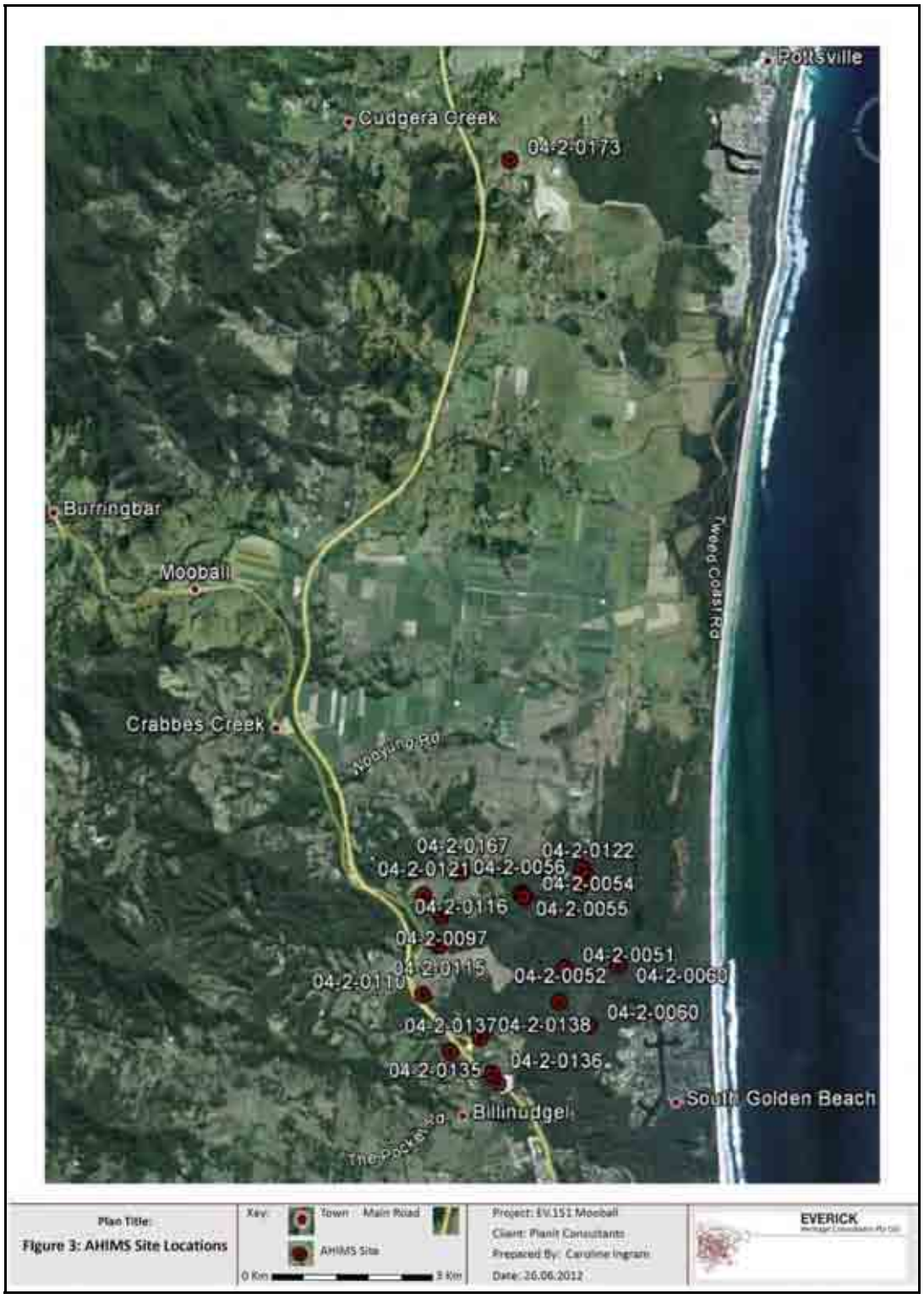

Figure 3: AHIMS Search Results

4.2 Other Heritage Registers: Indigenous & Historic Cultural Heritage

The following heritage registers were accessed on 22 November 2010 Aboriginal and historic places within the Tweed Shire LGA:

- **The World Heritage List**: Contains one place, the Gondwana Rainforest, which is not within close proximity to the Project Area.

- **The National Heritage List** (Australian Heritage Council): Contains no places listings in close proximity to Mooball.

- **Commonwealth Heritage List** (Australian Heritage Council): Contains no place listings within the Tweed LGA.

- **Register of the National Estate** (Australian Heritage Council): Contains no places listings in close proximity to Mooball.

- **The State Heritage Register** (NSW Heritage Office): Contains no places listings in close proximity to Mooball.

- **Tweed Shire Local Environment Plan 2000:** Contains one listed item in the Mooball region, the Hoskin Wildlife Refuge on Wabba Road, Mooball. The refuge is located approximately 1.5 km north of the Project Area, and is unlikely to be affected by the Project.

- **The Bundjalung Mapping Project:** A search of the BMP Register indicated the possible presence of a Cultural / Mythological site approximately 2.5km form the Project Area. Ground disturbance associated with The Project will not physically impact this site. Consultation with the Tweed Byron LALC and AAC has not identified potential impacts to this place as a result of the proposed rezoning. There are no other places on the BMP within close proximity to the Project Area.

5. Landscape Context

5.1 Environment Locality

The Project Area (c 8 ha) located at the western edge of Mooball village, is a combination of rolling hills and valley flat soil landscapes (Speight 1990:34). For archaeological purposes, the Project Area contains two general environmental units: a Hills Landform Unit and a Valley Flats Landform Unit. The features of each of these are described below.

5.2 Topography

5.2.1 Hills Landform Unit

Slopes fall to the north-west, north and east from a fairly narrow spur crest that separates the Crabbes Creek and Burringbar Creek systems. Elevations range between 10 m AHD and 60 m AHD, slopes are gentle (average 6%) to moderate (average 30%).

The most obvious land form elements are middle and lower slopes merging with valley / drainage flats within the Project Area. There are small areas of active aggradation at the heads of narrow streams and accelerated (man-made) erosion due to former banana cultivation.

5.2.2 Valley flats landform unit

An area of gently undulating alluvial plain at the edge of the Burringbar Creek floodplain, relief is <3%, stream flows are unidirectional combining to fall east, to Burringbar Creek beyond the Project Area.

5.3 Geology, Soils & Vegetation by Landform unit

5.3.1 Hills Landform Unit

Geology: is metasediments of the Neranleigh-Fernvale Group. Morand, quoting Chesnut 1980, describes their composition as thinly bedded fissile shales, siltstones and sandstones with occasional more massive greywackes, volcanic tuff, agglomerates, sandstones and massive cobble conglomerates (Morand 1996:53).

Soils: The soil landscape is classified as a 'bi' Billinudgel type location, an erosional/colluvial landscape typified by low rolling hills on metamorphics (Morand 1996: 53). The most prevalent soil materials of the slopes landform elements are an A horizon of red podzolics on upper slopes and yellow earths/yellow podzolics on middle to lower slopes (Morand 1996:55). This soil landscape post clearing is prone to shallow slumping and sheet erosion particularly on banana lands. The implication for the possible integrity of '*in situ*' cultural materials - particularly stone artefacts - is that were they located within the Project Area, they are highly likely to have been moved from their original points of deposition.

Vegetation: is open forest (wet sclerophyll) in pre European conditions, now cleared grassed slopes and regenerating grassed slopes on former banana land.

5.3.2 Valley Flats Landform Unit

Geology: is Deep Quaternary alluvium-clay, silt sand and gravel derived from the surrounding metamorphic hills (Morand 1996:112).

Soils: The soil landscape is classified as a 'Crabbes Creek' (cr) type location, an alluvial landscape (Morand 1996:112). Upper level (>200cm) soil materials are brown alluvial clays and clay loams (Morand 1996:112).

Vegetation: is cleared closed forest (rainforest) in pre European conditions, present vegetation consists of closed sod grassland of improved pastures.

5.4 Land-use History

5.4.1 Land Use – Historical

The desk top assessment identified only one item of historic heritage interest in proximity to the Project Are: a section of a road with historical associations to early road transport between Murwillumbah and Brunswick Heads. This historic portion of road passes through the lands adjacent to the Project Area to the east. The road is visible in the western section of the 1962 aerial photograph (Appendix D). This section is known to some local residents as the 'old coach road'. The route passes from the north-west corner, skirts the lower slopes and exists at the south-eastern end joining the old Pacific Highway in the vicinity of a gazetted General Cemetery.

The historical Parish mapping (Figure 4) indicates that in 1889 the road/track is the main road between Burringbar/Murwillumbah and south to Crabbes Creek/Brunswick Heads. The road roughly follows the line of lower slopes on the creek flats. At the northern end of what became Mooball village, the road intersects with a track leading to the top of the ridge separating Crabbes Creek and Burringbar Creek. It then enters the Burringbar Valley at an unknown point. Mooball Station is shown a short distance south of the Crabbes Creek Road turnoff.
There is also a General Cemetery located within proximity to the Project Area (Figures 5 and 6); however this area will not be affected by activities within the Project Area.

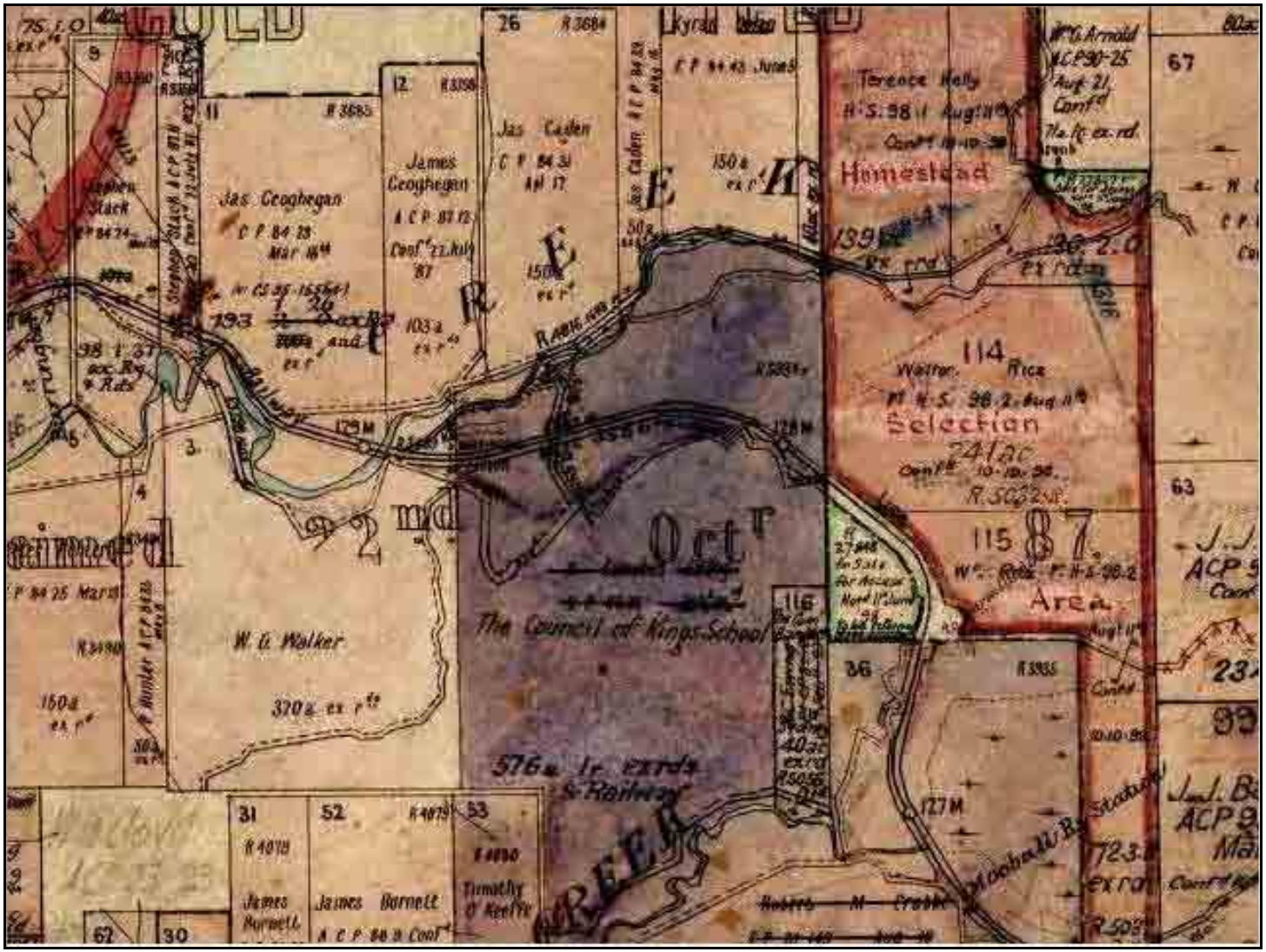

Figure 4: Mooball Parish Map c. 1889 showing general locality of Project Area (Purple/Blue)

