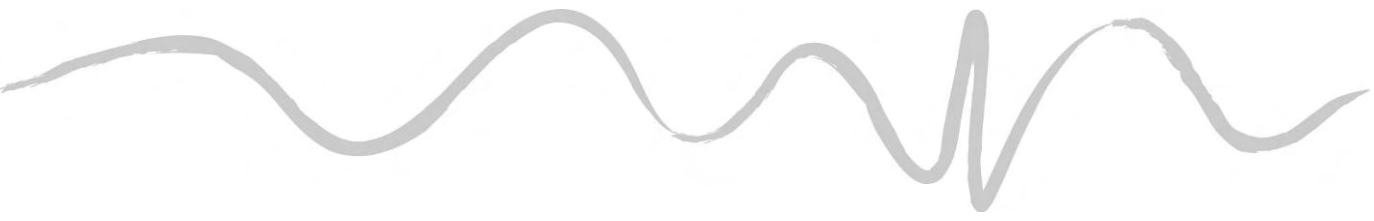
Review of Environmental Factors

Byron Regional Sport and Cultural Complex



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Review of Environmental Factors

Byron Regional Sport and Cultural Complex

Prepared for: Byron Shire Council
Project Manager: Rob van Iersel
Ref: 1058129
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PO Box 9
Lennox Head NSW 2478
T 02 6687 7666

PO Box 1446
Coffs Harbour NSW 2450
T 02 6651 7666

info@geolink.net.au

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Executive Summary

The Project

Byron Shire Council proposes to construct the Byron Regional Sport and Cultural Complex on land located at 249 Ewingsdale Road, Byron Bay. This land is owned by Council and is subject to a Plan of Management, which provides, in part, for an integrated sports facility and a cultural space for the community. The proposal is consistent with the Plan of Management.

The project involves the construction of a number of outdoor sports fields and associated infrastructure, a multi-purpose indoor sports complex, car parking and a new roundabout on Ewingsdale Road to provide access to the facilities. Amenities / change rooms and a canteen will also be constructed, as well as a bike / skate park; care takers residence and a visitor information centre (with public toilets).

The proposed Byron Regional Sport and Cultural Complex will ultimately contain the following elements:

- internal car parking;
- athletics track, associated hockey field and amenities block;
- general use sporting fields;
- multi-use sporting fields;
- storage sheds;
- cycle track (criterium);
- soccer fields and associated amenities;
- canteen / kiosk adjacent to soccer fields;
- visitor information centre, public toilets and associated car parking;
- caretaker's residence;
- bike / skate park; and
- an indoor facility (possibly containing a swimming pool).

Construction sequencing will be determined following detailed design. However, it is likely that the complex will be constructed in a number of stages, with earthworks and infrastructure for the whole of the site included in the first construction stage.

Access to the site is currently by way of a single, small gated driveway off Ewingsdale Road. It is recommended, therefore, that the first stage of the roundabout (see **Section 4.5** and **Appendix D**) be the first component constructed. This will minimise traffic impacts associated with subsequent construction activities.

The Site

The site is located 4 km west of the Byron Bay town centre and shares boundaries with the Byron Bay Arts and Industry Estate (east), the West Byron Effluent Reuse Wetland (north) and rural / environmental land (west). The site is part of a larger undeveloped area located within a significant corridor of remnant coastal habitat, linking the Belongil catchment / wetland to the south and the Tyagarah Nature Reserve in the south.

The site is subject to a number of constraints, which include:

- ecology – the site is part of a wildlife corridor, threatened species of fauna have been detected, some vegetation has high ecological value;
- soils – peat and potential acid sulfate soils exist across the site;
- flooding – a significant portion of the site is flood prone;
- groundwater – the water table is very close to the surface; and
- traffic – Ewingsdale Road is considered to be chronically congested in peak times.

Planning Approvals

Clause 65 of *State Environmental Planning Policy (Infrastructure) 2007*, allows development for the purposes of '*outdoor recreational facilities, including playing fields, but not including grandstands*', to be carried out without consent on a public reserve, provided it is being developed by, or on behalf of a Council.

The bulk of the proposal fits within this definition and therefore the provisions of SEPP (Infrastructure) 2007 are applicable. Accordingly, the proposed works do not require development consent and are therefore assessed under Part 5 of the *Environmental Planning and Assessment Act 1979* (EP&A ACT).

The proposed project elements and the subsequent planning approval pathway are:

Element	***Relevant Approval Pathway***
Outdoor sporting facilities and associated works / amenities	Part 5 EP&A Act – Review of Environmental Factors (REF)[1]
Access roundabout and associated works	Part 5 EP&A ACT – REF[2]
Internal access / car parking	Part 5 EP&A – REF[3]
Visitor information centre	Part 5 EP&A Act[4]
Bike / skate park	Part 5 EP&A Act[1]
Care takers residence	Part 4 EP&A Act – Development Application (DA)
Indoor Sports Centre	Part 4 EP& A Act – DA

Notes:

1. cl.65(3)(b) SEPP (Infrastructure) 2007
2. cl.94(1) SEPP (Infrastructure) 2007
3. cl.65(3)(a) SEPP (Infrastructure) 2007
4. cl.65(3)(c) SEPP (Infrastructure) 2007

This REF provides an assessment of the environmental implications of the elements of the proposal that can be dealt with under Part 5 of the EP&A Act. It does not deal with the items requiring development consent under Part 4 of the EP&A Act. Those elements will be subject to a separate assessment and approval process.

Detailed design of the facility has not yet been completed. It is therefore not possible to provide a detailed assessment of much of the construction activities.

For the purposes of this REF, therefore, a range of assumptions have been made regarding construction, based on the concept design and the likely construction scenario. These matters will be the subject of the recommended Construction Management Plan, to be prepared as part of the detailed design process.

Environmental Impacts

Ecology

There have been extensive studies and analysis of this locality over a number of years, associated with the development of the *Byron Biodiversity Conservation Strategy* (BSC, 2004) and associated with the West Byron Wastewater Reuse proposal. Further site-specific survey work was undertaken for the purposes of this REF. The original Plan of Management (PoM) developed for the land also addressed a number of ecological / biodiversity issues and provided recommendations regarding buffers and the like.

Those recommendations are carried forward into this REF. In particular, the PoM recommended that a Weed Control, Regeneration and Restoration Strategy be developed for the whole of the land, concentrating on ecological enhancement of that part of the land that will not be physically impacted by the complex.

In effect, this Plan will develop and document ecological compensation works that will add to the existing biodiversity values and offset the minor impacts associated with the construction of the sport and cultural complex.

This REF recommends that the management Plan be developed and adopted prior to the commencement of construction and that implementation be scheduled to accompany construction of the complex.

It is acknowledged that the locality contains areas of high to very high conservation / ecological value. Classification and mapping undertaken for the *Byron Biodiversity Conservation Strategy* (BSC, 2004) identified both high conservation value vegetation / habitat and land with wildlife corridor values. This mapping formed the basis for the siting of the proposed complex, as part of the previous Plan of Management for the site. The eastern edge of the mapped high conservation value area forms the western boundary of the sporting fields, so that the proposed development has avoided any areas designated with high conservation / ecological value.

In addition, the buffers recommended in the PoM have been adopted for the concept design, and it is recommended that these buffer areas be planted as part of the initial stage of construction. These areas should then be fenced during construction to protect this new planting. Detail regarding the planting and protection of the buffers are to be contained in the Construction Management Plan.

Notwithstanding this, the site proposed for the construction of the complex does contain vegetation with ecological / habitat value. Detailed assessment of the proposal indicates that the development will result in some ecological impacts.

However, given the restricted footprint of the development, the mitigation measures available and the ability to undertake additional ecological enhancement work on the adjoining high conservation value land, it is concluded that the impacts will not be significant.

Section 4.1 of this REF provides more detail regarding this ecological assessment.

On balance, therefore, considering the strong social / community benefits associated with the proposal, and the fact that there is no other unconstrained land available for this purpose, it is considered that the ecological impacts associated with construction and operation of the proposed Byron Regional Sport and Cultural Complex are acceptable.

Soils

The sport and cultural complex site is located at the interface of peat soils (increasing in depth to the west) and sandy soils (increasing in depth to the east). The peat soils are generally located toward the north-west of the sport and cultural complex site. Due to the nature of these soils, they will not provide appropriate foundation conditions for the fields or associated facilities. It will be necessary, therefore, to remove these peat soils, and replace them with suitable fill material.

The peat soils are also known to contain potential acid sulfate soils and their excavation, therefore, has the potential to oxidise these soils, forming actual acid sulfates resulting in the potential for significant environmental impacts.

Section 4.2 of this REF addresses this issue in detail. The potential impacts can be mitigated by the development and implementation of a detailed Acid Sulfate Soils Management Plan. This Plan will form part of the Construction Management Plan and will detail all aspects of acid sulfate soil investigation, analysis and treatment. A key objective will be to ensure that all excavated soils is appropriately tested and, if necessary, treated prior to leaving the site.

Soil / dust management and erosion and sedimentation controls will be implemented during the construction of the complex. This REF recommends that a detailed Erosion and Sedimentation Management Plan be developed as a key component of the Construction Management Plan. In relation to soils, this Plan should describe the detailed measures to be implemented to ensure that impacts are minimised and outline an implementation schedule for those measures, as well as assigning roles and responsibilities to construction personnel.

Stormwater / Flooding

There is a high water table within the site, such that water ponds in various areas after prolonged rain. For the sports fields to be 'playable', the surface will need to be raised (with fill) to provide a greater capacity for rain to infiltrate into the soil, thereby providing a playable surface for longer periods.

The site is also, however, flood prone, and the placement of fill has the potential to negatively impact on the existing flood regime of the locality. Detailed flood modelling has been carried out, demonstrating that, while there will be minor increases in flood levels for some nearby land, the increase is relatively minor and is considered to be acceptable.

Conceptual stormwater measures have been development, with the key objective of mimicking the existing hydrology of the locality. In the main, this requires that rainfall is infiltrated into the ground as much as possible, and as close as possible to where it falls.

A series of bioretention facilities and swales are therefore proposed to be incorporated into the car park and other impervious areas, to achieve this objective. The detailed design of these stormwater management measures will need to be completed as part of the design of the proposal. However, the modelling and assessment undertaken as part of the concept design demonstrates that it will be possible to achieve a result that has minimal impacts on ground and surface waters within the site.

More detail on these issues is contained in **Section 4.3** of this REF.

Traffic

Ewingsdale Road already suffers from traffic congestion in peak periods. There is potential, therefore, for traffic generated by the proposal, particularly for larger events, to have a significant impact on traffic. An independent traffic report has therefore examined this issue in detail (see **Section 4.5** and **Appendix D**).

The report demonstrates that larger events, such as music festivals for example, will not be able to staged at this complex because of detrimental parking / traffic issues. It concludes, however, that for the majority of sporting and cultural events anticipated for the complex, the proposed roundabout will provide adequate and efficient access, there will not be significant traffic impacts, and that sufficient car parking is provided.

Construction traffic will also have the potential to impact on traffic movement along Ewingsdale Road. The Construction Management Plan will detail controls to be implemented to minimise these impacts. Overall, Council will need to ensure that the fill material to be brought into the site can be delivered without the need for trucks to travel through the Byron Town Centre.

Additionally, construction activities must be timed to avoid school holidays or other peak traffic times. The proposed roundabout should be constructed as the first component of the development, so that construction traffic can use this completed roundabout to access the site.

A Traffic Control / Safety Plan will need to be prepared as part of the Construction Management Plan.

Conclusion

Based on a range of detailed assessments, this Review of Environmental Factors concludes that, provided the recommended environmental management measures are implemented, the operation of the proposed Byron Regional Sport and Cultural Complex will not result in significant environmental or social impacts.

Further, it finds that the complex will provide significant cultural and community benefits for the Shire.

In relation to construction of the complex, detailed design of the facility is yet to be finalised. As such, much of the detail regarding filling, excavation, stormwater, traffic and the like is not yet fully understood.

Sufficient assessment has been undertaken, however, to conclude that it is possible to construct the complex in a manner that avoids and/or mitigates environmental harm.

It is recommended that a detailed Construction Management Plan de developed and adopted by Council as part of the detailed design process. This Management Plan will guide all construction activities and establish a wide range of protection measures to be implemented. Amongst other things, the Construction Management Plan should contain:

- details of buffer plantings within the nominated ecological buffers, and measures to protect the planting during construction (note: this REF recommends that buffers be established and planted as early as possible in the construction process);
- an Acid Sulfate Soils Management Plan;
- an Erosion and sedimentation Control Plan; and
- a Traffic Control / Safety Plan.

1 Introduction

1.1 Preamble

GeoLINK has been engaged by Byron Shire Council to prepare a Review of Environmental Factors (REF) relating to a proposal by Council to construct the Byron Regional Sport and Cultural Complex on land described as Lot 3 DP 706286. The site is located at 249 Ewingsdale Road, Byron Bay and is owned by Byron Shire Council.

Illustration 1.1 shows the locality of the land.

Lot 3 has a total area of 40 ha. The proposed sport and cultural complex will occupy approximately 16 ha on the eastern end of the land.

The development of the complex is the implementation of a proposal originally developed as part of a Plan of Management for the land, which was prepared for Council in 2005. A copy of this Plan of Management (PoM) is contained in **Appendix A**. It provided for an integrated sports facility and a cultural space for the community.

The purpose of this report is to document an examination of all matters affecting or likely to affect the environment by the construction and operation of the complex. The report also provides a description of the site and its environment and details the nature and scale of the proposal.

1.2 Background – Plan of Management

1.2.1 Introduction

The property was originally purchased by Byron Shire Council in May 2003. The purchase was based on a preliminary assessment of potential operational and community uses for the land, being:

- *operational use of the western portion as an extension of Council's West Byron Effluent Reuse Wetland project;*
- *suitability of the relatively flat eastern portion for sporting fields, which have been identified as a high need in Byron Shire;*
- *potential for other community uses, including a festival site, out of town parking (park and ride) and opportunities for an entry 'gateway' to Byron Bay;*
- *benefits associated with the contiguous nature of Council-owned land, including the West Byron Effluent Reuse Wetland (to the north) with further options for access; and*
- *options for partial rezoning and alternative uses* (LandArc, 2005).

In accordance with the *Local Government Act 1993*, all public land must be classified as either community land or operational land. Community land is set aside for continuing community uses, whereas operational land remains in Council's ownership for other non-public uses.

The use of community land must be in accordance with a Plan of Management (PoM), prepared and adopted in accordance with the provisions of the Act.

A PoM for 249 Ewingsdale Road, Byron Bay was adopted by Council on 20 December 2005 (see **Appendix A**). As part of the adoption of this PoM, Council categorised 72% of the overall site as community land and 28% as operational land. The proposed Byron Regional Sport and Cultural Complex will be entirely within the community land.

1.2.2 PoM Framework

The PoM provides a framework for managing this community land in accordance with the *Local Government Act 1993* and other relevant legislation and policy. In developing the PoM, considerable community consultation was undertaken. The project has enjoyed a high level of support and involvement from the community, particularly through the community-based *Sporting Fields Working Group*.

The PoM establishes a number of categorises within the site, as required by the *Local Government Act 1993*. The categories are:

- Sportsground;
- General Community Use;
- Natural Area – Wetland; and
- Natural Area – Bushland.

Illustration 1.2 shows an extract from the PoM indicating the distribution of these categories across the site.

The PoM also established the following core objectives for each category:

Core Objectives: Management of community land categorised as a Sportsground

The core objectives for management of community land categorised as sportsground are:

a) to encourage, promote and facilitate recreational pursuits in the community involving organised and informal sporting activities and games; and

b) to ensure that such activities are managed having regard to any adverse impact on nearby residences.

Core Objectives: Management of community land categorised as General Community Use

The core objectives for management of community land categorised as general community use are to promote, encourage and provide for the use of the land, and to provide facilities on the land to meet the current and future needs of the local community and of the wider public:

a) in relation to public recreation and the physical, cultural, social and intellectual welfare or development of individual members of the public; and

b) in relation to purposes for which a lease, licence or other estate may be granted in respect of the land (other than the provision of public utilities and works associated with or ancillary to public utilities).

Core Objectives: Management of community land categorised as a Natural Area

The core objectives for management of community land categorised as a natural area are:

a) to conserve biodiversity and maintain ecosystem function in respect of the land, or the feature or habitat in respect of which the land is categorised as a natural area; and

b) to maintain the land, or that feature or habitat, in its natural state and setting; and

c) to provide for the restoration and regeneration of the land; and

d) to provide for community use of and access to the land in such a manner as will minimise and mitigate any disturbance caused by human intrusion; and

e) to assist in and facilitate the implementation of any provisions restricting the use and management of the land that are set out in a recovery plan or threat abatement plan prepared under the Threatened Species Conservation Act 1995 or the Fisheries Management Act 1994.

Core Objectives: Management of community land categorised as a Natural Area: Wetland

The core objectives for management of community land categorised as wetland are:

a) to protect the biodiversity and ecological values of wetlands, with particular reference to their hydrological environment (including water quality and water flow), and to the flora, fauna and habitat values of the wetland; and

b) to restore and regenerate degraded wetlands; and

c) to facilitate community education in relation to wetlands, and the community use of wetlands, without compromising the ecological values of wetlands.

Core Objectives: Management of community land categorised as a Natural Area: Bushland

The core objectives for management of community land categorised as bushland are:

a) to ensure the ongoing ecological viability of the land by protecting the ecological biodiversity and habitat values of the land, and flora and fauna (including invertebrates, fungi and micro-organisms) of the land and other ecological values of the land; and

b) to protect the aesthetic, heritage, recreational, educational and scientific values of the land; and

c) to promote the management of the land in a manner that protects and enhances the values and quality of the land a facilitates public enjoyment of the land, and to implement measures directed to minimising or mitigating any disturbance caused by human intrusion; and

d) to restore degraded bushland; and

e) to protect existing landforms such as natural drainage lines, watercourses and foreshores; and

f) to retain bushland in parcels of a size and configuration that will enable the existing plant and animal communities to survive in the long term; and

g) to protect bushland as a natural stabiliser of the soil surface.

In order to achieve these objectives, the PoM sets out a range of 'action items'. Action items relevant to the proposed sport and cultural complex are listed in **Table 1.1**.

Table 1.1 Plan of Management Action Items

Management objective	*Action item*	*Management actions*
To investigate traffic management study for Ewingsdale Road (including reference to this site development)	C1	**Access off Ewingsdale Road and traffic management** Prepare a Traffic Management Plan for Ewingsdale Road including consideration of the potential impacts associated with the development of this site – location of suitable entry / exit point (entry / roundabout option west of Quarry Road), traffic movements, potential increased traffic volumes and peak loadings, speed limits and safety, shared bikeway / pedestrian connections, 'gateway' treatment options, street lighting and public safety.
To provide appropriate safe vehicle access off Ewingsdale Road into this site	C2	**Internal vehicle access** Subject to investigations and recommendations, construct a new roundabout on Ewingsdale Road west of Quarry Road. Construct a sealed bitumen access road from roundabout into reserve, connecting to proposed Visitor Information Centre / bus interchange facilities, proposed car parking areas and recreational facilities.
To review options for 'park and ride' facility	C6	Investigate options to establish a 'park and ride' facility / transit area and shuttle service to alleviate peak congestion / traffic volumes in Byron Bay Town Centre.

Management objective	*Action item*	*Management actions*
To provide recreational and community infrastructure within the most durable areas	C10	**Multi-use community sports fields** - 3 x cricket pitches (including 2 senior (1 x turf); 1 for social cricket) - 1 x senior soccer (association) field, 2 x senior and junior soccer fields and 2 x junior soccer fields - 1 x rugby union field (not full-size) and touch football field and 1 x shared touch football field (soccer and softball) - 1 x multi-use athletics field / track, including 400 metre running track, straight for sprint events, areas for discus, shot put and javelin, long-jump and triple-jump events, softball nets and playing field for hockey and frisbee - special community use field / open grassed area for social cricket / junior soccer (see above), special events and temporary overflow event parking / park and ride options - 4 x netball courts - 4 x cricket nets - floodlighting of all playing fields - criterium closed bike circuit (one kilometre circuit) - 2 x separate amenities buildings - 3 x children's play areas - bike and skate park facility - workshop / maintenance building - fencing to play areas / security fencing treated effluent re-use pond for grounds maintenance
To provide a range of multi-use indoor organised sports facilities, community / leisure activities, amenities and storage areas	C11	**Indoor recreation facility** Indoor recreation / community building to include multi-use facilities for indoor basketball, netball, soccer, cricket and volleyball. Other facilities to include club meeting room, canteen / kiosk, space for community / leisure activities (e.g. music and arts), and equipment storage.
To promote innovative sustainable technologies in the development of recreational infrastructure	C12	**Recreational facilities development and management** Ensure high standard of playing field construction and maintenance with adequate subsoil drainage (as required), quality turf playing surfaces, automatic irrigation system (subject to integration with water storage / recycling technologies) and floodlighting. Investigate solar options for general lighting requirements.
To promote the site's 'gateway' location to Byron Bay	C15	**Visitor information centre / interpretive facilities and cafe / restaurant** Provide staged development of a Visitor Information Centre, including local and regional information services, environmental education and interpretive facilities, meeting rooms, displays and kiosk / visitor's shop with outdoor deck, tables / seating.

Management objective	*Action item*	*Management actions*
To provide access to proposed facilities	C5	**Car parking areas (including park and ride facility)** Provide staged development of car parking facilities as follows: 1. Two car parking areas for 211 + 102 = 313 car spaces in total 2. Park and ride facility / transit area facilities and sealed bitumen car parking area 3. Establish open grassed area (southern area) for temporary over-flow / event parking requirements or extension to park and ride facility

1.2.3 Environment Assessment / Mitigation

The Plan of Management also contains assessment of a number of key environmental constraints and recommendations for mitigation of potential impacts (Section 4 of PoM). Some of the key recommendations of the PoM are:

- ***Visual quality and scenic character***

  The future recreational development of this site should be sensitive and low-key. It should reinforce and enhance natural qualities rather than simply establishing large open grassed areas for sporting activities.

  The proposed development contains all the elements original proposed in the PoM. This will result in some large open grassed areas. The visual / scenic impacts of this will be mitigated mainly by perimeter landscaping – maintaining and enhancing the existing vegetation along the Ewingsdale Road frontage; appropriate landscaping along the eastern boundary (adjoining the Arts and Industry Estate) and ecological enhancement works in land adjoining to the west).

- ***Ecology / Biodiversity***

  It will be essential to establish appropriate buffers between areas of very high ecological value and proposed development. Similarly wherever possible, fragmented habitat of high ecological value should be consolidated and connected to core natural areas via suitable bio-linkage treatments.

  The PoM was created over the larger 40ha property. The proposed development occupies only the eastern portion of this land. The PoM acknowledges that the western portion of the land has the highest biodiversity values. The complex has adopted the footprint set out in the PoM as a suitable basis for the management and mitigation of overall ecological impacts.

  Maintenance of the western area of the land, together with future enhancement proposals for that land, will ensure the protection of the key conservation / biodiversity values. The development of the complex will result in ecological impacts. Overall, however, it is considered that these impacts are manageable and acceptable.

  High quality vegetation in the south-east corner, and along the Ewingsdale Road frontage will also be protected and enhanced, providing a link across the front of the site to the protected western land.

- ***Weed Management, regeneration and Restoration***

  The weed management strategy would need to be adequately funded, staged and monitored to deliver a sustainable outcome (i.e. address long term objectives of building ecosystems and durability). The strategy needs to be linked to the ongoing management of potential negative impacts and control of threatening processes……Best practise standards will need to be followed for bush regeneration / restoration, seed collection, replanting and ecological fire management or slashing regimes.

As outlined in **Section 4.1**, a key recommendation of this REF is that Council adopt and implement the strategy / management plan recommended in the PoM. This work will provide compensation for the ecological impacts associated with the construction and operation of the complex.

Work should not commence on the complex until Council has developed and adopted this strategy / management plan.

Buffers and faunal corridors will need to incorporate ecologically sensitive water quality control devices for managing stormwater run-off, exotic weeds and nutrient loadings from sports fields and car parking areas.

The importance of this issue is acknowledged and forms the basis for the stormwater management measures outlined in **Section 4.3** of this REF.

The key to the proposed stormwater measures is to 'mimic' the existing hydrology of the area, because much of the ecological value in the area is reliant on both surface and ground water regimes. In the main, this involves getting stormwater into the ground 'at source', rather than capturing and transporting the water. A range of bioretention and infiltration structures will be incorporated into the detailed design, both internal and at the edges of the development, to ensure that stormwater does not have detrimental impacts on existing groundwater dependent ecosystems.

Source: Brunswick Heads 9640-4-N and Byron Bay 9640-4-S Topographic Maps Date: May 2009

N O T E: Grid lines shown are based on the Geocentric Datum of Australia

0 1 km

North

Site Locality Plan

Source: LandArc Pty Ltd Date: May 2009

LEGEND

- Sportsground
- General community use
- Natural area wetland
- Natural area bushland

North

0 80

Community Land Categories

2 Overview of Site and Proposal

2.1 Cadastral Description

The site is described in Real Property terms as Lot 3 DP 706286 and is located at 249 Ewingsdale Road, Byron Bay. The entire property has an area of 40 ha and is rectangular in shape (refer to **Illustration 2.1**).

As shown in **Illustration 2.1**, there is an easement located along the eastern boundary of the site. The easement provides for drainage of water across the site and for landscaping purposes. The easement covers an existing drain, known locally as the western boundary drain, which is part of the stormwater drainage system for the adjacent sector of the Arts and Industry Estate. A retention / treatment pond, which is part of this system, is located in the south-eastern corner of the site.

2.2 Site Context

The site is located approximately 4 km west of the Byron Bay town centre and shares boundaries with the following geographical features and land uses:

- Byron Bay Arts and Industry Estate (east) – contains a range of light industrial and commercial uses, with limited residential units, generally attached to a commercial / industrial use;
- West Byron Effluent Reuse Wetland (north) – containing areas of wetland regeneration and water polishing wetlands, a managed aquatic habitat, and sewerage treatment plant;
- Rural / environmental land (west); and
- Ewingsdale Road (south).

South of the site, on the opposite side of Ewingsdale Road are the Sunnybrand Chickens facility, an intensive poultry growing and processing operation, and the Island Quarry, a disused quarry now approved for community / arts use.

The site is located within a significant corridor of remnant coastal habitat, linking the Belongil catchment / wetland to the south and the Tyagarah Nature Reserve in the north. While this corridor is somewhat fragmented, it has been documented as having very high conservation value, both in terms of the vegetation / habitats present and in terms of its wildlife corridor value (BSC, 2003).

This site context is shown in **Illustration 2.2**.

2.3 Site Analysis

This flat, low-lying site was purchased by Byron Shire Council for operational and community uses. The site has a history of partial clearing and modification for agricultural activities. It was previously used for many years as a holding paddock for cattle, associated with the F J Walker abattoir located further east, closer to town. Notwithstanding this previous use, most of the land still retains significant sedgeland habitat and biodiversity, particularly within the western portion of the site. The eastern portion has an existing cottage serviced by an unsealed access road. This area has been largely cleared for livestock grazing.

The site is subject to a number of constraints, which include:

- ecology – the site is part of a wildlife corridor, threatened species of fauna have been detected, some vegetation has extremely high ecological value;
- soils – peat and potential acid sulfate soils exist across the site;
- flooding – a significant portion of the site is flood prone;
- groundwater – the water table is very close to the surface; and
- traffic – Ewingsdale Road is considered to be chronically congested in peak times.

These constraints are shown in **Illustration 2.3** and discussed further below and assessed in detail in **Section 4** of this REF.

2.3.1 Vegetation

Extensive ecological surveys have previously been undertaken within the site (Fitzgerald 2004, 2008 and Bower and Murray 2004) and the adjacent 24 ha effluent irrigation area to the north (Fitzgerald 2005, Fitzgerald and Newell 2008). For the purposes of this REF, further research and field assessment has been undertaken on the16.5 ha within the eastern portion of the site (known as the community land) which extends east from the area mapped as High Conservation Value (HCV) vegetation to the eastern boundary, to confirm and add to the results and conclusions of those earlier studies.

Ecological issues are discussed in more detail in **Section 4.1**, with the full ecological assessment report contained as **Appendix B**.

Based on the current and previous ecological surveys, a total of three vegetation communities have been recorded from the sport and cultural complex site. These are:

- exotic grassland,
- sedgeland / fernland / grassland; and
- *Melaleuca quinquenervia* open forest / woodland.

No threatened flora or potential habitat for threatened flora has been recorded or identified within the site. No Endangered Ecological Communities (EEC) were recorded from the site during the current surveys.

2.3.2 Fauna

Five threatened fauna species were recorded during the current surveys. These species are the Wallum Froglet (*Crinia tinnula*), Little Bent-winged Bat (*Miniopterus australis*), Eastern Bent-winged Bat (*Miniopterus schreibersii oceanensis*), Southern Myotis (*Myotis macropus*) and the Greater Broad-nosed Bat (*Scoteanax rueppellii*).

Additional threatened species have previously been recorded within the site and also within the adjacent 24 ha effluent irrigation area and the nearby West Byron Sewage Treatment Plant (WBSTP). These species are discussed in more detail in **Section 4.1** and within the full ecological assessment report contained as **Appendix B**.

2.3.3 Soils

Soil Landscape mapping for the area (Morand, 1994) indicates that the majority of the site is within the Tyagarah soil landscape. This is landscape characterised by aeolian (i.e. wind-blown) sand deposits, generally forming low lying level to gently undulating plains.

Within this soil landscape, water tables are characteristically within 100 – 200 cm of the surface, higher in poorly drained areas. The soil landscape comprises deep (>150 cm), well drained Podzols and Acid Peats near barrier systems. It is also characterised by very strongly acid, permeable, often waterlogged soils of low fertility, low water holding capacity with localised salinity, permanently high water tables and moderate wind erosion hazard (Morand, 2004).

The area is also known to contain significant areas of peat soils, and a survey of sand and peat layers has been undertaken within the site (Ryffel & Bolton, 2003). The report produced from that survey is contained in **Appendix C**.

Illustration 2.4 shows the resultant peat depth contours within the site and indicates that a gradient of shallow to deep peat soils occurs from east to west and from south to north-west. Overall, across the 40 ha site, there is approximately 21 ha of land containing peat soils with a depth in excess of 300 mm. The majority of this is within the western part of the site, with only a small area affected by the proposed sporting fields (in the north-western corner of the proposed fields site, where peat depths are up to about 300-500 mm).

Filling and levelling for the construction of sports fields over the peat material is likely to lead to differential settlement and subsidence of the playing surface. The peat material, therefore, will need to be removed from the area proposed for sports fields and replaced with a more stable subgrade. As detailed in **Section 4.2.1**, potential acid sulfate soils have been identified within this area, and the removal of the material will therefore need to be subject to stringent environmental controls.

2.3.4 Flooding

Council's adopted mapping of flood prone land indicates that approximately one quarter of the site (i.e. ten hectares) is classified as flood prone. The flood prone area is confined to the western portion of the site and does not include any of the land covered by the proposed complex.

However, a Council-appointed flooding consultant (SMEC) is currently undertaking an update to the Belongil Creek Flood Study and this will result in revised flood mapping of the Belongil Creek catchment. Furthermore, the flood study update will include consideration of a range of climate change / seal level rise scenarios. Based on these more recent scenarios, SMEC has provided preliminary flooding information for the subject site.

The updated flood modelling results indicate that approximately half of the site is prone to inundation in the 100 year ARI climate change scenario 2 flood event. The western portion of the site is inundated, as well as a strip of land along the southern boundary (approximate width of 80 – 130 m). The western boundary drain, which runs along the eastern boundary of the site, is also flooded, as well as an area adjacent to the centre of the northern boundary. This climate change scenario represents an ocean water level of 2.91 mAHD and a 10 % increase in rainfall intensity compared to current conditions.

The updated flood modelling results indicate that the majority of the site is prone to inundation in the 100 year ARI climate change scenario 4 flood event. Only a couple of isolated areas in the centre of the site are not inundated in this flood event. This climate change scenario represents an ocean water level of 3.62 mAHD and a 40 % increase in rainfall intensity compared to current conditions.

2.3.5 Groundwater

Groundwater is shallow and close to the surface throughout the site. After periods of extensive rainfall, the groundwater level can actually rise to the surface in many locations across the site, meaning that the entire soil profile is saturated and water ponds on the surface.

Six piezometers were installed on the eastern portion of the site in early 2008. Groundwater levels have been measured in the piezometers on a monthly basis from March 2008 till March 2009. There is a groundwater gradient that runs in a general north-east to south-west direction. The results indicate that groundwater levels vary from approximately 2.4 to 3.1 mAHD in the north-eastern corner of the site, and from 1.7 to 2.5 in the southern portion of the site. The groundwater level at a specific location can vary by at least 800 mm and is primarily influenced by rainfall conditions.

The high groundwater levels will be a constraint to construction of the sports fields. With no change to existing ground levels, it is likely that groundwater will rise to the surface of the fields, or very close to the surface, on a reasonably regular basis. It is likely that this would result in the fields being 'unplayable' for extended periods in the wet season. The development site will therefore need to be filled to provide additional 'clearance' above the water table.

Extensive monitoring and modelling of the groundwater in the local area has been undertaken in relation to the augmentation of the West Byron STP.

The key findings from the various studies and investigations are:

- The Belongil Creek catchment has shallow groundwater in an uncontrolled aquifer, as evidenced by the occurrence of numerous swamps and wetlands. Historically, draining of land in the western and southern parts of the catchment has involved cutting surface drains, causing shallow groundwater to discharge to Belongil Creek.
- There is a localised rise in groundwater in the vicinity of West Byron STP, in response to infiltration of effluent along surface flow paths. This localised rise is wholly contained within the West Byron STP site and does not currently affect adjoining properties.
- Monitoring of the groundwater has indicated that there is a shallow surface zone, which is responsive to changes such as increased rainfall and tidal effects. Groundwater discharges from this shallow zone flow into surface water drains as they move south-west away from the plant.
- Monitoring has also indicated that effluent from the plant does not penetrate the deeper groundwater zones and does not affect the quality of groundwater even at short distances from the plant. Modelling of groundwater flow into the deeper zones has shown that increases in rainfall do not result in significant changes in groundwater flow rates.
- Groundwater modelling indicates that, for the base case, at the time of transfer of South Byron STP, and at the ultimate case in 2025, some localised saturation of ground occurs within the West Byron STP site in the vicinity of the constructed wetland and Cell H. No impacts are predicted for adjacent properties as the drainage system intercepts the shallow groundwater flows and transfers these flows through surface drainage.
- Existing use of groundwater resources in the surrounding region is limited due to variable groundwater quality and the high rainfall experienced. Monitoring of groundwater quality indicates that the existing effluent from West Byron STP is not adversely affecting groundwater quality due to rapid attenuation in the vicinity of the STP site. The augmented plant would provide an improved treatment standard in terms of nutrients and disinfection and therefore is likely to have a neutral or marginally beneficial effect on the regional groundwater quality.

2.3.6 Traffic

A preliminary assessment undertaken as part of the Plan of Management (LandArc, 2005) examined a range of access options, including access from Bayshore Drive by way of the West Byron Sewage Treatment Plant or by way of an adjoining industrial site.

Access options were further examined in a preliminary traffic assessment undertaken by RoadNet in 2006. As detailed further in **Section 4.5**, the preliminary assessment concluded that access from Ewingsdale Road would be the preferred option. At its Ordinary Meeting of May 2007, Council resolved that access to the facility should be off Ewingsdale Road. Council further resolved that a more detailed traffic study be undertaken to examine the whole of Ewingsdale Road.

RoadNet have further examined issues associated with traffic generation and parking associated with the proposed sporting and cultural facilities. Their report is contained in **Appendix D**, and is summarised further in **Section 4.5** of this REF.

Ewingsdale Road is subject to significant traffic congestion. Options for the future management / upgrade of the road network have been considered separately by Council. RoadNet have examined the potential impacts of various uses of the site in regard to existing and likely future network considerations.

As detailed further in **Section 4.5** and **Appendix D**, traffic capacity is a severe limitation for some of the potential uses of the site that were originally identified in the Plan of Management (LandArc, 2005).

2.3.7 Visual Quality

The landscape of the site is characterised by open rural vistas and natural areas. This landscape extends westward to the base of the rise in the vicinity of Quarry Lane, to the north and across Ewingsdale Road to the south. The landscape forms a contiguous natural corridor, providing a strong natural rural context for Byron Bay, particularly in terms of travellers entering town from the Pacific Highway.

The Byron Regional Sport and Cultural Complex site is directly adjacent to what is effectively the western edge of the town of Byron Bay, being the Arts and Industry Estate. Currently, this Estate provides the visual introduction to 'town' for travellers on Ewingsdale Road.

Given this context, the site has strong potential as a 'gateway' location for Byron Bay. The potential exists to provide a 'softer', more visual pleasing introduction to town through the development of sporting facilities and associated infrastructure on this land.

2.4 Proposed Development

As indicated above, a PoM for this land was adopted by Council on 20 December 2005. The PoM predominantly relates to the community land and provides for its future use and management for community, sporting and cultural facilities.

As such, Byron Shire Council in conjunction with the Sporting Fields Working Group developed a concept plan for use of the community land. This concept plan was then adopted as part of the PoM.

A conceptual layout plan has been developed from this original plan, responding to the constraints described above. The current development plan is shown in **Illustration 2.5**.

Detailed design of the facility has not yet been completed. It is therefore not possible to be certain regarding construction scheduling / activities or potential impacts.

For the purpose of this REF, therefore, a range of assumptions have been made regarding construction, based on the concept design and the likely logical construction schedule.

2.4.1 Staging

Construction sequencing will be confirmed following detailed design. However, it is likely that the complex will be constructed in three stages, as follows:

- Stage 1: Internal car parking
  Stage 1 roundabout and associated access works
  Excavation of peat material and importation of fill
  Profiling of site to finished surface levels
  Construction of infrastructure / services
  Athletics track, associated hockey field and amenities block
  General use sporting fields (south-east)
  Storage sheds (on northern boundary)
  Cycle track (criterium)
  Lighting and irrigation infrastructure for sports fields above
  Caretaker's residence*
  Bike / skate park*
- Stage 2: Soccer fields (south-west) and associated amenities
  Canteen / kiosk adjacent to soccer fields
  Visitor information centre*, public toilets* and associated car parking
  Services, lighting and irrigation infrastructure for sports fields above
- Stage 3: Multi-use fields (north-west)
  Indoor facility (possibly containing a swimming pool)*
  Services, lighting and irrigation infrastructure for sports fields
  Upgrade of roundabout to two lanes and associated roadworks

* ***As outlined in Section 3, the proposed caretaker's residence, indoor sports facility, visitor information centre and associated public toilets, and bike / skate park require Development Consent, subject to Part 4 of the Environmental Planning and Assessment Act 1979. As such, these components of the project will be subject to a separate development application(s). They may therefore be built 'out of sequence' (i.e. at a later date.***

These components are not assessed as part of this Review of Environmental Factors.

2.4.2 Construction Works

Stage 1 Roundabout

The traffic analysis undertaken by RoadNET (see **Appendix D**) has determined that a 'minimum sized' roundabout will operate satisfactorily for the first stages of the complex. This roundabout would incorporate single through-lanes on Ewingsdale Road, with separate right-turning lanes as well as appropriate 'slip-lanes'.

As highlighted above, it is recommended that this roundabout be the first component to be constructed, so that construction traffic associated with internal earthworks etc can use the roundabout to minimise impacts on traffic flow on Ewingsdale Road.

With the final stage of the complex, the roundabout will need to be expanded to provide a full, four-lane facility. This should be timed to coincide with the suggested widening of Ewingsdale Road.

Earthworks / Filling

As discussed in **Section 2.3.5**, the development site will need to be filled to provide clearance above the high water table. In addition, the peat soils located in the north-west of the complex site will need to be removed and replaced with clean fill, to provide appropriate foundation conditions for the fields.

Detailed design of the complex has not yet been completed. However, based on the concept design, it is estimated that the following quantities of material will be involved:

- Approximately 6,000-6,500m^3 of peat material to be removed;
- Approximately 50,000m^3 of fill material required to raise the levels appropriately (thin includes the replacement material for the fill); and
- Approximately 20,000m^3 of additional quality soil to provide the appropriate base material for the sports fields themselves.

Existing and indicative finished levels across the sport and cultural complex site are shown in **Illustration 2.6**.

Based on these fill quantities, and assuming that 'truck and dog' vehicles will be used during all construction, the total filling activities will generate a total of approximately 5,500 truck movements. This will be spread across the earthworks stage of the construction, which is likely to take in the order of 6 months to complete.

These numbers will need to be clarified in further detail as part of the detailed design of the proposal, and management of the construction traffic will need to be detailed in the Construction Management Plan.

Its is recommended, however, that there be a limit of 30 truck movements per day, that construction be timed to avoid school holidays and peak traffic periods, and that no truck movements be allowed through the Byron Bay Town Centre.

Appropriate soil / erosion / sedimentation control measures will also be implemented as an integral part of the construction. Details will be designed as part of the detailed project design and specified within the Construction Management Plan.

2.4.3 Anticipated Site Use

In relation to sporting activities, the Byron Regional Sport and Cultural Complex will be used for training and competition by a range of existing local sporting groups, including soccer, rugby union, hockey, touch football, little athletics, Australian rules, school sports and cricket.

The occurrence of sporting events, including training and competition, will be coordinated within a detailed operation / business plan to minimise conflicts and ensure efficient use of all facilities. Traffic management and parking availability will be important criteria for this ongoing management.

Appropriate drainage infrastructure will be designed for the site, including measures to control, capture and treat stormwater falling on the impervious areas of the site (see **Section 4.3** for details). It is also proposed that the fields will be irrigated with recycled water, provided from the adjoining West Byron Sewage Treatment Plant.

The general use sporting fields will be used for 'overflow' parking when required. Overall, these fields could accommodate an additional 360 cars, and this will be used during major sporting events.

It is also possible that the site could be used from time to time for community / cultural events. The Byron Bay Writers Festival is an example of the kind of event that could be housed at the site (although this is not yet a firm proposal). Management of the site will ensure that there are no conflicts between any community / cultural events and sporting events, so that the two are never scheduled at the same time. It is likely that the overflow parking on the general use fields will be required for some of the community / cultural events.

In relation to non-sport community uses, smaller-scale festivals, of a type and scale similar to the Byron Writers Festival, will utilise the site facilities, particularly the indoor sports / community buildings (that will be subject to a separate design / approvals process). Again, coordination of the timing of these events will occur by way of the detailed operational management plan, with traffic management / parking being key criteria for this management.

Council had also considered the potential to use the developed facility as the base for a 'park and ride' proposal. This concept has not yet been fully explored and RoadNet's traffic assessment (**Appendix D**) has highlighted a number of potential constraints.

Accordingly, at its meeting of 9 April 2009, Council resolved to remove the park and ride concept from the proposal, subject to further consideration in the future. It has therefore not been considered or assessed for the purposes of this REF.

2.4.4 Access and Traffic Movement

A traffic study has been prepared to examine the implications of the operation of the completed complex. RoadNet's preliminary traffic studies indicated that traffic signals or a two-lane roundabout would both be suitable treatments for access to the fully developed facility. Council previously considered these two options and resolved that a roundabout would be the preferred access option.

Council also determined that the construction of the roundabout could be staged, with a medium sized facility being constructed with Stage 1, to be updated to a larger diameter, two-lane, facility at a later date (at construction of full sports facilities). The 'first stage' roundabout would incorporate single through-lanes on Ewingsdale Road, with separate right-turning lanes as well as appropriate 'slip-lanes'. It will eventually be upgraded to a full two-lane facility.

Further detailed regarding traffic generation and access is assessed in **Section 4.5** of this REF.

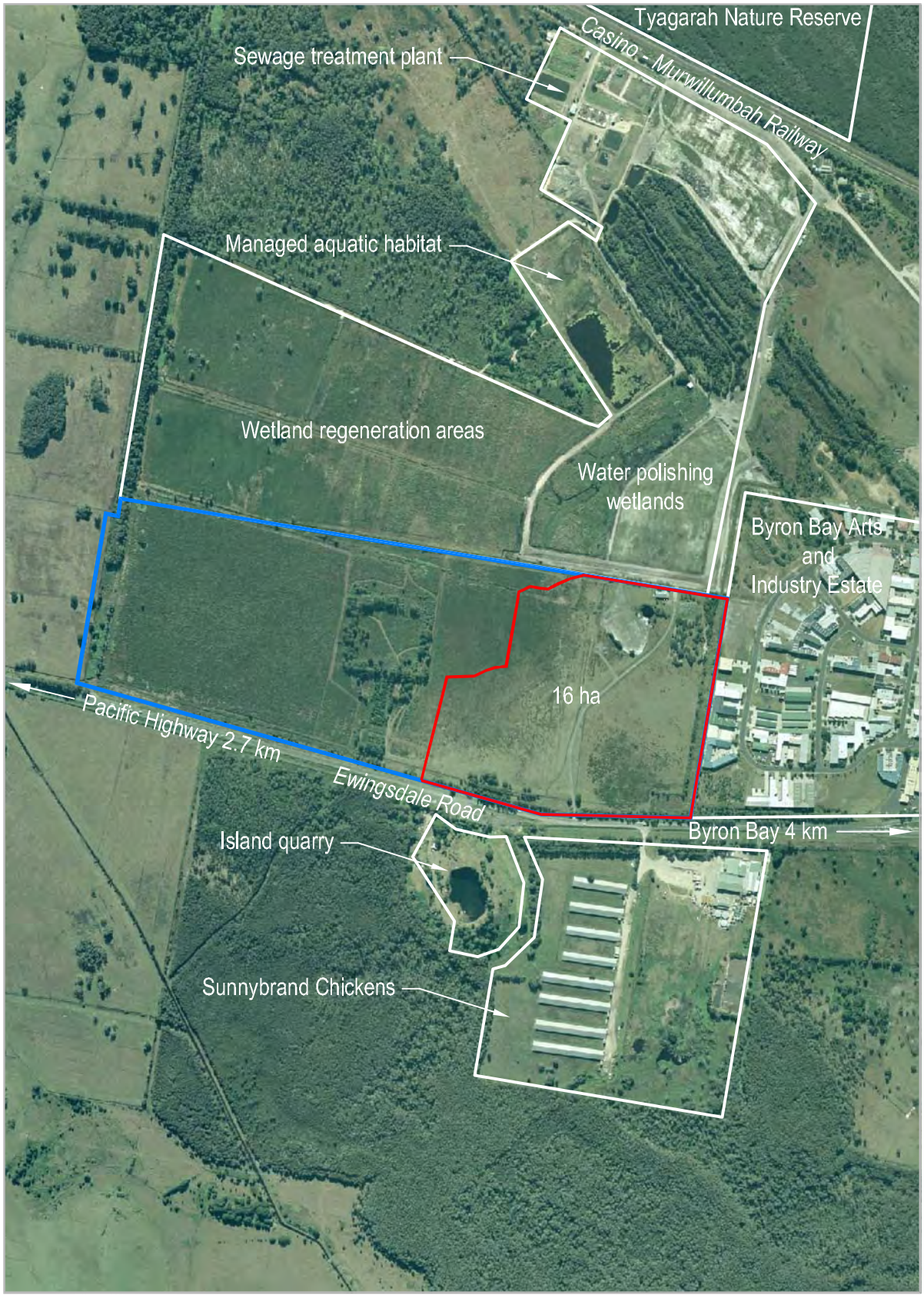
Source: Byron Shire Council Date: May 2009

0 200

North

The Site

Source: Byron Shire Council Date: May 2009



LEGEND

Sport and Cultural Complex site
Property boundary

North

0 200

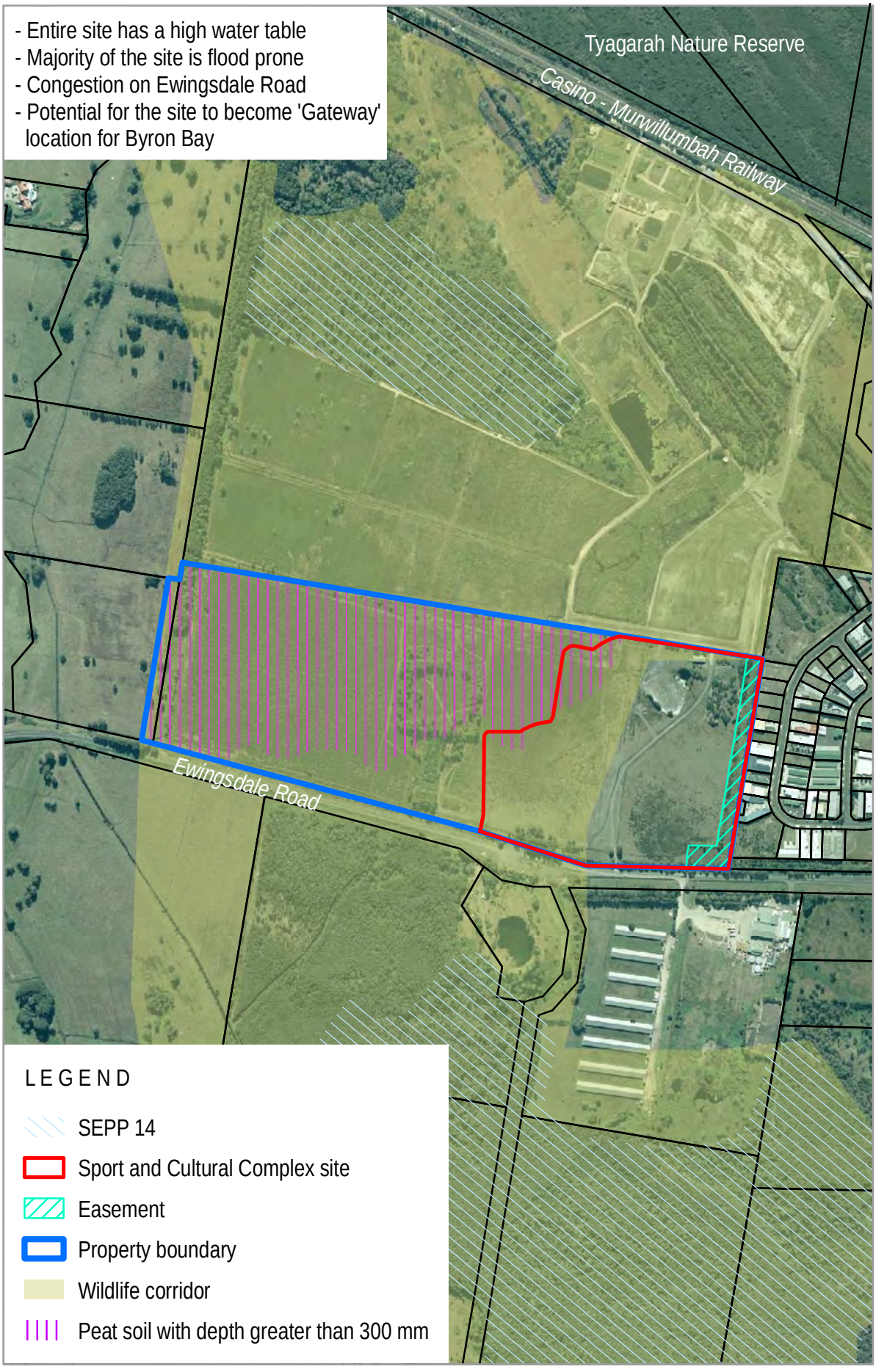
Site Context

GeoLINK environmental management and design

Review of Environmental Factors: Byron Regional Sport and Cultural Complex
1058263

Illustration 2.2

Source: Byron Shire Council Date: May 2009

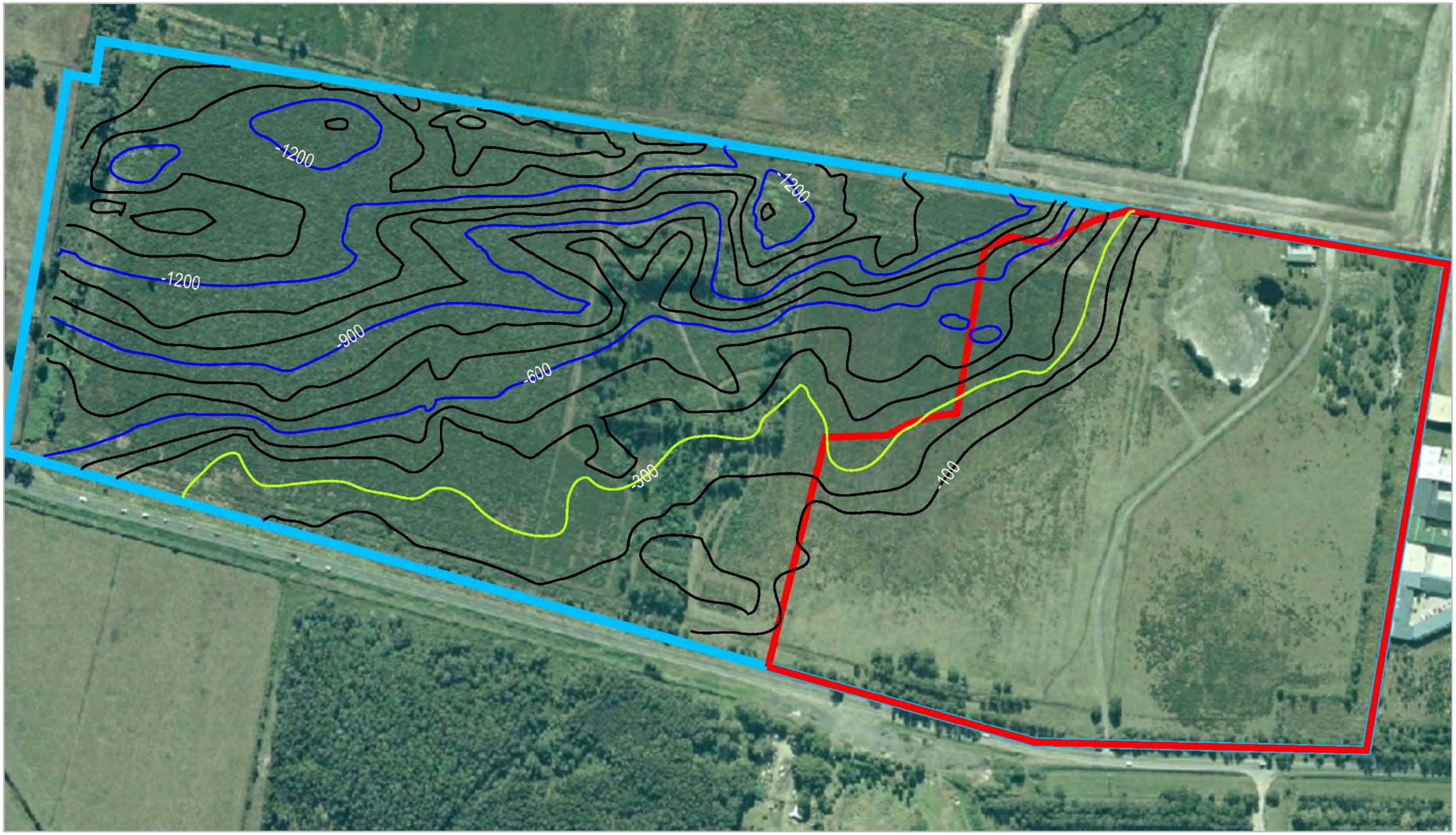


0 200

North

Site Analysis

Source: Sand and Peat Soil Layers Report by Tom Ryfell and Keith Bolton Date: May 2009



LEGEND

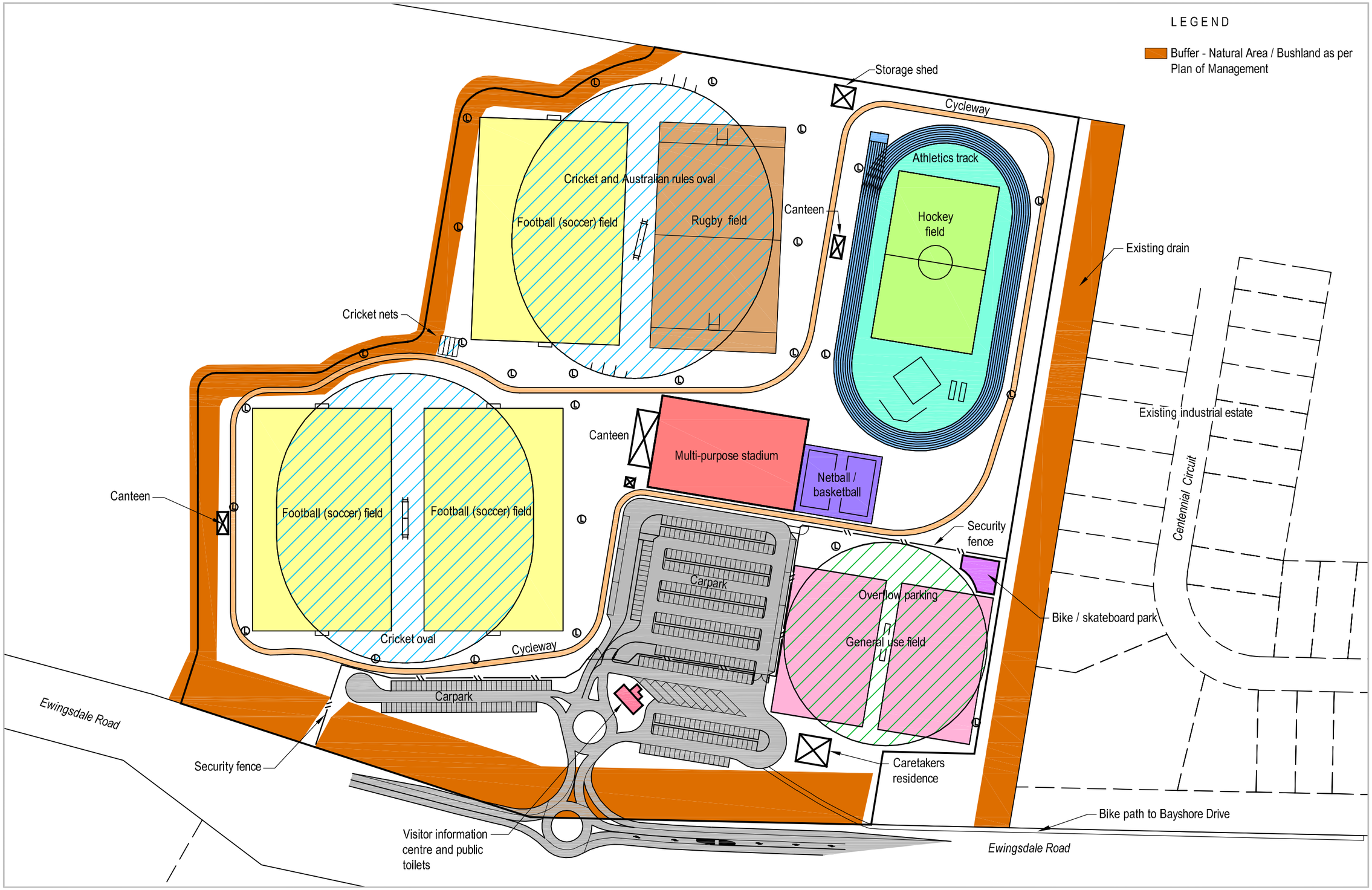
- Sport and Cultural Complex site
- Property boundary
- 300 mm depth contour has been highlighted as a representative sand / peat interface as per Ryffel and Bolton 2003

0 60

North

Peat Soil Depth Contours

Source: GeoLINK Date: July 2009



North

0 40

GeoLINK environmental management and design

Review of Environmental Factors: Byron Regional Sport and Cultural Centre
1058149

Proposed Development

Illustration 2.5

Source: GeoLINK Date: July 2009

LEGEND

Existing contour

Indicative contour

Existing drain

Existing industrial estate

Centennial Circuit

Ewingsdale Road

North

0 40

Existing Site Levels and Indicative Site Levels

3 Statutory Considerations

3.1 Approval Requirements

Clause 65 of *State Environmental Planning Policy (Infrastructure) 2007*, allows development for the purposes of '*outdoor recreational facilities, including playing fields, but not including grandstands*', to be carried out without consent on a public reserve, provided it is being developed by, or on behalf of a Council.

The bulk of the proposal fits within this definition and therefore the provisions of SEPP (Infrastructure) 2007 are applicable. Accordingly, the proposed works do not require development consent and are therefore assessed under Part 5 of the *Environmental Planning and Assessment Act 1979* (EP&A ACT).

There are, however, a number of project elements to which Part 5 of the Act cannot apply. Table 3.1 describes the proposed project elements, and the subsequent planning approval pathways.

Table 3.1 Table 3.1 Planning Approval Requirements

Element	*Relevant Approval Pathway*
Outdoor sporting facilities and associated works / amenities (includes excavation & filling and construction of services / infrastructure required to create the fields)	Part 5 EP&A Act – Review of Environmental Factors (REF)[1]
Access roundabout and associated works	Part 5 EP&A ACT – REF[2]
Internal access / car parking	Part 5 EP&A – REF[3]
Visitor information centre	Part 5 EP&A Act[4]
Bike / skate park	Part 5 EP&A Act[1]
Care takers residence	Part 4 EP&A Act – Development Application (DA)
Indoor Sports Centre	Part 4 EP& A Act – DA

Notes:

1. cl.65(3)(b) SEPP (Infrastructure) 2007
2. cl.94(1) SEPP (Infrastructure) 2007
3. cl.65(3)(a) SEPP (Infrastructure) 2007
4. cl.65(3)(c) SEPP (Infrastructure) 2007

This REF provides an assessment of the environmental implications of the elements of the proposal that can be dealt with under Part 5 of the EP&A Act. It does not deal with the items requiring development consent under Part 4 of the EP&A Act. Those elements will be subject to a separate assessment and approval process.

3.2 Assessment under Part 5 of EP&A Act 1979

Clause 65 of *State Environmental Planning Policy (Infrastructure) 2007*, allows development for various purposes, by or on behalf of a council, to be carried out on a public reserve without the need for development consent. The specified purposes include '*outdoor recreational facilities, including playing fields, but not including grandstands*'.

The primary components of the Byron Regional Sport and Cultural Complex, therefore, do not require development consent (see **Table 3.1** above).

This report, therefore, provides a Review of Environmental Factors, enabling an assessed of the project under Part 5 of the *Environmental Planning and Assessment Act 1979*.

3.3 Environmental Planning Instruments

3.3.1 Local Environmental Plans

Standard Instrument LEP

The site is zoned 1(d) – Investigation Zone pursuant to the *Byron Local Environmental Plan 1988*. Council officers advise that the site of the proposed Sport and Cultural Complex is likely to be zoned RE1 Public Recreation under the new Shire-wide 'Standard Template' LEP, being developed at the time of writing this REF (Emma-Jayne Leckie, pers. com). This 'new' zoning would allow the proposed use.

The remainder of the site is likely to be zoned E2 Environmental Conservation under the new plan, reflecting its biodiversity values.

Byron LEP 1988

As the development does not require development consent, detailed assessment of the proposed works against the Byron Local Environmental Plan is not required. However, the following provisions of the Plan indicate issues that are relevant to a consideration of the development of the site.

Zone Objectives

The objectives of the 1(d) zones are:

(a) to identify land which is to be investigated in respect of its suitability for rezoning for more intensive development;

(b) to ensure that development within the zone is compatible with the anticipated future development of the land;

(c) to ensure that development maintains the existing character of the locality and minimises disturbance to the scenic value of the escarpment and landscape through clearing, earthworks, access roads and construction of buildings;

(d) to ensure that development does not create unreasonable or uneconomic demands, or both, for provision or extension of public amenities or services; and

(e) to identify land requiring protection of significant vegetation and wildlife habitats, and to ensure that development does not adversely affect the integrity of the environment.

Development of the site for the proposed Byron Regional Sport and Cultural Complex is not inconsistent with these objectives. Mitigation measures are proposed for the development (see **Sections 4** and **5**) to ensure that the development will not have any significant environmental or scenic impacts.

Clause 24 – Development of flood liable land

The key requirements of this clause are that development of flood liable land should not restrict the flow characteristics of flood waters, and that development should not increase the level of flooding on other land in the vicinity.

The issue of flooding is addressed in **Section 4.4**, which highlights that flood modelling undertaken for the proposed development indicates that the requirements of this clause are not met.

Clause 37 – Development within Zone 1(d) Investigation Zone

Part 2 of this clause highlights a number of matters to be considered in relation to the development of land within this zone. These matters are addressed below:

(a) the land capability of the land;

Section 4 of this REF addresses the key issues that relate to the capability of this site. Given the assessment undertaken, it is concluded that the site is capable of accommodating the development as proposed.

(b) the demand for the development of the land;

The demand for facilities of this nature is well established. The facility will allow for a central regional sports facility that does not currently exist in Byron Shire.

(c) whether the land can be serviced with water, sewerage and roads, and the likely future road network;

The development can be adequately serviced.

(d) the strategic implication of the development of the land;

There are no strategic implications, other than an ability to adequately cater for future sporting and recreational needs of the Byron community.

(e) whether the land is located within the buffer area of a quarry, piggery or sewage treatment works;

The land is adjacent to the sewage treatment plant. The use is such that there is not likely to be any conflicts arising from this proximity.

(f) environmental management of the land.

See **Section 4.1** and **Appendix B**.

Part 3 of the clause highlights the need to protect significant vegetation and wildlife habitats and to ensure that any development will not adversely affect significant vegetation and wildlife on that land or adjacent land. This issue is addressed in detail in **Section 4.1** (see also **Appendix B**). The location of the development within the site and the mitigation measures proposed will ensure that the development does not result in significant ecological impacts.

Clause 63 - Development on land identified on the Acid Sulfate Soils Planning Map

A preliminary assessment of acid sulfate soils has been undertaken. As outlined in **Section 4.2** (see also **Appendix E**), areas of Potential Acid Sulfate Soils (PASS) have been identified within the development site. A detailed Acid Sulfate Soil Management Plan will therefore need to be developed to guide construction of the development, particularly relating to the excavation of peat soils, to ensure that it will not result in any detrimental acid sulfate soils impacts. The preliminary assessment indicates that this can be managed by the application of lime during excavation.

3.3.2 State Environmental Planning Policies

State Environmental Planning Policy (Infrastructure) 2007

SEPP (Infrastructure) 2007 applies to the state and commenced on 1 January 2008. As highlighted above, Clause 65 of this SEPP allows for development for the purpose of 'outdoor recreational facilities', 'lighting' and 'amenities facilities' on land considered a 'public reserve' by or on behalf of a council to occur without the need for development consent. Outdoor recreational facilities can include playing fields but not grandstands. Lighting can only occur without development consent where light spill and artificial glow is minimised in accordance with AS/NZS 1158:2007, Lighting for Roads and Public Spaces.

The proposed works involve development being carried out by a Council, namely Byron Shire Council, for the purpose of 'recreational facilities, including playing fields, but not including grandstands', 'lighting' and 'amenities facilities'. Development consent is therefore not required for this work, notwithstanding the provisions of any other planning instrument.

With regard to Clause 16 of SEPP (Infrastructure) 2007, the subject land is not adjacent to land reserved under the *National Parks and Wildlife Act 1974*, not adjacent to a marine park declared under the *Marine Parks Act 1997*, not adjacent to an aquatic reserve declared under the *Fisheries Management Act 1994*, nor in the foreshore area within the meaning of the *Sydney Harbour Foreshore Management Act 1998*. The development is not a fixed or floating structure in or over navigable waters and it not for the purpose of an educational establishment, health services facility, correctional centre or group home, or for a residential purpose in an area that is bushfire prone land. As such, the development is not specified development and written notice is not required to be given to any specified authority.

State Environmental Planning Policy No. 14 – Coastal Wetlands

State Environmental Planning Policy No. 14 (SEPP 14) was gazetted in December 1985. It aims to ensure that coastal wetlands are preserved and protected in the environmental and economic interests of the State. The subject site does not contain land that is a designated SEPP 14 Coastal Wetland. However, the adjoining parcel of land to the north, which is the location of the West Byron Sewage Treatment Plant, currently contains a small area that is a SEPP 14 coastal wetland. At the closest point of the proposed development, SEPP 14 Number 75 is 400 m away to the north-west. Additionally, SEPP 14 Number 79 is 250 m to the south of the proposed development site, on the opposite side of Ewingsdale Road.

A risk associated with the proposed sporting fields development is the impact associated with polluted stormwater runoff. Therefore, stormwater from the impervious areas will be collected in various stormwater treatment devices, thereby ensuring that there will be no detrimental impact on either of the nearby SEPP 14 coastal wetlands.

State Environmental Planning Policy No. 44 - Koala Habitat Protection

State Environmental Planning Policy No. 44 (SEPP 44) was gazetted in January 1995. It encourages the conservation and management of natural vegetation areas that provide habitat for Koalas to ensure that permanent free-living populations will be maintained over their present range.

Local councils cannot approve development in an area affected by the policy without an investigation of core Koala habitat. The policy provides the state-wide approach needed to enable appropriate development to continue, while ensuring there is ongoing protection of Koalas and their habitat. Although the proposal does not require development consent, an assessment of the provisions of the SEPP has been undertaken, to ensure that the project will not impact on any areas of Koala habitat.

Does the subject land occur in a Local Government Area identified in Schedule 1?
The site is located in the Byron Local Government Area, which is listed in Schedule 1.

Is the land to which the development application applies larger than 1 hectare in area?
The subject land is approximately 40 hectares in area.

Does the site contain areas of native vegetation where the trees of the types listed in Schedule 2 constitute at least 15 percent of the total number of trees in the upper or lower strata of the tree component?
The site does not contain any of the trees listed in Schedule 2 of the SEPP. It therefore does not contain potential or core Koala habitat.

State Environmental Planning Policy No. 55 – Remediation of Land
This SEPP provides a State-wide approach to the management and remediation of potentially contaminated land. In conducting a review of environmental effects, consideration must be given to whether it is likely that the site contains contaminated soil and it must be demonstrated that any fill brought onto the site is certified clean in accordance with SEPP 55.

A preliminary contamination assessment has been carried out and is summarised in **Section 4.2.2**.

State Environmental Planning Policy (Major Development) 2005
The SEPP establishes the framework within which projects are assessed under Part 3A of the *Environmental Planning and Assessment Act 1979*. It establishes a range of project types and categories that are considered to be 'major projects'. The Minister for Planning becomes the consent authority for these proposals.

In relation to recreations facilities, Schedule 1 of the SEPP lists recreational facilities with a '*capital investment value of more than $30 million*' as a project to which Part 3A will apply. In the subject case, while a detailed cost estimate has not been undertaken, preliminary costings indicate that the total project will have a capital investment value in the order of $20-30 million.

As such, this would not constitute 'major development' for the purposes of this SEPP.

The SEPP also sets out a framework for regional development to be assessed and determined by Regional Planning Panels. Clause 13A of the SEPP, however, establishes that this does not apply to development for which development is not required. The components of the project considered in this REF, therefore, are not affected by the regional provisions of this SEPP.

For the components of the project tat will require development consent (see above), clause 13B(2) specifies that it will be 'regional development' if it has a capital investment value greater than $5million.

3.3.3 Regional Environmental Plans
The area of proposed works is not listed in the schedules of the North Coast Regional Environmental Plan thus the proposed works do not trigger any consent requirements.

The proposed works are consistent with an objective of the REP in relation to community services, which is to 'ensure that full account is taken of the need for community services in the planning process'. The works are also consistent with an objective of the REP in relation to recreation, which is to 'to allow provisions for the diverse recreational needs of the community, taking into account expected population growth and visitor use, and prevent environmental degradation caused by excessive or inappropriate recreational use'.

The proposed Byron Regional Sport and Cultural Complex will be a great asset to residents of Byron Bay and the wider community. Demand for sports playing fields and other active recreation were highlighted in community consultation held to discuss potential uses for the subject land. Through this development, residents will be provided with facilities that far exceed current provision of this service in the Shire and potentially on the far north coast.

3.4 Confirmation of Part 5 Position

All relevant statutory planning instruments have been examined in relation to the proposal. As indicated above, development consent is not required for the subject activity by virtue of Clause 65 of SEPP (Infrastructure) 2007. However, the proposal is an 'activity' for the purposes of Part 5 of the EP&A Act 1979 and is therefore subject to an environmental impact assessment.

Clause 111 Duty to consider environmental impact

(1) For the purpose of attaining the objects of this Act relating to the protection and enhancement of the environment, a determining authority in its consideration of an activity shall, notwithstanding any other provisions of this Act or the provisions of any other Act or of any instrument made under this or any other Act, examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of that activity.

Section 4 of this REF summarises the assessment undertaken in relation to the relevant environmental impacts of the proposal.

(2) Without limiting subsection (1), a determining authority shall consider the effect of an activity on:

(a) any conservation agreement entered into under the National Parks and Wildlife Act 1974 and applying to the whole or part of the land to which the activity relates, and

There are no conservation agreements relevant to this land or any land in the immediate vicinity of the site.

(b) any plan of management adopted under that Act for the conservation area to which the agreement relates, and

There is no plan of management adopted under the *National Parks and Wildlife Act 1974* relevant to the site. The Plan of Management relevant to the site is adopted under the provisions of the *Local Government Act 1993*.

(c) any joint management agreement entered into under the Threatened Species Conservation Act 1995, and

There is no joint management agreement applicable to the site.

(d) any biobanking agreement entered into under Part 7A of the Threatened Species Conservation Act 1995 that applies to the whole or part of the land to which the activity relates.

There is no biobanking agreement applicable to this site.

(3) Without limiting subsection (1), a determining authority shall consider the effect of an activity on any wilderness area (within the meaning of the Wilderness Act 1987) in the locality in which the activity is intended to be carried on.

There are no wilderness areas on or near the site.

(4) Without limiting subsection (1), a determining authority must consider the effect of an activity on:

(a) critical habitat, and

There is no critical habitat on or near this site.

(b) in the case of threatened species, populations and ecological communities, and their habitats, whether there is likely to be a significant effect on those species, populations or ecological communities, or those habitats, and

See **Section 4.1**. The proposal will not result in a significant impact on any threatened species, populations or ecological communities, or their habitats.

(c) any other protected fauna or protected native plants within the meaning of the National Parks and Wildlife Act 1974.

See **Section 4.1**. The proposal will not have any significant impacts on protected fauna or native plants.

3.5 Protection of the Environment Policies

3.5.1 Noise Management

The New South Wales Industrial Noise Policy is relevant to the proposed development. As such, an Acoustic Assessment Report has been prepared (see Section 4.7 and **Appendix F**).

The noise assessment has considered both construction and operational noise issues. It has assumed noise associated with sporting events and amplified music from the site.

The report acknowledges that there are likely to be events at the complex that generate short-term noise well above existing background levels. Given the nature of the area, however, particularly the industrial nature of adjoining land and lack of residents in the area, this is not likely to generate significant impacts. Recommendations have been made, however, to mitigate and manage noise issues.

No licenses would be required pursuant to the *Protection of the Environment Operations Act 1997*.

3.5.2 Light Spill Management

Lighting of the proposed Byron Regional Sport and Cultural Complex has the potential to cause nuisance to nearby sensitive receiving environments. To prevent this from occurring, the design of lighting for the facility must comply with the following Australian and New Zealand Standards:

- AS/NZS 4282 – Control of the Effects of Obtrusive Light; and
- AS/NZS 1158 – Lighting for roads and public spaces – Pedestrian area (category P) lighting.

Qualified lighting designers, Rixon Design, have investigated the Ewingsdale site and provided a Lighting Guidelines Report for sporting fields and associated roads, parking and footpath areas (**Appendix G**). The proposed design includes the location of poles and the type of light fittings, ensuring that any light spill from the facility is within the recommended parameters of the abovementioned standards.

For the sports field lighting, 14 poles will be required, ranging in height from 22 m to 40 m. The fittings will be of a design which provides no upward lighting component and will have multiple fittings, allowing selective switching for training and competition purposes. They will also have variable reflectors, which are used to tailor and control the direction and area of the light. For the entry road, carpark and pathway lighting, the poles are recommended to range in height from 4.5 m to 8 m. Again, the type of lights used will provide no upward light and will have variable reflectors to tailor the direction and area of light.

Through implementing the lighting design recommended in Rixon Design's Lighting Guidelines Report, the Byron Regional Sport and Cultural Complex will not generate light spill that is outside the levels prescribed in the Australian and New Zealand Standards.

3.6 Need for the Proposed Activity

Strategic Planning conducted by Byron Shire Council revealed a need for better provision of community, recreational and sporting facilities for residents. Accordingly, the subject piece of land was identified as suitable for designation as community land. Consultation with the community and various stakeholders revealed a list of potential uses for the site, including the following:

- sports fields and associated infrastructure;
- tourist "gateway" to Byron Bay;
- improved road linkages and access to the site;
- "park and ride" facility;
- visitor information centre;
- wetland eco-tourism facilities;
- showground / festival and events site; and
- environmental protection / wildlife sanctuary (wetlands).

The feasibility and demand for each item on the list was then analysed, including cross referencing to strategic planning exercises previously completed by Byron Council. Through this process two key requirements for the Byron community were identified:

- develop active recreational infrastructure to service the needs of the Byron Bay community; and
- protect and manage vital wildlife corridors and significant habitat for endangered species.

The proposed development will satisfy both of these identified needs. The required sporting facilities will be provided (such as a cycling criterium, bike and skate park, netball courts, soccer, rugby and touch football fields, an Aussie rules ground, cricket and softball pitches). Simultaneously, the community sports centre has been designed with environmental protection and conservation being key deliverables.

3.7 Other NSW Legislation

Table 3.1 lists other NSW legislation that is relevant to the assessment of the proposed Byron Regional Sport and Cultural Complex and comments on their implications for the proposal.

Table 3.2 Additional NSW Legislation

Legislation	*Section(s)*	*Comment*
National Parks and Wildlife Act 1974	Sections 87(1), 90	The provisions of the Act are unlikely to be triggered by the proposal.
Threatened Species Conservation Act 1995	Schedules 1, 1A, 2 and 3	An ecological assessment of the site has been undertaken to identify threatened species, populations and ecological communities listed within Schedules 1, 1A, 2 and 3 and their habitat which may occur within the site (refer to **Section 4.1** and **Appendix B**).
Fisheries Management Act 1994	Sections 198-202 and 219-220	Concurrence is required from DPI for dredge and reclamation works on land that is periodically inundated by water. Concurrence is also sought when barriers to the movement of fish including water course crossings are to be constructed or modified. The proposed works do not involve dredge or reclamation works and will not create a barrier to the movement of fish. As such, the provisions of this Act are not triggered.

Legislation	Section(s)	Comment
Protection of the Environment (Operations) Act 1997	cl.48	A POEO Licence is required for 'extractive activities' that involve the extraction of more than 30,000 tonnes per annum of soil or other material. As indicated above, approximately 6,500m^3 of peat material will need to be removed / excavated. This equates to approximately 5,200 tonnes (specific gravtity of peat – approx 0.8). Therefore a POEO licence is not required.
Roads Act 1993	s.138	Roads Act approval will be required for the proposed roundabout and associated road works.

3.8 Environmental Protection and Biodiversity Conservation Act 1999

Under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act 1999), any action that has, or is likely to have, a significant impact on matters of national environmental significance or other aspects of the environment, such as on commonwealth land, may progress only with approval of the Commonwealth Minister for the Environment under Part 9 of the EPBC Act 1999. There are no matters of national environmental significance that will be affected by the proposal and therefore no Commonwealth approval is necessary for the proposed works.

3.9 NSW Draft Sea Level Rise Policy

The potential impact of climate change induced sea level rise on groundwater levels and flood levels has been given preliminary consideration. The NSW Government *Draft Sea Level Rise Policy Statement* (2009) adopts a sea level rise planning benchmark of:

- 0.4m increase in mean sea levels by 2050 (relative to 1990 mean sea levels); and
- 0.9m increase in mean sea levels by 2100 (relative to 1990 mean sea levels).

Furthermore, the policy states that there is no scientific evidence to suggest that sea levels will stop rising beyond 2100.

The policy promotes an adaptive risk-based approach to managing sea level rise impacts and recognises that "projections of sea level rise are being continually refined, based on updated information, and this continuous improvement in the accuracy of the projections is expected to continue."

The flood assessment undertaken by SMEC and discussed in **Section 4.4** is based on the analysis of two design flood events. One of these design flood events incorporates a 0.4m increase in mean sea levels and the other event incorporates a 0.91m increase in mean sea levels. This is consistent with the benchmarks recommended in the NSW Government *Draft Sea Level Rise Policy Statement* (2009).

As discussed in **Section 2.3.5**, high groundwater levels are a constraint to construction of the sports fields and the development site will therefore need to be filled to provide additional 'clearance' above the water table. It is proposed that the site be filled so that the surface of the sports fields is above the current seasonal high groundwater level. While it is acknowledged that increased sea levels are likely to have some impact on groundwater levels in the vicinity of the site, the magnitude of this impact is difficult to predict. Therefore, it is considered appropriate to adopt an adaptive management approach to this issue. If there is a significant increase in the seasonal high groundwater level in the future and this adversely impacts the useability of the sports fields, additional filling of the sports fields can be considered.

3.10 Consultation

Consultation was conducted as part of the preparation of a Plan of Management for the site in 2005. It included an open house public workshop held at Byron Bay Community Centre in March 2004, aimed at establishing community values and relevant issues that might affect the use of the land. Members of the general public were invited to attend through public notices of the workshop and key stakeholders were personally invited.

Stakeholders included:

- BEACON – Byron Environment and Conservation;
- Bikes committee (Byron Shire Council);
- Byron Bay Hockey Club;
- Byron Bay Little Athletics Centre Inc.;
- Byron Bay Soccer Club;
- Byron Bay Sports Association;
- Byron Environment Centre;
- Ewingsdale Progress Association and Hall Committee Inc.;
- IQ Inc. (Island Quarry Reserve Trust); and
- Women for Wik.

This session was followed by the posting of a questionnaire on the Byron Shire Council website and consultation with Council staff prior to finalising the Plan of Management.

Details of the consultation sessions and their results can be found in Section 3.0 Community Consultation of the PoM, which can be found within **Appendix A**.

4 Environmental Assessment

4.1 Ecology

4.1.1 Assessment

Extensive ecological surveys have previously been undertaken within Lot 3 (Fitzgerald 2004, 2008 and Bower and Murray 2004) and within the adjacent 24 ha effluent irrigation area and WBSTP to the north (Fitzgerald 2005, Fitzgerald and Newell 2008). For the purposes of this REF, further research and field assessment has been undertaken on the 16.5 ha within the eastern portion of the site (being the site for the sport and cultural complex) which extends east from the area mapped as High Conservation Value (HCV) vegetation to the eastern boundary, to confirm and add to the results and conclusions of those earlier studies.

For the purposes of this ecological assessment '***the land***' is used to refer to the whole of Lot 3, and '***the site***' is used to refer to the area to be occupied by the sport and cultural complex facilities.

Based on the current and previous ecological surveys, a total of three vegetation communities have been recorded from the site. These are:

- exotic grassland (~8 ha),
- sedgeland/ fernland/ grassland (~8.4 ha); and
- *Melaleuca quinquenervia* open forest / woodland (~0.01 ha).

No threatened flora or potential habitat for threatened flora has been recorded or identified within the land or the site. Targeted surveys were conducted for *Eleocharis tetraquetra* (Square-stemmed Spike Rush). No specimens of this species were observed. The site exhibits sub-optimal habitat (at best) for the Swamp Orchids *Phaius australis* and *P. tankervilliae*. These species were not observed during surveys and are considered unlikely to occur on the site.

No Endangered Ecological Communities (EEC) were recorded from the site during the current surveys.

Five threatened fauna species were recorded during the current surveys. These species are the Wallum Froglet (*Crinia tinnula*), Little Bent-winged Bat (*Miniopterus australis*), Eastern Bent-winged Bat (*Miniopterus schreibersii oceanensis*), Large-footed Myotis (*Myotis macropus*) and the Greater Broad-nosed Bat (*Scoteanax rueppellii*). Suitable foraging habitat is available within the site for the four microbats, however the site does not contain suitable roosting habitat.

Threatened species not recorded during the current surveys but recorded within the land during previous surveys undertaken by Fitzgerald (2004, 2005 and Fitzgerald and Newell 2008) include:

- Common Planigale (*Planigale maculata*), within the western portion of the land only;
- Wallum Sedge Frog (*Litoria oblongburensis*), near the border of the adjacent 24 ha effluent reuse site and within the eastern areas of the nearby STP site; and
- the Grey-headed Flying-fox (*Pteropus poliocephalus*), recorded at two locations along the northern boundary of the land.

Another three threatened species were recorded in close proximity to but outside the land, including:

- one Square-tailed Kite, which was also observed by Fitzgerald (23/9/2004) flying low over the Paperbark canopy of the western drain;
- a Koala, which was heard calling north of the land, near the western boundary of 24 ha site; and
- the Grass Owl (*Tyto capensis*), observed within the adjacent 24 ha area and STP lands.

A western to eastern decline in habitat quality for fauna is evident across the land, with limited habitat and correspondingly fewer threatened species records in the far eastern portion. It is recommended that the western portion of the land be given reservation status and management appropriate to its clear ecological importance. This western portion is classified as High Conservation Value vegetation and forms part of a wildlife corridor.

This finding also reflects previous studies, particularly the findings and mapping within the Byron Biodiversity Conservation Strategy 2004, which maps the western part of the land as having 'very high ecological value' (See **Illustration 4.1**).

The siting and design of the sport and cultural complex within the site has been arranged with this ecological value as the primary constraint. Accordingly, the edge of the ecological mapping (see **Illustration 4.1**) has formed the western boundary of the complex, such that there is no disturbance proposed within the area mapped as having high ecological value.

An impact assessment and seven-part tests of significance have been undertaken (refer to **Appendix B**) for threatened fauna species known or likely to occur on the land. This assessment concludes that potential impacts resulting from the proposed sport and cultural complex can be adequately managed and are not expected to result in a significant impact.

4.1.2 Mitigation / Compensation

The PoM previously developed for the wider site acknowledged the ecological / biodiversity values of the land. Like the assessment contained in **Appendix B**, the PoM acknowledged that development of the sport and cultural complex will result in some ecological impact. To mitigate these impacts, and to provide a level of compensation, the PoM recommends the development of a detailed *Weed Management, Regeneration and Restoration Strategy* (PoM, p.53).

This REF supports and endorses that recommendation.

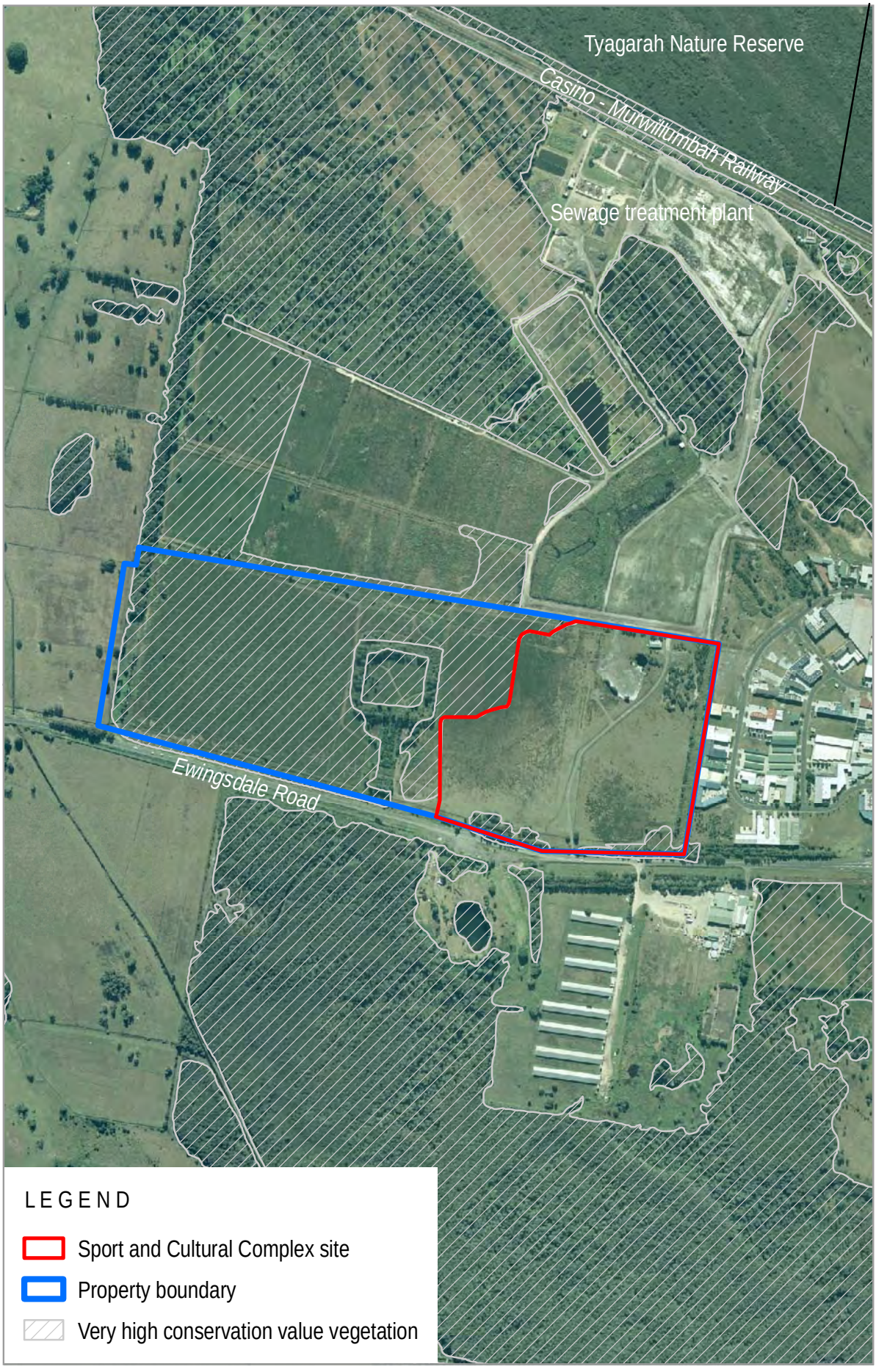
The Strategy should concentrate primarily on the area outside of the development footprint, to the west of the land. It should also, however, provide detailed provisions for the protection and management of existing vegetation in the south-east corner of the land and along the Ewingsdale Road frontage.

In effect, this Plan will develop and document ecological compensation works that will add to the existing biodiversity values and offset the minor impacts associated with the construction of the sport and cultural complex.

This REF recommends that the management Plan be developed and adopted prior to the commencement of construction and that implementation be scheduled to accompany construction of the complex.

The PoM also recommended appropriate buffers around the sport and cultural complex, to be categorised as 'Natural Area / Bushland'. These buffers have also been adopted for the concept design, as shown in **Illustration 2.5**. As shown in that Illustration, there will be minor encroachments into this buffer, from a small part of the cycle track. This encroachment is necessary as it not possible to accommodate all required facilities in any other way. The encroachment is clearly minor and will not affect the overall function of this buffer.

Source: Byron Shire Council Date: May 2009



North

0 200

Very High Ecological Value Land

The buffer area should be planted with appropriate sedgeland / heathland species. Details planting design will be undertaken as part of the overall detailed design of the project. It is recommended that planting be established at the initial construction stage, and that it be appropriately protected / fenced during construction of the adjoining facilities.

4.2 Soils

4.2.1 Acid Sulfate Soils

An Acid Sulfate Soil Investigation has been carried out by Australian Soil and Concrete Testing Pty Ltd in February 2008 (see **Appendix E**). This investigation revealed that there are no Actual Acid Sulfate Soils (AASS) across the Sport and Cultural Complex site, but there are Potential Acid Sulfate Soils (PASS), most noticeably in the north-eastern part of this area.

Extensive investigations have previously been carried out in relation to acid sulfate soils in this area, principally in association with the West Byron Effluent Reuse proposals. The assessments showed that pyrite (iron sulphide) is distributed randomly throughout the peat soils of the area (Bolton, 2001). Pyrite formation is the reverse reaction of pyrite oxidation and, Bolton (2001) notes that this is an acid-consuming reaction. During the formation of pyrite, both alkalinity and groundwater pH increase. In combination, pyrite formation and the application of effluent, which has a pH typically in the range of 6.8 to 8.5, can cause groundwater pH levels to increase close to neutral.

If the water table drops below the surface pyrite layer, the pyrite oxidises rapidly, liberating acid products. These episodes can be mitigated by managing groundwater conditions using the application of recycled water.

The Australian Soil and Concrete testing report (**Appendix E**) indicates that the Sport and Cultural Complex site contains PASS soils at varying depths in the soil profile. The results also indicate that Actual Acid Sulfate Soils (AASS) are not present in this development area. The report indicates that any excavated PASS soils will require neutralisation at a rate of approximately 7 kg of lime per cubic metre of soil. This is the maximum calculated neutralisation rate and therefore should be sufficient to neutralise the worst case PASS at the site.