Burringbar / Brunswick Heads Road and the Railway Line

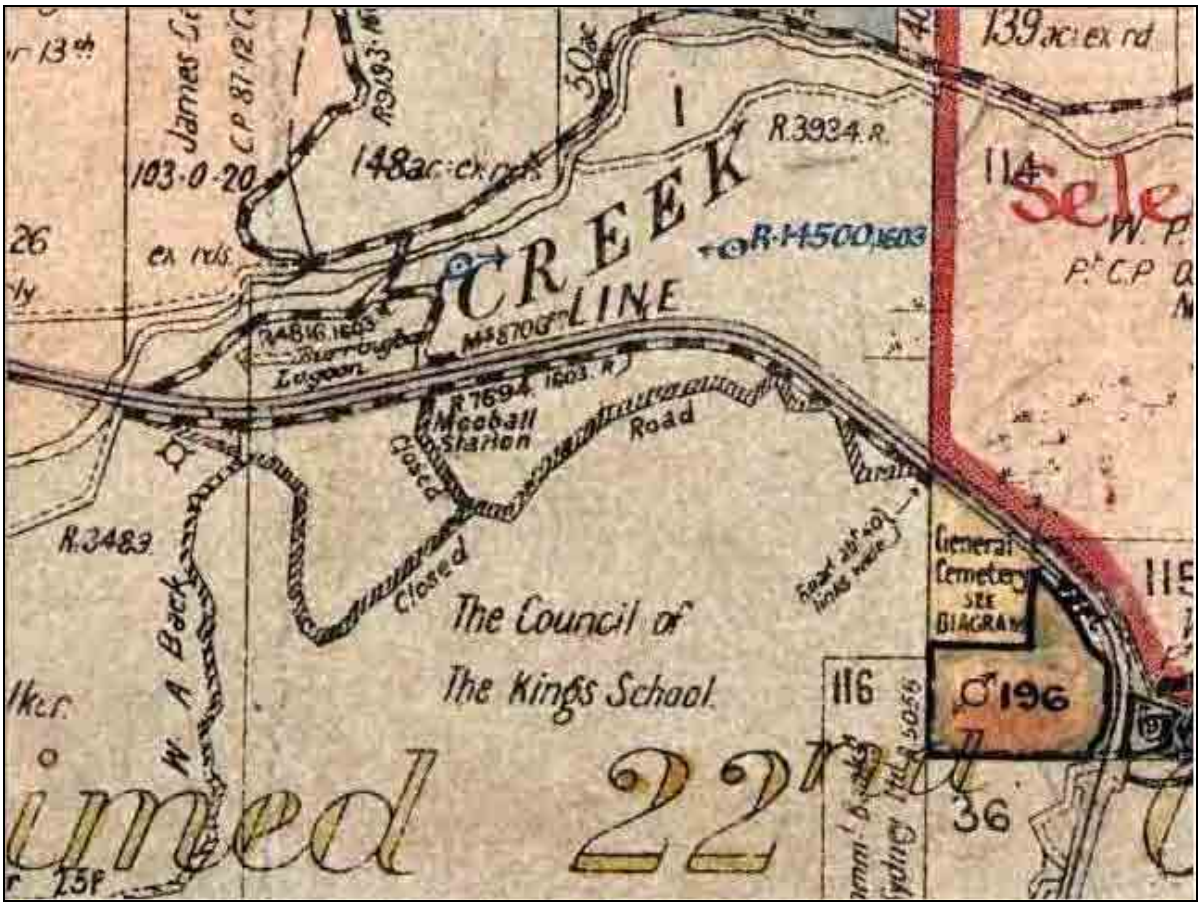

Figure 5: Mooball Parish Map 1904 showing surrounds of Project Area and the location of the General Cemetery within proximity to the Project Area

1904 Map 1 (Figure 5): There is a general cemetery shown adjacent to the Brunswick Heads Road, to the east of the Project Area. An inset showing the cemetery plan is shown in Figure 6. The road is shown as a constructed road one link wide.

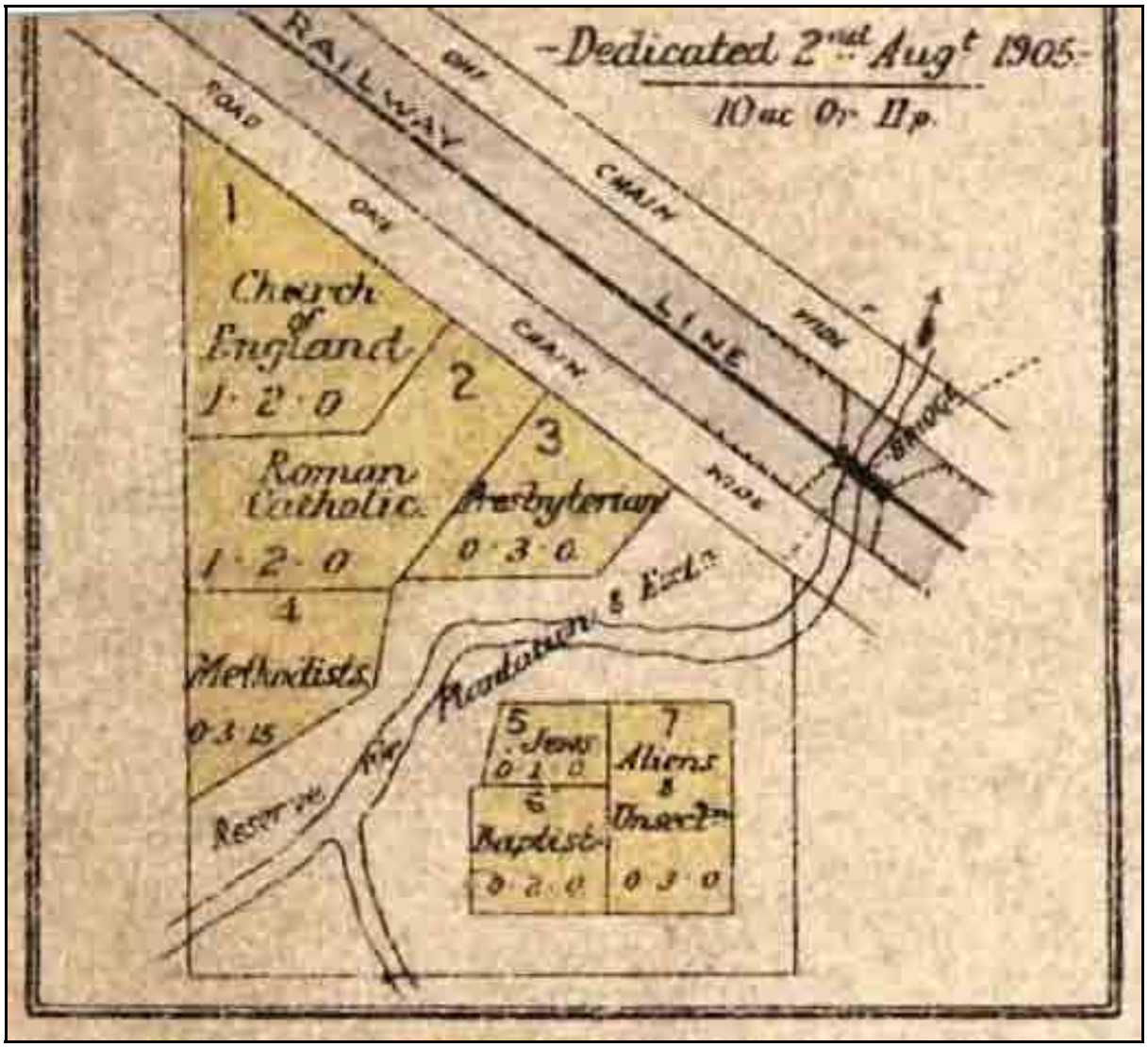

Figure 6: Mooball Parish Map 1904 insert showing Mooball Cemetery Plan.

5.4.2 A Review of Historic Aerial Photography

Historic aerial photographs of the Project Area were reviewed to ascertain the level of past ground disturbance. This information is used to assist in developing a predictive model for potential cultural heritage site locations. Aerial photographs from 1962, 1970, 1987, 1991 and 1993 were reviewed as part of this assessment (Appendix D).

The 1962 aerial photograph of the Project Area shows that the majority of it has been cleared of large trees, with the majority of the lands being used as open pasture. Only a select few trees remain, and are fairly juvenile at the time of this photograph, indicative of recent regrowth. There is also a large portion within the northern boundary that was being used for banana plantations. A small watercourse can be seen draining in a general north easterly direction.

The 1970 aerial photograph shows little change. The northern portion of the Project Area appears to have changed in land use-age from cropping to pasture. The clearly visible earth disturbance indicative of cropping visible in the 1962 photograph is not so pronounced in the 1970 photograph.

1987 sees evidence of the introduction of vegetation regrowth along the fence line transecting the Project Area, as well as regrowth trees on the slopes of the drainage depression. The most likely explanation is the continued use of this area for grazing, whereby the limited trees within the area provide useful shade for the grazing animals, whilst not being allowed to become over grown.

The 1991 and 1993 aerial photographs show no significant changes from 1987, indicative on ongoing use similar to that seen in 1987. The most recent mapping available via Google Earth and SIX-viewer indicate this use of land has remained consistent since 1993.

Conclusions: The Project Area has a history of moderate ground disturbances since European settlement. Initial clearing activities were unlikely to have caused significant ground disturbance, as they would have most likely been undertaken prior to the advent of mechanical clearing methods commonly used from the late 1940's onward. Unfortunately, the Project Area would have been subject to fairly reasonable erosion due to this vegetation clearing. Cultivation has caused significant ground disturbance over approximately 30% - 50% of the Project Area. Continued use as grazing land since the 1960's is indicated by the historical photographs reviewed.

6. ARCHAEOLOGICAL MODEL

6.1 Synthesis of Archaeology and Ethno-history

The Aboriginal people of the Tweed Coast were part of a larger linguistic group, the Bundjalung, which spoke a range of dialects in the area between the Clarence and Logan Rivers extending west to Tenterfield. Dialect groups

and sub-clans composed of interlinked family groups occupied distinct areas within the wider Bundjalung association. Land belonged to individual clans whose territorial boundaries had been established in mythology (Creamer and Godwin 1984). The Project Area is within the territory of the Minjungbal people, with the Kalibal/Widjabal to the west and the Arakwal to the south (Tindale 1974; Crowley 1978). The Minjungbal occupied the coastal plain and river valleys from a short distance north of Byron Bay to Southport and west to the coastal ranges. Curr provides some evidence for this model suggesting that dialects between the Albert River and Tweed River were closely related (Curr 1887:321). Tindale recognised a similar common language group extending between Byron Bay and Southport and west to Murwillumbah, which he called Minjanbal (Tindale 1940:191).

Keats (1988) and Crowley (1978) differ from Tindale's interpretation in that they generally agree on the northern boundary of the Arakwal but place the southern boundary of the Minyanbal on Cudgera Creek at Hastings Point (Keats 1988:30). Bray writing of his personal observations of the disbursement of the Tweed 'tribes' in the 1860s states that a probable coastal horde or clan group the Coodjingburra '... had the part along the coast between the Tweed and Brunswick Rivers, about ten miles back from the coast...' (Bray 1901:9). Keats and Crowley for unstated reasons cut the southern boundary of the Coodjingburra on Cudgera Creek at Hastings Point (Keats 1988:15, 30).

6.1.1 Territories and Movement

From the few eye witness sources available for the North Coast we can suggest that contact between elements of the coastal clans was frequent and may have involved relatively large numbers. Bray records that the coastal Coodjinburra '...used to mix very much with the Ballina Richmond River Blacks' (Bray 1901:9). However it may have been a way of life that rapidly disappeared under the impacts of disease and restrictions on Aboriginal groups by 'authorities' on the movement of Aboriginal people. A review of sightings of Aboriginal coastal groups in Coleman's review of ethno historical sources led her to a conclusion that in the initial stages of European contact, observers of coastal groups describe, '...consistently high, semi sedentary local populations on the coast with a highly sophisticated organic material culture which vanished almost overnight with European contact' (Coleman 1982:7).

Population numbers on the coastal plain were high, possibly reflecting the wide variety and high productivity of coastal ecologies. Ainsworth (1922) is the most detailed of early sources for the coastal plain and estuary, writing specifically of the Aboriginal people of east and west Ballina. Ainsworth (1922:43) recorded '...In 1847 there were

between 400 and 500 in the native tribes belonging to East and West Ballina'. Uniake an observer on John Oxley's ship 'Mermaid' estimated 200 men armed with spears observed the ship from Fingal Head following a brief exploration of the lower Tweed River (Uniake 1825:40). Bray observed in the 1860s, 600 camped on the Wollumbin plain near Murwillumbah. Pierce estimates that if on the basis that the 200 men observed by Oxley's expedition were drawn from coastal clans between the Brunswick and the Tweed Rivers, the population density between the rivers and inland for some miles was '...of about three per square mile...' (Pierce 1971:13). Population estimates by eye witnesses of Aboriginal numbers for the coastal regions immediately after European settlement are highly likely to be underestimates of pre contact numbers due to the impacts of diseases particularly small pox that spread throughout coastal groups prior to official settlement.

Contact between local clans and more distant groups took place for the purposes of exchange, intermarriage, armed conflict and during times of seasonally abundant food supply. A number of models have been proposed to account for the systematic use of the hunter gatherer environment of northern New South Wales and southern Queensland. Movement took place within territories in response to the availability of food supplies and across group territories for purposes of ceremonial occasions and tribal conflicts in addition to exploiting the seasonal abundance of particular food sources. However, it has been suggested that movement in the coastal river valleys does not seem to have been caused by food shortages as such, but rather to take advantage of different food types (Belshaw 1978:75). McBryde (1974 and 1976) argues for a seasonal movement of people between the coast in summer exploiting marine foods and hunting inland in winter.

On the ethno-historical evidence McBryde suggested that some seasonal movement was usual and that the basic subsistence economy of hunting, fishing and gathering was neither static, nor completely migratory, but characterised by movement between the coast and the foothills (McBryde 1974:337). A number of early references refer to seasonal movement on a limited scale including Ainsworth (1922) on the Richmond River and Dawson (1935) and McFarlane on the Clarence River. Bray (1923) states that the Lismore 'tribe' used to go to Ballina at the mouth of the river. Sullivan (1964:20) recorded that inland groups were allowed to come to the Tweed coast for a time. The archaeological evidence for movement in the coastal river valleys is less conclusive (McBryde 1974:338).

Movement within a clan territory in response to local conditions or availability of different food sources also occurred. Aborigines at Byron Bay often shifted camps but seldom moved far from a flying fox camp (Sullivan 1964). Bundock noted that on the upper Richmond flying fox were taken more easily in wet weather (Bundock 1898:4-5). Davey on the Tweed suggests that movement may have been frequent (Davey 1948). Moehead

recorded that near Lismore the Richmond Aborigines, '...camped on the river flats until the rain set in and would then retire to the hills' (Moehead nd:1).

At Ballina, Ainsworth describes movement over the short distance between the beaches and the 'big scrub', a distance of only a few kilometres. He suggests that Aborigines of east and west Ballina were scattered in small groups combining at times of abundant food resources:

> '... the tribe usually camped in divisions at different places except during the oyster season when they assembled unitedly at Chickiba, on North Creek ... The blacks in the month of September each year flocked to the beaches for salmon fishing' (Ainsworth 1922:44).

An exception to normal movement practices across tribal boundaries was that documented by Petrie (1975) and Bundock (1898). Bundock recorded the movement of the upper Richmond River Aborigines in the Wyangarie area to the Bunya Mountain, '... every third year or so ... under a sort of 'Truce of God'... for the blacks went through each other's territories unharmed' (Bundock 1898). These gatherings occurred every fourth year, attracting groups to their own traditionally defined camping areas and served to promote trade and strengthen kinship networks across a vast area of western Queensland, south-east Queensland, and north-east N.S.W.

6.1.2 Economy

According to Ainsworth (1922:43-44) the coastal Minjungbal (Tindale 1974) or Minjanbal (Crowley 1978) people relied on '... fish and oysters and the varied products of the chase...' He refers to the spearing of salmon on the beaches and the netting of estuarine fish by means of '... a "tow-row"-a finely meshed net attached to a stick of bamboo bent in the shape of a bow ...' He is not specific about which estuarine fish were caught by this method, although an excavation of a North Creek shell midden at Ballina did indicate the exploitation of flathead and bream (Bailey 1975:55).

Ainsworth places an emphasis on the consumption of oyster to the exclusion of other estuarine, coastal rock platform and open shore molluscs, all of which are recorded in local shell middens (Bailey 1975; Campbell 1982; Hughes 1991). Modern research supports Ainsworth's assessment as to the prominence of oyster at least for certain periods, in the diet of the Ballina group to the extent that this species comprises the greatest volume of estuarine shellfish represented in Aboriginal middens (Hughes 1991).

Terrestrial animal foods mentioned by Ainsworth (1922:43) include pademelons, wallabies, bandicoots, and iguanas. He reports that flying foxes provided a source of food and were easily brought down with the boomerang and pademelon stick. Bundock also records the hunting of flying fox '... by going into the camps where they sleep during the day, when it is raining heavily, as they will not fly...' (Bundock 1898).

At Byron Bay flying fox were so prolific and reliable that the natives, though often shifting camp, seldom went far away on account of this source of food supply (Anon. n.d., b:1 in Sullivan 1978:107). Ethnohistorical records are largely directed towards descriptions of hunting techniques which employed large groups of people and obvious types of technology requiring demonstrable physical skills: the use of spears, clubs, boomerangs, the 'tow-row' (net) etc. The role of plant foods in the local economy is often understated or overlooked entirely. Certainly, vegetable foods are given no particular prominence in Ainsworth's recollections at Ballina. He refers to yams obtainable in the scrubs, and to bread made from nuts which grew on the coastal headland (Ainsworth 1922:43). McFarlane (1934) writing of the Clarence River placed greater emphasis on the role of vegetable foods '... the woods supply much variety in the shape of fruit or berries but every description of vegetable contributed to the digestive requirements of the collector of food necessities...'

In the Tweed/Brunswick coastal zone the rhizome of the Bungwahl Fern *(Blechnum indicum)* provided the major component of the vegetable diet. Thomas Pamphlett a shipwrecked convict observed that in the Moreton Bay region, '...fern root was a daily part of the diet and carried in bundles when the tribe moved. Women and children spent the bulk of the day procuring fern root...a part of which they gave the men in exchange for fish...' (Uniacke 1843:58).

The most detailed analysis of material culture of the North Coast has been that undertaken by McBryde (1978).The region of the Tweed, Richmond and Clarence Rivers would seem to form a distinct unit. This is particularly so in the case of fishing technology. The multi-pronged fishing spear and the shellfish hook are both absent from this region. Fish were caught in nets or speared in the shallows (McBryde 1978:187). Spears were single pointed fire hardened weapons (Dawson 1935:22), of both a lighter and heavier variety (Byrne 1946:3). Neither the woomera nor the spear throwing stick were used in this region (Dawson ibid). The range of materials is considered wider than central Australian tribes with fewer all-purpose items, few composite tools and a number of specialised ones. This may reflect a more sedentary life style in a rich environment requiring fewer specialised tools (McBryde 1978:187). The stone tool element in the material culture was small and unspecialised. The archaeological evidence suggests changes to a simpler stone technology took place only centuries before European settlement. The stone tools in use immediately prior to European settlement, '... show little typological sophistication and did not demand highly skilled craftsmanship' (McBryde 1978:198).

6.1.3 Archaeological Context: Prehistory

Coastal sites in northern N.S.W. date to within the Holocene period. Published sources indicate that the earliest of these is a shell midden at the base of Sexton Hill on the lower Tweed River where an occupation phase was dated between 4,700 BP and 4,200 BP (Appleton 1993:34). At Ballina a shell midden on Chickiba Creek was found to have accumulated between 1,750 BP and c.100 BP (Bailey 1975:52). Shell samples from the Angels Beach area are dated between 800 BP and 530 BP, with one sample at 900-1,000 BP (Rich 1994:195). Stone artefacts were assessed on technological grounds to date to within the past 2,000 years (Rich 1994:161). Bailey's basal date of 1,750 BP suggests that the modern resource-rich environment may not have been productive enough at an earlier time to support any more than small groups. In contrast, the Tweed River estuarine site was in use some 3,000 years earlier than this (Appleton 1993).

Beach foreshore sites investigated to date have been associated with more recent phases of occupation. Fore dune sites typically take the form of narrow bands of pipi shell, or surface scatters of pipi and stone artefacts. Pipi horizons at South Ballina and Broadwater have dated to 260 years BP and 200 years BP respectively (McBryde 1982:77). A more substantial pipi midden (AHIMS: #04-06-0061) investigated on the beach foreshore at Byron Bay had been used between approximately 1,000 and 400 years BP. The 80 cm deep midden deposit was overwhelmingly dominated by pipi shell, with minor inclusions of periwinkle, limpet, sand snail, oyster and cartrut. Bream was the most abundant vertebrate species. Although in lower quantities relative to bream, a broad range of fauna was represented in the midden, including other types of fish, tortoise, macropods, bandicoot, possums, rodents, birds and reptiles. The midden's stone assemblage was characterized by primary flaking debitage which reflected the poor knapping quality of the raw materials used. All of these materials are believed to have been collected from intertidal pebble beds adjacent to the site (Collins 1994).

The most extensive archaeological investigation of sites on Pleistocene sand substrate has been that conducted by Rich (1994) at what is now known as Angels Beach Estate, Ballina. This study resulted in the recovery of 40,000 shells and shell fragments, bone fragments, a piece of ochre and 9,000 stone artefacts. Rich's investigation at Angels Beach Estate produced results, which are largely in accord with those from other studies in the Lennox Head-Ballina area, revealing an assemblage of unmodified flakes, backed blades, cores, hammerstone, uni- and bifacially faked pebble tools, manufactured chiefly on chalcedony, chert and acid volcanic beach/river pebbles. Bone and shell fragments indicated exploitation of estuarine shellfish and terrestrial animals in addition to fish. Rich concluded that evidence for the spatial distribution of intra-site activities, specifically meat butchering and tool manufacturing, suggested that the sites were not the product of itinerant or random occupation, but of repeated occupation by groups larger than a single family unit (Rich 1994:204). Radiocarbon

determinations for shell samples revealed an occupation phase dating between c. 100 BP and 530 BP. On technological grounds, stone working events were dated to within the last 2,000 years (Rich 1994:9).

6.2 Previous Archaeological Assessments

Few assessments have sampled the low hills, ridges and spurs that form the headwaters of coastal streams such as the Cudgera, Sheens, Burringbar, Crabbes and Billinudgel Creeks. The following review of previous archaeological assessments refers to sections or whole reports that assess the coastal hills landform units and parts of the alluvial upper creek valley plains.

Navin (1990) assessed an extensive area of coastal landscapes in relation to the Ocean Shores development, c 7km south east of Mooball village. The flat and level areas of the major ridge lines were considered the most archaeologically sensitive of the hills and ridges landform unit. Six sites were recorded; one midden and five artefact scatters. The sites are on lower spurs adjacent to wetlands of Marshalls Ridge in the Jones Road reserve, considered to be an access route to the Wooyung bora ground/ceremonial area (Navin 1990:27) The sites are low (<20) to medium (>20) density artefact scatters comprising stone flakes, flaked pieces, cores and fragmented pipi at three sites. The medium density artefact scatter consisted of 54 stone artefacts over 40 m with a small (2 m x 2 m) concentration of cockle shell. The midden site is a low density scatter of fragmented pipi shell and one stone flake (ibid: 28, 29).

Collins (1993) assessed what is now known as the Koala Beach Estate at north Pottsville. Landforms were an extensive area of coastal hills, remnant barrier dunes and drained lowlands. Of the eight sites recorded five artefact scatters and one isolated artefact were associated with a low spur and saddle ridgeline landform context. Four open campsites (#04-02-72 to #04-02-75) and four isolated artefacts (#04-02-117 to #04-02-120) were recorded. Of the 42 stone artefacts recorded 23 were classed as flaked pieces, 18 flakes and one core. The materials were predominantly chalcedony/agate with siltstone, fine grained volcanics, chert and quartz (Collins 1993:26). Collins observed it was likely that use of the area centered on exploitation of multi resources including terrestrial fauna and both fresh and marine aquatic foods. Collins concluded, with supporting statements made by Lilley (1984) and Piper (1976:173) that ' ... although no seasonal indicators were evident, that the low ridges and spurs of the coastal foothills complexes may have been used by small summer foraging groups who camped along the lower ridgelines to escape the inundation of less elevated areas during the wet season' (Collins 1993:31). The report concluded that due to their surface only contexts the sites were not archaeologically

significant (Collins 1993:32). An adjoining 3.4 ha of the Cudgera Creek floodplain to the south of the Collins study was assessed by Lamb (2004). No sites were found.

Davies (1994) assessed the route of the proposed Pacific Highway motorway between Chinderah and Billinudgel. The route passes immediately to the east of the Project Area. No sites were found in the ridge unit. This was attributed to disturbance and poor visibility conditions.

Mills (1998) conducted an assessment of 8.7 km between western Brunswick Heads and Billinudgel. Within the ridge and spur lines unit, two isolated artefacts were found on hill crests. Four potential archaeological deposits were proposed on a ridgeline cut by deep ephemeral creeks north of Billinudgel (Mills 1998:26-28). Two non-Indigenous heritage sites of a tree stump with platform holds and a 60 m section of wooden slip rail fencing were identified (ibid:34, 35).

Piper (1999) assessed 95 ha of floodplain and low hills at west Pottsville. Approximately 40% of the area comprised the hills and slopes landform unit. One site (AHIMS#04-2-0123) was found: an artefact scatter of four stone artefacts being a core, flake and two microflakes. The site was located in a highly disturbed context on a low spur projecting onto the Cudgera Creek flood plain.

Cotter (2002) conducted an archaeological assessment of c. 6 ha of low coastal hills forming the southern boundary to the Yelgun Creek flood plain. No archaeological relics were found. This was considered to be a function of disturbance through quarrying activity and minimal surface visibility (Cotter 2002:26).

Piper (2002) reassessed parts of areas at north Ocean Shores and Yelgun previously assessed by Navin. The archaeological assessment was designed to evaluate the condition and contents of sites previously recorded in the Marshalls Ridge complex and to record new sites in relation to uses of agricultural land owned by Greenfields Mountain Pty Ltd. Of the five artefact scatters recorded by Navin within the area reviewed by Piper, no evidence of Aboriginal artefacts was found at four sites. One site still contained two stone artefacts. All of the five sites are located on the ridge crest on or immediate to the Jones Road reserve (Piper 2002:41, 42). Additional sites were recorded on slopes falling to the Yelgun flood plain: one isolated artefact and an artefact scatter (AHIMS#04-02-0115) containing a range of tools that indicated a permanent campsite rather than a transient location (ibid: 49).

Fox (2003) identified eight axes collected by a property owner on a ridgeline at Crabbes Creek immediately south of the Project Area. The artefacts were collected over 500 sq m on level ground eroded by cattle (Fox 2003:50). The site does not appear on the DECCW AHIMS.

Everick Heritage Consultants (2008) conducted a cultural heritage assessment over 10 ha at west Pottsville. A scarred tree originally thought to be of Indigenous origin was later found to be of insufficient age according to an arborist's report.

Everick Heritage Consultants (2009) conducted an archaeological assessment over c 1.4km of ridgecrests for use as fire trails in the Condong Range c 2.5 km north west of Mooball. The area was highly disturbed due to previous forestry logging, no Indigenous sites were found.

Everick Heritage Consultants (2010) conducted an archaeological assessment over the adjacent property to the east for a proposed re-zoning application of Lot 7 on Plan 593200 and Lot 2 on Plan 534493 situated on Tweed Valley Way. Some of the terrain covered in that survey is almost identical in land form and past use as the current Project Area. No Aboriginal sites were found during this survey.