Ideally, excavation of PASS soils would be avoided. However, this will not be possible given the need to excavate and replace the peat material to provide suitable foundation material for the sports fields. This issue was examined in some depth during the development of the concept plan and the Plan of Management (LandArc, 2005). The area spatially suitable for the development of sporting fields is also strongly constrained by ecological values. On balance, therefore, it was determined that the development footprint should be established on the basis of high-conservation value mapping of the area (see **Illustration 4.1**), providing the overall shape and footprint of the development as shown in **Illustration 2.5**. It has not been possible to provide the fields in a way that avoids both the high conservation value areas and all PASS soils.

Management of the excavation of the peat material, and management of the construction of the development, will therefore need to be guided by a detailed Acid Sulfate Soil Management Plan, to be development in accordance with ASSMAC requirements (Acid Sulfate Soils Manual 1998, Acid Sulfate Soil Management Advisory Committee). Given that detailed design of the fields and their construction has yet to be undertaken, it is appropriate that the preparation of this Management Plan should occur as an integral part of that detailed design process.

The previous studies relating to effluent reuse application in the area and the conclusions of the Australian Soil and Concrete Testing report indicate that management of this issue will be able to be resolved by a combination of neutralisation of excavated material and groundwater management through the irrigation of the fields using recycled water.

4.2.2 Contamination

Scope of Work

The preliminary contamination investigation includes:

- a search of the relevant Department of Environment and Climate Change (DECC) database for previous records of contamination;
- a search of the Department of Primary Industry (NSW Agriculture) database for records of cattle dip sites;
- a Land Title search to assist in establishing the site history;
- liaison with Council and other relevant contacts to establish the site history and likely contaminants and areas of concern;
- review of historical aerial photography;
- review of previous environmental assessments of the site;
- review of geological and soil landscape information to help establish the fate of any potential contaminants in the soil;
- a search of groundwater bore database to determine the risk of groundwater contamination; and
- determination of the need for site sampling investigations based on the findings of the previous tasks.

Current and Surrounding Land Use

The site was purchased by Byron Shire Council in 2003 for operational and community uses. Parts of the site have a history of partial clearing and modification for agricultural activities, primarily for grazing. Most of the land retains significant sedgeland habitat and biodiversity value, particularly within the greater western portion. The eastern portion contains an existing cottage (currently vacant) serviced by an unsealed access road.

To the north of the land lie areas of wetland regeneration and water polishing wetlands, a managed aquatic habitat, and sewage treatment plant. To the east is the Byron Bay Arts and Industry Estate. Adjacent to the south of the land is Ewingsdale Road, an intensive poultry operation and a quarry. To the west is cleared agricultural land.

Landform

The site is flat and low-lying. Elevation ranges from 2 to 5 m AHD. Slopes are typically less than 1%.

Soils

As outlined in **Section 2.3.3**, soil Landscape mapping for the area (Morand, 1994) indicates that the majority of the site is within the Tyagarah soil landscape. This is landscape characterised by aeolian (i.e. wind-blown) sand deposits, generally forming low lying level to gently undulating plains.

Within this soil landscape, water tables are characteristically within 100 – 200 cm of the surface, higher in poorly drained areas. The soil landscape comprises deep (>150 cm), well drained Podzols and Acid Peats near barrier systems. It is also characterised by very strongly acid, permeable, often waterlogged soils of low fertility, low water holding capacity with localised salinity, permanently high water tables and moderate wind erosion hazard (Morand, 2004).

The area is also known to contain significant areas of peat soils, and a survey of sand and peat layers has been undertaken within the site (Ryffel & Bolton, 2003). The report produced from that survey is contained in **Appendix C.**

Illustration 2.4 shows the resultant peat depth contours within the site and indicates that a gradient of shallow to deep peat soils occurs from east to west and from south to north-west. Overall, across the 40 ha site, there is approximately 21 ha of land containing peat soils with a depth in excess of 300 mm. The majority of this is within the western part of the site, with only a small area affected by the proposed sporting fields (in the north-western corner of the site, where peat depths are up to about 300-500 mm).

Surface Waters

There are no permanent water courses within the study area. However, the site is adjacent to wetlands and wetland regeneration lands to the north. Any drainage from the site would be ill-defined due to the flat nature of the site.

Historical Land Use

Anecdotal information indicates that the land was originally cleared as part of the early settlement of the area for grazing purposes. It does not appear as though any cultivation of the land was attempted.

Historical aerial photographs of the study area were supplied by Council for review. The photographs date from 1983 to 2006 and show that the predominant land use has not substantially altered since 1983. A description of the observed changes in the study area photographs is summarised in **Table 4.1**. The aerial photographs can be viewed in **Appendix H**.

Table 4.1 Review of Aerial Photographs

Year	*Site Description*
1983	The study area is predominately cleared grassland. There are no buildings within the site. A series of north-south drains are apparent within the mainly in the central and western part. Local anecdotal information suggested that the land was used as cattle holding paddock associated with the abattoir located closer to Byron Bay. The drains, apparently, were dug in the 1970s to drain the site in an attempt to promote additional pasture grass.
2003	There is now a building (dwelling) located on the north eastern portion of the land. There are treed areas located in the north-eastern portion of the land and toward the centre of the property. The land remains predominately cleared grassland. There is no evidence of the north/south drains that existing in 1983. The western sector of the Arts and Industry estate has been constructed adjacent to the eastern boundary of the land.
2006	There are no significant changes since 2003. The treed areas in the north eastern corner are now largely cleared grassland although the central vegetation has expanded significantly. There appears to be a more distinct separation of cleared and sedge areas in the western part of the site, most likely associated with continued slashing in the east.

DECC Records

A search of the NSW DECC records revealed that no notices have been issued under either the *Environmentally Hazardous Chemicals Act (1985)* or the *Contaminated Land Management Act (1997)* within the study area or on land adjacent to the study area.

Search of DPI Records

A search of the NSW Department of Primary Industries (DPI) database did not reveal any cattle dip sites within the study area or in the immediate locality.

Land Titles Search

A list of past registered proprietors and lessors of Lot 3 DP 706286 was obtained from the Land Titles Office. This information is outlined in **Table 4.2**.

Table 4.2 Historical Title Search

Date	*Title holder*
June 2003 - present	Byron Shire Council
August 2002 – June 2003	Byron Bay Auto Centre Pty Ltd
September 1998 – August 2002	Peter John Newton and Tina Ann Newton
November 1986 – September 1998	Westpac Banking Corporation (Transfer by Mortgagee – Power of Sale)
November 1984 – November 1986	C.A.T. Projects Pty Ltd
Prior to November 1984	F. J. Walker (Byron Bay) Pty Ltd

Review of Previous Studies

Land within the locality has been extensively studied, particularly in relation to the recent upgrade of the West Byron Sewage Treatment Plant (STP) and the associated effluent reuse schemes. A range of detailed environmental studies / reports have been reviewed, including the Environmental Impact Statement (EIS) relating to the proposed upgrade of the STP. Whilst it does not appear that any specifically targeted assessment of soil contamination has been undertaken, there is no indication in any of the studies of any concern in this regard. Nor is there any historical information that would suggest past contaminating uses.

Areas and Chemicals of Concern

The site history and analysis has not revealed any potential areas and chemicals of concern within the study area. Therefore site sampling was not considered to be warranted as it is considered that the risk of contamination is very remote.

4.2.3 Erosion and Sediment Control

Erosion of sediment from the work site and surrounding area may pose a risk to the receiving environment, if appropriate measures are not implemented. Substantial amounts of earthworks are required to construct the proposed facility. Therefore strict adherence to best management practices would be required to ensure the surrounds are not adversely affected. To ensure that these earthworks are undertaken with the least environmental impacts, erosion and sedimentation mitigation measures would be undertaken, as outlined in **Section 5.1.4**.

These measures will be designed in detail as part of the detailed design of the proposal and documented in the Construction Management Plan.

4.2.4 Dust Control

A range of appropriate dust control measures will be implemented during construction as apart of the Construction Management Plan. These should include:

- as far as practical, large expanses of exposed soil should be avoided / minimised;
- appropriate watering of exposed areas should continue regularly during construction
- exposed areas should be seeded / turfed as soon as possible; and
- internal accessways should be delineated and surfaced with suitable gravels in high useage areas.

4.3 Water

The land and the surrounding area contain substantial tracts of intact native vegetation and associated ecological communities. These natural ecosystems comprise wetlands, sedgelands, fernlands and grasslands, with varying degrees of conservation value. Water plays an important role in each of these ecosystems and changes to either the hydrologic regime or water quality can have a detrimental impact. With regard to potential water-related impacts, the key issues associated with the development of the complex are stormwater management, recycled water irrigation, and groundwater impacts. There is also potential for water quality to be adversely impacted by the inappropriate use of fertiliser (and herbicide / pesticide, if applicable) on the sports fields. These issues are discussed in the following sections. Another related issue is the potential impact of acid sulfate soils and this is addressed in **Section 4.2.1**.

4.3.1 Stormwater Management

The change in land use associated with the development of the site will lead to increases in the frequency, volume and flow rate of stormwater emanating from the site. This is particularly related to the construction of impervious surfaces associated with the internal roads, car parks and buildings. The sports fields themselves will generate a similar amount of runoff as the existing sedgelands, with the vast majority of rainfall infiltrating through the soil profile to recharge the groundwater. The proposed land use changes and associated increase in impervious areas will also result in higher loads of water borne contaminants. Once again, the areas with the greatest change compared to the existing situation will be the internal roads, car parks and buildings.

Design criteria for stormwater management are specified in the *Byron Shire Development Control Plan 2002 – Part N – Stormwater Management* (25 November 2004) and the *Northern Rivers Local Government – Handbook of Stormwater Drainage Design* (Draft Version 1, December 2006).

Section N7 – Stormwater Quality Control of the Byron Shire DCP states that developments must provide treatment measures to address key pollutants in accordance with the **Table 2.3** for all stormwater flows up to 25% of the 1 year ARI peak flow. In addition, detention of stormwater is required so that the peak flows from the proposed development for the 5, 10, 20, 50 and 100 year ARI events, for durations from 5 minutes to 3 hours, do not exceed the existing peak flows from the site. These objectives are considered appropriate for the proposed complex.

Table 4.3 Byron Shire Council Stormwater Treatment Objectives

Pollutant / Issue	*Retention Criteria*
Litter	70% of average annual load greater than 5 mm
Coarse Sediment	80% of average annual load for particles ≤ 0.5 mm
Fine Particles	50% of average annual load for particles ≤ 0.1 mm
Total Phosphorus	45% of average annual load
Total Nitrogen	45% of average annual load
Hydrocarbons, motor fuels, oils and grease	90% of average annual load

In order to meet the stormwater treatment objectives, the vast majority of stormwater runoff from the impervious areas on the site will need to be routed through a treatment device (such as a bioretention system) before discharging to the receiving waterway. This will ensure the hydraulic 'disconnection' of runoff from impervious surfaces thus significantly attenuating the impact of frequent flows on the ecological health of receiving waterways.

The proposed stormwater management strategy incorporates the following items:

- **Car parks and internal roads** - Linear bioretention trenches located within the car parks and alongside the internal roads to collect, treat and detain stormwater runoff from these impervious areas. Based on the concept layout, it appears to be feasible to incorporate linear bioretention trenches with a total combined surface area of at least 400 m² into the car park and road areas. The drainage system will be designed so that stormwater is generally directed in a southerly direction, towards the open channel that runs along the southern boundary adjacent to Ewingsdale Road. The bioretention trenches will provide treatment of stormwater to meet the design objectives and will also be designed to provide appropriate detention. If the utilisation of dispersed linear bioretention trenches becomes problematic during the detailed design phase, an alternative option will be the construction of end-of-line bioretention basins along the southern edge of the car park areas.
- **Buildings and courts** - The multi-purpose stadium and outdoor courts proposed for the middle of the site also constitute a significant impervious area. Rainwater tanks will be utilised to collect roofwater runoff for subsequent reuse on the site. Excess stormwater will be directed to an end-of-line bioretention basin incorporated into the landscaped area located between the outdoor courts and the western boundary drain. The bioretention basin will have a surface area of at least 120 m² and will provide both treatment and detention of stormwater.
- **Sports fields** - Due to the high permeability of the turf and soil, the sports fields will only generate surface runoff in very intense rainfall events. Based on preliminary calculations, it is estimated that less than 5% of the rain that falls on the sports fields will become surface runoff and this runoff should be relatively clean. Therefore, the focus of stormwater management for the sports fields is the provision of appropriate drainage infrastructure to ensure surface runoff is efficiently conveyed from the fields in these relatively infrequent, high intensity storm events. The sports fields site will have a very gentle grade from north-east to south-west and shallow grass swales will be utilised to convey surface runoff to the site boundaries.

Plate 4.1 Examples of a bioretention basin (left) and a bioretention trench (right)

The adopted measures are shown in **Illustration 4.2**, with **Illustration 4.3** showing the location of existing stormwater drains in the area.

A conceptual stormwater treatment model was developed using the MUSIC software in order to quantify the pollutant removal provided by the proposed management strategy. Because the size and scale of the multi-purpose stadium are still to be finalised, it is difficult to estimate the likely size of the rainwater tank(s) and the potential reuse quantities. Therefore, to simplify the modelling procedure, only the bioretention trenches and bioretention basins were represented in the MUSIC model. Even so, it is clear from the results presented in **Table 4.4** below that the predicted pollutant load reductions meet Council's objectives for suspended solids and nutrients.

Source: GeoLINK Date: July 2009

LEGEND

- Indicative contour
- Turf swales to convey runoff from sports fields to western and southern boundaries
- Linear bioretention trenches

Rainwater tank(s)

Bioretention basin

Existing drain

Existing industrial estate

Centennial Circuit

Ewingsdale Road

0 40

North

Stormwater Management

Review of Environmental Factors: Byron Regional Sport and Cultural Centre
1058180

Illustration 4.2

Source: Byron Shire Council Date: July 2009

LEGEND

- Sport and Cultural Complex site
- Stormwater pipes / culverts
- Manmade drainage channels

North

0 80

Existing Stormwater / Drainage

GeoLINK environmental management and design

Review of Environmental Factors: Byron Regional Sport and Cultural Centre
1058184

Illustration 4.3

Table 4.4 Stormwater Pollutant Load Reductions

Pollutant	Post-Development Load – *without treatment* (kg/yr)	Post-Development Load – *with treatment* (kg/yr)	Load Reduction (%)
Total suspended solids	11,300	1,220	89
Total phosphorus	21.4	5.7	73
Total nitrogen	105	57	45

It is not possible to quantify the treatment effectiveness for the other pollutants listed in Council's objectives because the MUSIC software, which is the industry-standard software, does not have the capability to assess these additional pollutants. Despite this, a stormwater treatment strategy that meets the adopted stormwater quality management objectives for TSS, TP and TN, will, by default, be capable of removing significant proportions of litter, coarse sediment, oil and grease. So, although a quantitative assessment of the level of treatment provided for these additional pollutants cannot be undertaken, the proposed stormwater treatment strategy should be capable of meeting the relevant objectives. The proposed stormwater treatment strategy is considered to be consistent with the Plan of Management (PoM) contained in **Appendix A**. While the measures proposed above are not exactly the same as those floated in the PoM, they represent a best-practice approach to stormwater management and achieve the same intent.

4.3.2 Recycled Water Irrigation

The proposed sports fields will be irrigated with recycled water from the adjacent West Byron Sewage Treatment Plant (STP), as part of the wider Byron Bay Effluent Management Strategy. Recycled water will be supplied to the site via a pressurised recycled water main that Council intends to construct down the eastern boundary of the site adjacent to the western boundary drain. The Byron Bay Effluent Management Strategy provides for an allocation of 60 ML/yr to the sports fields from 2008 onwards. Council has advised that the supply of recycled water is currently restricted by infrastructure constraints at the STP. However, Council is committed to the implementation of the effluent management strategy and, as such, have advised that the design of the sports fields should proceed on the basis that the necessary infrastructure upgrades will be completed in the near future and recycled water will be made available to the complex.

Irrigation of the sports fields has the potential to alter the hydrologic characteristics (e.g. runoff, infiltration) of the site and the utilisation of recycled water for this irrigation introduces the issue of potential nutrient impacts due to the nutrient content of the recycled water. A conceptual irrigation model has been developed using the MEDLI software in order to assess these potential impacts. The MEDLI software is specifically used to design and assess effluent (i.e. recycled water) irrigation schemes and, as such, is considered the appropriate tool to undertake the assessment.

The detailed design of the sports fields will include specification of the topsoil and turf, as well as the design of the irrigation infrastructure and associated controls. Although this information is not available at this stage, the MEDLI model has been developed using representative values for typical sports fields. Council has provided values for the concentrations of nitrogen and phosphorus in the recycled water from the STP. Soil properties for the in-situ soils have been based on the soil surveys undertaken by Australian Soil and Concrete Testing.

The assessment of the impact of irrigating the sports fields with recycled water has been undertaken by establishing a 'base case' model, which represents the existing conditions, and comparing to an 'irrigation' model, which represents the operational scenario. The irrigation area has been estimated as 10.5 ha based on the conceptual design.

A representative irrigation schedule needs to be entered into the MEDLI model. The trigger for the commencement of irrigation has been set at 80% of plant available water capacity and irrigation will continue until field capacity is reached. The key results from the MEDLI modelling are summarised in the following table.

Table 4.5 Summary of MEDLI Modelling Results

Parameter	Base Case *(existing conditions with no irrigation)*	Irrigation Scenario *(irrigation with recycled water)*	Change in Parameter
Rainfall (mm/yr)	1803	1803	-
Irrigation (mm/yr)	0	438	+ 438
Soil evaporation (mm/yr)	172	2	- 170
Transpiration (mm/yr)	719	1042	+ 323
Runoff (mm/yr)	20	12	- 8
Drainage to groundwater (mm/yr)	892	1184	+ 292
Nitrate concentration in groundwater recharge (mg/L)	0.3	0.2	- 0.1

An increase in the frequency and/or quantity of surface runoff is one outcome that has the potential to impact on the adjacent sedgeland/ fernland/ grassland. However, the MEDLI modelling results indicate that there will be minimal change in the quantity of surface runoff due to irrigation. Nutrient concentrations in the groundwater recharge are another item of interest and, once again, the modelling results indicate that there will be minimal change due to irrigation.

The results indicate that there will be an increase in the volume of water that infiltrates down to recharge the groundwater. This is not considered to have a detrimental impact on natural ecosystems in the local vicinity. As discussed in **Section 2.3.5**, the groundwater levels in the area are subject to substantial natural variation and additional groundwater recharge within the sports fields site is unlikely to have a significant impact on groundwater levels beyond the site boundary.

Extensive monitoring and modelling of groundwater behaviour in the local area has been undertaken as part of the augmentation of the West Byron STP. Since the early 1990s, recycled water from the STP has been recharging groundwater via infiltration through constructed and regeneration wetlands on the STP site. This has caused localised mounding of the water table, but this has been confined to the STP site. A similar outcome is expected for the sports fields site.

As part of studies for the West Byron STP, Bolton (2001) concluded that for acid sulfate control the water table should be maintained at less than 600 mm below the surface. This prevents oxidation of the subsurface pyrite layer and the subsequent rapid release of high concentrations of acid products and metals. This indicates that if the proposed irrigation regime does lead to slight increases in the water table, there may be benefits associated with acid sulfate management.

4.3.3 Groundwater

As discussed in **Section 2.3.5**, groundwater is shallow and close to the surface throughout the site. Water that infiltrates through the surface soil layers recharges the unconfined aquifer and after periods of extensive rainfall, groundwater can rise to the surface creating dispersed pockets of surface water. The groundwater underlying the site is part of a broader unconfined aquifer that encompasses the majority of the Belongil Creek catchment. There is a groundwater gradient that runs across the development site in a general north-east to south-west direction.

The potential for irrigation of the sports fields to adversely impact groundwater quantity and quality is addressed in the preceding section. Although the specification of the topsoil and turf for the sports fields has not been prepared at this stage, it is reasonable to assume that the fields will be designed to ensure a relatively high rate of vertical drainage (i.e. permeability) that is comparable to the permeability of the existing site. Conversely, the proposed hard stand areas will be impervious. To ensure minimal change to the hydrologic regime, stormwater management measures will be designed to facilitate the infiltration of runoff from these hard stand areas at discrete locations throughout the site. Furthermore, these stormwater management measures will provide treatment of runoff in order to preserve the existing groundwater quality.

There are groundwater dependent wetland ecosystems located in the area. The wetlands to the north and west are located most closely to the site and therefore are potentially impacted by changes to groundwater.

As indicated above, the project is not expected to significantly alter existing groundwater levels, as infiltration / bioretention forms the key components of onsite stormwater management. As such, there is very little potential in any 'draw-down' or lowering of groundwater at the adjacent areas.

The groundwater gradient generally runs toward the south-west. As such, any elevated nutrient levels within the groundwater are unlikely impact on the systems to the north and west. In any case, the use of bioretention facilities, and the appropriate management, application and monitoring of treated wastewater for irrigation, will ensure that there is no net change to groundwater nutrient levels.

4.3.4 Management of Chemical Application

The inappropriate use of fertiliser has the potential to lead to increases in the nutrient load from the site and associated adverse impacts on the adjacent sedgeland / fernland / grassland. Although significant quantities of herbicide and pesticide are unlikely to be utilised, these also have the potential to cause adverse impacts. As such, a detailed management plan will be prepared to control the use of fertiliser and other chemicals on the sports fields.

The management plan will balance the need to maintain functional playing fields, while ensuring the application of chemicals does not lead to adverse impacts. The management plan will specify acceptable products and incorporate best-practice techniques to ensure that the application of fertiliser does not exceed the uptake of nutrients by the plants.

4.4 Flooding

As discussed in **Section 2.3.5**, the high groundwater levels and the propensity for groundwater to rise to the surface after extensive rainfall determine that the site needs to be filled to enable the creation of functional sports fields. Given that a large portion of the site is flood prone, an assessment has been undertaken to determine whether the filling of the site will increase the level of flooding on other land in the vicinity.

As discussed in **Section 2.3.4**, Council has engaged SMEC as a flooding consultant to update the Belongil Creek Flood Study and revise the flood mapping of the Belongil Creek catchment. Therefore, SMEC has used their updated flood model to assess the impacts of filling the sports fields site.

To undertake the assessment, a 'base case' model and a 'developed case' model were prepared, with the former representing the existing situation and the latter representing the filled scenario. GeoLINK provided SMEC with a preliminary earthworks design for the sports fields so that it could be incorporated into the 'developed case' model. This 'developed case' model also included an expanded cross-section for the western boundary drain and a preliminary design for the entrance road and associated culverts.

Two different flood events were analysed, these being the 100 year ARI climate change scenario 2 flood event, which incorporates an ocean water level of 2.91 mAHD and a 10% increase in rainfall intensity compared to current conditions, and the 100 year ARI climate change scenario 4 flood event, which incorporates an ocean water level of 3.62 mAHD and a 40% increase in rainfall intensity.

These flood events were simulated using the 'base case' model and the 'developed case' model and the peak flood levels were analysed to determine the impacts.

The results of the flood impact assessment undertaken by SMEC are summarised in **Appendix I**. It is important to note that a change in peak flood levels of +/- 0.02 m is considered to be a negligible impact and reflects the typical magnitude of uncertainty associated with the flood model.

Figures 1 (base case) and 2 (developed case) show the peak flood levels for the 100 year ARI climate change scenario 2 flood event. Figure 3 shows the difference in peak flood levels between these two scenarios. There are minor increases in peak flood levels in the south-eastern corner of the site and along the western boundary drain. These impacts are generally confined to the site itself, but there are small areas along the eastern edge of the western boundary drain where these impacts extend beyond the site boundary.

Figures 4 (base case) and 5 (developed case) show the peak flood levels for the 100 year ARI climate change scenario 4 flood event. Figure 6 shows the difference in peak flood levels between these two scenarios. There is no significant change in peak flood levels either within the site or on other properties.

Based on the results of the flood impact assessment completed by SMEC, there will be a negligible change (ie, +/- 0.02 m) in peak flood levels on the majority of other land in the vicinity as a result of creating the Byron Regional Sport and Cultural Complex. However, there will be a minor increase (up to 0.06 m) in the level of flooding on small sections of some of the properties bordering the eastern edge of the western boundary drain.

4.5 Traffic

The proposed Byron Regional Sport and Cultural Complex will be located on Ewingsdale Road, which is the main access to Byron Bay from the Pacific Highway. This road is known to be chronically congested during peak holiday periods throughout the year. Accordingly, a detailed Traffic Assessment has been conducted by qualified engineering consultant RoadNet Pty Ltd to ascertain the impact of the development on Ewingsdale Road and how the increase in traffic could be satisfactorily managed.

RoadNet's report is contained in full in **Appendix D**.

4.5.1 Operational Traffic

The assessment notes that a significant portion of the traffic that would be generated by the development for normal day-to-day sporting activities is already using Ewingsdale road, because the proposed activities

are already taking place within Byron Bay. RoadNet estimates that the following volumes would be added to two-way weekday peak hour flows in Ewingsdale Road:

- west of the site - 10 vehicles per hour (vph) in am peak hour and 100 vph in pm peak hour.
- east of the site - 10 vph in am peak hour and 200 vph in pm peak hour.

Various access options for the proposed complex were analysed. It was determined that the best outcome for Byron Bay residents and for the proposed facility would be to create direct access off Ewingsdale Road, via a new intersection. Through this option, safe and efficient access to the proposed complex can be effectively achieved providing that the timing and nature of possible activities are satisfactorily managed.

Access to the complex is proposed by way of a roundabout that will have the potential to be multi-functional through provision of more formal and efficient access to Island Quarry and Sunnybrand Chickens, which are located on the opposite side of Ewingsdale Road to the proposed complex (see Traffic Assessment – Appendix B Intersection Layout Plan).

The roundabout would initially be constructed as a two-land facility, which will have sufficient capacity for the anticipated sporting uses at the complex. Council has recently considered a report on the wider traffic issues for Byron Bay, which, in part, recommends that Ewingsdale Road be widened to four lanes. The design of the proposed roundabout allows for its future augmentation to four lanes so as to be consistent with the upgrade of Ewingdale Road, if and when that occurs.

Traffic modelling undertaken for RoadNet's assessment shows that this roundabout will function satisfactorily up until the year 2026 and beyond for the normal sporting activities proposed to occur at the complex. This includes night time concerts or smaller-scale community events with fewer than 1,500 people in attendance.

The report points out, however, that the roundabout and Ewingsdale Road, both currently and if widened to four lanes, will not have the capacity to accommodate traffic volumes associated with major social events such as the Blues and Roots or Splendour in the Grass festivals. Accordingly, it is recommended that the sport and cultural complex not be used for any events of that scale.

Additionally, given the design of the proposed complex, the Traffic Assessment has confirmed that using the facility for Park and Ride purposes provides significant difficulties. Approximate 250 additional spaces would need to be developed on the site and specifically set aside for this purpose in order for a Park and Ride to operate on the site as it should.

As highlighted above, Council has resolved that 'park and ride' does not form part of the current proposal for this complex. Should it be considered in the future, more detailed assessment will be required to demonstrate whether it is achievable in terms of both available spaces and in terms of the efficient operation of the site access.

4.5.2 Construction Traffic

As indicated above, it is estimated that the construction of the earthworks / infrastructure required for the complex will take approximately 6 months to complete. Over this period, it is likely that up to 30 truck movements per day will be required, particularly during the initial filling stage.

The early construction of the roundabout will minimise traffic impacts associated with these truck movements. Further, it is recommended that the construction be restricted to non-peak periods, outside of school holidays etc. While the source of fill is currently unknown, Council will need to ensure that trucks do not need to move through the Byron Bay Town Centre.

A Traffic Management / safety Plan will need to be included as part of the Construction Management Plan. Provided that appropriate measures are adopted and implemented, it is considered that traffic impacts associated with construction vehicles will be manageable.

4.6 Landscape and Visual Assessment

During the construction phase of this development visual amenity will be significantly reduced and some minor reductions in air quality may occur. The maintenance of existing vegetation along the Ewingsdale Road frontage of the land will provide some visual screening of construction activities. Dust suppression measures will be in place throughout construction to ensure air quality remains at an acceptable level.

It is not expected that the earthworks on the site will significantly change the visual amenity of the area. The site is bordered along the Ewingsdale Road frontage by established vegetation, forming a reasonable visual barrier between the road and the location of playing fields. These existing trees will be added to with appropriate endemic species, ensuring there is landscape buffer between the road and the facility at all times.

The detailed design of the complex has not yet been completed. It is not possible, therefore, to provide a definitive visual assessment as part of this REF.

As discussed in **Section 3.5.2** of this report, Rixon Design has prepared a Lighting Guidelines Report for the proposed Byron Regional Sport and Cultural Complex (see **Appendix G**). The report recommends the type of poles and light fittings that should be used to ensure the complex complies with the Lighting Codes of the Australian and New Zealand Standards. Provided the recommendations of this report are implemented, there will not be an adverse environmental impact resulting from the lighting.

4.7 Noise

4.7.1 Construction Noise

While there are a limited number of sensitive receivers in the locality, construction activities should still be managed to minimise noise. Construction would be restricted to:

- 7am to 6pm Mondays to Fridays;
- 7am to 1pm Saturdays; and
- No work Sundays and public holidays.

Noise control measures should be detailed within the Construction Management Plan.

4.7.2 Operational Noise

An acoustic assessment addressing the operational noise implications of the proposed development has been carried out by qualified traffic and acoustical consultants Carter Rytenskild Group (CRG). The CRG Environmental Noise Impact Report can be found under **Appendix F** of this REF.

This assessment involved ascertaining the existing ambient noise level, primarily generated by traffic on Ewingsdale Road, then calculating the likely increase in noise emissions as a result of the proposed Sport and Cultural Complex. The assessment calculated noise generated by the following activities:

- site related road traffic generated noise;
- onsite activity generated noise; and
- predicted construction noise emissions.

The increase in the predicted 10 year ultimate road traffic generated noise levels are generally within the 2 dB(A) rise deemed acceptable under the '*Environmental Criteria for Road Traffic Noise'*, with the

exception of Saturday mornings. Treatment options to mitigate traffic noise increases from the proposed development are provided. These include creating another entry to the site, regulating times of use of the facility, reducing the speed limit along Ewingsdale Road or constructing an acoustic barrier. CRG advise that the preferred treatment option would be to provide public transport to the venue and regulate times of use.

With regard to onsite activity generated noise, at the nearest offsite dwelling, impacts are predicted to be within the 2 dB(A) "Background +" noise criterion and the adopted internal limit of 45 dB(A) recommended, with the exception of the referees whistle at the hockey field, waste collection and concerts / festivals. As discussed in **Section 2.4** above, the facility may be used for community and cultural events, rather than a prior proposal to host concerts and festivals at the site. However, as there is still a chance that amplified music will be played at a community or cultural event, CRG's assessment of the impact of concerts and festivals still has relevance.

With regard to the referees whistle, CRG note that as hockey is proposed to be played during daytime hours on Saturdays and once or twice on Sundays, the impact of the noise will be minor. Waste collection activities are only likely to occur once or twice per week and are generally of short duration. CRG state that so long as waste collection is limited to the daytime hours between 7 am and 6 pm, the activity is unlikely to cause annoyance.

CRG also recommend acoustic treatments and management principles for concerts and festivals. It is stated in the Environmental Noise Impact Report that as this kind of noise generating activity would only occur several times per year, noise annoyance would be limited. CRG recommends a noise management plan be prepared prior to the occurrence of any concert of festival event.

Based on assumed construction noise source levels, noise impacts on the nearest noise sensitive properties are predicted to be above the adopted noise criterion of 41 dB(A). Construction noise is predicted to be generally within 1 dB(A) of the adopted noise limit of 45 dB(A) with the exception of the eastern dwellings located within the industrial estate. The likely exceedance of 1 dB(A) is typically undetectable to the average person and is therefore unlikely to cause annoyance. The CRG report contains recommendations on making the construction process quieter and management techniques such as giving due notice to neighbours. The Environmental Noise Impact Report asserts that the construction noise level is an acceptable outcome.

4.8 Heritage

4.8.1 Non-Aboriginal Heritage

Searches were conducted of the Australian Heritage Council database (which includes the World Heritage List, the National Heritage List, the Commonwealth Heritage list and the Register of the National Estate), the State Heritage Register, State Heritage Inventory, Byron LEP heritage listings and RTA s170 heritage register (refer to **Appendix J**). The site is not listed on any of these registers.

4.8.2 Aboriginal Heritage

A search was undertaken of the Department of Environment and Climate Change Aboriginal Heritage Information Management System sites register for the site and the surrounding area (556360: 6832160 (MGA 94). This search did not record any Aboriginal objects or places within the vicinity of the proposed works (refer to **Appendix J**).

It is understood that consultation was undertaken with representatives of the local Aboriginal community as part of the preparation of the previous PoM. Given the outcomes of that PoM, which endorsed the site as the location for this complex, and given the long history of cattle grazing across the site, it is considered that there is little potential for Aboriginal cultural heritage at this site.

Notwithstanding this, representatives of the local Aboriginal community should be invited to be present during initial site construction works, to inspect the site for relics etc.

Consultation with local Aboriginal representatives should be undertaken as part of developing the Construction Management Plan, so that their inspections can be appropriately planned and managed.

The plan should also contain procedures to be implemented in the event that any relics / items are discovered during construction.

4.9 Socio-economic Considerations

The establishment of the Byron Regional Sport and Cultural Complex will contribute positively to the lives of people of all socio-economic backgrounds living in Byron Shire and the wider community. With regard to equal opportunity access, while the facility is expected to be heavily utilised by various clubs for training and competing, there will be times when the sporting fields are available to be used by the general public. There will also be facilities available that are not connected to any particular club or group, including picnic areas and playgrounds. Additionally, various spaces within the development will be available for use by either Council or other groups to hold events, some of which will be free. It is expected that this facility will be an asset to all people, regardless of their socio-economic situation.

It is expected that through this development there will be economic benefits to the wider community. Particularly when a regional or State event is held, the Byron Regional Sport and Cultural Complex will attract more visitors to the area who are likely to then need accommodation in Byron Bay and surrounding town centres. Obvious other flow-through effects will also occur such as increased restaurant patronage and increased shopping. Additionally, sporting clubs that use the fields can probably expect to have increased membership.

4.10 Waste Management

4.10.1 Construction Wastes

As part of the construction of the complex, it is likely that a range of waste material will be generated. Initially, as highlighted above, approximately 6,500m^3 of peat material will need to be removed from the site (following treatment for potential acid sulfate soils, if required). This peat material should be treated as a resource. As much as possible should be reused on the site, associated with site landscaping or the like. Remaining material should be stockpiled at Council's depot (or other appropriate location) for later sale or reuse.

All other waste material should be managed / treated in accordance with Council's adopted policies. A Construction Waste Management Plan should be developed and documented as part of the Construction Management Plan.

4.10.2 Operational Waste

The business plan currently being prepared to guide the operation of the complex should contain management measures / provisions for the collection, sorting and treatment of all waste generated at the site. In the main, this will involve general refuse associated with the community use of the fields / facilities.

Appropriate waste receptacles should be provided at key points across the site, such that they are readily accessible for site users.

4.11 Infrastructure / Services

Council have advised that sufficient capacity existing in the local water and sewer reticulation to service the complex. Council are in the process of constructing a new sewer rising main along the eastern boundary of the land, to service the nearby Sunnybrand Chickens site and have advised that it will be possible to connect to this main.

Reticulated water is also located in the area, servicing the adjoining Arts and Industry Estate.

Detailed design of these services, including appropriate connections and internal reticulation, ass well as any required system upgrades, will be undertaken as part of the detailed design of the complex.

Country Energy has advised that electricity can be provided to the site, with sufficient capacity to service all required needs. A transformer will need to be provided onsite, and should be located centrally. Again, detailed design of connections and internal reticulation has not yet been undertaken.

Communication services are available and connection and internal reticulation will be designed at a later date.

4.12 Cumulative Impacts

Cumulative impacts are experienced when small continual or regular impacts such as pollution or clearing having minor isolated impacts when viewed separately, combine due to frequency and proximity, potentially resulting in large scale environmental degradation.

Establishing the proposed development will mean the loss of some green space in Byron Bay. This is always concerning as the repeated development of greenfield sites has the potential to be have an enormous cumulative impact. Byron Shire Council is aware of this potential and has had to weigh the needs of the community against the value of retaining the site in its current form. The eastern portion of the site has less ecological value that the western portion which will be reserved for conservation purposes (refer to Ecological Assessment within **Appendix B**). However Byron Shire has earmarked this site as having potential for development for some time, evidenced in the 1(d) Investigation zoning of the property under the Byron LEP. The proposed development of this land has been carefully planned to ensure areas with the least ecological value are being developed. As such, it has been determined that through the implementation of off-set actions, development of this site is appropriate and won't contribute to the cumulative environmental impact of inappropriate development in the Shire.

The traffic congestion situation on Ewingsdale Road is something that Byron Shire Council is acutely aware of and has invested significant amounts of time and money into resolving. Currently, a study is being prepared which will identify the main cause of traffic on Ewingsdale Road and whether constructing a bypass will create the amount of congestion relief that is required. There is some doubt over the value of a bypass as the majority of vehicles on Ewingsdale Road travelling towards the town centre end up remaining in the town centre, rather than travelling further on to other centres.

5.1 Mitigation Measures

5.1.1 Ecology / Biodiversity

The following mitigation measures would be implemented in order to prevent adverse impacts on flora and fauna in the surrounding areas:

- GeoLINK supports the recommendation of the Plan of Management (PoM) that 'all operational land [western portion of site] and portion of community land [west of proposed sports fields] rezoned as 7(k) (HABITAT ZONE)'. This will restrict use of the HCV vegetation land to only allow activities undertaken for conservation purposes.

  Further, the REF supports the recommendation in the PoM for the development and implementation of a detailed *Weed Management, Restoration and Management Plan*, focussing on increasing biodiversity and conservation values in the western part of the site and linking the existing vegetation in the south-east and along Ewingsdale Road to this western area. This Management Plan should be developed and adopted prior to any construction activities commencing on site.
- buffers should be provided as shown in **Illustration 2.5**, as recommended ion the PoM. These buffers should be planted with appropriate sedgeland / heathland species as part of initial site works, and subsequently protected by fencing during construction.
- trees to be removed would be examined immediately prior to removal for signs of current use by fauna to ensure that no animals are 'directly' affected by the works. Any trees containing fauna will be retained until the species leaves the site or the nests/hollows/limbs have been vacated. If any animals are injured during the proposed works, they will be immediately transported to a wildlife carer for rehabilitation and release.
- vehicles, machinery and any stockpile materials would be placed in designated bunded areas.
- refuelling of equipment and vehicles would only occur in an appropriately bunded area;
- care would be taken within/ near areas of native vegetation to minimise the spread of weeds into or throughout the site or surrounding area by carefully cleaning and maintaining equipment;
- weeds removed would be disposed of in an approved off-site location (council rubbish tip) to reduce the risk of spreading weeds to neighbouring areas;
- all vegetation would be retained beyond the limit of works;
- temporary rehabilitation will be undertaken on disturbed areas where works have been interrupted and soils are expected to remain exposed for more than one month;
- plant operators would be educated with regard to the significance of the surrounding vegetation;
- the boundary of the proposed footprint of disturbance will be clearly marked using coloured barriers to prevent access and unnecessary damage to the surrounding habitat; and
- waste material including vegetation debris would not be pushed into the vegetation surrounding the site.

5.1.2 Water Quality

A range of mitigation measures associated with stormwater management, recycled water irrigation and the application of chemicals to the sports fields are detailed in **Section 4.3**. The key measures are listed below:

- linear bioretention trenches located within the car parks and alongside the internal roads to collect, treat and detain stormwater runoff from these impervious areas;
- rainwater tanks to collect roofwater from the main buildings for subsequent reuse on the site;
- an end-of-line bioretention basin incorporated into the landscaped area located between the outdoor courts and the western boundary drain; and
- shallow grass swales to convey surface runoff from the sports fields to the site boundaries.

Other mitigation measures would be implemented in order to prevent adverse impacts to water quality:

- all soils excavated within / from the site shall be appropriately treated / managed in accordance with a detailed Acid Sulfate Soils Management Plan;
- internal stockpiles of soil shall be no more than 2m in height and shall be seeded if remaining for more than 1 week;
- irrigation of the fields with treated wastewater shall be managed so that there are no detrimental impacts on groundwater quantity or quality. A detailed Irrigation Management Plan should be developed to provide appropriate criteria for management, wastewater application and monitoring;
- all internal stockpiles, work compounds, acid sulfate soils treatment areas, washdown areas etc shall be located within the site to minimise potential for impact on wetlands / watercourses. Details of the location of these facilities is to be developed and documented as part of the detailed design of the complex and in the Construction Management Plan;
- rumble strips or the like shall be provided within the site at the entrance to minimise the transport of sediment onto Ewingsdale Road. Details to be provided in the Construction Management Plan;
- unnecessary storage on-site of fuels, lubricants or other compounds would be avoided;
- any storage of fuels, lubricants or other compounds would occur within a bunded, secure and impervious area;
- wastes would be collected and disposed of or recycled in accordance with Byron Shire Council waste disposal protocols and DECC guidelines;
- all equipment would be maintained and operated according to manufacturer's specifications;
- an incident management and emergency response procedure would be prepared detailing procedures to be followed in the event of a spill or release of waste; and
- a spill containment kit would be available at all times. Staff would also be trained in the effective deployment of the spill containment kit.

5.1.3 Air Quality

The following mitigation measures would be implemented in order to prevent adverse impacts to air quality, particularly during construction of the complex:

- vehicles, machinery and equipment would be maintained in accordance with manufacturer's specifications in order to meet the requirements of the Protection of the Environment Operations Act 1997 and associated regulations;
- trucks transporting material to and from the site would be covered immediately after loading to prevent wind blown dust emissions and spillages;
- vehicles and equipment would be switched off when not operating;
- no waste material would be burnt on site;
- debris and waste would be cleaned from the works area as soon as practical to ensure light-weight material is not dispersed by wind gusts;

- waste would be collected and disposed of appropriately or recycled; and
- water carts would dampen exposed surfaces to prevent generation of dust if required.

5.1.4 Noise and Vibration

The following mitigation measures would be implemented in order to prevent adverse noise and vibration impacts:

- a noise management procedure would be developed outlining the process to be undertaken if noise complaints are received;
- complaints would be officially registered and dealt with accordingly;
- extensive periods of continuous operation of noisy machinery would be avoided;
- all equipment would be well maintained in accordance with the manufacturer's specifications;
- the most appropriate sized tool for the respective job is used keeping in mind that the smaller the tool, the less noise is generated;
- all works are to be in accordance with AS2436-1981: Guide to Noise Control on Construction, Maintenance and Demolition Sites;
- all equipment used on the site would have evidence of compliance with recommended noise levels outlined in this standard;
- all plant would be fitted with appropriate exhaust systems to ensure compliance with pollution and noise emission standards; and
- the contractor would be required to minimise noise outputs through the use of best practice and high quality plant and equipment.

5.1.5 Soil Erosion and Sedimentation

To prevent soil erosion and sedimentation during construction works, the following mitigation measures would be implemented:

- preparation of a soil and water management plan in accordance with Part N6 of Byron Shire Council's DCP 2002 – Part N – Stormwater Management. Among other things, the soil and water management plan will identify drainage lines, discharge locations, key areas to be protected, controlled access points, and erosion and sediment controls;
- rumble strips or the like shall be provided within the site at the entrance to minimise the transport of sediment onto Ewingsdale Road. Details to be provided in the Construction Management Plan
- land disturbance would be limited to that necessary for implementation of the works and lands not to be disturbed would be clearly marked with barrier fences;
- disturbed areas would be stabilised and/or re-vegetated or mulched as soon as practical after works are complete;
- erosion and sedimentation controls (such as silt fences or soil berms) would be provided in appropriate locations around the work site including stockpiles and downslope of all unprotected disturbed areas prior to the commencement of works to capture any sediment passing from the site. These controls would be kept functional to the end of the construction works, or in the case of stockpiles, until they were removed;
- during disturbance of the site, water runoff would be directed to suitably designed sediment control structures capable of dealing with rain events likely to be experienced at the site at the time of construction;
- erosion and sediment controls would be maintained in an operational state and checked as soon as practical after significant rainfall events;
- to limit the spread of sediment by vehicle movements, soils would not be transported unless 'spadeable' i.e. the soil is not in a free flowing state and all construction equipment would be washed down at the end of each day before moving off site;

- the weather would be monitored during the proposed period of works. Works would be scheduled outside of forecasted rain events and postponed during unforseen rain events to avoid erosion and sediment run-off;
- spoil generated would be stockpiled for re-use on site or transported for use elsewhere or disposed of in an appropriate landfill according with Byron Shire Council guidelines; and
- the surface of Ewingsdale Road would be kept free of foreign materials, dirt and other foreign matter generated on or transported to the site at all times.

5.1.6 Waste Management

The following mitigation measures would be implemented in order to prevent adverse impacts in relation to waste generated by the proposed works:

- a Waste Management Plan would be prepared and implemented in accordance with the Waste Avoidance and Resource Recovery Act 2001 prior to commencement of the proposed works. This plan would ensure that no materials would be used in a manner that would pose a risk to public safety and that waste generated from the proposed works would be recycled where possible;
- unnecessary resource consumption would be avoided;
- non-recyclable wastes would be collected and disposed of or recycled in accordance with Byron Shire Council waste disposal protocols and DECC guidelines; and
- any contaminated waste generated by the proposed works would be disposed of in accordance with the EPA approved methods of waste disposal.

5.1.7 Heritage

The following mitigation measures would be implemented in order to prevent adverse impacts to any items of Aboriginal or non-Aboriginal heritage:

- if material of Aboriginal origin is identified, work would cease and DECC, Byron Shire Council and the Northern Region Aboriginal Cultural and Heritage Advisor would be notified in the first instance; and
- if non-Aboriginal heritage items or relics are discovered during the project works, the Department of Environment and Climate change, Byron Shire Council and the Northern Region Environmental Officer would be notified in the first instance.

5.1.8 Traffic and Access

The proposed redevelopment will not have any unusual safety impacts other than those that would be normally experienced at any sporting complex of this nature. The following mitigation measures would be implemented in order to prevent adverse impacts relating to traffic and access:

- the roundabout at Ewingsdale Road should be constructed as the first component of the works, to provide access for all construction vehicles;
- construction traffic would be limited to a maximum of 30 truck movements per day;
- construction would be restricted such that intensive truck movements are not occurring in holiday or other peak traffic times;
- haulage trucks would be prohibited from travelling through the Byron Bay Town centre;
- a pedestrian and cycle refuge is proposed adjacent to the proposed roundabout to assist these users cross Ewingsdale Road;
- the roundabout on Ewingsdale Road will allow for safer access to Island Quarry and Sunnybrand Chickens;
- a Traffic Management Plan would be prepared according to the requirements of Byron Shire Council, to ensure inconvenience is minimised and safety of road users and workers is maximised when the need to slow traffic arises;
- the site compound would be locked when unattended by Byron Shire Council staff or contactors;

- signage would be erected to clearly outline the times and locations of works and changed traffic conditions.
- construction activities would be restricted to the following times:
  - Monday to Friday 7:00 am to 6:00 pm; and
  - Saturday 8:00 am to 1:00 pm.
- no work would take place on Sundays or Public Holidays; and
- construction personnel would be provided with protective equipment and training.

5.1.9 Landscape and Visual Considerations

The following mitigation measures would be implemented in order to prevent visual impacts:

- vegetation removal would be to restricted to the immediate area of the proposed works;
- buffer vegetation, particularly the existing vegetation along the Ewingsdale Road frontage of the site, shall be retained and protected to provide a level of visual screening for the site;
- vegetation removed would be mulched and/or placed for stabilisation of disturbed soils; and
- work would cease if any pollution problems are suspected or detected.

5.1.10 Operational Hazards and Risks

In accordance with the Occupational Health and Safety Act 2000, workers would be provided with appropriate safety clothing and equipment. Supervisory staff and any visitors to the work area would also be required to wear protective clothing.

5.2 Environmental Monitoring

A Construction Management Plan (CMP) should be prepared to guide the construction of the complex, including the implementation of environmental impact mitigation measures. It should also identify key roles and responsibilities for environmental monitoring and methods of reporting incidence.

6

Consideration of Environmental Factors

6.1 Clause 228 Checklist (NSW Legislation)

As part of its obligation under Section 111 of the Environmental Planning and Assessment Act 1979, the determining authority is required to take into account, to the fullest extent possible, all matters likely to affect the environment. The determining authority is required by Clause 228 of the Environmental Planning and Assessment Regulations 2000 to give consideration to a number of factors that are listed in **Table 6.1**.

Table 6.1 Clause 228 Checklist (NSW Legislation)

	Factor	*Impact*
a	**Any Environmental Impact on a Community**	
	During the construction phase of this development the community may be temporarily affected by trucks and other construction vehicles entering and leaving the site via Ewingsdale Road. Impacts to be mitigated / managed by implementation of a detailed Construction Management Plan. Upon completion, residents will be significantly benefited by the development of this community sport and cultural facility.	Negative minor short term Very positive long term
b	**Any Transformation of a Locality**	
	The locality will be significantly transformed as it will change the existing greenfield site into a large community sporting facility. It is expected that the development will be highly utilised, shifting some visitor focus out of the Byron town centre and improving the identity of Ewingsdale.	Positive
c	**Any Environmental Impact on the Ecosystems of the Locality**	
	Section 5 of **Appendix B** outlines potential impacts that may result from the proposed sports and cultural facility and measures to manage these impacts.	Negative Minor Mitigation measures are available to resolve these negative impacts
d	**Any Reduction of the Aesthetic, Recreational, Scientific or Other Environmental Quality or Value of a Locality**	
	It is considered that this development will improve the aesthetic value of the site. While the entirety of Lot 3 includes areas with natural aesthetic value, the particular area of land that will be redeveloped has limited aesthetic value. It is expected that through this development, visual amenity at the site will be improved.	Positive aesthetic
	Obvious recreational benefits will be gained through this development for residents of the Shire and the wider community. The particular area of Lot 3 to be developed currently has quite low scientific value. Areas of the site with greater biodiversity and therefore greater scientific value will be retained.	Very positive recreational Slight negative scientific

	Factor	*Impact*
e	**Any Effect on A Locality, Place or Building Having Aesthetic, Anthropological, Archaeological, Architectural, Cultural, Historical, Scientific or Social Significance or Other Special Value for Present or Future Generations**	
	Generally speaking, the community of Byron Shire places great value on the natural environment and are concerned that the cumulative impact of development will change what they appreciate about the place. As such, any development needs to occur in a way that is sensitive to the existing environment. This site does not have specific heritage value and it is not listed on any register of Aboriginal or non-Aboriginal heritage items in the State or Commonwealth. It is not considered that through this development the heritage of any present, past or future generations will be affected. This site is not considered to have great value to local residents. Based on community consultation undertaken, it is known that the proposed sports fields development is generally supported and will improve residents connection to this piece of land.	Nil
f	**Any Impact on the Habitat of Protected Fauna (Within the Meaning of the National Parks and Wildlife Act 1974)**	
	The proposed sports and cultural facility is to be located on land that has been known to contain threatened fauna species and their habitat (see Ecological Assessment, **Appendix B**) which will therefore be impacted by the proposed development. Seven-part tests of significance undertaken in accordance with Section 5A of the *Environmental Planning and Assessment Act 1979* have determined that proposed development is unlikely to have a significant impact on these threatened species. This determination is only possible through the implementation of the off-set recommendations and extensive safeguards contained in the Ecological Assessment.	Negative Mitigation measures available to address potential impacts
g	**Any Endangering of any Species of Animal, Plant or Other Form of Life Whether Living on Land, in Water or in the Air**	
	Animals and plants will be impacted upon as a result of both the construction work that is to occur and the operation of the facility. As per (f) above, some species of threatened fauna will be affected by the proposed development. Given off-set recommendations contained in the Ecological Assessment and the safeguards in **Section 5** of this REF, endangering of any species of flora or fauna is considered unlikely.	Negative Mitigation measures available to address potential impacts
h	**Any Long Term Effects on the Environment**	
	Although several short term impacts may occur in relation to noise and air quality, no negative long term impacts would occur in the locality given the implementation of the proposed protective measures in **Section 5** of this REF. Positive long-term effects include better maintenance of subject site and the improvement of nearby habitat areas as a result of the off-set recommendations.	Positive minor Mitigation measures available to address potential negative impacts
i	**Any Degradation of the Quality of the Environment**	
	Degradation of the quality of the environment is not expected. Some improvements can be expected in nearby habitat areas due to the implementation of off-set measures recommended. Given the safeguards in **Section 5** of this REF, any impacts are considered unlikely.	Positive minor Through implementation of off-set measures

	Factor	*Impact*
j	**Any Risk to the Safety of the Environment**	
	The extent of earthworks associated with constructing the proposed development is quite extensive. Fill will be imported onto the site in order to construct the sports fields at the required level AHD. As the site is in very close proximity to designated wetlands there is risk of environmental damage if appropriate erosion and sediment control measures are not put in place. Furthermore, some of the existing soils on site have been identified as potential acid sulfate soils (PASS). In order to prevent environmental damage through oxidisation, these soils will need to be managed in accordance with ASSMAC Management Guidelines (1998), using the liming rate stated in the Acid Sulfate Soil Investigation report (see Appendix D). A detailed Acid Sulfate Soil Management Plan will be developed as part of the detailed design of the facility.	Potential Negative Mitigation measures available to address potential impacts
k	**Any Reduction in the Range of Beneficial Uses of the Environment**	
	Considering the current characteristics of the subject portion of Lot 3, it is considered that development is appropriate, particularly for the relatively low intensity use that is proposed. The proposed Byron Regional Sport and Cultural Complex is an ideal use for this land and will not result in reduced benefit of the environment.	Nil
l	**Any Pollution of the Environment**	
	Waste materials, fuel spills, particulate matter and sediment have the potential to cause pollution to the environment. However, given the proposed safeguards detailed in **Section 5** of this REF and the various specialist reports, pollution to the environment is unlikely to occur.	Negative minor Mitigation measures available to address potential impacts
m	**Any Environmental Problems Associated with the Disposal of Waste**	
	Any hazardous wastes found would be disposed of in a manner which would not damage or disturb any native flora or fauna or the environment in general. The disposal of such waste would be in accordance with DECC approved methods of waste disposal. The highest level of care will be taken to ensure that any PASS that are excavated will be prevented from causing environmental damage to the site or surrounding areas. No unconsolidated or unprotected spoil would be stored or retained at the site.	Potential negative Mitigation measures available to address potential impacts
n	**Any Increased Demands on Resources (Natural or Otherwise) that are likely to Become in Short Supply**	
	The project does not create any demand for resources that are in short supply nor is it likely to result in an increased demand on any natural resources that are likely to become in short supply. It is expected that fill will be sourced from established suppliers having appropriate environmental approvals.	Low
o	**Any Cumulative Environmental Effect with Other Existing or Likely Future Activities**	
	The proposed development is likely to contribute to cumulative impacts however extensive mitigation measures stated within **Section 5** of this REF would further reduce potential environmental impacts.	Low

6.2 EPBC Act 1999 (Commonwealth Legislation)

Under the Environment Protection and Biodiversity Conservation Act 1999, any action which has a significant impact on a matter of national environmental significance or Commonwealth land triggers the Act, and therefore, requires a commonwealth environmental impact assessment. The matters of national environmental significance and commonwealth land are considered in Table 6.2 in relation to the proposal. See **Appendix B** Ecological Assessment for results of the EPBC database search undertaken for the REF.

Table 6.2 Commonwealth Environmental Impact Assessment

	Factor	*Impact*
a	**Any Environmental Impact on a World Heritage Property?**	
	The proposal would not impact on any World Heritage Property as no such places exist within a 5 km radius of the works.	Nil
b	**Any Environmental Impact on National Heritage Places?**	
	The proposal would not impact on any National Heritage Places as no such places exist within a 5 km radius of the works.	Nil
c	**Any Environmental Impact on Wetlands of International Significance (Ramsar Sites)?**	
	The proposal would not impact on any Wetlands of International Significance as no such places exist within a 5 km radius of the works.	Nil
d	**Any Environmental Impact on Commonwealth Listed Threatened Species or Ecological Communities?**	
	The EPBC Act Protected Matters Report records habitat for 27 threatened fauna species and 16 threatened flora species that may occur within a 5 km radius of the site. No commonwealth listed threatened flora or ecological communities have been recorded on the site. The Grey-headed Flying-fox is a commonwealth listed threatened species that has been recorded within the site. This mobile species may forage on Grass Trees and Broad-leaved Paperbark which will be conserved in the western portion of the site. No roost sites are present within the site however some foraging habitat may be lost as a result of the proposed development. Extensive mitigation measures stated within **Section 5** of this REF minimise any potential environmental impacts. It is not expected that any Commonwealth listed species would be impacted by the proposed works.	Nil
e	**Any Environmental Impact on Commonwealth Listed Migratory Species?**	
	The habitats for 37 migratory species have been recorded within a 5 km radius of the proposed works. Eight are terrestrial birds which includes relatively common bird species found throughout the region i.e., Black-faced Monarch, Satin Flycatcher, Rufous Fantail and White-throated Needletail. Extensive mitigation measures stated within **Section 5** of this REF minimise any potential environmental impacts. It is not expected that the proposed works would have a direct impact on Commonwealth listed migratory species.	Nil
f	**Does Any Part of the Proposal Involve a Nuclear Action?**	
	The proposal does not involve a nuclear action.	Nil

	Factor	*Impact*
g	**Any Environmental Impact on a Commonwealth Marine Area?**	
	The proposal would not impact on any Commonwealth Marine Areas as no such places exist within a 5 km radius of the works.	Nil
h	**Any Environmental Impact on Commonwealth Land?**	
	The proposal would not impact on any Commonwealth Land as no such places exist within a 5 km radius of the works.	Nil

7 Conclusions

7.1 Summary of Findings

The range of factors that may be affected by the proposed works are summarised below.

7.1.1 Ecology

No threatened flora or potential habitat for threatened flora or Endangered Ecological Communities (EEC) were recorded within the proposed sport and cultural complex site.

Five threatened fauna species were recorded during the current surveys; Wallum Froglet (*Crinia tinnula*), Little Bent-winged Bat (*Miniopterus australis*), Eastern Bent-winged Bat (*Miniopterus schreibersii oceanensis*), Southern Myotis (*Myotis macropus*) and the Greater Broad-nosed Bat (*Scoteanax rueppellii*). Additionally, several threatened fauna species have also been recorded within the western portion of the land, the 24 ha effluent irrigation area to the north of the site and the nearby WBSTP.

The land contains extensive areas identified as having high conservation value vegetation in the western portion. A western to eastern cline in habitat quality for fauna is evident across the land, with limited habitat and correspondingly fewer threatened species records in the far eastern portion, which is subject to disturbance by the proposed sport and cultural complex.

An impact assessment and seven-part tests of significance have been undertaken, which has concluded that potential impacts resulting from the proposed sport and cultural complex can be adequately managed and are not expected to result in a significant impact.

Buffers to the complex, as originally recommended in the Plan of Management for the land, will be provided and maintained. These buffers will be planted with appropriate sedgeland / heathland species as an early component of the construction works and protected by fencing during construction works.

7.1.2 Water Quality

It is not expected that the proposed works would impact on water quality in the area. Stormwater management measures will be implemented to ensure that Council's policy of no net increase in pollutants will be achieved. Generally, this will be by way of roof water harvesting and reuse and by the use of bioretention structures for all car parking and internal access areas. Where possible, pervious paving will be used to maximise infiltration and minimise runoff.

Impacts on groundwater will be minimal. Council have advised that the wastewater to be used for irrigation is treated to a high standard and is therefore very low in nutrients. Nutrient levels will be further reduced by uptake by the grass and in the soil column before the irrigated wastewater meets the groundwater.

The use of fertilisers will be strictly controlled within an operational management plan such that fertilisers are applied at the optimum rate, such that nutrients are completely taken up by the grass.

7.1.3 Noise and Vibration

Noise and vibrations may be generated during the construction of the facility and during its operation. The noise assessment undertaken acknowledges that there will be some short-term events (sporting and / or cultural) where noise levels will be significantly above existing background noise levels.

Construction noise will be managed within the framework of the Construction Management Plan. Construction activities will be restricted to 'conventional' hours Monday to Saturdays, with no work on Sundays or public holidays.

Given the nature of the area and the scarcity of dwellings in the locality, it is considered that the noise impacts can be adequately dealt with by way of an operational management plan.

7.1.4 Soils, Erosion and Sedimentation

Erosion of sediment from the work site and surrounding area may pose a risk to the receiving environment. The proposed works involve fill and vegetation removal therefore erosion and sedimentation controls would be implemented as outlined in **Section 5**.

7.1.5 Traffic and Access

Traffic flow on Ewingsdale Road and into the development can be managed to ensure a satisfactory level of functionality, for normal sporting activities and small events with fewer than 1,500 people in attendance. This will be done through the construction of a roundabout which has the capability to service the proposed complex, as well the Island Quarry and Sunnybrand Chickens on the southern side of Ewingsdale Road.

Additional site uses such as larger festivals and events or Park and Ride are currently not feasible based on the proposed number of car parking spaces to be provided on site.

A traffic Control / Safety Plan will be included as part of the Construction Management Plan. The Stage 1 roundabout will be the first component of construction, so that it can be used by all construction traffic.

7.2 Conclusion

All relevant statutory planning instruments have been examined in relation to the proposal. Based on the review undertaken, the subject proposal does not require development consent and is subject to environmental impact assessment under Part V of the Environmental Planning & Assessment Act 1979.

This REF has therefore found that:

- the proposed works are not likely to significantly affect threatened species, populations or ecological communities listed in the TSC Act 1995. Therefore, a Species Impact Statement is not required;
- the proposed works would not have a significant impact on national environmental significance or other matters as described in the EPBC Act 1999 (refer to Section 6.2) and therefore the works do not need to be referred to the Minister;
- appropriate mitigation measures can be implemented to manage any potential short term or long term environmental effects; and
- the proposed works would not have any substantial adverse impacts on the natural or human environment.

Based on all of the above, the Byron Regional Sport and Cultural Complex, as proposed would not have a significant environmental impact.

8 Declaration

This Review of Environmental Factors provides a true and fair review of the proposal in relation to its potential effects on the environment. It addresses to the fullest extent possible, all matters affecting or likely to affect the environment as a result of the proposed activity.

Name: Rob van Iersel
GeoLINK

Signed:

Designation: Principal / Planner

Date: 14 May 2009

I have examined this Review of Environmental Factors and the certification by GeoLINK and accept the Review of Environmental Factors on behalf of Byron Shire Council.

Name:

Signed:

Designation:

Date:

Project Team

The project team members included:

Rob van Iersel
Principal / Planner

Trevor Emery
Principal / Civil Designer

Veronica Silver
Associate / Ecologist / Planner

Duncan Thompson
Associate / Environmental Engineer

Megan Jamieson
Planner

Richard Elliot
Drafter

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GeoLINK declares that it does not have, nor expects to have, a beneficial interest in the subject project.

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Appendix A

Plan of Management

249 Ewingsdale Road

BYRON BAY

PLAN OF MANAGEMENT

Adopted by Council 20 December 2005

for

Byron Shire Council

prepared by

LandArc Pty Limited

Landscape, Environmental and Heritage Consultants

CONTROLLED DOCUMENT
Adopted by Council 20 December 2005

This Plan of Management for
249 Ewingsdale Road, Byron Bay
was prepared by

LandArc Pty Limited

Landscape, Environmental and Heritage Consultants
Suite 9, 55 Avalon Parade, Avalon NSW 2107
tel: 9973 1330 fax: 9973 1791 email: mail@landarc.com.au

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Appendix I: Written Submissions & Questionnaires

1.0 INTRODUCTION

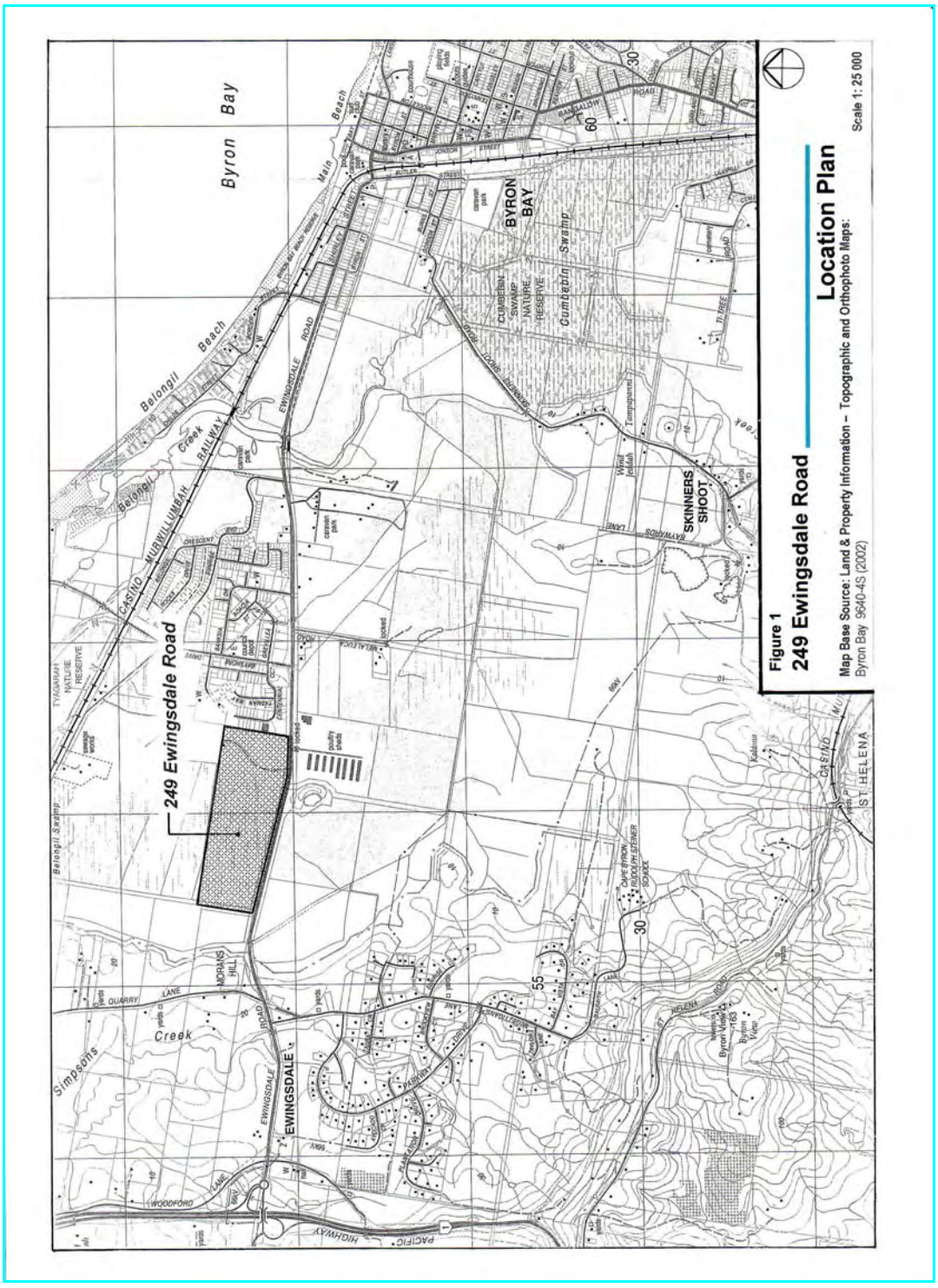
1.1 OVERVIEW

The *Byron Shire Council Management Plan 2004-2007* identifies Council's commitment to working with the community to achieve a *"Sustainable Future that will endure the forces of time and change".* Council's vision for a thriving community is based on provision of quality service delivery, infrastructure and sustainable environmental management. This vision seeks to balance economic and social needs of the present and future community with the objectives of maintaining functioning and viable ecosystems.

This principle of sustainability is particularly relevant to the public land described by this plan of management. The site encapsulates the competing pressures for land and resources which are shaping the future of the Byron Shire. The site has significant environmental and biodiversity values. It also has the potential to provide significant social, cultural and recreational values. The western portion of the site has also been identified for possible extension of the West Byron Effluent Reuse Wetland and associated infrastructure.

Accordingly, the strategic planning process has identified this land as a significant or priority area for investigation and development of a suitable plan of management. It is important that management should be consistent with Council's vision of a sustainable future and the requirements of all relevant legislation.

In late 2003, LandArc Pty Limited was commissioned to prepare a Plan of Management for this site. Byron Shire Council considered the Draft Plan of Management (Issue A: 5 June 2004) at an extraordinary meeting on 25 June 2004 and resolved *"that Council allocate the area of Lot 3 DP706286, 249 Ewingsdale Road, on the sole basis of funds contributed by the Section 94 Fund (being $1.33 million – 72%) and the Sewer Fund ($0.52 million – 28%)."* This resolution establishes the boundary between the operational land and community land portions of the site.


Byron Bay
Belongil Beach
Belongil Creek
BYRON BAY
Cumbebin Swamp
CUMBEBIN SWAMP NATURE RESERVE
SKINNERS SHOOT
EWINGSDALE ROAD
249 Ewingsdale Road
Belongil Swamp
TYAGARAH NATURE RESERVE
MORANS HILL
EWINGSDALE
Simpsons Creek
ST HELENA
Figure 1
249 Ewingsdale Road
Location Plan
Scale 1: 25 000
Map Base Source: Land & Property Information – Topographic and Orthophoto Maps:
Byron Bay 9640-4S (2002)

Following further community consultation, a concept plan was developed by the Sporting Fields Working Group, specifically to address issues relating to supply of local sporting and recreational facilities. On 31 March 2005, Council resolved *"to endorse the Concept Plan provided by the Sporting Fields Working Group for Lot 3 DP 706286, 249 Ewingsdale Road, Byron Bay."* This Concept Plan replaces *Figure 9: Landscape Masterplan* in this revised Draft Plan of Management. Accordingly, the document has been amended to address these changes, including alterations to the community land and operational land boundary.

1.2 STUDY AREA

This plan of management applies to the eastern portion of the 40.10 hectare parcel of public land, identified as Lot 3 in DP 706286 and located at 249 Ewingsdale Road, Byron Bay *(refer to Figure 1: Location Plan)*. The site is located approximately 3.5 kilometres to the west of the Byron Bay town centre and shares boundaries with the following geographical features and land uses:-

- Byron Bay Arts & Industry Estate (east);
- West Byron Effluent Reuse Wetland (north);
- Rural/ agricultural land use (west); and
- Ewingsdale Road.

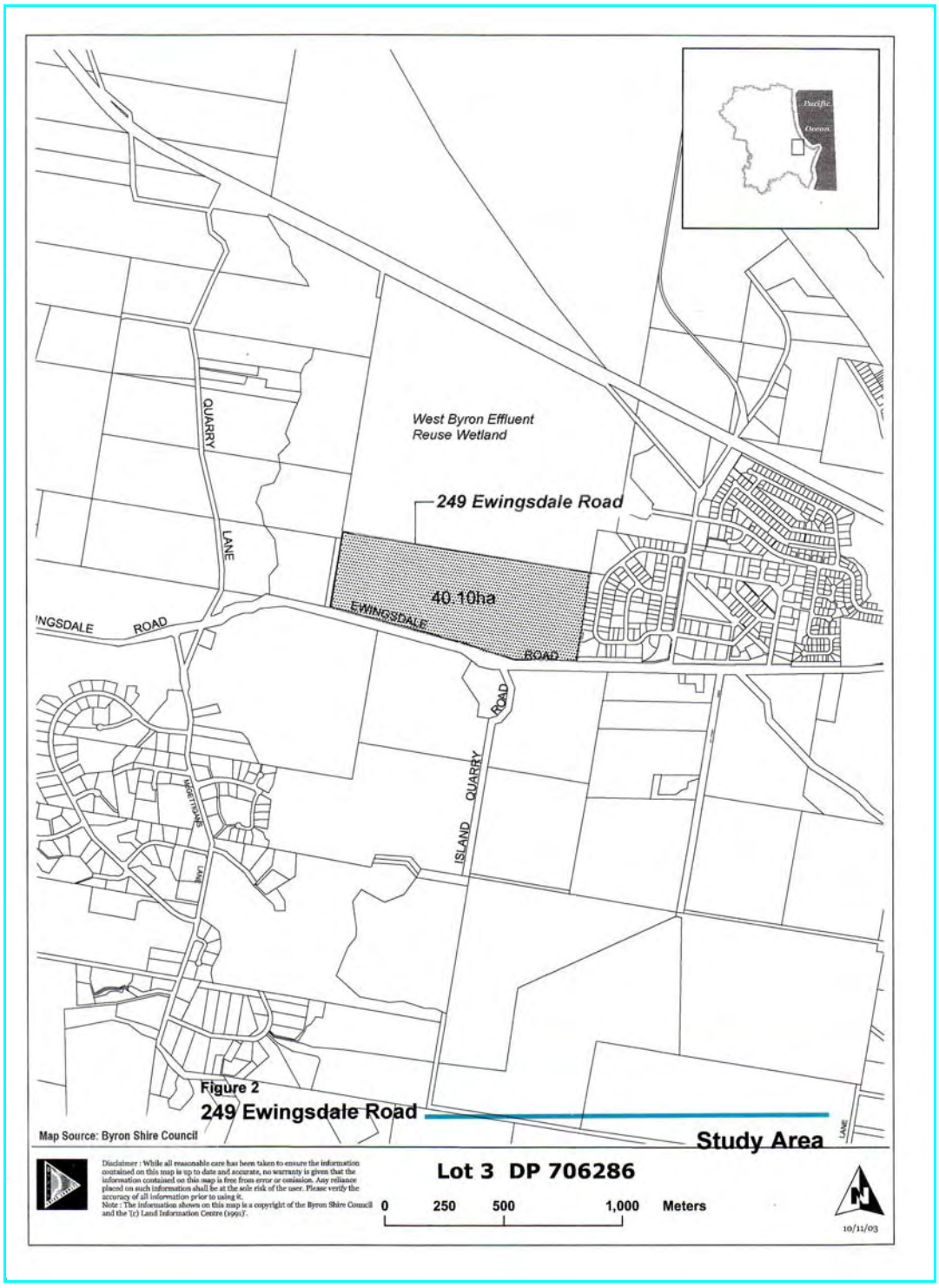
This flat, low-lying site was purchased by Byron Shire Council for operational and community uses. The site has a history of partial clearing and modification for agricultural activities. Nevertheless, most of the land still retains significant sedgeland habitat and biodiversity, particularly within the greater western portion of the site. The eastern portion has an existing cottage serviced by an unsealed access road. This area has been largely cleared for livestock grazing *(refer to Figure 2: Study Area)*.

1.3 AIMS AND OBJECTIVES

A community land plan of management provides the framework for managing community land. This plan of management has been prepared for Byron Shire Council under the direction of Council's Administration and Community Services. It has been prepared in accordance with the *Local Government Act 1993* and all other relevant legislation and policies.

The plan of management also establishes the framework for public land classification into separate operational and community land parcels. Following the private land purchase, Council resolved to classify the land as operational (as an interim measure) pending a land use study and assessment. Issues relating to the acquisition and classification of public land and categorisation of the community land portion are discussed in the following section *2.0 Land*

Description and Planning.



This plan of management aims to be performance oriented in order to contribute towards Council achieving its strategic goals, vision and outcomes as identified in the *Management Plan 2004-2007.* The following key objectives have guided the preparation of this plan of management:-

- establish an appropriate framework for land management in accordance with the relevant legislation;
- address land classification and community land categorisation issues;
- identify and assess key values and existing land condition;
- identify and assess land capability, potential future uses, facilities and improvements (including scale and intensity) and potential impacts;
- define the future role of the community land within the local area and Byron LGA;
- set a vision for the future reserve spanning the next 20-30 years;
- establish appropriate management strategies based on a balanced, sustainable approach to conservation, recreation, cultural and social needs of the community;
- address future leases/ licences affecting the community land;
- develop performance targets to assess and monitor objectives;
- assign directions and priorities (spanning the next 5-years); and
- develop a masterplan for implementation of the strategic plan.

1.4 RELEVANT LEGISLATION AND POLICIES

This plan of management has been prepared in accordance with the provisions contained in relevant legislation and policy guidelines, including but not limited to the following:

- Local Government Act 1993
- Local Government (General) Regulation 1999
- Environment Protection and Biodiversity Conservation Act 1999
- Threatened Species Conservation Act 1995
- Fisheries Management Act 1994
- Native Vegetation Conservation Act 1997
- National Parks and Wildlife Act 1974
- Noxious Weeds Act 1993
- Rural Fires Act 1997
- Environmental Planning and Assessment Act 1979
- Disability Discrimination Act 1992
- Integrated Catchment Management Plan - Northern Rivers Catchment (2002)
- NSW Flood Policy 1984
- NSW Wetlands Management Policy 1996
- NSW Floodplain Management Manual 2001

- Byron Shire Council Management Plan 2004-2007
- Byron Local Environmental Plan (LEP) 1988 (as amended)

- Byron State of the Environment Report
- Byron Flora and Fauna Study
- Byron Biodiversity Conservation Strategy 2003
- Byron Shire Council Social Plan 1999
- Byron Shire Community Profile (based on 2001 census data)
- Byron Shire Council Community Safety Plan 2003
- Byron Section 94 Plan 2001

1.5 LIST OF ABBREVIATIONS

BBCS	Byron Biodiversity Conservation Strategy 2003
DIPNR	Department of Infrastructure Planning and Natural Resources
LEP	Byron Local Environmental Plan 1988
LGA	Local Government Area (Byron Shire Council)
NPWS	National Parks & Wildlife Service (NSW)
NSWRFS	New South Wales Rural Fire Services
BSC	Byron Shire Council
TSC Act	Threatened Species Conservation Act 1995

2.0 LAND DESCRIPTION AND PLANNING

2.1 INTRODUCTION

Table 1: Land Description – 249 Ewingsdale Road, Byron Bay identifies the existing buildings and improvements to the subject land. A brief assessment of condition is provided. The existing farm cottage is currently under lease and two cattle agistment leases are in operation. The land is primarily vegetated with native sedgeland, fernland and grassland. The existing vegetation is described in other sections (refer to *4.0 Basis for Management*).

TABLE 1:
LAND DESCRIPTION – 249 EWINGSDALE ROAD, BYRON BAY

Land Description	Area (Ha)	Existing Facilities/ Improvements	Condition
Lot 3 DP 706286	40.10	livestock fencing/ entry gates (boundary/ internal)	good
		gravel access road (to cottage)	good
		brick/ concrete block & metal roof cottage	poor
		attached storage shed/ verandah	poor
		dam/ pond & stockpiled materials/ soil	poor
		power poles/ lines	good
		native sedgeland/ fernland/ grassland	n/a
		mixed native paperbark/ woodland regrowth	n/a
		slash pine plantation & exotic grasses/ weeds	n/a

2.2 BACKGROUND TO LAND ACQUISITION

The property described as 249 Ewingsdale Road, Byron Bay (Lot 3 in DP706286) was purchased by Byron Shire Council on 16 May 2003. The purchase was based on a preliminary investigation of potential operational and community uses for the land as follows:-

- operational use of the western portion of the land as an extension of Council's West Byron Effluent Reuse Wetland Project;
- suitability of the relatively flat eastern portion for sporting fields (identified as a high need/ priority in Byron Bay);

- potential for other community uses including a festival site, out-of-town parking and opportunities for an entry "gateway" to the township;
- benefits associated with the contiguous nature of Council owned land including the West Byron Effluent Reuse Wetland (northern boundary) with further options for access; and
- options for partial rezoning and alternative uses.

The land acquisition was made in accordance with the *Byron Shire Council Management Plan 2003-2006* and the key strategic objectives of a *resilient community*, *infrastructure assets*, *revenue and resources*. Council resolved on 18 August 2003:

"that all land being Lot 3 DP 706286 be classified as operational pending a land use study and assessment to be conducted by staff to assist Council in the determination of the use and proportional funding for the purchase…".

Originally, it was envisaged that the boundary between operational land (ie. area targeted for future extension of effluent reuse wetland) and community land (ie. community open space) would be established through the plan of management process. The Draft Plan of Management (Issue A: 5 June 2004) was prepared on this basis. Following consideration of the Draft Plan of Management, Council at its meeting on 25 June 2004 resolved that the boundary should be determined solely on the basis of funding for purchase of the land (ie. Section 94 Fund – community land portion (72%) and Sewer Fund – operational land portion (28%)).

2.3 CLASSIFICATION OF PUBLIC LAND

In accordance with the *Local Government Act 1993* all public land must be classified (s.25) as either community land or operational land (s.26). The purpose of classification is to clearly identify public land for use by the general public (community land) and land which would be used for operational purposes (operational land).

Classification has a direct consequence on council's ability to dispose or alienate the land by sale, leasing or some other means. The classification or reclassification of public land will generally be achieved by a local environmental plan (LEP) or in some circumstances, by a resolution of Council under sections 31, 32 and 33 of the *Local Government Act 1993*.

2.4 OPERATIONAL LAND

Operational land is not subject to the same restrictions placed on community land under the *Local Government Act 1993*. Operational land would usually include the following:

- land held as a temporary asset;
- land held as an investment;
- land which facilitates the carrying out by a council of its functions; or
- land which may not be open to the general public (eg. sewage treatment plant).

There is no requirement under the *Local Government Act 1993* to prepare a plan of management for operational land. This plan of management covers only the community land portion of the site and does not include any land to be retained for operational purposes.

2.5 COMMUNITY LAND

Community land must be managed in accordance with the *Local Government Act 1993* and all other relevant legislation and policies. The ways in which community land can be used and managed are strictly governed in accordance with an adopted plan of management and any law permitting the use of the land for a specified purpose or otherwise regulating its use. The nature and use of community land may not change without an adopted plan of management. Community land must not be sold, exchanged or otherwise disposed of except in the instance of enabling the land to be added to Crown reserve or a protected area under the *National Parks and Wildlife Act 1974*.

The use and management of community land must also be consistent with its designated categories (ie. natural area, sportsground, park, area of cultural significance and general community use) and their respective core objectives (refer to *5.0 Management Strategies – Community land categories and core objectives*).

2.6 DISCUSSION OF LAND CAPABILITY OPTIONS

No specific requirement for extension of the West Byron Effluent Reuse Wetland has been identified at this stage, however this option was a key consideration in the purchase of this land at 249 Ewingsdale Road. Future operational land area requirements have not yet been defined. Nevertheless, partial funding for the land acquisition was sourced from the Water and Sewerage Fund on the basis that a portion of land would be retained for possible future extension of constructed wetlands and other sewerage infrastructure. Land for this purpose would need to be retained as operational land.

In addition to operational issues, community expectations have been raised with respect to a substantial portion of the site being developed as community land. Community demand for additional recreational infrastructure in Byron Bay, particularly sporting fields, was identified as a key consideration in the

land purchase. A range of other potential community uses were also raised. The land assessment process has given due consideration to a broad range of inter-related environmental, social and economic factors in accordance with the principles of sustainability. The Concept Plan identifies the need for sporting and recreational facilities as the key element in determining the way most of the community land portion should be developed (refer to *Figure 9: Concept Plan*).

It is also important to recognise that any community land that includes natural areas (eg. this site's sedgeland, sedge/ fernland, sedge/ grassland and coastal woodland habitats) is subject to legislation covering the protection and maintenance of biodiversity under the *Local Government Act 1993* and *Threatened Species Conservation Act 1995.* Accordingly, the site offers significant challenges in terms of potential suitability of land uses, recreational activities, conservation and sustainability. Options relating to construction of sporting fields, associated recreational infrastructure, access and parking are affected by site constraints, particularly with respect to the following:-

1. **Ecological sensitivity/ biodiversity**
   natural area/ biodiversity protection and management (significant habitat, threatened species and wildlife corridor).
2. **Peat/ sand soil characteristics**
   limitations on soil capability for sports field construction (ie. peat/ sand levels and acid sulfate soils).
3. **Recreational spatial requirements**
   spatial requirements for recreational infrastructure.
4. **Traffic management and site access**
   traffic management and access to the site off Ewingsdale Road.

1. Ecological Considerations

The *Byron Biodiversity Conservation Strategy (BBCS, 2003*) highlighted the important ecological and biodiversity values associated with this site. Most of the sedgeland complex was ranked as "Extremely High Ecological Value" and assigned the highest priority for conservation. At least three scheduled threatened species – the Wallum Froglet, Wallum Tree Frog and Grass Owl, were believed to be dependent on the existing wetland complex of sedgeland/ fernland and grassland habitats (*Bower, H. and Fitzgerald, M, pers. comm.).* The Draft Plan of Management (Issue A: 5.06.2004) identified the need for further data on threatened species and ground truthing of existing habitat mapping. In particular, concerns were raised over the potential modification or removal of vital habitat and local corridor linkages for threatened species. During the latter part of 2004, Byron Shire Council appointed ecological consultant, Mark Fitzgerald to prepare an Ecological Habitat Assessment and Flora and Fauna Survey for the site.

This study identified six threatened fauna species during the survey and three more recorded from the WBSAS SIS. An additional seven species are expected to occur on the site, particularly during flood events. The study highlighted the site's significance as a locally important area, "a rare habitat within Byron Shire" and "an important local link in the major north-south wildlife corridor of the Byron coastal plain" (Fitzgerald, M., *Ecological Habitat Assessment and Flora and Fauna Survey at 249 Ewingsdale Road, West Byron Bay – Final Report for Byron Shire Council*, p.42). The conclusions and recommendations of this ecological study need to be carefully integrated within the objectives of this plan of management. For further discussion of biodiversity values refer to *4.6 Environment and Biodiversity – Conservation Significance*.

2. Peat/ Sand Soil & Acid Sulfate Soil Considerations

Site investigations were undertaken in June-July 2003 to establish the depths of peat soil and sand layers over the site (*Survey of Sand and Peat Soil Layers on a 40 Hectare Block at West Byron Bay by T. Ryffel & K. Bolton*). The study identified deep peat layers over the western portion of the site grading to more shallow levels of peat towards the middle section of the site (approx. 65% of total area). No peat layer was found in the eastern portion of the site (approx. 35% of total area). An internal report to Council subsequently identified a potential area of 14 hectares in the eastern portion of the site which could be used for sports fields without any major ground works. It was noted that removal of peat to enable development of further sports fields may raise environmental concerns.

The relationship between the peat/ sand soil depths is an important factor affecting future recreational development on the site. Filling and levelling for construction of playing fields over peat subgrade may lead to patterns of differential settlement and subsidence of the playing surface. The Concept Plan establishes a required area of 16.20 hectares (ie. an additional 2.4 hectares compared to the area identified in the earlier report) and extends the boundary of proposed playing fields to within the –550 mm peat contour depth. This proposal will require major ground works for these western edge playing fields in order to avoid potentially costly repairs at later stages. Any disturbance, excavation and removal of the peat layer would be subject to stringent environmental controls. The study findings support the extent and range of Class 2 and 3 Acid Sulfate Soils on this site as shown on the *Acid Sulfate Soils Planning Map.* For further discussion of peat and sand soil depths refer to *4.6 Environment and Biodiversity – Geology and Soils*.

3. Recreational & Social Infrastructure Considerations

There is no current recreational needs assessment or data relating to existing or future recreational demand within the Byron Bay area. Nevertheless, demand for sports playing fields and other active recreation were highlighted

in the community consultation process. In terms of supply, public playing fields are restricted to only one major location – Byron Bay Recreation Grounds in the centre of town. Facilities are needed for soccer, rugby, hockey, cricket, softball, basketball, netball, athletics and track cycling. These recreational needs and supply issues are critical factors in the preparation of this Plan of Management. Other potential uses which were reviewed for 249 Ewingsdale Road included "park and ride" facilities, visitor information/ environmental interpretation, an area for a festival site and shared pedestrian/ bikepath with connections to the town centre.

During the consultation phase of this study, the Byron Sports Association submitted a proposal outlining a supply target for recreational facilities which would cover a site area of approximately 19 hectares. Multi-use sporting fields and facilities catering to various user groups have been considered in the demand/ supply analysis. The area available for recreational development, as defined by land capability and environmental priorities, is significantly smaller than this figure. Refer to section *4.7 Future recreation, facilities and access*.

4. Traffic Management Considerations

Traffic management and vehicular access to the site needs to be investigated under the proposed *Traffic Management Plan for Ewingsdale Road* through to Byron Bay township. These investigations are beyond the scope of this plan of management but will nevertheless have a significant impact on the future outcomes for this site. This road carries high volumes of traffic with peak periods of chronic congestion. Alternate access off Bayshore Drive via an existing stockpiling yard would require movement through the STP site and potential disturbance of high value habitat. At this preliminary stage of investigations, site access off Ewingsdale Road is the preferred option and this would need to be part of a broader rationalized approach to traffic management. Existing access points into neighbouring properties would need to be considered in these investigations. In the interim, the Concept Plan in this Plan of Management proposes an optional roundabout adjacent to the Island Quarry site, approximately 200 metres west of the existing access point to 249 Ewingsdale Road.

Recommendations

As discussed in earlier sections, Byron Shire Council at its meeting on 25 June 2004 resolved that the boundary should be determined solely on the basis of funding for purchase of the land (ie. Section 94 Fund – community land portion (72%) and Sewer Fund – operational land portion (28%)). Refer to *Figure 3: Proposed Boundary for Reclassification to Operational Land and Community Land* and *Table 2: Operational Land and Community Land*. This boundary lies within the highly significant sedgeland complex habitat and vital faunal corridor. The *Byron Biodiversity Conservation Strategy* has ranked this area as "Extremely High Ecological Value" – the highest conservation priority

in the study. It is recommended that these important habitat values affecting all of the designated operational land and part of the community land portion are given appropriate protection and management.

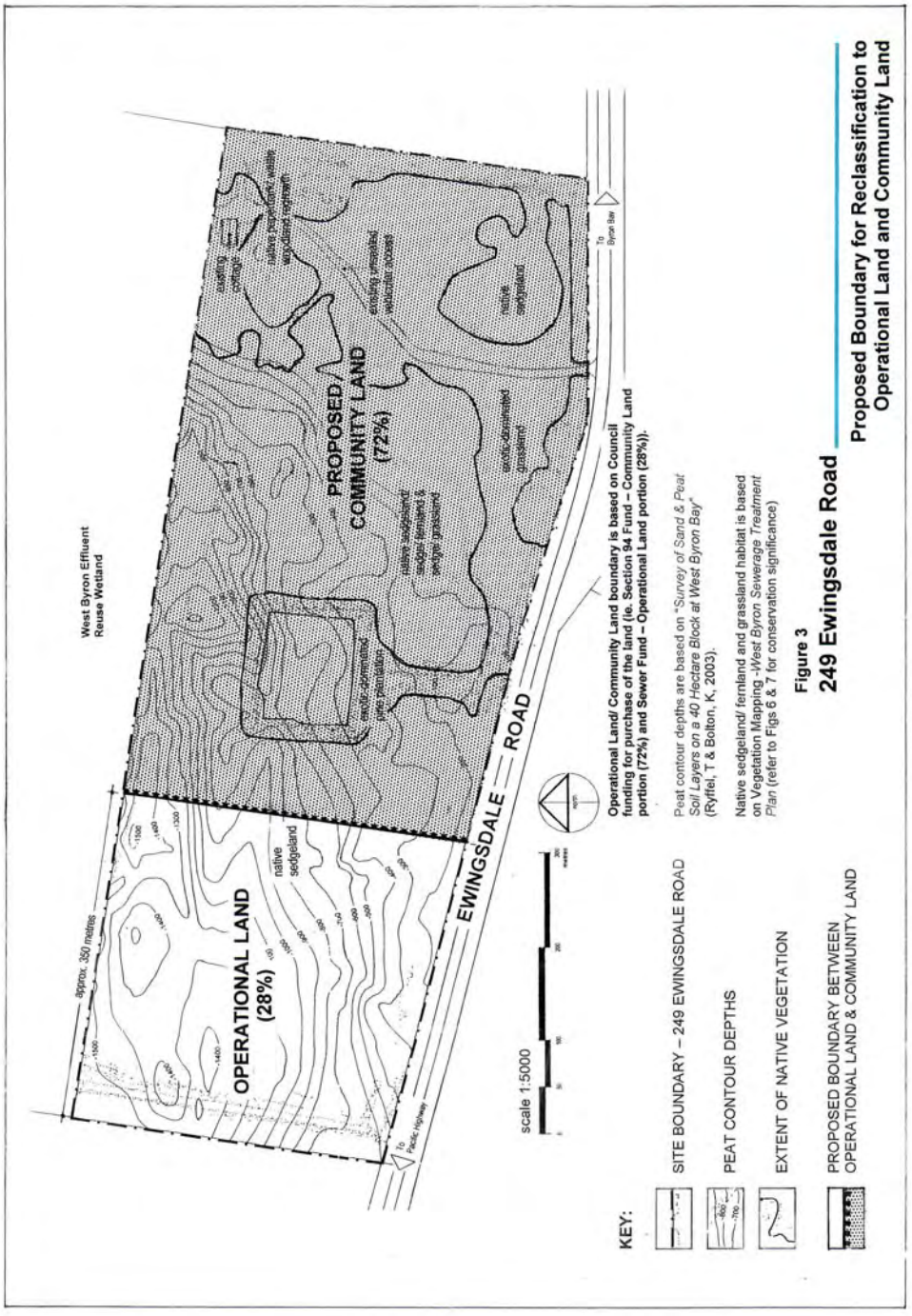


Figure 3
249 Ewingsdale Road
Proposed Boundary for Reclassification to Operational Land and Community Land

The approach to land management should be values-based and emphasise the "precautionary principle" as identified in the Guiding Principles of the Byron LEP (3)(a). The precautionary principle is defined by the *Australian Natural Heritage Charter* as follows:-

> "…where there are threats or potential threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation."