Fox (2010) has identified four PADS (Potential Archaeological Deposits)-three 'caves' at Upper Burringbar and one at creek level. One 'cave' contains occupation deposit, a number of stone axes have also been identified at two locations in the Burringbar Creek valley (Ian Fox pers com 2010).

The total range of confirmed Aboriginal sites from the above reports comprises: one (1) midden, twelve (12) artefact scatters, five (5) isolated artefacts and two (2) non-Indigenous sites. These sites are located from reports assessing the coastal hills landform unit adjacent to the middle and upper alluvial plains between Pottsville in the north and north Ocean Shores in the south.

6.3 Aboriginal Sites and Features (range and nature)

From the review of previous archaeological assessments in the locality it is apparent that the ridgelines linking the headwaters of the coastal creeks and spurs terminating at the valley flats can be archaeologically and therefore culturally sensitive. The following types of sites are assessed for their potential to remain within the Project Area.

6.3.1 Isolated artefacts

These will consist of single stone artefacts, which may have been randomly discarded or lost. They may occur in almost any environmental context exploited by Aboriginal people. They are commonly stone axes, single cores,

hammer stones, bevelled pounders, pebbles and flakes. Their presence may indicate that more extensive scatters of stone artefacts exist or existed nearby, perhaps obscured by vegetation or dispersed by mechanical means. This is the site type most likely to be found within the Project Area.

6.3.2 Open Campsites / Artefact Scatters

They consist of scatters of stone artefacts and possibly bone and hearths. Their exposure to the elements means that evidence of food resources used on the site (with the exception of shellfish) is usually lacking. They invariably consist of low or high density scatters of primary and secondary flakes in addition to the types of artefacts found as isolated finds. Open campsites are invariably found in elevated positions adjacent to creeks, wetlands and level sections of ridgelines. An open campsite containing a large component of shell refuse may be described as a midden. Open campsites may contain burials when located on sand strata. This is the site type second most likely to occur within the Project Area.

6.3.3 Scarred Trees

The majority of scarred trees on the North Coast of NSW result from the removal of bark for use as covering, shields, containers or canoes. There are no trees of sufficient age to have been modified by Aboriginal people prior to European settlement within the Project Area, therefore no potential exists for scarred trees.

6.3.4 Middens

Middens are campsites which are dominated by shellfish remains. Middens are usually situated near a source of shellfish and comprise predominantly, mature oyster, pipi, whelk, cockle and cartrut species in addition to terrestrial animal and fish bone, stone artefacts, charcoal and ash from fireplaces. Human burials have been associated with a number of middens between the Tweed and Richmond Rivers (Barz 1980; Bailey 1972; Lourandos 1979).

Middens may be composed of deep compacted debris reflecting consistent use over long periods of time, or thin scatters of shell which reflect use on a single occasion by a small group, perhaps in transit or gathering food away from a large campsite. All recorded middens have been located in elevated positions beside estuarine waterways or on elevated sand substrates close to wetlands. The dominant species found in estuarine middens is oyster,

while locations away from the waterways contain pipi or combinations of estuarine, open beach and rock platform species.

The Project Area is within range of a well-established creek line, therefore a potential for middens exists. However none have been detected in this landscape/environmental context, (that is beyond the immediate coastal zone), therefore this potential within the Project Area is extremely low.

6.3.5 Quarry Sites

A stone quarry in this general locality may occur where a source of opaline silica exists, as reported at Tintenbar (Collins 1996:31) or other siliceous types of stone occur (e.g. chert, chalcedony and silcrete). To date the only confirmed quarry sites recorded in the broad coastal zone between Ballina and the Qld border are on the Tweed Coast where greywacke outcrops have been excavated at several locations (Piper 1976:94). As there are no suitable rock outcrops or known sources of siliceous material in the Project Area the potential for quarry sites to be found is very low.

6.3.6 Burial Sites

In the Tweed/Brunswick there are oral accounts of burials on hill tops marked with stone cairns either singly or in triangular formation. There are also oral accounts of burials in cliff lines and overhangs in the headwaters of the Tweed River. Human skeletal materials may occur in soils, but are almost invariably found interred within soft sediments such as sand or shell midden deposits. Human burials are known to have been disturbed at several locations in the lower Tweed by sand mining and development works. However unless disturbed, usually by mechanical means, surface surveys are unlikely to detect them. The high acidic nature of the soils and the additional impact of land clearing, banana cultivation and road making make it extremely unlikely a human burial could remain intact within the Project Area.

6.3.7 Ceremonial Sites

There is little potential for the Project Area to contain ceremonial sites in the order of Bora grounds, which contain raised features in the form of earth or stone mounds. Surviving Bora grounds in this coastal region are without

exception found in sand based ground. There is a reference to a ceremonial event having taken place in 1847 at Tintenbar on the Emigrant Creek flats attended by up to 300 Aborigines. This confirms the use of rain forested areas for both ceremonial and economic purposes (Collins 1996:13). Given the 'completeness' of clearing since approximately the early twentieth century, there is little possibility of stone or earth structures that would indicate ceremonial grounds although former sites may be known to the Aboriginal community.

6.3.8 Mythological Sites

A mythological site is reported in the *Tweed Daily* to the east of the Project Area on the Mooball Pottsville Road. The location is the site of 'Burring' (fighting boomerang) in the Burringbar Creek (Ian Fox pers com 2010).

These sites are natural features, which derive their significance from an association with stories of the creation and mythological heroes. In the upper Richmond and Tweed Valleys these include rock pinnacles, mountains, waterfalls and waterholes. A particular concentration of these sites exists in the headwaters of the Richmond and Tweed Rivers. A variant of the mythological site is the increase site or 'djurebil' (jurraveel in Byrne 1984:11) where rites were conducted which assured the continued productivity of plants and animals. On Mount Durigan in the upper Tweed is a jurraveel for cunjevoi, (Byrne 1984:11) a rainforest food plant used by Aboriginal people in this region. Collins recorded an 'increase centre' (djurebil) for the sand goanna on the coastline to the north of Black Head Ballina, its influence spread along the coastline and inland as far as North Creek (Collins 1993:27). A stone arrangement (Site # 04-4-32) near Bangalow may have had mythological associations. However the feature is manmade, therefore not a natural mythological site (Collins 1996).

Mythological sites may not have physical characteristics which can be identified by archaeological surface surveys, and knowledge of their existence is frequently restricted within the Aboriginal community itself, due to the intergroup and intra-group information distribution rules. The potential for the presence of a mythological site within the Project Area is remote.

6.4 A Predictive Model (Pre Survey): Aboriginal Cultural Heritage

The following discussion presents a summary of the archaeological, ethnographic and land use information provided above.

From the desktop review, there is a low to moderate potential association between the Project Area and Aboriginal cultural heritage. While the Project Area may have contained important food and organic (wood, fibre, weaving materials, cane) material resources, the physical evidence of access to these resources is unlikely to have remained. There is no possibility that cultural materials of organic materials such as wood, fibre or cordage would survive nor is there any possibility that above ground earth mound or stone arrangements could remain 'in situ'. The Project Area as a choice of burial sites can only be known to the traditional occupants. The survivability and 'detectability' of a burial is considered unlikely, considering previous land uses, but cannot be entirely ruled out.

A background scatter of stone artefact materials from resource gathering activities by groups primarily occupying/exploiting the Burringbar Creek floodplain and using the ridgelines that separate the Crabbes Creek and Burringbar Creek systems as transit corridors is probable. The 'detectability' of scattered materials if they exist will be impeded by past and continuing soil movement. Most active erosional activity would have taken place during and immediately after forest clearing and surface stone clearing prior to grass cover becoming established. The longer this process took to complete the greater probability that cultural materials would be dispersed.

The adjacent Lot 7 on Plan 593200 and Lot 2 on Plan 534493, underwent a Cultural Heritage Field Survey, carried out by the Consultant and Mr Cyril Scott, Sites Officer for the Tweed Byron LALC, on 20 October 2010. No sites were identified in this area during the field investigations.

There are no landscape features within the Project Area that are considered to have a *high* potential to contain Aboriginal objects. More detailed analysis has been made possible following the archaeological survey (Section 8).

7. CULTURAL HERITAGE DUE DILIGENCE ASSESSMENT

As discussed in Section 2.2 above, the Due Diligence Code recommends a staged analysis of cultural and archaeological factors. This section discusses the analysis of the Project Area when compared against these guidelines.

7.1 Step 1: Will the activity disturb the ground surface?

Yes. The Proponent is proposing to re-zone the land which is the Project Area from Rural residential to urban residential. Ground disturbance is proposed to be quite extensive in those areas for Re-zoning.

7.2 Step 2a: Search of AHIMS Database

A search of the AHIMS register was undertaken 12th October 2010. The search identified 27 registered Aboriginal sites within the search area (Figure 4). None of the sites are within 3.5 km of the Project Area. All are located within the Yelgun / Wooyung region, approximately 3.5 km – 5 km to the south east. This is an area that is known to be of high regional cultural significance.

The desktop review of previous archaeological reports and personal communication with researcher Ian Fox indicated that a range of Aboriginal sites is known in the Mooball, Burringbar and Crabbes Creek areas, though relatively few in number. These included a mythological site. None of these sites are within the Project Area. The field inspection found no evidence of archaeological materials, nor information that any other type of Aboriginal cultural heritage was within the Project Area.

7.3 Step 2b: Is the activity in an area where landscape features indicate the presence of Aboriginal cultural heritage?

Yes. Aboriginal objects are often associated with particular landscape features such as ridge-lines, waterways and wetlands. The Due Diligence Code lists a range of landscape features that are considered likely to contain Aboriginal cultural heritage. These include proximity to watercourses, ridgelines and resource areas.

The Project Area is within proximity to the Burringbar Creek, which prior to European settlement would have been a highly productive food and resource environment. However, the extensive nature of the ground surface disturbance which has gone on at this location since European settlement would greatly reduce the probability of finding surface evidence of this cultural heritage.

7.4 Step 2c: Is there evidence of past ground disturbance?

Yes. The disturbance analysis in this report demonstrates that there have been major impacts of prior events of vegetation clearance, ploughing, and cropping that would have been highly destructive to the integrity of any Aboriginal Objects located within the Project Area. Such impacts have occurred on multiple occasions over the past 50 years and constitutes significant disturbance of the ground, consistent with the meaning in the Due Diligence Code (see Section 2.1.2).

As there is evidence of past ground disturbance, the following steps in the Due Diligence Code are not technically required as part of this assessment:

(a) Determining if the activity can be avoided.
(b) A desktop cultural heritage / archaeological assessment.
(c) A detailed archaeological survey.
(d) Further investigations and impact assessment.

Never-the-less, the proponent commissioned further archaeological reporting and an archaeological survey of the Project Area. These works have resulted in Recommendations 1 and 2.

8. SITE INSPECTION

8.1 Sampling Strategy & Survey Methods

The effectiveness of a sampling or whole site inspection strategy is based upon the extent and 'quality' (e.g. 5%, or 90%) of ground surface visibility. The available area of ground surface visibility and its 'quality' is dependent upon the erosional processes acting on the site, be they natural or man-made (accelerated) erosional process e.g. construction, cultivation (McDonald et al. 1990:92). 'Quality' or clearness of the ground surface visibility is impeded or enhanced by a lack of vegetation cover.

The Project Area (approximately 8 ha) comprises two broad spur lines falling east, terminating at the Burringbar Creek floodplain. An ephemeral watercourse drains from a spring at the 'heads' of the two spur lines. The spur lines emerge from low hills that form the Crabbes/Burringbar Creek catchments. Landform elements for the most

part are middle and lower slopes falling from low hills, a spur line crest to the west of the Project Area and narrow creek flats on Mooball Road. The crest is narrow, width approximately 50m, slopes generally are moderate to steep (average between 20 - 40%) and short. Erosion features are mainly cattle tracks across the flats and skirting the 'toe' of the western spur line. Small areas of erosion (slumping and/ or sheet wash) are present in formally cultivated slopes.

The main erosional processes in the past, and which remain ongoing, appear to be 'accelerated' (man-made), in the form of land clearing, cattle grazing and the creation of tracks for cattle and vehicle use (Figure 17). Reference to the 1962 aerial photograph indicates evidence of cultivation, probably bananas, over the flats adjoining Mooball Road and a north eastern facing slope (Appendix D). Whether other slopes and spur line crest have been cultivated prior to 1962 is unknown at this time but it is highly likely they were. The affects these types of activities would have had on any remaining Aboriginal cultural materials, notably stone artefacts, within the Project Area would be expected movement down slopes and along the surface of the crest.

In such a small Project Area as this an intensive pedestrian survey (survey on foot), in systematic transects across the whole site would have been the ideal, were it not for the heavy grass cover over almost all of the Project Area. The field assessment was instead conducted in an opportunistic manner focusing on all areas of exposed soils. The exposures resulted mainly from cattle trails emanating to and from a water tank in the western sector of the Project Area, and also from a steep cutting on the western slope of the western spur line. The field inspection was conducted on foot by the consultant and the Sites Officer of Tweed Byron LALC on 29 May 2012. Photographs were taken as a record of general features and conditions, to indicate the degree of surface visibility and the content of any sites found. Notes were made of the variations of ground surface visibility, the areas of visibility, the type and extent of ground cover, the evidence available for land uses and any other relevant features. An over-view of surface conditions and site detection conditions is given in Sections 8.2.

8.2 Survey Coverage

For the ease of survey, the Project Area was divided into three main elements, separated at an ephemeral stream. The Project Area can be described within three categories of land type, Area A is the slopes east of the stream and extending to the eastern boundary. Area B is the spur line west of the stream extending to the western boundary. Area C comprises the flats parallel with the northern boundary. These land types were further distinguished into Landform Elements (see table 1 below). The general conditions for survey are indicated below

and shown in Appendix E, Figures 12 - 19. Each Landform element (as represented in Table 1) was surveyed separately as a Survey Unit, with the data for each Survey Unit represented in Table 2 below. The total area of land actually visible during the inspection, and therefore able to have cultural heritage judgments made about it, was approximately 3,718 m², or approximately 4.5% of the total Project Area.

Table 1: Survey conditions

Landform Element	Contour Heights	Surface Conditions	Erosion Conditions	Surface Visibility
Area A: MIDSLOPES	c30m-60m (AHD), c20-40% slope falling to the north	cleared, heavily grassed	slumped in areas; crumbly dark brown soil; formally cultivated in parts; sheet wash at flats margins	Surface exposure: 10% Surface visibility: 60%
Area B: CREST	c40m-30m (AHD) gentle slope c6% falling north	cleared and grassed	stable, grassed over red and yellow clay soils	Surface exposure: 10% Surface visibility: 10%
Area B: EAST SLOPE	c30m-10m (AHD) moderate slopes c 20% falling south east to north east	grassed over red and yellow clays	subject to gully and sheet wash; eroded by narrow cattle pads across the northern end; may have been cultivated	Surface exposure: c5% Surface visibility: 90%
Area B: WEST SLOPE	c30-10m (AHD) moderate slope c 20%	grassed over red clays	eroded vehicle tracks and cutting; cattle pads; some aggradation of sediments from sheet wash	Surface exposure: 5% Surface visibility: 90%
Area C: FLATS	20m (AHD)	grassed over brown alluviums	Stable; some aggradation of sediments from sheet wash on the upper margins; previously cultivated	Surface exposure: 5% Surface visibility: 90%

Please Note: c6% = circa 6% or approximately 6%.

Table 2: Survey Coverage

Survey Units	Area (sqm)	Exposure %	Area Of Exposure (sq m)	Visibility %	Area For Site Detection (sq m)	% of LF For Site Detection	Sites Found
Area A: MIDSLOPES	30625	10	3062	60	1837	6	**0**
Area B: CREST	11250	10	1125	10	112	0.9	**0**
Area B: EAST SLOPE	11250	5	562	90	506	4.5	**0**
Area B: WEST SLOPE	16825	5	841	90	757	4.5	**0**
Area C: FLATS	11250	5	562	90	506	4.5	**0**

8.3 Results

There were no Aboriginal archaeological sites identified as a result of the field inspection. No areas with a high or moderate potential to contain scientifically significant Aboriginal cultural material were identified during the site inspection.

There is a broad ridgeline (Area B) running through the western side of the Project Area that has been identified by Tweed Byron LALC Officer Des Williams as a potential Aboriginal campsite (Figure 7). Mr Williams has reached this conclusion due to a number of factors, including his extensive cultural knowledge for the region, the elevated nature of the area in question and its proximity to Burringbar Creek and the ephemeral stream running through the central portion of the Project Area. He is of the opinion that archaeological test excavations are warranted in this area, as it has the potential to contain culturally significant subsurface deposits of Aboriginal Objects.

It must be acknowledged that the area identified by Mr Williams most probably had (and may still have) an increased potential for use as a campsite when compared to the lands that immediately surround it. Everick has given careful consideration Mr Williams observations. As noted above, it is quite likely that at least a background

scatter of stone tools will be located within this area. Mr Williams is also a particularly knowledgeable person on the heritage of the region. However, it is our considered opinion that, on the evidence available, the archaeological potential of this area does not reach the threshold for seeking an Aboriginal Heritage Impact Permit or undertaking archaeological test excavations. This is demonstrated by the synthesis of regional assessments and past land use analysis undertaken in this report. This position is consistent with the analysis against the Due Diligence Code detailed above.

It should be noted that while any Aboriginal Objects within the Project Area may be considered of low scientific value, they may have a higher cultural value to the Aboriginal people of the region. It is unusual that the Tweed Byron LALC and Everick disagree on management outcomes. However, this instance highlights the potential for an occasional difference in ascribing significance, as much as any difference in opinions on the archaeological potential for a given area. What is a reasonable thereshold for requiring archaeological excavations? Through past consultation with Everick, the Aboriginal community of the Tweed has consistently expressed its anxiety about the continued destruction of their heritage. They have expressed in strong desire to adopt a cautionary approach to managing their heritage. There is nothing unreasonable about this position. However, it is in stark contrast to the current public policy and legal position that has seen – for example – the Due Diligence Code adopted, that applies an extremely low level of caution to managing cultural heritage. This is part of a broader public policy position that aims to see development occur in an efficient manner. The rights and interests of proponents also cannot be ignored, as they are the ones that ultimately must fit the bill for any impact mitigation works.

Balancing the competing cultural, legal, ethical, social and economic interests in no easy task. While the goal must always be to remain objective, there cannot help to be a level of subjectivity. It is therefore not suggested that the recommendations in this report are authoritative. However, it is strongly asserted that the recommendations in this report represent a reasonable and acceptable outcome when these interests are balanced. Central to this approach is the recommendation that a monitoring program be implemented. We consider this to be a reasonable approach to facilitate the identification of Aboriginal Objects within the Project Area, given:

(a) the high levels of ground disturbance and erosion, and
(b) the uncertainty over the potential for the Project Area to contain (or retain) any more than a background scatter of Aboriginal Objects.

Figure 7: Tweed Byron LALC Area of Interest

9. CONCLUSIONS AND RECOMMENDATIONS

The following recommendations are based upon the desktop review and consultation with the Tweed Byron LALC and the AAC. The following recommendations are cautionary in nature.

Recommendation 1: Monitoring Area

It is recommended that a representative of the Tweed Byron LALC be invited to monitor initial earthworks on the north western ridge top, as shown in Figure 7. The Tweed Byron LALC should be given at least 7 days' notice of the requirement for monitoring. Prior to monitoring commencing, the excavator operator(s) and the Land Council representative should agree on protocols and procedures. This should include an initial scrape to remove grass and vegetation, with minimal subsurface ground disturbance. Subsequent excavation should be under the direction of the Land Council representative. The soils of the Monitoring Area are likely to be relatively shallow, and monitoring to a depth of greater than 0.5 – 1.0 m is considered unlikely to be required.

Recommendation 2: Cultural Inductions

It is recommended that the Proponent engage a representative of the Tweed Byron LALC to provide a cultural heritage induction to all plant operators undertaking initial ground disturbance within the Project Area. The induction should, as a minimum, cover:

(a) basic legislative requirements, including fines for the destruction of Aboriginal cultural heritage;
(b) a discussion on traditional Aboriginal culture, and why the management of Aboriginal cultural heritage is important to Aboriginal peoples;
(c) an introduction on how to identify Aboriginal objects,
(d) a description of portions of the Project Area considered likely to contain Aboriginal Objects; and
(e) a review of the Find Procedures for the project (See Recommendation 4).

Recommendation 3: Aboriginal Human Remains

It is recommended that if human remains are located at any stage during earthworks within the Project Area, all works must halt in the immediate area to prevent any further impacts to the remains. The Site should be cordoned

off and the remains themselves should be left untouched. The nearest police station, the Tweed Byron Local Aboriginal Land Council and the OEH Regional Office, Coffs Harbour are to be notified as soon as possible. If the remains are found to be of Aboriginal origin and the police do not wish to investigate the Site for criminal activities, the Aboriginal community and the OEH should be consulted as to how the remains should be dealt with. Work may only resume after agreement is reached between all notified parties, provided it is in accordance with all parties' statutory obligations.

It is also recommended that in all dealings with Aboriginal human remains, the Proponent should use respectful language, bearing in mind that they are the remains of Aboriginal people rather than scientific specimens.

Recommendation 4: Aboriginal Objects Find Procedure

It is recommended that if it is suspected that Aboriginal material has been uncovered as a result of development activities within the Project Area:

(a) work in the surrounding area is to stop immediately;
(b) a temporary fence is to be erected around the site, with a buffer zone of at least 10 metres around the known edge of the site;
(c) an appropriately qualified archaeological consultant is to be engaged to identify the material; and
(d) if the material is found to be of Aboriginal origin, the Aboriginal community is to be consulted in a manner as outlined in the OEH guidelines: *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (2010).

Recommendation 5: Notifying the OEH

It is recommended that if Aboriginal cultural materials are uncovered as a result of development activities within the Project Area, they are to be registered as Sites in the Aboriginal Heritage Information Management System (AHIMS) managed by the OEH. Any management outcomes for the site will be included in the information provided to the AHIMS.

Recommendation 6: Conservation Principles

It is recommended that all effort must be taken to avoid any impacts on Aboriginal Cultural Heritage values at all stages during the development works. If impacts are unavoidable, mitigation measures should be negotiated between the Proponent, OEH and the Aboriginal community.

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APPENDIX A: CORRESPONDENCE – TWEED BYRON LALC

The Tweed LALC were asked to provide written feedback on the contents and recommendations in this report. A draft copy of this report was provided to the AAC and the Tweed Byron LALC for comment. The AAC commented on the report to Tim Robins from Everick Heritage during the AAC meeting held in Tweed Heads on the 3rd August, 2012.

There were no Aboriginal archaeological sites identified as a result of the field inspection. No areas with a high or moderate potential to contain scientifically significant Aboriginal cultural material were identified during the site inspection.

There is a broad ridgeline (Area B: Figure 7) running through the western side of the Project Area that has been identified by Tweed Byron LALC Officer Des Williams as a potential Aboriginal campsite. Mr Williams has reached this conclusion due to a number of factors, including his extensive cultural knowledge for the region, the elevated nature of the area in question and its proximity to Burringbar Creek and the ephemeral stream running through the central portion of the Project Area. He is of the opinion that archaeological test excavations are warranted in this area, as it has the potential to contain culturally significant subsurface deposits of Aboriginal Objects.

At this meeting, the AAC supported the comments and recommendations made by Mr Williams of the Tweed Byron LALC. The AAC did not put forward any further recommendations or call for further actions, other than to support the call for action as described above.

The following pages are exerted from the Draft Minutes of the meeting held 3rd August 2012, with the relevant minutes highlighted.

Minutes

TWEED SHIRE COUNCIL

Minutes of the Aboriginal Advisory Committee Meeting held Friday 3 August 2012

Venue:
Tweed Byron Local Aboriginal Land Council, Tweed Heads West

Time:
9.38am

Present:
Aunty Joyce Summers (Canowindra representative) from 9.38-4.01pm, Jackie McDonald (Tweed Wollumbin Aboriginal Education Consultative Group representative), Cr Dot Holdom (Tweed Shire Council representative) from 9.38am-3.22pm and from 3.24pm-4.01pm, Des Williams (Tweed Byron Local Aboriginal Land Council representative) from 9.38am-10.27am and from 11.38am-2.20pm and from 2.21pm-4.01pm, Leweena Williams (Tweed Aboriginal Corporation for Sport representative) from 9.38am-1.13pm and from 2.21pm-2.32pm and from 3.24pm-4.01pm, Shannon Dousling (Tweed Aboriginal Local Aboriginal Land Council representative) 10.29am-11.57am.

Ex-officio:
David Oxenham from 9.38am-12.13pm (Tweed Shire Council), Anne McLean (Tweed Shire Council), Gabby Arthur (Minutes) (Tweed Shire Council).

Guest Observers (in order of arrival):
Jason McDonald from 9.50am-4.01pm, Ian Fox (Converge) from 10.08am-10.58am, Rob Appo (Converge) from 10.08am-10.58am, Craig Barrett (Converge) from 10.08am-10.58am, Suzanne Richmond (Tweed Shire Council) from 11.07am-12.13pm, Jason Young (Tweed Shire Council) from 11.56am-1.12pm, David Hannah (Tweed Shire Council) from 12.10pm-1.12pm, Sally Cooper (Tweed Shire Council) from 12.27pm-1.12pm, Tim Robins (Everick) from 1.14pm-4.01pm.

Apologies:
Garth Lena (Minyunbul Community representative), Desrae Rotumah (Tweed Aboriginal Co-operative Society Limited representative), David Keenan (Tweed Shire Council); Barry Longland (Mayor of Tweed Shire)

Chair: **Aunty Joyce Summers**
Moved: **Jackie McDonald**
Seconded: **Cr Dot Holdom**

RESOLVED that the Chair was declared vacant and nominations were called. Aunty Joyce Summers was nominated and was unanimously elected to Chair the meeting.

Aunty Joyce Summers opened the meeting with a welcome to all present and paid respect to Elders past and present.

Minutes

TWEED SHIRE COUNCIL

(c) Altitude Aspire, Terranora

(d) Tweed Valley Way, Mooball

Everick showed the Committee a map and advised that there is currently a Development Application with Council for the rezoning of the land. TBLALC has identified an area as a camp site and has requested investigations. Everick believes that monitoring is sufficient. Everick and TBLALC have disagreed on this issue; Everick has written a lengthy report to Council in relation to the site and requested that Council mediate a meeting between TBLALC and Everick.

TBLALC has requested a caveat be placed on the site so that if the land is sold in years to come that test pits are dug and investigations carried out prior to any development of the site. If the site is developed in future appropriate DA conditions must be put in place. The next step is to meet with Council officers to discuss the conditions of the re-zoning proposal.

TBLALC reminded Everick that Aboriginality never dies. It requested that an assurance that cultural heritage will not be disturbed by turning that area into a park. Everick requested a statement from the AAC regarding the proposal.