This approach is consistent with Council's LEP and current zoning objectives, Council's vision of a sustainable future for the Byron LGA and biodiversity planning provisions under the TSC Act.

An important correlation exists between the peat and sand soil interface and the extent of significant sedge/ fern and grassland habitat as identified in the BCCS (2003). A similar boundary is defined in the *Weed Management Plan – West Byron STP*. The physical boundary defining past land uses (ie. natural vegetated areas on waterlogged soils vs. cleared drier areas/ pasture grasses) also provides a subtle indicator of land capability. Community, social and recreational values also need to be considered. The pressing need for recreational facilities has been identified by the community and Sporting Fields Working Group as the major factor determining land use capability in this study. Accordingly, this factor has been given a very high priority in establishing the extent of proposed sports fields within community land (refer to *Figure 9: Concept Plan – Community Land Sports Fields).*

TABLE 2: OPERATIONAL LAND & COMMUNITY LAND

Land Description	Portion	Area (hectares)	Proposed Classification
Part Lot 3 in DP 706286	western	11.23	operational land (28%)
Part Lot 3 in DP 706286	eastern	28.87	community land (72%)

2.7 REGIONAL CONTEXT – ADJOINING LAND ZONING

The land lies within a significant corridor of remnant coastal habitat linking Bilongil Swamp and Tyagarah Nature Reserve (north), Cumbebin Swamp Nature Reserve (east) and Hayters Hill Nature Reserve (south). This habitat is highly fragmented with a broad range of zonings under the existing Byron LEP. Significant opportunities exist to promote and enhance bio-linkages within this corridor. The West Byron Effluent Reuse Wetland located immediately to the north of the site, is zoned 5(a) (SPECIAL USES ZONE). This area includes SEPP 14: Coastal Wetland zoned as 7(a) (WETLAND) and 7(b) (COASTAL HABITAT ZONE). The land immediately to the south of the

site, adjoining Ewingsdale Road, is also zoned 7(b) (COASTAL HABITAT ZONE). The adjoining Island Quarry site, located within this corridor, is a Crown reserve and former quarry. The land, zoned as 1(a) (GENERAL RURAL ZONE) is now under the management of a reserve Trust – Island Quarry (IQ) Association Inc. The land is currently used as a centre for community arts and environmental workshops/ events and waste recycling.

The wildlife corridor is bounded on the western side by land zoned as 1(b1) (AGRICULTURAL PROTECTION (b1) ZONE). Land included under this zoning has the following objectives:-

"to ensure that the use and other development of land adjacent to areas of significant vegetation, or wildlife habitat, or in a potential wildlife corridor, does not result in any degradation of that significant vegetation, wildlife habitat or potential wildlife corridor, and that any such development conserves, protects and enhances the value of the flora or fauna or the potential wildlife corridor concerned."

Although broad buffer provisions for habitat protection and enhancement are contained in the existing LEP for lands adjoining the western side of the site and corridor there are no such provisions for adjoining land along the eastern boundary of the site. The Byron Bay Arts & Industry Estate adjoining the eastern boundary of the site is zoned 4(a) (INDUSTRIAL ZONE). The land immediately to the south-east is used for poultry farming and includes buildings for processing (Sunnybrand Chickens). This land is zoned 1(ah) (HAZARD INDICATION ZONE). Under this zoning, Council must consider potential hazards such as flooding, bushfire and acid sulfate soils with respect to proposed development.

There is little or no landscape embellishment to the neighbouring industrial estate and public streets. All native vegetation has been removed. Building forms and finishes on adjoining industrial land have an abrupt and disjunctive impact on the rural and natural landscape character of the area. At the macro-level, this neighbouring industrial area has a far-reaching negative impact on the landscape character and scenic quality of the bay. This impact is particularly significant from the coastal foot-hills (Pacific Highway southern approach near McLeod's Shoot), St Helena Road and Bangalow Road (near Hayters Hill).

2.8 EXISTING ZONING OF 249 EWINGSDALE ROAD

The existing sedgeland on the site is not covered by *State Environmental Planning Policy (SEPP) No.14 – Coastal Wetlands*. All of the land on this site is described as Class 2 or 3 – Acid Sulfate Soils (refer to *4.6 Environment and Biodiversity*). The land is currently zoned as 1(d) (INVESTIGATION ZONE) in accordance with the *Byron Local Environmental Plan (LEP)* (refer to Figure 4:

Existing Zoning) The objectives of this zone are as follows:-

- to identify land which is to be investigated in respect of its suitability for rezoning for more intensive development;
- to ensure that development within the zone is compatible with the anticipated future development of the land;
- to ensure that development maintains the existing character of the locality and minimizes disturbance to the scenic value of the escarpment and landscape through clearing, earthworks, access roads and construction of buildings;
- to ensure that development does not create unreasonable or uneconomic demands, or both, for provision or extension of public amenities or services;
- to identify land requiring protection of significant vegetation and wildlife habitats, and to ensure that development does not adversely affect the integrity of the environment.

The zoning objectives focus on future development strategies which would maintain the existing landscape character and scenic quality, protect significant vegetation and wildlife habitats and ensure a balanced approach to provision of public amenities or services. In considering any development application in relation to future uses of this land, Council must ensure that the following matters are investigated:-

- land capability;
- demand for the development of the land;
- whether the land can be serviced with water, sewerage and roads, and the likely future road network;
- strategic implication of the development of the land;
- whether the land is located within the buffer area of a quarry, piggery or sewage treatment works; and
- environmental management of the land.

Development consent cannot be granted by Council unless it has considered the need to protect significant vegetation and wildlife habitats and to ensure that any development will not adversely affect significant vegetation and wildlife habitats on this land or adjacent land.

Figure 4
249 Ewingsdale Road
Existing Zoning

2.9 PROPOSED ZONING OF 249 EWINGSDALE ROAD

It is important to ensure consistency between the LEP and the principles of community land management, particularly with respect to classification of public land and categorisation of community land. The site's zoning will be subject to the changing place-based LEP process. In the interim however, it is recommended that in accordance with the land assessment, as described in this plan of management, the land should be rezoned as follows (refer to *Figure 5: Proposed Zoning*)

- all operational land [western portion of site] and portion of community land [west of proposed sports fields] rezoned as 7(k) (HABITAT ZONE); and
- proposed community land [eastern portion including sports fields and associated infrastructure] rezoned as 6(a) (OPEN SPACE ZONE).

Proposed Habitat Zone 7(k) Objectives

The LEP objectives for this zone are:-

- to identify and protect significant vegetation and wildlife habitats for conservation purposes;
- to prohibit development within the zone that is likely to have a detrimental effect on the wildlife habitats which exist;
- to enable the carrying out of development which would not have a significant detrimental effect on the wildlife habitats; and
- to enable the careful control of noxious plants and environmental weeds by means not likely to be significantly detrimental to the native ecosystem.

No works on this portion of the site would be permissible without development consent. The following land uses, activities and development on this portion of the site would be permissible, subject to development consent:-

- agriculture (other than animal establishments and clearing of land); bushfire hazard reduction; appropriate ecological management regimes; environmental facilities; roads and utility installations.

This portion of the site is mapped as Class 2 on the Acid Sulfate Soils Planning Map. The following works would be subject to development consent:-

- works below the natural ground surface; and
- works by which the watertable is likely to be lowered.

Proposed Open Space Zone 6(a) Objectives

The relevant LEP objectives for this zone are:-

- to ensure that there is adequate provision of both active and passive open space to serve the present and future recreational needs of residents and visitors;
- to identify land where existing recreation facilities for the general use of the community are provided;
- to provide opportunities to enhance the total environmental quality of the Shire of Byron.

Works on this portion of the site which would be permissible without development consent include:-

- landscaping; general park maintenance; bushfire hazard reduction; bush regeneration/ restoration.

The following land uses, activities and development on this portion of the site would be permissible, subject to development consent:-

- agriculture (other than animal establishments); childcare centres; cycleways; drainage; environmental facilities; markets; primitive camping grounds; recreation areas; restaurants; roads; recreation vehicle areas; showgrounds; carparking; festival areas; roads; carparking and utility installations.

The western portion of this area is mapped as Class 2 on the Acid Sulfate Soils Planning Map (refer to *Proposed Habitat Zone 7(k) Objectives* for development consent requirements). The greater eastern portion is mapped as Class 3 on the Acid Sulfate Soils Planning Map. The following works would be subject to development consent:-

- works beyond one metre below the natural ground surface;
- works by which the watertable is likely to be lowered beyond one metre below the natural ground surface.

For further details of permissible uses, activities, scale and intensity of future development refer to *5.0 Management Strategies*.

Figure 5
249 Ewingsdale Road
Proposed Zoning

2.10 LEASES, LICENCES OR OTHER ESTATE

A lease, licence or other estate may be granted, in accordance with an express authorisation by this plan of management, providing the lease, licence or other estate is for a purpose prescribed in s.46 of the *Local Government Act 1993.* The purpose must be consistent with core objectives for the category of community land (refer to *5.3 Community Land – Core Objectives*).

An existing lease for use of the farm cottage is operating on a month to month basis. Two cattle agistment leases are also current. It is envisaged that these leases would be terminated prior to development of the site for community uses. For express authorisation of future permitted leases, licences or other estate refer to *5.0 Management Strategies: items D1-D4*.

Council must not grant a lease, licence or other estate for a period (including any period for which the lease could be renewed by the exercise of an option) exceeding 21 years. A lease, licence or other estate may be granted only by tender in accordance with s.46A of the *Local Government Act 1993 (as amended)* and cannot exceed a term of 5 years (including any period for which the lease could be renewed by the exercise of an option), unless it satisfies the requirements as scheduled in s.47, or is otherwise granted to a non-profit organisation (refer to *Leases, licences and other estate in respect of community land – s.46, 46A, 47 and 47A Local Government Act 1993).* In the event of an objection to the proposed lease or license, the Minister's consent must be obtained. Furthermore, leases, licences or other estate must not be granted in respect of land categorised as a natural area, unless it is for a purpose prescribed in s.47B of the *Local Government Act 1993.*

2.11 OTHER LEGISLATIVE REQUIREMENTS

Native Vegetation Conservation Act 1997

This plan of management aims for consistency with the following objectives of the *Native Vegetation Conservation Act 1997*:-

(a) to provide for the conservation and management of native vegetation on a regional basis;
(b) to encourage and promote native vegetation management in the social, economic and environmental interests of the State;
(c) to protect native vegetation of high conservation value;
(d) to improve the condition of existing native vegetation;
(e) to encourage the revegetation of land and the rehabilitation of land with appropriate native vegetation;
(f) to prevent the inappropriate clearing of vegetation;
(g) to promote the significance of native vegetation in accordance with the

principles of ecological sustainable development.

Threatened species legislation

This plan of management aims for consistency with threatened species legislation. The *Threatened Species Conservation Act 1995* provides the legislative mechanisms for dealing with listed items. The operational land and community land on this site contain habitat of extremely high significance *(BBCS, 2003).* A total of six threatened fauna species were identified in a recent study. When endangered species, populations or ecological communities are scheduled under the TSC Act, the following legal responses are triggered:-

(a) land can be declared as "critical habitat"; or
(b) a "recovery plan" must be prepared; and
(c) where key threatening processes have been identified under Schedule 3, a "threat abatement plan" must be prepared.

In accordance with the *Local Government Act 1993,* community land which is affected in any of these ways under the *Threatened Species Conservation Act 1995* or *Fisheries Management Act 1994*, the following applies:-

- the land must have its own plan of management (it cannot be a generic plan);
- the plan must state whether the land has been declared as "critical habitat" or affected by a "recovery plan(s)" or "threat abatement plan";
- the land must be categorised as a natural area;
- must have consistency in the management objectives of the land and the *Threatened Species Conservation Act* or the *Fisheries Management Act*;
- the plan must incorporate the core objectives prescribed for a natural area;
- the draft plan must be forwarded to the Director General of National Parks and Wildlife or the Director of NSW Fisheries and must incorporate any requirements made by either person;
- no change in the use of the land is permitted until a plan of management has been adopted that meets the above requirements;
- no lease or licence can be granted until a plan of management is in place – (leases and/or licences that are in place before the land was affected by threatened species laws can continue to operate).

3.0 COMMUNITY CONSULTATION

3.1 INTRODUCTION

Community consultation has been an important component of the plan of management process. Byron Council has promoted an open, transparent approach to community consultation, providing opportunities for stakeholders and members of the community to contribute comments and submissions or to discuss specific issues.

It is important that community consultation continues through to public exhibition phase and release of the draft plan of management, at which time the community has a further opportunity to make final comments and submissions. This process highlights the significance of community ownership in the final plan of management.

3.2 PUBLIC WORKSHOP/ OPEN HOUSE

A public workshop was held at Byron Bay Community Centre – Fletcher Street Room, Byron Bay on Thursday 11th March 2004. The format for the workshop was designed as an informal "open house" style where individuals, community groups and Councillors could drop-in and leave as desired. The open house was widely advertised by Council as follows:-

- press releases to Byron Shire News and the Byron Shire Echo;
- notice in Council's block of the Byron Shire News for the two weeks ending 27.2.04 and 5.3.04;
- notice in Councillor Newsletter; and
- signs erected on location during the week of the consultation.

Council prepared a stakeholders list for the consultants, LandArc Pty Limited. These people were contacted in the week leading up to the open house. A number of issues were discussed with stakeholders who could not attend the open house. These issues have been noted and reviewed as part of the consultation process. Meetings were also held between Council staff and major stakeholders during the week of the open house.

The open house aimed to establish community values and to discuss the relevant issues affecting the future use of the public land acquired at 249 Ewingsdale Road, Byron Bay. The proceedings were facilitated by Noel Ruting, a Director of LandArc Pty Limited. It was intended to run the open

house between 4-6 pm and 7-9 pm, however discussion continued through without any break. A total of 16 people attended the open house session. People were encouraged to ask questions, make comments and provide further detailed submissions for the future use of the public land. Apart from Councillors and individual participants, the key stakeholder groups represented at the workshop included the following (in alphabetical order):-

- BEACON – Byron Environment and Conservation
- Bikes Committee (Byron Shire Council)
- Byron Bay Hockey Club
- Byron Bay Little Athletics Centre Inc.
- Byron Bay Soccer Club
- Byron Bay Sports Association
- Byron Environment Centre
- Ewingsdale Progress Association & Hall Committee Inc.
- IQ Inc. (Island Quarry Reserve Trust)
- Women for Wik

The issues raised by participants were recorded at the open house session. A Community Issues Questionnaire (pro forma) was also distributed for written comments. A total of eight completed questionnaires were received. Most of the submissions and completed questionnaires were mailed to LandArc after further consideration of the issues. Written submissions were received from the following individuals and groups (refer to *Table 3: Summary of Community Issues and Appendix I: Written Submissions & Questionnaires*):-

- Byron Bay Sports Association
- Byron Bay Soccer Club
- Byron Bay Little Athletics Centre Inc.
- Byron Bay Freeriders Inc.
- Ewingsdale Progress Association & Hall Committee Inc./ R. Grinberg;
- IQ Association Inc./ S. Rennie (Island Quarry Reserve Trust)

3.3 FURTHER CONSULTATION

Following concerns raised over the small number of people at the open house, the questionnaire was placed on Council's web-page to ensure further opportunities for community consultation. Issues relating to the future of the site were also highlighted in a front page article of the Byron Bay Echo following the open house.

In addition, Council's staff (including administration and community services, strategic planning water and waste, environmental planning, infrastructure planning) were consulted prior to completion of the Draft document. After submission of the Draft Plan of Management (Issue A: 5 June 2004), Byron

Shire Council conducted further consultation with the community to address issues regarding future provision of recreational facilities on this site.

TABLE 3: SUMMARY OF COMMUNITY ISSUES

Name/ Stakeholder	Key Issues
Byron Bay Sports Association	▪ acknowledges size constraints on land parcel ▪ sporting facilities are considered paramount ▪ critical shortage of land available for community ▪ inadequate sporting and recreational facilities ▪ also need for passive recreation/ community buildings ▪ allow adequate room for expansion (next 50 years) ▪ need to address a wide range of usage/ shared facilities ▪ requests following recreational infrastructure: - 2 X rugby fields - 1 X hockey field - 2 X cricket fields (1 turf/ 1 concrete wicket) - 1 X softball diamond - 3 X soccer fields - 4 X netball courts - 1 X indoor stadium (incl. indoor basketball/ soccer/ hockey/ cricket/ netball) - carparking area (incl. sketch plan showing layouts/ approx. 19 Ha)
Byron Bay Soccer Club	▪ adequate areas for all sporting clubs to service needs ▪ soccer identified as largest club sport in Byron Bay ▪ need for quality playing surfaces (incl. wet weather) ▪ suitable landscaping/ appropriate shade for spectators ▪ minimum sports field/ facilities requirements: - 3 X international size fields - 2 X mini-fields - indoor sports complex (multi-purpose/ wet weather)
Byron Bay Little Athletics Centre Inc.	▪ two seasons operating/ increasing registration 130 to 162 ▪ existing inadequate facilities at Byron Bay High School ▪ cannot host zone events/ need for athletes to travel ▪ need for quality playing surfaces (incl. wet weather) ▪ athletics requirements: - 400 metre/ 8 lane running track & areas for discuss, javelin, long jump and shot put - storage area for equipment (approx. 40m³) - adequate change-rooms/ toilets (for carnivals) - canteen facilities - carparking for up to 1000 athletes at carnivals
Byron Bay Freeriders Inc.	▪ over 40 club members ▪ current permitted closed circuit racing in Industrial Estate ▪ need for closed circuit criterium bicycle racing ▪ 600-800 metres length/ 6 metres width ▪ potential use of a future service access road system ▪ improved safety/ less disruption to business & services ▪ growth sport/ raise community profile/ juniors ▪ requests banked concrete track around one sports field
Byron Environment Centre	▪ preference for division of site into 2/3 wetland sanctuary and 1/3 showground/ 'park and ride' facility ▪ no objection to irrigation with treated effluent

	▪ protect native flora & fauna (incl. endangered species) ▪ urgent need for 'park and ride' for a sustainable future

continued

Name/ Stakeholder	Key Issues
Ewingsdale Progress Association & Hall Committee Inc.	▪ Ewingsdale Road is the main tourist artery in Byron Shire ▪ estimated 1.7 million visitors per year using this road ▪ very poor visual quality of roadway ▪ turn delicate marsh environment into an eco-tourism facility like Fleay's Wildlife Park, Gold Coast ▪ vision for landscaped tourist road/ entry statement in a 'tropical modern style' with road-side art installations ▪ appropriate management of roadside environment (incl. dumped vehicles, litter, vandalism, graffiti, etc.) ▪ urgent need to address road safety issues (narrow/ no road shoulder, steep drop to sides; no space for bicyclists; this road has highest incidence of car accidents in Shire; peak season traffic congestion; need for reduction in speed limit from 80kph to 60kph) ▪ in addition to festivals/ sporting fields, site should be used for promotion of tourism (incl. information kiosk, ample parking and 'park and ride' facilities ▪ other stated issues (relevant to this plan of management): - Council's use of road for gravel storage - Sunnybrand Chickens (smell and visual aspects) - need for separate bikepath
IQ Association Inc. (Island Quarry Reserve Trust)	▪ envisages opportunities for synergies between the IQ site and 249 Ewingsdale Road ▪ supports a mix of environmental protection and buffers, community sporting facilities, a 'park and ride' facility and bikeway connecting to Byron Bay town centre ▪ believes some merit in a tourist information centre ▪ proposes a new through road (across site) connecting to Bayshore Drive and Sunshine Beach and connections between on-site eco-bus station/ "park and ride" with access to a new train station and shuttle link into town (incl. sketch plan of "Byron Gateway" proposal) ▪ future roadworks should incorporate bikeway linkages between Bilongil Bridge and the Pacific Highway, incl. overhead bridge connection between the site and IQ ▪ need for safe access to community facilities, sports fields, skateparks, playgrounds and meeting venues ▪ concern over extending constructed effluent re-use wetlands and impact on habitat of endangered species
Other Questionnaire Responses	▪ need for Ewingsdale Road to be made better and safer ▪ need for more sports fields and facilities for Byron Bay ▪ equitable distribution of land for community facilities ▪ potential traffic and noise issues (Ewingsdale residents) ▪ need appropriate multiple use of the land (ie. wetlands/ habitat areas separated by a buffer to showground area, sports fields and "park and ride" facility) ▪ use of the site as a showground with show rings, spectator stands, stock holding areas, tea-room, public amenities, etc. ▪ potential use of wetlands for local eco-tourism facility incl. walkways and environmental education/ signage ▪ concern over effluent re-use seepage impacting habitat of

endangered species
- flood management issues

3.4 KEY OPTIONS AND ISSUES

The response to the pro forma question *"How would you like to see this public land managed for the community?"* identified a range of options and preferred uses as follows:-

- sports fields and associated infrastructure;
- tourist "gateway" to Byron Bay;
- improved road linkages and access to the site;
- "park and ride" facility;
- visitor information centre;
- wetland eco-tourism facilities
- showground/ festival and events site;
- environmental protection/ wildlife sanctuary (wetlands);
- use of operational land portion for effluent reuse wetland.

The current and previous community consultations together with Council's Management Plan 2004-2007, the Byron LEP, State of the Environment Report and other policy documents have identified two key requirements for this community land portion of the site:-

- development of active recreational infrastructure to service the needs of the Byron Bay community; and
- appropriate protection and management of vital wildlife corridors and significant habitat for endangered species.

As outlined in the previous section, the community land portion of the site has important opportunities as well as significant constraints on land capability and future uses. Inappropriate types of development would pose potential threats to existing values. *Sustainability*, a key principle of Council's Management Plan, can only be achieved through a balanced and sensitive approach to resource management. Accordingly, the future development and management of this land must ensure careful integration of economic, social and environmental factors.

The intensity and scale of proposed development options need to be carefully considered with respect to the site's existing context of rural land uses, habitat values and vital wildlife corridors. Proposals for significant intensification of services and facilities within significant habitat areas and along the entry corridor/ interface with Ewingsdale Road would not be considered appropriate under this plan of management.

Sports fields and other recreational infrastructure

Detailed submissions were received from local sporting groups. Each of these groups expressed interest in developing recreational facilities for organised sports. Recreational facilities as proposed in the submissions are affected by the site's spatial and environmental constraints. It is however envisaged that the site offers scope for staged development of playing fields and recreational facilities, subject to available funding. Additional recreational facilities and infrastructure such as children's play areas, boundary and safety fencing, internal roads and parking areas, public amenities, BBQ/ picnic areas, tables/ seating, pathways and signage also need to be considered. Supply and demand issues are discussed in *4.7 Future recreation, facilities and access*. Refer to *Figure 9: Concept Plan* for proposed site layout of recreational facilities, car parking areas and public access.

"Gateway"/ Ewingsdale road options

Options for significant road re-routing and "gateway" enhancement along this important tourist route need to consider the implications and impacts on existing natural features, scenic and visual quality, habitat values, wildlife corridors and traffic management. It will be important to ensure that visual and environmental buffers and bio-linkages are carefully integrated within future site development and along existing boundaries. The IQ submission for the "Byron Gateway" proposal, including off-site bus/ train interchanges linked to an on-site "park and ride" facility, raises a range of strategic transportation and infrastructure issues which are beyond the scope of this community land plan of management.

Road safety and traffic congestion

Important issues were raised over the need for improved traffic management along Ewingsdale Road, a major tourist route and major link road between the Pacific Highway and Byron Bay. Existing road safety issues would need to be thoroughly addressed with reference to any future site development and access (vehicular, pedestrian and bicyclists). The development of sporting and recreational infrastructure, "park and ride" facilities, festival/ events space and possible other uses are likely to increase traffic volumes and lead to further peak traffic congestion on this section of the road. These issues will be addressed in a future Traffic Management Plan for Ewingsdale Road.

"Park and ride" facility

The issues of increasing visitor volumes and traffic congestion along Ewingsdale Road and the town centre remain a high priority for the local community. Prior to the workshop, public expectations were raised over the use of the site at 249 Ewingsdale Road as a "park and ride" facility. This option received considerable community support during consultation. The preferred type of transportation system was also highlighted in the responses (eg. electric shuttle buses/ cars, use of rail connection and light rail solutions).

Use of a “park and ride” facility, particularly by visitors to Byron Bay, will be largely dependent upon people considering that this is a preferred option. The solution will need to ensure a high level of convenience to the user, efficient and reliable connections and an equitable pricing policy. In addition, these considerations need to be weighed with respect to the purpose and overall time taken for the return journey. The site is relatively remote at 3.5 kilometres to the centre of town (ie. a total of 7 kilometres for the return journey – a distance which may be considered too far and out of the way for many short-term visitors). The site is also a considerable distance from visitor accommodation and holiday attractions such as beaches, shops and restaurants. The “park and ride” option, whether it is on this site or an alternate location, will need to be investigated in relation to commercial and other considerations. These investigations are beyond the scope of this plan of management.

Visitor Information Centre

The diversity of wetland habitat and endangered species on the outskirts of town offers significant opportunities for establishing environmentally sensitive facilities catering to visitors. These existing biodiversity values should be protected and enhanced rather than fabricating and layering exotic and inappropriate landscape treatments. Furthermore, the site’s proximity to Ewingsdale Road and high tourist volumes may support the development of a Visitor Information Centre. Options for facilities and leasing should include a kiosk/ restaurant, outdoor viewing deck over adjoining sedgeland, a short-circuit track with boardwalks and educative signage. Indigenous cultural interpretive facilities should be considered in consultation with the Arakwal people.

Showground and festivals/events space

Although Byron Bay has no existing showground, broad community need for this site to be developed as a showground, has not been established. The availability of space for a showground needs to be considered in view of other recreational needs as identified. Development of a showground with related infrastructure of spectator stands, show rings, exhibition halls and stock holding areas would pose a considerable cost to Council and the community. Other showgrounds in the local Byron area are located at Bangalow and Mullumbimby.

Although purchase of the site considered the need for an alternate festival site for the *Byron Bay Blues & Roots Festival* and *Splendour in the Grass*, the need for this site has not been confirmed by festival organisers.

4.0 BASIS FOR MANAGEMENT

4.1 OBJECTIVES

This section of the plan of management addresses the following objectives:-

- *to identify the values attached to this land by the community, why they are valued and the importance of each of these values;*
- *to determine the land's potential role in servicing the needs of the local community;*
- *to identify key values and assess their relative significance;*
- *to establish a mechanism for protecting key values in relation to specific issues and threats; and*
- *to develop principles for sustainable management.*

4.2 COMMUNITY VALUES

"Values" can be simply described as the things which make a place important. The site's environmental values provide an outstanding natural setting for a broad range of recreational, cultural, social and other potential purposes. The consultation process defined a strong sense of community ownership of the land. It also identified a shared desire to develop and promote a high standard of public open space and facilities for the Byron Bay community.

Community values identified in the consultation process highlighted the importance of *potential* cultural values, including opportunities for public access, preferences for future community infrastructure and future recreational facilities. The site's potential value as a terminus for "park and ride" facilities, a showground/ festival event site, "gateway" site, eco-tourism and interpretive facilities were all highlighted in discussions, questionnaires and submissions.

Future sports facilities ranked very highly in the discussion of future community values. Suggested recreational facilities included playing fields for rugby, soccer, hockey and softball, cricket ovals, athletics track and field areas, criterium bike circuit and purpose-built stadium track, netball and basketball courts, indoor stadium facilities, public amenities and spectator facilities (refer to *4.7 Future recreation, facilities and access*).

The significance of the site's existing natural and cultural values, biodiversity and setting within a vital wildlife corridor were identified by only a small

proportion of participants. Only three of the responses to questionnaires identified these existing values and the need for environmental protection. One submission included these values as a minor consideration in the context of more significant changes.

It is important to recognise that community and visitor values are closely related to environmental quality and the opportunities provided by the setting. Wetland areas have historically been regarded as “swamps” with little intrinsic value – marginal places which could be cleared, farmed, filled with local waste and rehabilitated for other purposes, such as recreation. This site has been subject to a range of past disturbances and modification which have affected the integrity of many of its intrinsic values. Nevertheless, 249 Ewingsdale Road retains a range of exceptional values associated with its large area of wetland habitat. It is vital that these values are protected and managed on a sustainable basis.

4.3 DETERMINING KEY VALUES AND SIGNIFICANCE

The site’s broader management objectives must be based on a sound understanding of the resource or supply base. The following key values have been developed through further investigation, analysis and assessment. Key values are divided into four major categories which form the basis for further discussion in this section as follows:-

1. Natural and cultural setting
2. Indigenous and cultural heritage
3. Environment and biodiversity
4. Future recreation, facilities and access

Table 4: Values and Level of Significance assigns a significance ranking to values, based on either a local/ district, regional or state level. Values assessed as being of State significance relate to the presence of threatened species on the site which are subject to NSW threatened species legislation. The significance ranking of sedgeland habitat and the wildlife corridor values are assessed as regional significance in accordance with their “extremely high ecological value” as determined by the *Byron Biodiversity Conservation Strategy*. An assessment of Aboriginal cultural values relating to this site would be subject to further investigation and consultation with the Arakwal people.

The site’s recreation values relate to potential future values based on appropriate development of the community land. These include values of potential local/ district significance (ie. sports and passive recreational facilities/ “park and ride”) and those of potential regional significance (ie. visitor information centre/ nature-based recreation).

Table 4: Values and Level of Significance

Key Values	Level of Significance		
	Local/ District	Regional	State
Natural and cultural setting			
natural and cultural setting	■		
visual quality/ scenic & aesthetic values	■		
Indigenous and cultural values			
Aboriginal/ Indigenous values	subject to further investigation/ consultation		
European/ historic values	■		
Environment and biodiversity			
sedgeland habitat & wildlife corridor	■	■	
threatened species/ scientific values	subject to further investigation		
Recreational facilities and public access			
potential public access & linkages [vehicle, pedestrian/ cycleways]	■		
potential range of sporting facilities/ "park and ride" facility	■	■	
potential informal, passive & family-based recreation	■		
potential visitor information and nature-based recreation	■	■	

Note: Recreational facilities and public access relate to potential/ future values rather than existing values.

4.4 NATURAL AND CULTURAL SETTING

Significant natural areas and rural landscape

The landscape is flat, low-lying and open with expansive views over the landscape and surrounding hills to the south and west. The western portion of the site is dominated by extensive native sedgeland broken by a small exotic pine plantation, two shallow earth dams and pockets of native Paperbark/ coastal wattle regrowth. Most of the western (operational land) portion of the site is subject to periods of inundation and waterlogging. The site has a history of clearing and management for agricultural purposes, primarily for cattle grazing. The marginal nature of agriculture, particularly in the western portion of the site, has resulted in the retention of significant sedgeland habitat (refer to *4.6 Environment and Biodiversity – Conservation Significance*).

The drier, slightly elevated eastern portion of the site has been largely modified through clearing and introduction of exotic pasture grasses for cattle grazing. This area still retains native sedgeland (south-eastern corner), sedge/ grassland, Paperbark/ coastal wattle regrowth and smaller areas of sedge/ fernland, and reedland. This portion of the site also retains a cottage, small dam and unsealed road access. The cottage is in poor condition and should be demolished to allow for development of sporting fields and other

recreational facilities in this location.

PHOTO 1: View of Ewingsdale Road looking east towards Byron Arts & Industry Estate [left background]. Site access would need to be provided off this busy road.

PHOTO 2: View of the site looking south-west along the eastern boundary to Byron Arts & Industry Estate [Centennial Circuit]. Natural buffers such as this reedland and Paperbark/ Coastal Wattle regrowth woodland need to be protected and restored.

PHOTO 3: View of access road to existing cottage [looking south]. This eastern portion of the site has been largely cleared and modified with pasture grasses. The site is currently being leased for agistment purposes.

PHOTO 4: View of existing cottage [under current lease] looking north-west. Works are in progress on adjoining West Byron Effluent Reuse Wetland site [background].

Visual quality and scenic character

The predominant landscape quality of open, rural vistas and natural areas extends to the south across Ewingsdale Road and north towards the West Byron Effluent Reuse Wetland. This landscape forms a contiguous wildlife corridor linking with other adjoining protected natural areas. It also provides a vital buffer between the built edge of Byron Bay's Arts and Industry Estate and the surrounding rural landscape. The buildings within the light industrial area are uniformly large in scale, bulky, two-storey block structures. The built western elevations present a visually obtrusive wall of masonry finishes in a range of bright colour schemes.

It will be important to protect, restore and enhance existing remnant and regenerating native vegetation along this site boundary and interface with the future reserve. As previously outlined, the industrial area has a significant negative impact on visual and scenic quality, particularly from the neighbouring hills and approaches into Byron Bay. The future recreational development of this site should be sensitive and low-key. It should reinforce and enhance natural qualities rather than simply establishing large open grassed areas for sporting activities. The scenic and visual qualities of the surrounding rural and natural areas should be reinforced in this important "gateway" location to Byron Bay.

4.5 INDIGENOUS AND CULTURAL VALUES

"Over many thousands of years, Aboriginal people have left signs of their occupation of Australia. The reminders of where people lived, where they ate or collected food, how they hunted, their art and their sacred sites are all a special part of Australia's heritage ... [These places] document the lives of Australian indigenous people not only before European settlement, but also the changes wrought by colonialism".

Australian Heritage Commission (1997)

Aboriginal heritage

The Arakwal people are the traditional custodians of this land. For many thousands of years, this coastal wetland, grassland and woodland mosaic would have provided an immense source of food and materials for the Arakwal people including fishing, hunting and special plants for food, fibres, tools, canoe making and medicine.

The Aboriginal heritage of this area should be further investigated in consultation with the traditional Aboriginal custodians. Identified sites, relics or potential archaeological deposits (PAD) should be properly protected and managed. Under the *National Parks and Wildlife Act (1974)* and the *Heritage Act (1977)* all Aboriginal sites, whether recorded or not, are protected.

Protection under these Acts includes limiting public access to sites, promotion of educational/ interpretive programmes in Aboriginal heritage and conducting archaeological surveys to better understand this heritage.

Reconciliation

In 2001, the Byron LGA had an estimated population of 347 Aboriginal and Torres Strait Islanders, representing 1.2% of the total population. The Byron Shire Council *Social Plan* identifies the importance of consultation with the Indigenous community and aims to encourage the support, interpretation and communication of Aboriginal cultural heritage and the fostering of its contemporary expression as part of Byron's social and cultural fabric. Accordingly, this plan of management encourages a consultative strategy to address the site's land management issues with the traditional Arakwal custodians (refer to *5.0 Management Strategies*).

4.6 ENVIRONMENT AND BIODIVERSITY

Climate

The Byron LGA has a warm, sub-tropical climate with an average annual rainfall of between 1,429 mm (western part of LGA) to 1,868 mm at Cape Byron. The area has a typical summer rainfall pattern (January to March) with a drier winter and spring. The Byron LGA has recorded significant changing rainfall patterns, oscillating between periods of very high and low rainfall. These rainfall patterns, defined by alternating flood (FDRs) and drought dominated regimes (DDRs), have long term implications for future site management. In mid-2004, the Byron LGA was experiencing severe drought conditions, typical of the entire eastern seaboard and much of the country. Since this period the region has received significant falls of rain with floodwaters inundating the Ewingsdale Road site in December 2004 and again in June-July 2005. The region is also subject to very high rainfall derived from tropical cyclones moving down the Queensland coastline. This low-lying area is subject to flooding during these periods.

Catchment

The site is located within the Belongil Creek Catchment. This relatively small catchment, which includes the township of Byron Bay, has undergone considerable changes and long-term modification of its natural systems in recent decades. These changes have included vegetation clearing, loss of habitat, agriculture, introduction of weeds and pests, pollutants and an ever-increasing rate of urbanisation. The western portion of the site is subject to Flood (1 in 100 year). Drainage channels have been constructed on the site, mainly along boundary lines.

The *Integrated Catchment Management Plan for the Northern Rivers*

Catchment (2002) has been prepared to address the need for sustainable management of the Byron and broader northern rivers catchments. The document emphasizes the need for new opportunities with partnerships, education, advocacy and community involvement to deliver the following first order objectives:-

- naturally occurring plant and animal species, populations and their communities, maintained, enhanced and where targeted, restored;
- healthy and productive natural water systems which sustain the environment and the community;
- human settlement and land use activities managed now and in the future, to achieve sustainability in our communities, our ecosystems and in natural resource use;
- the economic, social and spiritual well-being of the Northern Rivers community recognized and promoted, specifically the cultural heritage values of the Bundjalung Nation, with maximisation of Aboriginal involvement in natural resource management; and
- land resources able to support sustainable economic activity and natural ecosystems.

While many of the broader catchment initiatives are beyond the scope of this plan of management, a number of objectives are particularly relevant and have been used in development of the management strategies.

Geology and Soils

This low-lying site is located within a broad area of aeolian sand deposits on the coastal plain. These coastal deposits were derived from wind-blown marine sediments comprising fine to coarse-grained, rounded quartz sand. During the past 8,500 years a peat layer has formed to varying depths over the lower western portion (approximately two-thirds) of the site. This peat layer was derived from the deposition and decomposition of vegetable matter in water and partial carbonisation of the material (ie. Open-sedgeland and Swamp Sclerophyll Forest).

In June-July 2003, Byron Shire Council commissioned a detailed investigation of the site to establish peat and sand layers on this site (*Survey of Sand and Peat Soil Layers on a 40 Hectare Block at West Byron Bay by T. Ryffel & K. Bolton*). The field study divided the site into grid transects for soil sampling using a gouge auger. Sample cores were taken up to a maximum depth of 2 metres and the relative depth of peat and sand layers were recorded. The study results confirmed the deepest peat layers occurred over the north-western portion of the site (ranging up to 1550 mm depth). A general rising gradient from deep to shallow peat layers occurs from west to east and north-west to south (adjoining Ewingsdale Road). Approximately 65% of the total site area (26 Ha) contains peat to a depth greater than 100 mm. The eastern portion of the site, approximately 35% of the total area (14 Ha) contains only sandy soil with no peat layer.

As outlined in previous sections, this interface between peat and sand soil depths is an important factor affecting future recreational development on the site. Filling and levelling for construction of playing fields over peat substrate potentially may lead to problems in the playing surface. Excavation and removal of peat layers would be subject to Council's environmental controls regarding Acid Sulfate Soils. When acid sulfate soils, containing pyritic materials (eg. iron sulfide) are exposed to oxygen, sulphuric acid is generated. This acidic leachate can release toxic concentrations of aluminium and iron into rivers, estuaries and other water bodies. This site is identified by the *Acid Sulfate Soils Planning Map* as containing Class 2 and Class 3 Acid Sulfate Soils (refer to *2.9 Proposed Zoning of 249 Ewingsdale Road*).

Natural vegetation

The site is dominated by natural vegetation – a dense low to tall sedgeland complex comprising sedgeland/ fernland/ grassland communities. The dominant native species include Tassel-rush *(Restio tetraphyllus),* Red-fruited Saw-sedge *(Gahnia sieberiana)* and Water-fern *(Blechnum indicum).* Reedland and coastal regrowth/ woodland are also present on the site. The existing natural vegetation is significant for the following reasons:-

- maintains natural character, high aesthetic and visual qualities and a vegetated buffer to adjoining industrial development;
- contains a reservoir of natural heritage and biodiversity values;
- provides vital habitat for scheduled threatened species (TSC Act);
- allows opportunities for connectivity, gene pool exchange, faunal corridors and bio-linkages (linkages with adjoining wetlands/ other protected natural areas on the coastal plain and escarpment);
- assists in maintaining soil stability and good water quality;
- enhances landscape amenity and recreational opportunities.

Regional Biodiversity

Biodiversity refers to the richness and diversity of a place, its life forms including plants, animals and micro-organisms, the genes they contain, and the ecosystems they form. Byron LGA contains exceptionally high biodiversity values and is considered to be one of the most threatened regions in NSW.

The Shire contains at least 54 threatened plant species, 84 threatened fauna species (excluding marine species) and 2 endangered ecological communities scheduled under the Federal *Environment Protection and Biodiversity Conservation Act 1999* and NSW *Threatened Species Conservation Act 1995* (*Byron Biodiversity Conservation Strategy, 2003*). These figures are revised from data collected during the preparation of the *Byron Flora and Fauna Study, 1999*, which listed only 38 flora species and 70 fauna species as threatened. The high number of threatened species is a function of the

region's status as a biodiversity hotspot and the cumulative negative impacts of clearing, habitat fragmentation, weed invasion and land use practices over the past 160 years.

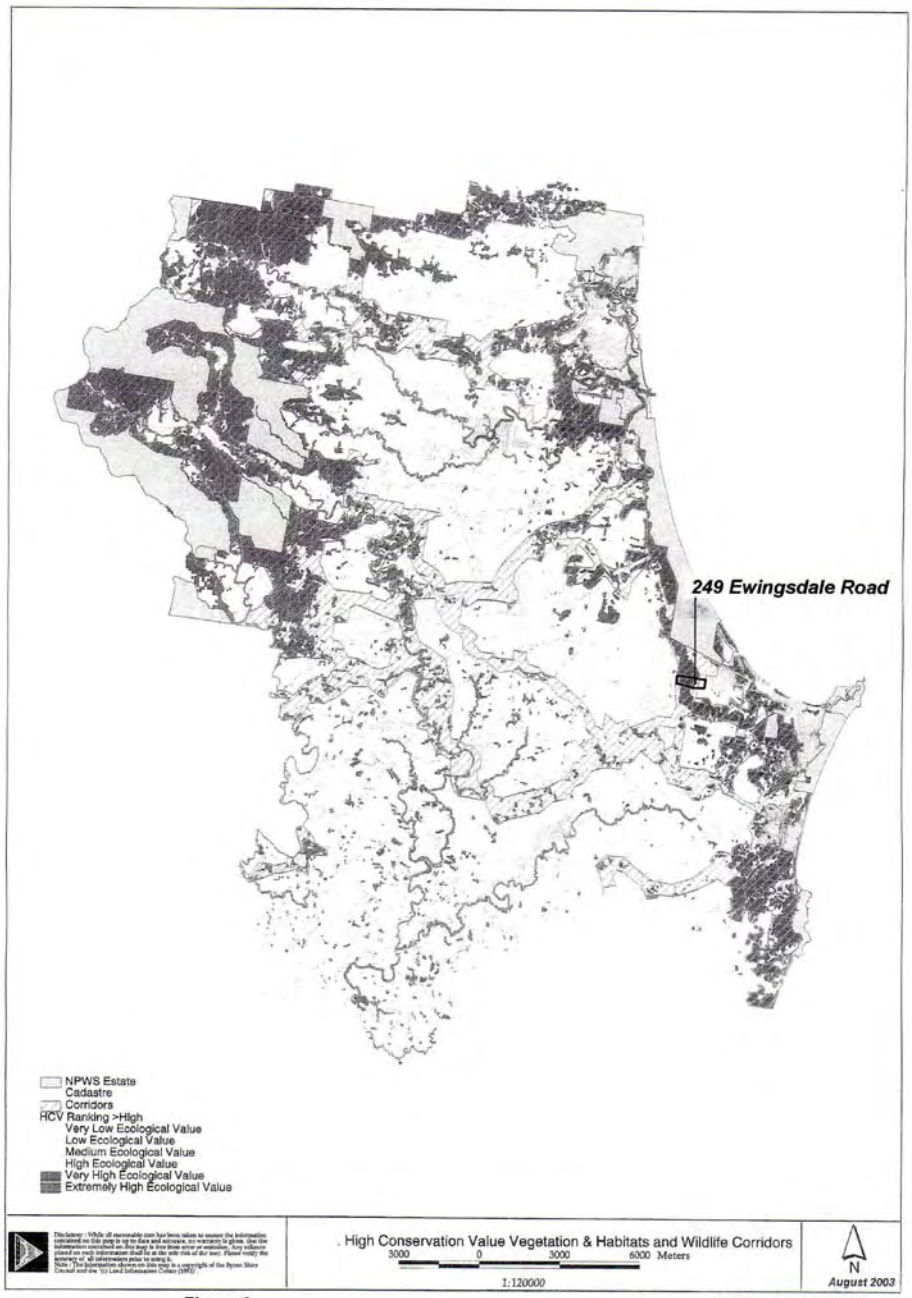


Figure 6 Map Source: Byron Shire Council

249 Ewingsdale Road

Regional Context: High Conservation Value Vegetation, Habitats & Corridors

PHOTO 5: View looking north-west from the south-eastern boundary of the site. This location contains significant natural sedgeland habitat dominated by Tassel-rush. This community has a ranking of "High Conservation Value" under the *Byron Biodiversity Conservation Strategy*. The native vegetation [foreground] would need to be removed to allow for recreational infrastructure as shown in *Figure 9: Concept Plan*.

PHOTO 6: View of eastern portion of the site [proposed community land] looking towards the adjoining Byron Arts & Industry Estate. Future recreational development of the community land will need to address local and macro- visual and scenic qualities.

PHOTO 7: Sedgeland habitat [operational land portion] – this native vegetation is part of a vital wildlife corridor, provides habitat for threatened species and is identified as being "Extremely High Conservation Value" (ie. area has a priority ranking for conservation) in the *Byron Biodiversity Conservation Strategy*.

Conservation significance

The *Byron Biodiversity Conservation Strategy* establishes the basis for a regional conservation strategy. The study identifies the comparative size, distribution, quality and value of remnant, fragmented habitat and relictual landscapes in the Byron LGA *(refer to Maps 2 and 9, BBCS, 2003).* These maps are included in this plan of management as a key strategic tool in developing the management strategies (refer to *Figure 6: Regional Context -- High Conservation Value Habitats & Corridors).* Proposed wildlife corridors and bio-linkages are shown hatched on this map.

The *Byron Biodiversity Conservation Strategy* develops priorities based on the ranking of relative conservation significance of remnant vegetation and habitat in the Shire (refer to *Relative Ecological Values Matrix, BBCS, 2003* for discussion of methodology). Priority areas for the regional conservation strategy are mapped as Very High Ecological Value and Extremely High Ecological Value. It is envisaged that the recommendations of the strategy will be included within a new *Byron Local Environmental Plan*.

The sedgeland complex covering the western portion of 249 Ewingsdale Road (operational/ part of community land) is ranked – Extremely High Ecological Value (*BBCS, 2003).* This area is dominated by open sedgeland which grades to sedge/ fernland and sedge/ grassland near the peat layer/ sandy soil interface. The eastern edge of the sedge/ grassland habitat (community land) is ranked – Medium Ecological Value (*BBCS, 2003).* The south-eastern corner of the site (community land) contains an important, albeit fragmented, component of open sedgeland which is ranked – High Ecological Value. The north-eastern corner of the site (community land) is ranked – Very Low Ecological Value. This area is considered the most durable portion of the site for proposed sports fields and other recreational infrastructure. It will be essential to establish appropriate buffers between areas of very high ecological value and proposed development. Similarly wherever possible, fragmented habitat of high ecological value should be consolidated and connected to core natural areas via suitable bio-linkage treatments.

The natural vegetation communities and habitat at 249 Ewingsdale Road are mapped in accordance with *Vegetation Mapping for West Byron STP* and further site investigations by LandArc Pty Limited (refer to *Figure 7: Existing Vegetation & Conservation Value).* The relative conservation value and priority rankings are identified on this map in accordance with the *Byron Biodiversity Conservation Strategy (BBCS, 2003).* The proposed boundary between operational land and community land and extent of sports fields and other recreational infrastructure are also marked on this figure. The proposal outlined in *Figure 9: Concept Plan*, prepared by the Sporting Fields Working Group, would require the removal of approximately 2.7 hectares of the

sedgeland complex (including sedge/ fernland and sedge/ grassland) ranked as "Extremely High Ecological Value" in the *Byron Biodiversity Conservation Strategy, 2003* (ie. an area representing the highest conservation ranking in the Byron LGA).

The sedgeland complex at 249 Ewingsdale Road is currently the largest area of this type of habitat in the Byron LGA (refer to *Byron Flora and Fauna Study 1999, Map 3 of 7 – Vegetation of Byron Shire*). A study prepared by *Landmark et al (BSC, 1999)* identifies a total area of 98 hectares of sedgeland- fernland/ grassland in the Byron LGA. The 29 hectares of sedgeland complex occurring on this site represents approximately 29% of this total vegetation community in the LGA *(Fitzgerald, M.,2004, p.26).* The BFFS identifies this area as Quarry Lane Wetlands (No.35) and describes the sedgeland association as dependent upon regular firing. Discontinuation of regular firing or slashing would probably result in eventual conversion to Paperbark woodland. This study states: *"These wetlands are an integral part of a coastal vegetation corridor forming an important link between Tyagarah NR and the Ewingsdale wetlands to the south".*

Threatened Species

The *Byron Biodiversity Conservation Strategy (BBCS, 2003*) had highlighted important ecological and biodiversity values associated with this site. Data gaps however existed in relation to the significance of the site in terms of vital habitat/ local corridor for threatened species and potential impacts on these species should the habitat be modified in any way from its present condition. The Draft Plan of Management (Issue A: 5.06.2004) identified the need for further detailed investigation of threatened fauna species and ground truthing of existing habitat mapping. It was recommended that a proper investigation be conducted into the populations, distribution and habitat requirements for threatened species on this site. The present condition of the site also provided opportunities for comparative analysis with the neighbouring effluent reuse wetland habitat.

During the latter part of 2004, an *Ecological Habitat Assessment and Flora and Fauna Survey* (EHA & FFS) for 249 Ewingsdale Road was prepared by ecological consultant, Mark Fitzgerald for Byron Shire Council. Prior to commencement of the study, it was believed that there were at least three scheduled threatened species dependent on the existing wetland complex of sedge/ fern and grassland habitats (*Bower, H. and Fitzgerald, M, pers. comm.).* These species included the Wallum Froglet *(Crinia tinnula),* Wallum Tree Frog *(Litoria olongburensis)* and Grass Owl *(Tyto capensis).* The recent study detected not three, but six threatened fauna species during the survey, and three more recorded from the WBSAS SIS. Threatened species identified during the study included (in order of abundance) the Wallum Froglet, Common Planigale, Grey-headed Flying-fox, Square-tailed Kite, Wallum

Sedge Frog (Olongburra Frog) and Koala *(Fitzgerald, M., 2004, p.33).* An additional seven species are expected to occur on the site, particularly during flood events.

Figure 7
249 Ewingsdale Road
Existing Vegetation & Conservation Value
EWINGSDALE ROAD
KEY:
Proposed boundary – Operational Land & Community Land
Proposed extent of sports fields (refer to Figures 8 and 9)
Extremely High Ecological Value
High Ecological Value
Medium Ecological Value
Note:
Data based on High Conservation Value Vegetation & Habitats mapping in Byron Biodiversity Conservation Strategy (2003) and site investigations conducted by LandArc.
West Byron Effluent Reuse Wetland
Sedgeland
Sedge grassland
Existing cottage
Paperbark/ Coastal Wattle woodland regrowth
Exotic-dominated Grassland
Existing wooded vehicular access
Paperbark open forest/ woodland
Ridge Terrace
Low-intensity Bush Rehabilitation
Paperbark open forest/ woodland
Paperbark woodland + Wet lands
Paperbark woodland + Reed/ sedgeland
Farmland
To Pacific Highway
To Byron Bay
Scale
Reedbed

Site investigations established a broad distribution for the Wallum Froglet, including sedgeland in the south-eastern corner (proposed community land and sports fields). The Wallum Tree Frog was recorded in only one location, the WBSTP lands, adjoining the western portion of the site. Little is known about the critical habitat of these frogs or the way they move around *(Fitzgerald, M, pers. comm.).* The frogs need isolated ponds without fish and a sufficient hydro-cycle to allow reproduction and development. It is important to ensure that the Plague Minnow or Mosquito Fish *(Gambusia holbrooki)* scheduled as a Key Threatening Process on Schedule 3 of the *Threatened Species Conservation Act 1995* is not introduced to the site.

In its conclusions, the EHA & FFS confirmed the site's significance as an "area of rare habitat within Byron Shire" and "an important local link in the major north-south wildlife corridor of the Byron coastal plain" and recommended rehabilitation and management for conservation "as the optimal environmental outcome for the area designated as Operational Land." (*Ecological Habitat Assessment and Flora and Fauna Survey at 249 Ewingsdale Road, West Byron Bay – Final Report for Byron Shire Council*, Fitzgerald, M., p.42). It is believed that the operational land identified in this ecological study refers to the area and boundary shown in the Draft Plan of Management (Issue A: 5.06.2004). The study makes no reference to the amended boundary as proposed in *Figure 9: Concept Plan* (Feb, 2005) nor the potential loss of significant habitat.

Management strategies which perpetuate habitat loss, fragmentation and isolation of populations will increase the chance of local extinction. This may occur through random fluctuations, introduced pathogens, predation, habitat disturbance, reproductive isolation and reduced gene flow. The potential for modification and conversion of existing open sedgeland habitat for a constructed effluent reuse wetland may have a significant negative impact on threatened species. For example, the two frog species, known as "acid frogs" are dependent on a specific low pH value in their environment. The Grass Owl is dependent on an open sedgeland habitat rather than a constructed Paper bark woodland dominated by Broad-leaved Paperbark (*Melaleuca quinquenervia*).

Exotic weed species

Environmental weeds tend to be fast-growing colonizing species with highly aggressive reproductive strategies. The site tends to have higher levels of weed invasion within the areas of greatest disturbance and modification. The site perimeters, particularly along Ewingsdale Road and the eastern area (community land) have the highest levels of weed invasion. A large portion of the community land has been modified with exotic pasture grasses including Broad-leaved Carpet Grass *(Axonopus compressus)* and Vasey Grass *(Paspalum urvillei).* The major woody weed species on community land are Camphor Laurel *(Cinnamomum camphora),* Slash Pine *(Pinus elliottii),*

Cadaghi *(Corymbia torelliana)* and Groundsel *(Baccharis halimifolia).* An original plantation of Slash Pine, established as part of a former development scheme, is located in the centre of the site (community land). This species is currently self-seeding throughout the sedgeland and in all the disturbed areas. It should be removed as a priority and new regrowth monitored and treated accordingly. Water Lettuce *(Pistia stratiotes)* on the dam near the cottage is a W1 category noxious weed species and should be eradicated in accordance with the *Noxious Weeds Act 1993.*

Weed Management, Regeneration and Restoration

The site will continue to be affected by dispersal of exotic weeds from external and adjoining developments. The Plan of Management will need to address these issues as well as potential nutrient loadings, erosion and sedimentation from various sources. The *EHA & FFS* makes important recommendations with respect to maintenance of the sedgeland complex and general weed management on the site *(Fitzgerald, M., 2004, s.8.5 and 9.0, pp.38-40).* In particular, native fauna habitat values associated with weed species need to be carefully managed through staged removal and restoration.

The weed management strategy would need to be adequately funded, staged and monitored to deliver a sustainable outcome (ie. address long term objectives of building ecosystem resilience and durability). The strategy needs to be linked to the ongoing management of potential negative impacts and control of threatening processes. It must be consistent with the conservation significance rankings and their management regimes. Council staffed programs, contract bush regeneration and volunteer Landcare programs must give due consideration to the priorities identified in the conservation significance assessment when planning and implementing regeneration and restoration works. Best-practice standards will need to be followed for bush regeneration/ restoration, seed collection, replanting and ecological fire management or slashing regimes. It is important that the strategy remains flexible and responsive to the site, emphasizing the balanced integration of conservation processes as follows:-

- promote community education, involvement and stewardship in the ongoing management of significant habitat;
- use skilled labour (ie. qualified and experienced bush regenerators) in conjunction with other community volunteers, school groups and employment training programs;
- clearly delineate management zones (eg. no mowing areas);
- ensure appropriate management and maintenance of areas and targeting of bush regeneration programs;
- establish an appropriately phased restoration strategy in relation to exotic weed species which may be used by native fauna for habitat;
- selectively target and control environmental weeds based on priority

targets set in weed management study;
- selectively target weeds in future high use/ high visibility areas in conjunction with appropriate restoration and enhancement strategies;
- develop opportunities for consolidating gains (eg. reduce edge to area ratios, enhance buffers and bio-linkages).

The strategy for buffers and core area consolidation should aim to establish a representative level of species and structural diversity which is appropriate to this site and specific location. Some areas may respond to bush regeneration techniques while others may require other intervention strategies based on their level of resilience. Only local provenance-sourced native plant species which are appropriate to the specific community should be used. Paperbark woodland/ forest species should be used to ensure the desired level of screening between active and passive recreational spaces, the roadway and unsympathetic perimeter development. The type of preferred structural characteristics, particularly the density of understorey, may need to be modified in some locations. High recreational use areas and pathways should maintain a high level of visibility, passive surveillance and public security. The strategy will need to control public access and recreational impacts in environmentally sensitive areas while ensuring access to more durable sites or site-hardened areas.

Buffers and faunal corridors will need to incorporate ecologically sensitive water quality control devices for managing stormwater run-off, exotic weeds and nutrient loadings from sports fields and carparking areas. These measures may include porous paving surfaces in carparking areas, collection channels, constructed earth retention ponds, rock flumes/ gabion structures and wetlands). These treatments should be considered in relation to potential enhancement of threatened species habitat.

Measures for monitoring conservation processes also need to be undertaken on a regular basis. These measures include soil sampling, analysis and amendment, recording of biophysical variables, assessment of any impact on threatened species and habitat values, introduction of site assessment methodology (eg. use of quadrats or rapid assessment methods) and research into fire management strategies for desired ecological outcomes.

Connectivity and bio-linkages

The enhancement of faunal corridors with proposed buffers and bio-linkages aims to reduce the effects of isolation, ecosystem simplification and instability. While potentially enhancing vital habitat and increasing the movement of mobile species, corridors can also extend edge effects and facilitate movement of weed species, feral animals and diseases between isolated populations *(Hobbs, 1997 and Crome, 1997)*. Proposed buffers should be designed to reduce edge effects as well as providing improved habitat values.

It is proposed that buffer width should be a minimum of 30 metres along the Ewingsdale Road frontage and a minimum of 20 metres for the eastern and western boundaries (ie operational land boundary). The northern boundary to the Effluent Reuse Wetland Area has an existing boundary buffer treatment. Internal buffer planting within the community land portion (eg. between car parking areas and sports fields) should promote opportunities for bio-linkages and enhance overall habitat values (eg. Paperbark woodland copses and sedgeland).

4.7 FUTURE RECREATION, FACILITIES AND ACCESS

Population and Demographics

The *Byron Shire Community Profile (based on 2001 Census data)* provides a detailed social profile of the Byron LGA. At the time of this last Census, Byron Shire had a total population of 30,249, including 1,329 overseas visitors and 1,982 domestic visitors from outside the Shire. At this time, the township of Byron Bay had a population of 5,241. Byron Shire experienced a slower rate of population growth between 1996 and 2001 (1.9% per annum) compared to the previous period between 1991 to 1996 (3.3% per annum). Byron Shire has experienced a period of high growth over the past three years, associated with population movement and rising coastal land values. The Shire receives an estimated 1.75 million visitors per annum and is host to festivals and events such as the Byron Blues and Roots Festival, Splendour in the Grass, Writers Festival, Byron Film Festival and the Billycart Derby.

Recreational Supply and Demand

The community consultation process identified a strong local need for playing fields and other recreational facilities in Byron Bay. Submissions were received from Byron Bay Sports Association, Byron Bay Soccer Club, Byron Little Athletics and Byron Bay Freeriders (cyclists). There was a strong community expectation that these facilities would be provided on this land (refer to *3.0 Community Consultation*).

At present, Byron Bay Recreation Grounds, located between Tennyson Street and Cowper Street Byron Bay, offers the only regularly available playing fields for senior and junior soccer, hockey, rugby union and cricket (synthetic turf wicket). This public reserve also has four tennis courts, croquet lawn and a scout/ girl guides hall. Other secondary playing field options include Byron Bay High School and St Finbars Catholic Primary School, the latter being used occasionally for soccer and rugby union training purposes. Byron Bay Little Athletics also share the Byron Bay High School playing fields. Red Devil Park, located near the junction of Bangalow Road and Broken Head Road, is a privately-held field for rugby league seniors and touch football. Other football

codes cannot use these playing fields.

As previously discussed, the Sporting Fields Working Group prepared a concept plan for the development of recreational facilities. The proposed facilities would address critical shortfalls in supply as well as developing vital opportunities for regional representation and hosting of events. On 31 March 2005, Byron Shire Council resolved to endorse this *Concept Plan: Community Sports Fields – Byron Bay* (refer to *Figure 9* in this Plan of Management).

Proposed recreational open space and facilities

The *Concept Plan* provides a greater number of multi-use sports fields and range of other recreational facilities. The total area of proposed sporting fields is 13.27 hectares. An area of 2.35 hectares is designated for landscape buffers. A further 0.58 hectares contains a pond (treated effluent re-use for grounds), bus interchange and Visitor Information Centre. The environmental impact on key habitat and conservation values together with other environmental constraints have been discussed in previous sections.

Figure 9: Concept Plan proposes the following layouts and recreational facilities for organised sport, subject to available funding:-

- Multi-use community sports fields including:
  - 3 № cricket pitches (including two senior (1 x turf) and one for social cricket);
  - 1 № senior soccer (association) field, 2 № senior and junior soccer fields and 2 № junior soccer fields;
  - 1 № rugby union field (not full-size) and touch football field and 1 № shared touch football field (soccer and softball);
  - 1 № athletics field including multi-use playing field for hockey, softball, frisbee, track and field events;
  - 1 № special community use field/ open grassed area for social cricket/ junior soccer (see above) and space for special events, temporary over-flow event parking/ park and ride options;
  - floodlighting of all playing fields and courts.
- 4 № netball courts
- 4 № cricket nets
- criterium closed bike circuit (one kilometre circuit)
- indoor recreation facility:
  - including indoor basketball, netball, soccer, cricket, volleyball;
  - rooms/ facilities for other community/ leisure activities including music and arts;
  - equipment storage area, change-rooms and amenities.
- 2 № separate amenities buildings
- 3 № children's play areas

- bike and skate park
- main car parking area (211 car spaces)
- second car parking area (102 car spaces)
- visitor information centre including kiosk/ shop, café/ restaurant, meeting rooms and car parking area (not designated), picnic area and bus interchange
- park and ride facility (optional – special community use area)
- workshop/ maintenance building
- fencing to playing areas/ security fencing
- shared pedestrian/ bikepath (linking to Byron Bay – Ewingsdale)
- treated effluent re-use pond for grounds maintenance
- restored buffers to boundaries and habitat zones (shown as "landscaped mound" and "landscape buffer").

The provision of organised sporting infrastructure should focus on high quality playing fields, facilities and amenities. In addition to sporting infrastructure, passive recreation should be considered as an integral component of the overall recreational experience. In this way, organised sports activities can be part of the broader opportunities spectrum or simply remain as stand alone activities separate to other uses and facilities.

Passive recreational opportunities

Passive recreational spaces should include places for informal group activities/ family gatherings, picnic and BBQ areas/ shelters, walking tracks/ boardwalks and opportunities for bike-riding, jogging, nature-based recreation, environmental study and educational activities. The Visitor Information Centre including a kiosk/ shop, café/ restaurant (small to medium capacity) and outdoor viewing deck would provide a focus for passive recreation and environmental education. This area would offer special opportunities for interaction with the surrounding natural environment.

Proposed public access to the site

The proposed *Traffic Management Plan for Ewingsdale Road* will need to consider the impacts associated with development of this site. Issues such as location of a suitable site entry/ exit point (possible roundabout), traffic movements, potential increased traffic volumes and peak loadings, shared bikeway/ pedestrian connections, street lighting and public safety should be considered in this traffic study. A roundabout would provide a slow point and safer vehicular access into the reserve. An internal sealed access road would need to be constructed (linking to the car parking areas). No vehicular access to Bayshore Drive or the Byron Arts and Industrial Estate should be provided. A shuttle system/ bus interchange for the proposed "park and ride" facility should examine options such as the use of electric transit buses and taxis.

The reserve's car parking areas and facilities should be linked to a shared internal pedestrian/ bikepath system (separate to vehicular access) with connections to an external bikepath along Ewingsdale Road. Options should be examined in the *Traffic Management Plan* for formalising bikepath connections to Byron Bay township. Consideration should also be given to extending this bikepath to the Pacific Highway. Walking tracks and boardwalks within ecologically sensitive areas should be low-key and constructed in a compacted decomposed aggregate finish.

Managing recreational values

The trend towards increasing urbanization and the site's proximity to the town centre will inevitably impose further recreational pressures on natural values. The number of visitors to the region, time available to participate in leisure activities and increasing range of recreational pursuits will also add to existing pressures on environmental quality and biodiversity. Over time, the reserve will attract greater numbers of visitors and the interests of a broader range of user groups. The positive side of this would be greater visibility of people, an improved level of security, broader community "ownership" and possible reduction of anti-social behaviour.

In addition, the site is likely to experience incremental and cumulative environmental impacts which will need to be carefully managed. It will be important to achieve a sustainable balance which is not simply demand driven. These issues need to be addressed in innovative and creative ways to enhance visitor carrying capacity whilst protecting significant natural values.

It will be important to control and manage the spatial extent of recreational activities. General maintenance practices will also need to be addressed. Regular maintenance, particularly mowing and edging, have the potential to cause considerable damage within natural areas, significantly reducing opportunities for natural recruitment. These areas should be clearly delineated and managed in a way which prevents these impacts, promotes public education and enhances opportunities for biodiversity.

An integrated signage system incorporating a simple, coherent graphic style, should be developed as a recognisable and unifying element throughout the reserve. In addition to identification and way finding, signage should serve an interpretive and educational function with information describing natural and cultural heritage, ecological values and threatened species. The proposed Visitor Information Centre should provide an important educational role in appropriate visitor behaviour.

It is essential that all environmental and social impacts are managed on a sustainable basis in order to meet the future needs of the community. Objective limits need to be established on the ***types*** and ***amounts*** of change

that are either desirable or acceptable for the reserve. Principles for managing future recreational impacts should therefore include the following:-

- maintain and promote long term sustainability of the reserve's natural areas as a limited and finite resource;
- provide for recreational activities within the most durable areas including options for enhanced recreational infrastructure and appropriate site shielding;
- restrict and regulate inappropriate management regimes, activities and visitor dispersal within fragile natural areas;
- enhance opportunities for low impact education (eg. visitor information centre, interpretive signage and brochures/ flyers);
- ensure that future recreational development is integrated with appropriate conservation strategies (eg. regeneration, restoration and enhancement).

In establishing limits of desirable or acceptable change, this plan of management provides a framework for the reserve's future management.

4.8 VISION STATEMENT

The following statement provides a vision for this community land which will form the basis of management strategies:-

"To promote and enhance the site's future role as a significant and unique asset within Byron Shire's recreational open space, ensuring protection of identified values through appropriate management in a way which best meets the environmental, recreational, educational, cultural and social needs of the present community and for future generations".

5.0 MANAGEMENT STRATEGIES

5.1 OBJECTIVES

This section of the plan of management addresses the following objectives:-

- *to identify community land categories;*
- *to establish core objectives for each of the community land categories;*
- *to develop an action plan for implementation of core objectives and management strategies (ie. desired outcomes);*
- *to develop performance targets to assess and monitor strategies;*
- *to assign directions and priorities (spanning the next 5-years);*
- *to address future leases and licences; and*
- *to provide a "Concept Plan" for implementation of the strategic plan.*

5.2 COMMUNITY LAND CATEGORIES

Community land must be categorised as either a natural area, a sportsground, a park, an area of cultural significance or for general community use, or a combination of these categories. The *Local Government Act 1993* has a further requirement that land categorised as a "natural area" must be given a sub-category of either bushland, wetland, escarpment, watercourse, foreshore or a category prescribed by the regulations. This plan of management categorizes the community land portion of the site into the following (refer to *Figure 8: Community Land Categories*):-

- Sportsground;
- General community use;
- Natural area: *wetland*; and
- Natural area: *bushland*.

5.3 GUIDELINES FOR CATEGORISING COMMUNITY LAND

The *Local Government Act 1993* was amended from 1 January 1999 to integrate the management of community land with threatened species laws, in particular the preparation of plans of management. The following definitions are in accordance with the guidelines for categorising community land under the *Local Government (General) Regulation 1999*:-

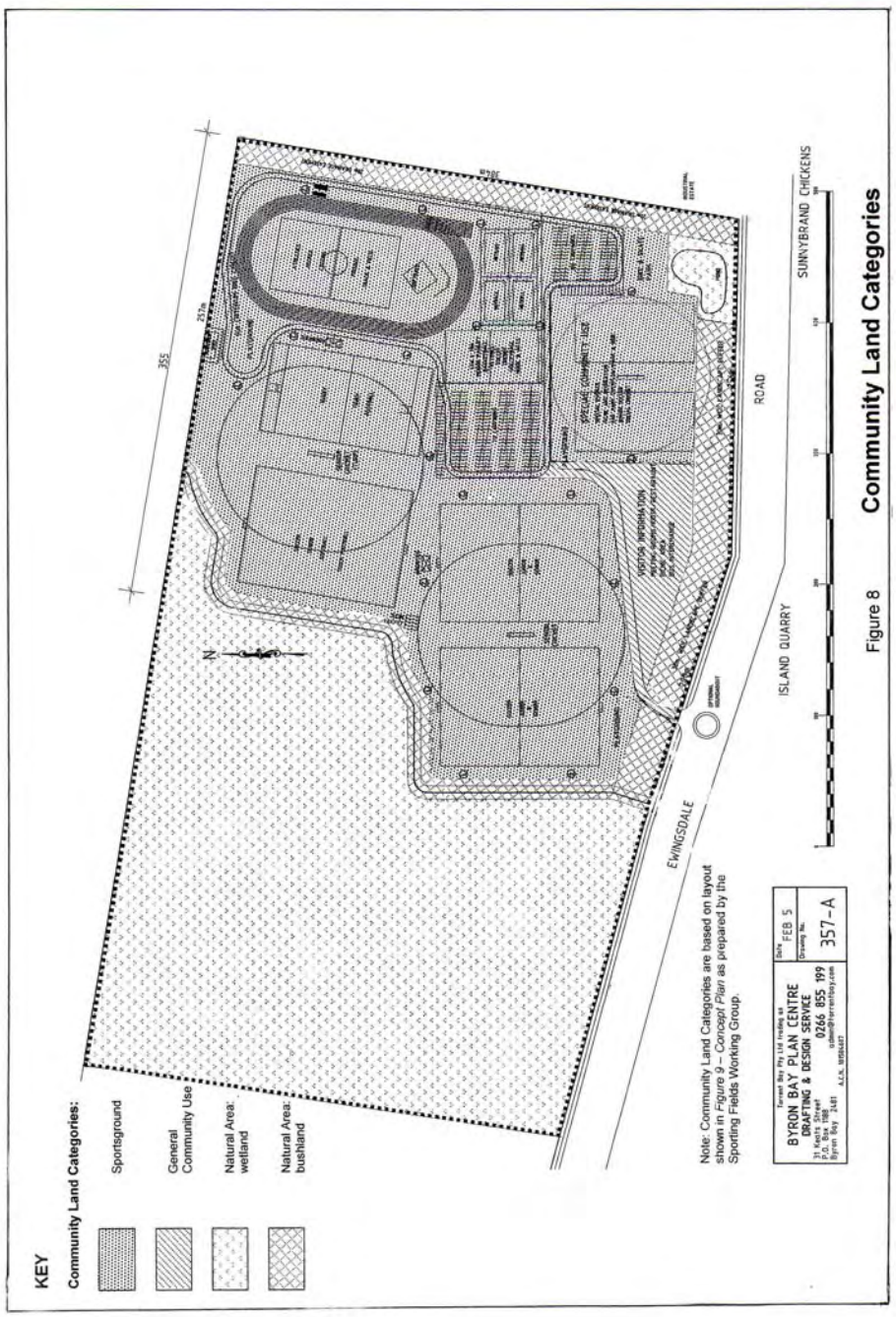

KEY
Community Land Categories:
Sportsground
General Community Use
Natural Area: wetland
Natural Area: bushland
Note: Community Land Categories are based on layout shown in Figure 9 – Concept Plan as prepared by the Sporting Fields Working Group.
BYRON BAY PLAN CENTRE
DRAFTING & DESIGN SERVICE
0266 855 199
FEB 5
357-A
ISLAND QUARRY
SUNNYBRAND CHICKENS
EWINGSDALE
ROAD
N
355
Community Land Categories

Figure 8

Sportsground

Land should be categorised as sportsground under s.36(4) of the Act if the land is used or proposed to be used primarily for active recreation involving organised sports or the playing of outdoor games.

Section 11, Local Government (General) Regulation 1999

Most of the eastern portion of community land is to be categorised as sportsground in accordance with proposed active recreational uses.

General Community Use

Land should be categorised as general community use under s.36(4) of the Act if the land:

(a) may be made available for use for any purpose for which community land may be used, whether by the public at large or by specific sections of the public, and

(b) is not required to be categorised as a natural area under section 36A, 36B or 36C of the Act and does not satisfy the guidelines for categorisation as a natural area, a sportsground, a park or an area of cultural significance.

Section 14, Local Government (General) Regulation 1999

The community land comprising the proposed Visitor Information Centre (including kiosk/ restaurant, meeting rooms and car parking) and bus interchange are to be categorised as general community use.

Natural Area

Land should be categorised as a natural area under s.36(4) of the Act if the land, whether or not in an undisturbed state, possesses a significant geological feature, geomorphological feature, landform, representative system or other natural feature or attribute that would be sufficient to further categorise the land as bushland, wetland, escarpment, watercourse or foreshore under section 36(5) of the Act.

Section 10, Local Government (General) Regulation 1999

Natural Area: wetland

Land that is categorised as a natural area should be further categorised as wetland under s.36(5) of the Act if the land includes marshes, mangroves, backwaters, billabongs, swamps, sedgelands, wet meadows or wet heathlands that form a waterbody that is inundated cyclically, intermittently or permanently with fresh, brackish or salt water, whether slow moving or stationary.

Section 16, Local Government (General) Regulation 1999

The western portion of community land and a small area in the south-eastern corner (proposed as an effluent re-use pond and remnant habitat) is to be

categorised as natural area – wetland.

Natural Area: bushland

Land that is categorised as a natural area should be further categorised as bushland under s.36(5) of the Act if the land contains primarily native vegetation and that vegetation:

(a) is the natural vegetation or a remainder of the natural vegetation of the land, or

(b) although not the natural vegetation of the land, is still representative of the structure or floristics, of the natural vegetation in the locality.

Such land includes:

(a) bushland that is mostly undisturbed with a good mix of tree ages, and natural regeneration, where the understorey is comprised of native grasses and herbs or native shrubs, and which contains a range of habitats for native fauna (such as logs, shrubs, tree hollows and leaf litter), or

(b) moderately disturbed bushland with some regeneration of trees and shrubs, where there may be a regrowth area with trees of even age, where native shrubs and grasses are present in the understorey even though there may be some weed invasion, or

(c) highly disturbed bushland where the native understorey has been removed, where there may be significant weed invasion and where dead and dying trees are present, where there is no natural regeneration of trees or shrubs, but where the land is still capable of being rehabilitated.

Section 15, Local Government (General) Regulation 1999

The proposed buffers to boundaries are to be categorised as natural area – bushland. This category includes areas which have been cleared in the past but retain opportunities for natural regeneration and restoration.

5.4 COMMUNITY LAND – CORE OBJECTIVES

In accordance with the *Local Government Act 1993,* each category and sub-category are provided with a set of core objectives. Refer to *5.1 Schedule of Core Objectives (Sheet 1 of 8)* and *Development of community land (s.47E Local Government Act 1993).*

5.5 ACTION PLAN

The *core objectives* and *desired outcomes* form the basis for development of *performance targets*. In turn these guide the preparation of specific *management actions* or the *means of achievement*. A system of checks and balances to assess actions and performance are provided by the *means of assessment*. Priorities for each management action are assigned according to its relative importance (refer to *5.2 Action Plan: Sheets 2-8)*. Action Plan tables are divided into the following sections:-

- public land classification *(Sheet 2 of 8);*
- community land development *(Sheets 2-3 of 8);*
- future recreation, facilities and public access *(Sheets 3-6 of 8);*

- leases and licences *(Sheets 6-7 of 8);*
- cultural heritage *(Sheet 7 of 8);*
- environment and biodiversity *(Sheet 8 of 8).*

5.6 CAPITAL WORKS PROGRAM

Priorities and cost estimates are further developed in the 5-year capital works program (refer to *Capital Works Program*). The Opinion of Probable Landscape Construction Costs is based on the *Concept Plan: Community Sports Fields (Figure 9)* and is indicative only.

5.7 CONCEPT PLAN: COMMUNITY SPORTS FIELDS

The *Concept Plan: Community Sports Fields (refer to Figure 9)* prepared by the Sporting Fields Working Group identifies key management actions to be implemented throughout the 5-year capital works program, subject to available funding.

5.0 MANAGEMENT STRATEGIES

5.1 Schedule of Core Objectives

	core objectives
community land management	**Desired Outcome: To establish an appropriate land management framework for community land.** Management strategies must be consistent with community land categories and their respective core objectives as identified in this Plan of Management **Core Objectives: Management of community land categorised as a Sportsground (35F)** "The core objectives for management of community land categorised as a sportsground are: a) to encourage, promote and facilitate recreational pursuits in the community involving organized and informal sporting activities and games, and; b) to ensure that such activities are managed having regard to any adverse impact on nearby residences." **Core Objectives: Management of community land categorised as General Community Use (36I)** "The core objectives for management of community land categorised as general community use are to promote, encourage and provide for the use of the land, and to provide facilities on the land, to meet the current and future needs of the local community and of the wider public: a) in relation to public recreation and the physical, cultural, social and intellectual welfare or development of individual members of the public, and b) in relation to purposes for which a lease, licence or other estate may be granted in respect of the land (other than the provision of public utilities and works associated with or ancillary to public utilities). **Core Objectives: Management of community land categorised as a Natural Area (36E)** "The core objectives for management of community land categorised as a natural area are: a) to conserve biodiversity and maintain ecosystem function in respect of the land, or the feature or habitat in respect of which the land is categorised as a natural area, and; b) to maintain the land, or that feature or habitat, in its natural state and setting, and; c) to provide for the restoration and regeneration of the land, and; d) to provide for community use of and access to the land in such a manner as will minimise and mitigate any disturbance caused by human intrusion, and; e) to assist in and facilitate the implementation of any provisions restricting the use and management of the land that are set out in a recovery plan or threat abatement plan prepared under the Threatened Species Conservation Act,1995 or the Fisheries Management Act, 1994." **Core Objectives: Management of community land categorised as a Natural Area: Wetland (36K)** "The core objectives for management of community land categorised as wetland are: a) to protect the biodiversity and ecological values of wetlands, with particular reference to their hydrological environment (including water quality and water flow), and to the flora, fauna and habitat values of the wetlands, and b) to restore and regenerate degraded wetlands, and; c) to facilitate community education in relation to wetlands, and the community use of wetlands, without compromising the ecological values of wetlands". **Core Objectives: Management of community land categorised as a Natural Area: Bushland (36J)** "The core objectives for management of community land categorised as bushland are: a) to ensure the ongoing ecological viability of the land by protecting the ecological biodiversity and habitat values of the land, and flora and fauna (including invertebrates, fungi and micro-organisms) of the land and other ecological values of the land, and; b) to protect the aesthetic, heritage, recreational, educational and scientific values of the land, and; c) to promote the management of the land in a manner that protects and enhances the values and quality of the land and facilitates public enjoyment of the land, and to implement measures directed to minimising or mitigating any disturbance caused by human intrusion, and; d) to restore degraded bushland, and; e) to protect existing landforms such as natural drainage lines, watercourses and foreshores, and; f) to retain bushland in parcels of a size and configuration that will enable the existing plant and animal communities to survive in the long term, and; g) to protect bushland as a natural stabiliser of the soil surface".

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5.0 MANAGEMENT STRATEGIES

5.2 Action Plan

	Performance Target (Management objectives)	Item	Means of Achievement (Management Actions)	Means of Assessment (of the actions)	Priority
public land classification	**Desired Outcome: To provide consistency in land management objectives and to address issues of classification of operational land to community land.**				
	To promote consistency in land management objectives for proposed community land. To determine boundary between operational land and community land.	A1	This Plan of Management establishes a boundary based on Council's resolution of 25.06.04 "that Council allocate the area of Lot 3 DP 706286, 249 Ewingsdale Road, on the sole basis of funds contributed by the Section 94 Fund (being $1.33 million - 72%) and the Sewer Fund ($0.52 million - 28%)." Refer to Figure 3 and Table 2 in this Plan of Management for operational land and community land parcels. Proceed with reclassification of eastern portion of site to community land.	Operational land [as applicable] reclassified as community land in accordance with Council resolution and this Plan of Management.	very high
	To address issues of reclassification of operational land and review objectives for this land. To ensure consistency between land management objectives and LEP zoning. To ensure appropriate protection of threatened biodiversity values.	A2	Review Operational Land objectives in relation to land assessment - Extremely High Conservation Significance/ Regional Habitat & Corridor values and presence of threatened species. This Plan of Management recommends that all remaining operational land and the western portion of proposed community land is zoned 7(k) HABITAT ZONE and that the eastern portion of community land is zoned 6(a) OPEN SPACE ZONE, subject to preparation of the place-based LEP.	Further investigations with respect to operational land undertaken and recommendations implemented.	very high
community land development	**Desired Outcome: To establish guidelines for assessing development proposals and impacts in compliance with requirements for community land.** **Core Objectives: Management of community land categorised as Sportsground (36F), General community use (36I), Natural area wetland (36K) and bushland (36J).**				
	To ensure thorough community consultation with all development proposals. To promote the future reserve's role as a broadly accessible community asset for the local and regional community.	B1 B2	Provide an open community-based consultative process with all development proposals. Ensure consistency in development proposals with *Local Government Act 1993* and all other relevant Federal and State legislation, Byron Shire Council Management Plan 2004-2007, Byron Local Environmental Plan, State of the Environment Report, Social/ Community Plan and all other relevant Council plans and policy.	Level of community consultation implemented for any new development within the future reserve. Number and % of changes to future reserve which are not consistent with relevant legislation and policy.	ongoing ongoing
	To protect the reserve's values from inappropriate development. To implement actions which will prevent incremental impacts and address threatening processes. To protect fragile and sensitive areas, particularly areas of high conservation/ ecological significance. To promote appropriate active sporting facilities and passive unstructured recreational opportunities.	B3	Development proposals, uses and activities within the reserve must be consistent with the following requirements: - promote sustainability - protect and enhance identified values - contribute to diversity and quality of recreational and community uses - demonstrate a clear connection with reserve's role and natural/ cultural settings - demonstrate consistency with community land core objectives - promote balanced, sustainable management of recreational infrastructure - maintain natural ground levels, water quality and groundwater flows - enhance visual and environmental amenity - ensure that future recreational facilities and infrastructure are consistent with natural and rural/ cultural setting - ensure that reserve is not alienated or fragmented by development - protect and enhance native vegetation and habitat values	Number and % of proposed developments that address and adhere to development guidelines. Measure trends over time.	ongoing

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5.0 MANAGEMENT STRATEGIES

5.2 Action Plan

	Performance Target (Management objectives)	Item	Means of Achievement (Management Actions)	Means of Assessment (of the actions)	Priority
community land development	**Desired Outcome: To establish guidelines for assessing development proposals and impacts in compliance with requirements for community land.** **Core Objectives: Management of community land categorised as Sportsground (36F), General community use (36I), Natural area wetland (36K) and bushland (36J).**				
	To ensure a high level of public safety and security. To promote public access and equity. To ensure consistency in permitted uses, scale and intensity of future recreational development. To address adjoining industrial land-uses and minimize potential impacts on the future use of the reserve. To ensure that development proposals will not have a negative impact on identified values. To restrict threatening processes and ensure protection of threatened species. To permit the use of the land for sustainable development of appropriate facilities.	B3 [cont'd]	- maintain and enhance public safety and security - adequately provide for public access, equity and broad community use - minimise traffic hazards and pedestrian conflict in relation to vehicular access, circulation, car parking, service/ operational and delivery areas	Number and % of proposed developments that address and adhere to development guidelines.	ongoing
		B4	Investigate strategies to minimize negative visual, scenic, aesthetic and environmental impacts of adjoining industrial development on this land and broader landscape quality. Ensure that existing native vegetation/ regrowth along boundary is protected and enhanced to establish an appropriate buffer. Use only locally-sourced, indigenous species in the restoration strategy.	Number and % of proposed developments on adjoining land that address and adhere to development guidelines. Measure trends over time.	very high ongoing
		B5	Development proposals which may directly or indirectly threaten the natural or cultural settings of the reserve and/ or other identified values are not permissible.	as above	ongoing
		B6	Proposed development, activities and uses must be consistent with threatened species legislation - *Threatened Species Conservation Act 1995* and *Environment Protection and Biodiversity Conservation Act 1999*.	as above	ongoing
		B7	This Plan of Management expressly authorises the staged development of proposed facilities and infrastructure [as shown in Figure 9: Concept Plan] subject to compliance with core objectives for the community land categories and the development guidelines [see items B1-B6].	Proposed staged development/ capital works items completed subject to available funding and the current Capital Works Program.	ongoing
future public access	**Desired Outcome: To promote opportunities for public access and appropriate recreational and community infrastructure.** **Core Objectives: Management of community land categorised as Sportsground (36F), General community use (36I), Natural area wetland (36K) and bushland (36J).**				
	To investigate traffic management study for Ewingsdale Road [incl. reference to this site development]. To make recommendations for addressing Ewingsdale Road issues.	C1	**Access off Ewingsdale Road and Traffic Management** Prepare a Traffic Management Plan for Ewingsdale Road including consideration of the potential impacts associated with development of this site - location of suitable site entry/ exit point [entry/ roundabout option west of Quarry Road] traffic movements, potential increased traffic volumes and peak loadings, speed limits and safety, shared bikeway/ pedestrian connections, "gateway" treatment options, "park and ride"/ alternate options, street lighting and public safety.	Investigations completed and recommendations implemented.	very high
	To provide appropriate safe vehicular access off Ewingsdale Road into this site. To provide access to proposed facilities.	C2	**Internal vehicular access** Subject to investigations and recommendations, construct a new roundabout on Ewingsdale Road west of Quarry Road. Construct a sealed bitumen access road from roundabout into reserve, connecting to proposed Visitor Information Centre/ bus interchange facilities, proposed car parking areas and recreational facilities.	Proposed development/ capital works items completed subject to available funding and the Capital Works Program.	very high

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5.0 MANAGEMENT STRATEGIES

5.2 Action Plan

	Performance Target (Management objectives)	Item	Means of Achievement (Management Actions)	Means of Assessment (of the actions)	Priority
future recreation, facilities and access	**Desired Outcome: To promote opportunities for public access and appropriate recreational and community infrastructure.** **Core Objectives: Management of community land categorised as Sportsground (36F), General community use (36I), Natural area wetland (36K) and bushland (36J).**				
	To protect significant habitat values. To address public safety and access issues.	C3	No through vehicular access to be provided to Bayshore Drive. Provide slow-points/ traffic calming devices along internal road at strategic locations incl. pedestrian/ bikepath crossings and carparking areas.	Public safety/ traffic management issues addressed as an integral component of access road development.	high
	To provide recreational and community infrastructure within the most durable areas. To ensure appropriate safeguards to protect environmental quality and habitat values.	C4	Identify and protect significant natural vegetation/ habitat areas, existing ground levels, overland flows and drainage lines. Ensure that roadway is kept low-key (no kerb and guttering) with all surface water/ run-off collected in detention areas/ wetlands and other water quality control devices within buffer areas.	Number and % of proposed developments that address and adhere to development guidelines.	very high ongoing
	To provide appropriate site shielding methods. To provide an appropriate level of service and facilities for public use of the reserve. To protect and maintain environmental quality. To ensure appropriate level of screening, buffers amenity and integration of carparking areas.	C5	**Car parking areas [incl. park and ride facility]** Provide staged development of carparking facilities as follows:- 1. Two car parking areas for 211 + 102 = 313 car spaces in total; 2. "Park and ride" facility/ transit area facilities and sealed bitumen carparking area; 3. Establish open grassed area (southern area) for temporary over-flow event parking requirements or extension of "park and ride" facility.	Proposed staged development/ capital works items completed subject to available funding and the current Capital Works Program.	high ongoing
	To review options for "park and ride" facility.	C6	Investigate options to establish a "park and ride" facility/ transit area and shuttle service to alleviate peak congestion/ traffic volumes in Byron Bay town centre.	Investigations conducted and recommendations implemented as part of broader traffic management study.	very high
	To ensure protection and enhancement of existing native vegetation along boundaries/ buffers to site.	C7	Protect, restore and enhance existing native vegetation/ buffers along boundaries to Operational Land, Ewingsdale Road and Byron Arts & Industry Estate. Establish natural buffers and visual screening to roads and carparking infrastructure within the reserve (shown as "landscaped mound" and "landscape buffer" on the Concept Plan).	No net loss of native vegetation/ buffer habitat to boundaries. Positive net gains in buffers/ bio-linkages over 5 years.	very high
	To address visual and scenic impacts with development of roadways, carparking areas and other facilities.	C8	Upgrade local visual quality of Ewingsdale Road as "gateway" to Byron Bay with integrated regeneration/ restoration and weed management strategy. Consider public safety issues/ protection of sight distances along entry roadway, carparks and pedestrian/ bikepath connections.		
	To provide safe pedestrian/ bikepath access and connections within the site and along Ewingsdale Road. To expand opportunities for alternate visitor access and enhance recreational experience.	C9	**Shared pedestrian/ bikepath access** Provide staged development of shared pedestrian/ bikepath as follows:- 1. Ewingsdale Road - Byron Bay connection; 2. Ewingsdale Road - Pacific Highway/ Ewingsdale connection; 3. Internal connections - separate Ewingsdale Road access, proposed Visitor Information Centre, "park and ride" facility and sports fields/ indoor centre. Investigate opportunities for pedestrian/ bikepath connection through to Bayshore Drive, subject to environmental protection.	Proposed staged development/ capital works items completed subject to available funding and the current Capital Works Program. Investigations conducted and recommendations implemented.	high ongoing medium

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5.0 MANAGEMENT STRATEGIES

5.2 Action Plan

	Performance Target (Management objectives)	Item	Means of Achievement (Management Actions)	Means of Assessment (of the actions)	Priority
future recreation, facilities and access	**Desired Outcome: To promote opportunities for public access and appropriate recreational and community infrastructure.** **Core Objectives: Management of community land categorised as Sportsground (36F), General community use (36I), Natural area wetland (36K) and bushland (36J).**				
	To address significant shortfalls in supply of sports fields and recreational facilities in the local area. To improve the quality and range of facilities and increase opportunities for competition at regional level. To ensure broad community access to multi-use sports fields, recreational and community facilities. To encourage broad community involvement in the reserve's future management. To promote equity and transparency in the management of facilities and playing fields. To provide new and expanded facilities to address growth sports. To maximise usage of fields seasonally (summer/ winter sports) including evening/ night use. To provide a range of passive/ unstructured recreational play spaces for children and facilities/ options for youth. To ensure appropriate security, public safety and environmental protection.	C10	**Multi-use community sports fields** - 3 X cricket pitches (including two senior (1 x turf)/ one for social cricket); - 1 X senior soccer (association) field, 2 X senior and junior soccer fields and 2 X junior soccer fields; - 1 X rugby union field (not full-size) and touch football field and 1 X shared touch football field (soccer and softball); - 1 X multi-use athletics field/ track including 400 metre running track, straight for sprint events, areas for discus, shot put and javelin, long jump and triple jump events; softball nets and playing field for hockey and frisbee. - special community use field/ open grassed area for social cricket/ junior soccer (see above), special events and temporary over-flow event parking/ park and ride options; - 4 X netball courts - 4 X cricket nets - floodlighting of all playing fields. - criterium closed bike circuit (one kilometre circuit) - 2 X separate amenities buildings - 3 X children's play areas - bike and skate park facility - workshop/ maintenance building - fencing to playing areas/ security fencing - treated effluent re-use pond for grounds maintenance	Proposed staged development/ capital works items completed subject to available funding and the current Capital Works Program.	very high ongoing
	To provide a range of multi-use indoor organised sports facilities, community/ leisure activities, amenities and storage areas.	C11	**Indoor Recreation Facility** Indoor recreation/ community building to include multi-use facilities for indoor basketball, netball, soccer, cricket and volleyball. Other facilities to include club meeting room, canteen/ kiosk, space for community/ leisure activities (eg. music and arts) and equipment storage.	Proposed staged development/ capital works items completed subject to available funding and the current Capital Works Program.	high
	To promote innovative sustainable technologies in the development of recreational infrastructure. To ensure a high standard of development and maintenance of playing surfaces. To promote opportunities for positive outcomes amongst stakeholder user groups and the broader community.	C12	**Recreation facilities development and management** Ensure high standard of playing field construction and maintenance with adequate subsoil drainage (as required), quality turf playing surfaces, automatic irrigation system (subject to integration with water storage/ recycling technologies) and floodlighting. Investigate solar options for general lighting requirements.	as above Investigations conducted and recommendations implemented.	very high
		C13	Promote community awareness of the future staged development of the reserve for organised sports activities and other opportunities. Ensure transparency and equity in the management of these facilities.	Number of complaints/ unresolved issues over time.	medium ongoing
	To address management issues, operational protocols and responsibilities in the use of facilities. To assist user groups in sourcing appropriate funding for development of facilities.	C14	Investigate options for establishing a Park Management Committee. Develop an Operational Manual addressing membership issues, office-bearers, meetings, finance/ insurances, leases/ licences, use of buildings, facilities and grounds, responsibilities for capital works, sports funding applications and general maintenance, public safety/ risk management, security, insurances and environmental protection.	Investigations conducted and recommendations implemented. Operations Manual prepared and implemented. Number of successful grant applications. Works implemented subject to appropriate funding.	medium ongoing

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5.0 MANAGEMENT STRATEGIES

5.2 Action Plan

	Performance Target (Management objectives)	Item	Means of Achievement (Management Actions)	Means of Assessment (of the actions)	Priority
future recreation and facilities	**Desired Outcome: To promote opportunities for public access and appropriate recreational and community infrastructure.** **Core Objectives: Management of community land categorised as Sportsground (36F), General community use (36I), Natural area wetland (36K) and bushland (36J).**				
	To permit the use of the land for sustainable development of recreational, cultural and tourist facilities and infrastructure.	C15	**Visitor Information Centre/ Interpretive Facilities and Café/ Restaurant** Provide staged development of a Visitor Information Centre including local and regional tourist information services, environmental education and interpretive facilities, meeting rooms, displays and kiosk/ visitor's shop with outdoor deck, tables/ seating.	Investigations conducted and recommendations implemented. Proposed works implemented subject to available funding.	medium
	To promote site's "gateway" location to Byron Bay. To investigate opportunities for involvement of Arakwal people.	C16	Investigate opportunities to involve local Arakwal people in the development of these facilities and interpretive programs.	Investigations conducted and recommendations implemented.	high
	To investigate option of a café/ restaurant.	C17	Investigate separate option for inclusion of small to medium sized café/ restaurant and kitchen with seating up to 40-50 people.	Investigations conducted and recommendations implemented.	low
	To promote low impact visitor access to adjoining wetland areas and environmental education.	C18	**Wetland walking track/ environmental education** Investigate options to provide a low-key, sensitively designed walking track (short circuit) through adjoining sedgeland/ Paperbark woodland, linked to Visitor Information Centre (incl. boardwalks and interpretive signage).	Proposed works implemented subject to available funding.	medium
	To improve visitor orientation, recreational experience, awareness of appropriate behaviour, range of facilities and open space linkages.	C19	**Reserve signage** Provide a logical, coherent and integrated approach to signage. Introduce a simple hierarchy of information with lettering scaled to distance, viewpoint and mode of transportation.	Proposed works implemented subject to available funding.	medium ongoing
leases and licences	**Desired Outcome: To establish guidelines for assessing leases, licences and other estate for community land.** **Core Objectives: Management of community land categorised as Sportsground (36F), General community use (36I), Natural area wetland (36K) and bushland (36J).**				
	To provide express authorisation for appropriate leases, licences or other estate over community land. To ensure consistency with relevant legislation affecting the uses and activities on community land. To protect the future reserve's values from inappropriate leases, licences or other estate. To permit the granting of leases, licences or other estate which are consistent with community needs and the community land core objectives.	D1	This Plan of Management expressly authorises the granting of leases, licences or other estate over this community land for the purposes of providing goods, services and facilities, and the carrying out of activities, appropriate to current and future needs within the local community and of the wider public in relation to any of the following: - public recreation, social and educational activities; - the physical, cultural, social and intellectual welfare or development of persons; - only if the purpose for which it is granted is consistent with the core objectives of its categorisation; and	Leases/ licences granted in accordance with this Plan of Management. Assess against Council policies, principles and permitted uses consistent with community land categories and core objectives. Measure trends over time.	ongoing

5.0 MANAGEMENT STRATEGIES

5.2 Action Plan

	Performance Target (Management objectives)	Item	Means of Achievement (Management Actions)	Means of Assessment (of the actions)	Priority
leases, licences and other estate	**Desired Outcome: To establish guidelines for assessing leases, licences and other estate for community land.** **Core Objectives: Management of community land categorised as Sportsground (36F), General community use (36I), Natural area wetland (36K) and bushland (36J).**				
	To permit the granting of short-term and casual licences consistent with the relevant legislation.	D2	In accordance with s.24 of the *Local Government (General) Regulation 1999*, the use or occupation of community land for the following events is prescribed as a purpose in respect of which a council may grant a licence on a short-term, casual basis: - the playing of a musical instrument, or singing for a fee or reward; - engaging in a trade or business; - the playing of a lawful game or sport; - delivering a public address; - commercial photographic sessions; - picnics and private celebrations such as weddings and family gatherings; - filming. The use or occupation of community land for such short term or casual events is prescribed only if the use or occupation does not involve the erection of any building or structure of a permanent nature.	Short-term and casual licences granted in accordance with this Plan of Management.	ongoing
	To permit the granting of leases, licences or other estate which are consistent with community needs and the community land core objectives.	D3	This Plan of Management expressly authorises the granting of a lease or licence over community land categorised as general community use/ sportsground for the following uses and activities:- - "Park and ride" transit/ shuttle services [see items C5/ C6] - Visitor Information Centre - kiosk and/or visitor's shop [see item C15] - Visitor Information Centre - café/ restaurant [see item C17]	Leases and/ or licences granted in accordance with this Plan of Management.	ongoing
	To permit the granting of short-term and casual licences consistent with the relevant legislation.	D4	This Plan of Management expressly authorises the granting of a licence over community land categorised as sportsground for the following uses and activities:- - Indoor Recreation Facility - canteen/ kiosk [see item C11]	Short-term and casual licences granted in accordance with this Plan of Management.	ongoing
cultural heritage	**Desired Outcome: To promote opportunities for dialogue with traditional Aboriginal custodians.** **Core Objectives: Management of community land categorised as Sportsground (36F), General community use (36I), Natural area wetland (36K) and bushland (36J).**				
	To promote opportunities for dialogue and consultation with traditional Aboriginal custodians.	E1	Continue to promote opportunities for consultation with the Indigenous community and encourage the support, interpretation and communication of Aboriginal cultural heritage and the fostering of its contemporary expression.	Number of programs initiated/ level of involvement. Measure trends over time.	high ongoing
	To promote opportunities for community education and interpretation of cultural values.	E2	Review opportunities to involve the Arakwal people, the area's traditional Aboriginal custodians, in the promotion of the site as a "gateway" to Byron Bay (ie. naming of reserve/ signage and interpretation associated with proposed Visitor Information Centre).	as above	high

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5.0 MANAGEMENT STRATEGIES

5.2 Action Plan

	Performance Target (Management objectives)	Item	Means of Achievement (Management Actions)	Means of Assessment (of the actions)	Priority
environment and biodiversity	**Desired Outcome: To protect and enhance the extent, quality and connectivity of existing native vegetation and habitats.** **Core Objectives: Management of community land categorised as Sportsground (36F), General community use (36I), Natural area wetland (36K) and bushland (36J).**				
	To conserve biodiversity and maintain ecosystem function in respect of the land, or the feature or habitat in respect of which the land is categorised as a natural area. To provide for community use of and access to the land in such a manner as will minimise and mitigate any disturbance caused by human intrusion. To improve quality, extent and connectivity of native habitat and enhance biodiversity. To address the long term objectives of building ecosystem resilience and durability. To develop appropriate intervention strategies. To secure genetic integrity as a key component of the restoration and enhancement strategy. To establish a representative level of species and structural diversity. To manage recreational impacts and protect regeneration/ restoration areas from trampling and erosion.	F1	**Management zones** Clearly delineate management zones [eg. significant habitat/ buffers and corridors under restoration regimes, informal passive/ active open spaces with mown understorey or open grassed areas. Install mowing strips, interpretive signage and/ or low-key timber protective fencing, barriers or bollards as required to protect fragile natural areas from inappropriate maintenance regimes or where trampling may occur.	Management zones clearly delineated within proposed development. Numbers or % of vegetative cover damaged or destroyed due to inappropriate maintenance regimes, trampling, vandalism, sporting activities, etc.	high ongoing
		F2	**Ecological buffers and 'mosaics'** Ensure appropriate protection and management of adjoining sedgeland habitat designated as an area of Extremely High Conservation Value. Provide ecological buffer treatments and integrate approach using 'mosaics' within the sportsground edges and margins rather than simply turfing these areas. Investigate options for using commercially available native turf grasses.	Area under restoration/ enhancement per annum. Measure trends over time.	ongoing
		F3	Minimise opportunities for invasion by pest/ noxious species, including proposed wetland effluent re-use pond (eg. Plague Minnow, Cane Toads, Water Lettuce - see recommendations in EHA & FFS, 2004).	Number of pest/ noxious species monitored over 5 years and programs initiated to address issues.	ongoing
		F4	Develop an adequately funded, staged and monitored weed management and regeneration/ restoration program which will deliver sustainable outcomes for the community land categorised as Natural Area: wetland and bushland.	Number and % of changes to native vegetation and habitat which are not consistent with this Plan of Management and threatened species legislation.	high ongoing
		F5	Consolidate adjoining core habitat areas through staged removal of weed species and buffer enhancement. Implement a minimal disturbance bush regeneration approach where positive net gains are achievable [ie. high levels of resilience]. Ensure the program protects and enhances vital habitat for threatened species and bio-linkages.	Area under regeneration per annum. Area under restoration/ enhancement per annum. Measure trends over time.	ongoing
		F6	Use locally-sourced indigenous species in these strategies [ie. use of local genotypes of species rather than introducing genotypes from different unrelated areas].	Number and % of overall species used being locally-sourced [ie. local genotypes].	ongoing
	To improve visitor awareness of environmental programs and promote community involvement.	F7	Provide opportunities for environmental education (eg. interpretive signage, walking tracks/ boardwalks and Vistor Information Centre - see items C15-C18.	Proposed works implemented subject to available funding.	medium
		F8	Subject to funding and labour constraints, progressively restore and expand upon existing work to provide improved habitat, bio-linkages and buffers to reduce effects of fragmentation, ecosystem simplification and instability.	Consolidation and expansion of restoration program in accordance with appropriate funding. % of disturbed areas under restoration over 5 years.	ongoing

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5.6 CAPITAL WORKS PROGRAM

ITEM	ACTION	CAPITAL COST ($)	IMPLEMENTATION 2006	2007	2008	2009	2010
A1-A2	Public land classification						
	no capital works component						
B1-B7	Community land development						
B1-B6	no capital works component						
B7	Staged development of facilities/ infrastructure [refer to following items]	see below					
C1-C19	Access and traffic control						
C1	Traffic Management Plan - Ewingsdale Road	not costed					
C2	Internal sealed bitumen roads [not including roundabout]	$150,000.00					
C3-C4	Pedestrian/ bikepath crossings/ slow points & water quality control	incl. above					
C5-C6	Staged development of carparking facilities:						
	1. Two car parking areas (313 car spaces)	$250,000.00					
	2. 'Park and Ride' facility/ transit area facilities & carparking	$140,000.00					
	3. Open grassed temporary over-flow parking area	incl. below					
C7-C8	Staged restoration of native vegetation/ buffers - see items F2-F8						
C9	Staged development of shared pedestria/ bikepath access:						
	1. Ewingsdale Road - Byron Bay connection	not costed					
	2. Ewingsdale Road - Pacific Highway/ Ewingsdale connection	not costed					
	3. Internal connections	$35,000.00					
C10	Multi-use community sports fields:						
	[incl. site preparation/ groundworks - peat soils in western fields & irrigation]						
	1. Multi-use fields (north-west) - cricket/ senior soccer, softball, rugby & touch	$480,000.00					
	2. Multi-use athletics field/ track facilities [incl. hockey/ frisbee/ softball field]	$320,000.00					
	3. Multi-use fields (south-west) - cricket/ senior & junior soccer	$400,000.00					
	4. Special community use (south-east) - cricket & junior soccer/ overflow parking	$150,000.00					
	4 No. netball courts X 4 [hard surface]	$85,000.00					
	floodlighting [all playing fields/ netball courts]	$250,000.00					
	Criterium closed bike circuit [separate section - bitumen seal]	$140,000.00					
	2 No. amenities buildings	$160,000.00					
	4 No. cricket nets	$25,000.00					
	3 No.children's play areas	$150,000.00					
	bike and skate park facility	$100,000.00					
	workshop/ maintenance building	$45,000.00					
C11	Indoor Recreation Facility	$950,000.00					
C12	see above for details						
C13-C14	no capital works component						
C15-C17	Visitor Information Centre [incl. building, kiosk/ visitor shop, toilets, displays/ interpretive facilities, café/ restaurant, outdoor deck & landscaping]	$1,250,000.00					
C18	investigate wetland walking track/ interpretive signage [incl. boardwalk]	not costed					
C19	Signage	$40,000.00					
D1-D4	Leases, licences and other estate						
	no capital works component						
E1-E2	Cultural heritage						
	no capital works component						
F1-F8	Environment and biodiversity						
F1	Management zones delineation/ protection [incl. fencing/ signage]	$40,000.00					
F2-F8	Staged restoration of native vegetation/ buffers & weed management	$80,000.00					
	TOTALS	$5,240,000.00					

continued over page

Note: * Opinion of probable landscape constructions costs is based on the Concept Plan and all figures shown are indicative only.

5.6 CAPITAL WORKS PROGRAM (CONTINUED)

SUMMARY OF ANNUAL BUDGETS	CAPITAL COST ($)
2006	$980,000.00
2007	$985,000.00
2008	$1,075,000.00
2009	$1,385,000.00
2010	$815,000.00
TOTALS	$5,240,000.00

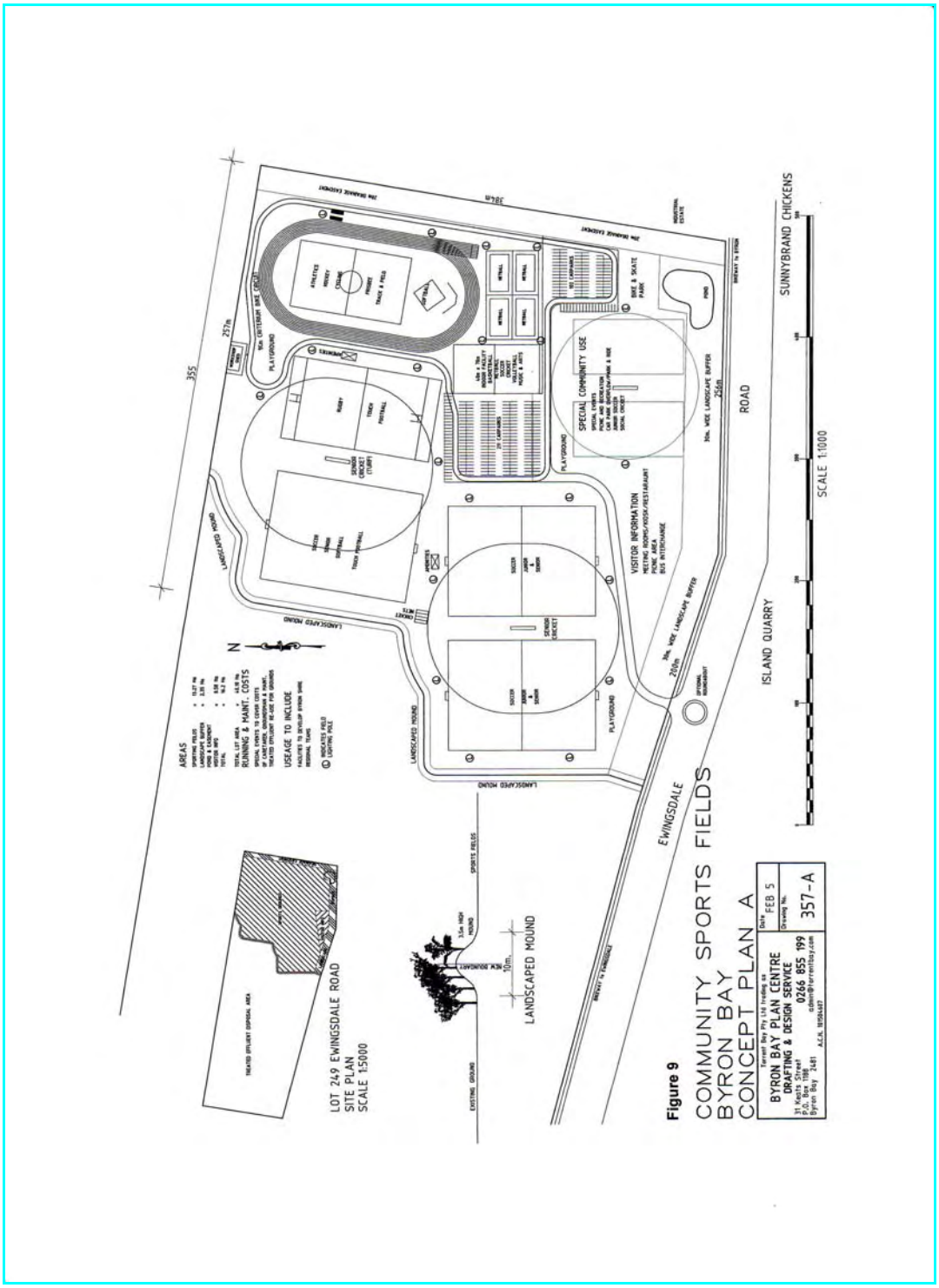
COMMUNITY SPORTS FIELDS
BYRON BAY
CONCEPT PLAN A
SCALE 1:1000
SUNNYBRAND CHICKENS
ISLAND QUARRY
ROAD
EWINGSDALE
SPECIAL COMMUNITY USE
VISITOR INFORMATION
LANDSCAPED MOUND
LOT 249 EWINGSDALE ROAD
SITE PLAN
SCALE 1:5000
BYRON BAY PLAN CENTRE
DRAFTING & DESIGN SERVICE
0266 855 199
FEB 5
357-A

Figure 9

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Appendix B

Ecological Assessment

Ecological Assessment

Byron Regional Sport and Cultural Complex

Project Manager: Rob van Iersel
Ref: 1058502
Date: May 2009
© GeoLINK, 2009

PO Box 9
Lennox Head NSW 2478
T 02 6687 7666

PO Box 1446
Coffs Harbour NSW 2450
T 02 6651 7666

info@geolink.net.au

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1 Introduction

1.1 Background

GeoLINK has been engaged by Byron Shire Council to undertake an ecological assessment relating to a proposal by Council to construct a regional sport and cultural complex and associated infrastructure on land described as Lot 3 DP 706286. The site is located at 249 Ewingsdale Road, Byron Bay and is owned by Byron Shire Council (refer to **Illustration 1.1**).

For the purposes of this ecological assessment '***the land***' is used to refer to the whole of Lot 3, and '***the site***' is used to refer to the area to be occupied by the Regional Sport and Cultural Complex.

Extensive ecological surveys have previously been undertaken within Lot 3 (Fitzgerald 2004, 2008 and Bower and Murray 2004) and the adjacent 24 ha effluent irrigation area to the north (Fitzgerald 2005, Fitzgerald and Newell 2008). GeoLINK has therefore only been engaged to provide an assessment covering the proposed Regional Sport and Cultural Complex.

The purpose of this assessment is to provide baseline data on the ecological attributes of the site, identify any ecological constraints to the proposed development and identify opportunities to avoid or mitigate potential impacts.

The assessment provided herein addresses these requirements and includes a detailed flora and fauna assessment to address the following Acts:

- *Threatened Species Conservation Act 1995*; and
- *Environment Protection and Biodiversity Conservation Act 1999*.

1.2 The Land

The site is located approximately 3.5 km west of the Byron Bay town centre and shares boundaries with the following geographical features and land uses:

- Byron Bay Arts and Industry Estate (east);
- West Byron Effluent Reuse Wetland (north);
- Rural / environmental land (west); and
- Ewingsdale Road (south).

This flat, low-lying (~2.5-3 m AHD) land was purchased by Byron Shire Council for operational and community uses. The land has a history of partial clearing and modification for agricultural activities. Nevertheless, the majority of the western portion of the land still retains significant sedgeland habitat and biodiversity. The eastern portion of the land has an existing cottage serviced by an unsealed access road. This area has been largely cleared for livestock grazing.

1.3 The Site

The site is that area which covers approximately 16.5 ha within the eastern portion of the land (also known as the community land) which extends east from the area mapped as High Conservation Value (HCV) vegetation to the eastern boundary (refer to **Illustration 1.2**). The current ecological assessment has been restricted to this area. The PoM (2005) states that this drier, slightly elevated eastern portion of the site has been largely modified through clearing and introduction of exotic pasture grasses for cattle grazing.

Source: Brunswick Heads 9640-4-N and Byron Bay 9640-4-STopographic Maps Date: May 2009

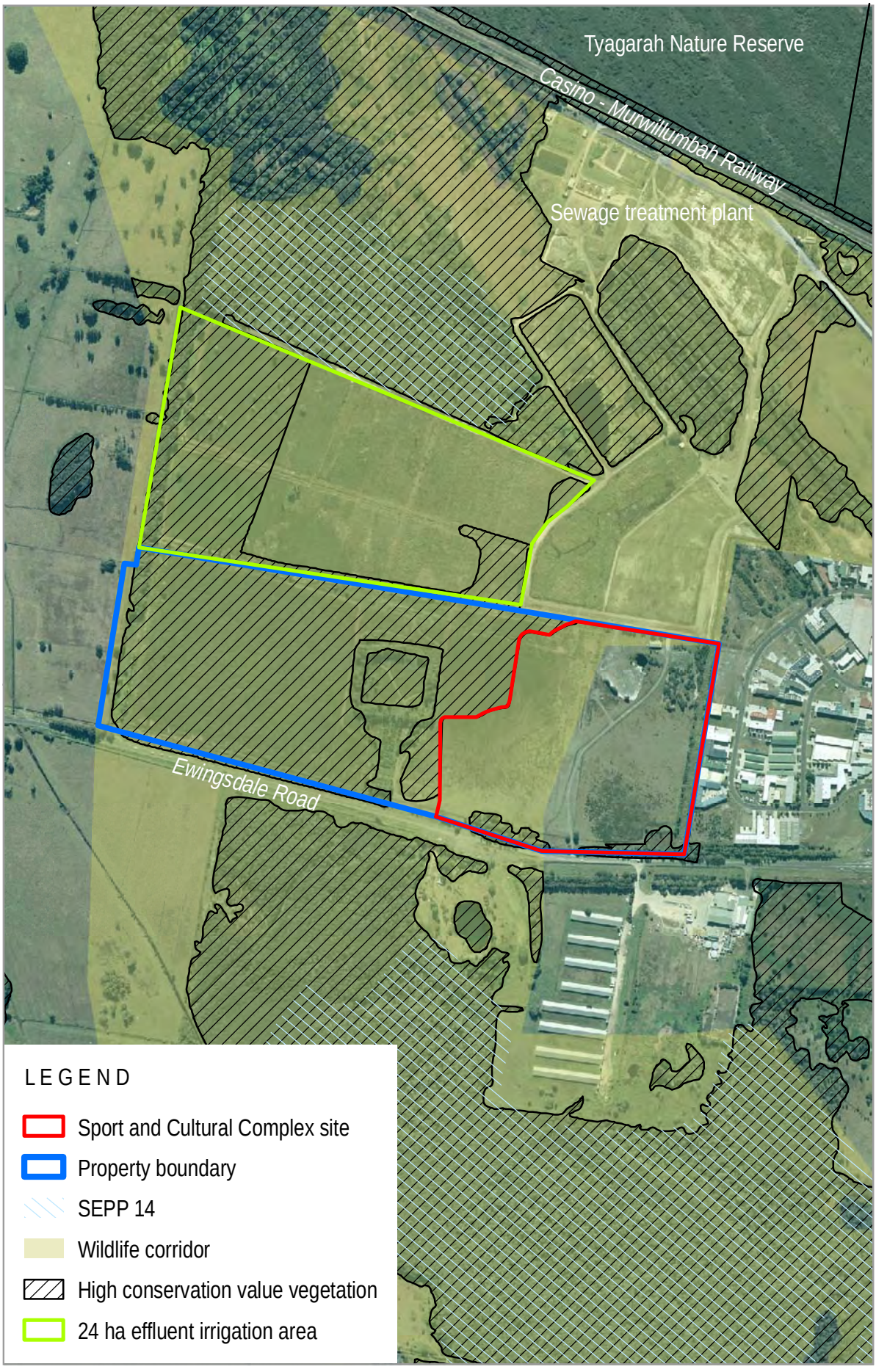
N O T E: Grid lines shown are based on the Geocentric Datum of Australia

0 1 km

North

Site Locality Plan

Source: Byron Shire Council Date: May 2009



North

0 200

Aerial Photograph

2 The Proposal

2.1 Description of Works

A Plan of Management (PoM) prepared by LandArc (2005) for the site was adopted by Council on 20 December 2005. At the time the PoM was adopted, Council categorised 72% of the site as community land and 28% of the site as operational land. The proposed Regional Sport and Cultural Complex will be located entirely within the community land. The PoM predominantly relates to the community land and provides for its future use and management for community, sporting and cultural facilities.

In developing the PoM considerable community consultation was undertaken. The project has enjoyed a high level of support and involvement from the community, particularly through the community-based *Sporting Fields Working Group*. As such, Byron Shire Council in conjunction with the *Sporting Fields Working Group* developed a concept plan for use of the community land. This concept plan was then adopted as part of the PoM.

From the concept plan, a proposed layout plan has been designed. The proposed development has been divided into three sectors, each of which can be undertaken as a separate stage of construction. The items included in these three sectors are as follows:

- Sector 1: Internal car parking
  Athletics track, associated hockey field and amenities block
  General use sporting fields (south-east)
  Storage sheds (on northern boundary)
  Cycle track (criterium)
  Caretaker's residence*
  Bike / skate park*
- Sector 2: Soccer fields (south-west) and associated amenities
  Canteen / kiosk adjacent to soccer fields
  Visitor information centre*, public toilets* and associated car parking
- Sector 3: Multi-use fields (north-west)
  Indoor facility (possibly containing a swimming pool)*

* The proposed caretaker's residence, indoor sports facility, visitor information centre and associated public toilets, and bike / skate park will be subject to a separate development application. They will therefore be built 'out of sequence' (i.e. at a later date) and are not part of this assessment.

3 Methodology

3.1 Report Methodology

The general methodology for this ecological assessment has been formulated based on a review of the *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities – Working Draft, Department of Environment and Conservation (NSW) November 2004.* The report methodology is as follows:

- literature review of previous assessments and background information;
- conduct a search of the following databases to identify potential issues:
  - Department of Environment and Climate Change Wildlife Atlas Flora Records;
  - Department of Environment and Climate Change Wildlife Atlas Fauna Records; and
  - Environment Protection and Biodiversity Conservation Database.
- undertake supplementary field surveys;
- assess the habitat;
- assess the ecological impacts; and
- outline mitigation measures to be implemented to reduce potential impacts.

Specific flora and fauna survey methodology is provided in **Sections 3.4** to **3.6**.

3.2 Site Inspection

An initial site inspection was undertaken by GeoLINK on 10 January 2008. Additional surveys were undertaken on 11 and 12 January 2008. The field survey approach, outlined below, focused on general flora and fauna surveys and habitat assessments in accordance with the *Threatened Species Biodiversity Survey and Assessment: Guidelines for Developments and Activities – Working Draft November 2004* (DEC 2004).

3.3 Weather

The specific weather conditions during the site inspection and survey dates are described in **Appendix A**.

3.4 Flora Surveys

Field inspections were conducted in order to provide a list of all species observed within the boundaries of the proposed works, identify vegetation communities and determine the likely occurrence on the site of threatened species that were identified during threatened species database searches. Flora surveys were undertaken on 10, 11 and 12 January 2008 with a total survey effort of fourteen field hours.

3.4.1 Random Meander Surveys

The "random meander" method, as explained within the *Threatened Species Biodiversity Survey and Assessment: Guidelines for Developments and Activities – Working Draft November 2004* (DEC 2004), was undertaken to record general flora species and also target potential threatened species as outlined in Cropper (1993).

3.4.2 Transect Surveys

Vegetation surveys incorporated transect methodology which involves walking 100 m recording every plant species seen within 5 m of either side of the observer. The survey incorporated targeted searches for threatened plant species known or likely to occur.

The floristic composition and structure of vegetation communities within the study area were recorded. The identification of flora species were recorded in the field and those that required further clarification were collected and keyed out using relevant literature.

3.4.4 Targeted Threatened Flora Searches

Targeted threatened flora surveys were incorporated into the random meander, transect and quadrat surveys as indicated above. The full area of the study area was traversed.

3.5 Habitat Assessment

As it is recognised that not all species can be detected during a single seasonal period, habitat assessments were undertaken to identify any potential habitats (especially for threatened species).

3.5.1 Random Meander Surveys

The "random meander" method, as explained within the *Threatened Species Biodiversity Survey and Assessment: Guidelines for Developments and Activities – Working Draft November 2004* (DEC 2004), was undertaken to assess the habitat present. The following features of fauna habitat were recorded:

- land use;
- vegetation structure;
- dominant plant species;
- level of disturbance;
- presence of scats, tracks, scratches and pock marks;
- tree hollows and spouts;
- connectivity;
- rocky outcrops or caves; and
- availability of water.

3.6 Fauna Surveys

3.6.1 General Fauna Surveys

Opportunistic sightings of fauna species were recorded during field surveys. This included noting the location and species of any fauna encountered during general field work (i.e. not specific targeted surveys). In general, the following fauna survey methodology follows guidelines set out in DEC (2004) and Murray *et. al.* (2002). The locations of fauna surveys are depicted in **Illustration 3.1**.

Following an initial habitat assessment, target species were determined and surveys were undertaken for those species that were identified as having potential habitat within the site.

Source: Byron Shire Council Date: May 2009

LEGEND

- Site boundary
- Western site boundary to proposed sporting fields
- Hair tube
- SD1 anabat detector
- Call playback
- Spotlighting

0 100

North

GeoLINK environmental management and design

Ecological Assessment: Ewingsdale Sport and Cultural Complex
1058497

Fauna Survey Locations

Illustration 3.1

3.6.2 Amphibian Survey

In order to adequately survey for frogs species, a number of specific survey techniques were employed. These are as follows:

Diurnal Searches

Surveys were concentrated on areas of suitable habitat such as sedgeland/fernland/grassland vegetation, drainage channels, and low inundated areas with high water table. Specific habitat searches included the investigation of potential basking and sheltering sites such as track edges, dense low vegetation and ground litter.

Nocturnal Searches

Surveys were conducted along drainage channels, soaks and areas of water. This involved call playback of pre-recorded frog calls, listening for calls and spotlight searches. Frog calls not able to be identified during field surveys were recorded and played back against pre-recorded frog calls for positive identification.

3.6.3 Reptile Survey

Herpetofauna searches were undertaken within areas representing potential reptile habitat, such as decorticating bark, the derelict building and edges of drains to determine the presence of reptile species within the site. This involved searching under logs, rocks and turning over debris, and was combined with general fauna surveys.

During night surveys, specific spotlight survey periods of 15 minutes were dedicated to targeting nocturnal reptile species such as geckos and nocturnal snakes.

3.6.4 Diurnal Bird Survey

Area search method as outlined within DEC (2004) was conducted as part of this study. Specific observations were recorded from visual and vocal identification conducted during peak morning and mid – afternoon activity periods. Bird calls not able to be identified during field surveys were recorded and played back against pre-recorded bird calls for positive identification.

3.6.5 Nocturnal Bird Survey

Call Playback and Spotlighting

Sampling methodologies employed as part of this study included a combination of call playback and spotlighting. The primary target species were threatened owls. Call playback involved the broadcasting of pre-recorded vocalisations of the Grass Owl using a 15 watt 'TOA' megaphone ER-1215S. An initial listening period of 10 minutes was undertaken at the call playback broadcast site followed by 10 minutes spotlighting the immediate area. Calls were then broadcast intermittently for approximately 5 minutes followed by a 10 minute listening period. After all calls had been broadcast a further 15 minutes of spotlighting was undertaken within the broadcast area. Call playback was undertaken over two consecutive nights on 11 and 12 January 2008.

3.6.6 Mammal Survey (Excluding Bats)

Mammal survey methodology employed included hair tube sampling, spotlighting, searches of tracks, scats and other traces (diggings, prints, scratches etc.) and habitat analysis. Based on a review of previous survey methodology employed for this site, hair tube analysis was preferred over Elliott and cage trapping to compliment these survey techniques undertaken previously.

Hair Tubes

A total of twenty Faunatech 'Universal Hair Funnels' were placed in along run-ways in areas with suitable ground cover across the site for a total of 11 nights (220 trap nights) from the 10 January 2008 to 21 January 2008. The hair funnels were baited with a peanut butter, rolled oats and honey mixture. A standard Faunatech adhesive wafer pad was used within the hair funnel. Wafer pads when removed were

checked to determine if hair samples has been captured. Pads containing hair samples were forwarded to Georgeanna Story of *Scats About* for expert analysis.

Spotlighting

Spotlighting was undertaken over two nights (11 and 12 January 2008) on foot using a 100 watt spotlight. Weather conditions during spotlighting are described in **Appendix A**. Survey effort covered two nights, each being for a period of 1½ hours commencing 20 minutes after dark.

Tracks, Scats and other Traces

During surveys, opportunistic recordings of tracks, scats, scratches, diggings and other traces were observed and/or collected for further analysis and reference to Triggs (1996).

3.6.7 Megachiropteran Species (Flying-foxes, Fruit Bats)

Blossom and Fruit Assessment

The potential foraging resources of the site such as the favoured *Melaleuca* blossom were assessed to determine suitable target areas for spotlighting.

Spotlighting

Spotlighting was undertaken on foot using a 100 watt spotlight. Weather conditions during spotlighting are provided in **Appendix A**. Survey effort covered two nights, each being for a period of 1½ hours commencing 20 minutes after dusk.

Vocal Detection

The Grey-headed Flying-fox (*Pteropus poliocephalus*) is known to emit audible vocal calls especially during territorial disputes when feeding. Listening for vocal calls was undertaken during night surveys over two consecutive nights.

3.6.8 Microchiropteran Bats

Ultrasonic Echolocation Detection

Microchiropteran bats (microbats) emit high frequency echolocation calls to navigate and forage. Ultrasonic call detection and analysis is recognised as an effective way of surveying microbat species within a range of habitats (Murray *et.al.* 2002). An Anabat SD1 CF bat detector was set throughout the night (7pm – 6am) to record bat activity within the site. Surveys were undertaken over two consecutive nights (11 and 12 January 2008) with Anabat survey stations set in different locations each night. Recorded echolocation calls were forwarded to Greg Ford, an Anabat echolocation call analysis specialist for call identification.

3.7 Survey Limitations

The surveys were conducted during summer, which is favourable for the identification of many fauna and flora species. However as not all species flower or fruit during this period, some may have been overlooked. Additionally, while some species may be present, they may have avoided detection due to their rarity, elusive nature or the sporadic utilisation of the site.

4 Results

4.1 Literature Review

4.1.1 Fitzgerald 2004

Fitzgerald conducted flora and fauna surveys over the land, determining that sedgeland/ fernland/ grassland is the dominant community which is locally significant. Habitats on land are dominated by dense groundlayer vegetation, principally sedgelands.

Six threatened fauna species were detected on the land during surveys undertaken by Fitzgerald (2004):

- Grey-headed Flying-fox – recorded during spotlighting feeding on the flowering spikes of Swamp Grass Trees at two locations along the northern boundary of the land;
- Wallum Froglet – was the most common threatened species recorded within the land and the only threatened species recorded in the eastern portion of the land;
- Wallum Sedge Frog – one call recorded by Fitzgerald in March 2003 near the border of the 24 ha effluent irrigation area and the land;
- Common Planigale – associated with sedgeland/ fernland/ grassland recorded in pitfall traps in the far western portion of the land;
- Square-tailed Kite - observed by Fitzgerald (23/9/2004) flying low over the Paperbark canopy of the western drain; and
- Koala - heard calling on 17/11/04 north of the land, near western boundary of 24 ha effluent irrigation area.

No small mammals were captured within the Elliot traps located in the low grazed sedgeland/ grassland in the eastern portion of the land. Fitzgerald reports that the Grass Owl is likely to roost and breed in tall sedgelands on the land and/ or in its near vicinity. Historically, such vegetation may have supported Long-nosed Potoroo however disturbance regimes at the land, particularly long term broad scale slashing, have probably resulted in the elimination of this species from this land. No hollows were observed and the remaining stands of trees are highly edge effected. Fitzgerald notes that a western to eastern cline in habitat quality for fauna is evident, with limited habitat and correspondingly fewer threatened species records in the far eastern portion of the land. Fitzgerald supports the proposed boundary for reclassification of the land into operational and community land. It is recommended that operational land be given reservation status and management appropriate to its clear ecological importance.

4.1.2 Fitzgerald 2005

Fitzgerald conducted amphibian and Eastern Grass Owl surveys on the adjacent 24 ha effluent irrigation area to the north of the land in 2005. Five native frog species; Common Eastern Froglet (*Crinia signifera*), Wallum Froglet (*Crinia tinnula*[V]), Brown-striped Grass Frog (*Limnodynastes peroni*), Eastern Dwarf Tree Frog (*Litoria fallax*), Rocket Frog (*Litoria nasuta*) and the exotic Cane Toad (*Bufo marinus)* were recorded from the 24 ha effluent irrigation area. The Eastern Grass Owl was not recorded, however Fitzgerald (2005) notes that suitable roosting and foraging habitat are available but the prey resources, such as small mammals may not have been sufficiently abundant to warrant foraging by this species at the time of surveys.

4.1.3 Fitzgerald and Newell 2008

Fitzgerald and Newell (2008) conducted fauna surveys on the 24 ha effluent irrigation area and the West Byron Sewage Treatment Plant (WBSTP) in June, September and November 2007. The Grass Owl responded to call playback within the 24 ha effluent irrigation area which indicates that it continues to forage at times in the area. Fitzgerald and Newell (2008) note that the Grass Owl has previously been

recorded on the WBSTP lands (by Fitzgerald in 2004) and its pattern of occurrence is most likely driven by patterns of prey abundance. The Wallum Sedge Frog was not recorded in the 24 ha effluent irrigation area but was recorded in low numbers in the eastern areas of the WBSTP and breeding habitat was recorded in the far north-western section. The Wallum Froglet however was recorded at all ten transects in both the WBSTP and the 24 ha effluent irrigation areas (ie. five in WBSTP and five in 24 ha effluent irrigation area).

4.1.4 Fitzgerald 2008

Fitzgerald conducted an ecological assessment for the construction of a proposed sewage pipeline from the Sunnybrand Chickens property into the WBSTP which traverses the eastern edge of the proposed Regional Sport and Cultural Complex. This assessment did not record any threatened flora species or endangered ecological communities. Suitable habitat was identified along/ near the proposed pipeline within the vicinity of the Regional Sport and Cultural Complex for the following threatened species:

- Wallum Froglet – within lower lying portions of the tall grassland/ fernland;
- Grass Owl and Common Planigale – within tall grassland/ fernland; and
- Grey-headed Flying-fox and Blossom Bat – within Paperbark trees.

This report concludes that the narrow linear disturbance created by the proposed pipeline is unlikely to result in a significant adverse impact on threatened fauna.

4.2 Flora Observations

Based on the current surveys, a total of three vegetation communities have been recorded from the site. These are; exotic grassland, sedgeland/ fernland/ grassland and *Melaleuca quinquenervia* open forest/ woodland. Vegetation community descriptions follow Bower and Murray (2004) and include; map unit 111001 - *Melaleuca quinquenervia* mid-high open forest/ woodland, map unit 111002 - exotic grassland, map unit 111003 - *Restio tetraphyllus* (closed) sedgeland, map unit 111004 - *Typha orientalis*/ *Leersia hexandra* tall swamp grassland with marginal regrowth, map unit 111005 – *Melaleluca quinquenervia*/ *Acacia melanoxylon* low (open) woodland with Coastal Wattle and sparse grassland, map unit 111006 - *Restio tetraphyllus*/ *Hemarthria uncinata*/ *Axonopus* sedge/ grassland and map unit 111007 - *Restio tetraphyllus*/ *Blechnum indicum* dense sedge/ fernland.

No threatened flora or potential habitat for threatened flora has been recorded or identified within the site or the land. Targeted surveys were conducted for *Eleocharis tetraquetra* (Square-stemmed Spike Rush). No specimens of this species were observed. The site exhibits sub-optimal habitat for the Swamp Orchids *Phaius australis* and *P. tankervilliae.* These species were not observed during surveys and are considered unlikely to occur on the site.

No Endangered Ecological Communities (EEC) were recorded from the site during the current surveys. Further detailed discussion is provided in **Section 4.3** in respect to this matter.

The floristic and structural characteristics of these vegetation communities are described in **Sections 4.2.1**-**4.2.3**. All flora species observed are listed within **Appendix B**. The distribution of these vegetation communities is shown in **Illustration 4.1**.

NB: seven polygons are shown within **Illustration 4.1** based on Bower Bush Works and Murray (2004). The Sedge/ fernland, sedge/ grassland and sedgeland have been combined as one vegetation community for the following descriptions.

4.2.1 *Melaleuca quinquenervia* Open Forest/ Woodland

Structure

This community is a low woodland/ open forest of 6-10 m in height with a variable percent foliage cover (PFC) of 15-45 %.

Floristic Composition

Canopy – Trees 6 to 10 m with a variable canopy cover ranging from 15 to 45 PFC. This stratum is dominated by *Melaleuca quinquervia* (Broad-leaved Paperbark) and *Acacia melanoxylon* (Blackwood) with scattered occurrences of *Cinnamomum camphora** (Camphor Laurel), *Pinus elliottii** (Slash Pine) and *Eucalyptus torreliana** (Cadaghi).

Mid Stratum – Scattered shrubs generally sparse with a variable cover of 5 to 15 PFC. Dominant species are *Acacia longifolia* var. *sophorae* (Coastal Wattle) and *Melaleuca alternifolia*.

Lower Stratum – Dominated by exotic and native grass, herb, fern and sedge species such as *Axonopus compressus** (Broad-leaved Carpet Grass), *Digitaria didactyla* (Queensland Blue Couch), *Hypolepis muelleri* (Harsh Ground Fern), *Blechnum indicum* (Swamp Water Fern) and *Hibbertia scandens* (Climbing Guinea Flower), *Hemarthria uncinata* (Matgrass) and *Paspalum urvillei** (Vasey Grass).

Note * denotes exotic species

Distribution and Variation of Community within the Site

This community occurs as a narrow band of trees along the southern boundary fringing Ewingsdale Road and is associated with disturbed sand mounds and the dwelling in the north-eastern portion of the site. This community exhibits two slight variations and correlates to map unit 111001 – *Melaleuca quinquenervia* mid-high open forest/ woodland and 1110005 - *Melaleuca quinquenervia/ Acacia melanoxylon* low (open) woodland with Coastal Wattle and sparse grassland as described in Bower and Murray (2004).

Condition of Vegetation

This community suffers from a high edge - area ratio and is of regrowth structure. Previous land uses have extensively disturbed this community from any near natural state.

Conservation Significance and Regional Context

The Melaleuca within the north-eastern corner of the site provides blossoms and nectar for local birds and bats but is not expected to constitute a significant resource due to the small area of trees. Melaleuca provides value for mobile fauna and provide an important winter resource for nectivorous fauna. Fitzgerald (2008) notes that this includes Honeyeaters, Lorikeets, Friarbirds but also potentially the threatened Grey-headed Flying Fox and Eastern Blossom Bat. The vegetation along the southern boundary fringing Ewingsdale Road is mapped by Byron Shire Council as being of HCV. Council's mapping however is broad scale and site specific surveys indicate that this vegetation community is comprised of regrowth vegetation, with a low and dense structure and low floristic diversity and therefore does not exhibit characteristics of vegetation having significant conservation value in the Byron local government area.

4.2.2 Exotic Grassland

Structure

This community is a grassland structure of 0.2-1.2 m in height with a variable PFC of 65-90 % (refer to **Plate 4.1** and **4.2**).

Floristic Composition

Canopy – Absent
Mid Stratum – Absent
Lower Stratum – Simple floristic composition consisting of exotic grass and herb species along with a number of cosmopolitan native species. Dominant species include *Seteria sphacelata** (South African Pigeon Grass), *Paspalum urvillei** (Vasey Grass), *Axonopus compressus** (Broad-leaved Carpet Grass), *Cyperus polystachyos, Hemarthria uncinata* (Matgrass), *Centella asiatica* (Pennywort), *Restio tetraphyllus* subsp. *meiostachyus* and *Fimbristylis ferruginea.* The native orchid species *Spiranthes sinensis* (Ladies' Tresses) was recorded flowering during the current survey.

Note * denotes exotic species

Distribution and Variation of Community within the Site

This community is widespread across the eastern portion of the site occurring to both the east and west of the main vehicular access track. Slight variation was observed within this community with dense thickets of *Seteria sphacelata** (South African Pigeon Grass) exclusively dominating areas to the immediate east and west of the access track in the southern portion. Lower lying periodically inundated areas exhibit slightly higher proportions of *Cyperus polystachyos, Hemarthria uncinata* (Matgrass) and *Baloskion tetraphyllus* subsp. *meiostachyus*. This community correlates to map unit 111002 – exotic grassland as described in Bower and Murray (2004).

Condition of Vegetation

This vegetation community is the result of historic clearing of native vegetation for agricultural activities (predominantly grazing). It is currently managed and maintained through periodic slashing via mechanical means.

Conservation Significance and Regional Context

This vegetation community is dominated by exotic species and is not representative of remnant native vegetation. This community does not exhibit characteristics of vegetation having significant conservation value in the Byron Local Government Area.

Plate 4.1 Exotic Grassland type variant

Plate 4.2 Exotic Grassland *Seteria sphacelata* dominant

4.2.3 Sedgeland/ Fernland/ Grassland

Structure

This community is a sedgeland/ fernland/ grassland structure of 0.5-1.2 m in height with a variable PFC of 65-90 % (refer to **Plate 4.3**).

Floristic Composition

Canopy – Absent
Mid Stratum – Absent

Lower Stratum – This stratum exhibits a very simple floristic composition almost exclusively dominated by *Baloskion tetraphyllus* subsp. *meiostachyus*, *Hemarthria uncinata* (Matgrass) and *Blechnum indicum* (Swamp Water Fern). Additional sub-dominant species include the exotic grasses *Seteria sphacelata** (South African Pigeon Grass), *Axonopus compressus** (Broad-leaved Carpet Grass) and *Paspalum urvillei** (Vasey Grass) along with incursions of *Imperata cylindrica* var. *major* (Blady Grass) and *Gahnia clarkei* (Tall Saw-sedge). These sub-dominant species occur primarily as edge incursions as *Baloskion tetraphyllus* subsp. *meiostachyus* exhibits a dense closed low canopy restricting available light levels.

Note * denotes exotic species

Distribution and Variation of Community with the Site

This community is widespread across the western portion of the site and appears to be closely related to areas of restricted drainage associated with underlying peat substrate. These areas were mapped as

polygons 111006 and 111007 in Bower and Murray (2004). Variation within this vegetation type is considered to reflect micro topographical features, disturbance history and edge effects.

In addition, an isolated area of closed sedgeland dominated by *Baloskion tetraphyllus* subsp. *meiostachyus* occurs in the south-eastern portion of the site and correlates to polygon 111003 in Bower and Murray (2004). This area occurs on a sand substrate however is associated with a slight localised depression. Previous geological data indicates that this area is underlain by a coffee rock substrate (ERM 2001) however recent bore log data identifies unconsolidated silecous sands (ASCT 2008). This community is subject to a high edge - area ratio however due to the dense nature of *Baloskion tetraphyllus* subsp. *meiostachyus* weed incursions are generally restricted to the edge areas.

Condition of Vegetation

Parts of this vegetation community are currently disturbed through periodic slashing via mechanical means. The main exotic incursion within this community is the grass species *Axonopus compressus** (Broad-leaved Carpet Grass).

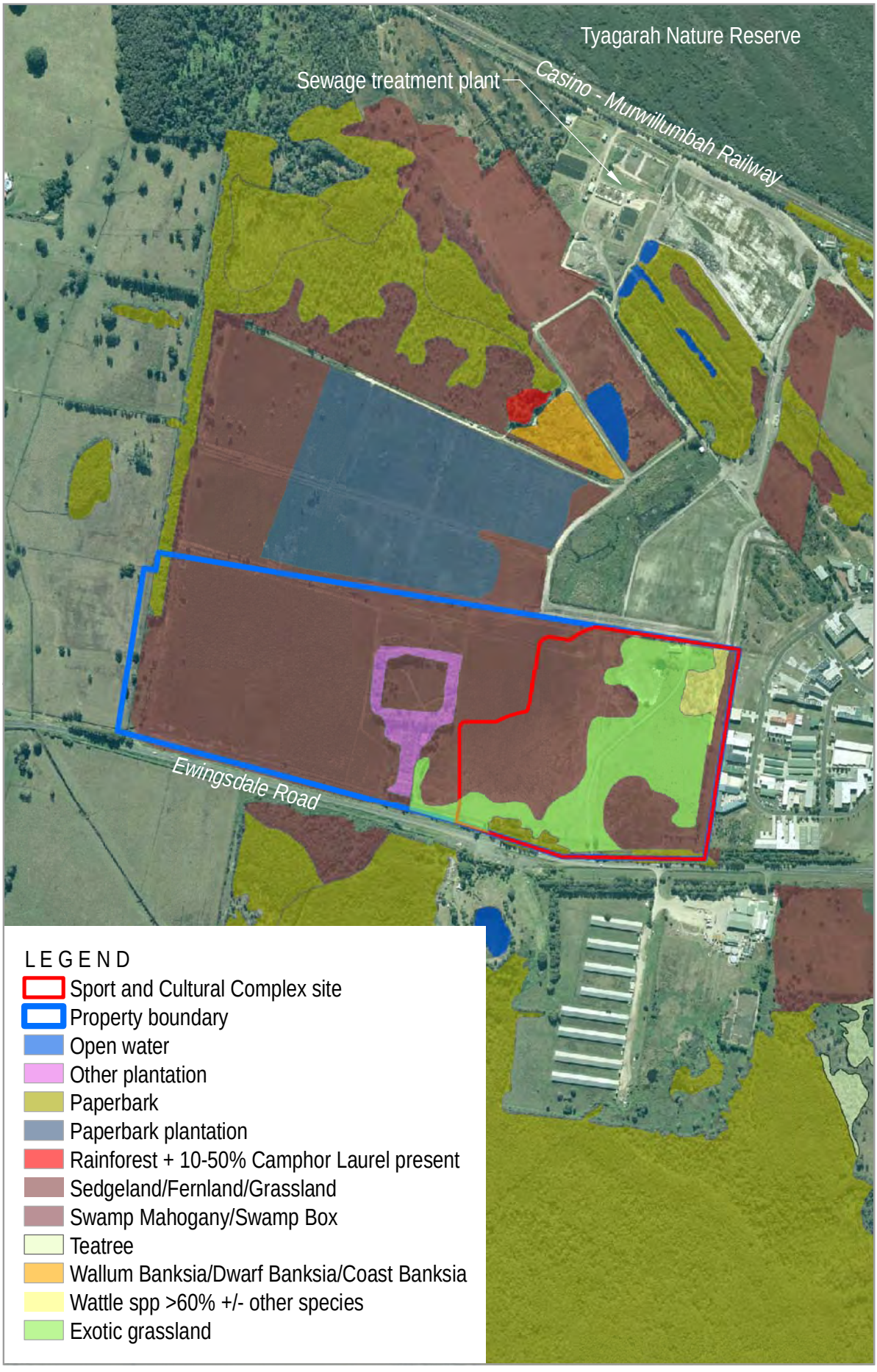
Based on the almost mono-culture nature of the *Baloskion tetraphyllus* subsp. *meiostachyus* variant, it is likely that this vegetation type is the result of prior disturbance rather than intact remnant vegetation. Given the landuse disturbances such as grazing and agriculture within the site, the construction of Ewingsdale Road and the Byron Industrial Estate, it is likely that the community has been altered from a natural remnant state.

Conservation Significance and Regional Context

This vegetation community corresponds to sedgeland/ fernland/ grassland community identified as part of the Byron Flora and Fauna Study (Landmark *et al.* 1999). This vegetation provides suitable habitat for a number of threatened and non-threatened fauna and is of significant conservation value in the Byron local government area. Landmark *et al.* (1999) record 98 ha of sedgeland/ fernland/ grassland in mapping of native vegetation of the shire. Additionally, threatened Common Planigales and Wallum Froglets were recorded associated with this vegetation community and the Grass Owl is likely to roost and breed in tall sedgelands.

Plate 4.3 Sedgeland/ Fernland/ Grassland

Source: Bower Bushworks and A.S. Murray 2004 Date: May 2009



North

0 200

Vegetation Communities

4.3 Threatened Flora

4.3.1 Database Results

Records of threatened flora species, populations or ecological communities known to occur within a 5 km radius of the site were obtained from the Department Environment and Climate Change Wildlife Atlas. The search of the Wildlife Atlas identified 25 threatened flora species occurring within the search area. Additionally, records of threatened plant species, communities or species habitat likely to occur within 5 km of the site were obtained from the Environment Protection Biodiversity Conservation (EPBC) database. The EPBC database listed 14 threatened flora species as '*species habitat **likely** to occur within area*'.

The suitability of habitat within the search area and therefore the potential occurrence of the threatened species are listed in **Table 4.1**. The species listed within the EPBC search are not actual records, rather just *species or species habitat likely to occur within area;* therefore the EPBC results have not been included within **Table 4.1**. The list of all threatened species found within these database searches is provided in **Appendix C**.

Table 4.1 Threatened Flora Recorded in DECC Wildlife Atlas

Scientific Name	*Common Name*	*Status*		*Habitat Requirement (Source NPWS 2002a)*	*Suitability of Site Habitat*	*Potential Occurrence*
		TSC Act	*EPBC Act*			
Achronychia littoralis	Scented Acronychia	E	E	Littoral rainforest on sand	Low	Unlikely
Allocasuarina defungens	Dwarf Heath Casuarina	E	E	Tall heath on sand, but may also occur on clay or sandstone	Low	Unlikely
Archidendron herdersonii	White Lace Flower	V	-	Riverine and lowland subtropical and littoral rainforest	Low	Unlikely
Chamaesyce psammogeton	Sand Spurge	E	-	Coastal sand dunes and exposed sites on headlands	Low	Unlikely
Cryptocarya foetida	Stinking Cryptocarya	V	V	Littoral rainforest, usually on sandy soils, mature trees also known on basalt soils	Low	Unlikely
Davidsonia jerseyana	Davidson's Plum	E	E	Subtropical rainforest and wet eucalypt forest	Low	Unlikely
Diuris sp. aff. chrysantha	Byron Bay Diuris	E	-	Low-growing grassy heath on clay soil	Low	Unlikely
Endiandra floydii	Crystal Creek Walnut	E	E	Warm temperate or subtropical rainforest with Brush Box overstorey, and in regrowth rainforest and Camphor Laurel forest	Low	Unlikely
Endiandra hayesii	Rusty Rose Walnut	V	V	Sheltered moist gullies in lowland subtropical and warm temperate rainforest on alluvium or basaltic soils	Low	Unlikely

Scientific Name	Common Name	Status		Habitat Requirement (Source NPWS 2002a)	Suitability of Site Habitat	Potential Occurrence
		TSC Act	EPBC Act			
Endiandra muelleri subsp. bracteata	Green-leaved Rose Walnut	E	-	Subtropical and warm temperate rainforests	Low	Unlikely
Floydia praealta	Ball Nut	V	V	Riverine and subtropical rainforest, usually soils derived from basalt	Low	Unlikely
Geodorum densiflorum	Pink Nodding Orchid	E	-	Dry eucalypt forest at lower altitudes often on coastal sand	Low	Unlikely
Grevillea hilliana	White Silky Oak	E	-	Subtropical rainforest, often on basalt-derived soils	Low	Unlikely
Macadamia tetraphylla	Rough-leaved Queensland Nut	V	V	Subtropical rainforest usually near the coast	Low	Unlikely
Marsdenia longiloba	Slender Marsdenia	E	V	Subtropical and warm temperate rainforest, lowland moist eucalypt forest adjoining rainforest	Low	Unlikely
Melicope vitiflora	Coast Euodia	E	-	Subtropical and littoral rainforest	Low	Unlikely
Owenia cepiodora	Onion Cedar	V	V	Subtropical and dry rainforest	Low	Unlikely
Phaius australis	Southern Swamp Orchid	E	E	Swampy grassland or swampy forest	Low	Unlikely
Phaius tankervilleae	Lady Tankarville's Swamp Orchid	E	E	Swampy grassland or swampy forest, rainforest, eucalypt and paperbark forest	Low	Unlikely
Pterostylis nigricans	Dark Greenhood	V	-	Coastal heathland with Heath Banksia and lower-growing heath with lichen-encrusted and relatively undisturbed soil surfaces on sandy soils	Low	Unlikely
Syzygium hodgkinsoniae	Red Lilly Pilly	V	V	Riverine and subtropical rainforest on rich alluvial or basaltic soils	Low	Unlikely
Syzygium moorei	Durobby	V	V	Subtropical and riverine rainforest	Low	Unlikely
Tinospora tinosporoides	Arrow-head Vine	V	V	Wetter subtropical rainforest, including littoral rainforest, on fertile, basalt-derived soils	Low	Unlikely

Scientific Name	Common Name	Status		Habitat Requirement (Source NPWS 2002a)	Suitability of Site Habitat	Potential Occurrence
		TSC Act	EPBC Act			
Xylosma terraereginae	Queensland Xylosma	E	-	Littoral and subtropical rainforest on coastal sands or soils derived from metasediments	Low	Unlikely

E = Endangered; V = Vulnerable

4.4 Endangered Ecological Communities

No EECs were recorded from the site during the current surveys.

The geomorphological evolution of the site is a low lying flat coastal plain of the Pleistocene epoch. The underlying strata comprises generally of sand with an area in the north-west identified as containing a peat lens.

In general, floodplain soils have been described as forming via two distinct types of material; point bar deposits and overbank deposits (Wolman and Leopold 1957). The site is not associated with an active point bar deposits or fluvial overbank flows. The soils do not comprise of fine silts / clays or loams that generally form floodplain soils.

In addition, given the conjecture over classifications of floodplains and coastal sand plains, an analysis of the floristic composition identifies that the exotic grassland and sedgeland/ fernland/ grassland vegetation types do not form part of either the endangered Freshwater Wetland or Swamp Sclerophyll Forest on Coastal Floodplain. In particular *Baloskion tetraphyllus* subsp. *meiostachyus*, which is the dominant sedge is not listed as a floristic indicator under the final determination of either community.

Melaleuca quinquenervia which is identified as a dominant species in the *Melaleuca quinquenervia* open forest/ woodland vegetation type is listed as a diagnostic species for the Swamp Sclerophyll Forest on Coastal Floodplain. *Melaleuca quinquenervia* is however equally dominant in sand plain swamp forests and is a positive diagnostic species of vegetation group 19 - Sand Flat Forest as described in Keith and Scott (2005).

In addition to the occurrence of these communities on a sandplain, (rather than floodplain), only three floristic diagnostic species listed under paragraph one of the final determination are dominant within the *Melaleuca quinquenervia* open forest/ woodland vegetation community. Given this, based on floristic and geomorphological attributes, the vegetation within the site does not form part of any listed endangered ecological community.

4.5 Fauna Observations

Fauna recorded within the site are listed in **Table D.1** (refer to **Appendix D**). Five threatened fauna species were recorded during the current surveys. These species are the Wallum Froglet (*Crinia tinnula*), Little Bent-winged Bat (*Miniopterus australis*), Eastern Bent-winged Bat (*Miniopterus schreibersii oceanensis*), Large-footed Myotis (*Myotis macropus*) and the Greater Broad-nosed Bat (*Scoteanax rueppellii*).

4.5.1 Habitat Assessment

Site habitats were assessed to determine their value for native fauna species. These assessments were completed in conjunction with the flora surveys. The assessment focused on identifying habitat features known to be associated with threatened species and other native fauna groups. Observations made in

respect of these habitat features are listed in **Table 4.2**. These features are components of the environment that, if present, will support fauna communities or indicate that fauna may be present.

Table 4.2 Habitat Features

Habitat Feature	*Indicator*	*Score*	*Comment*
Claw Marks on Trees	Claw marks on trees indicate the presence of arboreal mammals, mainly mammals such as Possums, Gliders and Koalas	0	No claw marks were observed
Scats	A range of animal faeces may be recorded indicating the presence of certain animals	2	Scats of Fox, Swamp Wallaby and European Hare were observed
Tracks	A range of animal tracks in the soil may be recorded indicating the presence of certain animals	1	Few tracks were observed, mainly Swamp Wallaby
Tree Hollows	Tree hollows provide shelter and roosting areas for birds and arboreal mammals	0	No significant tree hollows were observed
Rocky Outcrops	Rocky outcrops are preferred by certain fauna	0	No major rocky outcrops are present
Animal Diggings	A range of animal diggings in the soil may be recorded indicating the presence of certain animals	1	Small diggings in the sedgeland/ fernland/ grassland were observed. These appeared to be Bandicoot diggings however these species were not otherwise detected
Burrows	Fauna can be identified by the types of burrows present	0	No burrows were observed
Leaf Litter	Large amounts of leaf litter often indicates ample invertebrate activity and shelter for small animals	0	The site is dominated by sedgeland/ fernland/ grassland therefore leaf litter is very sparse
Bodies of Water	Fauna are often attracted to water bodies to drink, spawn or forage	1	At the time of surveys, the sedgeland/ fernland/ grassland had standing water
Stags and Logs	Dead trees and branches often provide shelter and form hollows for fauna to live or hide in	0	No large stags or logs were observed
Extent of well developed Vegetation Structure	An area with a large extent of well developed vegetation structure will encourage fauna	2	The sedgeland/ fernland/ grassland vegetation provides a dense low vegetation structure
Diversity of Flora Species	A broad flora species diversity provides a large range of food sources and habitat available for fauna	2	Floristic diversity is generally restricted to sedge, fern and grass species. Tree and shrub diversity is low
Understorey and Ground Cover	Dense understorey or ground cover such as thick grass provides shelter for small ground dwelling fauna	3	The exotic grassland and sedgeland/ fernland/ grassland exhibit a dense understorey or ground cover

Habitat Feature	Indicator	Score	Comment
Connectivity	Areas that are connected to other areas of vegetation provide a corridor for movement and can accommodate large numbers of fauna	1	The proposed Regional Sport and Cultural Complex is bordered to the east by the industrial estate and is bordered to the south by Ewingsdale Road which is a barrier to the movement. Extensive vegetation is located within the western portion of the land. The 24 effluent irrigation area directly north of the land is also conducive to fauna movement.

0 *Nil*
1 *Low Occurrence*
2 *Medium Occurrence*
3 *High Occurrence*

4.6 Threatened Fauna

Records of threatened fauna species known to occur within a 5 km radius of the site were obtained from the Department Environment and Climate Change Wildlife Atlas. The search of the Wildlife Atlas identified 46 threatened fauna species occurring within the search area. Additionally, records of threatened fauna species or species habitat likely to occur within 5 km of the site were obtained from the Environment Protection Biodiversity Conservation (EPBC) database. The EPBC database listed 26 threatened fauna species as '*species habitat **likely** to occur within area*'.

The suitability of habitat within the search area and therefore the potential occurrence of the threatened species are listed in **Table 4.3**. Pelagic species were not assessed. The species listed within the EPBC search are not actual records, rather just *species or species habitat likely to occur within area;* therefore the EPBC results have not been included within **Table 4.3**. The list of all threatened species found within these database searches is provided in **Appendix C**.

Assessments of potential occurrence are based on the field survey, a review of previous assessments completed in the study area and knowledge of the ecological requirements of threatened fauna species known from the locality. Potential occurrences are discussed as either possible, likely or unlikely occurrences.

Table 4.3 Threatened Fauna Recorded in DECC Wildlife Atlas

Scientific Name	Common Name	Status		Habitat Requirement (Source NPWS 2002b)	Suitability of Site Habitat	Potential Occurrence
		TSC Act	EPBC Act			
Aves						
Amaurornis olivaceus	Bush-hen	V	-	Coastal wetlands from mangroves, lagoons and swamps, to river margins and creeks running through rainforest	Moderate	Possible. Suitable habitat available to north within 24 ha effluent irrigation area
Botaurus poiciloptilus	Australasian Bittern	V	-	Permanent freshwater wetlands with tall dense vegetation, particularly bulrushes and spikerushes	Low	Unlikely

Scientific Name	Common Name	Status		Habitat Requirement (Source NPWS 2002b)	Suitability of Site Habitat	Potential Occurrence
		TSC Act	EPBC Act			
Calidris tenuirostris	Great Knot	V	-	Tidal mudflats, sandy ocean shores, inland freshwater or salt lakes	Low	Unlikely
Cyclopsitta diophthalma coxeni	Double-eyed Fig-Parrot	E	E	Drier rainforest and adjacent wet eucalypt forest	Low	Unlikely
Ephippoorhynchus asiaticus	Black-necked Stork	E	-	Swamps, mangroves, mudflats, dry floodplains	Low	Possible. Suitable habitat available to north
Esacus neglectus	Beach Stone-curlew	E	-	Tidal flats at the mouth of estuaries, ocean beaches	Low	Unlikely
Grus rubicundus	Brolga	V	-	Shallow swamps, floodplains, grasslands	Moderate	Possible
Irediparra gallinacea	Comb-crested Jacana	V	-	Among vegetation floating on slow-moving rivers and permanent lagoons, swamps, lakes and dams.	Low	Unlikely. Suitable habitat available to north
Ixobrychus flavicollis	Black Bittern	V	-	Dense vegetation fringing and in streams, swamps, tidal creeks and mudflats, particularly amongst swamp sheoaks and mangroves	Low	Unlikely. Possible during flood events
Monarcha leucotis	White-eared Monarch	V	-	Primarily in coastal rainforest, swamp forest and wet eucalypt forest	Low	Unlikely
Pandion cristatus (Previously named *Pandion haliaetus)*	Eastern Osprey	V	-	Forage for fish in fresh, brackish or saline waters of rivers, lakes, estuaries with suitable nesting sites nearby	Low	Unlikely. Possible during flood events
Ptilinopus magnificus	Wompoo Fruit-dove	V	-	Rainforests, low-elevation moist eucalypt forest, and Brush Box forests	Low	Unlikely
Ptilinopus regina	Rose-crowned Fruit-dove	V	-	Subtropical and dry rainforest, moist eucalypt forest and swamp forest	Low	Unlikely
Ptilinopus superbus	Superb Fruit-dove	V	-	Subtropical and dry rainforest, moist eucalypt forest and swamp forest	Low	Unlikely
Haematopus fuliginosus	Sooty Oystercatcher	V	-	Rocky headlands, rocky shelves, beaches and offshore islands	Low	Unlikely
Haematopus longirostris	Pied Oystercatcher	V	-	Open beaches, inter-tidal flats, sandbanks and occasionally rocky headlands	Low	Unlikely
Sterna albifrons	Little Tern	E	-	Coastal waters, bays, shallow inlets, salt or brackish lakes	Low	Unlikely

Scientific Name	Common Name	Status		Habitat Requirement (Source NPWS 2002b)	Suitability of Site Habitat	Potential Occurrence
		TSC Act	EPBC Act			
Sterna fuscata	Sooty Tern	V	-	Tropical and subtropical seas, islands, cays	Low	Unlikely
Tyto capensis	Grass Owl	V	-	Tall grass, including grass tussocks in swampy areas, grassy plains, swampy heath, cane grass, sedges on floodplains	High	Possible. Previously recorded in 24 ha effluent irrigation area and WBSTP to north (Fitzgerald and Newell 2008)
Tyto tenebricosa	Sooty Owl	V	-	Dry rainforest, subtropical and warm temperate rainforest and moist eucalypt forests	Low	Unlikely
Podargus ocellatus	Marbled Frogmouth	V	-	Subtropical rainforest in deep, wet, sheltered gullies frequently containing stands of Bangalow Palms	Low	Unlikely
Mammals						
Phascolarctos cinereus	Koala	V	-	Appropriate food trees in forests and woodlands, and treed urban areas	Low	Unlikely. One record (Fitzgerald 2004) of Koala heard on 17/11/04 north of the land, near western boundary of 24 ha effluent irrigation area
Planigale maculata	Common Planigale	V	-	Rainforest, eucalypt forest, heathland, marshland, grassland and rocky areas with surface cover close to water	High	**Possible.** Previously recorded in western portion of the land
Potorous tridactylus	Long-nosed Potoroo	V	-	Cool temperature rainforest at altitudes to 1500 m, moist and dry forests, wet heathland with dense layer of grasses, ferns, vines or shrubs, with occasional open areas	Moderate	Possible
Pseudomys gracilicaudatus	Eastern Chestnut Mouse	V	-	Wet coastal heath and forest areas along the coast and ranges, dense understorey of sedges	Moderate	Possible

Scientific Name	Common Name	Status		Habitat Requirement (Source NPWS 2002b)	Suitability of Site Habitat	Potential Occurrence
		TSC Act	EPBC Act			
Pteropus poliocephalus	Grey-headed Flying-fox	V	V	Conspicuous camps in lowland rainforest and swamp forest	Moderate	**Known.** Previously recorded on the northern boundary of the land (Fitzgerald 2004)
Pteropus alecto	Black Flying-fox	V	-	Large communal day-time camps in remnants of coastal subtropical rainforest or swamp forest, often with Grey-headed Flying-foxes	Moderate	Possible – was removed as a vulnerable species in 2008
Miniopterus australis	Little Bent-wing Bat	V	-	Moist eucalypt forest, rainforest and dense coastal scrub	High	**Known.** Recorded on the site using Anabat
Miniopterus schreibersii oceanensis	Eastern Bentwing-bat	V	-	Forest or woodland, roost in caves, old mines and stormwater channels	High	**Known.** Recorded on the site using Anabat
Nyctophilus bifax	Eastern Long-eared Bat	V	-	Lowland subtropical rainforest and wet and swamp eucalypt forest, extending to adjacent moist eucalypt forest	Moderate	Possible
Scoteanax rueppellii	Greater Broad-nosed Bat	V	-	Woodland, moist and dry eucalypt forest to rainforest	High	**Known.** Recorded on the site using Anabat
Syconycteris australis	Eastern Blossom-bat	V	-	Littoral rainforest and feed on flowers in adjacent heathland and paperbark swamps	Moderate	Possible
Gastropods						
Thersites mitchellae	Mitchell's Rainforest Snail	E	Critically E	Lowland subtropical rainforest and swamp forest on alluvial soils	Low	Unlikely
Amphibians						
Crinia tinnula	Wallum Froglet	V	-	Acid paperbark swamps and sedge swamps of the coastal 'wallum' country	High	**Known.** Recorded on the site during previous and current surveys
Litoria aurea	Green and Golden Bell Frog	E	V	Vegetation in and around permanent swamps, lagoons and farm dams	Low	Unlikely. Presumed locally extinct

Scientific Name	Common Name	Status		Habitat Requirement (Source NPWS 2002b)	Suitability of Site Habitat	Potential Occurrence
		TSC Act	EPBC Act			
Litoria olongburensis	Wallum Sedge Frog	V	V	Paperbark swamps and sedge swamps of the coastal 'wallum' country	High	**Known.** Previously recorded on the northern boundary of the land (Fitzgerald 2004)

E = Endangered; V = Vulnerable

Five threatened fauna species were recorded during the current surveys. These species are the Wallum Froglet (*Crinia tinnula*), Little Bent-winged Bat (*Miniopterus australis*), Eastern Bent-winged Bat (*Miniopterus schreibersii oceanensis*), Large-footed Myotis (*Myotis macropus*) and the Greater Broad-nosed Bat (*Scoteanax rueppellii*). ERM had recorded Little Bent-winged Bat (*Miniopterus australis*), Large-footed Myotis (*Myotis macropus* syn *M.adversus*) and Greater Broad-nosed Bat (*Scoteanax rueppellii*) in 2001 during surveys for the Byron Bay Sewerage Augmentation Scheme Species Impact Statement.

5 Impact Assessment

5.1 Potential Impacts

The main impact associated with the proposed Regional Sport and Cultural Complex is the direct loss of vegetation and habitat. **Table 5.1** outlines other potential impacts that may result from the proposed development and measures to minimise these impacts.

Table 5.1 Potential Impacts and their Management

Potential Impact	*Management Measures*
Physical damage during construction	
Fauna may be killed or injured during vegetation clearing.	▪ Areas of vegetation to be retained will be clearly delineated with temporary fencing during works; ▪ Removal of sedgelands/ fernland/ grassland will occur outside of the Grass Owl breeding season (March-June); ▪ Speed limits will be restricted to 10 km/ hr in order to minimise roadkill; ▪ Construction workers will be educated regarding the significance of the adjoining vegetation and habitat; and ▪ A pre-clearing inspection by personnel with ecological or wildlife caring qualifications will be conducted immediately prior to, and during vegetation removal to ensure that no animals are 'directly' impacted by the works. Any trees containing fauna will be retained until the species leaves the site or the nests have been vacated. If any animals are injured during the proposed works, they will be immediately transported to a wildlife carer or vet for appropriate treatment.
Direct loss of habitat	
The proposed development may result in the loss of habitat for fauna species.	▪ The most significant areas of habitat within the land are the HCV vegetation in the western portion of the land which provide foraging resources; ▪ The sedgeland/ fernland/ grassland community within the western portion of the land will be retained for conservation purposes; and ▪ An area of compensatory plantings, with appropriate resources and funding for long term maintenance should be considered.
Increased introduction and establishment of weeds within adjacent vegetation	
Weeds may disperse into the adjacent native vegetation during construction due to exposure of a new edge of sedgeland/ fernland/ grassland. Disturbance to the site creates opportunities for weeds to colonise within the adjacent segeland/ fernland/ grassland.	▪ The proposed works will result in removal of approximately 6.9 ha of exotic grassland, which is a positive environmental outcome; ▪ Vegetation will be established on site as street trees and landscape plantings. These will be native species appropriate to the site; ▪ The boundary of the proposed footprint of disturbance will be clearly marked using coloured barriers to prevent access and unnecessary damage to the surrounding habitat; and ▪ Waste material including vegetation debris would not be pushed into the vegetation surrounding the site.

Potential Impact	*Management Measures*
Altered Water Quality	
Modifications to the site may alter the water quality within the adjacent sedgeland/ fernland/ grassland.	▪ Linear bioretention trenches located within the car parks and alongside the internal roads will be installed to collect, treat and detain stormwater runoff from these impervious areas; ▪ Rainwater tanks will be used to collect roof water from the main buildings for subsequent reuse on the site; ▪ An end-of-line bioretention basin will be incorporated into the landscaped area located between the outdoor courts and the western boundary drain; and ▪ Shallow grass swales will be used to convey surface runoff from the sports fields to the site boundaries.
Altered Groundwater Levels	
Application of water onto the sports fields may alter the groundwater levels within the adjacent sedgeland/ fernland/ grassland.	▪ Extensive monitoring and modelling of groundwater behaviour in the local area has been undertaken as part of the augmentation of the WBSTP. Since the early 1990s, recycled water from the WBSTP has been recharging groundwater via infiltration through constructed and regenerated wetlands on the STP site. This has caused localised mounding of the water table, but this has been confined to the STP site. A similar outcome is expected for the sports field sites; and ▪ Groundwater levels in the broader area are subject to substantial natural variation and additional groundwater recharge within the sports fields site is unlikely to have a significant impact on groundwater levels beyond the site boundary (refer to **Section 4.3.2** of the REF for further discussion).
Altered Nutrient Levels	
Application of fertiliser on the sports fields may alter the nutrient levels within the adjacent sedgeland/ fernland/ grassland.	▪ A detailed management plan will be prepared to control the use of fertiliser and other chemicals on the sports fields. The management plan will balance the need to maintain functional playing fields, while ensuring the application of chemicals does not lead to adverse impacts. The management plan will specify acceptable products and incorporate best-practice techniques to ensure that the application of fertiliser does not exceed the uptake of nutrients by the plants.
Light Spill	
Additional light may spill onto the adjacent sedgeland/ fernland/ grassland potentially impacting fauna. The existing site is bordered by the industrial estate to the east and Ewingsdale Road to the south, which both currently provide artificial light sources.	▪ Hours of operation will be restricted to 7 am – 10 pm; ▪ All lights will be turned off when not in use; and ▪ Lighting will be designed in accordance with relevant Australian Standards (*ASNZS4282 – Control of the Effects of Obtrusive Light and ASNZS1158-P- Lighting for roads and public spaces*). This will minimise light spill on the adjacent sedgeland/ fernland/ grassland.
Pollution from Unclean Fill	
Filling of the lower lying areas may introduce pollutants from unclean fill.	▪ Only clean fill will be used, preferably sourced locally.

Potential Impact	*Management Measures*
Impacts on Plant Reproduction	
Clearance of areas of the site represents a loss of habitat available for dispersal for plants and will reduce pollination and dispersal events.	▪ The proposed works will result in removal of approximately 6.9 ha of exotic grassland, which is a positive environmental outcome as this seed source will be removed; ▪ The area to the west and north contains native vegetation which is available for pollination and dispersal; and ▪ It is recommended that all operational land (western portion of land) and portion of community land (west of proposed sports fields) be rezoned as 7(k) (HABITAT ZONE)
Altered Fire Regime	
Increased visitation at the sports fields may increase the risk of fire in the surrounding bushland.	▪ Fencing will be provided to separate the sports fields from the adjacent bushland; ▪ Informal community surveillance in the form of users of the area reporting people lighting fires will be encouraged; and ▪ Educative signage on the site boundary will be erected to advise of the significance of the adjoining bushland.

5.2 Vegetation Communities

The proposed Regional Sport and Cultural Complex covers approximately 16.5 ha and therefore will result in the removal of approximately 6.9 ha of exotic grassland 6.7 ha of sedgeland/ fernland/ grassland, 2.3 ha of *Melaleuca quinquenervia* open forest/ woodland.

LandArc Pty Ltd (2005) note that the proposed Regional Sport and Cultural Complex would result in the removal of approximately 2.7 ha of sedgeland complex ranked as 'extremely high ecological value' in the *Byron Biodiversity Strategy 2003*. The eastern edge of the sedgeland/ grassland habitat (within the community land) is ranked as 'medium ecological value' (BSC 2004).

5.3 Threatened Flora

No threatened flora or potential habitat for threatened flora has been recorded within the site. It is not expected that the proposed works will result any impact on threatened flora.

5.4 Endangered Ecological Communities

No threatened endangered ecological communities have been recorded within the site. It is not expected that the proposed works will impact on any endangered ecological communities.

5.5 Threatened Fauna

As indicated in **Table 5.1**, there are a number of impacts that need to be managed in order to alleviate adverse effects on threatened fauna. Seven-part tests of significance have been prepared (refer to **Appendix E**) in accordance with Section 5A of the *Environmental Planning and Assessment Act 1979* for threatened species known to occur within the site from current or previous surveys.

5.6 Wildlife Corridor

Fauna corridors are described as vegetation communities that allow the movement of fauna between connected landscape elements (Soule and Gilpin 1991). Corridors provide dispersion routes for migrating animals with large foraging or breeding ranges. Corridors are also particularly important for small remnants that do not support large viable populations.

An area in the western portion of the site has been mapped as part of a wildlife corridor under the Byron Biodiversity Conservation Strategy (refer to **Illustration 1.2**). LandArc Pty Ltd (2005:19) note that *the site lies within a significant corridor of remnant coastal habitat linking Belongil Swamp and Tyagarah Nature Reserve (north), Cumbebin Swamp Nature Reserve (east) and Hayters Hill Nature Reserve (south).*

The proposed development will result in a slight reduction in the width of this wildlife corridor. This reduction has the potential to reduce east / west movement however the exotic grassland and Byron Industrial Estate already restrict overall east / west wildlife movement. The proposed regional Regional Sport and Cultural Complex however will still allow for avian, microbat and flying-fox flight paths to be maintained.

6 Recommendations

6.1 Mitigation Measures

The following mitigation measures will be implemented to ameliorate potential ecological impacts:

- GeoLINK supports the recommendation stated within the Plan of Management that "all operational land (western portion of the land) and portion of community land (west of proposed sports fields) rezoned as 7(k) (Habitat Zone)". This will restrict use of the HCV vegetation land to only allow activities undertaken for conservation purposes;
- Implement an appropriate management regime of fire/ slashing within the western portion to prevent the sedgeland association converting to Paperbark woodland;
- Implement a program of long term weed control, maintenance and monitoring especially within the area mapped as "other plantation" which comprises exotic Slash Pine (*Pinus elliottii*) which are currently seeding throughout the sedgeland;
- A pre-clearing inspection by personnel with ecological or wildlife caring qualifications will be conducted immediately prior to, and during removal to ensure that no animals are 'directly' impacted by the works. Any trees containing fauna will be retained until the species leaves the site or the nests/hollows/limbs have been vacated. If any animals are injured during the proposed works, they will be immediately transported to a wildlife carer or vet for appropriate treatment;
- Prior to vegetation removal, call-playback of pre-recorded Grass Owl calls and spotlighting shall be undertaken to detect the presence of Grass Owls. If Grass Owls are detected during these surveys, further survey and analysis may be required to determine if the Owl is breeding onsite;
- Removal of sedgelands/ fernland/ grassland undertaken in preparation for the proposed Regional Sport and Cultural Complex shall be undertaken outside the breeding season for the Grass Owl which is March to June;
- Landscape plantings will be locally sourced indigenous species compatible with existing vegetation identified on the site;
- Explore further off-site Council owned lands, associated with this wildlife corridor, for compensatory plantings, active management and rehabilitation;
- A detailed management plan will be prepared to control the use of fertiliser and other chemicals on the sports fields. The management plan will balance the need to maintain functional playing fields, while ensuring the application of chemicals does not lead to adverse impacts on adjoining sedgelands. The management plan will specify acceptable products and incorporate best-practice techniques to ensure that the application of fertiliser does not exceed the uptake of nutrients by the plants.
- Vehicles, machinery and any stockpile materials would be placed in designated bunded areas;
- Refuelling of equipment and vehicles would only occur in an appropriately bunded area;
- Care would be taken within/ near areas of native vegetation to minimise the spread of weeds into or throughout the site or surrounding area by carefully cleaning and maintaining equipment;
- Weeds removed would be disposed of in an approved off-site location (council rubbish tip) to reduce the risk of spreading weeds to neighbouring areas;
- Temporary rehabilitation would be undertaken on disturbed areas where works have been interrupted and soils are expected to remain exposed for more than one month;
- The boundary of the proposed footprint of disturbance would be clearly marked using coloured barriers to prevent access and unnecessary damage to the surrounding habitat and all vegetation would be retained beyond the limit of works;

- Waste material including vegetation debris would not be pushed into the vegetation surrounding the site;
- Speed limits will be restricted to 10 km/ hr in order to minimise roadkill;
- Construction workers would be educated regarding the significance of the adjoining vegetation and habitat;
- Fauna friendly fencing would be provided to separate the sports fields from the adjacent HCV sedgeland/ fernland/ grassland to prevent humans and vehicles from entering the adjacent vegetation; and
- Educative signage would be erected on the site boundary to advise of the significance of the adjoining HCV sedgeland/ fernland/ grassland.

7

Conclusions

A total of three vegetation types have been recorded from the site. These are exotic grassland, sedgeland/ fernland/ grassland and *Melaleuca quinquenervia* open forest/ woodland. No threatened flora or potential habitat for threatened flora has been recorded within the site. No Endangered Ecological Communities were recorded from the site during the current surveys.

Five threatened fauna species were recorded during the current surveys. These species are the Wallum Froglet (*Crinia tinnula*), Little Bent-winged Bat (*Miniopterus australis*), Eastern Bent-winged Bat (*Miniopterus schreibersii oceanensis*), Southern Myotis (*Myotis macropus*) and the Greater Broad-nosed Bat (*Scoteanax rueppellii*).

Threatened species not recorded during the current surveys within the area of the proposed Regional Sport and Cultural Complex but have been recorded within the land during previous surveys undertaken by Fitzgerald (2004, 2005 and Fitzgerald and Newell 2008) include Common Planigale (*Planigale maculata*) within the western portion of the land only, Wallum Sedge Frog (*Litoria oblongburensis*) near the border of the 24 ha effluent irrigation area with the site as well as the eastern areas of the WBSTP and the Grey-headed Flying-fox (*Pteropus poliocephalus*) recorded at two locations along the northern boundary of the land.

Additionally, three threatened species were recorded in close proximity to but outside the land including one Square-tailed Kite which was also observed by Fitzgerald (23/9/2004) flying low over the Paperbark canopy of the western drain, a Koala was heard calling north of the land, near the western boundary of 24 ha effluent irrigation area and the Grass Owl (*Tyto capensis*) within the 24 ha effluent irrigation area and WBSTP lands.

A western to eastern cline in habitat quality for fauna is evident across the land, with limited habitat and correspondingly fewer threatened species records in the far eastern portion of the land, which is subject to disturbance by the proposed Regional Sport and Cultural Complex. It is recommended that the western portion of the land be given reservation status and management appropriate to its clear ecological importance. This western portion is classified as HCV vegetation and forms part of a wildlife corridor. An impact assessment and seven-part tests of significance undertaken in accordance with Section 5A of the *Environmental Planning and Assessment Act 1979* have been undertaken (refer to **Appendix E**) for threatened fauna species known or likely to occur on the site . This assessment has concluded that potential impacts resulting from the proposed Regional Sport and Cultural Complex can be adequately managed and are not expected to result in a significant impact on these threatened species.

Project Team

The project team members included:

Veronica Silver
Ecologist

Mark Stables
Ecologist

Anna Lloyd
Ecologist

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GeoLINK declares that it does not have, nor expects to have, a beneficial interest in the project.

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A

Meterological Data

Table A.1 Meteorological Data January 2008 – Byron Bay

Date	*Min temp (°C)*	*Max temp (°C)*	*Rainfall (mm)*	*Direction of maximum wind gust*	*Speed of maximum wind gust (km/h)*	*9am Temperature (°C)*	*3pm Temperature (°C)*
10/01/2008	23.4	24.5	0	ESE	56	23.6	23.4
11/01/2008	20.4	27.3	12.5	E	46	21.5	24.5
12/01/2008	19.3	26.1	1.8	E	48	22.8	22.9

Source: http://www.bom.gov.au/climate/dwo/200801/html/IDCJDW2022.200801.shtml

B

Floristic Data

Table B.1 Floristic Data

Family	*Species*	*Common Name*	*Geo 08*	*BBW 04*
Amaryllidaceae	*Crinum pedunculatum*	Swamp Lily	x	x
Apiaceae	*Centella asiatica*	Pennywort	x	x
	*Hydrocotyle bonariensis**	A Pennywort	x	x
	Hydrocotyle pedicellosa	Pennywort		x
Apocynaceae	*Parsonsia straminea*	Common Silkpod	x	x
Araceae	*Pistia stratiotes**	Water Lettuce		x
Asteraceae	*Ageratina riparia**	Mistflower	x	x
	*Ambrosia artemisiifolia**	Annual Ragweed	x	x
	*Baccharis halimifolia**	Groundsel Bush	x	x
	*Cirsium vulgare**	Spear Thistle	x	x
	*Conyza bonariensis**	Flaxleaf Fleabane	x	x
	*Conyza parva**	A Fleabane		x
	*Crassocephalum crepidioides**	Thickhead	x	x
	Emilia sonchifolia var. javanica	-	x	
	*Erechtites valerianifolia**	Brazilian Fireweed	x	
	*Hypochaeris radicata**	Catsear	x	x
	*Senecio madagascariensis**	Fireweed	x	x
Blechnaceae	*Blechnum indicum*	Swamp Water Fern	x	x
Campanulaceae	*Wahlenbergia stricta*	Tall Bluebell	x	x
Casuarinaceae	*Allocasuarina littoralis*	Black Sheoak	x	x
Commelinaceae	*Commelina cyanea*	Native Wandering Jew	x	x
Convolvulaceae	*Ipomoea cairica**	Coast Morning Glory	x	x
Cyperaceae	*Baumea teretifolia*	A Twigrush	x	x
	*Cyperus eragrostis**	Umbrella Sedge	x	
	Cyperus exaltatus	-		x
	Cyperus polystachyos	A Sedge	x	x
	Eleocharis equisetina	A Spikerush	x	x
	Fimbristylis ferruginea	-	x	
	Fimbristylis nutans		x	
	Gahnia clarkei	Tall Saw-sedge	x	x
	Gahnia sieberiana	Red-fruit Saw-sedge	x	x
	Isolepis inundata	Swamp Clubrush	x	x
	Lepironia articulate	A Rush	x	x
	Schoenus brevifolius	A Rush	x	x
Dennstaedtiaceae	*Histiopteris incise*	Bat's Wing Fern	x	x
	Hypolepis muelleri	Harsh Ground Fern	x	x
	Pteridium esculentum	Bracken	x	x
Dilleniaceae	*Hibbertia scandens*	Climbing Guinea Flower	x	x

Family	*Species*	*Common Name*	*Geo 08*	*BBW 04*
Droseraceae	*Drosera binata*	Forked Sundew	x	
Euphorbiaceae	*Glochidion sumatranum*	Umbrella Cheese Tree	x	x
	Homalanthus populifolius	Bleeding Heart	x	x
Fabaceae (Faboideae)	*Lotus uliginosus**	Birds-foot Trefoil	x	x
Fabaceae (Mimosoideae)	*Acacia longifolia var. sophorae*	Coastal Wattle	x	x
	Acacia melanoxylon	Blackwood	x	x
Goodeniaceae	*Goodenia paniculata*	-	x	x
Haloragaceae	*Gonocarpus micranthus subsp. ramosissimus*	-	x	x
	*Myriophyllum aquaticum**	Brazilian Water-milfoil		x
Iridaceae	*Sisyrinchium sp.* A*	Scourweed	x	x
Juncaceae	*Juncus continuus*	A Rush	x	x
	Juncus planifolius	-	x	x
	Juncus prismatocarpus	Branching Rush		x
	Juncus sp.	A Rush		x
	Juncus usitatus	-	x	x
Lauraceae	*Cinnamomum camphora**	Camphor Laurel	x	x
Lentibulariaceae	*Utricularia aurea*	Golden Bladderwort	x	x
Lobeliaceae	*Lobelia alata*	Angled Lobelia	x	x
	Pratia purpurascens	Whiteroot	x	x
Lythraceae	*Cuphea carthagenensis**	-	x	x
Menyanthaceae	*Villarsia exaltata*	Yellow Marsh Flower	x	x
Moraceae	*Ficus microcarpa var. hillii*	Small-fruited Fig	x	x
	Ficus obliqua	Small-leaved Fig	x	x
Myrtaceae	*Eucalyptus robusta*	Swamp Mahogany	x	x
	Eucalyptus torelliana	Cadaghi	x	x
	Melaleuca alternifolia	-		x
	Melaleuca quinquenervia	Broad-leaved Paperbark	x	x
Onagraceae	*Oenothera indecora subsp. bonariensis**	Small Flower Evening Primrose	x	x
Orchidaceae	*Spiranthes australis*	Ladies' Tresses	x	
Philydraceae	*Philydrum lanuginosum*	Frogsmouth	x	x
Pinaceae	*Pinus elliottii**	Slash Pine	x	x
Poaceae	*Andropogon virginicus**	Whisky Grass	x	x
	*Axonopus compressus**	Broad-leaved Carpet Grass	x	x
	Digitaria didactyla	Queensland Blue Couch	x	x
	*Digitaria sanguinalis**	A Summer Grass	x	
	Entolasia stricta	Wiry Panic		x

Family	*Species*	*Common Name*	*Geo 08*	*BBW 04*
	Eragrostis elongata	Clustered Lovegrass	x	
	Hemarthria uncinata	Matgrass	x	x
	Imperata cylindrica var. major	Blady Grass	x	x
	Leersia hexandra	Swamp Ricegrass	x	x
	*Panicum maximum**	Guinea Grass		x
	*Paspalum dilatatum**	Paspalum	x	
	*Paspalum notatum**	Bahia Grass	x	
	*Paspalum urvillei**	Vasey Grass	x	x
	*Paspalum wettsteinii**	Broad-leaved Paspalum	x	x
	Phragmites australis	Common Reed	x	x
	*Setaria sphacelata**	South African Pigeon Grass	x	x
	*Sporobolus africanus**	Parramatta Grass	x	
Polygonaceae	*Persicaria attenuata*	A Smartweed		x
	Persicaria decipiens	Slender Knotweed	x	x
	Persicaria dichotoma	A Smartweed	x	x
	Persicaria strigosa	A Smartweed	x	x
	*Rumex sp**	A Dock		x
Proteaceae	*Banksia ericifolia var. macrantha*	-	x	x
Restionaceae	*Restio pallens*	A Rush	x	x
	Restio tetraphyllus subsp. meiostachyus	A Rush	x	x
Rutaceae	*Acronychia imperforata*	Beach Acronychia	x	x
	Melicope elleryana	Pink-flowered Doughwood	x	x
Sapindaceae	*Cupaniopsis anacardioides*	Tuckeroo	x	x
Selaginellaceae	*Selaginella uliginosa*	Swamp Selaginella	x	x
Solanaceae	*Duboisia myoporoides*	Corkwood	x	x
	*Solanum mauritianum**	Wild Tobacco Bush	x	x
Sphagnaceae	*Sphagnum secundatum*	Sphagnum Moss	x	x
Typhaceae	*Typha orientalis*	Broad-leaved Cumbungi	x	x
Verbenaceae	*Lantana camara**	Lantana	x	x
Xanthorrhoeaceae	*Xanthorrhoea fulva*	Swamp Grasstree	x	x
Xyridaceae	*Xyris complanata*	-	x	x

Key

*	Exotic species
Geo08	GeoLINK surveys undertaken January 2008
BBW04	map units 111001, 111002, 111003, 111004, 111005, 111006 and 111007

C

Wildlife Atlas Results
EPBC Act Protected Matters Report

NSW National Parks & Wildlife Service
atlas of nsw wildlife

Search Results

Your selection: Flora, threatened species, Selected Area - 153.52566,-28.68549,153.62846,-28.58549 returned a total of 269 records of 24 species.
Report generated on 07/01/2008 - 12:19 (Data valid to 06/01/2007)

Choose up to 3 species to map.
** Exotic (non-native) species*

Plants	Map	Scientific Name	Common Name	Legal Status	Count	Info
Apocynaceae						
	☐	Marsdenia longiloba	Slender Marsdenia	E1	1	
Casuarinaceae						
	☐	Allocasuarina defungens	Dwarf Heath Casuarina	E1	3	
Davidsoniaceae						
	☐	Davidsonia jerseyana	Davidson's Plum	E1	36	
Euphorbiaceae						
	☐	Chamaesyce psammogeton	Sand Spurge	E1	1	
Fabaceae (Mimosoideae)						
	☐	Archidendron hendersonii	White Lace Flower	V	26	
Flacourtiaceae						
	☐	Xylosma terrae-reginae	Queensland Xylosma	E1	2	
Lauraceae						
	☐	Cryptocarya foetida	Stinking Cryptocarya	V	48	
	☐	Endiandra floydii	Crystal Creek Walnut	E1	34	
	☐	Endiandra hayesii	Rusty Rose Walnut	V	8	
	☐	Endiandra muelleri subsp. bracteata	Green-leaved Rose Walnut	E1	16	
Meliaceae						
	☐	Owenia cepiodora	Onion Cedar	V	2	
Menispermaceae						
	☐	Tinospora tinosporoides	Arrow-head Vine	V	16	
Myrtaceae						
	☐	Syzygium hodgkinsoniae	Red Lilly Pilly	V	9	
	☐	Syzygium moorei	Durobby	V	36	
Orchidaceae						
	☐	Diuris sp. aff. chrysantha	Byron Bay Diuris	E1	5	
	☐	Geodorum densiflorum	Pink Nodding Orchid	E1	2	
	☐	Phaius australis	Southern Swamp Orchid	E1	3	
	☐	Phaius tankarvilleae	Lady Tankarville's Swamp Orchid	E1	2	
	☐	Pterostylis nigricans	Dark Greenhood	V	1	
Proteaceae						
	☐	Floydia praealta	Ball Nut	V	1	
	☐	Grevillea hilliana	White Silky Oak/Yiel Yiel	E1	1	
	☐	Macadamia tetraphylla	Rough-shelled Bush Nut	V	6	
Rutaceae						
		Acronychia littoralis	Scented Acronychia	E1	8	

☐				
☐	Melicope vitiflora	Coast Euodia	E1	2

** Exotic (non-native) species*

Choose up to 3 species to map.