Cr Holdom advised that she felt that this Development Application needs to come to the AAC before going to Council for decision. Cr Holdom reminded the Committee that the Council is in caretaker-mode and in such circumstances; things can be signed off under delegation.

Des Williams left the meeting at 2.20pm
Des Williams and Leweena Williams returned to the meeting at 2.21pm
Meeting resumed at 2.22pm with a quorum

RECOMMENDATION:
Moved: Jackie McDonald
Seconded: Des Williams
That:

1. The Aboriginal Advisory Committee acknowledges that Council needs to meet with Tweed Byron Local Aboriginal Land Council and Everick (Tim Robins) to discuss some of the matters rising from the Tweed Valley Way, Mooball proposal.

Page 10 of 14

Minutes

TWEED SHIRE COUNCIL

2. The Aboriginal Advisory Committee be satisfied that Aboriginal Cultural Heritage will not be impacted by this or future development.

3. Council makes a long term commitment to protect undiscovered relics that could come to the fore with any future ground disturbance of the site.

Carried

Leweena Williams left the meeting at 2.32pm

Meeting resumed at 2.33pm with no quorum

(e) Kings Forest

Cobaki Lakes - Refers to Items 30 and 32 of Outstanding Matters Report

(f) 60 Tringa Street, Tweed Heads West

APPENDIX B: AHIMS SEARCH RESULTS

Site ID	Site Name	Easting	Northing	Context / Type	Features
04-2-0110	Yelgun 2	550320	6848680	open site	artefact
04-2-0114	Yelgun Flat 1	550550	6849250	open site	artefact
04-2-0052	N.O.S. 13, North Ocean Shores	552000	6848500	open site	artefact
04-2-0054	N.O.S. 15	551640	6849760	open site	artefact
04-2-0055	N.O.S. 16, North Ocean Shores	552350	6849850	open site	artefact
04-2-0056	N.O.S. 17, North Ocean Shores	552370	6850050	open site	artefact
04-2-0096	N.O.S. 23	551600	6849800	open camp site	artefact
04-2-0097	N.O.S. 24	550600	6849600	open camp site	artefact
04-2-0116	Artefact Scatter	551640	6849760	open site	artefact
04-2-0121	GMY1	550400	6849850	open site	artefact
04-2-0122	GMY2	552430	6849950	open site	artefact
04-2-0135	JW-OS-1 (PAD 4)	551190	6847580	PAD	artefact
04-2-0136	JW-OS-2 (PAD 5)	551120	6847700	PAD	artefact
04-2-0137	JW-OS-3 (PAD 6)	550620	6847990	PAD	artefact
04-2-0138	JW-OS-4	551000	6848130	PAD	artefact
04-2-0167	Yelgun 3	550893	6850095	open site	artefact
04-2-0168	Yelgun 4	551946	6850057	open site	artefact
04-2-0051	N.O.S. 12	552090	6848890	midden	earth mound, shell, artefact
04-2-0060	N.O.S. 20	552750	6848880	midden	earth mound, shell, artefact
04-2-0173	Kudgeree Avenue 1	551970	6858410	open site	modified tree; artefact
04-2-0050	N.O.S. 11, North Ocean Shores	552350	6848200	open site	modified tree
04-2-0115	Yelgun Flat 1	550550	6849250	PAD	open camp site

APPENDIX C: BMP SEARCH RESULTS

BUNDJALUNG MAPPING PROJECT (BMP) SEARCH REPORT

Reference Number: 18.05.12

Requested by: Caroline Ingram, Everick Heritage Consultants Pty Ltd

Client Reference Number: EV151

Location: Mooball

Purpose: Preliminary Cultural Heritage Assessment

The following information is sourced from the BMP library and database in accordance with a **Resource Access Agreement** endorsed by the Tweed/Byron Local Aboriginal Land Council (TBLALC) and representative members of the Tweed Aboriginal community. Information is provided only for the purpose stated above and is not to be used for any other purpose, unless by prior arrangement with the TBLALC.

Results:

- BMP maps have a mythological location identified on Burringbar Creek at the rural property known as Cowell Park, approximately 2.5kms east north east of Mooball Village. The grid reference is 55040E 685402N (1:25,000 Potsville Mapsheet 9641-3S GDA94). Note that the location is approximate and identifies the area at which the natural course of Burringbar Creek becomes a drainage channel. See attached "story" transcript by Bernard Jarrett, Northern Star, January 5, 1938, 2nd paragraph of the section headed "Place Names". Also note that at the location given, old parish maps identify that spot as the termination of the Burringbar Creek channel, which then became an area marked as "Mooball Swamp". Mooball is recorded as the Aboriginal word for "swamp or lake".

- A 5km radius from the centre of Mooball Village includes two possible artefact and midden shell scatter locations, adjacent to Warwick Park Road, at grid reference 55220E 685535N and 55245E 685515N (1:25,000 Potsville Mapsheet 9641-3S GDA94). Sites identified by former landowner with photographs (attached).

- Several BMP recorded sites at Upper Burringbar and Mooball National Park are beyond a 5km radius of Mooball Village. There are no BMP recorded sites in close proximity to Mooball Village.

Search Report prepared by: Ian Fox (BMP Researcher/Librarian)

Date: 18 May 2012.

1

Site photo at grid reference 55245E 685515N (Warwick Park Road)

Site photo at grid reference 55220E 685535N (Warwick Park Road)

2

Northern Star January 5th 1938.
Article by Bernard J. Jarrett (born 1858),
son of John Jarrett selector at Gundurimba, and nephew of Charles Jarrett.

Cedar Getting Days on the Far North Coast
Eighty Years of Active Service

Mullumbimby, Tuesday.
Mr. BERNARD JARRETT, of Mullumbimby, who is one of the most familiar figures on the Northern Rivers, will celebrate his 80th birthday this year. Mr. Jarrett was born at Maitland in 1858, but he was brought to Ballina, then known to aboriginals as "Bullanah," when he was only four months old.

His father, Mr. John Jarrett, selected a farm of 40 acres near Gundurimba in 1861, and he divided his time between farming and cedar-getting. He penetrated much of the virgin country of the mid-Richmond to obtain cedar.

When he was only eight years old, Mr. Barney Jarrett acted as his father's assistant, boiling the billy and clearing the ground round the logs. There were very few settlers in the district at the time, and timber-getting was the principal industry.

They frequently encountered the aboriginals, but were not troubled by them. They enlisted the services of some of the more intelligent blackfellows, who proved splendid axemen and demanded no more than a few shillings, a packet of tea and some flour for their work.

When he became old enough, Mr. Jarrett assisted his father in cutting the timber, and he followed this pursuit until about 15 years ago when he found wielding the axe too tiring.
He travelled many parts of the North Coast seeking suitable timbers, which were mainly sent to Sydney for sale.

NO MAN'S LAND
Before any land was selected in the Byron Bay district, Mr. Jarrett and his brothers were pulling timber from Cooper's Shoot. This was loaded at Byron Bay on the barque, "Brilliant," which was built to carry about 150 cedar logs. The vessel called at Brunswick Heads, where she anchored about a mile out. The timber was taken out over the bar on a raft. At this time Byron Bay boasted only one building - a cedar cutter's hut.

Mr. Jarrett married Miss Alice Darby in 1882 and they selected a small farm at Emigrant Creek, near Ballina. On leaving this, they resided at Brunswick Heads, then in the Tweed district and later at Mullumbimby.

Mr. Jarrett declared that thousands of feet of valuable timber were wasted in the early years, and this was due to lack of foresight on the part of the cutters. The men were well paid, but the work was very arduous. There was always a plentiful supply of fresh food, as wild birds, including turkeys, ducks and pigeons, abounded, while the streams were well stocked with fish.

PLACE NAMES
Mr. Jarrett can recount many interesting tales regarding the names of district centres. He learned from one aboriginal that Mullumbimby meant "eel-tail catfish," and was so called because these fish were found in great quantities in Mullumbimby Creek. Mr. Jarrett, however, does not place much reliance on this explanation, as another native told him the name was symbolical of three hills.

Perhaps the most interesting tale regarding district nomenclature is that woven around the name, Burringbar. According to one aboriginal legend, a huge native travelled hundreds of miles across Australia, armed with a great burring, a war weapon. He fought the tribes as he went, and eventually

3

reached Burringbar Creek, which was then, of course, unnamed. As he was about to cross, he was speared by another native, and he fell athwart the stream. His burring was so big that it blocked (or barred) the stream, and a swamp was formed. This incident is supposed to have happened near Mr. Buckley Kelly's property, where a swamp is to be found.

The aboriginal name for Brunswick Heads is durring (Mr. Jarrett is not certain of the spelling), and is said to mean "bush rat." Apparently, the name is derived from the shape of the North Head.

FAST FLOWING TIDE

Koranba, meaning "quick," is the name given to Byron Bay, because of the fast flowing water near Byron bay, because of the fast flowing water near Byron Headland. Although he will not vouch for the correct spelling of this word, he maintains that it has no connection with Cavanbah. Coraki means "junction of two rivers."

Mr. Jarrett, as a boy saw two tribal fights on the stretch of level ground between Lismore and Gundurimba. Here "Big Fella" Jimmy and Micky, two huge natives, were killed by spears. The encounters were between tribes from the Clarence and Mid-Richmond districts. The gins stood behind the warriors to collect and hand to them any spears and boomerangs that missed their mark.

NORTHERN STAR JAN 9 1938

Eighty Years of Active Life

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PLACE NAMES

Mr. Jarrett can recount many in-

Personal

Mr. F. Ivey, of Lindfield, will be in Casino for a few days.

Mrs. R. A. Muggleton, of Ashhill Creek, is a patient in a Casino hospital.

Mr. Alwyn Power, of Bangalow, has returned to Sydney after spending a holiday with relatives at Goonellabah and Tuckurimba.

Mr. T. Wilson, of the Deep Creek school, on the Casino-Lawrence Road, has been appointed to the Glenbrook school, Penrith district.

Mr. Roy Leadbeatter has returned to Coolmangar after spending the the Christmas vacation with his brother at Tuckurimba.

Mrs. T. Miller, senr., of Casino, while on holidays, was taken ill and had to be removed to the Lower Clarence Hospital, Maclean.

Mr. Trevor Smith (Coolmangar) is a patient in a private hospital in Lismore, and has undergone a serious operation.

Mr. S. Smith, of Auburn, Sydney is spending a vacation with his aunt and uncle, Mr. and Mrs. G. Connelly of Keith-street, Bangalow.

Mr. A. Woodward, junr., of Concord West, has returned home, after spending a few days with Mr. N. Armstrong, of Bangalow.

Mr. T. Hamilton, of Sydney, has returned home after visiting relatives and friends in the Bangalow and Knockrow districts.

Mr. H. Connelly and daughter, Merle, have returned home to Ipswich, after spending a holiday with relatives at Bangalow.

Sergt. T. H. Rhuman left Coraki last week-end for Liverpool, where he will take up duties as officer-in-charge of the police station.

Mr. R. Argue, who has been visi-

PLACE NAMES

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(Continued in column six).

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APPENDIX D: HISTORICAL AERIAL PHOTOGRAPHY

Figure 8: 1962 Aerial Photograph of Lot 2 DP828280 and nearby properties. Study Area in red.

Figure 9: 1970 Aerial Photograph of Lot 2 DP828280 and nearby properties. Study Area in red.

Figure 10: 1987 Aerial Photograph of Lot 2 DP828280 and nearby properties. Study Area in red.

Figure 11: 1991 Aerial Photograph of Lot 2 DP828280 and nearby properties. Study Area in red.

Figure 12: 1993 Aerial Photograph of Lot 2 DP828280 and nearby properties. Study Area in red.

APPENDIX E: PHOTOGRAPHS FROM FIELD ASSESSMENT

Figure 13: Area A, view west along the midslope

Figure 14: View north east over Area C (Flats) from Area A

Figure 15:View north, Area A

Figure 16: view north to Area B, showing the spur crest

Figure 17: View West across width of Area B

Figure 18: Erosion feature within western slope of Area B

Figure 19: Erosional feature between Areas C and B

Figure 20: Erosional feature (cattle trough) within Area C

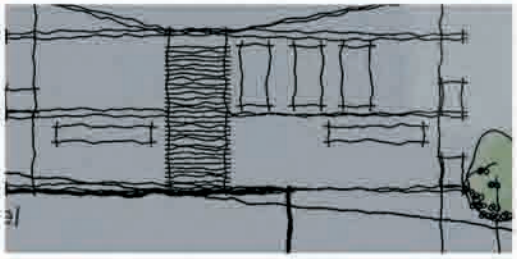
PLANIT
CONSULTING

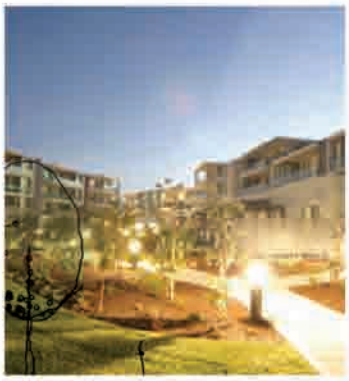
Community Benefit Statement

Gateway Planning Proposal
Request to Rezone
Part Lot 2 DP 828280
No. 5993 Tweed Valley Way,
Mooball NSW







Prepared by Planit Consulting - September 2012

Review and Amendments Schedule – PLANIT CONSULTING PTY LTD

		Date
Author	BL	September 2012
Reviewer	AS	September 2012

Amendments

The content of this report was prepared for the exclusive use of the Council to accompany a planning proposal for the proposed residential development at the subject land. The report is not to be used for any other purpose or by any other person or corporation.

Planit Consulting Pty Ltd accepts no responsibility for any loss or damage suffered arising to any person or corporation who may use or rely upon this document for a purpose other than that described above.