DISCLAIMER: The Atlas of New South Wales Wildlife contains data from a number of sources including government agencies, non-government organisations and private individuals. These data are only indicative and cannot be considered a comprehensive inventory, and may contain errors and omissions. Find out more about the Atlas.

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NSW National Parks & Wildlife Service
atlas of nsw wildlife

Search Results

Your selection: Fauna, threatened species, Selected Area - 153.52566,-28.68549,153.62846,-28.58549 returned a total of 315 records of 41 species.
Report generated on 07/01/2008 - 12:18 (Data valid to 06/01/2007)

Choose up to 3 species to map.
** Exotic (non-native) species*

Amphibia	Map	Scientific Name	Common Name	Legal Status	Count	Info
Hylidae						
	☐	Litoria aurea	Green and Golden Bell Frog	E1	3	
	☐	Litoria olongburensis	Olongburra Frog	V	20	
Myobatrachidae						
	☐	Crinia tinnula	Wallum Froglet	V	37	

Aves	Map	Scientific Name	Common Name	Legal Status	Count	Info
Accipitridae						
	☐	Pandion haliaetus	Osprey	V	5	
Ardeidae						
	☐	Botaurus poiciloptilus	Australasian Bittern	V	3	
	☐	Ixobrychus flavicollis	Black Bittern	V	10	
Burhinidae						
	☐	Esacus neglectus	Beach Stone-curlew	E1	1	
Ciconiidae						
	☐	Ephippiorhynchus asiaticus	Black-necked Stork	E1	28	
Columbidae						
	☐	Ptilinopus magnificus	Wompoo Fruit-Dove	V	5	
	☐	Ptilinopus regina	Rose-crowned Fruit-Dove	V	4	
	☐	Ptilinopus superbus	Superb Fruit-Dove	V	1	
Dicruridae						
	☐	Monarcha leucotis	White-eared Monarch	V	3	
Gruidae						
	☐	Grus rubicunda	Brolga	V	1	
Haematopodidae						
	☐	Haematopus fuliginosus	Sooty Oystercatcher	V	1	
	☐	Haematopus longirostris	Pied Oystercatcher	V	13	
Jacanidae						
	☐	Irediparra gallinacea	Comb-crested Jacana	V	2	
Laridae						
	☐	Sterna albifrons	Little Tern	E1	6	
	☐	Sterna fuscata	Sooty Tern	V	1	
Podargidae						
	☐	Podargus ocellatus	Marbled Frogmouth	V	1	
Procellariidae						
	☐	Pterodroma leucoptera leucoptera	Gould's Petrel	E1	1	

	☐ Pterodroma nigripennis	Black-winged Petrel	V	1	
Psittacidae					
	☐ Cyclopsitta diophthalma coxeni	Double-eyed Fig-parrot	E1	1	
Rallidae					
	☐ Amaurornis olivaceus	Bush-hen	V	14	
Scolopacidae					
	☐ Calidris tenuirostris	Great Knot	V	3	
Tytonidae					
	☐ Tyto capensis	Grass Owl	V	12	
	☐ Tyto tenebricosa	Sooty Owl	V	1	

Gastropoda	Map	Scientific Name	Common Name	Legal Status	Count	Info
Camaenidae						
	☐	Thersites mitchellae	Mitchell's Rainforest Snail	E1	17	

Mammalia	Map	Scientific Name	Common Name	Legal Status	Count	Info
Dasyuridae						
	☐	Planigale maculata	Common Planigale	V	18	
Muridae						
	☐	Pseudomys gracilicaudatus	Eastern Chestnut Mouse	V	1	
Phascolarctidae						
	☐	Phascolarctos cinereus	Koala	V	7	
Potoroidae						
	☐	Potorous tridactylus	Long-nosed Potoroo	V	11	
Pteropodidae						
	☐	Pteropus alecto	Black Flying-fox	V	1	
	☐	Pteropus poliocephalus	Grey-headed Flying-fox	V	7	
	☐	Syconycteris australis	Common Blossom-bat	V	2	
Vespertilionidae						
	☐	Miniopterus australis	Little Bentwing-bat	V	18	
	☐	Miniopterus schreibersii oceanensis	Eastern Bentwing-bat	V	1	
	☐	Myotis adversus	Large-footed Myotis	V	26	
	☐	Nyctophilus bifax	Eastern Long-eared Bat	V	2	
	☐	Scoteanax rueppellii	Greater Broad-nosed Bat	V	2	

Reptilia	Map	Scientific Name	Common Name	Legal Status	Count	Info
Cheloniidae						
	☐	Caretta caretta	Loggerhead Turtle	E1	10	
	☐	Chelonia mydas	Green Turtle	V	14	

** Exotic (non-native) species*

Choose up to 3 species to map.

DISCLAIMER: The Atlas of New South Wales Wildlife contains data from a number of sources including government agencies, non-government organisations and private individuals. These data are only indicative and cannot be considered a comprehensive inventory, and may contain errors and omissions. Find out more about the Atlas.

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Department of the Environment and Water Resources

Protected Matters Search Tool

You are here: Environment Home > EPBC Act > Search

7 January 2008 12:22

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

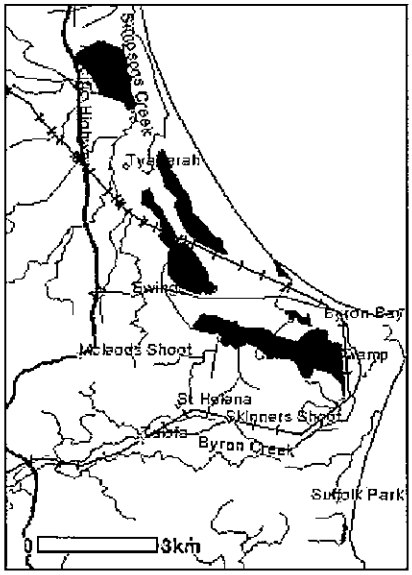
You may wish to print this report for reference before moving to other pages or websites.

The Australian Natural Resources Atlas at http://www.environment.gov.au/atlas may provide further environmental information relevant to your selected area. Information about the EPBC Act including significance guidelines, forms and application process details can be found at http://www.environment.gov.au/epbc/assessmentsapprovals/index.html

Search Type: Point
Buffer: 5 km
Coordinates: -28.63559,153.577

Report Contents:
Summary
Details
- Matters of NES
- Other matters protected by the EPBC Act
- Extra Information

Caveat
Acknowledgments



This map may contain data which are
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Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance - see http://www.environment.gov.au/epbc/assessmentsapprovals/guidelines/index.html.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Significance: (Ramsar Sites)	None
Commonwealth Marine Areas:	None
Threatened Ecological Communities:	None
Threatened Species:	43
Migratory Species:	37

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place and the heritage values of a place on the Register of the National Estate. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage/index.html.

Please note that the current dataset on Commonwealth land is not complete. Further information on Commonwealth land would need to be obtained from relevant sources including Commonwealth agencies, local agencies, and land tenure maps.

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species. Information on EPBC Act permit requirements and application forms can be found at http://www.environment.gov.au/epbc/permits/index.html.

Commonwealth Lands:	2
Commonwealth Heritage Places:	None
Places on the RNE:	None
Listed Marine Species:	58
Whales and Other Cetaceans:	13
Critical Habitats:	None
Commonwealth Reserves:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	3
Other Commonwealth Reserves:	None
Regional Forest Agreements:	1

Details

Matters of National Environmental Significance

Threatened Species [Dataset Information]	Status	Type of Presence
Birds		
*Cyclopsitta diophthalma coxeni** Coxen's Fig-Parrot	Endangered	Species or species habitat likely to occur within area
Diomedea dabbenena * Tristan Albatross	Endangered	Foraging may occur within area
Lathamus discolor * Swift Parrot	Endangered	Species or species habitat may occur within area
Macronectes giganteus * Southern Giant-Petrel	Endangered	Species or species habitat may occur within area
Macronectes halli * Northern Giant-Petrel	Vulnerable	Species or species habitat may occur within area
*Poephila cincta cincta** Black-throated Finch (southern)	Endangered	Species or species habitat likely to occur within area
*Pterodroma neglecta neglecta** Kermadec Petrel (western)	Vulnerable	Species or species habitat may occur within area
Rostratula australis *	Vulnerable	Species or species habitat may occur within

Australian Painted Snipe		area
Thalassarche impavida * Campbell Albatross	Vulnerable	Species or species habitat may occur within area
Turnix melanogaster * Black-breasted Button-quail	Vulnerable	Species or species habitat likely to occur within area
Xanthomyza phrygia * Regent Honeyeater	Endangered	Species or species habitat may occur within area
Frogs		
Litoria aurea * Green and Golden Bell Frog	Vulnerable	Species or species habitat may occur within area
Litoria olongburensis * Wallum Sedge Frog	Vulnerable	Species or species habitat likely to occur within area
Mammals		
Balaenoptera musculus * Blue Whale	Endangered	Species or species habitat may occur within area
Chalinolobus dwyeri * Large-eared Pied Bat, Large Pied Bat	Vulnerable	Species or species habitat may occur within area
*Dasyurus maculatus maculatus (SE mainland population)** Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population)	Endangered	Species or species habitat may occur within area
Eubalaena australis * Southern Right Whale	Endangered	Species or species habitat likely to occur within area
Megaptera novaeangliae * Humpback Whale	Vulnerable	Congregation or aggregation known to occur within area
*Potorous tridactylus tridactylus** Long-nosed Potoroo (SE mainland)	Vulnerable	Species or species habitat may occur within area
Pteropus poliocephalus * Grey-headed Flying-fox	Vulnerable	Species or species habitat likely to occur within area
Reptiles		
Caretta caretta * Loggerhead Turtle	Endangered	Species or species habitat may occur within area
Chelonia mydas * Green Turtle	Vulnerable	Species or species habitat may occur within area
Dermochelys coriacea * Leathery Turtle, Leatherback Turtle, Luth	Vulnerable	Breeding may occur within area
Sharks		
*Carcharias taurus (east coast population)** Grey Nurse Shark (east coast population)	Critically Endangered	Congregation or aggregation known to occur within area
Carcharodon carcharias * Great White Shark	Vulnerable	Species or species habitat may occur within area
Rhincodon typus * Whale Shark	Vulnerable	Species or species habitat may occur within area
Snails, slugs		
Thersites mitchellae * Mitchell's Rainforest Snail	Critically Endangered	Species or species habitat likely to occur within area
Plants		
Acronychia littoralis * Scented Acronychia	Endangered	Species or species habitat likely to occur within area
Corokia whiteana *	Vulnerable	Species or species habitat likely to occur within area
Cryptocarya foetida * Stinking Cryptocarya, Stinking Laurel	Vulnerable	Species or species habitat likely to occur within area
Davidsonia jerseyana * Davidson's Plum, Ooray	Endangered	Species or species habitat likely to occur within area
Davidsonia johnsonii * Smooth Davidsonia, Smooth Davidson's Plum, Small-leaved Davidson's Plum	Endangered	Species or species habitat likely to occur within area
Desmodium acanthocladum * Thorny Pea	Vulnerable	Community likely to occur within area

Diploglottis campbellii * Small-leaved Tamarind	Endangered	Species or species habitat likely to occur within area
Endiandra floydii * Floyd's Walnut	Endangered	Species or species habitat likely to occur within area
Floydia praealta * Ball Nut, Possum Nut, Big Nut, Beefwood	Vulnerable	Species or species habitat likely to occur within area
Gossia fragrantissima * Sweet Myrtle, Small-leaved Myrtle	Endangered	Species or species habitat likely to occur within area
Owenia cepiodora * Onionwood, Bog Onion, Onion Cedar	Vulnerable	Species or species habitat likely to occur within area
Phaius australis * Lesser Swamp-orchid	Endangered	Species or species habitat likely to occur within area
Randia moorei * Spiny Gardenia	Endangered	Species or species habitat likely to occur within area
Syzygium hodgkinsoniae * Smooth-bark Rose Apple, Red Lilly Pilly	Vulnerable	Species or species habitat likely to occur within area
Syzygium moorei * Rose Apple, Coolamon, Robby, Durobby, Watermelon Tree, Coolamon Rose Apple	Vulnerable	Species or species habitat likely to occur within area
Tinospora tinosporoides * Arrow-head Vine	Vulnerable	Species or species habitat likely to occur within area
Migratory Species [Dataset Information]	Status	Type of Presence
Migratory Terrestrial Species		
Birds		
*Cyclopsitta diophthalma coxeni** Coxen's Fig-Parrot	Migratory	Species or species habitat likely to occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle	Migratory	Species or species habitat likely to occur within area
Hirundapus caudacutus White-throated Needletail	Migratory	Species or species habitat may occur within area
Merops ornatus * Rainbow Bee-eater	Migratory	Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch	Migratory	Breeding may occur within area
Monarcha trivirgatus Spectacled Monarch	Migratory	Breeding likely to occur within area
Myiagra cyanoleuca Satin Flycatcher	Migratory	Breeding likely to occur within area
Rhipidura rufifrons Rufous Fantail	Migratory	Breeding may occur within area
Xanthomyza phrygia Regent Honeyeater	Migratory	Species or species habitat may occur within area
Migratory Wetland Species		
Birds		
Ardea alba Great Egret, White Egret	Migratory	Species or species habitat may occur within area
Ardea ibis Cattle Egret	Migratory	Species or species habitat may occur within area
Gallinago hardwickii * Latham's Snipe, Japanese Snipe	Migratory	Species or species habitat may occur within area
Rostratula benghalensis s. lat. Painted Snipe	Migratory	Species or species habitat may occur within area
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift	Migratory	Species or species habitat may occur within area
Ardea alba Great Egret, White Egret	Migratory	Species or species habitat may occur within area
Ardea ibis Cattle Egret	Migratory	Species or species habitat may occur within area

Calonectris leucomelas Streaked Shearwater	Migratory	Species or species habitat may occur within area
Diomedea dabbenena Tristan Albatross	Migratory	Foraging may occur within area
Macronectes giganteus Southern Giant-Petrel	Migratory	Species or species habitat may occur within area
Macronectes halli Northern Giant-Petrel	Migratory	Species or species habitat may occur within area
Puffinus leucomelas Streaked Shearwater	Migratory	Species or species habitat may occur within area
Sterna albifrons Little Tern	Migratory	Breeding likely to occur within area
Thalassarche chlororhynchos Yellow-nosed Albatross, Atlantic Yellow-nosed Albatross	Migratory	Species or species habitat may occur within area
Thalassarche impavida Campbell Albatross	Migratory	Species or species habitat may occur within area
Migratory Marine Species		
Mammals		
Balaenoptera edeni Bryde's Whale	Migratory	Species or species habitat may occur within area
Balaenoptera musculus * Blue Whale	Migratory	Species or species habitat may occur within area
Dugong dugon Dugong	Migratory	Species or species habitat likely to occur within area
Eubalaena australis * Southern Right Whale	Migratory	Species or species habitat likely to occur within area
Lagenorhynchus obscurus Dusky Dolphin	Migratory	Species or species habitat may occur within area
Megaptera novaeangliae * Humpback Whale	Migratory	Congregation or aggregation known to occur within area
Orcinus orca Killer Whale, Orca	Migratory	Species or species habitat may occur within area
Sousa chinensis Indo-Pacific Humpback Dolphin	Migratory	Species or species habitat may occur within area
Reptiles		
Caretta caretta * Loggerhead Turtle	Migratory	Species or species habitat may occur within area
Chelonia mydas * Green Turtle	Migratory	Species or species habitat may occur within area
Dermochelys coriacea * Leathery Turtle, Leatherback Turtle, Luth	Migratory	Breeding may occur within area
Sharks		
Carcharodon carcharias Great White Shark	Migratory	Species or species habitat may occur within area
Rhincodon typus Whale Shark	Migratory	Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species [Dataset Information]	Status	Type of Presence
Birds		
Anseranas semipalmata Magpie Goose	Listed - overfly marine area	Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift	Listed - overfly marine area	Species or species habitat may occur within area
Ardea alba Great Egret, White Egret	Listed - overfly	Species or species habitat may occur within area

	marine area	
Ardea ibis Cattle Egret	Listed - overfly marine area	Species or species habitat may occur within area
Calonectris leucomelas Streaked Shearwater	Listed	Species or species habitat may occur within area
Catharacta skua Great Skua	Listed	Species or species habitat may occur within area
Diomedea dabbenena Tristan Albatross	Listed	Foraging may occur within area
Gallinago hardwickii * Latham's Snipe, Japanese Snipe	Listed - overfly marine area	Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle	Listed	Species or species habitat likely to occur within area
Hirundapus caudacutus White-throated Needletail	Listed - overfly marine area	Species or species habitat may occur within area
Lathamus discolor * Swift Parrot	Listed - overfly marine area	Species or species habitat may occur within area
Macronectes giganteus Southern Giant-Petrel	Listed	Species or species habitat may occur within area
Macronectes halli Northern Giant-Petrel	Listed	Species or species habitat may occur within area
Merops ornatus * Rainbow Bee-eater	Listed - overfly marine area	Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch	Listed - overfly marine area	Breeding may occur within area
Monarcha trivirgatus Spectacled Monarch	Listed - overfly marine area	Breeding likely to occur within area
Myiagra cyanoleuca Satin Flycatcher	Listed - overfly marine area	Breeding likely to occur within area
Rhipidura rufifrons Rufous Fantail	Listed - overfly marine area	Breeding may occur within area
Rostratula benghalensis s. lat. Painted Snipe	Listed - overfly marine area	Species or species habitat may occur within area
Sterna albifrons Little Tern	Listed	Breeding likely to occur within area
Thalassarche chlororhynchos Yellow-nosed Albatross, Atlantic Yellow-nosed Albatross	Listed	Species or species habitat may occur within area
Thalassarche impavida Campbell Albatross	Listed	Species or species habitat may occur within area
Mammals		
Dugong dugon Dugong	Listed	Species or species habitat likely to occur within area

Ray-finned fishes

Acentronura tentaculata Hairy Pygmy Pipehorse	Listed	Species or species habitat may occur within area
Campichthys tryoni Tryon's Pipefish	Listed	Species or species habitat may occur within area
Corythoichthys amplexus Fijian Banded Pipefish, Brown-banded Pipefish	Listed	Species or species habitat may occur within area
Corythoichthys ocellatus Orange-spotted Pipefish, Ocellated Pipefish	Listed	Species or species habitat may occur within area
Festucalex cinctus Girdled Pipefish	Listed	Species or species habitat may occur within area
Filicampus tigris Tiger Pipefish	Listed	Species or species habitat may occur within area
Halicampus grayi Mud Pipefish, Gray's Pipefish	Listed	Species or species habitat may occur within area
Hippichthys cyanospilos Blue-speckled Pipefish, Blue-spotted Pipefish	Listed	Species or species habitat may occur within area
Hippichthys heptagonus Madura Pipefish, Reticulated Freshwater Pipefish	Listed	Species or species habitat may occur within area
Hippichthys penicillus Beady Pipefish, Steep-nosed Pipefish	Listed	Species or species habitat may occur within area
Hippocampus kelloggi Kellogg's Seahorse	Listed	Species or species habitat may occur within area
Hippocampus kuda Spotted Seahorse, Yellow Seahorse	Listed	Species or species habitat may occur within area
Hippocampus planifrons Flat-face Seahorse	Listed	Species or species habitat may occur within area
Hippocampus whitei White's Seahorse, Crowned Seahorse, Sydney Seahorse	Listed	Species or species habitat may occur within area
Lissocampus runa Javelin Pipefish	Listed	Species or species habitat may occur within area
Maroubra perserrata Sawtooth Pipefish	Listed	Species or species habitat may occur within area
Micrognathus andersonii Anderson's Pipefish, Shortnose Pipefish	Listed	Species or species habitat may occur within area
Micrognathus brevirostris Thorn-tailed Pipefish	Listed	Species or species habitat may occur within area
Microphis manadensis Manado River Pipefish, Manado Pipefish	Listed	Species or species habitat may occur within area
Solegnathus dunckeri Duncker's Pipehorse	Listed	Species or species habitat may occur within area
Solegnathus hardwickii Pipehorse	Listed	Species or species habitat may occur within area
Solegnathus spinosissimus Spiny Pipehorse, Australian Spiny Pipehorse	Listed	Species or species habitat may occur within area
Solenostomus cyanopterus Blue-finned Ghost Pipefish, Robust Ghost Pipefish	Listed	Species or species habitat may occur within area
Solenostomus paradoxus Harlequin Ghost Pipefish, Ornate Ghost Pipefish	Listed	Species or species habitat may occur within area
Stigmatopora nigra Wide-bodied Pipefish, Black Pipefish	Listed	Species or species habitat may occur within area
Syngnathoides biaculeatus Double-ended Pipehorse, Alligator Pipefish	Listed	Species or species habitat may occur within area
Trachyrhamphus bicoarctatus Bend Stick Pipefish, Short-tailed Pipefish	Listed	Species or species habitat may occur within area
Urocampus carinirostris Hairy Pipefish	Listed	Species or species habitat may occur within area
Vanacampus margaritifer Mother-of-pearl Pipefish	Listed	Species or species habitat may occur within area

Reptiles

Astrotia stokesii Stokes' Seasnake	Listed	Species or species habitat may occur within area
Caretta caretta * Loggerhead Turtle	Listed	Species or species habitat may occur within area
Chelonia mydas * Green Turtle	Listed	Species or species habitat may occur within area
Dermochelys coriacea * Leathery Turtle, Leatherback Turtle, Luth	Listed	Breeding may occur within area
Hydrophis elegans Elegant Seasnake	Listed	Species or species habitat may occur within area
Pelamis platurus Yellow-bellied Seasnake	Listed	Species or species habitat may occur within area
Whales and Other Cetaceans [Dataset Information]	Status	Type of Presence
Balaenoptera acutorostrata Minke Whale	Cetacean	Species or species habitat may occur within area
Balaenoptera edeni Bryde's Whale	Cetacean	Species or species habitat may occur within area
Balaenoptera musculus * Blue Whale	Cetacean	Species or species habitat may occur within area
Delphinus delphis Common Dolphin	Cetacean	Species or species habitat may occur within area
Eubalaena australis * Southern Right Whale	Cetacean	Species or species habitat likely to occur within area
Grampus griseus Risso's Dolphin, Grampus	Cetacean	Species or species habitat may occur within area
Lagenorhynchus obscurus Dusky Dolphin	Cetacean	Species or species habitat may occur within area
Megaptera novaeangliae * Humpback Whale	Cetacean	Congregation or aggregation known to occur within area
Orcinus orca Killer Whale, Orca	Cetacean	Species or species habitat may occur within area
Sousa chinensis Indo-Pacific Humpback Dolphin	Cetacean	Species or species habitat may occur within area
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin	Cetacean	Species or species habitat may occur within area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin	Cetacean	Species or species habitat likely to occur within area
Tursiops truncatus s. str. Bottlenose Dolphin	Cetacean	Species or species habitat may occur within area

Commonwealth Lands [Dataset Information]

Communications, Information Technology and the Arts - Australian Postal Corporation

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Extra Information

State and Territory Reserves [Dataset Information]

Cumbebin Swamp Nature Reserve, NSW

Hayters Hill Nature Reserve, NSW

Tyagarah Nature Reserve, NSW

Regional Forest Agreements [Dataset Information]
Note that all RFA areas including those still under consideration have been included.

Upper North East NSW RFA, New South Wales

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the *Environment Protection and Biodiversity Conservation Act 1999*. It holds mapped locations of World Heritage and Register of National Estate properties, Wetlands of International Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

For species where the distributions are well known, maps are digitised from sources such as recovery plans and detailed habitat studies. Where appropriate, core breeding, foraging and roosting areas are indicated under "type of presence". For species whose distributions are less well known, point locations are collated from government wildlife authorities, museums, and non-government organisations; bioclimatic distribution models are generated and these validated by experts. In some cases, the distribution maps are based solely on expert knowledge.

Only selected species covered by the migratory and marine provisions of the Act have been mapped.

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers.

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites;
- seals which have only been mapped for breeding sites near the Australian continent.

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Acknowledgments

This database has been compiled from a range of data sources. The Department acknowledges the following custodians who have contributed valuable data and advice:

- New South Wales National Parks and Wildlife Service
- Department of Sustainability and Environment, Victoria
- Department of Primary Industries, Water and Environment, Tasmania
- Department of Environment and Heritage, South Australia Planning SA
- Parks and Wildlife Commission of the Northern Territory
- Environmental Protection Agency, Queensland
- Birds Australia
- Australian Bird and Bat Banding Scheme
- Australian National Wildlife Collection
- Natural history museums of Australia
- Queensland Herbarium
- National Herbarium of NSW
- Royal Botanic Gardens and National Herbarium of Victoria
- Tasmanian Herbarium
- State Herbarium of South Australia
- Northern Territory Herbarium
- Western Australian Herbarium

- Australian National Herbarium, Atherton and Canberra
- University of New England
- Other groups and individuals

ANUCliM Version 1.8, Centre for Resource and Environmental Studies, Australian National University was used extensively for the production of draft maps of species distribution. Environment Australia is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Last updated:

Department of the Environment, Water, Heritage and the Arts
GPO Box 787 Canberra ACT 2601 Australia
Telephone: +61 (0)2 6274 1111

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D

Fauna Survey Data

Table D.1 Fauna Survey Data

	Common Name	*Scientific Name*	*Observation Type*
Aves	Masked Lapwing	*Vanellus miles*	Observed
	Magpie Lark	*Grallina cyanoleuca*	Observed
	Torresian Crow	*Corvus orru*	Observed
	Australian Wood Duck	*Chenonetta jubata*	Observed
	Brown Cuckoo-dove	*Macropygia amboinensis*	Observed
	Red-browed Finch	*Neochmia temporalis*	Observed
	Pacific Black Duck	*Anas superciliosa*	Observed
	White-faced Heron	*Egretta novaehollandiae*	Observed
	Purple Swamphen	*Porphyrio porphyrio*	Observed
	Crested Pigeon	*Ocyphaps lophotes*	Observed
	Pheasant Coucal	*Centropus phasianinus*	Observed
	Fairy Martin	*Hirundo ariel*	Observed
	Superb Fairy-wren	*Malurus cyaneus*	Observed
	Golden-headed Cisticola	*Cisticola*	Heard
Mammals	Swamp Wallaby	*Wallabia bicolor*	Observed/ scats
	Rabbit*	*Oryctolagus cuniculus*	Observed/ diggings/ scats
	House Mouse*	*Mus domesticus*	Hair sample
	Fox*	*Vulpes vulpes*	Hair sample/ scat (scat contents include snake, beetle and *Melomys burtoni*)
	Melomys	*Melomys sp.*	Hair sample
	Antechinus	*Antechinus sp.*	Hair sample
	Eastern Free-tail Bat	*Mormopterus sp2*	Anabat
	Gould's Wattled Bat	*Chalinolobus gouldii*	Anabat
	Little Bent-wing Bat	*Miniopterus australis*[v]	Anabat
	Eastern Bent-wing Bat	*Miniopterus schreibersii oceanensis*[v]	Anabat
	Large-footed Myotis/ unknown Long-eared Bat	*Myotis macropus*[v]*/ Nyctophilus sp.*	Anabat
	Greater Broad-nosed Bat	*Scoteanas rueppellii*[v]	Anabat
	Eastern Broad-nosed Bat	*Scotorepens orion*	Anabat
	Eastern Forest Bat	*Vespadelus pumilus*	Anabat
	Grey-headed Flying-fox	*Pteropus poliocephalus*	Observed flying high over the site
Amphibians	Striped Marsh Frog	*Limnodynastes peronii*	Heard
	Eastern Dwarf Tree Frog	*Litoria fallax*	Heard
	Rocket Frog	*Litoria nasuta*	Heard
	Common Eastern Froglet	*Crinia signifera*	Heard
	Wallum Sedge Frog	*Crinia tinnula*[v]	Heard
	Bleating Tree Frog	*Litoria dentata*	Heard

	Common Name	*Scientific Name*	*Observation Type*
	Brown-striped Grass-frog	*Limnodynastes peronii*	Heard
	Ornate Burrowing Frog	*Limnodynastes ornatus*	Heard

Key:
* - Feral species
V – Vulnerable species
E – Endangered species

E

Seven-part Tests of Significance

E.1 Seven-part Test of Significance for Wallum Froglet (*Crinnia tinnula*)

The Scientific Committee, established by the *Threatened Species Conservation Act 1995*, has made a Final Determination to list the Wallum Froglet as Vulnerable in Schedule 2 of the Act.

(a) in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,

The Wallum Froglet was recorded during the current survey period within the proposed Regional Sport and Cultural Complex and by Fitzgerald (2004) within the western portion of the land. Fitzgerald (2008) recorded the Wallum Froglet within the far south-eastern corner of the proposed Regional Sport and Cultural Complex. Fitzgerald (2005) has also recorded the Wallum Froglet within the adjoining 24 ha effluent irrigation area and in 2007, Fitzgerald recorded the Wallum Froglet within the WBSTP further north of the site.

Wallum Froglets are very small terrestrial frogs; usually no more than 20 mm long and can vary greatly in colour and pattern. The species is a late winter breeder and males call in choruses from within sedge tussocks or at the edge of the water. Maintenance of suitably low pH of water is important (4.3 to 5.7: Ingram and Corben 1975) and Wallum Froglets move to more acidic waters to breed (3.0-5.2: Meyer 2000 in ERM 2001). Meyer (2000 in ERM 2001) states that breeding ceases in less acid environments and frog species which tolerate less acidic conditions tend to displace Wallum Froglets.

Breeding areas for the Wallum Froglet include ephemeral swamps and soaks (Ehmann 1997 and Neilson 2000 in Meyer *et al.* 2006). Little is known of the non-breeding habitat, however anecdotal evidence suggests the Wallum Froglet may retreat into eucalypt forest and woodland and/or rainforest (Queensland DNR 2001).

The Wallum Froglet is at threat from:

- destruction and degradation of coastal wetlands as a result of roadworks, coastal developments and sand mining;
- reduction of water quality and changes to acidity in coastal wetlands; and
- grazing and associated frequent burning of coastal wetlands.

The proposed Regional Sport and Cultural Complex will require removal of vegetation, excavation and placement of fill material leading to a direct loss of known and potential habitat for the Wallum Froglet. Changes in water levels and pH have the potential to adversely impact on the local population of the Wallum Froglet however the Regional Sport and Cultural Complex has been designed (incorporating bioretention trenches, end-of-line bioretention basin and shallow grass swales) to ensure significant hydrological changes do not result in adverse impacts on adjoining areas such as the HCV vegetation (west) and 24 ha effluent irrigation area (north).

Large areas of Wallum Froglet habitat will remain undisturbed within the western portion of the site. It is recommended that this western portion of the site be rezoned as 7(k) (Habitat Zone). This will restrict use of the land to only allow activities undertaken for conservation purposes.

It is acknowledged that the proposed Regional Sport and Cultural Complex will result in the loss of Wallum Froglet habitat and potential direct mortality of individuals. Extensive habitat however is located west and north of the proposed Regional Sport and Cultural Complex. It is not expected that the proposed action is likely to effect the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

(b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,

No consideration under this part of the assessment is required.

(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

No consideration under this part of the assessment is required.

(d) in relation to the habitat of a threatened species, population or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

Wallum Froglets are found in acid paperbark swamps and sedge swamps of the coastal 'wallum' country from Sydney to Fraser Island. Wallum is a banksia-dominated lowland heath ecosystem characterised by acidic waterbodies and low-nutrient sandy soils (NPWS 2002).

The Wallum Froglet was recorded during the current survey period within the sedgeland/ fernland/ grassland within the proposed Regional Sport and Cultural Complex. Fitzgerald (2004) recorded the Wallum Froglet within sedgeland/ fernland/ grassland and Pine over sedges within the site. Fitzgerald (2008) recorded the Wallum Froglet within the far south-eastern corner of the proposed Regional Sport and Cultural Complex. Fitzgerald (2005 and 2007) has also recorded the Wallum Froglet within the adjoining 24 ha effluent irrigation area (comprised predominantly of Broad-leaved Paperbark) and in 2007, Fitzgerald recorded the Wallum Froglet within the WBSTP further north of the site.

Approximately 6.7 ha of habitat within the 40 ha site will be removed as a result of the proposed Regional Sport and Cultural Complex. Fitzgerald (2008) notes that the Wallum Froglet is a widespread and relatively abundant species within better quality coastal Byron Shire wallum habitats. Habitat within the 24 ha effluent irrigation area, the WBSTP and surrounding habitat such as the Tyagarah Nature Reserve would not be disturbed by the proposed works.

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

The proposed Regional Sport and Cultural Complex is bordered to the east by the industrial estate which does not provide suitable Wallum Froglet habitat and is bordered to the south by Ewingsdale Road which is a barrier to the movement of the Wallum Froglet. The proposed Regional Sport and Cultural Complex is located within the far eastern portion of the site and suitable Wallum Froglet habitat is available in the western portion of the site. It is unlikely that the proposed works will result in an area of habitat likely to become fragmented or isolated from other areas of habitat.

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality,

Known habitat of the Wallum Froglet is of high significance however extensive habitat is available within the western portion of the site which is of higher ecological value. Compared to the western section, the eastern section is slightly elevated, drier and has been largely modified through clearing and introduction of exotic pasture grasses for cattle grazing.

(e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),

No areas of critical habitat are listed under the *Threatened Species Conservation Act 1995* within the study area nor are there any areas of critical habitat for the Wallum Froglet listed under the TSC Act.

(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,

No recovery plan or threat abatement plan has been prepared for the Wallum Froglet. A National Recovery plan for Wallum-dependent frog species includes the Wallum Froglet and has been prepared by Meyer *et al.* (2006). The proposed Regional Sport and Cultural Complex does not contain works that will prohibit the implementation of any strategy within this plan.

In NSW, the recovery planning process has been largely replaced through the preparation of Priority Action Statements. The proposed development will not create barriers to the implementation of PAS for the conservation of the Wallum Froglet.

(g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

A threatening process is defined under the *Threatened Species Conservation Act 1995* as a process that threatens, or may have the capability to threaten, the survival or evolutionary development of species, populations or ecological communities. The current list of key threatening processes under TSC Act, and whether the proposed development is recognised as a threatening process is shown in **Table E.1**.

Table E.1 Key Threatening Process –Wallum Froglet

Listed Key Threatening Process (as described in the final determination of the Scientific Committee to list the threatening process)	***Is the development or activity proposed of a class of development or activity that is recognised as a threatening process?***		
	Likely	Possible	Unlikely
Alteration of habitat following subsidence due to longwall mining			✓
Alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands		✓	
Bush rock removal			✓
Clearing of native vegetation	✓		
Competition and grazing by the feral European Rabbit, *Oryctolagus cuniculus* (L.)			✓
Competition and habitat degradation by feral goats			✓
Competition from feral honeybee			✓
Death or injury to marine species following capture in shark control programs on ocean beaches			✓
Ecological consequences of high frequency fires			✓
Entanglement in or ingestion of anthropogenic debris in marine and estuarine environments			✓
Herbivory and environmental degradation caused by feral deer			✓
Human caused climate change			✓
Importation of red imported fire ants into NSW			✓
Infection by *Psittacine circoviral* (beak and feather) disease affecting endangered psittacine species and populations			✓

Listed Key Threatening Process (as described in the final determination of the Scientific Committee to list the threatening process)	*Is the development or activity proposed of a class of development or activity that is recognised as a threatening process?*		
Infection of frogs by amphibian chytrid causing the disease chytridiomycosis			✓
Infection of native plants by *Phytophthora cinnamomi*			✓
Introduction of the large earth bumblebee, *Bombus terrestris*			✓
Invasion and establishment of *Bufo marinus*			✓
Invasion and establishment of exotic vines and scramblers			✓
Invasion, establishment and spread of *Lantana camara*			✓
Invasion of native plant communities by *Chrysanthemoides monilifera*			✓
Invasion of native plant communities by exotic perennial grasses			✓
Invasion of the Yellow Crazy Ant			✓
Loss and/or degradation of sites used for hill-topping by butterflies			✓
Predation by *Gambusia holbrooki* Girard, 1859 (Plague Minnow or Mosquito Fish)			✓
Predation by the European Red Fox *Vulpes vulpes* (Linnaeus, 1758)			✓
Predation by the Feral Cat *Felis catus* (Linnaeus, 1758)			✓
Predation by the Ship Rat *Rattus rattus* on Lord Howe Island			✓
Predation, habitat degradation, competition and disease transmission by Feral pigs			✓
Removal of dead wood and dead trees			✓

Alteration to natural flow regimes can occur through reducing or increasing flows, altering seasonality of flows, changing the frequency, duration, magnitude, timing, predictability and variability of flow events, altering surface and subsurface water levels and changing the rate of rise or fall of water levels (DEC 2004). The Regional Sport and Cultural Complex has been designed (incorporating bioretention trenches, end-of-line bioretention basin and shallow grass swales) to ensure significant hydrological changes do not result in adverse impacts on adjoining areas such as the HCV vegetation (west) and 24 ha effluent irrigation area (north).

Clearing of native vegetation is a threatened process listed under this Act. Clearing is defined as the destruction of a sufficient proportion of one or more strata (layers) within a stand or stands of native vegetation so as to result in the loss, or long term modification, of the structure, composition and ecological function of stand or stands. Although the proposed development involves clearing of native and exotic vegetation, positive outcomes are expected from rezoning the western portion of the site for conservation purposes.

Conclusion

Despite loss of some individuals, it is not expected that the proposed works will significantly adversely affect this species.

E.2 Seven-part Test of Significance for Wallum Sedge Frog (*Litoria olongburensis*)

The Scientific Committee, established by the *Threatened Species Conservation Act 1995*, has made a Final Determination to list the Wallum Sedge Frog as Vulnerable in Schedule 2 of the Act.

(a) in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,

The Wallum Sedge Frog was not recorded during the current survey period within the proposed Regional Sport and Cultural Complex. Fitzgerald (2004) reports that one call Wallum Sedge Frog was heard calling during surveys in March 2003 within the site near the border of the 24 ha effluent irrigation area. The Wallum Sedge Frog has not been recorded within the 24 ha effluent irrigation area but was recorded in low numbers in the eastern areas of the WBSTP and breeding habitat was recorded in the far north-western section (and north into Tyagarah Nature Reserve). Fitzgerald (2008) notes that a breeding aggregation was present at transect 1 as evidenced by 15 frogs recorded in the September sample and 34 frogs in the November sample. Further investigation of this breeding aggregation revealed Wallum Sedge Frogs occurring in rushes and sedges north of transect 1 and extending into nearby Tyagarah Nature Reserve.

Wallum Sedge Frogs are small slender frogs up to 25 mm long and are light green to light above, with a dark-brown streak running from the nostril to the eye and down the flank and another cream-coloured stripe from below the eye to the flank. They are found in paperbark swamps and sedge swamps of the coastal 'wallum' country. Wallum is a banksia-dominated lowland heath ecosystem characterised by acidic waterbodies. Wallum Sedge Frogs are usually found amongst sedges and rushes (NPWS 2002).

This species is at threat from:

- destruction and degradation of coastal wallum and coastal wetlands for roadworks, coastal developments and sand mining;
- reduction of water quality and changes to acidity in coastal wetlands; and
- grazing and associated frequent burning of coastal wetlands (NPWS 2002).

The proposed Regional Sport and Cultural Complex will require removal of vegetation, excavation and placement of fill material which may lead to a loss of potential habitat for the Wallum Sedge Frog. Changes in water levels and pH have the potential to adversely impact on the local population of the Wallum Sedge Frog however the Regional Sport and Cultural Complex has been designed (incorporating bioretention trenches, end-of-line bioretention basin and shallow grass swales) to ensure significant hydrological changes do not result in adverse impacts on adjoining areas such as the HCV vegetation (west) and 24 ha effluent irrigation area (north).

The area of the proposed Regional Sport and Cultural Complex has been assessed as providing potential habitat for Wallum Sedge Frog based on one record from 2003. The Wallum Sedge Frog has not been recorded from the 24 ha effluent irrigation area however suitable habitat is available within the WBSTP.

Large areas of potential Wallum Sedge Frog habitat will remain undisturbed within the western portion of the site. It is recommended that this western portion of the site be rezoned as 7(k) (Habitat Zone). This will restrict use of the land to only allow activities undertaken for conservation purposes.

It is acknowledged that the proposed Regional Sport and Cultural Complex may result in the loss of Wallum Sedge Frog habitat and potential direct mortality of individuals however it is not expected that the proposed action is likely to effect the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

(b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,

No consideration under this part of the assessment is required.

(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

No consideration under this part of the assessment is required.

(d) in relation to the habitat of a threatened species, population or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

Wallum Sedge Frogs are found in acid paperbark swamps and sedge swamps of the coastal 'wallum' country. Wallum is a banksia-dominated lowland heath ecosystem characterised by acidic waterbodies and low-nutrient sandy soils (NPWS 2002).

Approximately 6.7 ha of potential habitat within the 40 ha site will be removed as a result of the proposed Regional Sport and Cultural Complex. The Wallum Sedge Frog has not been recorded directly within the area of the proposed Regional Sport and Cultural Complex, and has not been recorded on the site since 2003. No known habitat will be removed as a result of the proposed development. Habitat within the WBSTP and surrounding habitat such as the Tyagarah Nature Reserve would not be disturbed by the proposed works.

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

The proposed Regional Sport and Cultural Complex is bordered to the east by the industrial estate which does not provide suitable Wallum Sedge Frog habitat and is bordered to the south by Ewingsdale Road which is a barrier to the movement of the Wallum Sedge Frog. The proposed Regional Sport and Cultural Complex is located within the far eastern portion of the site and suitable Wallum Sedge Frog habitat is available in the western portion of the site. It is unlikely that the proposed works will result in an area of habitat likely to become fragmented or isolated from other areas of habitat.

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality,

The are directly affected by the proposed Regional Sport and Cultural Complex provides potential habitat for the Wallum Sedge Frog. It is of high importance however areas of known habitat and breeding habitat are even more so.

(e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),

No areas of critical habitat are listed under the *Threatened Species Conservation Act 1995* within the study area nor are there any areas of critical habitat for the Wallum Sedge Frog listed under the TSC Act.

(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,

No recovery plan or threat abatement plan has been prepared for the Wallum Sedge Frog. A National Recovery plan for Wallum-dependent frog species including the Wallum Sedge Frog and has been

prepared by Meyer *et al.* (2006). The proposed Regional Sport and Cultural Complex does not contain works that will prohibit the implementation of any strategy within this plan.

In NSW, the recovery planning process has been largely replaced through the preparation of Priority Action Statements (PAS). The proposed development will not create barriers to the implementation of PAS actions for the conservation of the Wallum Sedge Frog.

(g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

A threatening process is defined under the *Threatened Species Conservation Act 1995* as a process that threatens, or may have the capability to threaten, the survival or evolutionary development of species, populations or ecological communities. The current list of key threatening processes under TSC Act, and whether the proposed development is recognised as a threatening process is shown in **Table E.2**.

Table E.2 Key Threatening Process –Wallum Sedge Frog

Listed Key Threatening Process (as described in the final determination of the Scientific Committee to list the threatening process)	***Is the development or activity proposed of a class of development or activity that is recognised as a threatening process?***		
	Likely	Possible	Unlikely
Alteration of habitat following subsidence due to longwall mining			✓
Alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands		✓	
Bush rock removal			✓
Clearing of native vegetation	✓		
Competition and grazing by the feral European Rabbit, *Oryctolagus cuniculus* (L.)			✓
Competition and habitat degradation by feral goats			✓
Competition from feral honeybee			✓
Death or injury to marine species following capture in shark control programs on ocean beaches			✓
Ecological consequences of high frequency fires			✓
Entanglement in or ingestion of anthropogenic debris in marine and estuarine environments			✓
Herbivory and environmental degradation caused by feral deer			✓
Human caused climate change			✓
Importation of red imported fire ants into NSW			✓
Infection by *Psittacine circoviral* (beak and feather) disease affecting endangered psittacine species and populations			✓
Infection of frogs by amphibian chytrid causing the disease chytridiomycosis			✓
Infection of native plants by *Phytophthora cinnamomi*			✓
Introduction of the large earth bumblebee, *Bombus terrestris*			✓
Invasion and establishment of *Bufo marinus*			✓
Invasion and establishment of exotic vines and scramblers			✓

Listed Key Threatening Process (as described in the final determination of the Scientific Committee to list the threatening process)	*Is the development or activity proposed of a class of development or activity that is recognised as a threatening process?*		
Invasion, establishment and spread of *Lantana camara*			✓
Invasion of native plant communities by *Chrysanthemoides monilifera*			✓
Invasion of native plant communities by exotic perennial grasses			✓
Invasion of the Yellow Crazy Ant			✓
Loss and/or degradation of sites used for hill-topping by butterflies			✓
Predation by *Gambusia holbrooki* Girard, 1859 (Plague Minnow or Mosquito Fish)			✓
Predation by the European Red Fox *Vulpes vulpes* (Linnaeus, 1758)			✓
Predation by the Feral Cat *Felis catus* (Linnaeus, 1758)			✓
Predation by the Ship Rat *Rattus rattus* on Lord Howe Island			✓
Predation, habitat degradation, competition and disease transmission by Feral pigs			✓
Removal of dead wood and dead trees			✓

Alteration to natural flow regimes can occur through reducing or increasing flows, altering seasonality of flows, changing the frequency, duration, magnitude, timing, predictability and variability of flow events, altering surface and subsurface water levels and changing the rate of rise or fall of water levels (DEC 2004). The Regional Sport and Cultural Complex has been designed (incorporating bioretention trenches, end-of-line bioretention basin and shallow grass swales) to ensure significant hydrological changes do not result in adverse impacts on adjoining areas such as the HCV vegetation (west) and 24 ha effluent irrigation area (north).

Clearing of native vegetation is a threatened process listed under this Act. Clearing is defined as the destruction of a sufficient proportion of one or more strata (layers) within a stand or stands of native vegetation so as to result in the loss, or long term modification, of the structure, composition and ecological function of stand or stands. Although the proposed development involves clearing of native and exotic vegetation, positive outcomes are expected from rezoning the western portion of the site for conservation purposes.

Conclusion

Despite loss of some individuals, it is not expected that the proposed works will significantly adversely affect this species.

E.3 Seven-part Test of Significance for:

Little Bent-wing Bat (*Miniopterus australis*)
Eastern Bent-wing Bat *(Miniopterus schreibersii oceanensis)*
Large-footed Myotis *(Myotis macropus)*
Greater Broad-nosed Bat *(Scoteanas rueppellii)*

The Scientific Committee, established by the *Threatened Species Conservation Act 1995*, has made a Final Determination to list the Little Bent-wing Bat, Eastern Bent-wing Bat, Large-footed Myotis and Greater Broad-nosed Bat as Vulnerable in Schedule 2 of the Act.

(a) in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,

The Little Bentwing-bat is known to forage for small insects within and under the canopy of moist eucalypt forest, rainforest or dense coastal banksia scrub (DECC 2007). The Little Bentwing-bat also forms large maternity roosts at birthing time (December), travelling up to 200 km to these areas. Outside of the birthing season, both males and females prefer to roost in caves, tunnels, disused mines, stormwater drains and sometimes tree hollows. The flight of the Little Bentwing-bat is more manoeuvrable than the Eastern Bentwing-bat and it makes use of sub-canopy areas within well-timbered habitats for foraging.

The Eastern Bentwing-bat roosts in caves and other structures offering thermal advantages (pipes, small and large mines, concrete bunkers, lava tubes). During birthing season (Spring), females gather in large numbers in select caves to give birth and raise their young, often travelling up to several hundred kilometres from foraging and mating areas. Individuals of this species can live as long as 30 years. This species has fast and direct flight, foraging in open areas including tracks, waterways and above the canopy (Hoye and Hall 2008).

The Large-footed Myotis (*Myotis macropus* formerly known as Southern Myotis – *Myotis adverses)* is found in the coastal band from the north-west of Australia, across the top-end and south to western Victoria. It is rarely found more than 100 km inland, except along major rivers. Large-footed Myotis generally roosts in groups of 10 - 15 close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage. They forage over streams and pools catching insects and small fish by raking their feet across the water surface. In NSW females have one young each year usually in November or December (DEC 2005a).

The Greater Broad-nosed Bat is the only species of its genus, occurring from north-eastern Queensland (Nowak 1994) to north-eastern Victoria. One of the largest microchiropterans found along the coast of northern NSW, the Greater Broad-nosed Bat rarely ventures above 500 m ASL. Foraging on large, slow-flying beetles and other flying insects, this species has also been recorded consuming small microchiropterans in captivity and during capture (Hoye and Richards 1995). It's moderate to low manoeuvrability and slow flight precludes it from utilising dense habitat or specialising in fast flying prey in large open spaces. This species makes use of flyways along creeks and is capable of utilising small open spaces within woodlands through to tall wet coastal sclerophyll forests (Hoye and Richards 2008) and rainforests (Duncan *et al.* 1999). Greater Broad-nosed Bat roost in tree hollows, utilising trunks and branches, as well as roofs of old buildings (Churchill 1998). It has also been described as roosting within fissures in trunks of trees and under exfoliating bark (Duncan *et al.* 1999). Maternity roosts are formed in large hollows (Hoye and Richards 1995). Little is known of its breeding biology. A single young is born in January (Hoye and Richards 1995).

Little Bentwing-bat is at threat from:
- disturbance of colonies, especially in nursery or hibernating caves may be catastrophic;
- destruction of caves that provide seasonal or potential roosting sites;
- changes to habitat, especially surrounding maternity caves; and
- use of pesticides (NPWS 2002).

Eastern Bentwing-bat is at threat from:
- damage to or disturbance of roosting caves, particularly during winter or breeding;
- loss of foraging habitat;
- application of pesticides in or adjacent to foraging areas; and
- predation by feral cats and foxes (DEC 2005b).

Large-footed Myotis is at threat from:
- Reduction in stream water quality affecting food resources
- Loss or disturbance of roosting sites.
- Clearing adjacent to foraging areas.
- Application of pesticides in or adjacent to foraging areas (DEC 2005a).

Greater Broad-nosed Bat is at threat from:
- disturbance to roosting and summer breeding sites;
- foraging habitats cleared for residential and agricultural developments, including clearing by residents within rural subdivisions;
- loss of hollow-bearing trees;
- pesticides and herbicides which reduce the availability of insects, or result in the accumulation of toxic residues in individuals' fat stores; and
- changes to water regimes which impact food resources, as is the use of pesticides and herbicides near waterways (DEC 2005c).

The site generally only provides foraging habitat for these species. No suitable roosting habitat occurs at the site. Night lighting associated with the Regional Sport and Cultural Complex has the potential to attract insects within the light stream that may provide concentrated foraging resources for these insectivorous bats. Microbats are highly mobile and can travel several kilometres per night. It is unlikely, given suitable habitat for this species is widespread on the adjoining vegetated lands that the proposed sporting fields on this site would lead to a significant impact on these species.

(b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,

No consideration under this part of the assessment is required.

(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

No consideration under this part of the assessment is required.

(d) in relation to the habitat of a threatened species, population or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed,

No roosting habitat will be affected by the proposed development as no suitable roosts were observed within the site. The sedgeland/ fernland/ grassland does not comprise species that readily form hollows that could be utilised by roosting microbats. The microbats may forage over the dams located within the site which will not be impacted by the proposed Regional Sport and Cultural Complex. The site only contains sparse forested vegetation and does not contain suitable flyways. Foraging habitat may be removed as a result of the proposed development however night lighting associated with the Regional

Sport and Cultural Complex has the potential to attract insects within the light stream that may provide concentrated foraging resources for these insectivorous bats.

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

Microbats are highly mobile and can travel 10-30 km per night. The site lack flyways and roost sites therefore it is not expected that habitat will become fragmented or isolated from other areas as a result of the proposed action.

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality,

The site does not contain any hollow-bearing trees or potential roost habitat. The habitat to be removed provides only foraging habitat. The site does not provide important habitat for the subject microbat species.

(e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),

No areas of critical habitat are listed under the *Threatened Species Conservation Act 1995* within the study area nor are there any areas of critical habitat for the subject microbats listed under the TSC Act.

(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,

No recovery plan or threat abatement plan has been prepared for the subject species. The recovery planning process has now been incorporated into Priority Action Statements (PAS). The proposed development will not create barriers to the implementation of the PAS for the subject species.

(g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

A threatening process is defined under the *Threatened Species Conservation Act 1995* as a process that threatens, or may have the capability to threaten, the survival or evolutionary development of species, populations or ecological communities. The current list of key threatening processes under TSC Act, and whether the proposed development is recognised as a threatening process is shown in **Table E.3**.

Table E.3 Key Threatening Process –Microbats

Listed Key Threatening Process (as described in the final determination of the Scientific Committee to list the threatening process)	***Is the development or activity proposed of a class of development or activity that is recognised as a threatening process?***		
	Likely	Possible	Unlikely
Alteration of habitat following subsidence due to longwall mining			✓
Alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands		✓	
Bush rock removal			✓
Clearing of native vegetation	✓		
Competition and grazing by the feral European Rabbit, *Oryctolagus cuniculus* (L.)			✓
Competition and habitat degradation by feral goats			✓

Listed Key Threatening Process (as described in the final determination of the Scientific Committee to list the threatening process)	*Is the development or activity proposed of a class of development or activity that is recognised as a threatening process?*		
Competition from feral honeybee			✓
Death or injury to marine species following capture in shark control programs on ocean beaches			✓
Ecological consequences of high frequency fires			✓
Entanglement in or ingestion of anthropogenic debris in marine and estuarine environments			✓
Herbivory and environmental degradation caused by feral deer			✓
Human caused climate change			✓
Importation of red imported fire ants into NSW			✓
Infection by *Psittacine circoviral* (beak and feather) disease affecting endangered psittacine species and populations			✓
Infection of frogs by amphibian chytrid causing the disease chytridiomycosis			✓
Infection of native plants by *Phytophthora cinnamomi*			✓
Introduction of the large earth bumblebee, *Bombus terrestris*			✓
Invasion and establishment of *Bufo marinus*			✓
Invasion and establishment of exotic vines and scramblers			✓
Invasion, establishment and spread of *Lantana camara*			✓
Invasion of native plant communities by *Chrysanthemoides monilifera*			✓
Invasion of native plant communities by exotic perennial grasses			✓
Invasion of the Yellow Crazy Ant			✓
Loss and/or degradation of sites used for hill-topping by butterflies			✓
Predation by *Gambusia holbrooki* Girard, 1859 (Plague Minnow or Mosquito Fish)			✓
Predation by the European Red Fox *Vulpes vulpes* (Linnaeus, 1758)			✓
Predation by the Feral Cat *Felis catus* (Linnaeus, 1758)			✓
Predation by the Ship Rat *Rattus rattus* on Lord Howe Island			✓
Predation, habitat degradation, competition and disease transmission by Feral pigs			✓
Removal of dead wood and dead trees			✓

Alteration to natural flow regimes can occur through reducing or increasing flows, altering seasonality of flows, changing the frequency, duration, magnitude, timing, predictability and variability of flow events, altering surface and subsurface water levels and changing the rate of rise or fall of water levels (DEC 2004). The Regional Sport and Cultural Complex has been designed (incorporating bioretention trenches, end-of-line bioretention basin and shallow grass swales) to ensure significant hydrological changes do not result in adverse impacts on adjoining areas such as the HCV vegetation (west) and 24 ha effluent irrigation area (north).

Clearing of native vegetation is a threatened process listed under this Act. Clearing is defined as the destruction of a sufficient proportion of one or more strata (layers) within a stand or stands of native vegetation so as to result in the loss, or long term modification, of the structure, composition and

ecological function of stand or stands. The native and exotic vegetation that will be removed as a result of the proposed works provides only foraging habitat for these mobile species. It is not expected that this KTP will significantly adversely affect the subject species.

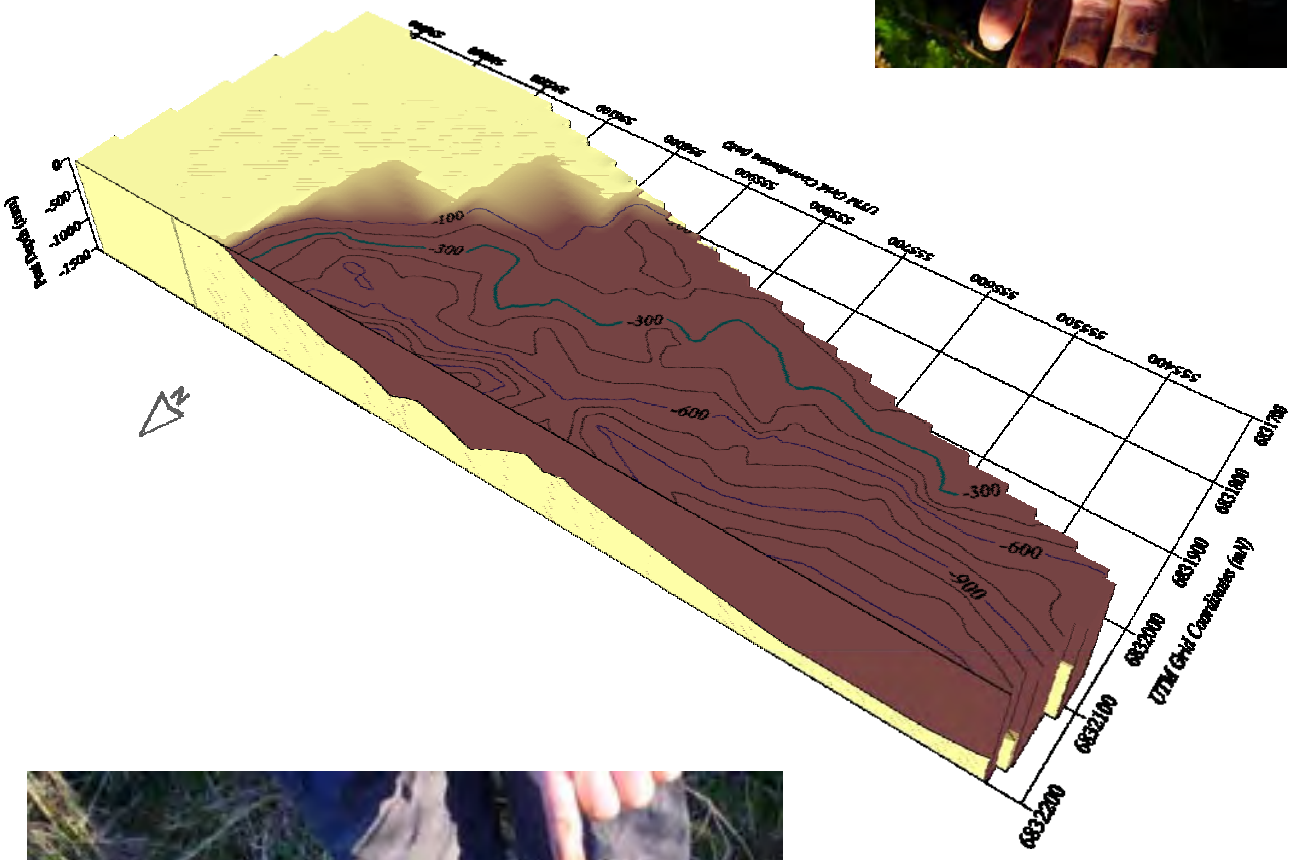
Conclusion

It is highly unlikely that the proposed works will significantly adversely affect the subject species

Appendix C

Sand and Peat Survey

Survey of Sand and Peat Soil Layers on a 40 Hectare Block at West Byron Bay



Report by
Tom Ryffel & Keith Bolton

Survey of Sand and Peat Soil Layers on a 40 Hectare Block at West Byron Bay

This report is a summary of field work and observations gathered between 23/6/03 to 10/703 to establish the sand/peat interface on a 40ha block at West Byron Bay. Fieldwork was undertaken by Tom Ryffel (Project Manager), Jayson Winmill and Keith Bolton

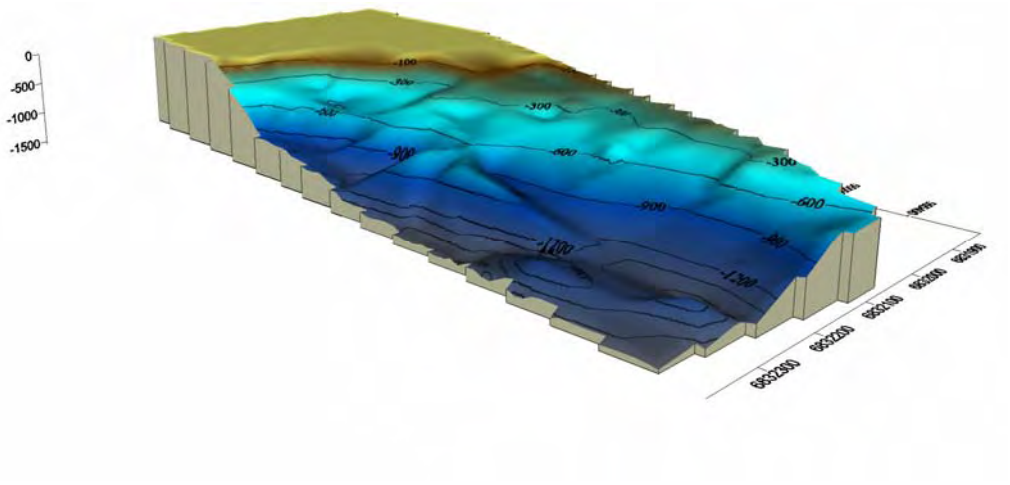
- *Written by Tom Ryffel & Keith Bolton*
- *Photos by Tom Ryffel*
- *Figures produced by Tom Ryffel & Keith Bolton*

Special thanks to Jason Winmill for his tireless efforts in trying conditions to extract over 150 cores across the project site.

Corresponding author: Tom Ryffel

Postal Address: *School of Environmental Science and Management*
Southern Cross University
P.O Box 157
Lismore, NSW, 2480

Ph: *02 6620 3569*
Mobile: *0405 824 458*
Fax: *02 6621 2669*
Email: *tryffel@scu.edu.au*



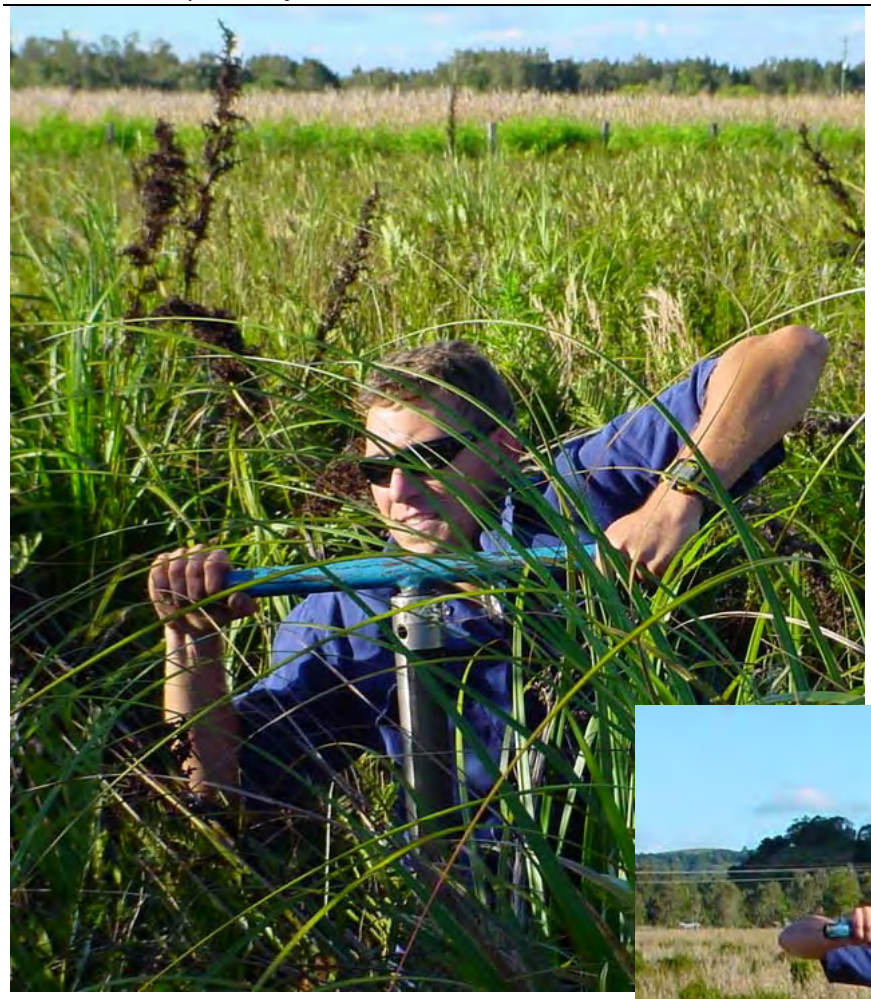
INTRODUCTION

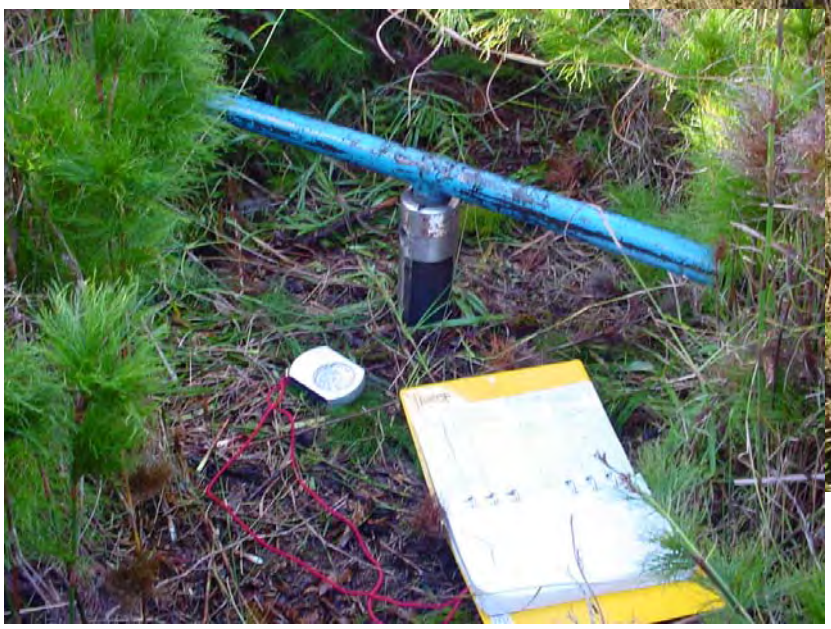
This study was commissioned by Byron Shire Council to identify the peat and sand layers on a 40 ha site at west Byron Bay. The site consists of two principal soil types :

- **Peat.** The peat layer was formed during the previous 8,500 years from a Melaleuca forest and its understorey vegetation.
- **Sand.** Sand generally underlies peat, however surface sand profiles are evident in the eastern potion of the site.

FIELD METHODOLOGY

The field survey consisted of a soil sampling programme utilizing GPS technology, a compass and a 100m survey tape A gouge auger was used to sample soil cores to a maximum depth of 2 m. Depth of peat and sand layers were measured in each extracted core. (Plates 1 – 5). Soil samples were undertaken according to grid transects. Refer to Figure 1 for a diagram of grid transects in a west-east direction and a south-north direction. There were a total of 9 west-east transects, and a total of 9 south-north transects. Distance between adjacent west-east transects was 40 m, and the distance between adjacent south-north transects was 100m. More intensive sampling was undertaken along the sand peat interface and property boundaries to accurately establish soil profile characteristics. More than 150 core samples were collected. Vegetation and soil texture notes were also recorded. All transect points were uploaded into a Garmin GPS unit. For the purposes of presentation of data from this study, a peat depth of 300 mm was highlighted as a prospective sand peat interface. However, peat depth profiles have been presented to allow other boundaries to be readily interpolated. Results are presented as schematic diagrams. Results include transect slices, contour lines, and 3-D depictions. In addition, surface areas of sand and peat, and peat volumes for the site were calculated.





Plates 1 – 3. Collection of soil samples using a gouge auger

Plates 4 and 5. Collection of soil samples using a gouge auger

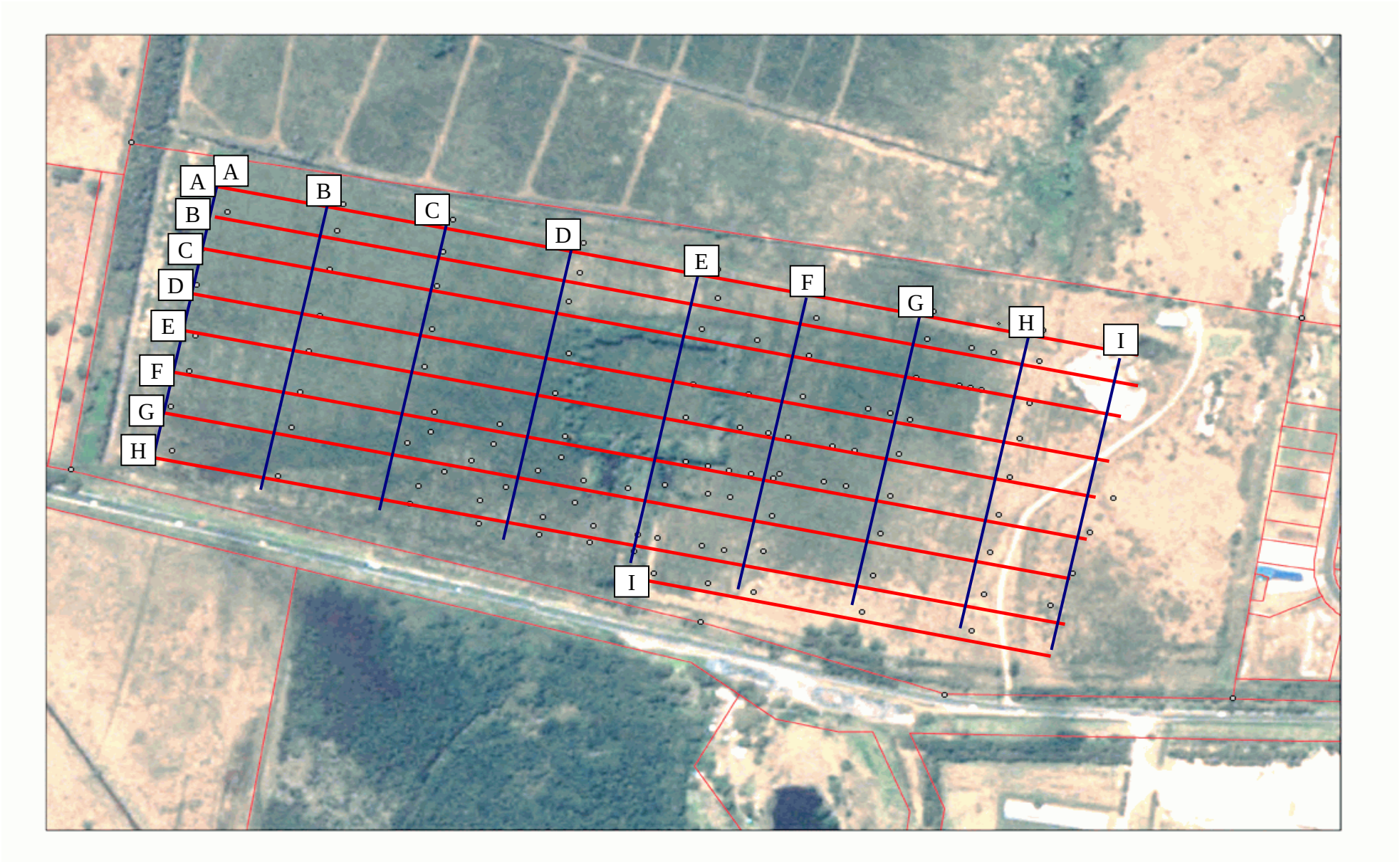
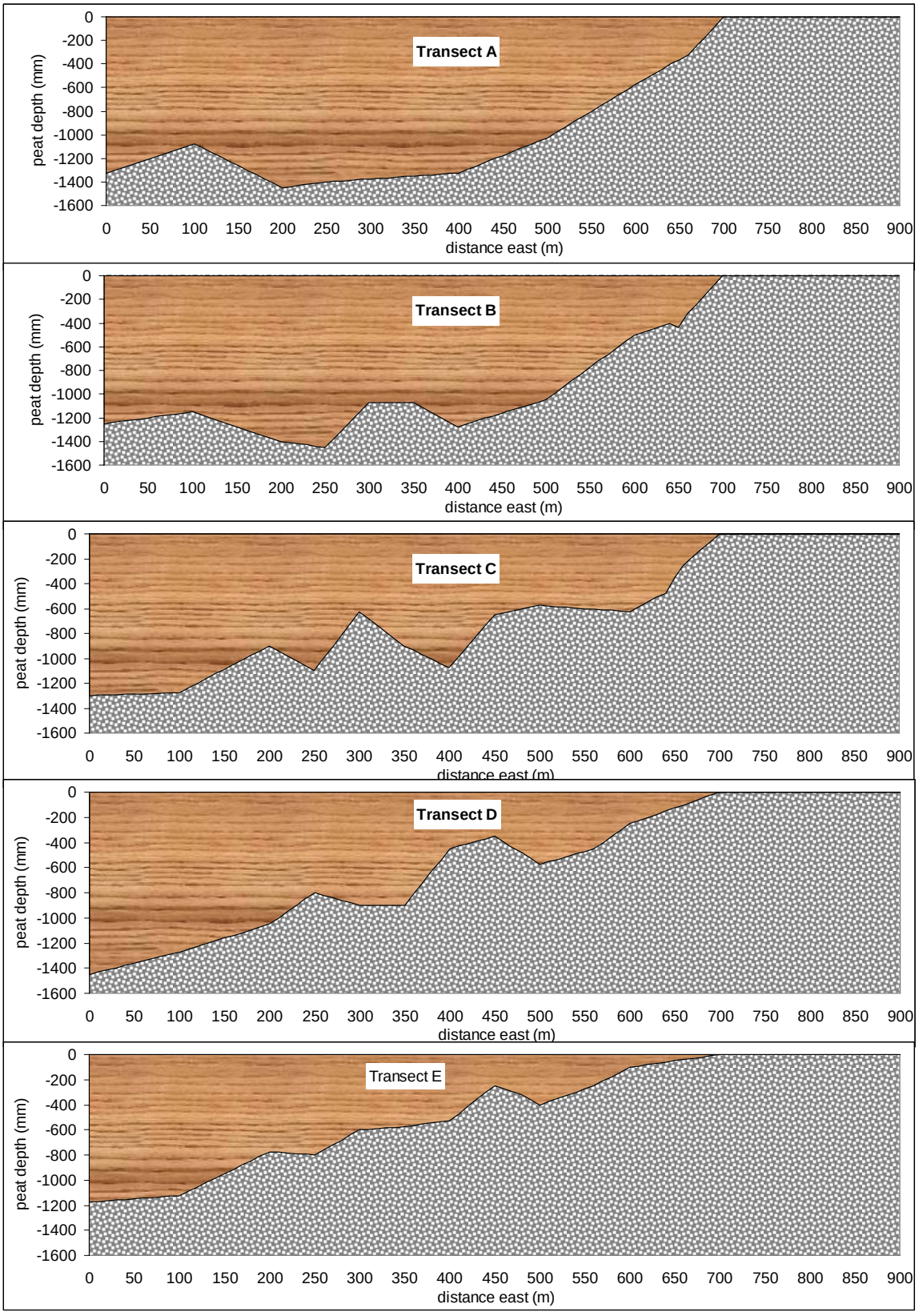
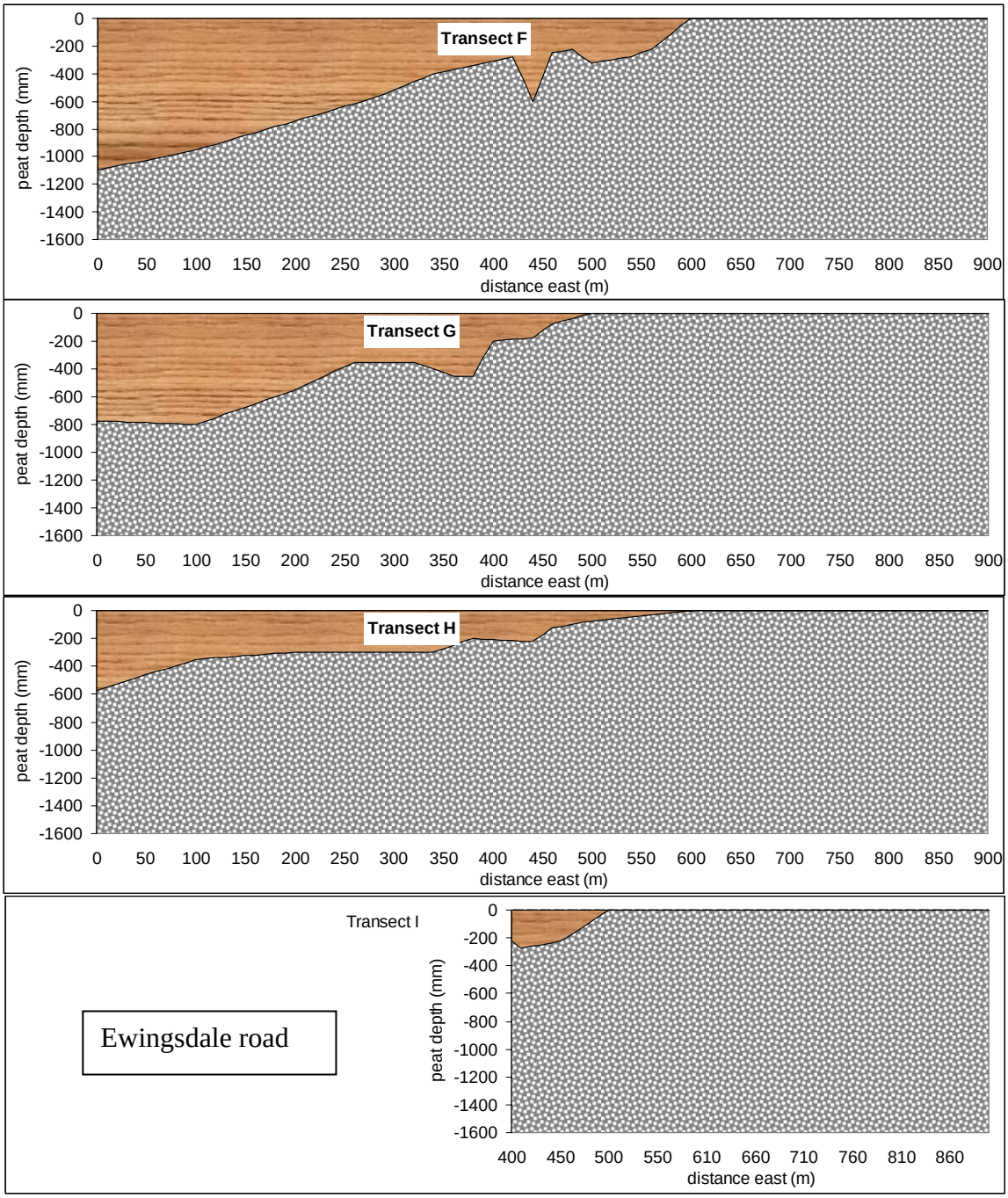


Figure 1. Grid transects utilised during the peat / sand interface study.

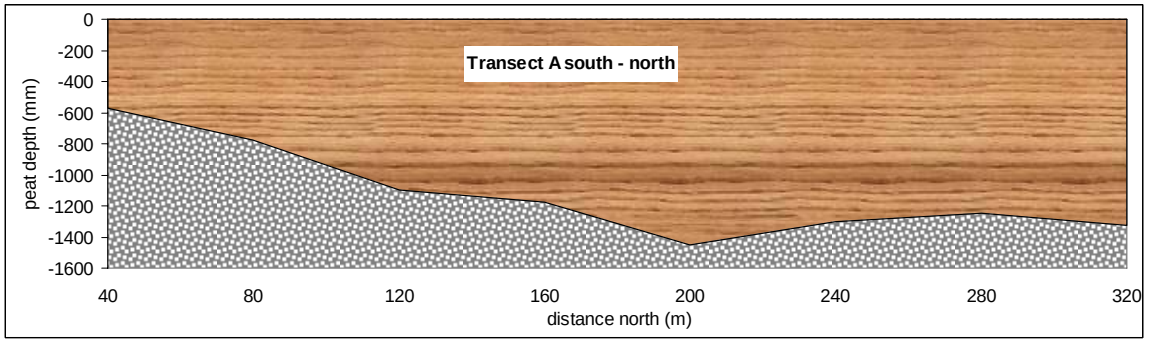
WEST-EAST TRANSECTS
(refer to Figure 1)

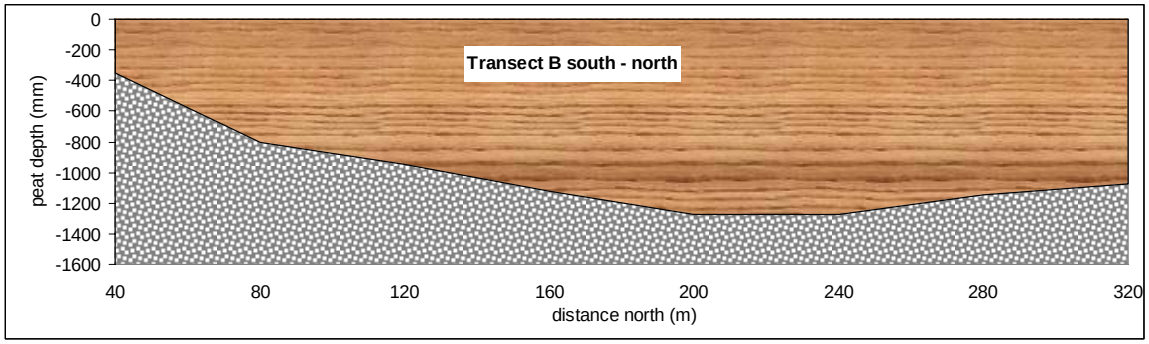


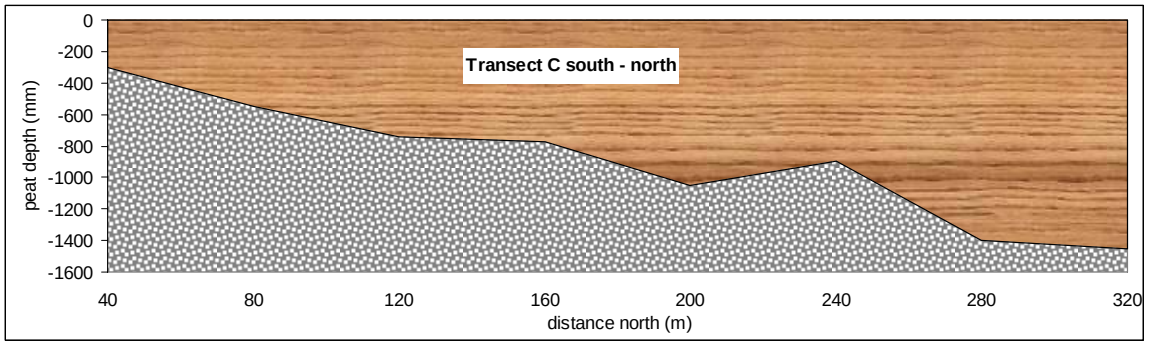

Transect F
peat depth (mm)
0
-200
-400
-600
-800
-1000
-1200
-1400
-1600
0 50 100 150 200 250 300 350 400 450 500 550 600 650 700 750 800 850 900
distance east (m)
Transect G
peat depth (mm)
distance east (m)
Transect H
peat depth (mm)
distance east (m)
Transect I
peat depth (mm)
400 450 500 550 610 660 710 760 810 860
distance east (m)
Ewingsdale road
peat
sand

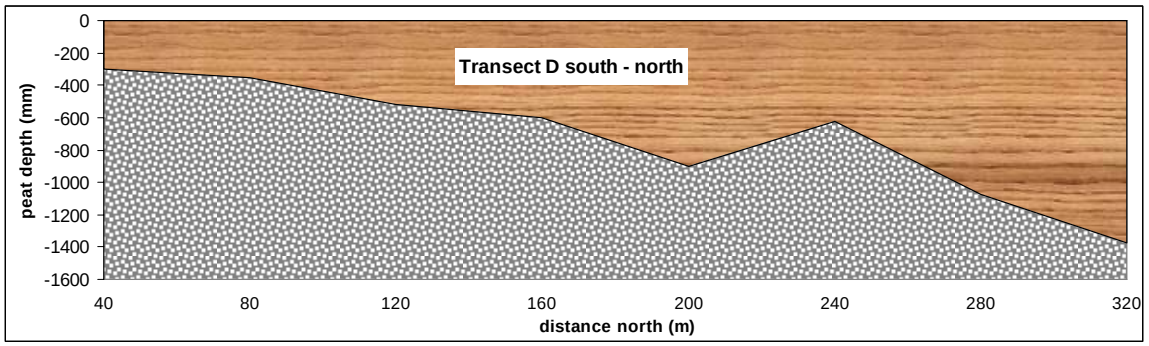
SOUTH-NORTH TRANSECTS

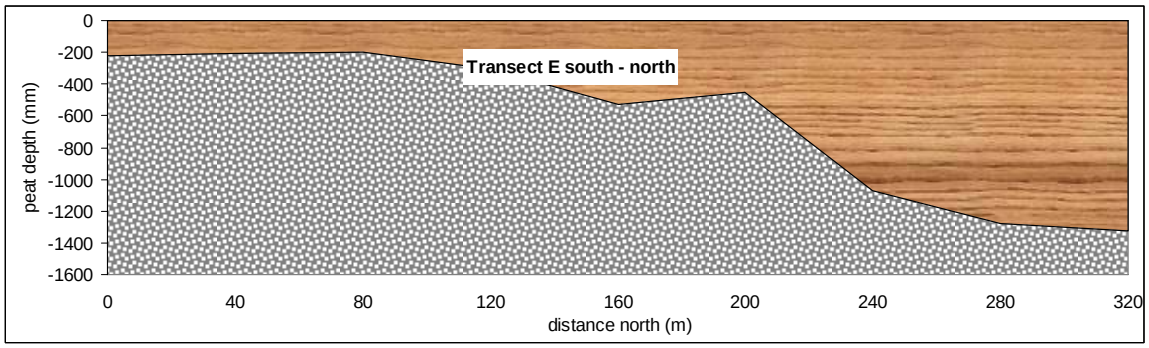
(refer to Figure 1)

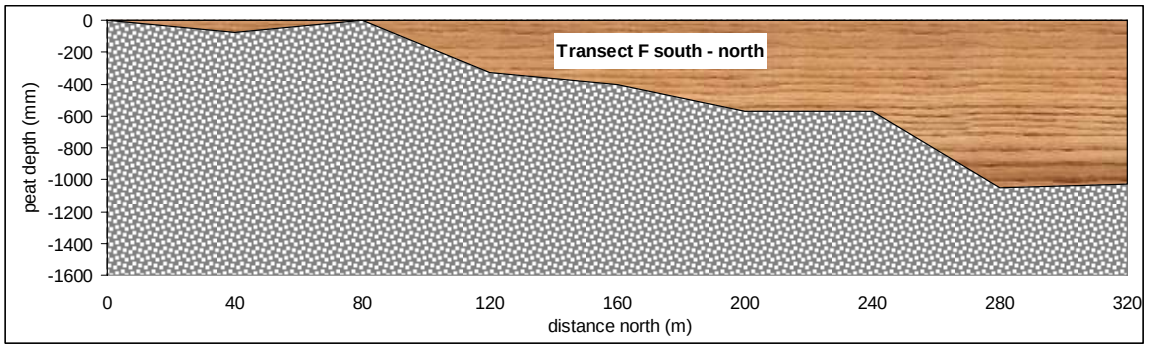


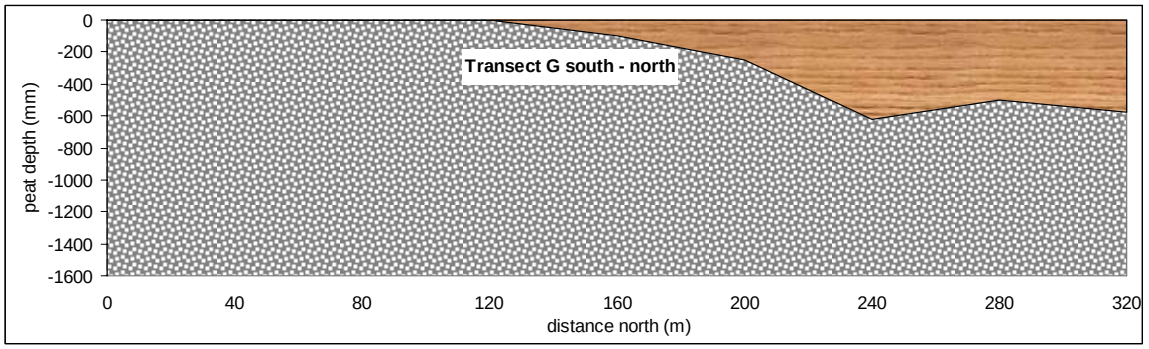


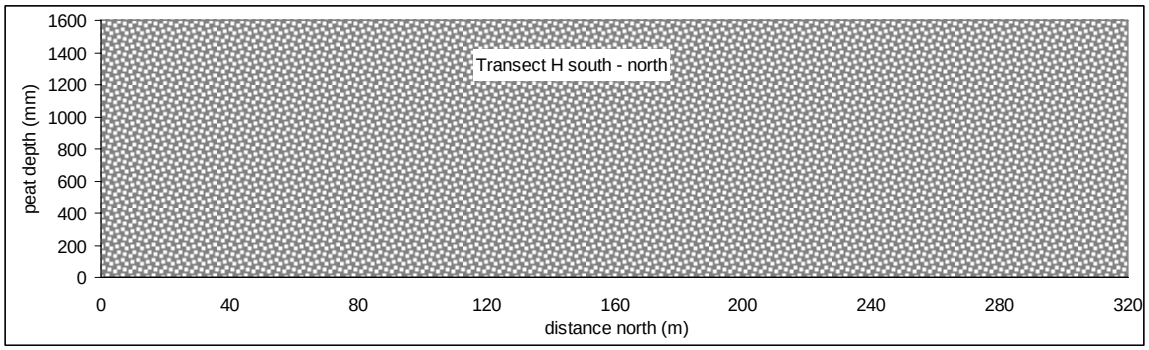




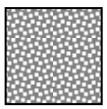

Transect E south - north
peat depth (mm)
0
-200
-400
-600
-800
-1000
-1200
-1400
-1600
0
40
80
120
160
200
240
280
320
distance north (m)


Transect F south - north
peat depth (mm)
0
-200
-400
-600
-800
-1000
-1200
-1400
-1600
0
40
80
120
160
200
240
280
320
distance north (m)


Transect G south - north
peat depth (mm)
0
-200
-400
-600
-800
-1000
-1200
-1400
-1600
0
40
80
120
160
200
240
280
320
distance north (m)


Transect H south - north
peat depth (mm)
1600
1400
1200
1000
800
600
400
200
0
0
40
80
120
160
200
240
280
320
distance north (m)

peat



sand

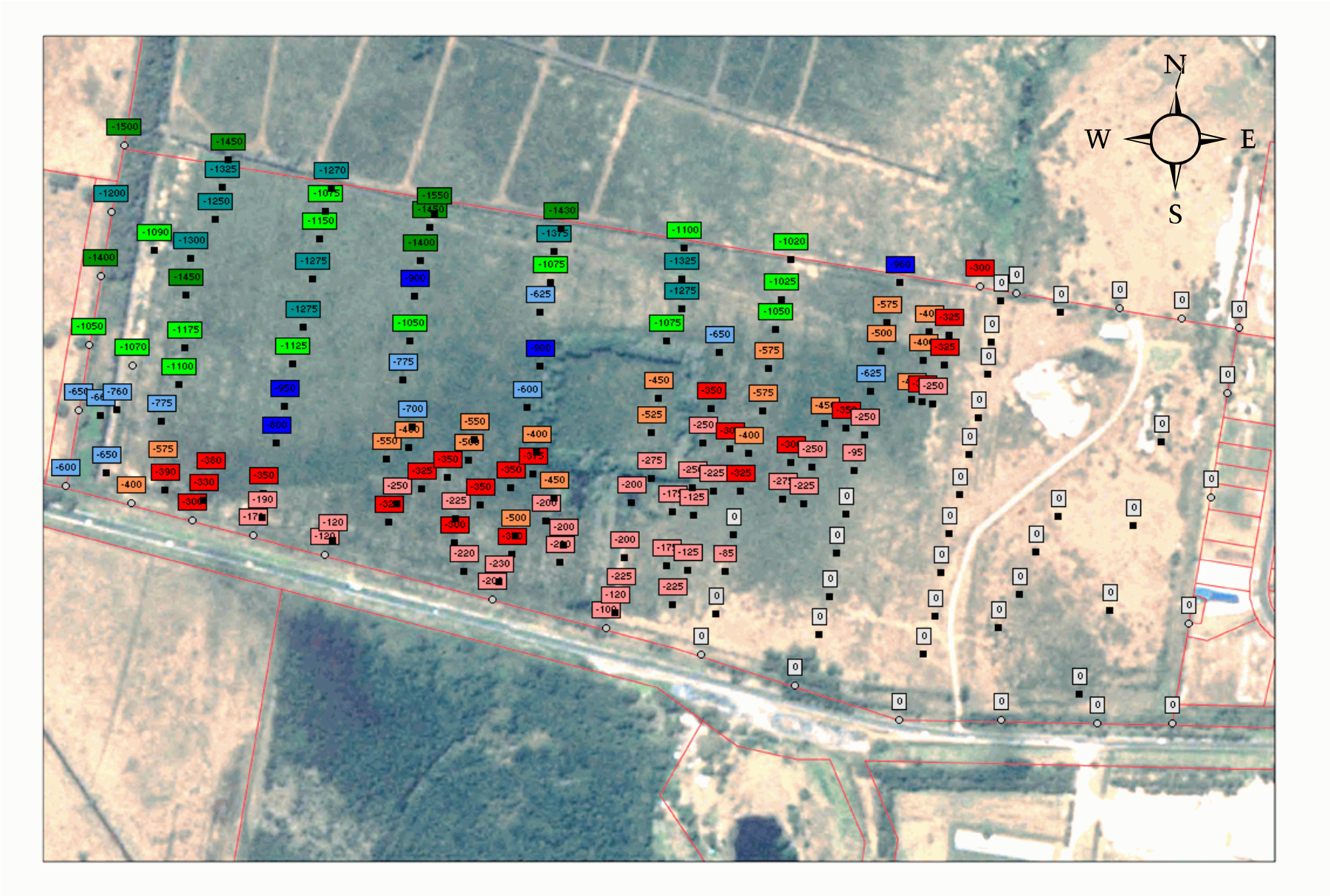


Figure 2 – major sampling sites with peat depth. Note that this is not an exhaustive representation of all sampling sites.

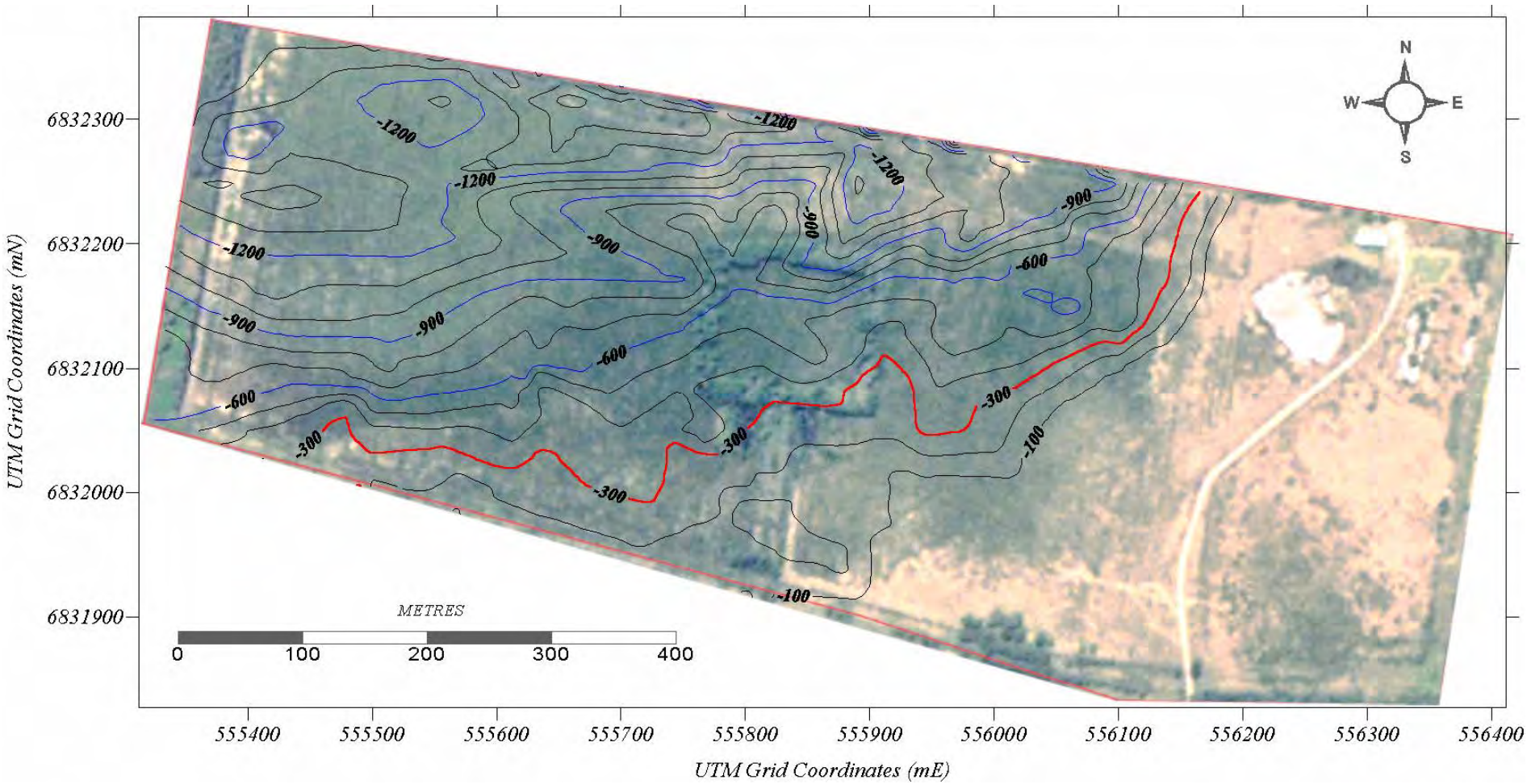


Figure 3. Peat depth contour diagram emphasising the 300 mm contour interval

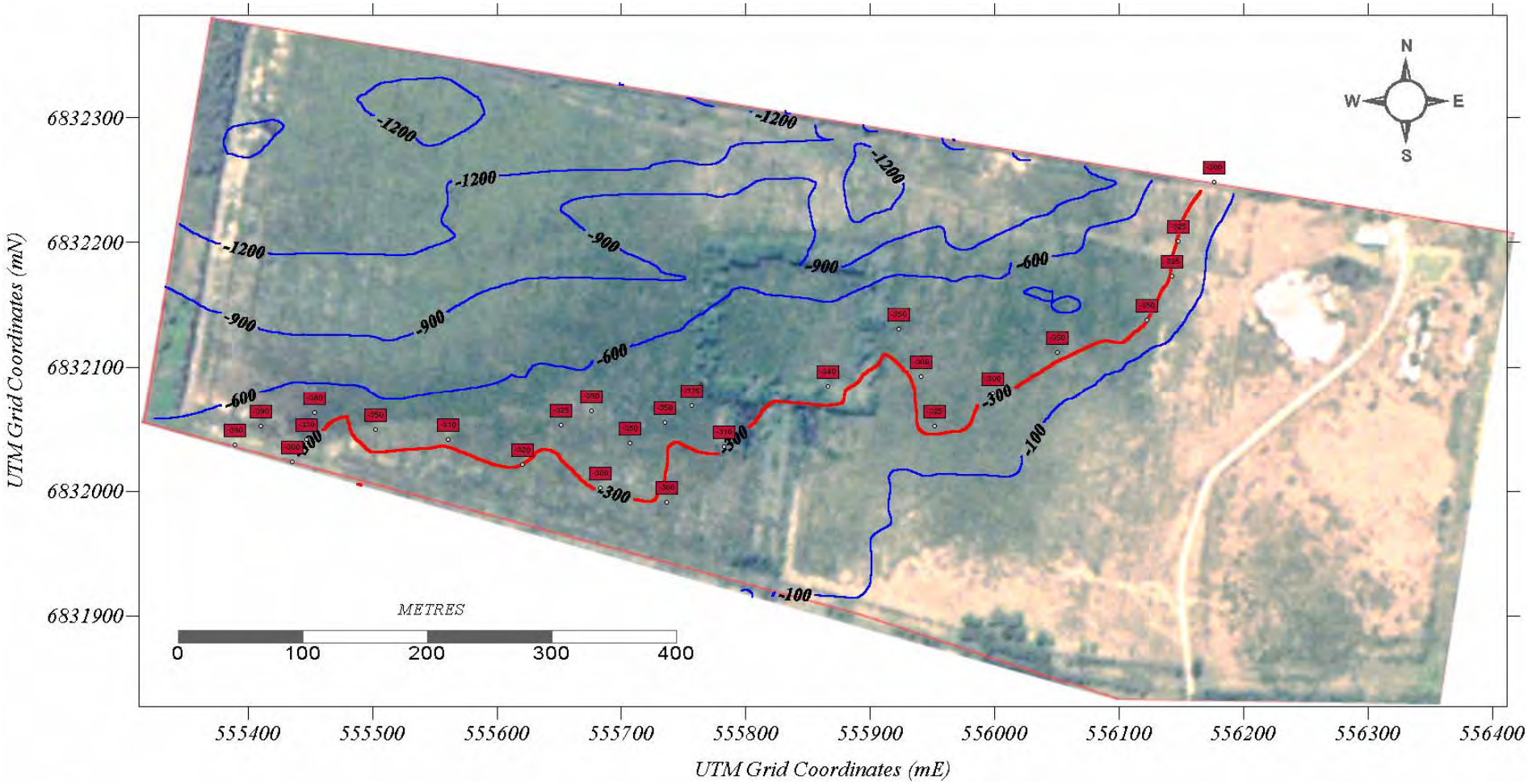


Figure 4. Peat depth contour diagram showing peat depths around the 300 mm contour line

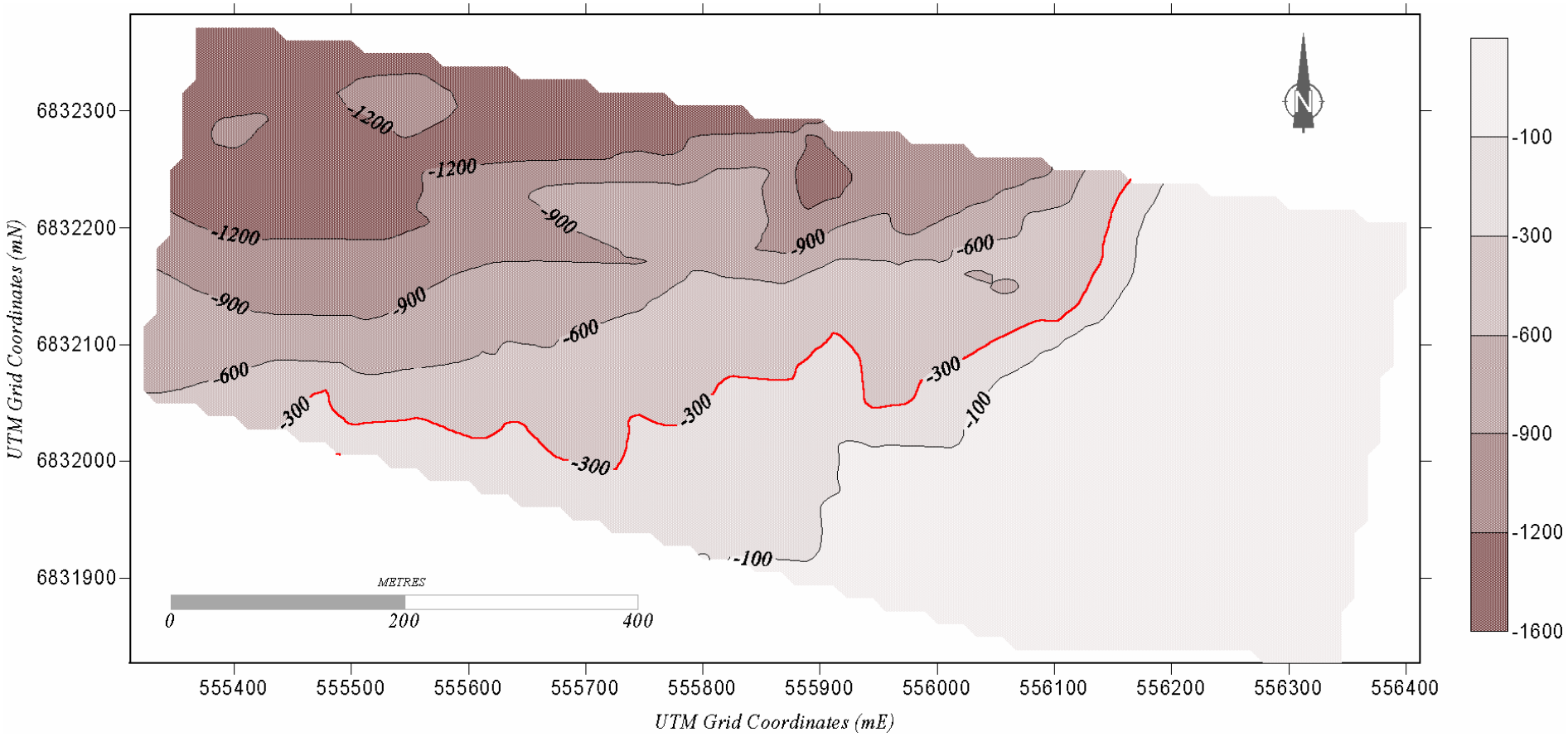


Figure 5. Peat depth contour diagram

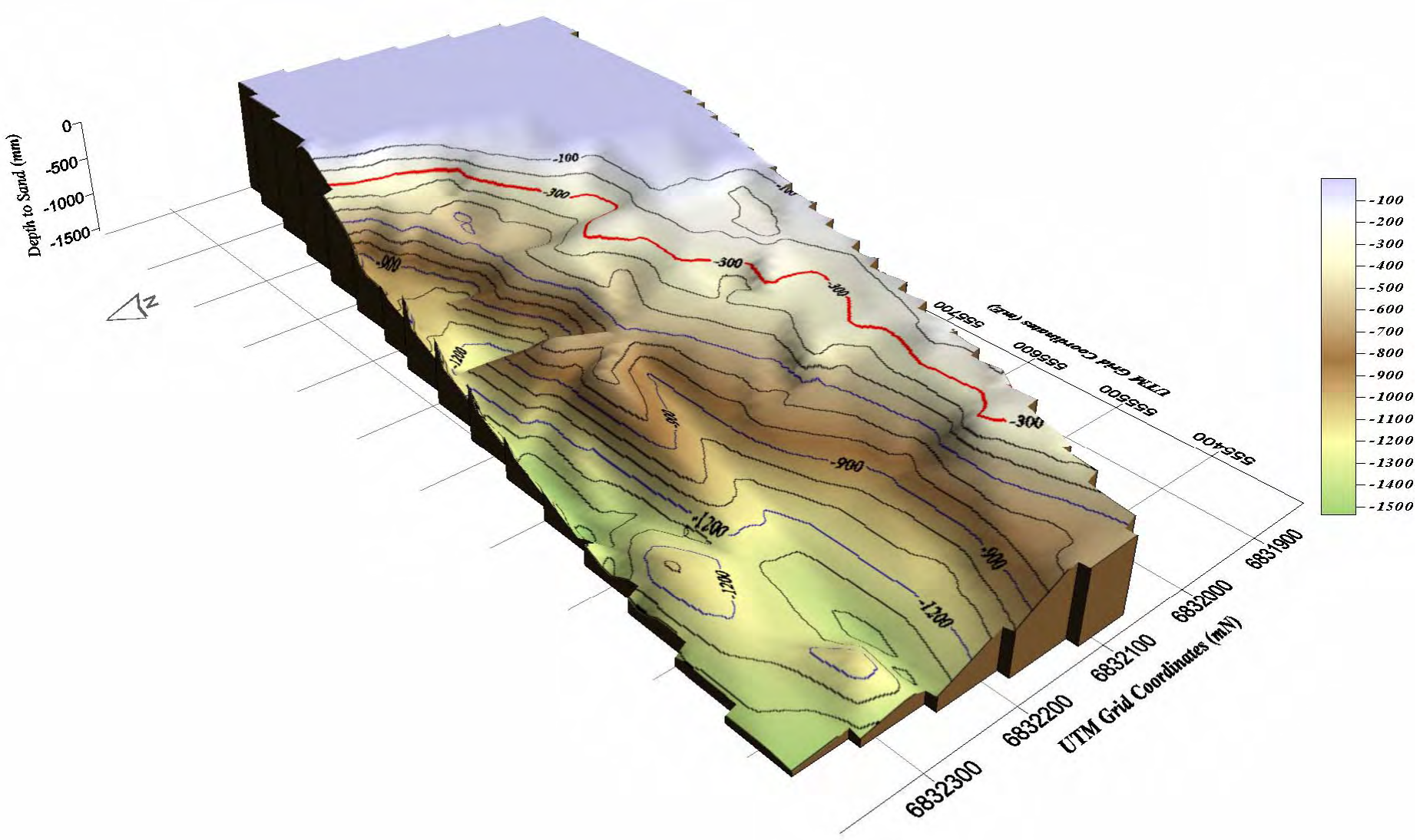


Figure 6. 3-D sand surface diagram with contour line

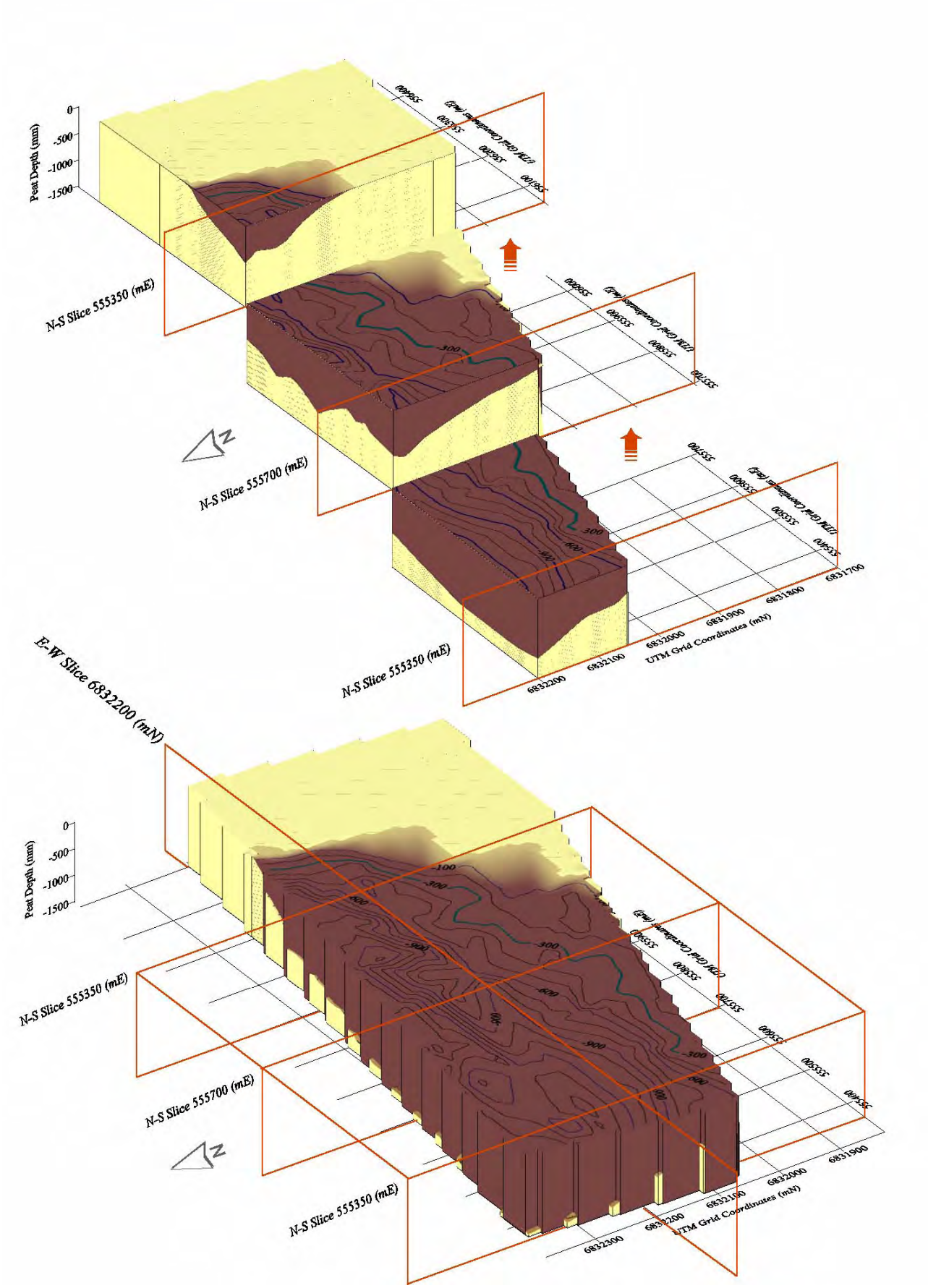


Figure 8 3-D transects of peat / soil.

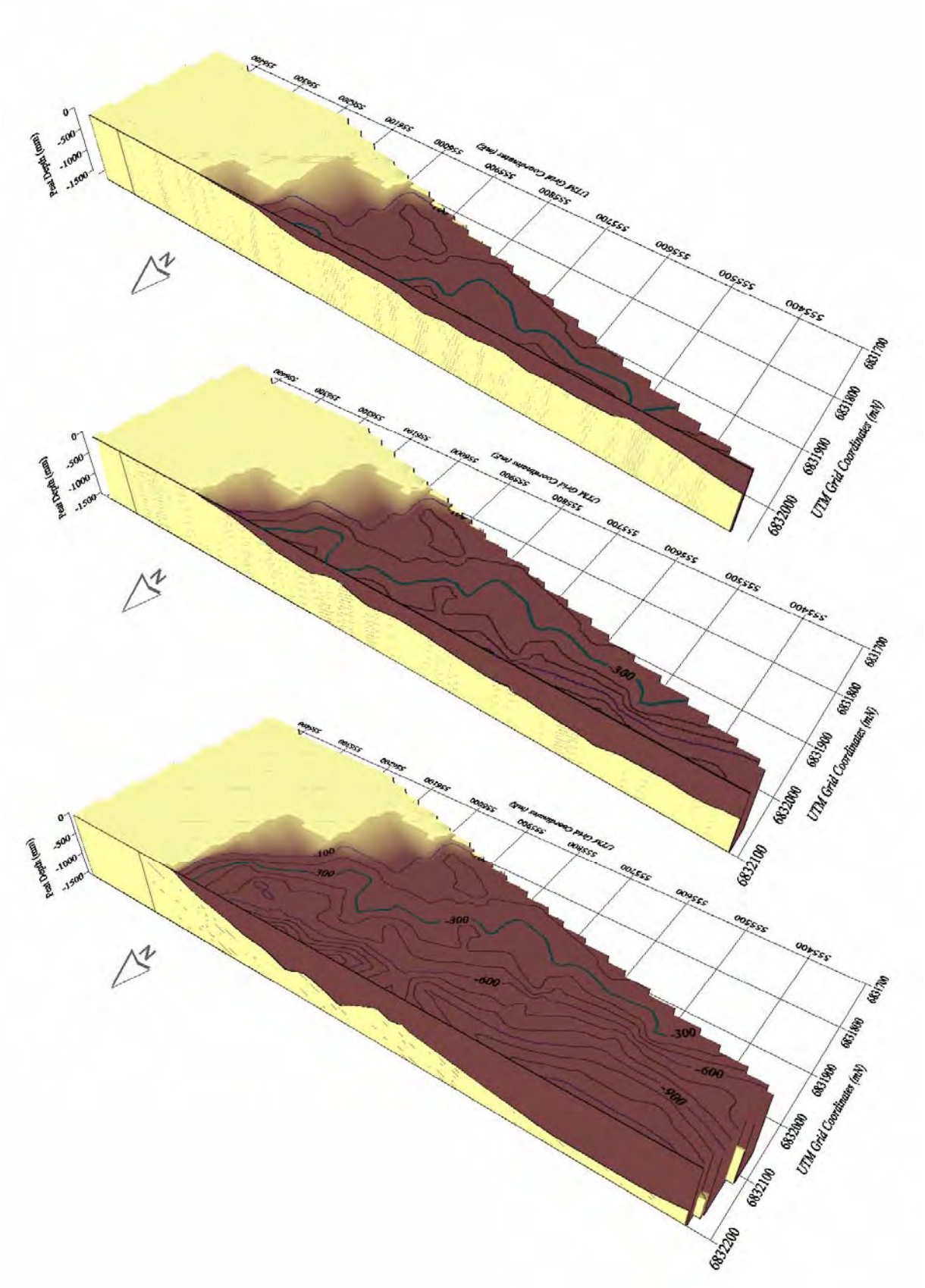


Figure 8 continued. 3-D transects of peat / sand interface

Peat Volume & Surface Area for 40ha West Byron Site.

Total Peat Volumes by:

Trapezoidal Rule:	198756.24 m^3
Simpson's Rule:	198837.69 m^3
Simpson's 3/8 Rule:	198729 m^3

Surface Areas

Total Site:
40ha
98.8 acres
399681 m^2

Peat:
Depth > 100mm
26 ha
64.3 acres
260190 m^2

Depth > 300mm
21.1 ha
52 acres
210545 m^2

Depth > 600mm
14.7 ha
36.4 acres
147338 m^2

Depth > 900mm
9.9 ha
24.5 acres
99005 m^2

Depth > 1200
6.3 ha
13 acres
52716 m^2

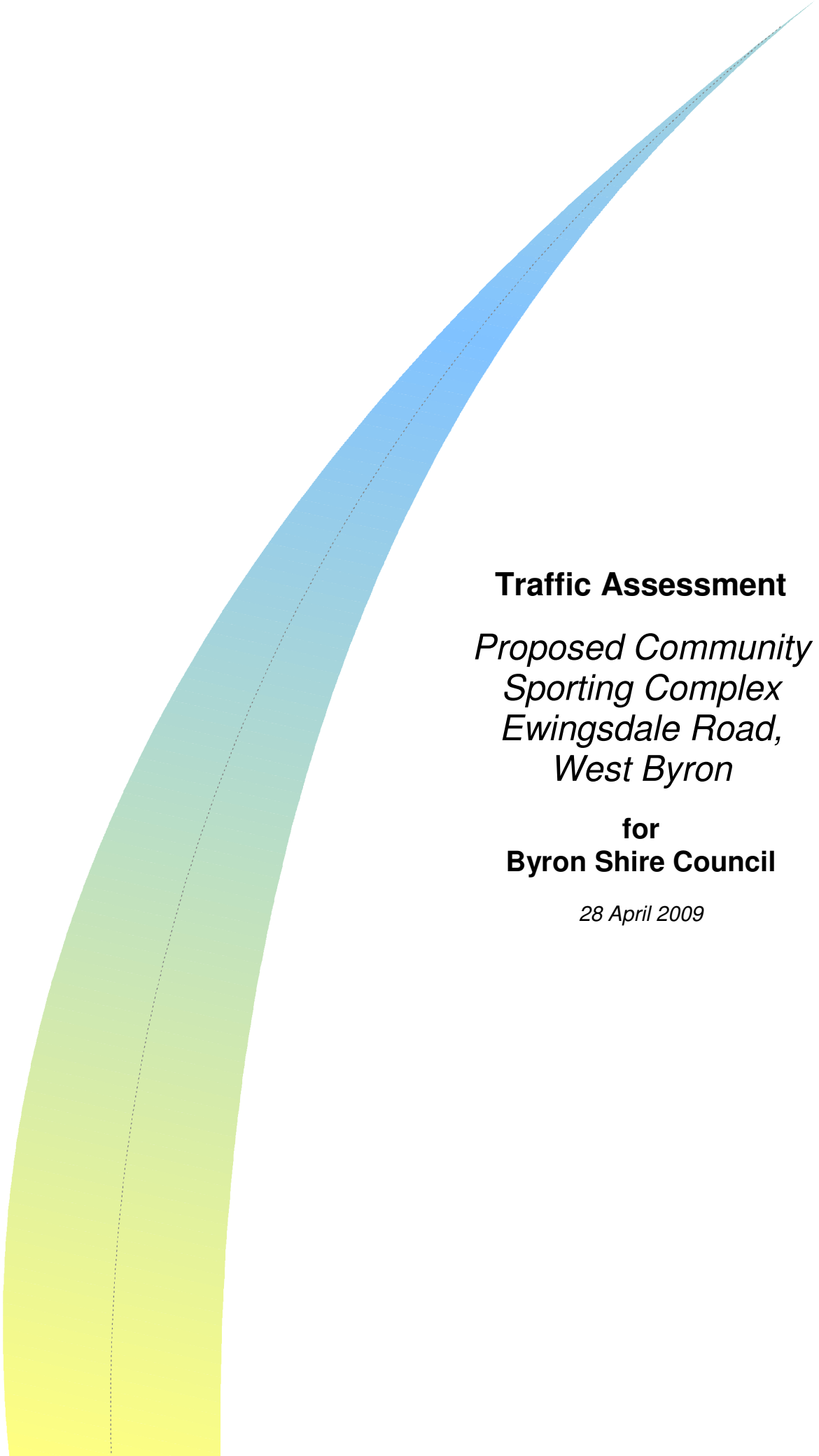
Coordinates for the peat / sand interface (Utilising Garmin handheld GPS unit. Accuracy can only be guaranteed to ± 15 metres due to GPS limitations).

UTM Grid Coordinates; Australian Geodetic 1966

CORE I.D.		ZONE	EASTING (mE)	NORTHING (mN)	PEAT (mm)
BN1	UTM	56J	556170	6832247	-300
BS10	UTM	56J	555430	6832022	-300
T10460ME	UTM	56J	556136	6832171	-325
T11460ME	UTM	56J	556141	6832199	-325
T13E	UTM	56J	555731	6831989	-300
T13W	UTM	56J	555614	6832019	-320
T1I	UTM	56J	555677	6832000	-300
T23W2	UTM	56J	555497	6832048	-350
T33W	UTM	56J	555646	6832051	-325
T3I	UTM	56J	555701	6832037	-350
T43E	UTM	56J	555729	6832053	-350
T4I	UTM	56J	555670	6832062	-350
T53E	UTM	56J	555751	6832066	-375
T63E	UTM	56J	555945	6832050	-325
T7275ME	UTM	56J	555935	6832090	-300
T7340ME	UTM	56J	555992	6832077	-300
T8250ME	UTM	56J	555917	6832129	-350
T8380ME	UTM	56J	556044	6832110	-350
T9450ME	UTM	56J	556116	6832135	-350
TN2W	UTM	56J	555448	6832061	-380
TN3W	UTM	56J	555442	6832040	-330
TN4W	UTM	56J	555405	6832050	-390

Appendix D

Traffic Assessment



RoadNet

Traffic Assessment

Proposed Community Sporting Complex Ewingsdale Road, West Byron

for
Byron Shire Council

28 April 2009

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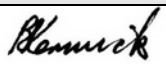
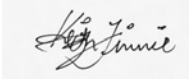
RoadNet *Pty Limited*
Planners and Engineers
PO Box 1381
No8, Sixth Avenue
Palm Beach QLD 4221
Ph 0755257377 Fax 07 55257388
email: gold.coast@roadnet.net.au

Document Status	**Final**

Task	Responsibility	Signature
Prepared by:	Brian Kerwick (Gold Cost Office)	
Reviewed by:	Keith Finnie, MIE Aust, CPEng.	

Executive Summary

Background

RoadNet Pty Ltd has been engaged by Byron Shire Council to prepare at traffic study for vacant land located on Ewingsdale Road adjacent to the West Byron Sewerage Treatment Plant and the West Byron Industrial Estate.

Figure 1 – Locality Sketch

The land is just over 40 ha in size and was purchased by Council for sports fields, a festival site, an overflow parking area in peak times, a Park and Ride facility, a Tourist Information Centre and as a gateway site for Byron Bay. The use of the site for major festivals may now not occur and the decision on its use for park and ride has been deferred.

A Draft Plan of Management has been prepared for the site. On this basis an internal layout plan has been developed by consultants GeoLINK in conjunction with the Sports Council. (Refer to Appendix A). A layout plan of the proposed intersection (roundabout) on Ewingsdale Road prepared by RoadNet is contained in Appendix B. A Schedule of Activities and Events provided by the Sports Council is contained in Appendix C. The study and intersection design is based on traffic generation derived from this schedule.

This traffic assessment builds on the previous traffic report by RoadNet in 2006 that investigated various access options for the sporting complex. The two main access options considered for the site in the previous traffic study were:

1) access through Bayshore Drive and the Industrial Estate; and
2) direct access off Ewingsdale Road.

Council has considered the report and has resolved that its preferred option is a roundabout on Ewingsdale Road located opposite Island Quarry. The roundabout would be designed and staged to fit into the route development strategy for Ewingsdale Road between the Highway and Town.

Council has decided that the roundabout would be constructed as a minimum sized facility (refer to the layout plan in Appendix B) in the first instance, with the capability of being expanded when funds permit, to create a gateway feature on the proposed median-divided dual carriageway road. In addition, the roundabout should be designed to allow for future access to properties (Sunnybrand Chickens and Island Quarry) on the southern side of Ewingsdale Road.

This report provides sufficient data and analysis to demonstrate that the proposed access arrangement can function satisfactorily in the short and long term for the types of activities

proposed for the site. In this regard Council has requested that the following issues be further investigated for the purposes of allowing the completion of the Review of Environmental Factors for the development application for the sporting complex:

- Identify the number of car parking spaces that could be allocated for park and ride at various times while taking account of the needs of primary users local sporting activities including training, regional sporting events and Tourist Information Centre.
- Identify the size and scale of public events that could be held on the site without the need for an event specific Traffic Control Plan.

Park and Ride

In regard to park and ride Council has suggested that all 360 spaces be made available for this purpose between 8am and 6pm Monday to Friday and 180 spaces available at other times.

The parking demand displayed in Figures 2 & 3 shows that all available spaces would be required for sporting events, for a typical weekday in winter. There would be no spare formal parking spaces available for park and ride during this period. The general use fields could be used for this purpose whereby a total of 250 spaces would be available.

Figure 2 - Summer Parking Demand

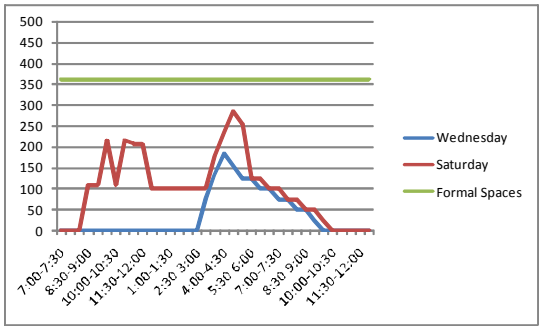
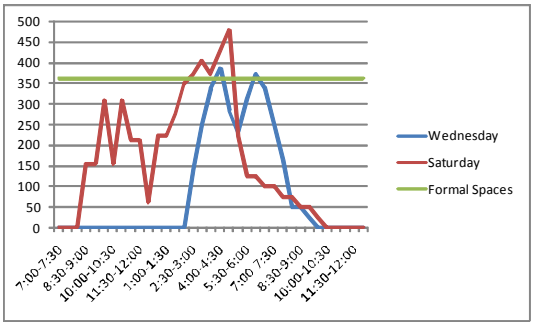


Figure 3 - Winter Parking Demand



The potential effect of a park and ride facility in peak hour is outlined in the following example. Assuming that all 250 spaces were to be used by commuters in the morning peak period (7:30 to 9:00), the queue into Town could be reduced by 1.1km. The travel time would also be reduced considerably although there would be no additional travel time benefits for bus patrons. A bus leaving every 10 minutes carrying 50 people per bus would require a minimum of 3 buses (two inbound trips per bus per hour) to move the 500 passengers.

The return trips in the afternoon may be more spread over time where buses (with potentially lower patronage) would be needed over a longer period.

Incentives are usually needed for motorists to use a park and ride facility. Existing peak hour congestion may be sufficient to entice commuters to use the facility although pricing and reliability would be important considerations.

It is not apparent that the facility would be sufficiently attractive for tourists at other times to be viable.

Management of Public Events

It was initially envisaged that two major events - 'The Blues Festival' and 'Splendour in the Grass' would be held on the site attracting up to 20,000 people. However, organisers of these events have indicated to Council that they would be using alternative sites. Should this position change and this site be considered for such events, a detailed traffic management plan would be needed because Ewingsdale Road will not cope with the additional traffic (including the access arrangements) which would be associated with onsite parking.

Major events could be held on the site providing that there is no on-site parking, because parking demand would greatly exceed the limited supply and lead to serious congestion and on-street parking problems. The distance between the entry and the parking area is short and does not allow for any queuing of vehicles.

A condition of approval for major events should require that all ticketing include bus travel to the site. Ticketing / parking management should also avoid any payments for on-site parking so that queuing would not occur near the entry.

The two main types of public events now envisaged for the site are: 1) Regional Tournaments and Carnivals; and 2) Medium sized Social Events such as concerts and exhibitions.

Regional Tournaments and Carnivals

Regional Tournaments and Carnivals are mainly held on weekends. The highest demand of all sports would be the Rugby Sevens, played over a full weekend where 1500 people could be expected.

The parking demand shown in Table 1 is based on 30% arriving on buses and 70% by car.

The number of parking spaces required on this basis exceeds the number of formal spaces available and overflow parking on the playing fields would not be available.

Additional parking would be required off site.

Land on the southern side of Ewingsdale Road should be investigated for overflow parking in order to prevent the use of the industrial area.

Table 1 – Rugby Sevens – Parking Accumulation

	Saturday	Sunday
8:00-8:30	0	0
8:30-9:00	158	158
9:00-9:30	315	315
9:30-10:00	467	467
10:00-10:30	515	515
10:30-11:00	509	509
11:00-11:30	504	504
11:30-12:00	499	499
12:00-12:30	462	462
12:30-1:00	410	410
1:00-1:30	436	436
1:30-2:00	436	436
2:00-2:30	436	436
2:30-3:00	436	436
3:00-3:30	425	425
3:30-4:00	404	404
4:00-4:30	383	383
4:30-5:00	357	357
5:00-5:30	331	331
5:30-6:00	278	278
6:00-6:30	173	173
6:30-7:00	42	42

Medium sized Social Events

Public events are expected to cater for up to 5000 people and will start around 6pm in the evening when traffic volumes on Ewingsdale Road volumes have started to reduce.

The types of events proposed are:

- Indoor concert (4000 people) 7pm to midnight.
- Outdoor concert (5000 people) 6pm to 11pm.
- Exhibitions (1000 people) 9am to 11pm.

For the larger event, allowing two people per car, 2500 parking spaces would be needed to cater for full demand. If the spare playing fields were to be used a total of approximately 600 spaces would be available. This shortfall means that about 75% of patrons would have to use public transport. As previously mentioned, this could be done through ticketing arrangements and organising a suitable number of buses to move patrons. Without limiting the parking demand serious congestion and on-street parking problems would be expected.

Entering the site would not be a major problem if the parking demand were to be limited to the number of parking spaces available. Again exiting the site would not be a problem when patrons leave between 11pm and midnight.

Applications for events accommodating more than 1500 people should contain a management plan detailing event times, parking, ticketing and public transport arrangements.

1. INTRODUCTION

Byron Shire Council purchased Lot 3 DP 706286 (249 Ewingsdale Road) for additional land for the adjacent sewerage works, sports fields, a festival site, an overflow parking area in peak times and as a gateway site for Byron Bay. Sections of the site will also be set aside for environmental protection. A copy of the Draft Layout Plan of the site is contained in Appendix A.

The land is just over 40 ha in size and is located on Ewingsdale Road adjacent to the West Byron Sewerage Treatment Plant and the Byron Industrial Estate. It is currently zoned as Rural 1(d) Urban Investigation under Byron LEP 1988. Ewingsdale Road is the main road connecting Byron Bay to the Pacific Highway and runs past the site.

RoadNet Pty Ltd has been engaged by Council to update its traffic study prepared in Nov 2006. The study will form part of the development application for the staged development of the site. The 2006 Study examined access options for the complex.

Council has now decided on its preferred option, access directly off Ewingsdale Road via a roundabout.

This traffic report is essentially an addendum to the Nov 2006 Traffic Report. Much of the data and analysis contained in this report is copied from that earlier report. Additional issues raised by Council are addressed in this report.

2. THE PROPOSAL

The proposal is primarily for a Regional Sporting Complex that will include:

- Soccer grounds,
- Indoor Stadium (3 Basketball Courts),
- Rugby League Fields,
- Netball Courts,
- Cricket pitches,
- Cycling track, and
- Skate Park.

Sports carnivals are also envisaged, such as touch football and soccer.

The facility will also provide for other activities such as:

- Tourist Information Centre,
- Regional Tournaments and Carnivals, and
- Public events such as concerts (4,000 –5,000 people).

On-site car parking is proposed for 360 cars and 10 buses for normal usage.

Overflow parking will be permitted on the easternmost football field (approx 250 spaces).

Council would also like to promote the site as a Park and Ride facility. However, there are other traffic management and logistic issues that require further consideration. Council has, therefore, deferred detailed consideration of this matter. This report provides an overview of potential impacts of a park and ride facility.

The sporting complex is to be developed in three stages. They are:

Stage 1 – Soccer fields (x2), cricket pitch, 'special community use', car park, bike and Skate Park, amenities and visitor information. (It is anticipated that Stage 1 would be further staged such that the soccer fields could be developed, with the parking area and driveways initially being a gravel surface with sealing and delineation occurring at a later time.)

Stage 2 – soccer/softball/touch football field, rugby/touch football field, cricket pitch and athletic track and field.

Stage 3 – Indoor facility for basketball/netball/music and arts.

3. STUDY METHODOLOGY

This traffic assessment extracts relevant sections from the Nov 2006 Traffic Study by RoadNet and refocuses the report to reflect recent Council decisions in regard to access to the site, including consolidation of accesses along Ewingsdale Road.

Traffic generation and parking requirements contained in this study are based on information provided by Byron Sports Council. The Sports Council provided details on sporting activities and social events, their times, hours of operation and the estimated number of people that may attend each event. This data was entered into a spreadsheet and calculations undertaken on how many trips and parking demand may be generated at various times of each day of the week.

Estimated traffic flows have modelled using intersection analysis software aaSIDRA 3.2 for 10 years and 20 years into the future.

Traffic growth has been estimated on the basis of long term trends obtained from historical traffic counts on Ewingsdale Road over the past 20 years.

Aerial photographs were obtained from Council and a concept layout sketch prepared for the access arrangements. NSW RTA and Austroads Road Design Guidelines have been applied to the design layout of the proposed roundabout on Ewingsdale Road. Turning paths have been applied to ensure large vehicles including buses can negotiate the intersection.

An estimate of cost has been prepared for staging of the roundabout based on costs provided by the RTA for similar projects elsewhere in the Northern Region.

The layout and operation of the Sporting Complex has been discussed with Council Officers and representatives of Byron Sports Council.

4. LOCATION

The site is located on Ewingsdale Road on the outskirts of Byron Bay.

Figure 4 - Locality Plan

Figure 5 – Locality (Enlarged View)

5. DESCRIPTION OF SITES AND SURROUNDS

5.1 General

The site is located adjacent to the West Byron Bay Arts and Industry Estate on the northern side of Ewingsdale Road on the western outskirts of the town of Byron Bay.

Ewingsdale Road is the main access to Byron Bay from the Pacific Highway, located approximately 2km to the west of the site. Byron Bay CBD is 3km to the east. Approximately 15,000 vehicles per day pass the site.

There are large numbers of turning movements at the Ewingsdale Road / Bayshore Drive intersection. Approximately 50% of all movements involve turning traffic.

Traffic volumes progressively increase towards Town with approximately 23,000 vehicles per day at the level crossing in Town. These volumes exceed 30,000 per day during holiday periods.

The North Coast Railway Line is located to the north of the site and forms a level crossing on Bayshore Drive. It runs generally parallel to Ewingsdale Road

Island Quarry is located on the southern side of Ewingsdale Road opposite the site. It is intended to transform the quarry (now disused) into an ecological centre with linkages to the proposed Sporting Complex. Sunnybrand Chickens is also located opposite and to the east of the Quarry.

Bayshore Drive is the main access into the Arts and Industry Estate and to the residential area of Sunrise Beach. Centennial Circuit is a local road servicing the western part of the Arts and Industry Estate. It forms a loop and meets Bayshore Drive in two locations. There is no access to the site from the Industrial Estate.

Rural land is located to the west and north of the site.

5.2 Ewingsdale Road

Ewingsdale Road is the main access to Byron Bay. It is a two lane rural road with painted turning bays at most junctions. The speed limit in Ewingsdale Road, from the Pacific Highway to west of McGettigans Lane, is 60kph where it changes to 100kph for 2.1km to Island Quarry. It then changes to 80kph past the site extending to east of the Belongil Creek bridge and then 50kph into Town.

Ewingsdale Road is on a generally level alignment combined with some gentle horizontal curves. Two accesses to Sunnybrand Chickens are located to the west of Bayshore Drive. The eastern access has no widening and the other, the main access, has widening with painted turning bays. Ewingsdale Road continues past the site and Island Quarry to the west on a gentle curve and level alignment. Access to the Sporting Complex is proposed on this curve. Currently there is no formal intersection to Island Quarry. However, a right-turn bay is required upon transformation of the quarry into an environmental park.

Ewingsdale Road past the site is on a narrow formation with narrow gravel shoulder and steep table drains. It is unsuitable for vehicles to stop or park and makes no provision for pedestrians or cyclists. It is not suitable for any overflow parking for special events at the site, such as occurs at Belongil Fields further towards Town.

To the east of Bayshore Drive a gravel road, Melaleuca Drive, leads off to the south. Two junctions lead off to the north into the Industrial Estate, Banksia Drive and Sunrise Boulevard. Both have painted turning bays.

To the east of Bayshore Drive an off-road cycleway is located parallel to Ewingsdale Road and continues into Byron Bay.

5.3 Intersection of Ewingsdale Road and Bayshore Drive

The intersection of Ewingsdale Road and Bayshore Drive is a T-junction with a Seagull arrangement.

Painted Seagull islands are provided for right-turn protection along with a full-length acceleration lane to 80kph standard. A left-turn acceleration lane is also provided.

The speed limit in Ewingsdale Road is 80kph. All approaches are straight and level. Sight distance is generally good.

The junction has some street lighting but not to current lighting standards.

Figure 6- Looking west in Ewingsdale Road past Bayshore Drive on right

A tourist development is proposed on the eastern side of the Railway Crossing in Bayshore Drive. Part of the conditions of consent requires that a roundabout be installed at the intersection of Ewingsdale Road and Bayshore Drive. The timing of this installation is uncertain.

5.4 Island Quarry

Island quarry is located on the southern side of Ewingsdale Road opposite the Sporting Fields site. The quarry pit is now filled with water. There is an approval to utilise the site as an eco-tourist business. A Crown Trust currently manages the site. The existing access is located to the west of the access to Sunnybrand Chickens and has no widening for turning traffic. A locked gate controls access to the site so current traffic volumes would be minor. The approval requires an Austroads Type 'C' junction for access.

It is intended to incorporate cultural activities into the development of this land and desirably provide a connection to the Sporting Complex opposite.

Figure 7 - Looking east in Ewingsdale Road

An access strategy is included in the web page for Island Quarry which includes the construction of a large roundabout and an overpass across Ewingsdale Road for pedestrians and cyclists. These ideas are not technically or economically feasible and have received no further consideration in this Study.

5.5 Sunnybrand Chickens

Sunnybrand Chickens is located on the southern side of Ewingsdale Road opposite the West Byron Industrial Estate and to the east of Island Quarry. The business operates a chicken abattoir, a waste water treatment plant and chicken growing sheds. The operation has two accesses: 1) a minor access with no widening to the administration area and 2) the main access to the sheds with painted turning bays in Ewingsdale Road.

Sunnybrand Chickens employ approximately 200 staff. There are two shifts per day with the majority of staff working between 3am and 7pm; i.e. staff arrives at 3am, staff arrive and leave at 11am, staff leave at 7pm. Accordingly, most traffic movements in and out of the site are outside of the normal peak hours.

The manager has indicated that approximately 20 trucks would enter and leave the site (40 movements) per day over a 24 hour period. Arrival and departure rates vary from day to day.

Figure 8 - Main access

Figure 9 - Secondary access (No widening)

Looking east in Ewingsdale Road

5.6 Cyclists

Figure 10 - Looking east across Bayshore Drive

An off-road cycleway runs from Town to Bayshore Drive.

It crosses Ewingsdale Road halfway into Town by way of pedestrian / cycle refuge.

This cycleway would be extended to a new intersection to the Sporting Complex.

The proposed seagull intersection at the sporting complex entry provides an opportunity to construct a pedestrian/cycle refuge in the tail of the right turn bay.

6. EXISTING TRAFFIC CONDITIONS

6.1 Traffic Volumes and Growth

Traffic volumes have been obtained from several sources. Table 2 is an extract from the RTA's Traffic Volumes publication 2004 and it shows Annual Average Daily Traffic volumes (AADT) for various years. Volumes for year 2006 incorporated into Figure 11 have been estimated from peak hour intersection counts.

Table 2 – Extract from RTA Traffic Volumes 2004

MAIN ROAD NO.306 - LISMORE-MULLUMBIMBY-TYAGARAH

LISMORE LGA

STATION	LOCATION	MAP	Km	1980 AADT	1982 AADT	1984 AADT	1986 AADT	1988 AADT	1990 AADT	1992 AADT	1995 AADT	1998 AADT	2001 AADT	2004 AADT
04.443	LISMORE-N OF MR142,TERANIA ST	TOWN	0.1	--	2430	--	4923	--	--	--	2530	2424	2352	2497
04.203	LISMORE-4KM N OF MR142,TERANIA ST	6	4.0	--	1830	--	1621	--	--	--	2341	2380	2625	2498
04.444	AT BYRON SHIRE BDY	6	29.9	--	140	--	168	--	--	--	166	703	414	256

BYRON LGA

STATION	LOCATION	MAP	Km	1980 AADT	1982 AADT	1984 AADT	1986 AADT	1988 AADT	1990 AADT	1992 AADT	1995 AADT	1998 AADT	2001 AADT	2004 AADT
04.673	S OF HUONBROOK RD	6	45.6	--	560	--	1299	--	--	--	--	--	--	--
04.446	MULLUMBIMBY-S OF BURRINGBAR ST	TOWN	48.8	--	3770	--	3766	--	--	--	5844	5835	6100	6872
04.461	MULLUMBIMBY-E OF MR306,DALLEY ST	TOWN	3.7	--	5160	--	5303	--	--	--	7215	7241	6800	7716
04.460	MULLUMBIMBY-0.2KM E OF JAMES ST	TOWN	2.4	--	4210	--	4435	--	--	--	--	--	--	--
04.459	MULLUMBIMBY-W OF SH10,PACIFIC HWY	6	0.1	--	4260	--	4432	--	4904	--	6989	6707	7746	9074

MAIN ROAD NO.545 - BALLINA-EWINGSDALE

BALLINA LGA

STATION	LOCATION	MAP	Km	1980 AADT	1982 AADT	1984 AADT	1986 AADT	1988 AADT	1990 AADT	1992 AADT	1995 AADT	1998 AADT	2001 AADT	2004 AADT
04.681	BALLINA-E OF SH10,KERR ST	TOWN	--	2040	--	1721	--	--	--	2733	3005	2981	2972	--
04.668	BALLINA-W OF KINGSFORD SMITH DR	TOWN	--	6590	--	5338	--	--	--	--	--	--	--	--
04.161	BALLINA-AT MISSINGHAM BRIDGE	TOWN	1.6	--	11580	--	11231	--	--	--	10992	12626	12120	11332
04.484	BALLINA-W OF COOGEE ST	TOWN	2.4	--	6640	--	7382	--	--	--	--	--	--	--
04.679	BALLINA-N OF SUVLA ST	TOWN	0.0	--	--	--	3674	--	--	--	--	--	--	--
04.660	LENNOX HEAD-1.5KM S OF TINTENBAR RD	6	0.0	--	2640	--	--	--	--	--	5620	6891	9366	8126
04.674	AT BALLINA SHIRE BDY	6	0.0	--	2110	--	2001	--	--	--	4158	4736	5690	5049

BYRON LGA

STATION	LOCATION	MAP	Km	1980 AADT	1982 AADT	1984 AADT	1986 AADT	1988 AADT	1990 AADT	1992 AADT	1995 AADT	1998 AADT	2001 AADT	2004 AADT
04.167	BYRON BAY-N OF BANGALOW RD	6	8.1	--	4400	--	5336	--	--	--	5315	6573	7689	6549
04.300	BYRON BAY-E OF MR545,JONSON	TOWN	6.4	--	6030	--	5554	--	--	--	--	--	--	--
04.210	BYRON BAY-AT RLY XING	TOWN	5.6	--	7810	--	8634	--	--	--	15827	19582	20269	21140
04.299	BYRON BAY-W OF KENDALL ST	TOWN	4.0	--	4830	--	5992	--	--	--	--	--	--	--
04.069	EWINGSDALE-E OF SH10,PACIFIC HWY	6	0.1	--	4120	--	4908	--	7021	--	9675	11410	11876	14510

Classification counts undertaken by Council in May 2006 have been used in this report to analyse existing traffic conditions.

Figure 11 – Hourly Volumes on Ewingsdale Road

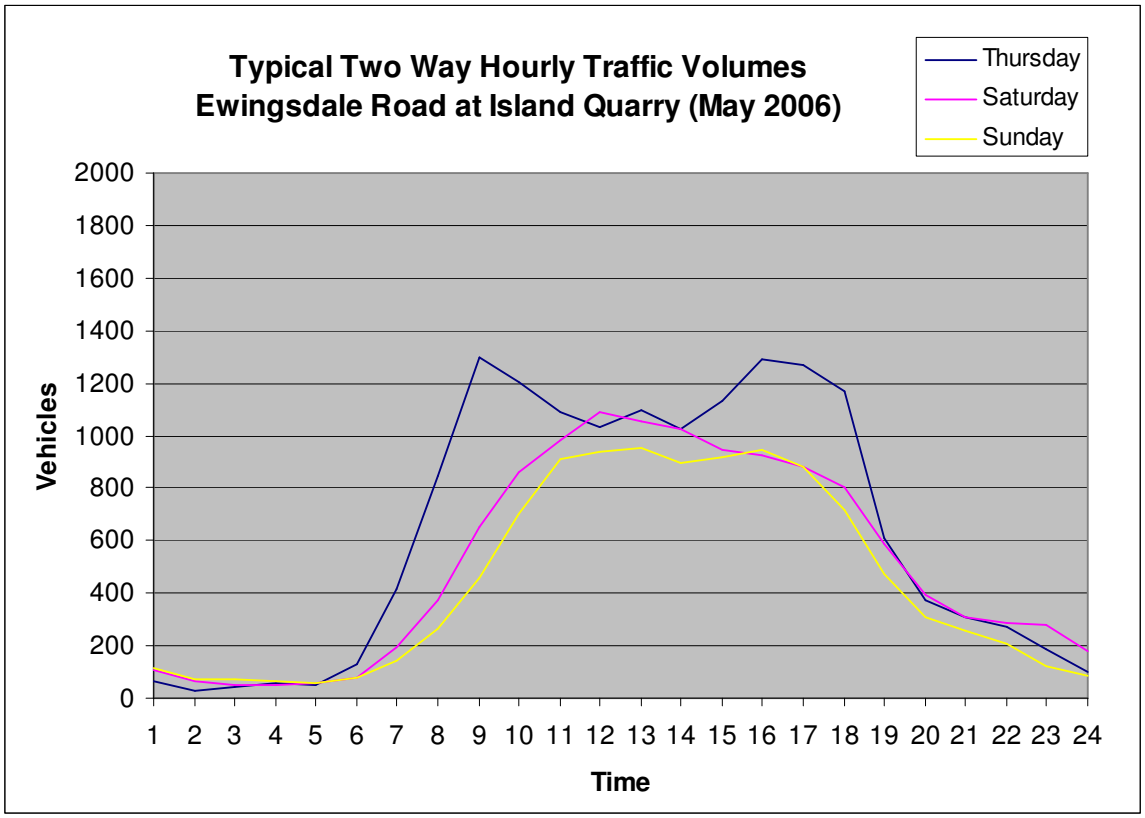


Table 3 – Vehicle Classification on Ewingsdale Road

Vehicle Classification at Island Quarry		
	% of total traffic	Description
Class 1	94.08%	Car
Class 2	1.24%	Car and trailer
Class 3	2.95%	Light Commercial Vehicles - 3.77%
Class 4	0.73%	
Class 5	0.09%	
Class 6	0.09%	Heavy Commercial Vehicles - 0.91%
Class 7	0.07%	
Class 8	0.13%	
Class 9	0.53%	
Class 10	0.05%	
Class 11	0.03%	
Class 12	0.00%	

Figure 12 – Daily Traffic Volumes on Ewingsdale Road

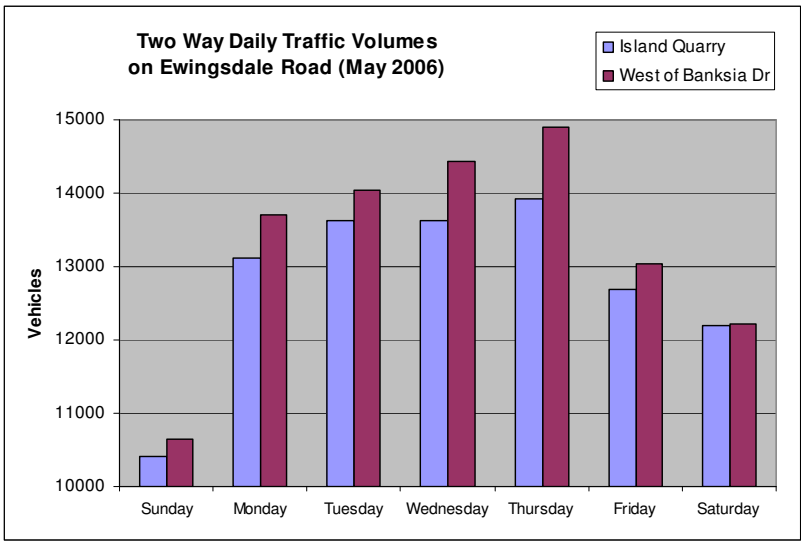
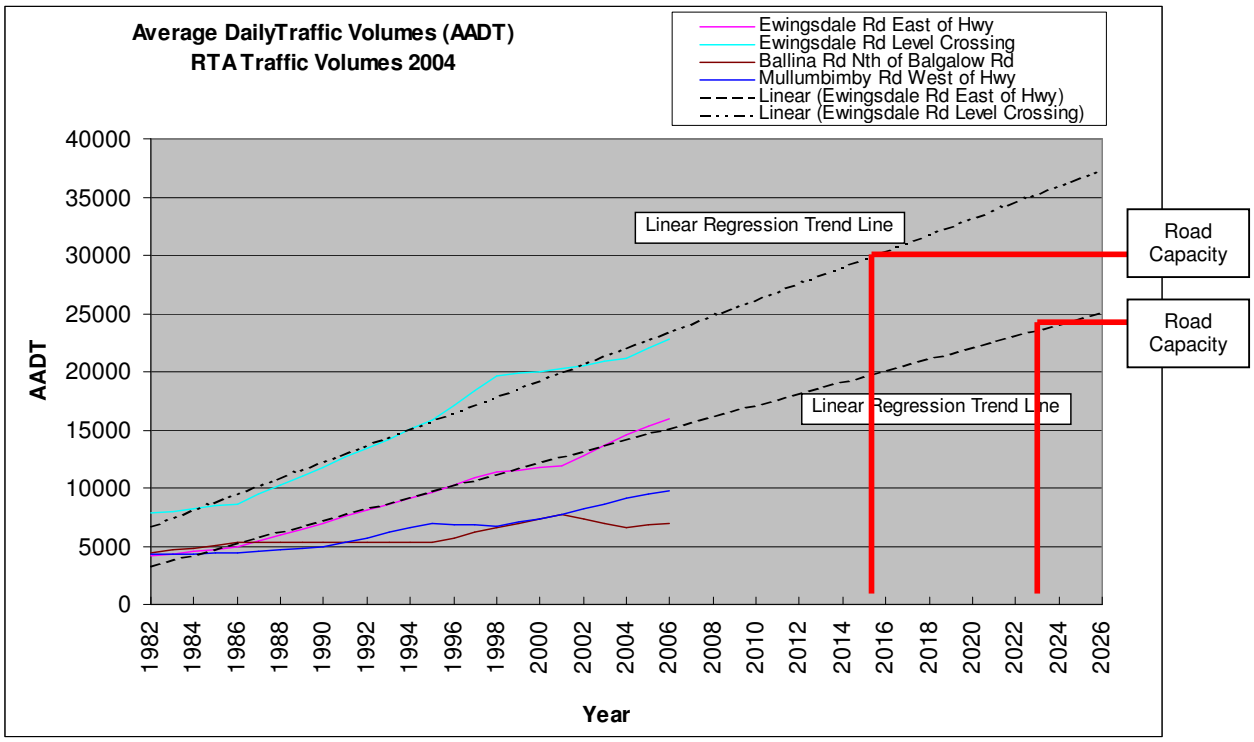


Table 4 – Typical two way Hourly Volumes

2006 Counts	Ewingsdale Road at Island Quarry		
Time	Thursday	Saturday	Sunday
0	61	108	115
1	32	63	71
2	42	52	69
3	56	47	65
4	47	54	55
5	130	81	81
6	419	195	143
7	843	372	265
8	1299	651	457
9	1206	857	705
10	1087	979	907
11	1029	1087	942
12	1099	1051	953
13	1024	1025	899
14	1135	943	918
15	1291	925	947
16	1268	885	882
17	1168	800	714
18	608	589	473
19	371	394	308
20	310	307	261
21	273	286	208
22	186	280	123
23	101	180	83
Total	15085	12211	10644

Figure 13 – Historic and Projected Daily Volumes Ewingsdale Road



This Chart indicates a number of important issues:

- Ewingsdale Road at Island Quarry will exceed its carrying capacity during normal traffic conditions by year 2023 (17 years).
- A growth rate of 3.33% pa (linear) is predicted using 2006 as a base year. This represents an additional 500 vehicles per day each year on Ewingsdale Road.

A review of counts that were carried out by Council every two years in November (separate to RTA counts) showed the same volumes and trends contained in Figure 13.

Council also carried out counts in April over a similar period in 2001. The April counts (Easter Holidays) showed volumes varying between 30,000 and 35,000 at the Lawson Street Level Crossing. These volumes would represent the upper level of capacity and would occur with serious congestion.

6.2 Intersection Volumes

Ewingsdale Road / Bayshore Drive

Figure 14 – Peak Hour intersection counts 8:30-9:30am and 4:00-5:00pm

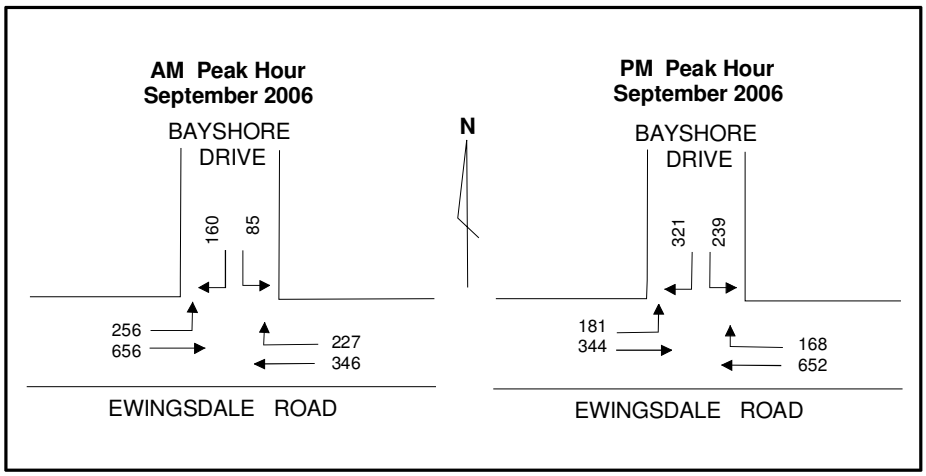
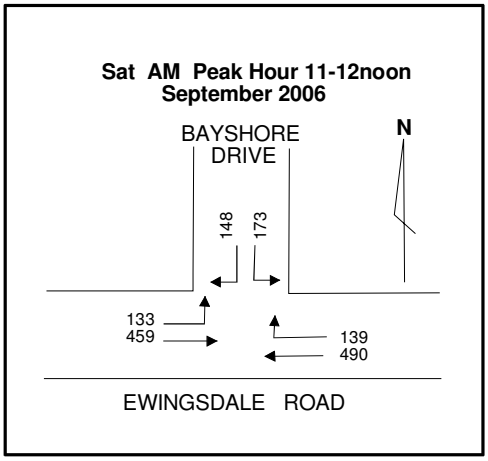


Figure 15 – Saturday intersection counts



6.3 Population Growth

Population growth is assumed to increase in the same proportion as traffic growth for Ewingsdale Road.

ABS data from the 2001 Census revealed a resident population of Byron Bay of 5241.

The traffic growth rate from 2001 to 2006 was 4.0% pa linear growth based on a 2001 traffic volume of 12,500. Using this same rate to extrapolate the population to 2006 reveals a population of 7,000.

Traffic growth on Ewingsdale Road has been estimated at 3.33% pa linear (on a 2006 base year) on the basis of past trends. It is reasonable to assume that this would also closely align with population growth.

It has been estimated that up to 2000 'day trippers' could visit the Byron Bay area during peak holiday periods. This would increase the population by approximately 35%. This is not inconsistent with other coastal towns in Northern NSW.

7. TRAFFIC GENERATION

Traffic generation has been calculated for various uses proposed for the site at various times. Byron Sporting Council has been consulted and it has kindly provided a schedule of proposed activities with an estimate of how many people may attend sporting and cultural events. A copy of this schedule is in contained in Appendix C.

The traffic calculations are based on the estimated number of people attending an event divided by the vehicle occupancy. The arrivals and departures are broken into 30 minute periods to reflect the number of teams and events starting and finishing during the day. The traffic volume calculated for each activity every 30 minute period of the day is added for both Winter-time and Summer-time. This provides a profile of traffic activities across a typical week for both winter and summer.

Table 5 below provides an example of the calculation for Soccer.

Table 5 – Calculation of Traffic Generation for Soccer

	Juniors Training		3:30-6:00	TWT	85% Arrive at 3:30-4:00	85% Leave at 5:00-5:30
People	Occupancy	Cars			15% Arrive at 4:00-4:30	15% Leave at 5:30-6:00
250	2	125				
	Seniors Training		6:00-9:00	TWT	70% Arrive at 6:00-6:30	70% Leave at 8:00-8:30
People	Occupancy	Cars			30% Arrive at 6:30-7:00	30% Leave at 8:30-9:00
100	1.5	67				
	Junior Comp		9:00-12:00	Sat	33% Arrive at 8:30-9:00	33% Leave at 10:00-10:30
People	Occupancy	Cars			33% Arrive at 9:30-10:00	33% Leave at 11:00-11:30
750	2	375			33% Arrive at 10:30-11:00	33% Leave at 12:00-12:30
	Senior Mens Comp		12:00-5:00	Sat	25% Arrive at 11:00-11:30	15% Leave at 1:30-2:00
People	Occupancy	Cars			30% Arrive at 12:30-1:00	25% Leave at 3:30-4:00
300	2	150			30% Arrive at 2:00-2:30	50% Leave at 5:00-5:30
					15% Arrive at 3:00-3:30	10% Leave at 5:30-6:00
	Senior Ladies Comp		12:00-5:00	Sat	25% Arrive at 11:00-11:30	15% Leave at 1:30-2:00
People	Occupancy	Cars			30% Arrive at 12:30-1:00	25% Leave at 3:30-4:00
300	2	150			30% Arrive at 2:00-2:30	50% Leave at 5:00-5:30
					15% Arrive at 3:00-3:30	10% Leave at 5:30-6:00
	Over 30s Ladies Comp		6:00-9:00	WTF	50% Arrive at 5:00-5:30	50% Leave at 7:30-8:00
People	Occupancy	Cars			50% Arrive at 6:30-7:00	50% Leave at 9:00-9:30
200	1.5	133				
Junior	Special Events					
Regional Comp		3 comps March to July				
People	Occupancy	Cars	9:00-4:00	Sun	50% Arrive at 8:00-8:30	50% Leave at 3:30-4:00
500	1.5	167	50% on Buses		50% Arrive at 8:30-9:00	50% Leave at 4:00-4:30
	Special Events					
Finals Series		September				
People	Occupancy	Cars	12:00-5:00	Sat	25% Arrive at 11:00-11:30	15% Leave at 1:30-2:00
500	2	250			30% Arrive at 12:30-1:00	25% Leave at 3:30-4:00
					30% Arrive at 2:00-2:30	50% Leave at 5:00-5:30
					15% Arrive at 3:00-3:30	10% Leave at 5:30-6:00

Further details of the spreadsheet calculations are contained in Appendix C.

Tables 6 and 7 show a summary of traffic generation for a typical winter and summer week respectively.

Table 6 – Winter Traffic Generation (Excluding Major Events and Park and Ride)

SUMMARY OF TRAFFIC VOLUMES FOR WINTER EVENTS

	Monday		Tuesday		Wednesday		Thursday		Friday		Saturday		Sunday	
	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
7:00-7:30														
7:30-8:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00-8:30	3	3	3	3	3	3	3	3	13	3	3	3	3	3
8:30-9:00	3	3	3	3	3	3	3	3	32	3	156	3	48	3
9:00-9:30	3	3	3	3	3	3	3	3	42	4	3	3	48	3
9:30-10:00	3	3	3	3	3	3	3	3	23	4	156	3	3	3
10:00-10:30	3	3	3	3	3	3	3	3	3	4	3	156	3	48
10:30-11:00	3	3	3	3	3	3	3	3	3	4	156	3	48	3
11:00-11:30	3	3	3	3	3	3	3	3	3	4	63	156	41	48
11:30-12:00	3	3	3	3	3	3	3	3	3	8	3	3	3	3
12:00-12:30	3	3	3	3	3	3	3	3	6	23	3	156	49	48
12:30-1:00	3	3	3	3	3	3	3	3	6	8	165	3	48	3
1:00-1:30	3	3	3	3	3	3	3	3	6	8	3	3	49	3
1:30-2:00	3	3	3	3	3	3	3	3	6	8	93	39	3	26
2:00-2:30	3	3	3	3	3	3	3	3	6	8	75	3	48	3
2:30-3:00	3	3	3	3	3	3	3	3	8	8	23	3	26	26
3:00-3:30	3	3	109	3	143	3	109	3	13	62	39	3	26	3
3:30-4:00	81	3	81	3	113	3	113	3	91	27	81	113	81	41
4:00-4:30	58	3	77	3	88	3	82	3	58	3	58	3	58	3
4:30-5:00	53	3	53	3	53	3	53	3	53	3	53	3	53	3
5:00-5:30	50	78	50	185	117	219	117	185	117	78	50	308	50	222
5:30-6:00	25	55	53	74	65	117	53	111	25	55	25	119	25	93
6:00-6:30	50	50	102	50	130	50	135	50	50	50	50	50	50	50
6:30-7:00	58	50	45	50	112	50	112	50	92	50	25	50	25	50
7:00-7:30	50	50	50	50	50	83	50	83	50	50	50	50	50	50
7:30-8:00	25	50	25	50	25	117	25	117	25	117	25	50	25	50
8:00-8:30	50	50	50	130	50	137	50	130	50	50	50	50	50	50
8:30-9:00	25	83	25	70	25	137	25	137	25	117	25	50	25	50
9:00-9:30	50	50	50	50	50	50	50	50	50	50	50	50	50	50
9:30-10:00	0	25	0	25	0	25	0	25	0	25	0	25	0	25
10:00-10:30	0	25	0	25	0	25	0	25	0	25	0	25	0	25
10:30-11:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:00-11:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:30-12:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30:-1:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	621		812		1063		1017		857		1488		986	

Table 7 – Summer Traffic Generation (Excluding Major Events and Park and Ride)

SUMMARY OF TRAFFIC VOLUMES FOR SUMMER EVENTS

	Monday		Tuesday		Wednesday		Thursday		Friday		Saturday		Sunday	
	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
7:00-7:30														
7:30-8:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00-8:30	3	3	3	3	3	3	3	3	13	3	3	3	3	3
8:30-9:00	3	3	3	3	3	3	3	3	32	3	110	3	3	3
9:00-9:30	3	3	3	3	3	3	3	3	42	4	3	3	3	3
9:30-10:00	3	3	3	3	3	3	3	3	23	4	110	3	3	3
10:00-10:30	3	3	3	3	3	3	3	3	3	4	3	110	3	3
10:30-11:00	3	3	3	3	3	3	3	3	3	4	110	3	3	3
11:00-11:30	3	3	3	3	3	3	3	3	3	4	103	110	3	3
11:30-12:00	3	3	3	3	3	3	3	3	3	8	3	3	3	3
12:00-12:30	3	3	3	3	3	3	3	3	6	23	3	110	3	3
12:30-1:00	3	3	3	3	3	3	3	3	6	8	3	3	3	3
1:00-1:30	3	3	3	3	3	3	3	3	6	8	3	3	3	3
1:30-2:00	3	3	3	3	3	3	3	3	6	8	3	3	3	3
2:00-2:30	3	3	3	3	3	3	3	3	6	8	3	3	3	3
2:30-3:00	3	3	3	3	3	3	3	3	8	8	3	3	3	3
3:00-3:30	3	3	3	3	3	3	3	3	13	62	3	3	3	3
3:30-4:00	81	3	81	3	81	3	81	3	91	27	81	3	81	3
4:00-4:30	58	3	98	3	58	3	98	3	58	3	58	3	58	3
4:30-5:00	53	3	53	3	53	3	53	3	53	3	53	3	53	3
5:00-5:30	50	78	50	78	50	78	50	78	50	78	50	78	50	78
5:30-6:00	25	55	25	55	25	55	25	55	25	55	25	155	25	55
6:00-6:30	50	50	50	90	50	50	50	90	50	50	50	50	50	50
6:30-7:00	58	50	25	50	25	50	25	50	25	50	25	50	25	50
7:00-7:30	50	50	50	50	50	50	50	50	50	50	50	50	50	50
7:30-8:00	25	50	25	50	25	50	25	50	25	50	25	50	25	50
8:00-8:30	50	50	50	50	50	50	50	50	50	50	50	50	50	50
8:30-9:00	25	83	25	50	25	50	25	50	25	50	25	50	25	50
9:00-9:30	50	50	50	50	50	50	50	50	50	50	50	50	50	50
9:30-10:00	0	25	0	25	0	25	0	25	0	25	0	25	0	25
10:00-10:30	0	25	0	25	0	25	0	25	0	25	0	25	0	25
10:30-11:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:00-11:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:30-12:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30:-1:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	621		627		587		627		724		1009		587	

7.1 Traffic Assignment

The intersection traffic counts at Ewingsdale Road and Bayshore Drive indicates a directional split to the east and west from Bayshore Drive of 50% each way on a Saturday and a 60/40 split in favour of the trips to/from the west for weekday peak hours. These splits are adopted for analysis purposes in this study. A 50% split is applied to all traffic movements to and from the sporting complex site.

The following diagrams show the traffic generated by the three stages of the complex together with through volumes on Ewingsdale Road for the respective year.

Intersection modelling has been carried out using these projections.

Figure 16 - Traffic Volumes – Stage 1.

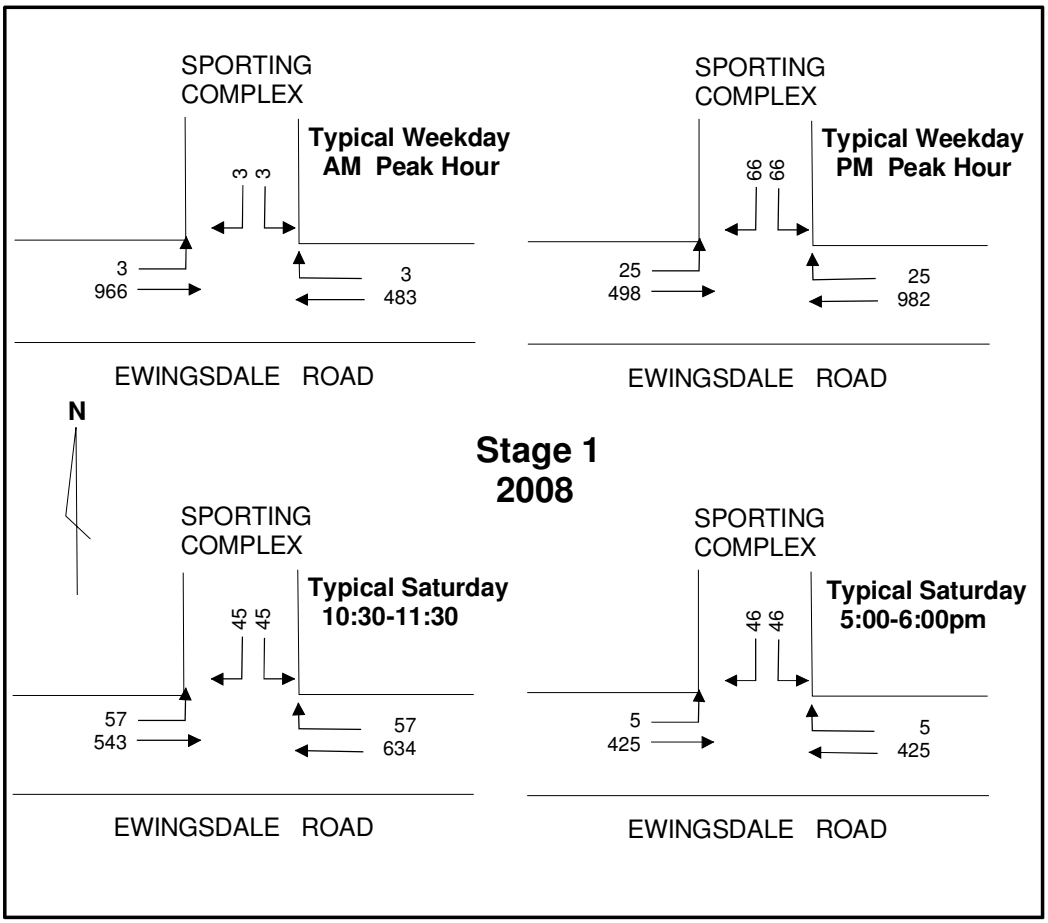


Figure 17 - Traffic Volumes – Stage 2.

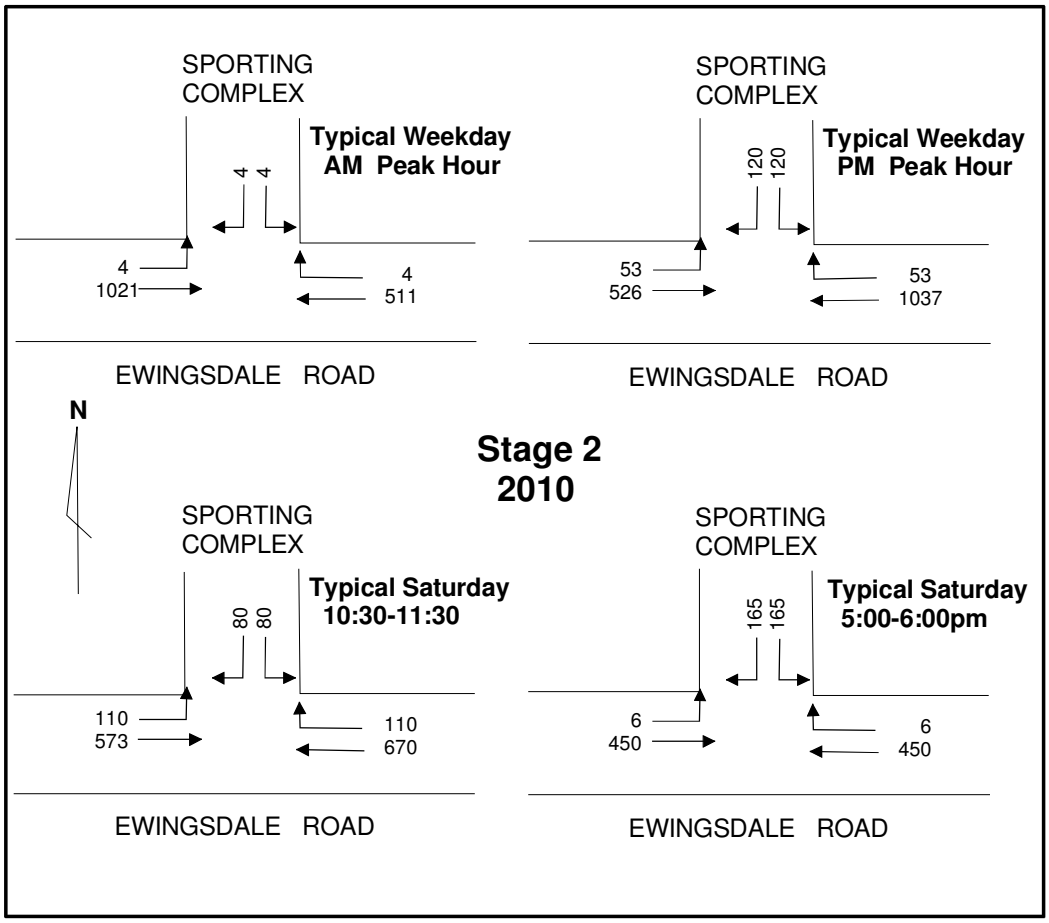
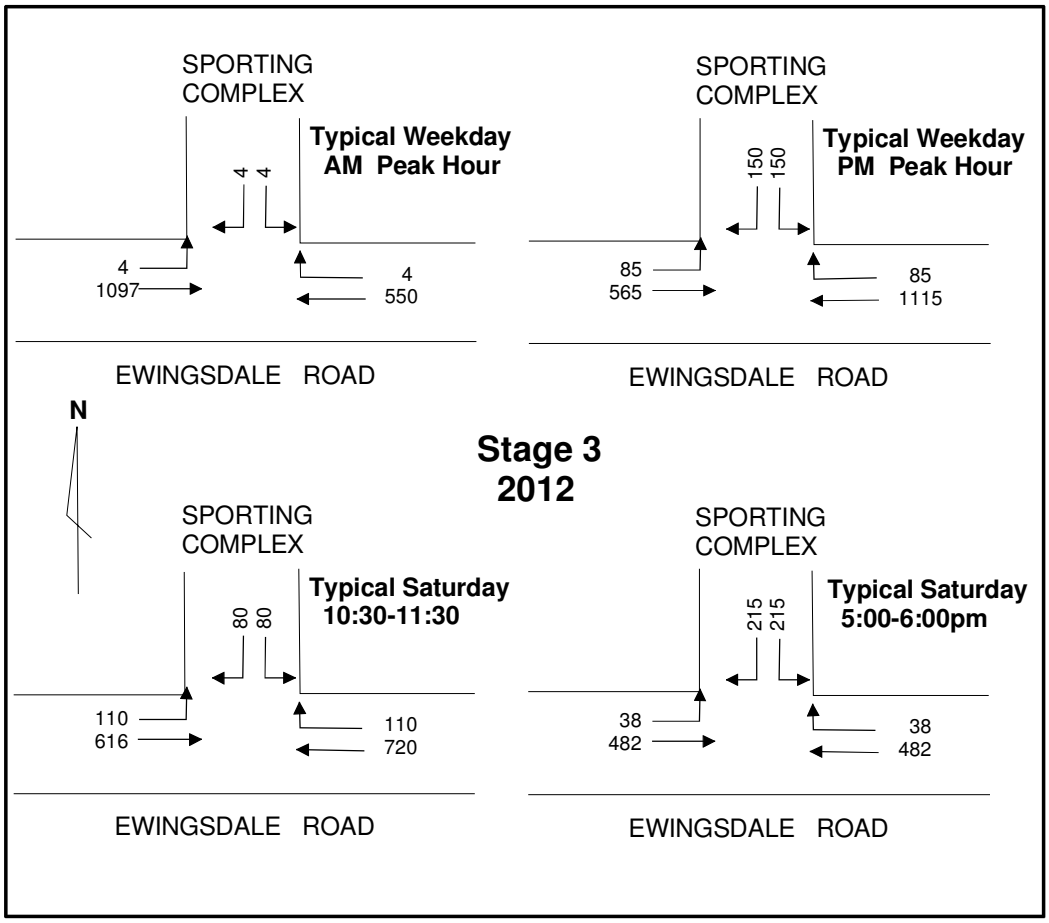


Figure 18 - Traffic Volumes – Stage 3.



8. PARKING

Table 8- Winter Parking Accumulation (Excluding Major Events and Park and Ride)

PARKING SUMMARY FOR WINTER EVENTS

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
7:00-7:30							
7:30-8:00	0	0	0	0	0	0	0
8:00-8:30	0	0	0	0	10	0	0
8:30-9:00	0	0	0	0	39	153	45
9:00-9:30	0	0	0	0	77	153	89
9:30-10:00	0	0	0	0	96	307	89
10:00-10:30	0	0	0	0	95	153	45
10:30-11:00	0	0	0	0	94	307	89
11:00-11:30	0	0	0	0	93	213	82
11:30-12:00	0	0	0	0	88	213	82
12:00-12:30	0	0	0	0	71	60	84
12:30-1:00	0	0	0	0	69	222	129
1:00-1:30	0	0	0	0	67	222	175
1:30-2:00	0	0	0	0	65	276	152
2:00-2:30	0	0	0	0	63	348	197
2:30-3:00	0	0	0	0	63	368	197
3:00-3:30	0	106	140	106	15	404	220
3:30-4:00	78	185	250	216	78	372	260
4:00-4:30	133	258	336	296	133	427	315
4:30-5:00	183	308	386	346	183	477	365
5:00-5:30	155	174	284	278	222	219	193
5:30-6:00	125	153	232	220	192	125	125
6:00-6:30	125	205	312	305	192	125	125
6:30-7:00	133	200	373	367	233	100	100
7:00-7:30	133	200	340	333	233	100	100
7:30-8:00	108	175	248	242	142	75	75
8:00-8:30	108	95	162	162	142	75	75
8:30-9:00	50	50	50	50	50	50	50
9:00-9:30	50	50	50	50	50	50	50
9:30-10:00	25	25	25	25	25	25	25
10:00-10:30	0	0	0	0	0	0	0
10:30-11:00	0	0	0	0	0	0	0
11:00-11:30	0	0	0	0	0	0	0
11:30-12:00	0	0	0	0	0	0	0
12:30:-1:00	0	0	0	0	0	0	0

Figure 19 - Winter Parking Demand

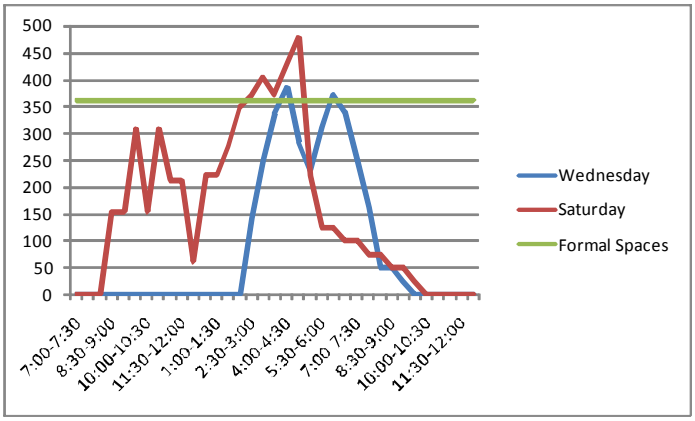
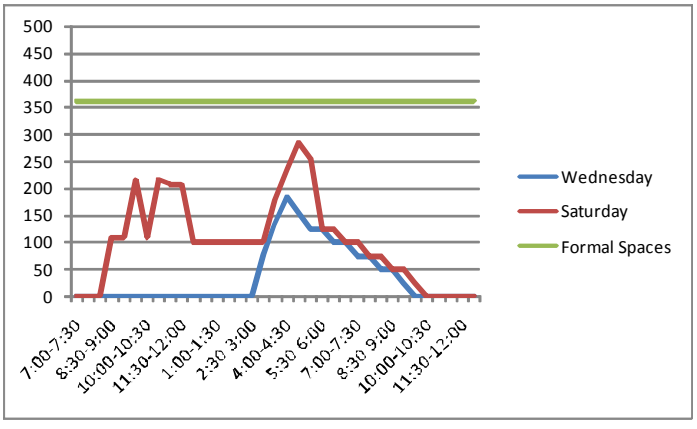


Table 9 - Summer Parking Accumulation (Excluding Major Events and Park and Ride)

PARKING SUMMARY FOR SUMMER EVENTS

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
7:00-7:30							
7:30-8:00	0	0	0	0	0	0	0
8:00-8:30	0	0	0	0	10	0	0
8:30-9:00	0	0	0	0	39	107	0
9:00-9:30	0	0	0	0	77	107	0
9:30-10:00	0	0	0	0	96	215	0
10:00-10:30	0	0	0	0	95	107	0
10:30-11:00	0	0	0	0	94	215	0
11:00-11:30	0	0	0	0	93	207	0
11:30-12:00	0	0	0	0	88	207	0
12:00-12:30	0	0	0	0	71	100	0
12:30-1:00	0	0	0	0	69	100	0
1:00-1:30	0	0	0	0	67	100	0
1:30-2:00	0	0	0	0	65	100	0
2:00-2:30	0	0	0	0	63	100	0
2:30-3:00	0	0	0	0	63	100	0
3:00-3:30	0	0	0	0	15	100	0
3:30-4:00	78	78	78	78	78	178	78
4:00-4:30	133	173	133	173	133	233	133
4:30-5:00	183	223	183	223	183	283	183
5:00-5:30	155	195	155	195	155	255	155
5:30-6:00	125	165	125	165	125	125	125
6:00-6:30	125	125	125	125	125	125	125
6:30-7:00	133	100	100	100	100	100	100
7:00-7:30	133	100	100	100	100	100	100
7:30-8:00	108	75	75	75	75	75	75
8:00-8:30	108	75	75	75	75	75	75
8:30-9:00	50	50	50	50	50	50	50
9:00-9:30	50	50	50	50	50	50	50
9:30-10:00	25	25	25	25	25	25	25
10:00-10:30	0	0	0	0	0	0	0
10:30-11:00	0	0	0	0	0	0	0
11:00-11:30	0	0	0	0	0	0	0
11:30-12:00	0	0	0	0	0	0	0
12:30:-1:00	0	0	0	0	0	0	0

Figure 20 - Summer Parking Demand



SPECIAL EVENTS

It was initially envisaged that two major events - 'The Blues Festival' and 'Splendour in the Grass' would be held on the site attracting up to 20,000 people. However, organisers of these events have indicated to Council that they would be using alternative sites. Should this position change and this site be considered for such events a detailed traffic management plan would be needed because Ewingsdale Road will not cope with the additional traffic (including the access arrangements) which would be associated with on-site parking.