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Planit Consulting declares that it does not have, nor expect to have, a beneficial interest in the subject project.

Planit Consulting Pty Ltd
September 2012

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info@planitconsulting.com.au

Offices also at Nobby's Beach & Darwin

1.1 Introduction

Planit Consulting have been engaged by R&S Harnett to prepare a planning report associated with a request to rezone Part Lot 2 in DP 828280 (referred to herein as 'the site'), located at Tweed Valley Way, Mooball, as depicted within the aerial extract below.

Figure 1 – Aerial Photograph – Source; Tweed SC GIS Mapping

1.2 Discussion

In reviewing the existing and desired level of services for the proposal a number of items have influenced the form of the assessment, these are summarized in the dot points below.

- The Urban Centers Hierarchy identified within the Urban Land Release Strategy and Employment Lands Strategy 2009. Mooball is identified as a small village; an excerpt from the strategy is reproduced below. Although not intended as a standardised set of requirements the description of typical services is the most accurate indicator of appropriate levels of servicing and has been used for comparison.

Small Villages A Small Village is a cluster of shops for daily shopping. It has more shops than a Neighbourhood Centre but does not have a supermarket. Small villages and other small local centres are serviced with bus stops, schools and small parks.	**Small villages include Hastings Point, Uki, Fingal Heads, Tyalgum, Terranora, Cudgen, Mooball, Burringbar, Condong, Tumbulgum. By 2031, Tanglewood and Kunghur (Nightcap) will also be small villages.** 1–15 shops and services. Similar to village only smaller and without a supermarket. A small strip of shops and surrounding residential area within a 5 to 10 minute walk serving daily shopping needs.

	Typical dwelling range 50 - 750. Typical population range is 500 to 2000 Medium density housing, including shop–top dwellings in and around the main street. Less than 10% of dwellings will be units. Local bus network. Access to pocket parks or small urban outdoor space. Governance body: local government.

- Information on population triggers for service delivery within villages is limited to nonexistent. Population triggers for higher order services which were found during research relate to urban localities. As a reference standard the population triggers within the Urban Land Development Authority Guideline No.11 – Community Facilities have been used; and

- Information on where and how services should be provided to avoid unsustainable duplications in the context of closely grouped villages to which Mooball and a number of the surrounding settlements can be described is limited to nonexistent. The paper 'An Investigation into Village Infrastructure and Services' prepared by Geolink Environmental Management and Design provided the most collated discussion reviewing a number of northern rivers villages, stating 'determining a generic model for the appropriate mix of basic services for different sized villages is a difficult, if not an impossible task' (Geolink Environmental Management & Design, 2003)

Based on this, the review of current services has been broken up into two. First a comparison of the local services against the Urban Centers Hierarchy identified within the Urban Land Release Strategy and Employment Lands Strategy 2009. Second a review of the regional services and comparison of these against the populations identified within the ULDA guideline.

1.3 Existing and Proposed Populations

In assessing the level of existing and proposed services the existing and proposed populations must be established. In reviewing the available existing population's data, the locality of Mooball is grouped into 'other urban and rural areas' and is assigned a combined population count. As of 2006 the combined population of the other urban and rural areas within Tweed Shire is identified as 11667 persons.

1.3.1 Existing Populations

To inform this assessment and provide a figure specific to the village of Mooball a visual count of dwellings within a reasonable radius of the Mooball village has been undertaken from aerial image and the average dwelling size of 2.7 persons per dwelling applied. To allow for a degree of safety a 10% margin of error has been included. From the count a total of 57 dwellings were identified. This results in an estimated existing population of 170 persons.

1.3.2 Proposed Population

The proposed population has been calculated based upon the concept master plan submitted to Council as part of planning proposal (Refer **Appendix A – Master Plan**). The master plan identifies a total yield of 32 allotments. Again the average household size of 2.7 persons and 10% margin of error have been applied. This results in a proposed population increase of 95.04 persons for a total of 265.04 persons upon completion of the proposal.

1.4 Local Facilities and Services

1.4.1 Context

Mooball is an inland village centred upon the intersection of Tweed Valley Way and Pottsville-Mooball Road. The site is located on the southern side of Tweed Valley Way southwest to the existing Mooball village as depicted within **Figure 1 – Aerial Image**. Access to Mooball is provided via Tweed Valley Way (the old Pacific Highway) which links Murwillumbah to the Pacific Highway bypass. Pottsville Road provides access to the north, linking Tweed Valley Way with the coastal towns of Pottsville, Bogangar, Hastings Point and Kingscliff.

1.4.2 Services & Facilities

The village of Mooball currently includes the local services as listed below. These services are limited to convenience services only and in general have been declining since opening of the Pacific Highway-Tweed Valley Way bypass. The location of these facilities is identified within **Appendix B – Local Services Location**

Retail

- Hotel, general store/video/newsagent,
- Butcher,
- Post office,
- Cafe/gallery,
- Bottleshop,
- Real estate agent
- Hairdresser
- Laundromat
- Hardware store
- Mechanic / smash repairs.

The proposal will likely make allowance for small convenience facilities consistent or complimentary to the above uses, however such uses will be limited in scale to no more than 500m^2 so as to assist in the strengthening of existing facilities.

Public Recreation Facilities

Existing local public recreation facilities are limited. However the site is adjacent to the lands currently under Council consideration as PP10/007 (See **Appendix A – Concept Masterplan**). The larger adjacent planning proposal lands offer substantial Public Open Space and Recreational Parks which will provide this service to existing Mooball residents and future residents of the subject site.

Public Transport.

Parsons Bus and Coach currently run services between Murwillumbah and Pottsville via Mooball (See **Appendix B – Local Services Location**). Route 616 and 618 provides 4 bus services per day Monday to Friday (excluding public holidays). The current time table provides services at 8.04am, 10.00am, 2.25pm and 4.50pm (refer **Appendix E – Bus Time Table**). These services terminate at Murwillumbah and Pottsville. Travellers are then able to utilise the Surfside Buslines network from these points. The proposal has no specific proposal to increase these services, however it is expected that additional services could be added should sufficient demand be generated.

Additional Services

A number of local services are also located within the adjoining village of Burringbar and currently service the Mooball locality these include:

- Community hall;
- Primary School;
- Sports club and playing fields.

1.4.3 Service Level

The services identified above are consistent with the level of services identified within the Urban Centres Hierarchy. A summary is provided within **Table 1 – Service Comparison** below. The Urban Centers Hierarchy identified within the Urban Land Release Strategy and Employment Lands Strategy 2009 identifies a typical population range of 500 – 2000 persons. Currently the estimated population of 170 people is well below that typical for a small village.

This gives an indication as to why services have been declining within the locality. It is given the proposal, with an estimate total population of 265.04 persons, is not one which requires significant additional local services but will provide the population base required to support those existing services, helping maintain these into the future, along with limited additional facilities. Council is also to be mindful of the adjacent planning proposal lands and its increase to the population of Mooball.

Service	Urban Hierarchy Listed Services (small village)	Existing / proposed services	Consistent
Shops	1-15	10 shops / service retailers (proposed 500m2 or less)	Yes
Public Transport	Local bus services	4 services per day between Murwillumbah and Pottsville	Yes
Recreation	Access to pocket parks or outdoor urban spaces	The proposed **Concept Masterplan (Appendix A)** portrays that the proposal provides for adequate open space provisions for future residents. The adjacent PP10/007 lands make provision for Public Open Space Recreational Parks. Opportunity exists to target, in consultation with Council and the proponents, niche recreational opportunities in open space or residue areas outside of the footprint. These uses could include: 1. Hiking / Trail Running Tracks, Cycle Trails, Interpretive Tracks and the like.	Yes
School	Yes	Primary School (located in adjoining Burringbar)	Yes

Table 1 – Service Comparison

1.5 Regional Facilities and Services

1.5.1 Context

The village of Mooball is located towards the southern fringe of the Tweed Shire local government area. The village is well connected to via the Tweed Shire road network. Some of the key features of the region include (but not limited to):

- It is well serviced by the Pacific Highway, providing regional access to Byron Bay and the Gold Coast.
- Mooball is located approximately 25 kilometres (20 minute drive) north of Byron Bay, 20 kilometres (15 minute drive) to Murwillumbah and approximately 30 kilometres (30 minute drive) to Coolangatta / Gold Coast airport.
- Tweed Heads / Coolangatta is the major commercial, institutional and entertainment centre servicing the region.
- Murwillumbah currently services the subregion with a range of commercial, retail, health, educational, civic and community services and facilities.

1.5.2 Regional Services

The following services are provided 'regionally'. The location of these facilities and as the crow flies distance to these facilities is identified within **Appendix C – Regional Services Location**

Emergency Services

- Fire brigade

The site will be serviced by the Rural Fire Service (RFS). The site is located within the RFS Northern Region, Far North Coast Team. The closest fire control centre is located at Murwillumbah. The proposal is unlikely to provide significant additional demand on these services. As part of detailed design the proposal will be constructed to comply with Planning for Bushfire Protection 2006

and the relevant requirements of AS3959 – 2009 affording an adequate level of bushfire protection and not resulting in undue risk to new residents

- Ambulance

The NSW Ambulance service provides stations at Tweed Heads, Kingscliff, Murwillumbah. The proposal does not include any specific use such as aged care that could potentially result in a significant demand for ambulance services. The proposal is unlikely to provide significant additional demand on these services.

- Police

The site falls within the jurisdiction of the Tweed Byron Local Area Command (LAC). Police stations within this LAC are located at Murwillumbah, Kingscliff and Tweed Heads, Bangalow, Brunswick Heads and Byron Bay. As part of detailed design the proposal will be constructed to include CPTED principles ensuring crime prevent is built into the development. The proposal is unlikely to provide significant additional demand on these services.

Education Facilities

- Schools

The area is serviced via a range of public primary and secondary schools. The closet primary school is Burringbar Primary. The closest secondary schooling is Murwillumbah High. At a total population of 265.04 persons, the demand the proposal does not generate sufficient demand for new dedicated education facilities.

- Childcare facilities

Child care facilities are located at Murwillumbah, Mt Warning, Pottsville, Bogangar/Cabarita, Kingscliff, Billinudgel and Ocean Shores. The proposal currently does not include any new childcare facilities; however the proponent is open to discussions with Council regarding the provision of mixed use childcare / community hall building which could service Mooball and the immediately surrounding area.

Health Services

- Hospitals

Hospital services are available at Murwillumbah District Hospital and Tweed Hospital. The proposal will have no direct impact on these services.

- Medical centres

The Tweed Region is serviced by a wide range of both public and private health services separate to the major hospitals. Public Services provided by NSW Health North Coast Area Health Service include:

- Baby Clinic
- Metal Health Services
- Women's Health Services
- Community Nursing
- Diabetes Educator
- Drug and Alcohol Counselling
- Speech Pathology

Private Medical services include

- General Practitioner Medical Centres
- Dentists
- Pathology & Radiology
- Pharmacies

- Physiotherapy and Chiropractic
- Acupuncture, Massage & Natural Therapies
- Psychology

Refer **Appendix D – Medical Services Summary** for detail of location and facilities available with close proximity to the site. The proposal will not result in a significant additional demand on these services.

1.5.3 Service Levels

Regional Services

Limited information is available surrounding thresholds for service provisions within villages. Thresholds reviewed and summarised with **Table 2 – Service Threshold** below are those which apply to urban areas and are general population triggers for the provision of these services. These thresholds although not specific to village development do demonstrate the relevant population levels which are required to sustain such facilities.

At a proposed population of approximately 265.04 people, Mooball upon completion of development will not provide sufficient population to warrant provision of 'regional services' dedicated solely to the Mooball village.

Service	Facility : Population	Mooball Population Meets Trigger
Fire Brigade	1:25,000	No
Ambulance	1:25,000	No
Police	1:20,000 – 30,000	No
Schools – Primary	1:3,000 dwellings	No
Schools – Secondary	1:8,000 dwellings	No
Child care centres	1:7,500 – 10,000	No
Hospitals	Over 100,000.00	No
Medical Centres	20,000 – 30,000	No
Public Recreation Facilities	15000 – 30000 (Branch Library) 25000 – 40000 (Indoor Sports Centre) 25000 – 40000 (Public swimming pool)	No No No
Public Transport	N/A	N/A

Table 2 – Services Thresholds (Urban Land Development Authority, 2008)

Villages are inherently linked to other settlements in their locality. Villages do not provide services to meet every need of the population. Residents draw on larger villages, towns and cities to fulfil a range of needs. (Geolink Environmental Management & Design, 2003) As demonstrated in this review the Tweed Shire is well serviced providing all necessary regional services. Mooball is well connected via road and is provided with public transport enabling these to be easily accessed. Provision of regional services is not justified as part of the proposal.

1.6 Conclusion

The ability for village residents to access particular facilities in other urban areas has a major influence on the types of facilities suitable for a village. Access to services in nearby locations often negates the need for a given facility and the replication of services easily accessible to village residents in nearby centres is not sustainable.

Given the proposed population numbers the proposal is not one which requires additional local services but is one which will provide the population base required to support those existing services, helping to maintain these into the future. Regionally Tweed Shire and therefore Mooball are well catered for with higher order services with adequate access provided.

The proposal will have adequate access to services.

1.7 References

Geolink Environmental Management & Design. (2003). *Villages - An Investigation into Village Infrastructure and Services.* Lennox Head: Geolink Environmental Management & Design.

Tweed Shire Coucil. (2009). *Tweed Shire Urban Land Release Strategy.* Murwillumbah: Tweed Shire Council.