Major events could be held on the site providing there is no on-site parking because parking demand would greatly exceed the limited supply and lead to serious congestion and on-street parking problems. The distance between the entry and the parking area is short and does not allow for any queuing.

A condition of approval for major events should require that all ticketing include bus travel to the site. Ticketing / parking management should also avoid any payments for on-site parking so that queuing would not occur near the entry.

The two main types of public events now envisaged for the site are: 1) Regional Tournaments and Carnivals; and 2) Medium sized Social Events such as concerts and exhibitions.

Regional Tournaments and Carnivals

Regional Tournaments and Carnivals are mainly held on weekends. The highest demand of all sports would be the Rugby Sevens played over a full weekend where 1500 people could be expected.

The parking demand shown in Table 1 is based on 30% arriving on buses and 70% by car.

The number of parking spaces required on this basis exceeds the number of formal spaces available and overflow parking area on the playing fields would not be available.

Additional parking would be required off site.

Land on the southern side of Ewingsdale Road should be investigated for overflow parking in order to prevent the use of the industrial area.

Table 10 – Rugby Sevens – Parking Accumulation

	Saturday	Sunday
8:00-8:30	0	0
8:30-9:00	158	158
9:00-9:30	315	315
9:30-10:00	467	467
10:00-10:30	515	515
10:30-11:00	509	509
11:00-11:30	504	504
11:30-12:00	499	499
12:00-12:30	462	462
12:30-1:00	410	410
1:00-1:30	436	436
1:30-2:00	436	436
2:00-2:30	436	436
2:30-3:00	436	436
3:00-3:30	425	425
3:30-4:00	404	404
4:00-4:30	383	383
4:30-5:00	357	357
5:00-5:30	331	331
5:30-6:00	278	278
6:00-6:30	173	173
6:30-7:00	42	42

Medium sized Social Events

Public events are expected to cater for up to 5000 people and will start around 6pm in the evening when traffic volumes on Ewingsdale Road volumes have started to reduce.

The types of events proposed are:

- Indoor concert (4000 people) 7pm to midnight.
- Outdoor concert (5000 people) 6pm to 11pm.
- Exhibitions (1000 people) 9am to 11pm.

For the larger event at two people per car, 2500 parking spaces would be needed to cater for full demand. If the spare playing fields were to be used a total of approximately 600 spaces would be available. This shortfall means that about 75% of patrons would have to use public transport. As previously mentioned, this could be done through ticketing arrangements and organising a suitable number of buses to move patrons. Without limiting the parking demand serious congestion and on-street parking problems would be expected.

Entering the site would not be a major problem if the parking demand were to be limited to the number of parking spaces available. Again exiting the site would not be a problem when patrons leave between 11pm and midnight.

Applications for events accommodating more than 1500 people should contain a management plan detailing event times, parking, ticketing and public transport arrangements.

Impacts on the Industrial Area

The sporting complex will have limited formal car parking (360 spaces). It will also have provision for overflow parking on one of the playing fields (potentially 250 spaces).

There is the potential for major events at the site to have an impact on parking and traffic flow within the West Byron Industrial Estate should the parking capacity be exceeded.

This should be avoided as it has the potential to seriously affect business activities.

Additional overflow parking could be arranged on the southern side of Ewingsdale Road by agreement with Island Quarry and Sunnybrand Chickens.

Alternatively, ticketing for major events could be arranged to include bus travel from Town to minimise parking at the site.

9. STAGED ACCESS

The investigation and analysis in this study shows that traffic signals and a two lane roundabout are both suitable treatments for: 1) the Bayshore Drive intersection; and 2) a new intersection to the Sporting Complex directly off Ewingsdale Road.

Council has previously considered the advantages and disadvantages of both facilities and has determined that a roundabout at a new intersection on Ewingsdale Road best serves its needs for the following reasons.

A roundabout at the Sporting Complex entry:

- provides the opportunity to create an entry statement to Byron Bay;
- provides the opportunity for a pedestrian refuge in Ewingsdale Road to assist pedestrians and cyclists;
- slows traffic on the long straight leading into the industrial area;
- limits the amount of roadwork needed on Ewingsdale Road in the short to medium term;
- provides the opportunity to consolidate accesses to properties on the southern side.

Council has determined that the roundabout should be staged. A minimum sized facility would be provided initially followed by a larger diameter roundabout as part of future upgrading of Ewingsdale Road to four lanes. A concept layout plan of the smaller roundabout design is contained in Appendix B.

10. ASSESSMENT OF TRAFFIC IMPACTS

10.1 Impact on the Road Network

A significant proportion of the traffic that would be generated by the development for normal day-to-day activities is already using Ewingsdale Road because the proposed activities are already taking place within Byron Bay. Traffic flow to/from the west on Ewingsdale Road will not change much because it already passes the site. Traffic volumes to and from the east will increase because existing users of the facilities in Town would now need to use Ewingsdale Road.

It is estimated that the following volumes would be added to two way weekday peak hour flows in Ewingsdale Road;

West of site	10 vehicles per hour (vph) in am peak hour and 100 vph in pm peak hour.
East of site	10 vph in am peak hour and 200 vph in pm peak hour

10.2 Road Capacity

Ewingsdale Road is currently a two-lane rural road. It has limited capacity and delays are experienced at intersections.

Volumes west of Bayshore Drive in 2006 were 16,000 (Level of Service (LOS) 'D').

Projected volumes indicate that Ewingsdale Road as a two lane road will reach (LOS 'F') by year 2022.

LOS 'A' indicates free flow of traffic with a high degree of freedom for choosing travel speed and ease of manoeuvring.

LOS 'F' indicates forced flow of traffic and that the road is over capacity (more cars arriving than can be serviced by the available traffic lanes) resulting in congestion and intolerable queuing.

It is clear that Ewingsdale Road needs to be upgraded to cater for the movement of people and goods to and from Byron Bay. It is understood that the recent route development study for Ewingsdale Road has recommended that is should become a limited access four lane divided road for its full length, constructed in stages as funding becomes available.

The proposed roundabout at the Sporting Complex has been designed to fit in with that scenario.

10.3 Intersection Capacity

Intersection capacity can best be assessed by using a formal intersection analysis model. In this case traffic modelling has been carried out using the aaSIDRA Version 3.2 model to quantify the performance of the proposed roundabout.

Ewingsdale Road / Roundabout to the Sporting Complex

Predicted traffic generated by the Sporting Complex during normal times of operation has been added to existing traffic passing the site.

A new roundabout intersection has been modelled for years 2016 and 2026 and the following results obtained. Refer to Table 11.

Modelling shows that a roundabout would function satisfactorily for normal day-to-day activities up to and beyond year 2026.

It is possible that special events may require a Traffic Control Plan, depending upon the size and timing of the event.

It is also shown that the following facilities improve intersection performance;

- Left turn slip lanes have been incorporated into the intersection design to provide a smooth entry and exit for cars and buses.
- A left turn slip lane for exiting traffic should be provided onto Ewingsdale Road for use by buses and by cars exiting the site travelling east.
- A left turn slip lane for exiting traffic should be provided off Ewingsdale Road for use by vehicles entering the site from the west.
- The roundabout needs two lanes for at least 60m in both approaches of Ewingsdale Road for vehicle storage and turning.

Table 11 - Summary of Intersection Modelling Results

Period	D/S	Average Delay (sec) Intersection	Highest Average Delay (Seconds) Movement	Level of Service	95% back of Queue
Two lane Roundabout at New intersection for Sporting Complex					
2006 am	0.36	6.4	14.0 RT from South	A	19m LT, Thru, RT from West
2006 pm	0.43	7.7	17.5 RT from South	A	26m LT, Thru from East
2016 am	0.52	6.3	14.6 RT from South	A	34m LT, Thru, RT from West
2016 pm	0.53	7.7	19.2 RT from South	A	36m LT, Thru from East
2026 am	0.63	6.3	15.4 RT from South	A	48m LT, Thru, RT from West
2026 pm	0.67	7.9	22.2 RT from South	A	57m LT, Thru, RT from East
Small Roundabout at New intersection for Sporting Complex					
2012 am Weekday	0.64	9.1	17.0 RT from Sports Centre	A	67m Thru from West
2012 pm Weekday	0.83	9.8	16.0 RT from East	A	10m Thru from East
2012 am Saturday	0.50	9.6	15.3 RT from East	A	40m RT from East
2012 pm Saturday	0.40	8.4	16.3 RT from East	A	26m Thru from East

Ewingsdale Road / Bayshore Drive

Traffic has been projected by 3.33% pa linear growth on all legs of the intersection to reflect conditions in year 2016 and 2026, to show the performance at those years without the Sporting Complex. Modelling shows that a roundabout would be required between year 2010 and 2016.

Modelling also shows that traffic generated by the sporting complex will not adversely affect the operation of a roundabout at this site.

10.4 Traffic management for Special Events

The amount of traffic generated by the site will depend upon the amount of parking permitted along with the size, nature and timing of events. Traffic management for special events is addressed in Section 8 of this report – Parking.

10.5 Cyclists

Provision has been made for bicycles by way of a 2.5m wide sealed shoulder on the southern side of Ewingsdale Road as part of the road widening. On the northern side, the existing cycleway would be extended to the site access.

The roundabout design incorporates a pedestrian refuge in Ewingsdale Road that can be used by cyclists to cross.

The opportunity exists to increase bicycle usage into Town as part of a Park and Ride scheme.

10.6 Pedestrians

There is little residential development in close proximity to the site. Accordingly, almost all pedestrians would arrive and leave the site by motor car or bus or bicycle.

There may be some pedestrian demand across Ewingsdale Road from the development of the future Island Quarry complex that will attract visitor traffic. The pedestrian refuge proposed on Ewingsdale Road would safely cater for that pedestrian movement.

10.7 Public Transport

Two bus companies, Kirklands and Blanchs, provide route services in the Shire plus school services. The design of the roundabout would include provision for buses to set down and pick up in both directions on Ewingsdale Road.

Provision has been made internally for bus parking (10 buses) and circulation.

11. ROAD SAFETY

The proposed redevelopment will not have any unusual safety impacts other than those that would be normally experienced at any sporting complex of this nature.

A pedestrian and cycle refuge is proposed adjacent to the proposed roundabout to assist these road users cross Ewingsdale Road.

The roundabout proposal will be designed to ultimately form a cross intersection thereby creating the opportunity for properties on the southern side to gain safer access to Ewingsdale Road.

Major events have the potential to cause traffic congestion. The limited supply of parking could cause queuing from the entry onto Ewingsdale Road if the parking demand is not properly managed. Likewise, overflow parking could occur on Ewingsdale Road which has narrow shoulders unsuitable for parking and use by pedestrians walking to the site.

Access During Construction

The volume, speed and nature of traffic on Ewingsdale Road will make it difficult for construction traffic to enter and leave the site directly onto Ewingsdale Road. It would be hazardous for turning traffic on Ewingsdale Road especially for the right turn into the site where vehicles would be exposed to rear-end accidents. Congestion may also result from vehicles queuing behind turning traffic.

If Council wants to delay the construction of the Ewingsdale Road access then construction traffic for the sporting complex should gain access via Bayshore Drive. Otherwise the roundabout should be installed prior to any significant degree of construction activity.

12. INTERNAL ACCESS ARRANGEMENTS

Site constraints means that the entry onto Ewingsdale Road is located very close to the internal parking areas. There is little room for queuing. Turning templates have been applied to the internal design layout and the roundabout entry to ensure that the geometry is suitable for buses.

The internal layout is such that drivers should experience little difficulty accessing parking spaces.

Layout plans are contained in Appendix A.

13. ESTIMATES OF COST

The accuracy of these cost estimates is ± 30%, as this is the 'Strategic' stage of development. The estimate of cost for a minimum treatment roundabout is $750,000 as shown in the following table. An allowance for planning and design has been made as well as 20 % contingency cost on roadwork.

Table 12 – Estimate of cost

EWINGSDALE RD, BYRON BAY SPORTS COMPLEX - ESTIMATE
ROUNDABOUT DESIGN - Minimum Treatment

Location	Description	Quantity	Units	Rate	Total
EWINGSDALE ROAD					
New area of pavement north side of Ewingsdale Rd	Inc linemarking, signposting & minor drainage works	1535	m2	200	$307,000
New area of pavement south side of Ewingsdale Rd	Inc linemarking, signposting & minor drainage works	270	m2	200	$54,000
Kerb & concrete	medians, roundabout & outside kerb	1	Item	30000	$30,000
Asphalt correction course	Correction course	1	Item	50000	$50,000
Traffic control	Based on 8 weeks construction	1	Item	50000	$50,000
Lighting	Intersection lighting	1	Item	70000	$70,000
Contingencies	20% of above items	1	Item	20%	$88,200
DESIGN					
Design Cost	Planning, survey & design	1	Item	80000	$80,000
	Supervision of construction	1	Item	25000	$25,000
	TOTAL				**$754,200**

The construction of a larger roundabout to provide a gateway treatment on a dual carriageway road would be approximately twice the cost of a minimum treatment facility ($1.5m). This estimate is based on an estimation of additional road pavement area and the application of a unit rate per m². It has also been compared with other recently-constructed sites.

14. CONSULTATION

Byron Sports Council

A meeting was held in Council Offices with Sports Council representatives Paul Erwin and Laurie Jackson. Valuable background information was discussed along with explanations of the proposed concept. Access options were also discussed at this meeting and during follow up telephone conversations with Paul Erwin.

The layout plan for the site was provided by David Challis from Ostamore Pty Ltd, Drafting and Design Service, Byron Bay.

Byron Council

An on-site meeting was held with Council Engineers to discuss access options and obtain background information.

Council Engineers were present at the meeting with Byron Sports Council. Several discussions were held after that meeting to clarify issues arising.

Roads and Traffic Authority

The RTA has been consulted in relation to this development including intersection options and access arrangements.

The issues, analysis and draft findings of this report were discussed with the Roads and Traffic Authority Northern Regional Office.

The proposed access arrangement (roundabout) is compatible with the feedback received.

15. CONCLUSIONS

Safe and efficient access to the proposed Sporting Complex can be effectively achieved providing that the timing and nature of possible activities are satisfactorily managed. Two main access options have been considered by Council: 1) from Ewingsdale Road via Bayshore Drive, Centennial Circuit and the Industrial Estate; and 2) a new intersection on Ewingsdale Road opposite Island Quarry.

Council has decided that an access directly onto Ewingsdale Road would best suit Council's objectives and not adversely impact on the Industrial Estate. A new roundabout at this location provides the opportunity to consolidate accesses on Ewingsdale Road i.e., Sporting Complex, Island Quarry and Sunnybrand Chickens and to create a 'Gateway' treatment.

Council determined that the development should be staged with minimal cost of roadwork in the first stage.

Modelling shows that a roundabout would function satisfactorily at this intersection up to year 2026 and beyond for normal Sporting Complex activities, including night time concerts. This assessment is based on the information provided by the Byron Sports Council relating to the normal activities proposed and the assumption that that Ewingsdale Road will be widened in the proximity of the site to accommodate turning and merging traffic.

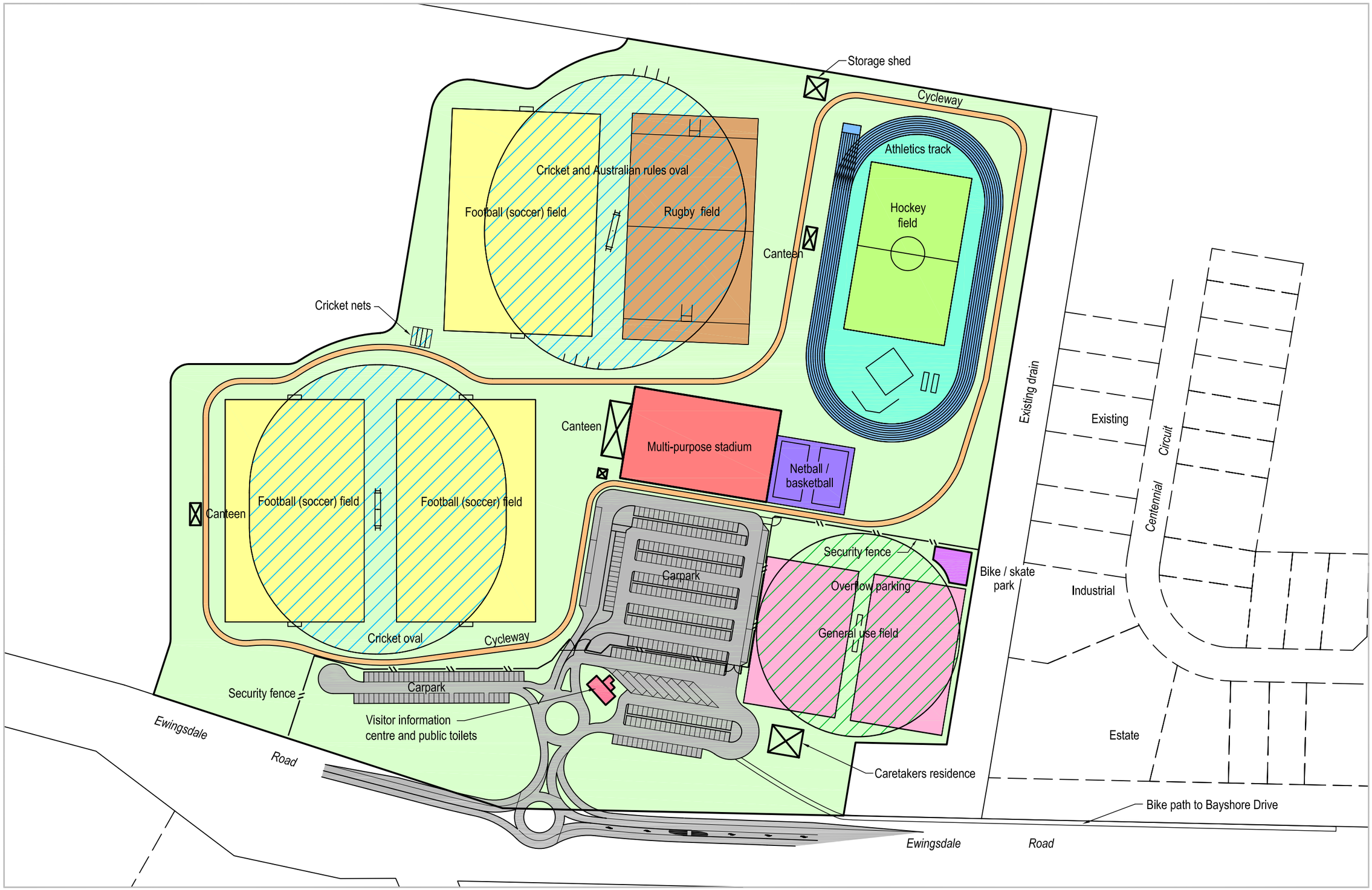
Ewingsdale Road does not have the capacity now or when widened to four lanes to accommodate traffic volumes associated with Major Social Events (Blues Festival and Splendour in the Grass) if parking is permitted on site. The limited amount of on-site parking and the short queuing distances would create serious congestion for events with greater than 1500 people. The movement of people to and from such events should be by public transport.

In order for the Park and Ride concept to be feasible additional parking is needed on-site on the general purpose fields. Approximately 250 spaces could be set aside for this purpose.

Access and parking arrangements for Major Social or Sporting Events should be subject to a separate approval whereby a specific Traffic Control Plan would be required.

APPENDIX A

SPORTING COMPLEX LAYOUT PLAN



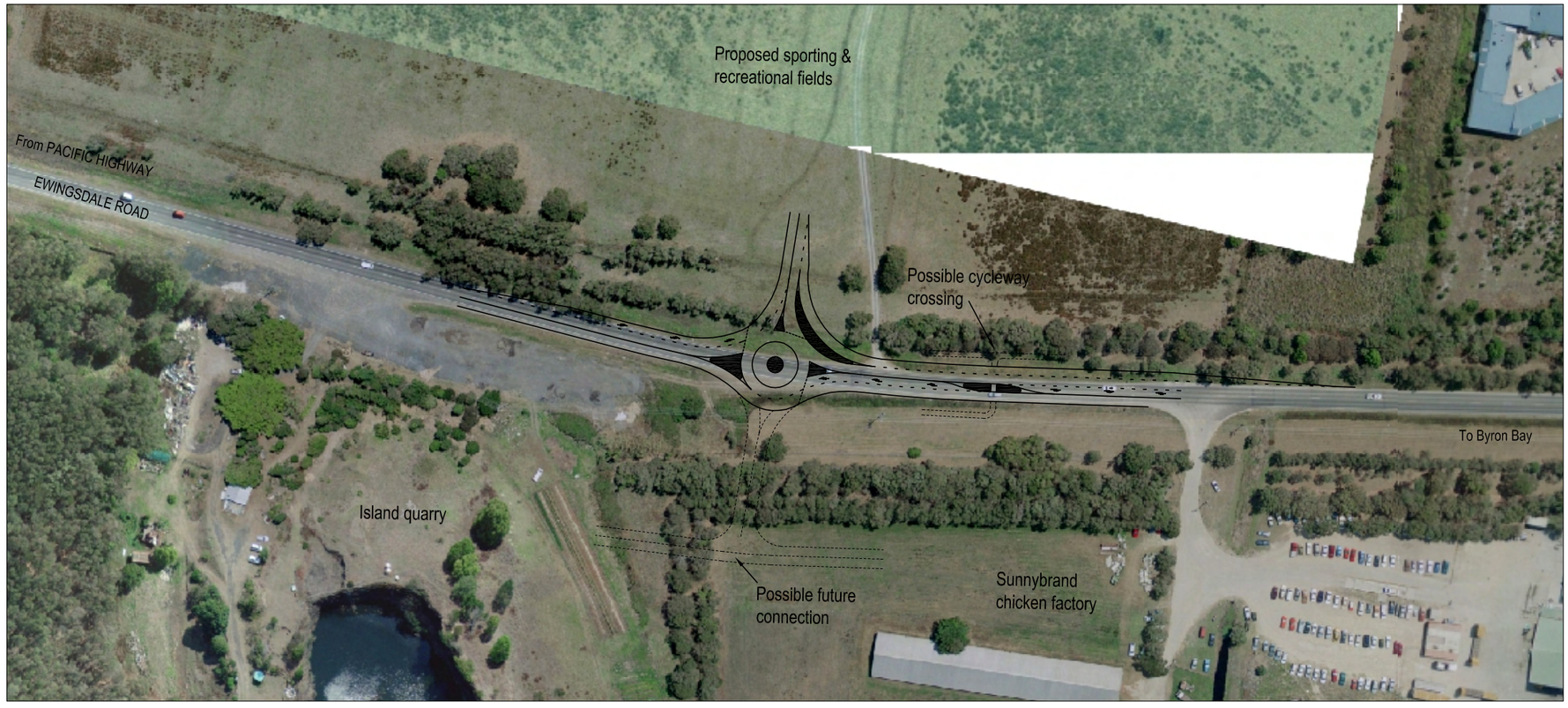
GeoLINK
environmental management and design

Byron Regional Sport and Cultural Complex

Proposed Layout

APPENDIX B

INTERSECTION LAYOUT PLAN



NOTES:

1. Pavement will be asphalt. Concrete pavement is recommended for ultimate roundabout design.
2. Existing right turn bay into Sunnybrand Chicken factory is reduced due to lower approach speed from roundabout.
3. Minimal landscaping opportunity in roundabout
4. Outside radius of roundabout is minimum 17.0m with mountable central island.

CONCEPT DESIGN - ROUNDABOUT

No.	AMENDMENT DETAIL	AUTH.	DATE

SCALES

0 10 20 40 60 80 100

SCALE 1:1000 HORIZONTAL (A1)

COMPUTER FILE REF: 07983-CD-DP-001.dwg

GRID: N/A DATUM: N/A

RoadNet *Pty Ltd* ABN 89 070 034 347
PO Box 1381
Suite 2/8 Sixth Ave,
Palm Beach QLD 4221.
Ph: 07 5525 7377 Fax: 07 5525 7388
E-Mail: gold.coast@roadnet.net.au

DESIGNED: Scotty McKay

CHECKED: Bob Franklin

ROADNET PTY LTD

EWINGSDALE ROAD
BYRON SHIRE COUNCIL
ACCESS TO PROPOSED COMMUNITY SPORTING COMPLEX
AND SURROUNDING DEVELOPMENTS

FILE No.	ISSUE	SHEET No.
07983	A	
CREATED 19/9/07		

REG. No. 07983-CD-001

APPENDIX C

SCHEDULE OF ACTIVITIES AND EVENTS

EWINGSDALE SPORTS FIELDS

INDICATIVE USE PATTERNS

Following is an outline of the indicative use patterns and likely attendances for those using the proposed facilities at Ewingsdale. They are listed by sport and event type.

ACTIVITY	TIME OF YEAR	DAYS USED	TIME	ATTENDANCE	COMMENT
SOCCER					
Training – Juniors	Feb – Sept	Tues/Wed/Thurs	3.30 – 6.00pm	150 kids/100 adults	
Training – Seniors	Feb – September	Tues/Wed/Thurs	6.00 – 9.00pm	100 adults	
Competition Juniors	March – September	Saturday	9.00am – 12 noon	10 teams per hour = 150 kids & 100 adults	Note:after first game starts people arrive for second & third game. Max at one time – 600
Competition Seniors	March – September	Saturday	12noon – 5.00pm	6 teams – 3 games 30 players per game 200 spectators – max 300 over three games	As above – max at one time - 300
Competition Seniors	March – September	Sunday	12noon – 5.00pm	As above	As above
Competition Ladies Over 30	April – September	Wed/Thurs &/or Fri	6.00 – 9.00pm	4 teams – 2 games 150 – 200 total 100 at any one time	

ACTIVITY	TIME OF YEAR	DAYS USED	TIME	ATTENDANCE	COMMENTS
SOCCER Cont'd					
Junior Regional Comp Say – 3 per season	March – July	Sunday	9.00am – 4.00pm	20 teams 300 players 200 spectators	Round Robin 500 stay most of the day
Final Series	September	Saturdays	12noon – 5.00pm	3 games 90 players 400 spectators	Movement between games. Max at one time 320 people
RUGBY UNION					
Training	March – September	Tues and Thursday	6.00 – 8.00pm	50 max	
Competition seniors	March – September	Saturday	2.00 – 5.00pm	1 or 2 games 400 total	
Rugby Sevens	2nd weekend October	Sat/Sun	9.00am – 6.00pm	50 teams of 10 1,000 spectators 8 – 10 games simultaneously	Annual international competition
HOCKEY					
Training	March – September	Wed/Thurs	4.00 – 5.30pm 5.30 – 7.00pm	50 juniors/25 parents 50 seniors	
Competition	March – September	Saturdays	9.00am – 12noon	3 games – 6 teams 90 players/90 spectators	Some movement between games Max 100

ACTIVITY	TIME OF YEAR	DAYS USED	TIME	ATTENDANCE	COMMENT
Hockey Cont'd					
Competition	March – September	Saturdays	12noon – 5.oopm	3 games – 6 teams 90 Players/90 Spectators	As above
Regional Carnival(2)	May & June	Sunday	9.00am – 5.00pm	Round Robin – 2 games simultaneously. 300 players 500 spectators	
FRISBEE					
Training/comp	All year	Mondays	7.00 – 9.00pm	50 players	
Carnival	November	Sunday	9.00am – 5.00pm	400 people – all day	
TOUCH FOOTBALL					
Carnival	November	Sunday	9.00am – 5.00pm	600 people – all day	
LITTLE ATHLETICS					
Competition	October – Feb	Saturday	9.00am – 12 noon	300 competitors 150 adults 50 officials	
Regional Carnival	November or Jan	Saturday	9.00am – 5.00pm	1400 competitors 600 adults 60 officials	Est. 500 cars 12-15 buses

ACTIVITY	TIME OF YEAR	DAYS USED	TIME	ATTENDANCE	COMMENT
SCHOOL SPORT					
4 Carnivals for Local schools	??	weekdays	8.30am – 3.30pm	1000 students per event 100 teachers per events 200 spectators per events	
2 Inter-School Carnivals Regional Schools – Multi Sport		weekdays	8.30am – 3.30pm	2,000 students 120 teachers 400 spectators	
AUSTRALIAN RULES FOOTBALL					
Training - Juniors	March – September	1 night?	4.00 – 6.00pm	40 kids/40 adults	
Training – Seniors	March – September	1 night?	6.00 – 8.00pm	40 players/20 spectators	
Competition – Jnrs	March – September	Sundays	9.00am – 12 noon	6 Teams x 20 players 3 Games 150 spectators	
Competition – Snrs	March – September	Sundays	1.00 – 5.00pm	4 teams x 20 players 2 games 150 spectators	
Carnival – 1 day	July	Sunday	9.00am – 5.00pm	10 teams x 20 300 – 500 Spectators	
CRICKET					
Training	October – March	Tues and Thursday	4.00 – 6.30pm	60 people	
Competition - Jnrs	October – March	Saturdays	9.00 – 12noon	150 Juniors/spectators	
Competition – Snrs	October – March	Saturdays	12noon – 6.00pm	150 players/spectator	

ACTIVITY	TIME OF YEAR	DAYS USED	TIME	ATTENDANCE	COMMENT
SPORTS HALL (3 Courts)					
General Sports use	All year	3 nights per week initially Will take time to build up The various sports and their Respective numbers	4.00pm – 10.00pm	130 people per hour 50 players/officials 60 spectators 780 per night	This facility will become a 7 day per week operation once the operators Generate interest
Basketball Tournament	2 per year	Saturday and Sunday	9.00am – 7.00pm	20 teams 200 competitors 500 spectators	Three games at once – all day
Netball Tournament	2 per year	Saturday and Sunday	9.00am – 7.00pm	20 teams 200 competitors 500 spectators	as for Basketball
CONCERTS/NON SPORT					
Blues Festival	Easter	Fri/Sat/Sun/Mon	12noon – 12 Midnight	20,000 per day	2 week build up 1 week dismantle
Music Festival	October L/W	Saturday and Sunday	12noon – 12 midnight	20,000per day	1 week build up 1 week dismantle
Indoor concerts	3 per year	Saturday	7.00pm – 12midnight	4,000 per concert	
Outdoor Concerts	3 per year	Saturday or Sunday	6.00 (Gates open) – 11.00pm	5,000 per concert	
Dinners/Exhibitions Art Shows etc	4 per year	???? probably W/Ends	9.00am – 11.00pm	1,000 per event	

APPENDIX D

TRAFFIC MODEL

APPENDIX E

TRAFFIC COUNTS

Two Way Volumes

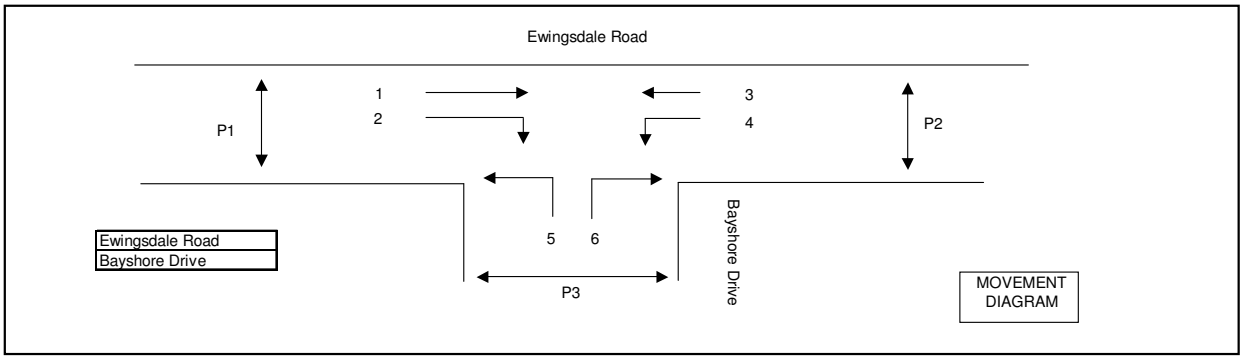
2006 Counts	Ewingsdale Road at Island Quarry		
Time	Thursday	Saturday	Sunday
0	61	108	115
1	32	63	71
2	42	52	69
3	56	47	65
4	47	54	55
5	130	81	81
6	419	195	143
7	843	372	265
8	1299	651	457
9	1206	857	705
10	1087	979	907
11	1029	1087	942
12	1099	1051	953
13	1024	1025	899
14	1135	943	918
15	1291	925	947
16	1268	885	882
17	1168	800	714
18	608	589	473
19	371	394	308
20	310	307	261
21	273	286	208
22	186	280	123
23	101	180	83
Total	15085	12211	10644

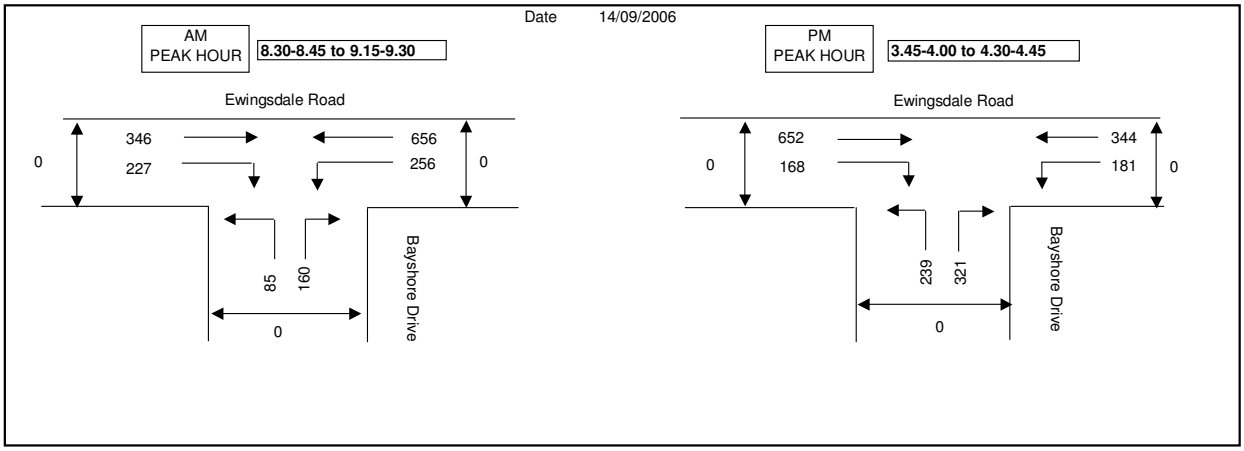
Vehicle Classification at Island Quarry		
	% of total traffic	Description
Class 1	94.08%	Car
Class 2	1.24%	Car and trailer
Class 3	2.95%	Light Commercial Vehicles - 3.77%
Class 4	0.73%	
Class 5	0.09%	
Class 6	0.09%	Heavy Commercial Vehicles - 0.91%
Class 7	0.07%	
Class 8	0.13%	
Class 9	0.53%	
Class 10	0.05%	
Class 11	0.03%	
Class 12	0.00%	

Location Ewingsdale Road Street 2 Bayshore Drive Town Ewingsdale, Byron Bay
Date 14/09/2006 Day Thursday

Time	1	H	2	H	3	H	4	H	5	H	6	H	1/4h totals	Hrly Total	P1	P2	P3	1/4h totals
8.00-8.15	65	1	50	0	95	0	68	2	24	0	33	0	338	Incl. Hvy	0	0	0	0
8.15-8.30	74	1	49	0	140	1	60	1	21	0	36	2	385		0	0	0	0
8.30-8.45	68	4	50	0	167	1	78	1	4	1	42	0	416		0	0	0	0
8.45-9.00	92	0	56	0	148	1	64	0	28	0	33	0	422	1561	0	0	0	0
9.00-9.15	96	2	59	0	179	2	50	0	29	0	38	1	456	1679	0	0	0	0
9.15-9.30	83	1	62	0	157	1	63	0	23	0	45	1	436	1730	0	0	0	0
9.30-9.45	63	2	41	0	131	0	72	0	49	0	44	0	402	1716	0	0	0	0
9.45-10.00	80	3	43	4	117	3	65	3	39	2	40	2	401	1695	0	0	0	0
10.00-10.15	0	0	0	0	0	0	0	0	0	0	0	0	0	1239	0	0	0	0
10.15-10.30	0	0	0	0	0	0	0	0	0	0	0	0	0	803	0	0	0	0
10.30-10.45	0	0	0	0	0	0	0	0	0	0	0	0	0	401	0	0	0	0
10.45-11.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	621	14	410	4	1134	9	520	7	217	3	311	6	Max Hr	1730	0	0	0	0
	Overall peak hour:						**8.30-8.45 to 9.15-9.30**							**3**				
Peak total	339	7	227	0	651	5	255	1	84	1	158	2	1728		0	0	0	0
Light+HV	346		227		656		256		85		160							

Time	1	H	2	H	3	H	4	H	5	H	6	H	1/4h totals	Hrly Total	P1	P2	P3	1/4h totals
3.00-3.15	131	7	52	1	68	2	50	5	58	2	54	0	430	Incl. Hvy	0	0	0	0
3.15-3.30	130	8	32	0	72	3	37	4	0	0	63	1	350		0	0	0	0
3.30-3.45	141	4	40	3	75	2	30	5	41	1	59	3	401		0	0	0	0
3.45-4.00	150	7	39	1	81	4	54	3	56	3	62	1	460	1641	0	0	0	0
4.00-4.15	158	5	42	2	80	4	41	1	61	2	99	2	495	1706	0	0	0	0
4.15-4.30	160	5	50	1	82	5	36	0	59	0	73	3	471	1827	0	0	0	0
4.30-4.45	160	7	30	3	83	5	41	5	57	1	80	1	472	1898	0	0	0	0
4.45-5.00	151	2	32	3	78	1	38	1	52	2	76	0	436	1874	0	0	0	0
5.00-5.15	0	0	0	0	0	0	0	0	0	0	0	0	0	1379	0	0	0	0
5.15-5.30	0	0	0	0	0	0	0	0	0	0	0	0	0	908	0	0	0	0
5.30-5.45	0	0	0	0	0	0	0	0	0	0	0	0	0	436	0	0	0	0
5.45-6.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	1181	45	317	14	619	26	327	24	384	11	566	11	Max Hr	1898	0	0	0	0
	Overall peak hour:						**3.45-4.00 to 4.30-4.45**							**4**				
Peak total	628	24	161	7	326	18	172	9	233	6	314	7	1898		0	0	0	0
Light+HV	652		168		344		181		239		321							

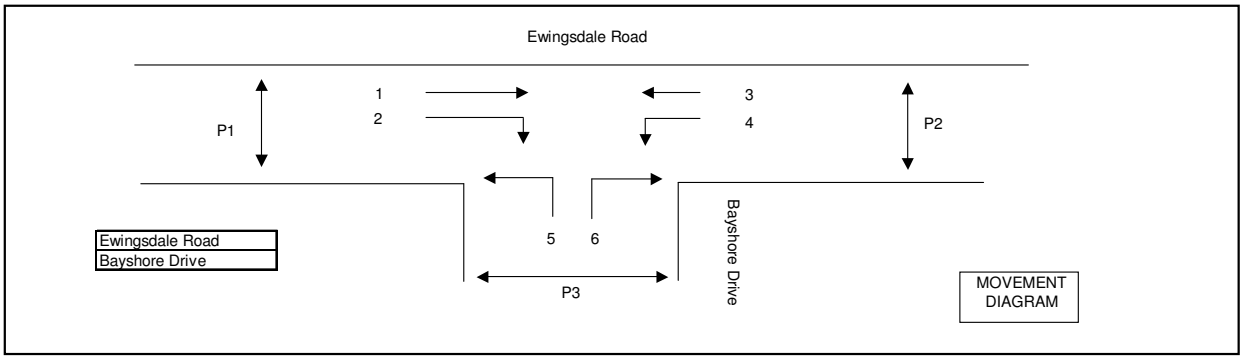


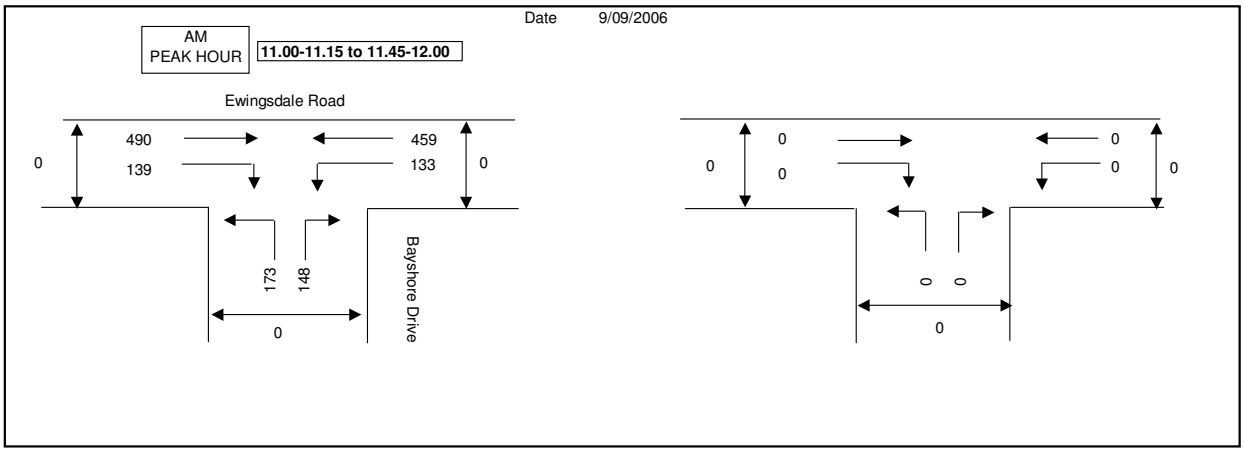


Location Ewingsdale Road Street 2 Bayshore Drive Town Ewingsdale, Byron Bay
Date 9/09/2006 Day Saturday

Time	1	H	2	H	3	H	4	H	5	H	6	H	1/4h totals	Hrly Total	P1	P2	P3	1/4h totals
10.00-10.15	0	0	0	0	0	0	0	0	0	0	0	0	0	Incl. Hvy	0	0	0	0
10.15-10.30	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0
10.30-10.45	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0
10.45-11.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11.00-11.15	117	4	33	1	112	3	32	0	50	1	29	2	384	384	0	0	0	0
11.15-11.30	112	5	23	2	117	3	33	2	42	1	27	0	367	751	0	0	0	0
11.30-11.45	122	2	42	1	114	5	37	1	39	2	42	0	407	1158	0	0	0	0
11.45-12.00	122	6	32	5	103	2	27	1	38	0	47	1	384	1542	0	0	0	0
12.00-12.15	116	3	32	1	112	2	27	0	42	0	37	2	372	1530	0	0	0	0
12.15-12.30	101	2	29	0	116	1	22	0	31	0	42	1	345	1508	0	0	0	0
12.30-12.45	108	3	33	0	109	4	20	0	25	0	34	0	336	1437	0	0	0	0
12.45-1.00	107	2	22	1	93	4	16	0	36	1	36	0	318	1371	0	0	0	0
Total	905	27	246	11	876	24	214	4	303	5	294	6	Max Hr	1542	0	0	0	0
	Overall peak hour:						**11.00-11.15 to 11.45-12.00**							**5**				
Peak total	473	17	130	9	446	13	129	4	169	4	145	3	1539		0	0	0	0
Light+HV	490		139		459		133		173		148							

Time	1	H	2	H	3	H	4	H	5	H	6	H	1/4h totals	Hrly Total	P1	P2	P3	1/4h totals
3.00-3.15	0	0	0	0	0	0	0	0	0	0	0	0	0	Incl. Hvy	0	0	0	0
3.15-3.30	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0
3.30-3.45	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0
3.45-4.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4.00-4.15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4.15-4.30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4.30-4.45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4.45-5.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5.00-5.15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5.15-5.30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5.30-5.45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5.45-6.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	Max Hr	0	0	0	0	0
	Overall peak hour:						**3.00-3.15 to 3.45-4.00**							**1**				
Peak total	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0
Light+HV	0		0		0		0		0		0							

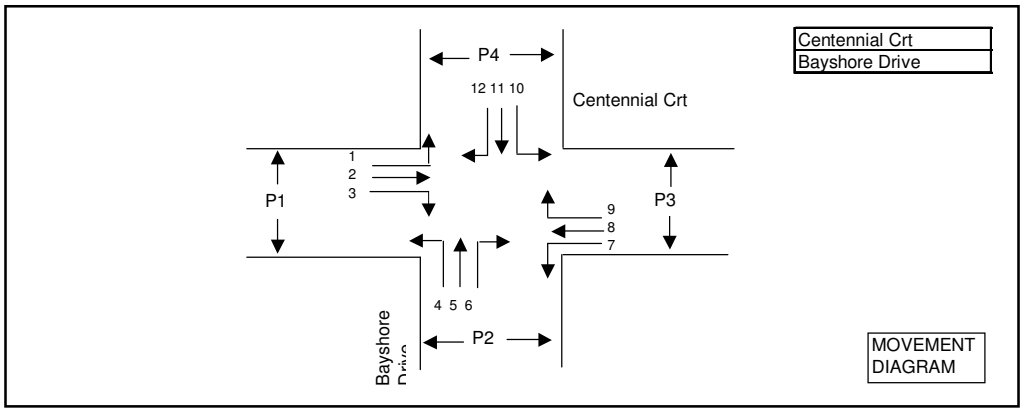


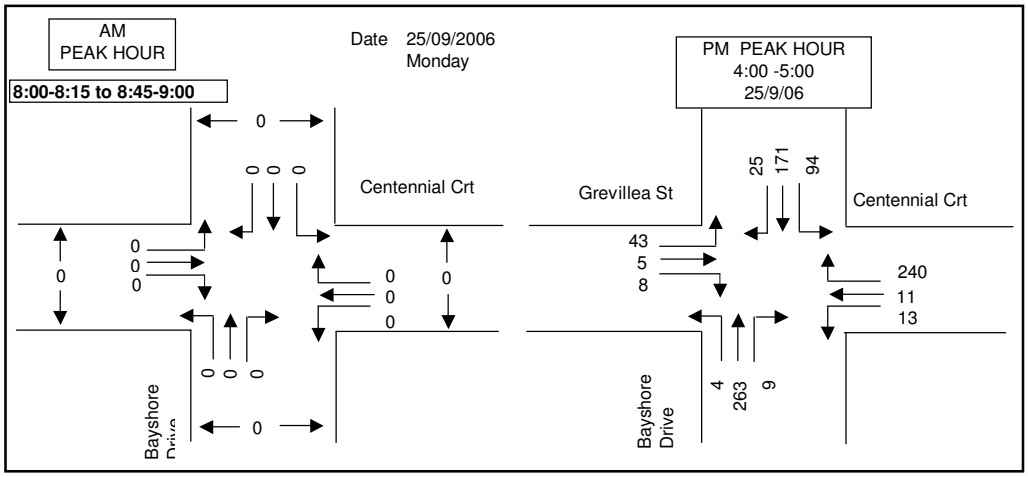


Location Centennial Cr Bayshore Drive Byron Bay
Date 25/09/2006 Monday

Time	1	2	3	4	5	6	7	8	9	10	11	12	1/4h totals	Hourly	P1	P2	P3	P4	1/4h totals
8:00-8:15	0	0	0	0	0	0	0	0	0	0	0	0	0	Totals	0	0	0	0	0
8:15-8:30	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0
8:30-8:45	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0
8:45-9:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:00-9:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:15-9:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:30-9:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:45-10:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00-10:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:15-10:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:30-10:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:45-11:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	Max Hr	0	0	0	0	0	
	Peak hour:			**8:00-8:15 to 8:45-9:00**					**Peak Hr begins in quarter hour No:**					**1**					
Peak total	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0

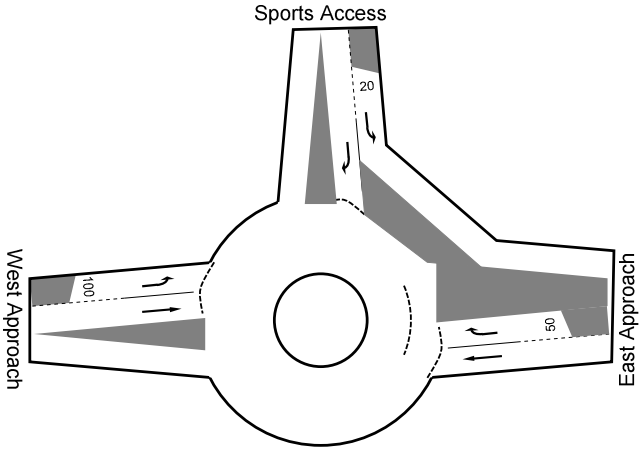
Time	1	2	3	4	5	6	7	8	9	10	11	12	1/4h totals	Hourly	P1	P2	P3	P4	1/4h totals
3:00-3:15	0	0	0	0	0	0	0	0	0	0	0	0	0	Totals	0	0	0	0	0
3:15-3:30	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0
3:30-3:45	7	1	4	3	47	3	4	4	39	37	33	8	190		0	0	0	0	0
3:45-4:00	7	1	1	3	45	2	2	3	33	29	38	5	169	359	0	0	0	0	0
4:00-4:15	10	1	1	0	90	4	0	0	90	23	40	8	267	626	0	0	0	0	0
4:15-4:30	10	2	0	2	59	2	2	1	50	25	58	6	217	843	0	0	0	0	0
4:30-4:45	14	2	5	2	57	1	3	5	57	29	45	6	226	879	0	0	0	0	0
4:45-5:00	9	0	2	0	57	2	8	5	43	17	28	5	176	886	0	0	0	0	0
5:00-5:15	0	0	0	0	0	0	0	0	0	0	0	0	0	619	0	0	0	0	0
5:15-5:30	0	0	0	0	0	0	0	0	0	0	0	0	0	402	0	0	0	0	0
5:30-5:45	0	0	0	0	0	0	0	0	0	0	0	0	0	176	0	0	0	0	0
5:45-6:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	57	7	13	10	355	14	19	18	312	160	242	38	Max Hr	886	0	0	0	0	
	Peak hour:			**4:00-4:15 to 4:45-5:00**					**Peak Hr begins in quarter hour No:**					**5**					
Peak total	43	5	8	4	263	9	13	11	240	94	171	25	886		0	0	0	0	0





APPENDIX F

INTERSECTION MODELLING RESULTS



Ewingsdale Rd / Sports Access

Roundabout Weekday am 2012 Stage 3

Roundabout

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
East Approach										
5	T	579	5.0	0.325	8.3	LOS A	24	0.05	0.53	62.8
6	R	4	0.0	0.005	14.7	LOS B	0	0.05	0.74	54.6
Approach		**583**	**5.0**	**0.325**	**8.4**	**LOS A**	**24**	**0.05**	**0.53**	**62.8**
Sports Access										
7	L	4	0.0	0.002	0.8	LOS A#	0#	0.00	0.11	36.9
9	R	4	0.0	0.008	16.9	LOS B	0	0.90	0.64	18.0
Approach		**8**	**0.0**	**0.008**	**8.8**	**LOS A**	**0**	**0.45**	**0.37**	**22.5**
West Approach										
10	L	4	0.0	0.004	10.5	LOS B	0	0.05	0.70	59.2
11	T	1155	5.0	0.641	9.4	LOS A	67	0.08	0.57	61.0
Approach		**1159**	**5.0**	**0.641**	**9.4**	**LOS A**	**67**	**0.08**	**0.57**	**61.0**
All Vehicles		**1750**	**5.0**	**0.641**	**9.1**	**LOS A**	**67**	**0.07**	**0.56**	**61.5**

Ewingsdale Rd / Sports Access

Roundabout Weekday pm 2012 Stage 3

Roundabout

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
East Approach										
5	T	1174	5.0	0.830	10.4	LOS B	110	0.83	0.62	55.6
6	R	89	0.0	0.112	15.9	LOS B	5	0.39	0.70	52.9
Approach		**1263**	**4.7**	**0.830**	**10.8**	**LOS B**	**110**	**0.80**	**0.62**	**55.4**
Sports Access										
7	L	158	0.0	0.085	0.8	LOS A#	4#	0.00	0.11	36.9
9	R	158	0.0	0.182	9.7	LOS A	11	0.73	0.73	23.6
Approach		**316**	**0.0**	**0.182**	**5.2**	**LOS A**	**11**	**0.37**	**0.42**	**27.4**
West Approach										
10	L	89	0.0	0.097	11.4	LOS B	5	0.32	0.65	57.7
11	T	595	5.0	0.395	10.0	LOS A	30	0.35	0.56	58.6
Approach		**684**	**4.4**	**0.395**	**10.1**	**LOS B**	**30**	**0.34**	**0.57**	**58.5**
All Vehicles		**2263**	**3.9**	**0.830**	**9.8**	**LOS A**	**110**	**0.60**	**0.58**	**54.8**

Ewingsdale Rd / Sports Access

Roundabout Sat pm 2012 Stage 3

Roundabout

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
East Approach										
5	T	507	4.9	0.396	9.5	LOS A	26	0.52	0.61	58.3
6	R	40	0.0	0.051	16.3	LOS B	2	0.44	0.70	52.7
Approach		**547**	**4.6**	**0.397**	**10.0**	**LOS B**	**26**	**0.51**	**0.61**	**57.8**
Sports Access										
7	L	226	0.0	0.122	0.8	LOS A#	6#	0.00	0.11	36.9
9	R	226	0.0	0.236	9.1	LOS A	14	0.69	0.71	24.1
Approach		**452**	**0.0**	**0.236**	**4.9**	**LOS A**	**14**	**0.34**	**0.41**	**27.9**
West Approach										
10	L	40	0.0	0.044	10.9	LOS B	2	0.20	0.65	58.3
11	T	507	4.9	0.313	9.6	LOS A	22	0.21	0.55	59.8
Approach		**547**	**4.6**	**0.313**	**9.7**	**LOS A**	**22**	**0.21**	**0.56**	**59.7**
All Vehicles		**1546**	**3.2**	**0.396**	**8.4**	**LOS A**	**26**	**0.35**	**0.53**	**54.5**

Ewingsdale Rd / Sports Access

Roundabout Sat am 2012 Stage 3

Roundabout

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
East Approach										
5	T	758	5.0	0.498	8.8	LOS A	40	0.36	0.52	59.7
6	R	116	0.0	0.144	15.3	LOS B	6	0.29	0.69	53.4
Approach		**874**	**4.3**	**0.498**	**9.7**	**LOS A**	**40**	**0.35**	**0.54**	**58.8**
Sports Access										
7	L	84	0.0	0.045	0.8	LOS A#	2#	0.00	0.11	36.9
9	R	84	0.0	0.103	9.9	LOS A	6	0.74	0.71	23.4
Approach		**168**	**0.0**	**0.103**	**5.3**	**LOS A**	**6**	**0.37**	**0.41**	**27.3**
West Approach										
10	L	116	0.0	0.130	11.7	LOS B	7	0.37	0.66	57.4
11	T	648	4.9	0.443	10.2	LOS B	34	0.41	0.57	58.1
Approach		**764**	**4.2**	**0.442**	**10.4**	**LOS B**	**34**	**0.40**	**0.59**	**58.0**
All Vehicles		**1806**	**3.9**	**0.498**	**9.6**	**LOS A**	**40**	**0.38**	**0.55**	**57.2**

Appendix E

Acid Sulfate Soils Investigation

Acid Sulfate Soil Investigation

For

Proposed Byron Bay Community Recreation Centre
Ewingsdale Road, Byron Bay

Prepared for: **Geolink**

Prepared by: **Australian Soil and Concrete Testing P/L**
7/17 Southern Cross Drive, Ballina, NSW, 2478

A.B.N. **49 050 539 930**

Email: asct@bigpond.com.

Reference: **031 - 057**

Date: **13th February, 2008**

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1. Introduction

Australian Soil and Concrete Testing Pty Ltd (ASCT) have undertaken an Acid Sulfate Soil Investigation at the proposed development site for the Byron Bay Community Recreation Centre, Ewingsdale Road, Byron Bay. The proposed development will consist of several specialised playing fields, an indoor sports facility, skate park, detention pond, landscaped areas, bitumen driveways and a carpark with approximately 319 parking spaces.

The broad aim of the Acid Sulfate Soil Investigation is to determine whether acid sulfate soil (ASS) is present at the site. If so, the extent, severity and type of ASS would also need to be determined. Furthermore, the investigation aims to determine the liming rate required to neutralise ASS should it be present on site.

2. Background

ASS typically occurs in low-lying coastal areas. Developments involving excavation or lowering of the water table may result in the oxidation of sulfur (predominately in the form of pyrite) contained within these soils and the subsequent generation of acid discharge from the soil. The resultant discharge may find its way into the groundwater or stormwater and eventually into natural aquatic environments. The acidic run-off may lower the pH of the receiving water system, increase the concentration of metals and reduce the natural buffering capacity of the receiving waters.

There are two basic types of ASS. Actual Acid Sulfate Soils (AASS) are soils where the pyrites have been oxidised and sulfuric acid is present. Potential Acid Sulfate Soils (PASS) have not been oxidised and sulfuric acid has not yet been generated.

PASS in anaerobic conditions such as below the water table do not present an environmental hazard. However, if conditions change from anaerobic to aerobic, the pyrite in PASS will oxidise to form sulfuric acid. Oxidation can occur by either lowering the water table or removing the soil from below the water table, such as excavation.

3. Scope of Work

The scope of work for the Acid Sulfate Soil Investigation included:

- Drilling of six boreholes and the drilling/installation of six groundwater monitoring piezometers across the proposed development site.
- Collection of soil samples from the boreholes and piezometers at 1.0 m and 1.5 m below the ground surface.
- Analysis of all samples for field pH (pH_f) and field peroxide pH (pH_{fox}) to provide initial indication of PASS/AASS.
- Laboratory analysis of four samples to determine % chromium reducible sulfur ($\%S_{cr}$), total actual acidity (TAA), net acidity and liming rates.
- Summary of ASS Analysis results.

4. ASS Management Principles and Guidelines

The following principles are in accordance with the ASSMAC Management Guidelines (1998) and are the fundamental strategies that underpin the management of ASS.

4.1 Avoidance

This is the soundest strategy and the proposed works should always attempt to modify work practices in order to avoid unnecessarily exposing of disturbing ASS. The proposed works should also where possible avoid activities that result in the fluctuation of the groundwater, in particular the lowering of groundwater.

4.2 Minimisation

Appropriate handling techniques and treatment of excavated soil are to be used to minimise and or prevent the disturbance of ASS. Furthermore, earthworks activities should be managed to minimise or mitigate the potential of ASS to impact on the surrounding environment.

4.3 Neutralisation

Sufficient neutralising agent should be incorporated into excavated soils in order to neutralise acid that is generated over time due to the gradual oxidation of ASS. Neutralising agent should also be applied to acidified water run-off and any remaining water 'in-situ' (within the pore spaces of the material being excavated) that has become acidified.

The management and remediation of the excavated soil for earth works will usually be achieved using a combination of the management strategies outlined above.

5. Soil Sampling

Soil Sampling was conducted in accordance with the ASSMAC guidelines (1998) and included:

- The drilling of six boreholes and six piezometers on 31st January, 2008. The borehole locations are displayed in figure 1.
- Sampling was undertaken by staff of ASCT, namely by Brian Dick (Managing Director) and Ben Hart (B. App. Sc.).
- Two soil samples were collected from each borehole at 1.0 and 1.5 m from the ground surface. Therefore, a total of 12 soil samples were collected from the site.
- The drilling was conducted with a truck mounted drill rig (Yanmar 35) using solid flight augers and the samples were collected directly from the augers. The sampling augers were washed with clean water between each sample location.
- Samples were placed in zip lock plastic bags and transferred immediately to an esky with ice for storage. Samples were stored on ice overnight before being field pH (pH_f) and field peroxide pH (pH_{fox}) tested in accordance with ASSMAC test method codes 21Af and 21Bf respectively. Furthermore, pH_{fox} testing was carried out using 30 % hydrogen peroxide adjusted to pH 5.5.
- Subsequently, four samples were selected to be tested for % chromium reducible sulfur (%S_{cr} – Method 22B), total actual acidity (TAA), net acidity and liming requirements. These samples were transferred under ASCT's chain of custody conditions to the Environmental Analysis Laboratory (EAL), Lismore for analysis. The chain of custody documentation has been included in Appendix B of this report.

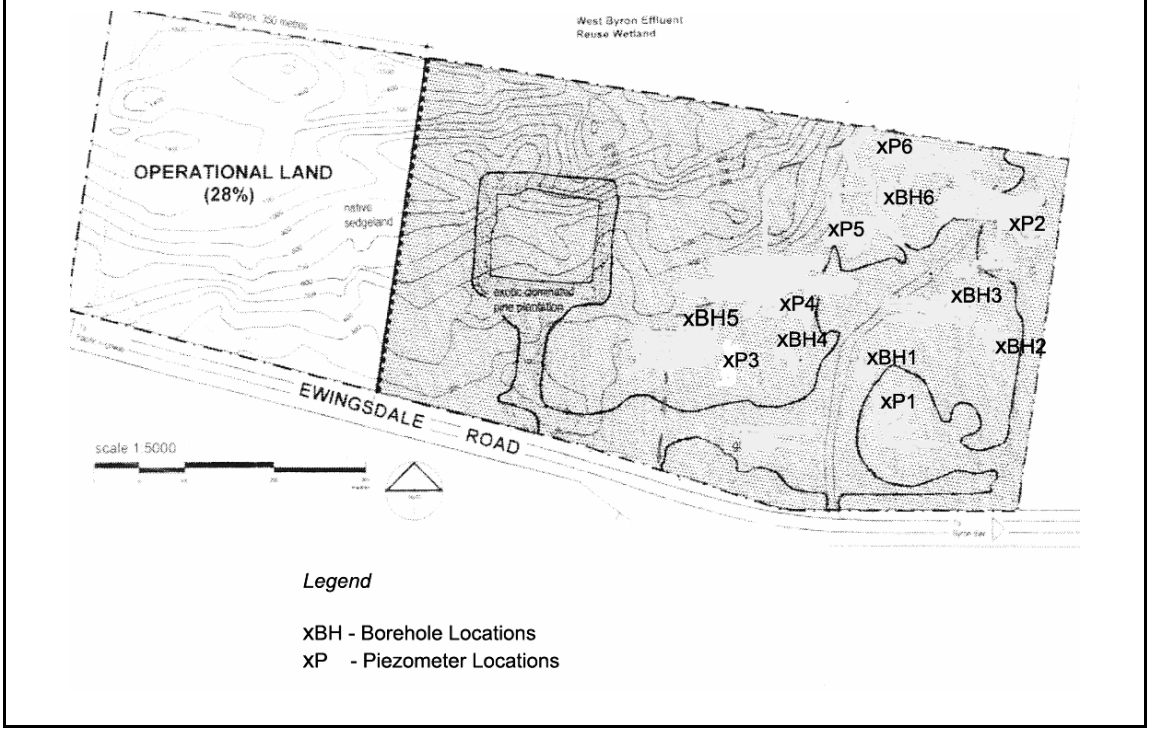


Figure 1: The borehole and piezometer locations at the proposed development site.

6. Results

6.1 Field Testing

A summary of the field testing results is displayed in table 1. The results indicate that the site contains PASS, with its distribution most noticeable in the northern and eastern areas of the proposed development site. The field results also indicate that PASS exists at both sample depths in areas indicated to contain PASS (*i.e.* 1.0 m and 1.5 m). Furthermore, the results indicate that AASS is not present at the site.

Table 1: Field testing summary.

Sample Source	Sample Depth (m)	pH_f	pH_{fox}	$pH_f - pH_{fox}$	PASS/AASS Indication*
BH1	1.0	5.05	**3.95**	**1.1**	PASS likely
"	1.5	5.35	4.42	0.93	PASS unlikely
BH2	1.0	5.47	4.93	0.54	PASS unlikely
"	1.5	4.86	**3.83**	**1.03**	PASS likely
BH3	1.0	4.85	**3.65**	**1.2**	PASS likely
"	1.5	4.89	**3.70**	**1.19**	PASS likely
BH4	1.0	4.93	4.09	0.84	PASS unlikely
"	1.5	5.08	4.34	0.74	PASS unlikely
BH5	1.0	5.01	4.49	0.52	PASS unlikely
"	1.5	5.09	4.24	0.85	PASS unlikely
BH6	1.0	5.00	4.11	0.89	PASS unlikely
"	1.5	5.07	**3.95**	**1.12**	PASS likely
Piezometer 1	1.0	4.68	**3.64**	**1.04**	PASS likely
"	1.5	4.97	4.05	0.92	PASS unlikely
Piezometer 2	1.0	4.86	**3.67**	**1.19**	PASS likely
"	1.5	4.72	**2.67**	**2.05**	PASS very likely
Piezometer 3	1.0	5.09	4.22	0.87	PASS unlikely
"	1.5	5.15	4.38	0.77	PASS unlikely
Piezometer 4	1.0	4.88	4.02	0.86	PASS unlikely
"	1.5	5.08	4.15	0.93	PASS unlikely
Piezometer 5	1.0	4.58	**3.68**	0.9	PASS likely
"	1.5	4.91	**3.77**	**1.14**	PASS likely
Piezometer 6	1.0	4.86	**3.35**	**1.51**	PASS likely
"	1.5	4.79	**3.81**	0.98	PASS likely

* Indications are based on the ASSMAC guidelines and are determined as follows:

- PASS unlikely if → $pH_f - pH_{fox} < 1.0$
- Possible PASS if → $5 < pH_{fox} > 3$, or $pH_f - pH_{fox} > 1.0$
- PASS very likely if → $pH_{fox} < 3.0$, or $pH_f - pH_{fox} > 1.5$
- AASS present if → $pH_f < 4.0$

6.2 Laboratory Results

A summary of the laboratory results is displayed in table 2 and the complete results have been included in Appendix A. The laboratory testing provides more reliable results than the field testing and the ASS classifications of the laboratory samples are based on the following:

- Non-Potential Acid Sulfate Soils (Non PASS/AASS) – Laboratory testing indicates these soils have a net acidity below the ASSMAC action criteria and are not considered to present and environmental hazard.
- Potential Acid Sulfate Soils (PASS) – Laboratory testing indicates these soils have net acidity above the ASSMAC action criteria they may generate sulfuric acid and may present an environmental hazard. Management of these soils will be required.
- Actual Acid Sulfate Soils (AASS) – Laboratory testing indicates that these soils are actual acid sulfate when total actual acidity (TAA) is $pH_{KCl} < 4.0$. These soils may leach acid and will require management.

Table 2: Summary of laboratory test results

Sample Location	Depth (m)	TAA (pH_{KCl})	% Chromium Reducible Sulfur ($\%S_{cr}$)	Net Acidity mole H^+/tonne	Action Criteria* mole H^+/tonne	Acid Sulfate Potential	Lime Rate $kgCaCo_3/m^3$
Piezo 1	1.0	4.68	<0.005	28	18	PASS	3
Piezo 2	1.5	4.32	0.026	74	18	PASS	7
Piezo 5	1.5	4.88	<0.005	33	18	PASS	3
Piezo 6	1.0	5.85	<0.005	2	18	NON PASS	0

* Action criteria taken from the ASSMAC guidelines and is based on more than1000 tonnes of soil to be disturbed.

Laboratory analysis showed that three of the four samples analysed had a net acidity above the ASSMAC action criteria. Therefore, on the basis of the laboratory testing the site can be classified as having Potential Acid Sulfate Soils. PASS was found to exist at both sample depths including 1.0 and 1.5 m. Laboratory testing also indicates there is no AASS at the site.

The laboratory analysis has determined a liming application rate (with a safety factor of 1.5) based on the results of testing. The recommended liming rates are displayed in table 2 and range from 0 – 7 kg $CaCo_3$ (lime)/m^3.

7. ASS Summary

The field testing indicates the site contains PASS and the laboratory testing shows that the soil has a net acidity above the ASSMAC action criteria. Therefore, the soil analyses together with the general site information have enabled the following conclusions to be made:

- The soils on the site can be classified Potential Acid Sulfate Soils (PASS).
- PASS was found to exist most noticeably in the northern and eastern parts of the proposed development site and at varying depths throughout the soil profile.
- Excavated PASS will require neutralisation at a rate of approximately 7 kg of lime ($CaCO_3$)/m^3 of soil. This is the maximum calculated neutralisation rate and therefore should be sufficient to neutralise the worst case PASS at the site.
- The laboratory testing suggests that Actual Acid Sulfate Soils (AASS) do not exist at the site.

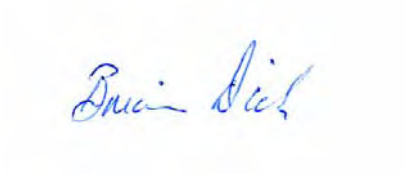
The presence of PASS indicates these are soils are likely to generate sulfuric acid if they are allowed to oxidise either by excavation or lowering of the watertable. Subsequently, this may present an environmental hazard and the appropriate management of these soils will be required.

8. Limitations

This report relies on information supplied by the client and the results of investigations conducted in accordance with accepted practices and standards. The report is intended to represent a reasonable interpretation of the appropriate legislation and the condition of the site at the time of the investigation. However, due to these elements being subject to change over time the report under no circumstances can be considered to represent the definitive state of the site at all times.

Finally, should any problem or concern arise that needs clarification or assistance the client should not hesitate to contact this office.

Yours Faithfully,
Australian Soil and Concrete Testing Pty. Ltd.



Ben Hart
Environmental Officer
B. App. Sc

Brian Dick
Managing Director

9. References

DPI Qld, 2003. *Acid Sulfate Soils Laboratory Methods Guidelines*.

Stone, Y, Ahern C R, and Blunden B (1998). *Acid Sulfate Soils Manual 1998. Acid Sulfate Soil Management Advisory Committee* (ASSMAC), Wollongbar, NSW, Australia.

APPENDIX A – Results of Acid Sulfate Soil Analysis

RESULTS OF ACID SULFATE SOIL ANALYSIS (Page 1 of 1)

4 samples supplied by Australian Soil & Concrete Testing on 4th February, 2008 - Lab. Job No. E8701.
Analysis requested by Brian Dick. **Your Project: #031-057-Ewingsdale Sports Fields.**

Sample Site	EAL lab code	Texture (note 6)	Moisture Content (% moisture)	Lab. Bulk Density tonne DW/m³	TAA pH_{KCl}	Titratable Actual Acidity (TAA) mole H⁺/tonne (to pH 6.5)	Reduced Inorganic Sulfur (% chromium reducible S) (%Scr) (note 2)	Reduced Inorganic Sulfur (Scr) mole H⁺/tonne	NET ACIDITY Chromium Suite mole H⁺/tonne (based on %Scrs)	LIME CALCULATION Chromium Suite kg $CaCO_3/m^3$ (includes 1.5 safety Factor)
Method No.					*23A*	*23F*	*22B*	*a- 22B*	*note 5*	*note 5*
8497-PIE 201	*E8701/1*	Coarse	11.9	1.3	4.68	28	<0.005	0	28	3
8497-PIE 202	*E8701/2*	Coarse	20.5	1.2	4.32	57	0.026	16	74	7
8497-PIE 205	*E8701/3*	Coarse	19.6	1.2	4.88	33	<0.005	0	33	3
8497-PIE 206	*E8701/4*	Coarse	16.9	1.4	5.85	2	<0.005	0	2	0

NOTE:
1 - All analysis is Dry Weight (DW) - samples dried and ground immediately upon arrival (unless supplied dried and ground)
2 - Samples analysed by SPOCAS method 23 (ie Suspension Peroxide Oxidation Combined Acidity & sulfate) and 'Chromium Reducible Sulfur' technique (Scr - Method 22B)
3 - Methods from Ahern, CR, McElnea AE , Sullivan LA (2004). ***Acid Sulfate Soils Laboratory Methods Guidelines.*** QLD DNRME.
4 - Bulk density was determined immediately on arrival to laboratory (insitu bulk density is preferred)
5 - ABA Equation: Net Acidity = Potential Sulfidic Acidity (ie. Scrs or Sox) + Actual Acidity + Retained Acidity - measured ANC/FF
6 - For Texture: coarse = sands to loamy sands; medium = sandy loams to light clays; fine = medium to heavy clays and silty clays
7 - .. Denotes not requested or required
8 - CRS, TAA and ANC are NATA certified but other SPOCAS segments are currently not NATA certification
9- Results at or below detection limits are replaced with '0' for calculation purposes.
10 - Projects that disturb >1000 tonnes of soil, the ≥0.03% S classification guideline would apply.

NATA
Lab.Accred. No.: 14960

(Classification of potential acid sulfate material if: coarse Scr≥0.03%S or 19mole H+/t; medium Scr≥0.06%S or 37mole H+/t; fine Scr≥0.1%S or 62mole H+/t)

Report Page 2 of 2

checked: .....

APPENDIX B – Chain of Custody Documentation

AUSTRALIAN SOIL AND CONCRETE TESTING P/L A.B.N.49 050 539 930

Unit 7/17 Southern Cross Drive, P.O. Box 5120 Ballina NSW 2478. Telephone: 02 6686 8567, Fax: 02 6686 8396

E8701

ASCT Doc. No. A18 Rev. 03- 3/7/07 - CC

Laboratory Test Program

Client :	Geolink.	Project no : 031 - 057	Project : Ewingsdale Sports Fields.
Location :	Proposed Sports Fields.	Requested By: ASCT	Test methods : EAC
Sampled By :	BH.	Sample Type : SOIL	Date Sampled : 1/2/08

Lab Sample No	Sample Source	Sample Description	Depth of Sample (m)	Gas Screen	Lime Rate																
8497	PIEZO 1	SAND /DARK BROWN	1.0	/	/																
"	PIEZO 2	" " "	1.5	/	/																
"	PIEZO 5	" " "	1.5	/	/																
"	PIEZO 6	SAND/BROWN GREY	1.0	/	/																

Comments:

Signed: _____ Date: 4/2/08

(Approved Signatory)

Signed: _____ Date: 4/2/08

(Receiving Authority)

Sampling performed at ASCT P/L Ballina
NATA Accredited Laboratory Number 3229

Page of

Appendix F

Acoustic Assessment

CARTER RYTENSKILD GROUP
Traffic and Acoustical Consultants

GOLD COAST
2563 Gold Coast Highway
Mermaid Beach Queensland 4218

POSTAL:
PO Box 441
Mermaid Beach Queensland 4218

P: (07) 5527 7333
F: (07) 5527 7555

E: info@crg.net.au
CRG Traffic & Acoustics Pty Ltd

BRISBANE
Level 36, Riparian Plaza
71 Eagle Street
Brisbane Queensland 4000

POSTAL:
Level 36, Riparian Plaza
71 Eagle Street
Brisbane Queensland 4000

P: (07) 3121 3198
F: (07) 3121 3030

www.crg.net.au
ABN 47 553 772 655

Proposed Byron Bay Community Facility
"Ewingsdale Community Sports Centre"
249 Ewingsdale Road, Byron Bay
(Lot 3 on DP706286)

ENVIRONMENTAL NOISE IMPACT REPORT

Prepared for

Byron Shire Council

C/- Geolink Environmental Management and Design

20 January 2009
crgref: 07540a report

1.0 INTRODUCTION

This report is in response to a request from Geolink Environmental Management and Design on behalf of Byron Shire Council for an environmental noise impact assessment of a proposed community facility and sports centre along Ewingsdale Road at Byron Bay.

In undertaking the above, noise monitoring was conducted for the site and through modelling, predictions of onsite activity and construction noise emissions were produced as well as traffic generation noise impacts on Ewingsdale Road. Based upon the predicted noise impact levels, recommendations regarding acoustic treatment to the development have been provided.

2.0 DESCRIPTION OF THE DEVELOPMENT

The parcel of land is described as Lot 3 on DP706286, 249 Ewingsdale Road. The site is bounded by Ewingsdale Road to the south, Council's water treatment facility to the north an industrial estate to the east and undeveloped land to the west.

The proposal is to develop the site into a community and sports facility comprising the following:

- **Sector 1:** Cycleway, athletics track, hockey field, netball / basketball courts, general use fields, bike / skateboard park, public toilet building, caretakers residence and 298 car parking spaces.
- **Sector 2:** Cycleway, two soccer fields which can also be used as a cricket field, visitor's information centre and 62 car parking spaces.
- **Sector 3:** Cycleway, two rugby fields which can also be used as cricket or Aussie Rules fields, cricket nets and a multi-purpose stadium.

We note that the care takers residence and multi-purpose stadium are included in the development plan; but, will require a development application which will be lodged in the future.

Indicative uses and likely hours of operation have been presented in Appendix A of this report; and range from weekly sporting and training events to annual music concerts and festivals.

Vehicle access to the site is proposed from Ewingsdale Road. Increased traffic on Ewingsdale Road generated by the development has therefore been assessed in accordance with the New South Wales EPA '*Environmental Criteria for Road traffic Noise*'.

Onsite activity noise emissions (i.e. vehicle activities, sports activities, amplified music, deliveries, waste collection and mechanical plant) has the potential to impact upon surrounding noise sensitive receivers (i.e. surrounding dwellings) and has been assessed in accordance with New South Wales EPA '*Industrial Noise Policy'*. The nearest offsite noise sensitive receivers are as follows:

1. Residential dwellings within the industrial estate due east of the site at approximately 100m;
2. Residential dwellings due east across Ewingsdale Road at approx. 500m;
3. Melaleuca Bed and Breakfast due southeast across Ewingsdale Road at approx. 700m;
4. Residential dwellings due southwest across Ewingsdale Road at approx. 1,000m; and
5. Residential dwellings due west at approx. 1,100m.

Noise emissions from the construction of the proposed facility have also been assessed.

For site and receiver location refer to Appendix A and for development plans refer to Appendix B.

3.0 AMBIENT NOISE SURVEY

3.1 Instrumentation

The following equipment was used to record ambient noise levels at the subject site locale.

- Rion NC 73 Calibrator; and
- Rion NL 21 Environmental Noise Logger.

All instrumentation used in this assessment hold current calibration certificate from a certified NATA calibration laboratory. All measurements were conducted generally in accordance with Australian Standard AS 1055:1997 - *'Acoustics-Description and measurement of environmental noise*'.

3.2 Background Noise Monitoring Methodology

A logger was located along the eastern site boundary. The microphone was in a free-field location, approximately 1.2m above ground level and 250m from the nearest lane of Ewingsdale Road. Refer to Figure 2 in Appendix A for the logger location.

The logger was set to record noise statistics in 15 minute blocks continually between Monday 5/01/09 and Wednesday 14/01/09. The statistical interval was chosen to allow application of AS/NZS 2107:2000 *'Acoustics – Recommended Design Sound Level and Reverberation Times for Building Interiors'*. The operation of the sound level logging equipment was field calibrated before and after the measurement session with no significant drift from the reference signal recorded.

Daily weather observations were obtained from the Bureau of Meteorology's website (http://www.bom.gov.au/) at the Byron Bay Lighthouse weather station at approximately 6km east of the subject site. Weather conditions during the noise monitoring period generally were fine, with a temperature range between 18 and 31^{o}C and a relative humidity range between 40 and 80%. Refer to Appendix C for daily weather observations.

3.3 Results

Table 1 presents the measured ambient noise levels at the logger location. Data from the 10/01/09 has been omitted as 0.8mm of rain was recorded at the Byron Bay Lighthouse weather station. Graphical presentation of the measured levels is presented in the Appendix C to this report.

Background Noise	**Measured Level L_{A90} dB(A)**			**$L_{Aeq\ 24hr}$**
	Daytime (7am-6pm)	**Evening (6pm-10pm)**	**Night (10pm-6am)**	**24 Hours**
6/01/09	36	44	41	52
7/01/09	37	43	41	52
8/01/09	36	43	40	56
9/01/09	48	45	43	56
11/01/09	36	45	38	50
12/01/09	36	46	40	51
13/01/09	40	45	41	49
RBLs	**36**	**45**	**41**	

Table 1: Measured noise levels at the logger location.

We note that the evening measured levels are not consistent with other times of the year (i.e. winter time) and are likely to be comprised of insect noise associated with the summer season. We therefore refer to Appendix A of Australian Standard AS1055.2-1997 for background L_{A90} levels for different areas containing noise sensitive properties (refer to the attachment in Appendix A of t his report).

4.0 NOISE ASSESSMENT CRITERION

4.1 Road Traffic Noise

Assessment of potential noise impacts resulting from increase traffic generation are required to be conducted as per the New South Wales EPA '*Environmental Criteria for Road traffic Noise*' as presented below.

We note that Ewingsdale Road is considered as a collector road.

TYPE OF DEVELOPMENT	CRITERIA		
	DAY (7 am–10 pm) dB(A)	NIGHT (10 pm–7 am) dB(A)	WHERE CRITERIA ARE ALREADY EXCEEDED
8. Land use developments with potential to create additional traffic on collector road	$L_{Aeq(1hr)}$60	$L_{Aeq(1hr)}$55	Where feasible and reasonable, existing noise levels should be mitigated to meet the noise criteria. Examples of applicable strategies include appropriate location of private access roads; regulating times of use; using clustering; using 'quiet' vehicles; and using barriers and acoustic treatments. In all cases, traffic arising from the development should not lead to an increase in existing noise levels of more than 2 dB.

Table 2: Noise limit criteria for road traffic noise.

4.2 Onsite Commercial Activity Noise Impacts

Noise associated with the commercial premises is regulated by the NSW Industrial Noise Policy.

The assessment procedure has three components:

- Control of intrusive noise impacts – The limit criteria for this assessment is as follows: $L_{Aeq,\ 15\ min} \leq$ rating background level[1] + 5 dB;
- Maintaining noise level amenity for residential premises. This is achieved by ensuring that the proposed development complies with the noise limit criteria set in Table 2.1 of the Policy. If we assume that the area is within a Rural Area (as defined in the Policy), the following limits apply:
  - Daytime (7 am – 6 pm Mon-Sat; 8 am – 6 pm Sun) 50 - 55 dB(A) Leq;
  - Evening (6 pm – 10 pm) 45 - 50 dB(A) Leq;
  - Night (remaining periods) 40 - 45 dB(A) Leq.

With regards to the $L_{Aeq,\ 15\ min} \leq$ rating background level + 5 dB criterion, based upon the location of the subject site and surrounding noise sensitive properties, the area is considered to be a Category R1 area (Areas with negligible transportation) as defined in Australian Standard AS1055.2-1997. The background noise levels for a Category 1 are presented as an attachment in Appendix A.

By considering the above criteria, the measured RBLs and the background levels provided in AS1055.2-1997 for a Category 1 area, we recommend the following noise limits for the proposed use:

- Daytime (7 am – 6 pm Mon-Sat; 8 am – 6 pm Sun) 41 (RBL 36 + 5) dB(A) Leq;
- Evening (6 pm – 10 pm) 40 (AS1055 35 + 5) dB(A) Leq; and
- Night (remaining periods) 35 (AS1055 30 + 5) dB(A) Leq.

Further to the above criteria, we recommend applying a design target of 45 dB(A) L_{10} inside living areas and bedrooms from short term noise events. This level is within sleep disturbance prevention criteria set by the World Health Organisation.

[1] The rating background level is the overall single figure background level representing each assessment period (day/evening/night over the whole monitoring period.

4.3 Earthworks Noise Criteria

Byron Shire Council have no specific local law regulating construction noise, therefore, as a guide to quantifying impacts (although not a regulatory requirement), the *Industrial Noise Policy* (refer to Section 4.2) has been used (which has superseded the Environmental Protection Agency's "*Noise Control Manual*" which is out of print, and unobtainable). The Policy is intended for large, permanent industrial activities and expressly excludes construction activities.

Further to the above, Appendix 1 of the NSW EPA's "*Noise Guide For Local Government*" provides the following guidance in relation to construction noise:

The noise problem	How to assess it	How to manage it	How to regulate it	Any further action
Construction	Some noise from a construction site is expected. However, additional and avoidable noise may be result of work practices not in accordance with consent conditions from development application approval.	Work practices need to conform with consent conditions, which can stipulate particular times of day for noisy activities and particular work practices to avoid additional noise.	The consent conditions and the planning legislation act to regulate the activity. Noise Control Notices and Prevention Notices can also be used (4.2.1 and 4.2.4) consistent with the consent conditions.	

The NSW EPA's *'Environmental Noise Control Manual'* prescribes the following noise criterion for construction activities (Chapter 171). The Manual has been superseded; however, the criterion specified in the document is still relevant in providing guidance for assessment of construction noise.

Level Restrictions

- Construction period of 4 weeks and under: the L_{A10} level measured over a period of not less than 15 minutes when the construction site is in operation must not exceed the background level by more then 20 dB(A).
- Construction period greater than 4 weeks and not exceeding 26 weeks: the L_{A10} level measured over a period of not less than 15 minutes when the construction site is in operation must not exceed the background level by more then 15 dB(A).

For construction periods longer then 26 weeks or construction operations occurring outside the above-mentioned time periods, Council typically require that the L_{A10} level when construction is being undertaken should not exceed the background level by more then 5 dB(A).

Time Restrictions

- Monday to Friday, 7am to 6pm.
- Saturday 8am to 1pm.
- No construction work to take place on Sundays or public holidays.

Based upon the noise criterion presented above and the measured background noise levels (refer to Section 3.3, Table 1), the following noise limits apply:

Period of Construction Activity	**Noise Limit Criterion L_{A10} dB(A)**
Period of up to 4 weeks	56 (Background RBL 36 + 20 dB(A))
Period of 4 to 26 weeks	51 (Background RBL 36 + 15 dB(A))
Period of 40 or more weeks	41 (Background RBL 36 + 5 dB(A))

Table 3: Construction activity noise limits.

It is also noted that Australian Standard AS 2436 – 1981 '*Guide to noise control on construction, maintenance and demolition sites*' provides extra guidance for management of on-site noise.

For internal noise levels, we recommend applying a noise limit of 45 dB(A) L_{A10} (based upon previous similar projects).

5.0 PREDICTED NOISE IMPACTS

5.1 Site Related Road Traffic Generation Noise Impacts

5.1.1 Road Traffic Volumes:

Roadnet Pty Ltd, the traffic engineers for the development, has provided the following traffic volumes for Ewingsdale Road (AADT and hourly) at the location of the subject site. We were advised that the traffic data was collected in 2006 and percentage of heavy vehicles was determined to be 4.7% (of the AADT volume).

2006 Counts	Ewingsdale Road at Island Quarry		
Time	Thursday	Saturday	Sunday
0	61	108	115
1	32	63	71
2	42	52	69
3	56	47	65
4	47	54	55
5	130	81	81
6	419	195	143
7	843	372	265
8	1299	651	457
9	1206	857	705
10	1087	979	907
11	1029	1087	942
12	1099	1051	953
13	1024	1025	899
14	1135	943	918
15	1291	925	947
16	1268	885	882
17	1168	800	714
18	608	589	473
19	371	394	308
20	310	307	261
21	273	286	208
22	186	280	123
23	101	180	83
Total	15085	12211	10644

For ten year ultimate traffic volume predictions a 3.5% annual compound increase has been applied to the above traffic volumes. The ultimate predicted AADT traffic volume is predicted to be as follows:

Ultimate traffic volume along Ewingsdale Road: 23,590 per 24 hours

Roadnet Pty Ltd have also advised that based upon the likely sporting uses (i.e. times during the week and number of users) that Saturday mornings and afternoons and weekday evenings are likely to create the highest vehicle movements to and from the site during any one hour period (excluding large events such as festival and concerts). We note that due to the limited number of car spaces available at the site, for festivals and concerts, *'park and ride'* systems (such as that used for the new Titans Gold Coast Stadium) are likely to be employed.

Assuming all three sectors of the facility are constructed (refer to the layout plan presented in Appendix B) the following hourly peak volumes are predicted:

Weekday 6pm to 7pm 1 hour peak volume: 998 vehicles per hour heading east and west
Saturday 7am to 8pm 1 hour peak volume: 964 vehicles per hour heading east and west
Saturday 5pm to 6pm 1 hour peak volume: 950 vehicles per hour heading east and west

We note that the traffic engineers have assumed a 50% split of vehicle travelling in an east or west direction of Ewingsdale Road.

5.1.2 Existing Predicted Noise Impacts from Site Related Additional Traffic on Ewingsdale Road

Road traffic noise modelling was conducted using TNOISE, which is based upon the "CoRTN" (Control of Road Traffic Noise) method produced by the UK Department of Transport 1988.

The increases in am and pm hourly traffic volumes from vehicles entering and leaving the development (refer to Section 5.1.1) are predicted to raise existing $L_{Aeq\ 1hr}$ traffic noise levels from Ewingsdale Road by between 2 dB(A) and 4 dB(A) as presented below:

Weekday 6pm to 7pm 1 hour peak volume:	65.4 dB(A) to 68.0 dB(A) $L_{Aeq\ 1hr}$: + 2.6 dB(A)
Saturday 7am to 8pm 1 hour peak volume:	63.3 dB(A) to 66.9 dB(A) $L_{Aeq\ 1hr}$: + 3.6 dB(A)
Saturday 5pm to 6pm 1 hour peak volume:	66.6 dB(A) to 68.7 dB(A) $L_{Aeq\ 1hr}$: + 2.1 dB(A)

For TNOISE result sheets refer to Appendix C of this report.

The increase in traffic noise levels is above the 2 dB(A) rise deemed acceptable under the '*Environmental Criteria for Road Traffic Noise*'.

The above levels are considered conservative given that full operation of the complex will not occur from the opening of the complex. The development is also likely to be constructed in stages, therefore further delaying full operation. Traffic noise impacts along Ewingsdale Road ten years after the initial opening of the development are provided below.

5.1.3 10 Year Predicted Noise Impacts from Site Related Additional Traffic on Ewingsdale Road

Based upon ultimate traffic volumes on Ewingsdale Road, the increases in am and pm hourly traffic volumes from vehicles entering and leaving the development (refer to Section 5.1.1) are predicted to raise $L_{Aeq\ 1hr}$ traffic noise levels by between 1 dB(A) and 3 dB(A) as presented below:

Weekday 6pm to 7pm 1 hour peak volume:	67.4 dB(A) to 69.2 dB(A) $L_{Aeq\ 1hr}$: + 1.8 dB(A)
Saturday 7am to 8pm 1 hour peak volume:	65.2 dB(A) to 67.2 dB(A) $L_{Aeq\ 1hr}$: + 2.7 dB(A)
Saturday 5pm to 6pm 1 hour peak volume:	68.6 dB(A) to 70.0 dB(A) $L_{Aeq\ 1hr}$: + 1.4 dB(A)

For TNOISE result sheets refer to Appendix C of this report.

The increase in traffic noise levels are generally within the 2 dB(A) rise deemed acceptable under the '*Environmental Criteria for Road Traffic Noise*' with the exception of Saturday mornings. However, for Saturday mornings, we note that the as the average person cannot typically detect a 3 dB(A) variation in sound pressure level a 1 dB(A) exceednace is unlikely to cause annoyance.

5.2 Onsite Activity Noise Impacts

5.2.1 Assumed Noise Source Levels

All noise source levels used in the assessment have been collected from similar previous investigations. All noise levels have been corrected for impulsiveness or tonality as per Australian Standard AS 1055:1997 - '*Acoustics-Description and measurement of environmental noise*'.