Urban Land Development Authority. (2008). *ULDA Guideline No.11 - Community Facilities.* Retrieved August 28, 2012, from Urban Land Development Authority: http://www.ulda.qld.gov.au/01_cms/details.asp?ID=157

Appendix A – Concept Masterplan

PO Box 1623 Kingscliff NSW 2487
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info@planitconsulting.com.au

Offices also at Nobby's Beach & Darwin

Appendix B – Local Services Location

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Offices also at Nobby's Beach & Darwin

Concept Masterplan

Site Analysis: Context

Part Lot 2 DP 828280 – No. 5993 Tweed Valley Way, Mooball NSW

Scale: 1:10,000 @ A3 | Drawing No: MB_SA_02 | Date: September 2012

Level 1 3247 Gold Coast Hwy
Hobby Beach
PO Box 204 Hobby Beach QLD 4218

Telephone: 07 5526 1550
Fax: 07 5526 1502
admin@planitconsulting.com.au

PLANIT CONSULTING

Appendix C – Regional Services Location

PO Box 1623 Kingscliff NSW 2487
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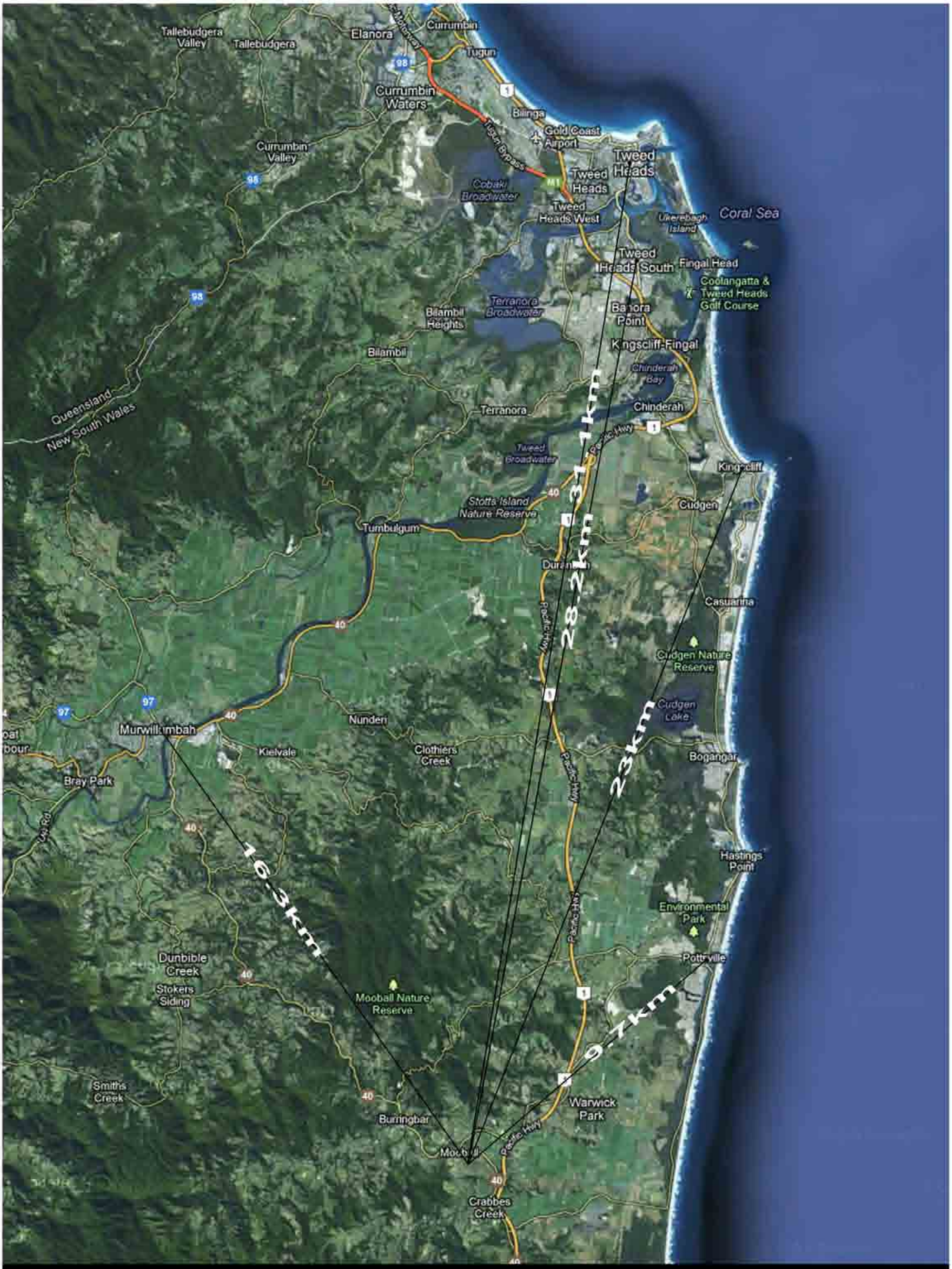
Offices also at Nobby's Beach & Darwin



Regional Context Plan
Part Lot 2 DP 828280
No. 5993 Tweed Valley Way
Mooball NSW

Scale - 1:100,000 @ A3

Drawn By - BE

Date - September 2012

Ref - 5993TVW

N

Level 2, 11-13 Kirkwood St
Kingscliff
P.O. Box 1223 Kingscliff NSW 2487

Telephone: 02 6674 3000
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PLANIT CONSULTING

Appendix D – Medical Services Summary

NSW Health Services (No Hospital)

Banora Point Community Centre Cnr Woodlands & Leisure Drive Banora Point
Banora Point- Community Health Centre - Baby Clinic Corner Of Leisure Driveand Woodlands Drive Banora Point
BreastScreen NSW North Coast - Tweed Heads Clinic Located At The Tweed Hospital, Via Powell Street Entrance, Tweed Heads Head Office: PO Box 1098 Lismore
Kingscliff - Community Mental Health Services Turnock Street (next To The Library) Kingscliff
Kingscliff Community health - Women's Health services Turnock Street, Next To The Library Kingscliff
Kingscliff Community Health Centre - Community Nursing Turnock Street, Next To The Library Kingscliff
Kingscliff Community Health Centre - Diabetes Educator Turnock Street, Next To The Library. Kingscliff
Kingscliff Community Health Centre - Drug and Alcohol Counselling Turnock Street, (next To The Library) Kingscliff
Kingscliff Community Health Centre - Speech Pathology Turnock Street, Next To The Library. Kingscliff

Private Health Services

MEDICAL CENTRES

King Street Medical Centre
14 King Street Murwillumbah NSW 2484 / Ph: 6672 4244
Main Street Medical Centre
140 Main Street Murwillumbah NSW 2484 / Ph: 6672 1200
Queen Street Medical Centre
12 Queen Street Murwillumbah NSW 2484 / Ph: 6672 1244
Wollumbin St Medical Centre
36 Wollumbin Street Murwillumbah NSW 2484 / Ph: 6672 1488

DENTISTS

Biltoft & Associates Dentist
Tweed Arcade Queen Street Murwillumbah NSW 2484 / Ph: 6672 1980
King Street Dental Practise
16 King Street Murwillumbah NSW 2484 / Ph: 6672 1788
Donald Dezentje Dental Surgery
144 Main Street Murwillumbah NSW 2484 / Ph: 6672 1068

PATHOLOGY & RADIOLOGY

Sullivan Nicolaides Pathology
Sunnyside Mall Murwillumbah NSW 2484 / Ph: 6672 4100
QML Pathology
Main Street Murwillumbah NSW 2484 / Ph: 6672 3348
South Coast Radiology
Suite 1, 2 King Street Murwillumbah NSW 2484 / Ph: 6672 7777
Gold Coast Medical Imaging
Ewing Street Murwillumbah NSW 2484 / Ph: 6672 0299

PHARMACIES

Shortis & Daley Pharmacy
72 Main Street Murwillumbah NSW 2484 / Ph: 6672 1038

Murwillumbah Pharmacy
108 Main Street Murwillumbah NSW 2484 / Ph: 6672 1733
Sunnyside ChemWorld Chemist
Sunnyside Shopping Centre 27 Wollumbin Street Murwillumbah NSW 2484 / Ph: 6672 3323
Con Varela's Pharmacy
80 Main Street Murwillumbah NSW 2484 / Ph: 6672 2388
Mapp & Hession Pharmacy
14 King Street Murwillumbah NSW 2484 / Ph: 6672 1394
Uki Pharmacy
1448 Kyogle Road, Uki NSW 2484 / Ph: 6679 4044

PHYSIOTHERAPY & CHIROPRACTIC

King Street Chiropractic
18 King Street Murwillumbah NSW 2484 / Ph: 6672 8990
Nullum Physiotherapy
7 Nullum Street Murwillumbah NSW 2484 / Ph: 6672 6715
Murwillumbah Physiotherapy Centre
28 Brisbane Street Murwillumbah NSW 2484 / Ph: 6672 3818
Family Health Clinic
Tweed Arcade Wharf Street Murwillumbah NSW 2484 / Ph: 6672 4739
Fit As A Fiddle
4 Elizabeth Street Murwillumbah NSW 2484 / Ph: 6672 4700
AA Physiotherapy and Sports Injury Clinic
29 Mooball Street Murwillumbah NSW 2484 / Ph: Abby Aitchison 0403 195 986

ACUPUNCTURE, MASSAGE & NATURAL THERAPIES

Murwillumbah Physiotherapy Centre
28 Brisbane Street Murwillumbah NSW 2484 / Ph: 6672 3818
Family Health Clinic
Tweed Arcade Wharf Street Murwillumbah NSW 2484 / Ph: 6672 4739
Mt Warning Natural Therapy Centre
Mount Warning Road Murwillumbah NSW 2484 / Ph: 6679 5017
Regent Natural Therapy
5 Brisbane Street Murwillumbah NSW 2484 / Ph: 6672 7070
Tune-In Clinic
Suite 28-29 Tweed Arcade Wharf Street Murwillumbah NSW 2484 / Ph: 0415 858 555
Murwillumbah Massage Centre
132 Main Street Murwillumbah NSW 2484 / Ph: 6672 8455

PSYCHOLOGISTS

Andrea Haddock
Suite Four, 38 Main Street Murwillumbah NSW 2484 / Ph: 6672 8847
Dr Brendan Lloyd
Nulum Street Murwillumbah NSW 2484 / Ph: 6672 3259

Appendix E – Bus Time Table

PO Box 1623 Kingscliff NSW 2487
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Offices also at Nobby's Beach & Darwin

616/618 Murwillumbah-Cabarita-Pottsville-Burringbar-Murwillumbah		
Monday to Friday *Excluding Public Holidays*	**AM** ♿	**PM** ♿
Murwillumbah	9.00	1.25
Kyndalyn Crt	9.07	1.32
Condor Pl	9.12	1.37
Yandala	9.14	1.39
Rosewood Av	9.20	1.45
Coast Rd, Cabarita *(Beach Resort)*	9.22	1.47
Banksia Av	9.23	1.48
Cabarita Rd	9.24	1.49
Sandalwood Av	9.25	1.50
Ti-Tree Av	9.26	1.51
Hastings Rd *(Southern end)*	9.27	1.52
opp. Pottsville Bowls	9.35	2.00
Overall Dv	9.39	2.04
Overall Dv Shops	9.43	2.08
opp. Caravan Park Sth	9.45	2.10
Pottsville Shops	9.46	2.11
Ballina St	9.48	2.13
Mooball	10.00	2.25
Burringbar P.O.	10.03	2.28
Burringbar Servo	10.04	2.29
Murwillumbah	10.20	2.45

♿ *Routes so marked will generally be serviced by a wheelchair accessible bus. Periodic maintenance may affect availability, please check prior to journey.*

616 Murwillumbah to Cabarita and Return		
School Days Only	**AM**	**PM**
Murwillumbah	7.00	3.35
Kyndalyn Crt	7.10	3.50
Farrants Rd	—	3.54
Condor Pl	7.14	4.00
Yandala	7.15	4.02
Tanglewood Rd	—	4.10
Cabarita Rd	7.27	4.15
Sandalwood Av	7.29	4.16
Ti-Tree Av	7.30	4.16
Hastings Rd *(Southern end)*	7.32	4.17
Coast Rd, Cabarita	7.35	4.18
Tanglewood Rd	7.42	4.25
Yandala Pl	7.50	4.30
Condor Pl	7.53	4.32
Farrants Rd	7.55	—
Murwillumbah	8.30	4.50

Stokers Siding School Runs		
School Days Only	**AM**	**PM**
Murwillumbah	7.30	3.35
Adcocks Rd	7.53	4.05
Stokers Post Office	8.00	3.55
5 Ways	8.05	3.50
McConells Rd	8.00	3.50
Dallis Park	8.12	3.45
Murwillumbah	8.25	4.20

618 Murwillumbah to Pottsville via Mooball and Return		
School Days Only	**AM**	**PM**
Murwillumbah	6.50	3.35
Burringbar Servo	7.05	3.48
Mooball	7.07	3.50
Pottsville Shops	7.22	4.24
Pottsville Primary	7.27	4.27
Overall Dv Shops	7.33	4.33
Overall Dv *(Black Rocks)*	7.34	4.34
Caravan Park Sth	7.44	4.39
Pottsville Shops	7.45	4.40
Ballina St	7.47	—
Mooball	8.04	4.50
Burringbar Servo	—	5.00
Murwillumbah	8.30	5.10

618 Murwillumbah to Burringbar and Return		
School Days Only	**AM**	**PM**
Murwillumbah	7.20	3.38
Burringbar Servo	7.35	3.55
Burringbar P.O.	7.36	3.56
Greenvale Crt *(end)*	7.45	4.00
Burringbar P.O.	7.55	4.10
Burringbar Servo	7.56	4.11
Murwillumbah *(Services Club)*	8.12	4.30