The following noise source levels are typically associated with the operation of community / sports centre development and have been assessed within this report:

Activity/Noise Source	**Noise Level, SPL L_{A10} dB(A) at 1m**
Car door closure	83 dB(A)
Car bypass at 5km/hr	77 dB(A)
Alfresco dining area at canteen	75dB(A)
Referee's whistle	93*dB(A)
Children playing	80dB(A)
Boisterous crowd	85dB(A)
Festival / concert amplified music / band	110 dB(A) at 3m
Deliveries	87**dB(A)
Waste collection	97*dB(A)
Cluster of air-conditioning condenser plant	60 dB(A)
Commercial A/C plant	70 dB(A)
Refrigeration plant	75**dB(A)

* Denotes + 5 dB correction for impulsiveness in accordance with AS1055. ** Denotes + 5 dB correction for tonality in accordance with AS1055.

Table 4: Typical noise source levels associated with the proposed development.

It should be stressed that mechanical plant selection have yet to be undertaken given that the development is at the development approval stage. For this reason, we have applied nominal noise levels. **Noise levels associated with mechanical plant are purely illustrative, and should be reviewed upon determination of types of plant.**

5.2.2 Predicted Onsite Activity Noise Emissions at the Nearest Offsite Noise Sensitive Properties

Based upon the location of onsite activities in relation to surrounding offsite noise sensitive properties (building façade and inside rooms with windows open), we predict the following noise impact levels as presented in Table 5.

The predicted levels assume that the recommended treatments detailed in Section 6.1 and 6.2 are incorporated into the development.

Noise source	**Predicted Noise Impact, SPL L_{A10} dB(A)**	
Dwellings due East	**Nearest Façade to Onsite Activity**	**Inside with Windows Open**
Car door closure	38	30
Car bypass at 5km/hr	32	24
Alfresco dining at canteen	31	23
Referee's whistle at hockey field	53	45
Children playing at athletics track	41	33
Boisterous crowd at hockey field	42	34
Festival music / band at hockey field	81	74
Deliveries	42	34
Waste collection	52	44
Cluster of A/C condensers	<20	<20
Commercial A/C plant	26	<20
Refrigeration plant	31	23
Dwellings due East Across Road	**Nearest Façade to Onsite Activity**	**Inside with Windows Open**
Car door closure	30	23
Car bypass at 5km/hr	24	<20
Alfresco dining at canteen	21	<20
Referee's whistle at soccer field	42	35
Children playing at soccer field	29	22
Boisterous crowd at soccer field	34	27
Festival music / band at soccer field	68	61
Deliveries	34	27
Waste collection	44	37
Cluster of A/C condensers	<20	<20
Commercial A/C plant	<20	<20
Refrigeration plant	23	<20
Bed and Breakfast due Southeast	**Nearest Façade to Onsite Activity**	**Inside with Windows Open**
Car door closure	28	20
Car bypass at 5km/hr	22	<20
Alfresco dining at canteen	<20	<20
Referee's whistle at general use field	39	31
Children playing at general use field	26	<20
Boisterous crowd at general use field	31	23
Festival music at general use field	65	58
Deliveries	32	25
Waste collection	42	35
Cluster of A/C condensers	<20	<20
Commercial A/C plant	<20	<20
Refrigeration plant	<20	<20
Criterion dB(A)	**7am - 6pm: 41 / 6pm – 10pm: 40 / 10pm - 7am: 35**	**45**

Table 5: Predicted noise impact levels at offsite noise sensitive properties.

For point source calculations refer to Appendix C of this report.

Noise source	Predicted Noise Impact, SPL L_{A10} dB(A)	
Dwellings due Southwest	**Nearest Façade to Onsite Activity**	**Inside with Windows Open**
Car door closure	25	<20
Car bypass at 5km/hr	<20	<20
Alfresco dining at canteen	<20	<20
Referee's whistle at soccer field	35	28
Children playing at soccer field	22	<20
Boisterous crowd at soccer field	27	20
Festival music / band at soccer field	62	54
Deliveries	28	21
Waste collection	38	31
Cluster of A/C condensers	<20	<20
Commercial A/C plant	<20	<20
Refrigeration plant	<20	<20
Dwellings due West	**Nearest Façade to Onsite Activity**	**Inside with Windows Open**
Car door closure	24	<20
Car bypass at 5km/hr	<20	<20
Alfresco dining at canteen	<20	<20
Referee's whistle at soccer field	35	27
Children playing at soccer field	22	<20
Boisterous crowd at soccer field	27	<20
Festival music / band at soccer field	61	54
Deliveries	28	20
Waste collection	38	30
Cluster of A/C condensers	<20	<20
Commercial A/C plant	<20	<20
Refrigeration plant	<20	<20
Criterion dB(A)	**7am - 6pm: 41 / 6pm – 10pm: 40 / 10pm - 7am: 35**	**45**

Table 5 (Continued): Predicted noise impact levels at offsite noise sensitive properties.

For point source calculations refer to Appendix C of this report.

5.3 Predicted Construction Noise Emissions at the Nearest Noise Sensitive Properties

Onsite construction activity noise source levels have been compiled from measurements taken from similar previous construction works investigations. All noise levels have been corrected for impulsiveness or tonality as per Australian Standard AS 1055:1997 - '*Acoustics-Description and measurement of environmental noise*'. The following noise sources are likely to be used in undertaking the proposed construction works and have been assessed within this report:

Activity/Noise Source	**Noise Level SPL dB(A) L10 @ 7m**
Excavator	88 dB(A)
Dozer	87 dB(A)
Front-end Loader	85 dB(A)
Truck Unloading	83 dB(A)
Generator	75**dB(A)

Table 6: Typical noise source levels associated with construction works.

Based upon the assumed noise source level presented above, we predict the following noise impact levels at the nearest noise sensitive properties (façade and inside habitable room with windows open).

Noise source	**Predicted Noise Impact, SPL L_{A10} dB(A)**	
Dwellings due East	**Nearest Façade to Noise Source**	**Inside with Windows Open**
Excavator	67	60
Dozer	66	59
Front-end Loader	64	57
Truck Unloading	62	55
Generator	54	47
Dwellings due East Across Road	**Nearest Façade to Noise Source**	**Inside with Windows Open**
Excavator	54	46
Dozer	53	45
Front-end Loader	51	43
Truck Unloading	49	41
Generator	41	33
Bed and Breakfast due Southeast	**Nearest Façade to Noise Source**	**Inside with Windows Open**
Excavator	51	43
Dozer	50	42
Front-end Loader	48	40
Truck Unloading	46	38
Generator	38	30
Dwellings due Southwest	**Nearest Façade to Noise Source**	**Inside with Windows Open**
Excavator	47	40
Dozer	46	39
Front-end Loader	44	37
Truck Unloading	42	35
Generator	34	27
Dwellings due West	**Nearest Façade to Noise Source**	**Inside with Windows Open**
Excavator	47	40
Dozer	46	39
Front-end Loader	44	37
Truck Unloading	42	35
Generator	34	27
Criterion dB(A)	**Daytime: 41**	**Inside: 45**

Table 7: Predicted noise impact levels at surrounding noise sensitive properties.

For point source calculation sheets, refer to Appendix C of this report.

6.0 RECOMMENDED ACOUSTIC TREATMENTS

6.1 Recommended Acoustic Treatments for General Onsite Activity

Based upon the assumed onsite activity noise source levels, the following acoustic treatments and management principles are recommended to mitigate onsite commercial noise impacts:

- Sports events should generally be conducted between the hours of 7am and 10pm.
- Waste collection be limited to the daytime period of 7am to 6pm.
- Drainage grating over trafficable areas be well secured to prevent rattling.
- Mechanical plant be designed and installed to comply with the noise criterion presented in Section 4.2. As final plant selection has not been completed, additional acoustic assessment/s should be undertaken once plant selections are finalised. Such assessments should be undertaken prior to Building Approval; and be conditioned within the Development Approval.
- Refer to Section 6.2 for recommendations relating to festival / concert events.

6.2 Recommended Acoustic Treatments for Festival / Concert Amplified Music / Band

Based upon the assumed festival / concert amplified music / band noise source levels, the following acoustic treatments and management principles are recommended:

- Hours of amplified music and live entertainment be limited to between 7am and midnight.
- Speakers should be directed in a horizontal direction or slightly towards the ground.
- Speakers should be generally pointed away from the nearby eastern residential dwellings.
- Based upon the measured levels, amplified music and live entertainment should not exceed 110 dB(A) measured at 3m from any speaker.
- Leading up to the festival, local residents should be provided with an indicative schedule of the music festival program, in particular, a clear notification of the times when music / live performances are planned. This notification should also include contact details of the 'responsible person' should residents wish to discuss the festival activities.
- Assign the task of managing noise emissions to a person (the 'responsible person') that is contactable at all times (e.g. leading up to, during and after the event). This person would be responsible for handling noise complaints sensitively, and ensuring that the festival runs during the times specified. The 'responsible person' should maintain a Noise Complaint Record, with an example recording form attached in Appendix C of this report.
- Spot noise source level checks should be conducted during festivals / concerts to ensure the above noise limits are not exceeded.
- Onsite security personal should conduct regular observations of the stage and crowd areas to ensure patrons are not behaving boisterously.
- Security personal should ensure that patrons leave in a calm and orderly fashion at the completion of the festival.
- Pack up of equipment should be conducted between the hours of 7am and 6pm the following day after the event.

A noise management plan (NMP) should be prepared by a suitable qualified and experienced noise consultant prior to any festival / concert being undertaken.

6.3 Recommended Acoustic Treatments for Onsite Construction Activity

To minimise noise emissions impacting surrounding noise sensitive properties we recommend the following acoustic treatments and management principles during the construction phase:

- All construction activity activities should be limited to the time restrictions presented in Section 4.3 of this report.
- Trucks and equipment should not arrive or queue outside the site before 7am Monday to Friday and 8am on Saturday.
- Onsite equipment should not be started before 7am Monday to Friday and 8am on Saturday.
- No alarm bells/paging systems should be used. Cordless telephones are a suitable substitute.
- Vehicles have a modified beeper installed (commonly termed a "croaker", as they sound similar to a frog croak).
- Drivers be instructed to operate equipment in a manner that does not generate unnecessary noise, through avoiding excessive revving, and avoidance of impact with solid objects.
- All plant be maintained in good condition; with all reasonable and feasible acoustic treatments (i.e. residential mufflers and plant enclosures) installed and maintained (refer to AS 2436 – 1981 '*Guide to noise control on construction, maintenance and demolition sites*').
- Machines/equipment which discharge noise in a certain direction should be orientated away from the residential properties to the east minimize noise annoyance.
- Machines/equipment should be turned off when not in use or throttled down to a minimum.
- Truck and equipment speeds be limited to 20km/hr at the site.
- All onsite roads be well maintained (no potholes) and levelled as required to minimise truck bounce as they move around the site.
- Drainage grating over trafficable areas be well secured to prevent them rattling when a vehicle traverses over the grate.
- Assign the task of managing noise emissions to a person (the 'responsible person') that is contactable at all times (e.g. 24 hours per day), and is likely to be present on-site most of the time that activity is occurring. This person would be responsible for handling noise complaints sensitively, and ensuring that work does not commence before the times specified above. The 'responsible person' should maintain a Noise Complaint Record, with an example recording form attached to this report.
- The 'responsible person' should also conduct regular observations of noise levels from the construction activities. Should any noise sources be identified as being able to be practically relocated further away from the residential area, the 'responsible person' should undertake to have the source relocated.
- Providing local residents with an indicative schedule of the works program, in particular, a clear notification of the times when new or noisy activities are to be conducted proximate to the residential premises. This notification should also include contact details of the 'responsible person' should residents wish to discuss the onsite activity.

A noise management plan (NMP) should be prepared by a suitable qualified and experienced noise consultant prior to any construction works being undertaken at the site.

7.0 DISCUSSION

7.1 Road Traffic Noise

Increases in the existing traffic volumes on Ewingsdale Road, from the proposed development, are predicted to increase road traffic noise levels by more than the 2 dB(A) rise deemed acceptable under the '*Environmental Criteria for Road Traffic Noise*'.

The predicted levels are considered conservative however given that full operation of the complex will not occur from the initial opening of the complex. The development is also likely to be constructed in stages, therefore further delaying full operation. Given that Ewingsdale Road is also the main access road to Byron Bay, future increase in traffic volume (i.e. 10 year planning horizon) will reduce the overall impacts associated with the proposed development once it is in full operation (refer to Section 5.1.3).

The increase in the predicted 10 year ultimate traffic noise levels are generally within the 2 dB(A) rise deemed acceptable under the '*Environmental Criteria for Road Traffic Noise*' with the exception of Saturday mornings. However, for Saturday mornings, we note that the as the average person cannot typically detect a 3 dB(A) variation in sound pressure level a 1 dB(A) exceednace is unlikely to cause annoyance.

Treatment options for consideration to mitigate traffic noise increases from the proposed development are as follows:

- **Adding an addition entry to the site (i.e. Centennial Circuit):** this option is unlikely to reduce traffic on Ewingsdale Road and would increase traffic noise impacts to those dwellings located on Centennial Circuit.

- **Regulating times of use of the facility:** we note that due to typical working hours the primary times of use would be weekday evenings and weekends particularly on Saturdays.

- **Minimising the number of vehicles entering the site:** such options would include regular public transport to the sporting complex and / or a designated 'park and ride' system for the site particularly for large events. Bike and pedestrian path access for local residents.

  We note that due to the limited number of car spaces available at the site, for festivals and concerts *'park and ride'* systems are likely to be employed.

- **Acoustic barrier for affected residents along Ewingsdale Road:** construction of barriers would be a costly exercise and would have other negative effects such as visual and changing flood overland flow.

- **Reducing the speed limit along Ewingsdale Road at locations of affected residents:** reducing the speed limit below 100km/hr would reduce noise impacts; however, given that dwellings are located along the length of Ewingsdale Road the treatment option may not be considered favourable. We note that reducing the speed limit at the location of the complex would reduce traffic impacts at the nearest residents (i.e. those presented in Figure 2 of Appendix A).

Given the limited exceedance of the predicted 10 year traffic noise impacts, application of public transport and regulating times of use are likely to be the most practicably and achievable treatment options.

7.2 Onsite Activity Noise Impacts at Offsite Dwellings

Based upon the assumed source levels, impacts at the nearest offsite dwellings are predicted to be within 2 dB(A) the "Background +" noise criterion and the adopted internal limit of 45 dB(A) with the exception of a referees whistle (at hockey field) impacting the eastern dwellings (within the industrial estate), waste collection and concert / festival music. As the average person cannot typically detect a 3 dB(A) variation in sound pressure level, a 2 dB(A) exceedance is unlikely to cause annoyance and is considered an acceptable outcome.

Based upon the predicted levels we have recommended that the majority of onsite activities be limited to between the hours of 7am and 10pm.

We note that hockey activities (i.e. referees whistle) are likely to be limited to during daytime hours on Saturdays and once or twice on Sundays (refer to Appendix A for indicative use patterns for the facility) and are unlikely to cause annoyance at the eastern dwellings. We also note that the eastern dwellings are within an industrial estate; hence noise impacts from the referees whistle are unlikely to be at the same level or above the industrial noise impacts occurring from the industrial premises below or around the eastern residential dwellings.

As waste collection activities are only likely to occur once or twice per week, and are generally of short duration; such activities are unlikely to cause annoyance. To minimise annoyance we have recommended that such activities be limited to the daytime hours between 7am and 6pm.

To minimise noise impacts from concerts / festival amplified music and bands we have recommended acoustic treatments and management principles for such activities. As such activities would only occur several times during the year (refer to Appendix A for indicative use patterns for the community and sports facility) the potential for noise annoyance would be limited.

To ensure onsite activities are controlled during such events a noise management plan should be prepared by a suitable qualified and experienced noise consultant prior to any festival / concert being undertaken.

We have provided an indication of potential noise impact levels, and required acoustic treatments, of likely onsite mechanical plant; although the levels are merely a guide as no plant selections have yet been completed. For this reason, further more detailed assessment/s should be conducted upon determination of plant. Such assessments should be undertaken prior to Building Approval; and be conditioned within the Development Approval.

7.3 Onsite Construction Activity Noise Impacts at Offsite Dwellings

Based upon the assumed construction noise source levels, noise impacts outside the nearest noise sensitive properties are predicted to be above the adopted noise criterion of 41 dB(A).

Predicted noise impacts at internal areas of the nearest noise sensitive properties are predicted to be generally within 1 dB(A) of the adopted noise limit of 45 dB(A) with the exception of the eastern dwellings located within the industrial estate. As the average person cannot typically detect a 3 dB(A) variation in sound pressure level, a 1 dB(A) exceedance is unlikely to cause annoyance and is considered an acceptable outcome.

Given the limited separation distance to the nearest eastern dwellings (of approximately 100m), and that the dwellings are two storeys in height, application of acoustic barriers or earth berms would be ineffective.

Available acoustic treatments to minimise noise impacts are therefore limited to noise reduction at the source (i.e. application of mufflers and plant enclosures) and incorporation of management principles into the day to day operation of the construction site. However, such measures are unlikely to ensure compliance with the noise criterion as heavy equipment, including dozers and front-end loaders, will be used onsite.

The key to managing noise impacts is to ensure that all practical steps are taken to minimise noise from the site – if the nearby residents are aware that the builder is mindful of noise impacting upon their residential premises, they will tend to be less annoyed than if they feel no regard is made as to their amenity. Good communication is an important factor in managing noise from the site, as a good relationship between the builder and the residents will further ensure that should an issue arise, it can be dealt with in a reasonable manner.

We also note that nose impact levels at individual properties will vary from day to day depending on the location of construction works.

To minimise noise annoyance, we have recommended that onsite activities be limited to the daytime hours; and that a noise management plan be prepared for the site prior to construction works being undertaken.

Given that construction activities are likely to run beyond 26 weeks, it would be advantageous to keep surrounding residents and commercial operators abreast of the works progress; and give prior notice of any activities which may cause unexpected noise intrusion. In the unlikely event of a noise complaint, the complaint must be dealt with sensitively and respectfully, with the noise abated as soon as possible.

8.0 CONCLUSIONS

This report is in response to a request from Geolink Environmental Management and Design on behalf of Byron Shire Council for an environmental noise impact assessment of a proposed community facility and sports centre along Ewingsdale Road at Byron Bay.

We note that the care takers residence and multi-purpose stadium are included in the development plan; but, will require a development application which will be lodged in the future.

Based upon the adopted noise limit criterion, overall, the proposed development will generally be within acceptable levels of Council's requirements, subject to the acoustic treatments recommended in Section 6 being integrated into the design, construction and operation of the development.

Report Reviewed By:

JAY CARTER BSc
Director

Report Compiled by:

Matthew Lopez BEng
Consultant

APPENDIX A

Attachments and Subject Site Location

Attachment A: Indicative Uses for the Proposed Development.

EWINGSDALE SPORTS FIELDS

INDICATIVE USE PATTERNS

Following is an outline of the indicative use patterns and likely attendances for those using the proposed facilities at Ewingsdale. They are listed by sport and event type.

ACTIVITY	TIME OF YEAR	DAYS USED	TIME	ATTENDANCE	COMMENT
SOCCER					
Training – Juniors	Feb – Sept	Tues/Wed/Thurs	3.30 – 6.00pm	150 kids/100 adults	
Training – Seniors	Feb – September	Tues/Wed/Thurs	6.00 – 9.00pm	100 adults	
Competition Juniors	March – September	Saturday	9.00am – 12 noon	10 teams per hour = 150 kids & 100 adults	Note:after first game starts people arrive for second & third game. Max at one time – 600
Competition Seniors	March – September	Saturday	12noon – 5.00pm	6 teams – 3 games 30 players per game 200 spectators – max 300 over three games	As above – max at one time - 300
Competition Seniors	March – September	Sunday	12noon – 5.00pm	As above	As above
Competition Ladies Over 30	April – September	Wed/Thurs &/or Fri	6.00 – 9.00pm	4 teams – 2 games 150 – 200 total 100 at any one time	

ACTIVITY	TIME OF YEAR	DAYS USED	TIME	ATTENDANCE	COMMENTS
SOCCER Cont'd					
Junior Regional Comp Say – 3 per season	March – July	Sunday	9.00am – 4.00pm	20 teams 300 players 200 spectators	Round Robin 500 stay most of the day
Final Series	September	Saturdays	12noon – 5.00pm	3 games 90 players 400 spectators	Movement between games. Max at one time 320 people
RUGBY UNION					
Training	March – September	Tues and Thursday	6.00 – 8.00pm	50 max	
Competition seniors	March – September	Saturday	2.00 – 5.00pm	1 or 2 games 400 total	
Rugby Sevens	2nd weekend October	Sat/Sun	9.00am – 6.00pm	50 teams of 10 1,000 spectators 8 – 10 games simultaneously	Annual international competition
HOCKEY					
Training	March – September	Wed/Thurs	4.00 – 5.30pm 5.30 – 7.00pm	50 juniors/25 parents 50 seniors	
Competition	March – September	Saturdays	9.00am – 12noon	3 games – 6 teams 90 players/90 spectators	Some movement between games Max 100

ACTIVITY	TIME OF YEAR	DAYS USED	TIME	ATTENDANCE	COMMENT
Hockey Cont'd					
Competition	March – September	Saturdays	12noon – 5.oopm	3 games – 6 teams 90 Players/90 Spectators	As above
Regional Carnival(2)	May & June	Sunday	9.00am – 5.00pm	Round Robin – 2 games simultaneously. 300 players 500 spectators	
FRISBEE					
Training/comp	All year	Mondays	7.00 – 9.00pm	50 players	
Carnival	November	Sunday	9.00am – 5.00pm	400 people – all day	
TOUCH FOOTBALL					
Carnival	November	Sunday	9.00am – 5.00pm	600 people – all day	
LITTLE ATHLETICS					
Competition	October – Feb	Saturday	9.00am – 12 noon	300 competitors 150 adults 50 officials	
Regional Carnival	November or Jan	Saturday	9.00am – 5.00pm	1400 competitors 600 adults 60 officials	Est. 500 cars 12-15 buses

ACTIVITY	TIME OF YEAR	DAYS USED	TIME	ATTENDANCE	COMMENT
SCHOOL SPORT					
4 Carnivals for Local schools	??	weekdays	8.30am – 3.30pm	1000 students per event 100 teachers per events 200 spectators per events	
2 Inter-School Carnivals Regional Schools – Multi Sport		weekdays	8.30am – 3.30pm	2,000 students 120 teachers 400 spectators	
AUSTRALIAN RULES FOOTBALL					
Training - Juniors	March – September	1 night?	4.00 – 6.00pm	40 kids/40 adults	
Training – Seniors	March – September	1 night?	6.00 – 8.00pm	40 players/20 spectators	
Competition – Jnrs	March – September	Sundays	9.00am – 12 noon	6 Teams x 20 players 3 Games 150 spectators	
Competition – Snrs	March – September	Sundays	1.00 – 5.00pm	4 teams x 20 players 2 games 150 spectators	
Carnival – 1 day	July	Sunday	9.00am – 5.00pm	10 teams x 20 300 – 500 Spectators	
CRICKET					
Training	October – March	Tues and Thursday	4.00 – 6.30pm	60 people	
Competition - Jnrs	October – March	Saturdays	9.00 – 12noon	150 Juniors/spectators	
Competition – Snrs	October – March	Saturdays	12noon – 6.00pm	150 players/spectator	

ACTIVITY	TIME OF YEAR	DAYS USED	TIME	ATTENDANCE	COMMENT
SPORTS HALL (3 Courts)					
General Sports use	All year	3 nights per week initially Will take time to build up The various sports and their Respective numbers	4.00pm – 10.00pm	130 people per hour 50 players/officials 60 spectators 780 per night	This facility will become a 7 day per week operation once the operators Generate interest
Basketball Tournament	2 per year	Saturday and Sunday	9.00am – 7.00pm	20 teams 200 competitors 500 spectators	Three games at once – all day
Netball Tournament	2 per year	Saturday and Sunday	9.00am – 7.00pm	20 teams 200 competitors 500 spectators	as for Basketball
CONCERTS/NON SPORT					
Blues Festival	Easter	Fri/Sat/Sun/Mon	12noon – 12 Midnight	20,000 per day	2 week build up 1 week dismantle
Music Festival	October L/W	Saturday and Sunday	12noon – 12 midnight	20,000per day	1 week build up 1 week dismantle
Indoor concerts	3 per year	Saturday	7.00pm – 12midnight	4,000 per concert	
Outdoor Concerts	3 per year	Saturday or Sunday	6.00 (Gates open) – 11.00pm	5,000 per concert	
Dinners/Exhibitions Art Shows etc	4 per year	???? probably W/Ends	9.00am – 11.00pm	1,000 per event	

APPENDIX A

ESTIMATED AVERAGE BACKGROUND A-WEIGHTED SOUND PRESSURE LEVELS ($L_{A90,T}$) FOR DIFFERENT AREAS CONTAINING RESIDENCES IN AUSTRALIA

(Informative)

This Appendix may only be used as a guideline. Whenever possible values of $L_{A90,T}$ shall be measured in accordance with Clause 4.2.1. Where the measured values are obtainable, this Appendix shall not be used.

Noise area category (Notes 1 and 2)	Description of neighbourhood	Average background A-weighted sound pressure level, $L_{A90,T}$					
		Monday to Saturday			Sundays and public holidays		
		0700–1800	1800–2200	2200–0700	0900–1800	1800–2200	2200–0900
R1	Areas with negligible transportation	40	35	30	40	35	30
R2	Areas with low density transportation	45	40	35	45	40	35
R3	Areas with medium density transportation or some commerce or industry	50	45	40	50	45	40
R4	Areas with dense transportation or some commerce or industry	55	50	45	55	50	45
R5 (See Note 3)	Areas with very dense transportation or in commercial districts or bordering industrial districts	60	55	50	60	55	50
R6 (See Note 3)	Areas with extremely dense transportation or within predominantly industrial districts	65	60	55	65	60	55

NOTES:

1 The division into noise area categories is necessary in order to accommodate existing sound levels encountered at residential sites in predominantly commercial or industrial districts, or in areas located close to main land transport routes, i.e. road and rail.

2 The noise area category most appropriate should be selected irrespective of metropolitan or rural zoning and will vary from location to location.

3 Some industrial and commercial sites are not predominant sources of high background sound levels.

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Figure No. 1: Subject Site Location

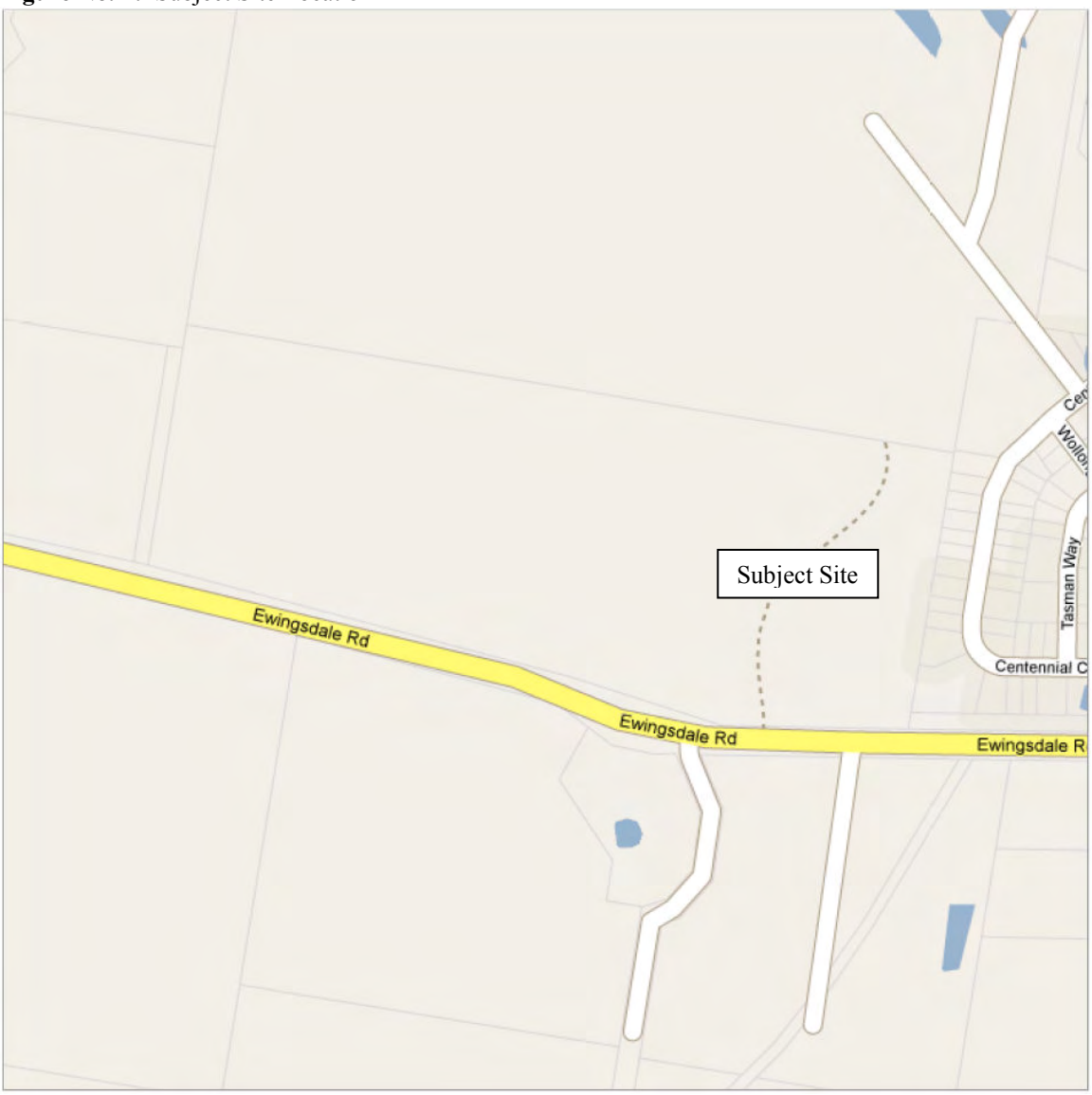
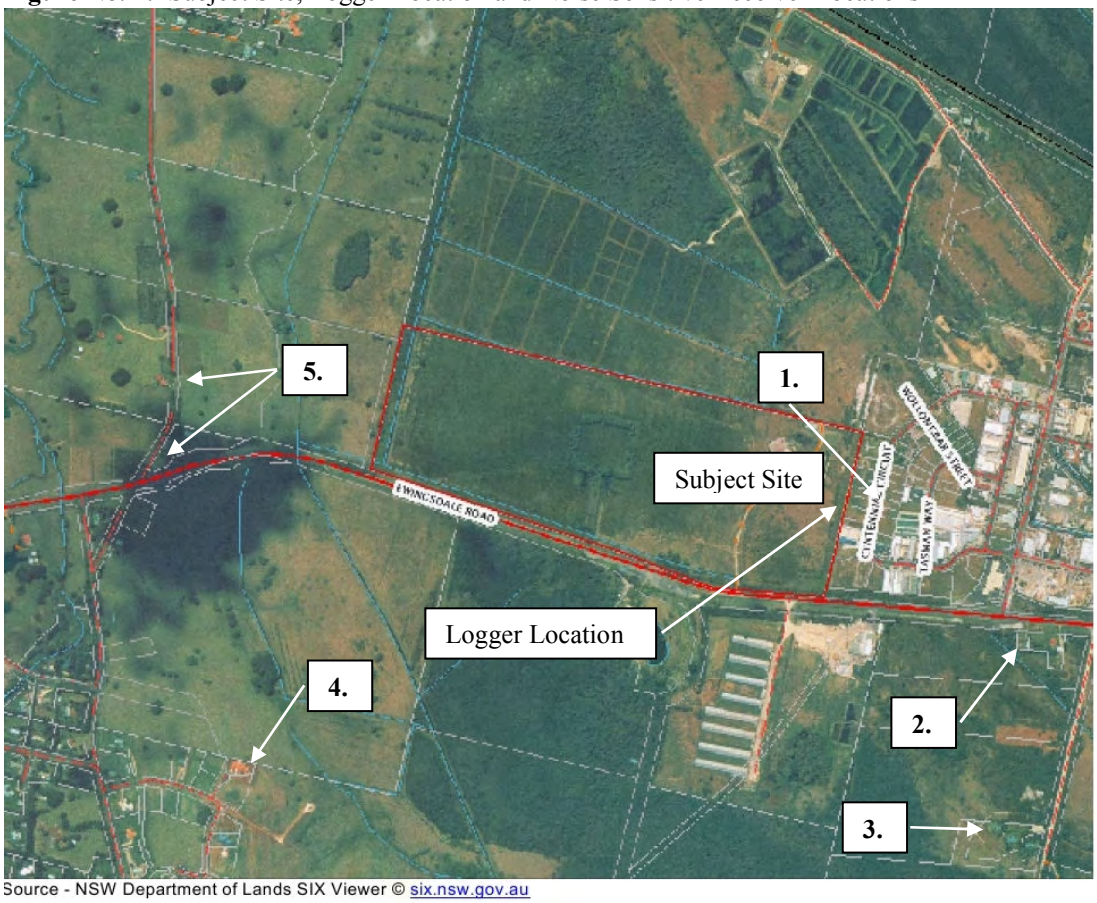


Figure No. 2: Subject Site, Logger Location and Noise Sensitive Receiver Locations



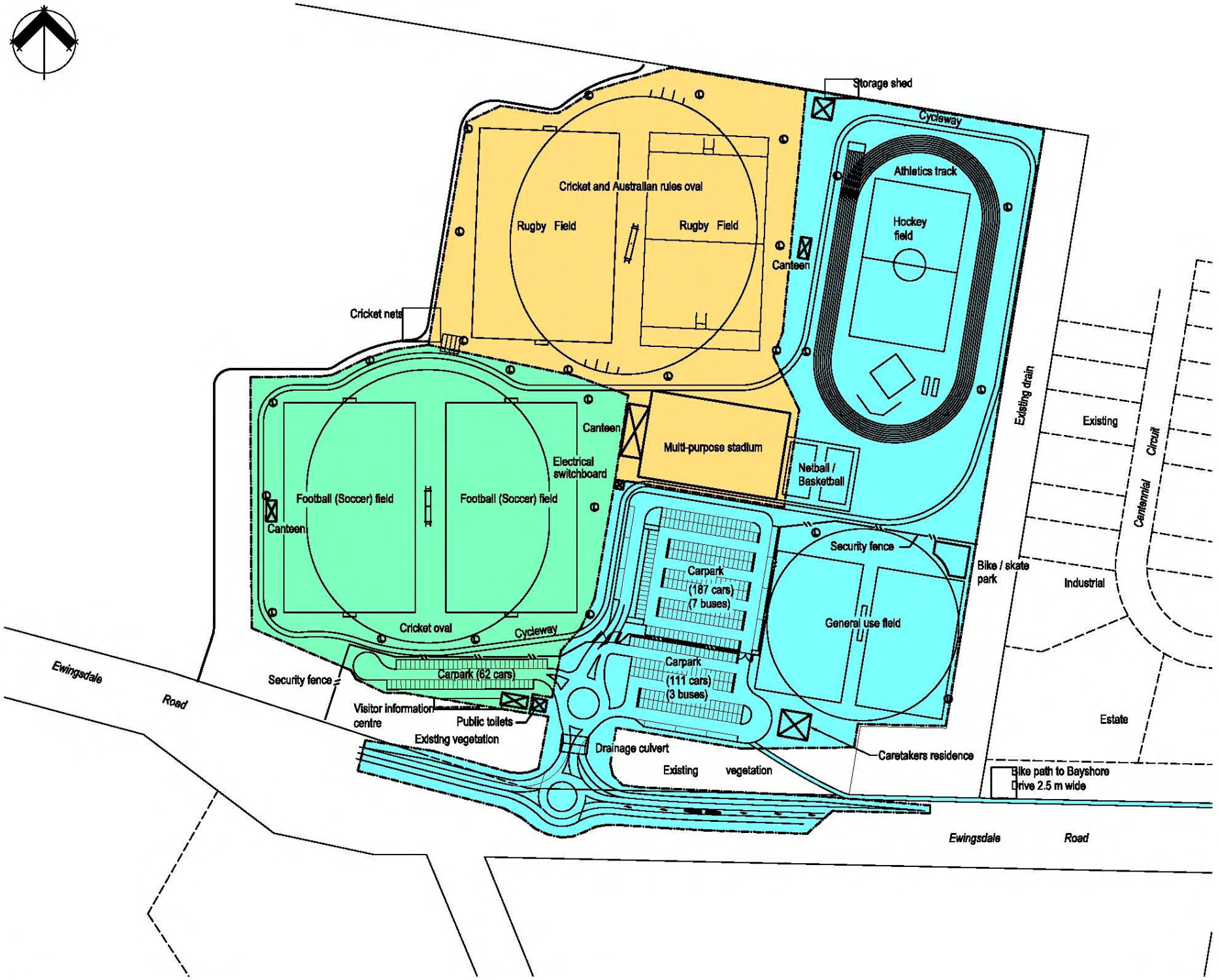
Source - NSW Department of Lands SIX Viewer © six.nsw.gov.au

NOISE SENSITIVE RECEIVER LOCATIONS

1. Residential dwellings within the industrial estate due east of the site at approximately 100m;
2. Residential dwellings due east across Ewingsdale Road at approx. 500m;
3. Melaleuca Bed and Breakfast due southeast across Ewingsdale Road at approx. 700m;
4. Residential dwellings due southwest across Ewingsdale Road at approx. 1,000m; and
5. Residential dwellings due west at approx. 1,100m.

APPENDIX B

Development Plans



No.	Description	Date	Initial
A	Amended after review	5/11/08	TTC

Amendments

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GeoLINK
environmental management and design
Level 1, 64 Bellina Street
PO Box 9
LEMNOX HEAD NSW 2478
T 02 6687 7666
F 02 6687 7782
info@geolink.net.au

33 Gordon Street
PO Box 1448
COFFS HARBOUR NSW 2450
T 02 6651 7666
F 02 6651 7733

www.geolink.net.au
quality solutions sustainable future

Project Title
Ewingsdale Community Sports Centre

Client
Byron Shire Council

Designed	TRE	Drawn	TRE	Checked
Approved		Date	Oct 08	
XREFs				
Scale				

metres 0 10 20 30 40 50

Drawing Title
Proposed Layout

1058123

Drawing Number	Revision
1058/01	A

APPENDIX C

Measurement Results and Model Calculations / Predictions

Byron Bay, New South Wales
January 2009 Daily Weather Observations

Most observations from Byron Bay automatic weather station, but some from Byron Bay (Cape Byron Lighthouse).

Australian Government
Bureau of Meteorology

Date	Day	Temps		Rain	Evap	Sun	Max wind gust			9am						3pm					
		Min	Max				Dirn	Spd	Time	Temp	RH	Cld	Dirn	Spd	MSLP	Temp	RH	Cld	Dirn	Spd	MSLP
		°C	°C	mm	mm	hours		km/h	local	°C	%	eighths		km/h	hPa	°C	%	eighths		km/h	hPa
1	Th																				
2	Fr															22.7	84		SSW	35	1010.2
3	Sa		25.1				ESE	81	03:15	23.1	77		E	61	1015.1						
4	Su	22.1	26.0	0			E	57	06:11	23.6	53		E	41	1017.8	25.5	50		SSE	20	1016.3
5	Mo	18.4	27.0	0			S	35	11:19	20.9	72		SW	22	1015.0	25.9	67		SE	19	1013.4
6	Tu	20.8	30.9	0			ENE	37	21:24	24.2	71		SE	11	1014.1	29.6	50		E	19	1012.6
7	We	22.6	30.8	0			NE	39	19:10	26.8	67		ENE	9	1013.8	29.7	56		NE	30	1011.5
8	Th	22.1	28.1	0			N	31	14:41	25.2	76				1010.4	27.0	67		N	17	1009.2
9	Fr	21.6	23.8	0			S	76	13:50	23.0	80		SSW	50	1011.9	23.2	74		S	54	1011.9
10	Sa	18.3	24.2	0.8			S	65	23:38	21.8	59		S	41	1013.3	23.5	62		S	33	1011.9
11	Su	18.0	29.1	0			ESE	37	13:28	19.7	70		SW	11	1013.0	26.3	60		E	26	1011.7
12	Mo	19.6	29.9	0.2			E	33	18:39	23.6	72		S	11	1014.8	27.9	52		E	19	1014.2
13	Tu	22.8	29.2	0			E	46	02:51	24.9	63		E	24	1018.0	28.5	53		E	31	1016.7
14	We	21.5	30.0	0			E	35	00:51	24.9	53		E	19	1018.0	29.7	42		E	19	1017.0
15	Th	18.5	27.5	0			N	50	14:41	23.9	66		NNW	6	1016.5	26.2	62		N	30	1013.3
16	Fr	22.9		0						24.6	70		N	17	1012.2						
Statistics for the first 16 days of January 2009																					
Mean		20.7	27.8							23.6	67			24	1014.6	26.6	59			27	1013.1
Lowest		18.0	23.8							19.7	53		NNW	6	1010.4	22.7	42		N	17	1009.2
Highest		22.9	30.9	0.8			ESE	81		26.8	80		E	61	1018.0	29.7	84		S	54	1017.0
Total				1.0																	

Temperature, humidity, wind, pressure and rainfall observations are from Byron Bay (Cape Byron AWS) {station 058216}. Cloud observations are from Byron Bay (Cape Byron Lighthouse) {station 058009}

The closest station with sunshine and evaporation observations is at Alstonville, about 29 km to the southwest.

IDCJDW2022.200901 Prepared at 23:36 GMT on 15 Jan 2009

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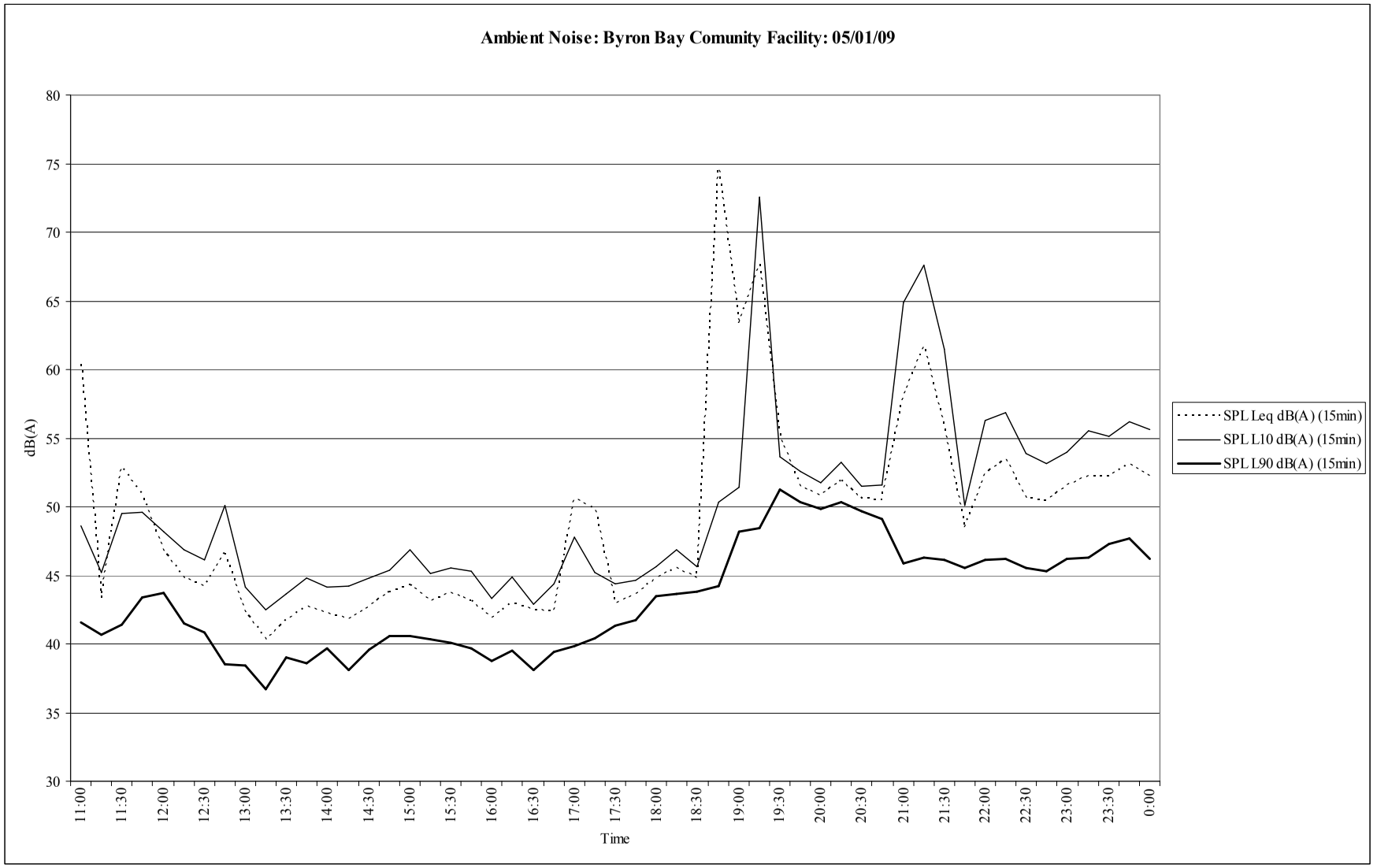
Ambient Noise: Byron Bay Comunity Facility: 05/01/09
dB(A)
80
75
70
65
60
55
50
45
40
35
30
11:00
11:30
12:00
12:30
13:00
13:30
14:00
14:30
15:00
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16:00
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18:00
18:30
19:00
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20:00
20:30
21:00
21:30
22:00
22:30
23:00
23:30
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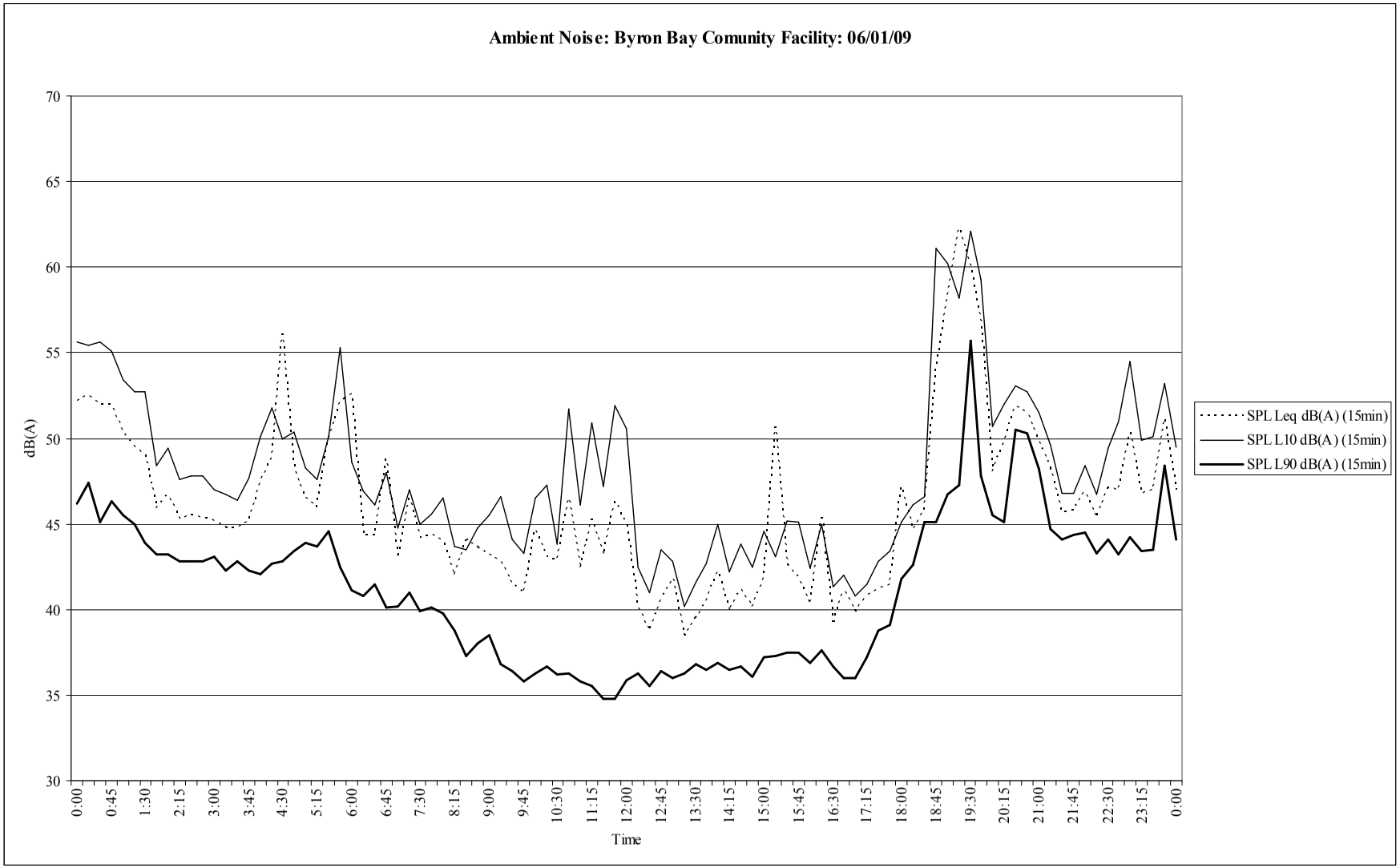
Time
SPL Leq dB(A) (15min)
SPL L10 dB(A) (15min)
SPL L90 dB(A) (15min)


Ambient Noise: Byron Bay Comunity Facility: 06/01/09
dB(A)
70
65
60
55
50
45
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35
30
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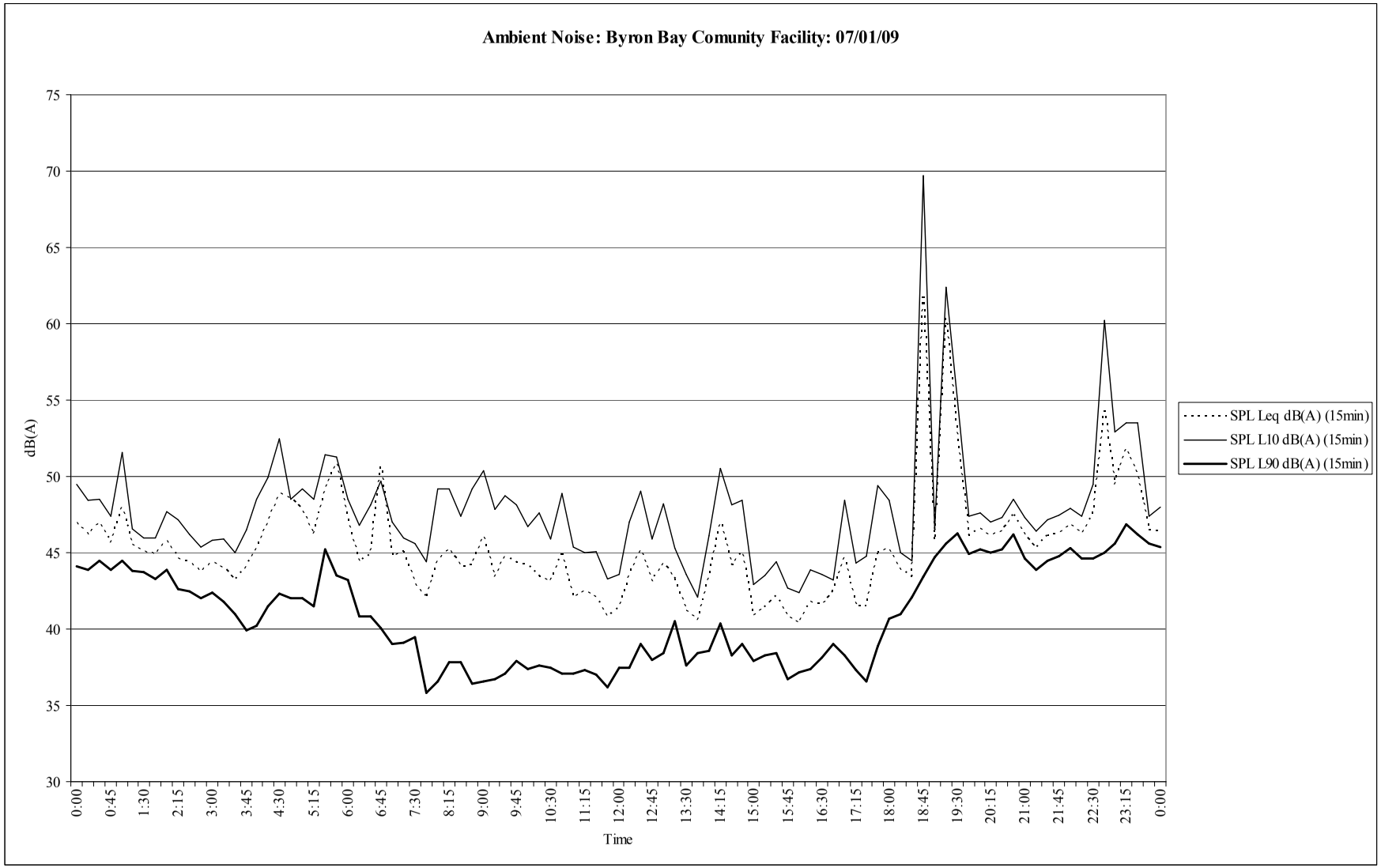
15:00
15:45
16:30
17:15
18:00
18:45
19:30
20:15
21:00
21:45
22:30
23:15
0:00
Time
SPL Leq dB(A) (15min)
SPL L10 dB(A) (15min)
SPL L90 dB(A) (15min)


Ambient Noise: Byron Bay Comunity Facility: 07/01/09
dB(A)
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1:30
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3:45
4:30
5:15
6:00
6:45
7:30
8:15
9:00
9:45
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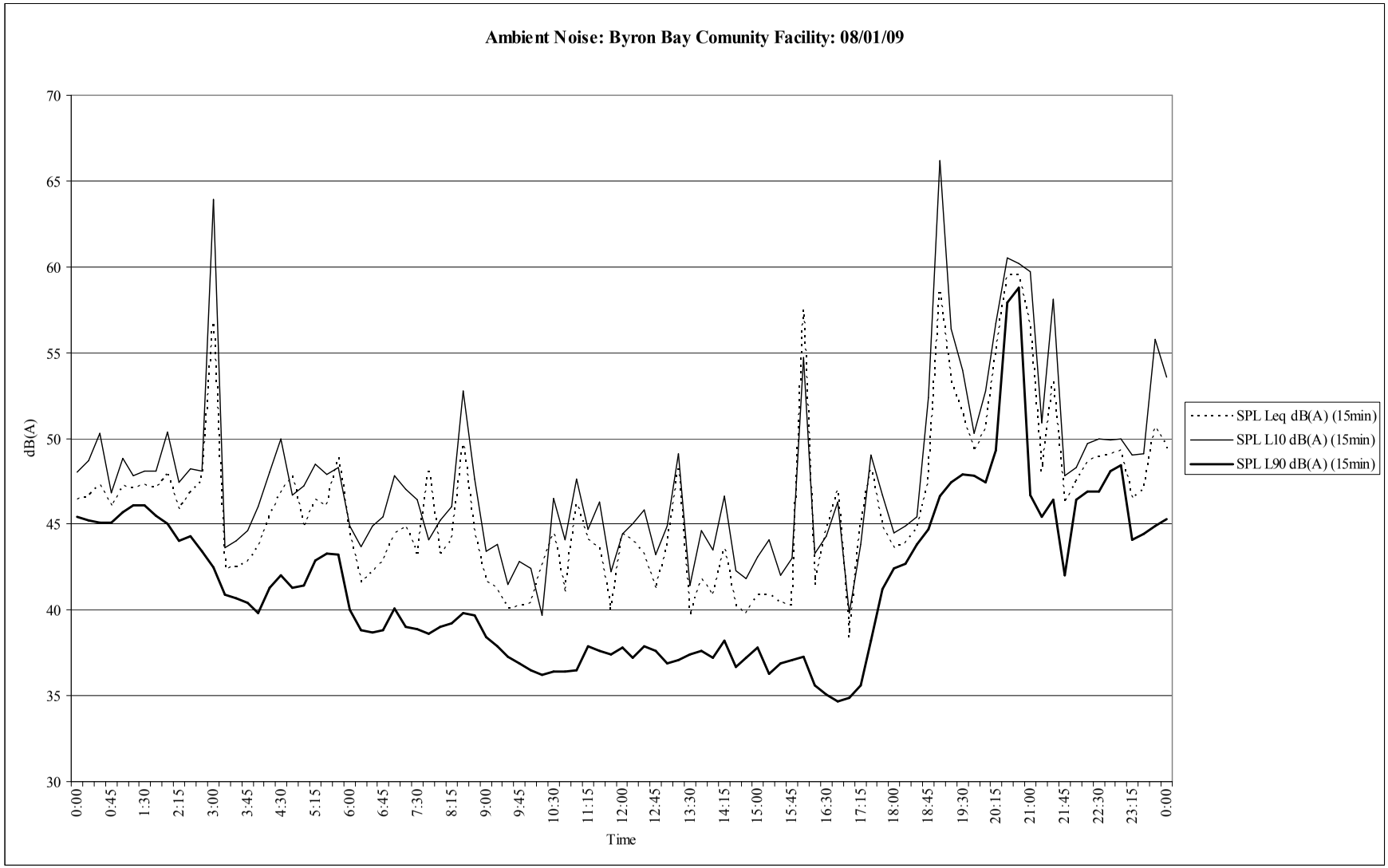
15:00
15:45
16:30
17:15
18:00
18:45
19:30
20:15
21:00
21:45
22:30
23:15
0:00
Time
SPL Leq dB(A) (15min)
SPL L10 dB(A) (15min)
SPL L90 dB(A) (15min)


Ambient Noise: Byron Bay Comunity Facility: 08/01/09
dB(A)
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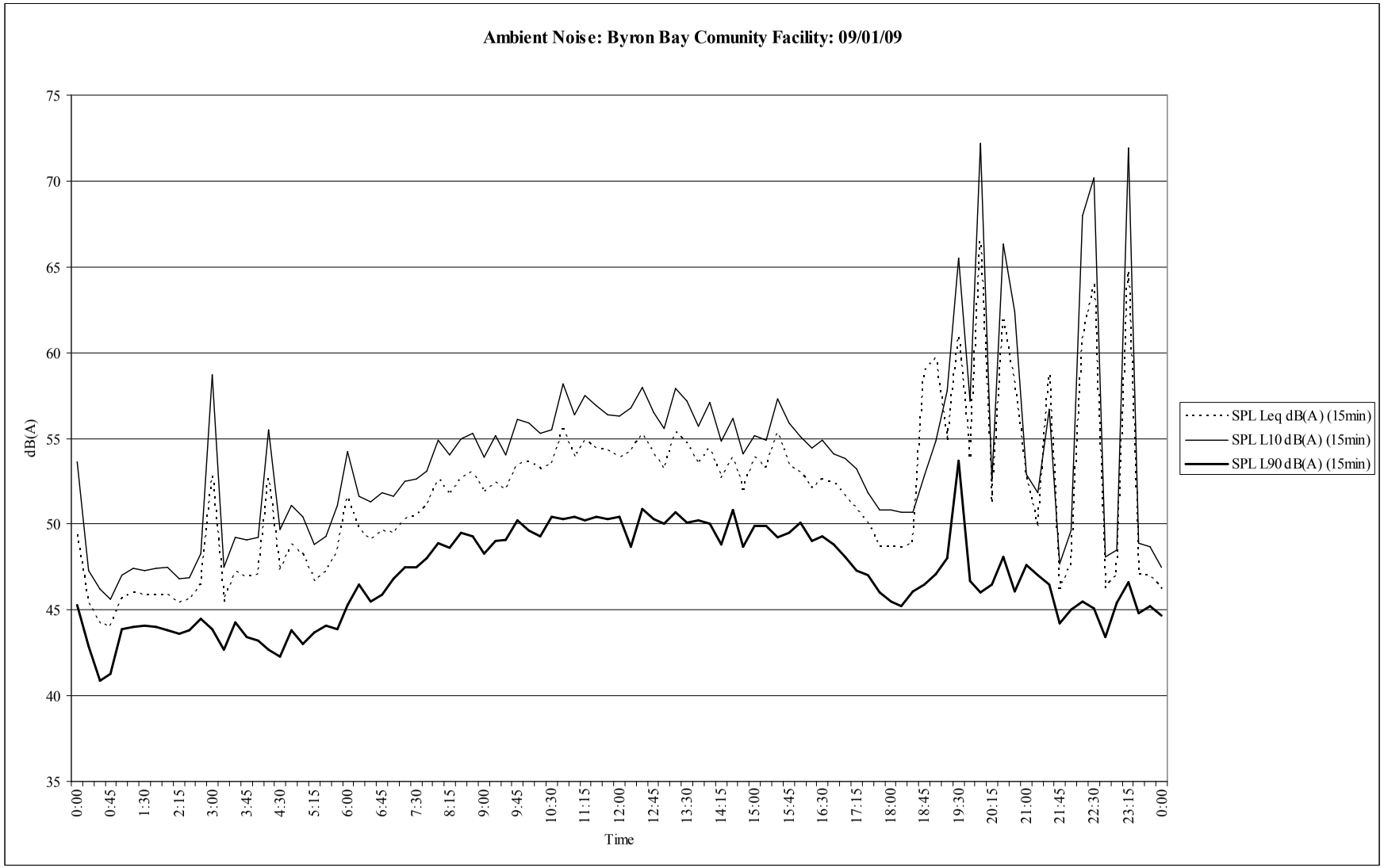
14:15
15:00
15:45
16:30
17:15
18:00
18:45
19:30
20:15
21:00
21:45
22:30
23:15
0:00
Time
SPL Leq dB(A) (15min)
SPL L10 dB(A) (15min)
SPL L90 dB(A) (15min)


Ambient Noise: Byron Bay Comunity Facility: 09/01/09
dB(A)
75
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65
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55
50
45
40
35
0:00
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18:00
18:45
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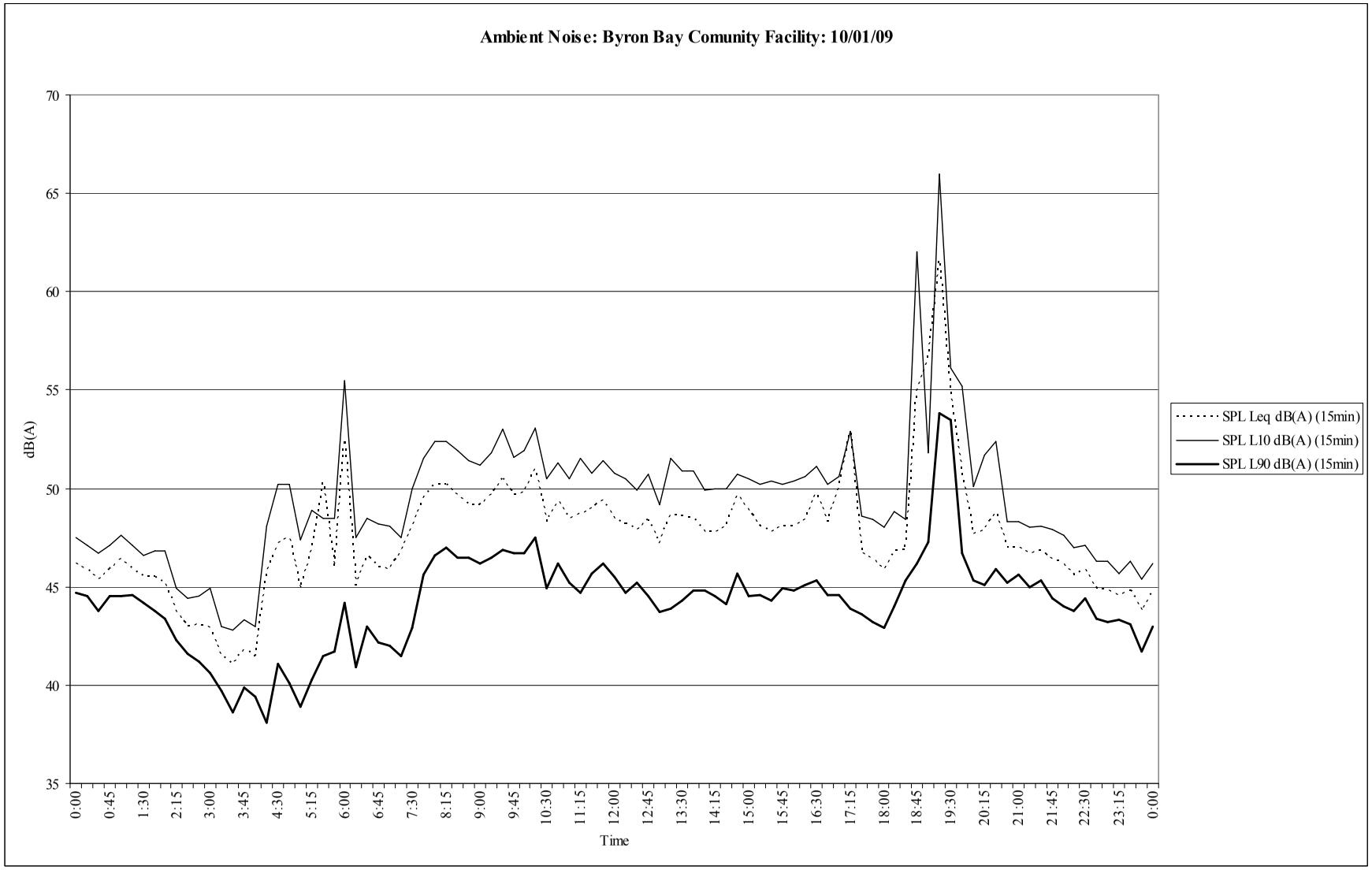
20:15
21:00
21:45
22:30
23:15
0:00
Time
SPL Leq dB(A) (15min)
SPL L10 dB(A) (15min)
SPL L90 dB(A) (15min)


Ambient Noise: Byron Bay Comunity Facility: 10/01/09
70
65
60
55
50
45
40
35
dB(A)
0:00
0:45
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17:15
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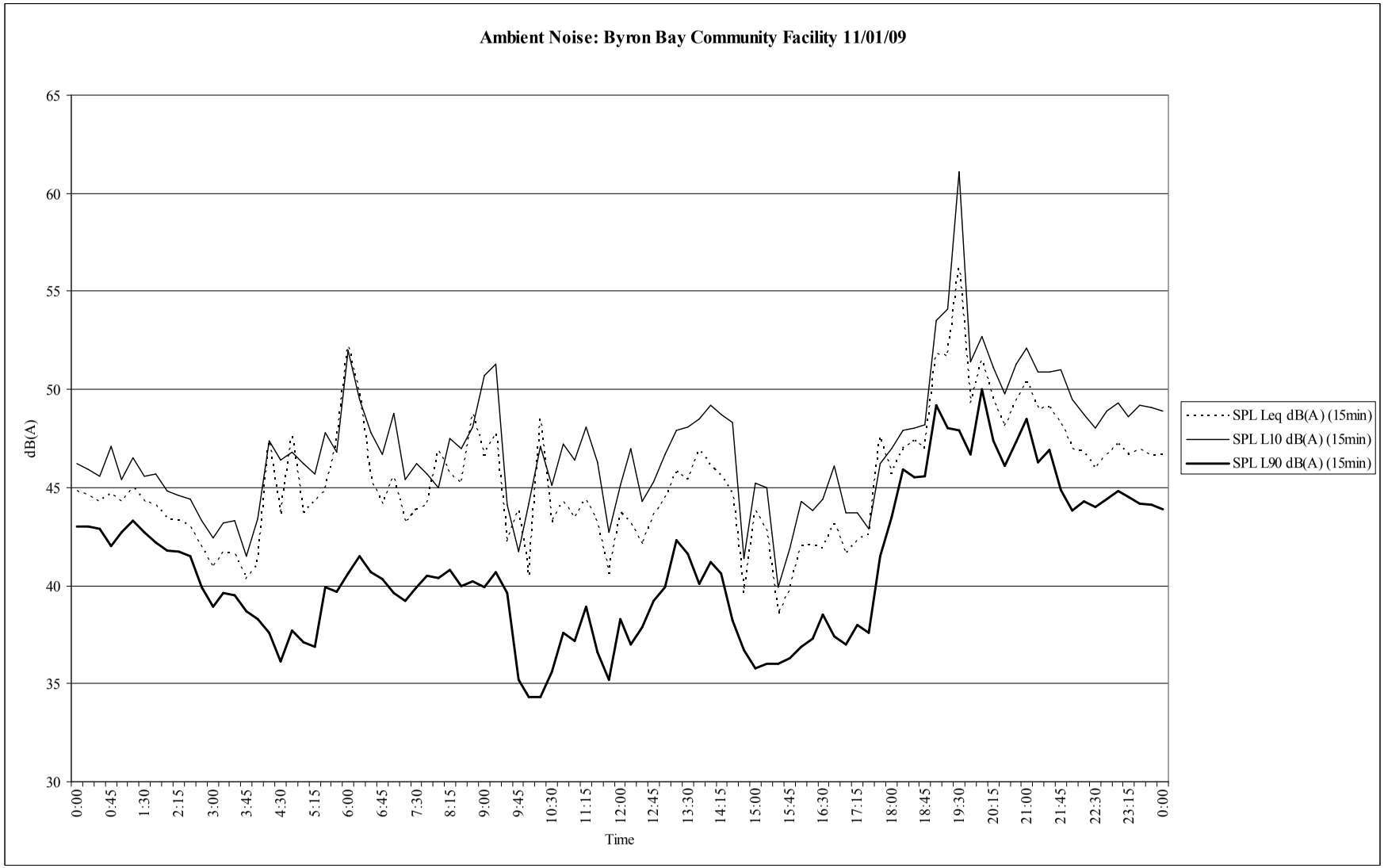
18:45
19:30
20:15
21:00
21:45
22:30
23:15
0:00
Time
SPL Leq dB(A) (15min)
SPL L10 dB(A) (15min)
SPL L90 dB(A) (15min)


Ambient Noise: Byron Bay Community Facility 11/01/09
dB(A)
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55
50
45
40
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0:00
0:45
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3:00
3:45
4:30
5:15
6:00
6:45
7:30
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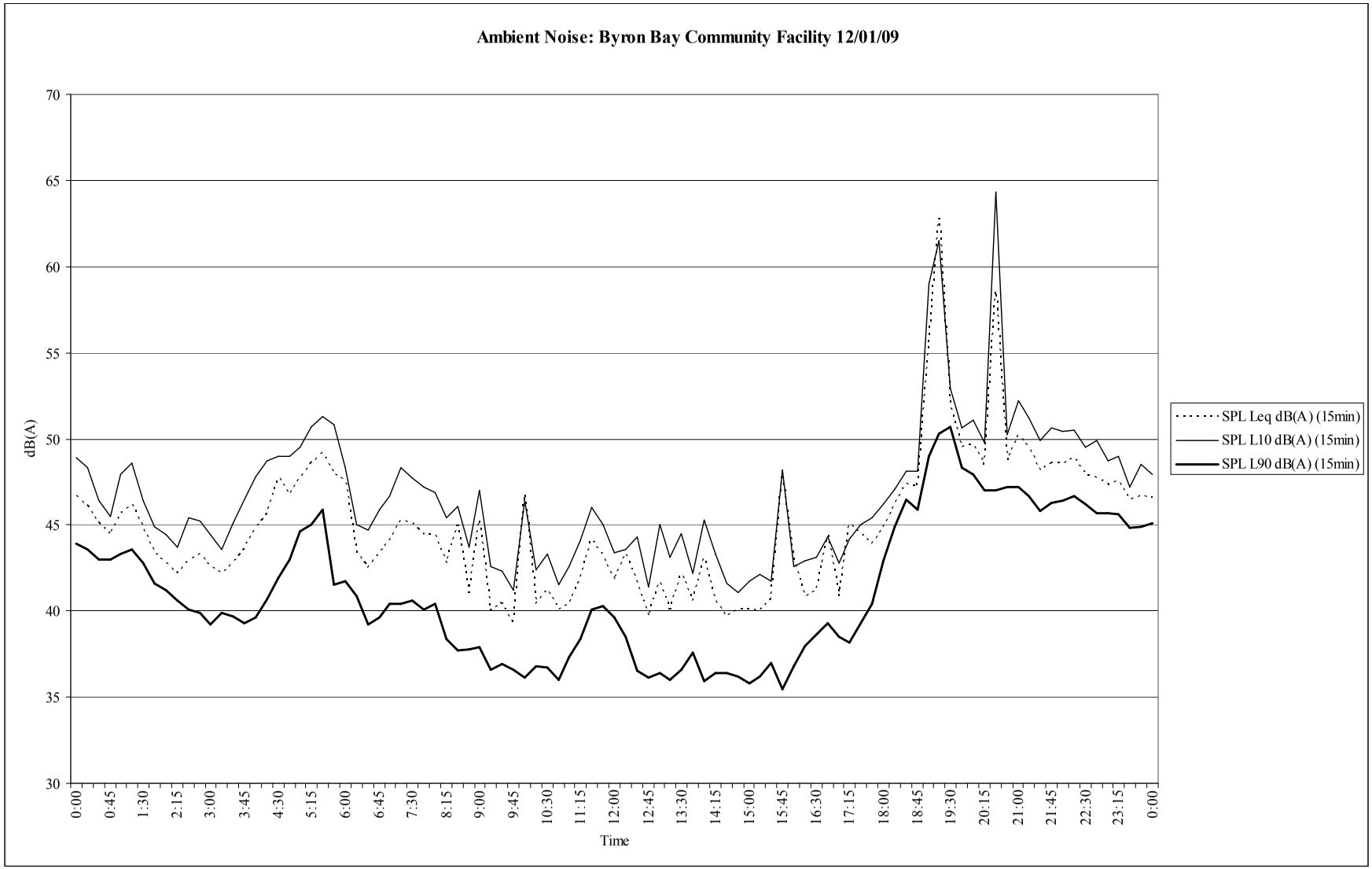
15:45
16:30
17:15
18:00
18:45
19:30
20:15
21:00
21:45
22:30
23:15
0:00
Time
SPL Leq dB(A) (15min)
SPL L10 dB(A) (15min)
SPL L90 dB(A) (15min)


Ambient Noise: Byron Bay Community Facility 12/01/09
dB(A)
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50
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0:45
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7:30
8:15
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10:30
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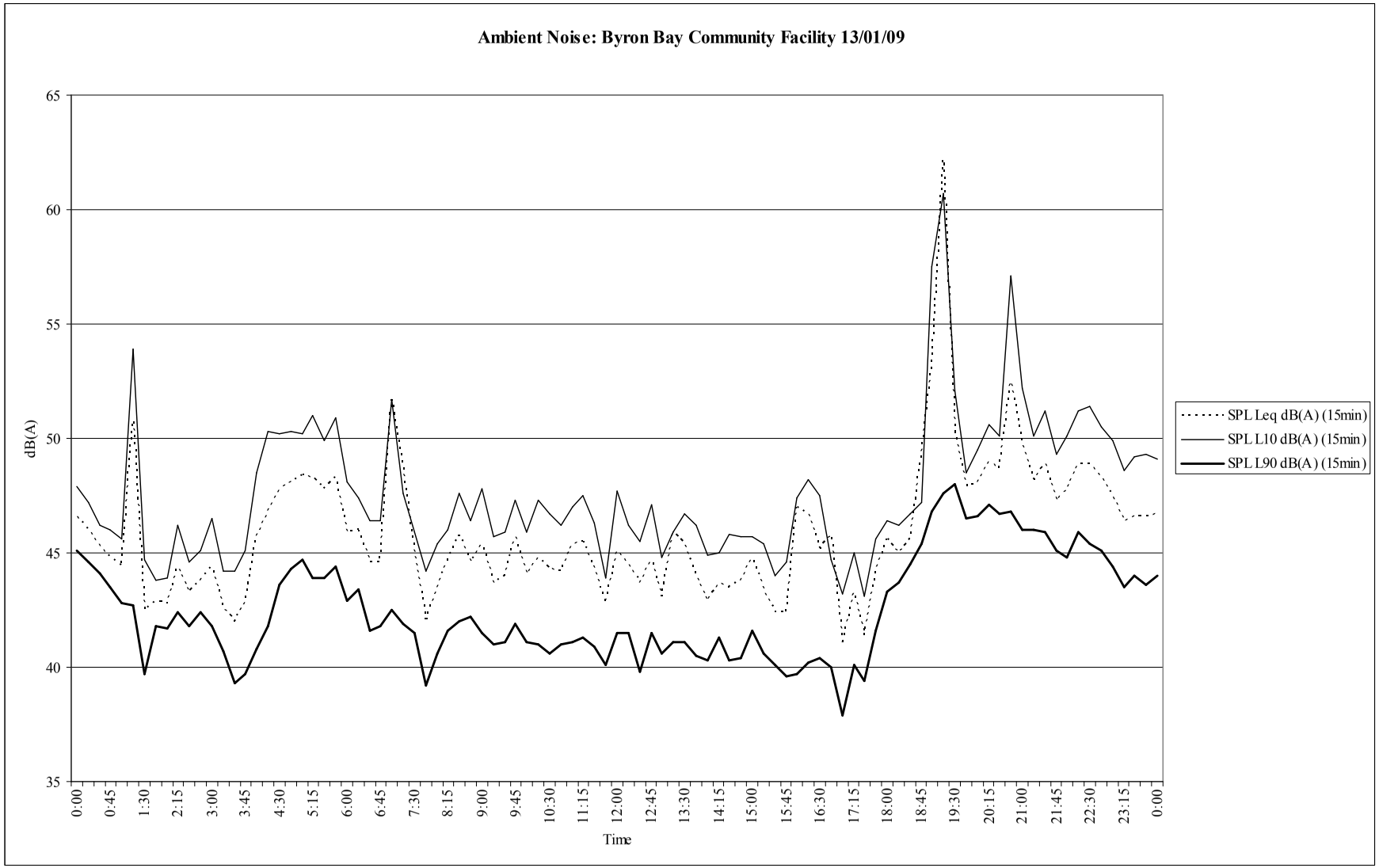
12:00
12:45
13:30
14:15
15:00
15:45
16:30
17:15
18:00
18:45
19:30
20:15
21:00
21:45
22:30
23:15
0:00
Time
SPL Leq dB(A) (15min)
SPL L10 dB(A) (15min)
SPL L90 dB(A) (15min)


Ambient Noise: Byron Bay Community Facility 13/01/09
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60
55
50
45
40
35
dB(A)
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0:45
1:30
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3:00
3:45
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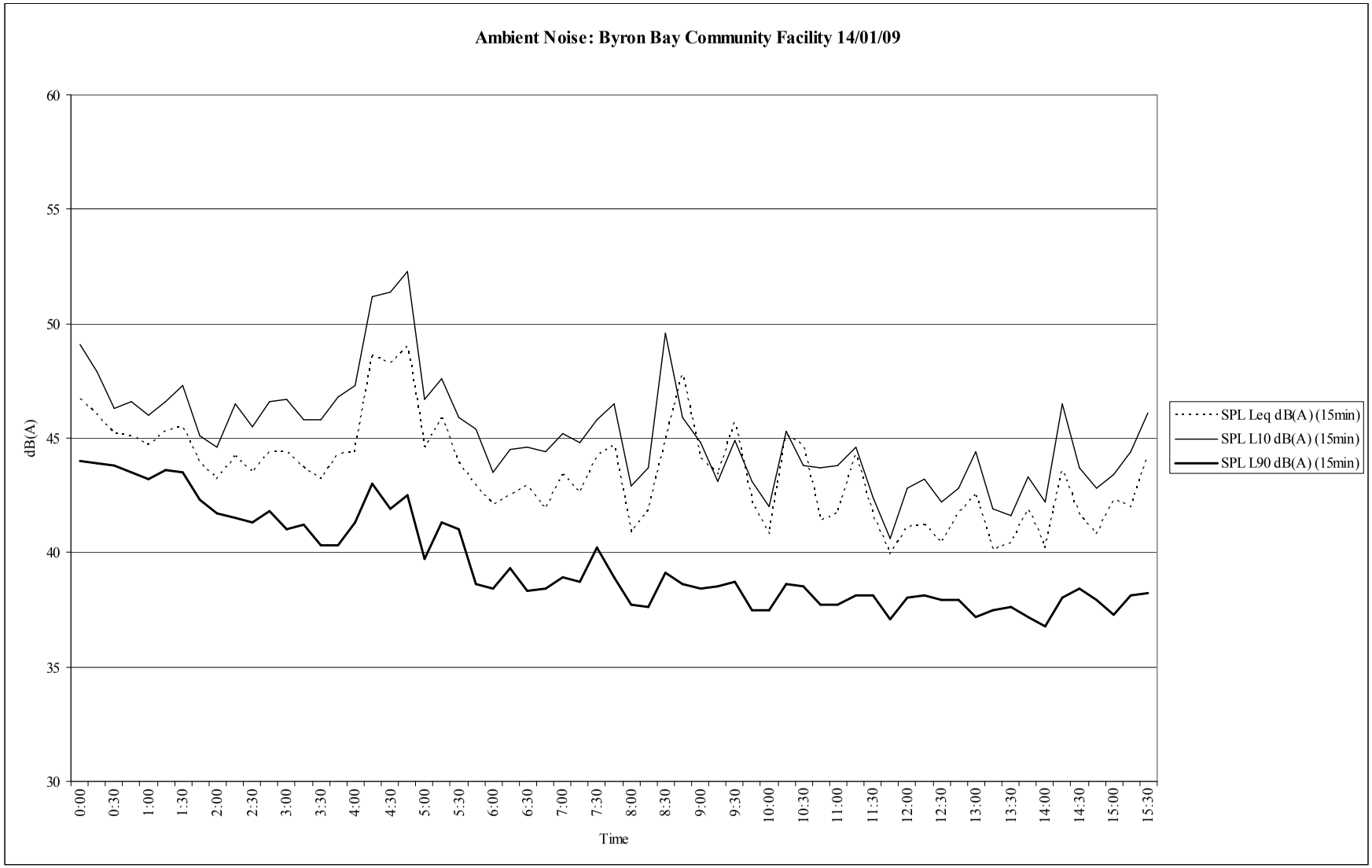
15:45
16:30
17:15
18:00
18:45
19:30
20:15
21:00
21:45
22:30
23:15
0:00
Time
SPL Leq dB(A) (15min)
SPL L10 dB(A) (15min)
SPL L90 dB(A) (15min)


Ambient Noise: Byron Bay Community Facility 14/01/09
60
55
50
45
40
35
30
dB(A)
0:00
0:30
1:00
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2:00
2:30
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4:30
5:00
5:30
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10:00
10:30
11:00
11:30
12:00
12:30
13:00
13:30
14:00
14:30
15:00
15:30
Time
SPL Leq dB(A) (15min)
SPL L10 dB(A) (15min)
SPL L90 dB(A) (15min)

Onsite Activities Impacting					
Dwellings due East			**Bed and Breakfast due Southeast**		
Car door closure	83.0	dB(A) @ 1m	Car door closure	83.0	dB(A) @ 1m
Distance to receiver	250.0	m	Distance to receiver	760.0	m
Barrier Attenuation	0.0	dB	Barrier Attenuation	0.0	dB
Distance attenuation	-48.0	dB	Distance attenuation	-57.6	dB
Façade reflection	2.5	dB(A)	Façade reflection	2.5	dB(A)
Impact at Façade	37.5	dB(A)	Impact at Façade	27.9	dB(A)
Impact inside	30.0	dB(A)	Impact inside	20.4	dB(A)
Car bypass @ 5km/hr	77.0	dB(A) @ 1m	Car bypass @ 5km/hr	77.0	dB(A) @ 1m
Distance to receiver	245.0	m	Distance to receiver	750.0	m
Barrier Attenuation	0.0	dB	Barrier Attenuation	0.0	dB
Distance attenuation	-47.8	dB	Distance attenuation	-57.5	dB
Façade reflection	2.5	dB(A)	Façade reflection	2.5	dB(A)
Impact at Façade	31.7	dB(A)	Impact at Façade	22.0	dB(A)
Impact inside	24.2	dB(A)	Impact inside	<20	dB(A)
Alfresco dining at canteen	75.0	dB(A) @ 1m	Alfresco dining at canteen	75.0	dB(A) @ 1m
Distance to receiver	220.0	m	Distance to receiver	870.0	m
Barrier Attenuation	0.0	dB	Barrier Attenuation	0.0	dB
Distance attenuation	-46.8	dB	Distance attenuation	-58.8	dB
Façade reflection	2.5	dB(A)	Façade reflection	2.5	dB(A)
Impact at Façade	30.7	dB(A)	Impact at Façade	<20	dB(A)
Impact inside	23.2	dB(A)	Impact inside	<20	dB(A)
Referee whistle	93.0	dB(A) @ 1m	Referee whistle	93.0	dB(A) @ 1m
Distance to receiver	140.0	m	Distance to receiver	690.0	m
Building screening	0.0	dB	Barrier Attenuation	0.0	dB
Distance attenuation	-42.9	dB	Distance attenuation	-56.8	dB
Façade reflection	2.5	dB(A)	Façade reflection	2.5	dB(A)
Impact at Façade	52.6	dB(A)	Impact at Façade	38.7	dB(A)
Impact inside	45.1	dB(A)	Impact inside	31.2	dB(A)
Children at play	80.0	dB(A) @ 1m	Children at play	80.0	dB(A) @ 1m
Distance to receiver	120.0	m	Distance to receiver	690.0	m
Barrier Attenuation	0.0	dB	Barrier Attenuation	0.0	dB
Distance attenuation	-41.6	dB	Distance attenuation	-56.8	dB
Façade reflection	2.5	dB(A)	Façade reflection	2.5	dB(A)
Impact at Façade	40.9	dB(A)	Impact at Façade	25.7	dB(A)
Impact inside	33.4	dB(A)	Impact inside	<20	dB(A)
Boisterous crowd	85.0	dB(A) @ 1m	Boisterous crowd	85.0	dB(A) @ 1m
Distance to receiver	195.0	m	Distance to receiver	690.0	m
Building screening	0.0	dB	Barrier Attenuation	0.0	dB
Distance attenuation	-45.8	dB	Distance attenuation	-56.8	dB
Façade reflection	2.5	dB(A)	Façade reflection	2.5	dB(A)
Impact at Façade	41.7	dB(A)	Impact at Façade	30.7	dB(A)
Impact inside	34.2	dB(A)	Impact inside	23.2	dB(A)

Onsite Activities Impacting					
Dwellings due East			**Bed and Breakfast due Southeast**		
Festival band music	110.0	dB(A) @ 3m	Festival band music	110.0	dB(A) @ 3m
Distance to receiver	110.0	m	Distance to receiver	700.0	m
Barrier Attenuation	0.0	dB	Barrier Attenuation	0.0	dB
Distance attenuation	-31.3	dB	Distance attenuation	-47.4	dB
Façade reflection	2.5	dB(A)	Façade reflection	2.5	dB(A)
Impact at Façade	81.2	dB(A)	Impact at Façade	65.1	dB(A)
Impact inside	73.7	dB(A)	Impact inside	57.6	dB(A)
Rw to achieve 45 dB(A) inside	39.7		Rw to achieve 45 dB(A) inside	23.6	
Deliveries	87.0	dB(A) @ 1m	Deliveries	87.0	dB(A) @ 1m
Distance to receiver	245.0	m	Distance to receiver	750.0	m
Barrier Attenuation	0.0	dB	Barrier Attenuation	0.0	dB
Distance attenuation	-47.8	dB	Distance attenuation	-57.5	dB
Façade reflection	2.5	dB(A)	Façade reflection	2.5	dB(A)
Impact at Façade	41.7	dB(A)	Impact at Façade	32.0	dB(A)
Impact inside	34.2	dB(A)	Impact inside	24.5	dB(A)
Waste Collection	97.0	dB(A) @ 1m	Waste Collection	97.0	dB(A) @ 1m
Distance to receiver	245.0	m	Distance to receiver	750.0	m
Barrier Attenuation	0.0	dB	Barrier Attenuation	0.0	dB
Distance attenuation	-47.8	dB	Distance attenuation	-57.5	dB
Façade reflection	2.5	dB(A)	Façade reflection	2.5	dB(A)
Impact at Façade	51.7	dB(A)	Impact at Façade	42.0	dB(A)
Impact inside	44.2	dB(A)	Impact inside	34.5	dB(A)
Cluster of A/C condensor units	55	dB(A) @ 1m	Cluster of A/C condensor units	55	dB(A) @ 1m
Number of condensor units	3	units	Number of condensor units	3	units
Combined source level	60	dB(A) @ 1m	Combined source level	60	dB(A) @ 1m
Distance source to receiver	225	m	Distance source to receiver	730	m
Distance attenuation	-47.0	dB(A)	Distance attenuation	-57.3	dB(A)
Directivity	0	dB(A)	Directivity	0	dB(A)
Façade reflection	2.5	dB(A)	Façade reflection	2.5	dB(A)
Impact at façade	<20	dB(A)	Impact at façade	<20	dB(A)
Impact inside opern window	<20	dB(A)	Impact inside opern window	<20	dB(A)
Commercial A/C Plant	70.0	dB(A) @ 1m	Commercial A/C Plant	70.0	dB(A) @ 1m
Distance to receiver	225.0	m	Distance to receiver	850.0	m
Barrier Attenuation	0.0	dB	Barrier Attenuation	0.0	dB
Distance attenuation	-47.0	dB	Distance attenuation	-58.6	dB
Façade reflection	2.5	dB(A)	Façade reflection	2.5	dB(A)
Impact at Façade	25.5	dB(A)	Impact at Façade	<20	dB(A)
Impact inside	<20	dB(A)	Impact inside	<20	dB(A)
Refrigeration plant	75.0	dB(A) @ 1m	Refrigeration plant	75.0	dB(A) @ 1m
Distance to receiver	225.0	m	Distance to receiver	850.0	m
Barrier Attenuation	0.0	dB	Barrier Attenuation	0.0	dB
Distance attenuation	-47.0	dB	Distance attenuation	-58.6	dB
Façade reflection	2.5	dB(A)	Façade reflection	2.5	dB(A)
Impact at Façade	30.5	dB(A)	Impact at Façade	<20	dB(A)
Impact inside	23.0	dB(A)	Impact inside	<20	dB(A)

Onsite Activities Impacting					
Dwellings due Southwest			**Dwellings due West**		
Car door closure	83.0	dB(A) @ 1m	Car door closure	83.0	dB(A) @ 1m
Distance to receiver	1075.0	m	Distance to receiver	1165.0	m
Barrier Attenuation	0.0	dB	Barrier Attenuation	0.0	dB
Distance attenuation	-60.6	dB	Distance attenuation	-61.3	dB
Façade reflection	2.5	dB(A)	Façade reflection	2.5	dB(A)
Impact at Façade	24.9	dB(A)	Impact at Façade	24.2	dB(A)
Impact inside	<20	dB(A)	Impact inside	<20	dB(A)
Car bypass @ 5km/hr	77.0	dB(A) @ 1m	Car bypass @ 5km/hr	77.0	dB(A) @ 1m
Distance to receiver	1060.0	m	Distance to receiver	1145.0	m
Barrier Attenuation	0.0	dB	Barrier Attenuation	0.0	dB
Distance attenuation	-60.5	dB	Distance attenuation	-61.2	dB
Façade reflection	2.5	dB(A)	Façade reflection	2.5	dB(A)
Impact at Façade	<20	dB(A)	Impact at Façade	<20	dB(A)
Impact inside	<20	dB(A)	Impact inside	<20	dB(A)
Alfresco dining at canteen	75.0	dB(A) @ 1m	Alfresco dining at canteen	75.0	dB(A) @ 1m
Distance to receiver	1125.0	m	Distance to receiver	1090.0	m
Barrier Attenuation	0.0	dB	Barrier Attenuation	0.0	dB
Distance attenuation	-61.0	dB	Distance attenuation	-60.7	dB
Façade reflection	2.5	dB(A)	Façade reflection	2.5	dB(A)
Impact at Façade	<20	dB(A)	Impact at Façade	<20	dB(A)
Impact inside	<20	dB(A)	Impact inside	<20	dB(A)
Referee whistle	93.0	dB(A) @ 1m	Referee whistle	93.0	dB(A) @ 1m
Distance to receiver	1040.0	m	Distance to receiver	1090.0	m
Barrier Attenuation	0.0	dB	Barrier Attenuation	0.0	dB
Distance attenuation	-60.3	dB	Distance attenuation	-60.7	dB
Façade reflection	2.5	dB(A)	Façade reflection	2.5	dB(A)
Impact at Façade	35.2	dB(A)	Impact at Façade	34.8	dB(A)
Impact inside	27.7	dB(A)	Impact inside	27.3	dB(A)
Children at play	80.0	dB(A) @ 1m	Children at play	80.0	dB(A) @ 1m
Distance to receiver	1040.0	m	Distance to receiver	1090.0	m
Barrier Attenuation	0.0	dB	Barrier Attenuation	0.0	dB
Distance attenuation	-60.3	dB	Distance attenuation	-60.7	dB
Façade reflection	2.5	dB(A)	Façade reflection	2.5	dB(A)
Impact at Façade	22.2	dB(A)	Impact at Façade	21.8	dB(A)
Impact inside	<20	dB(A)	Impact inside	<20	dB(A)
Boisterous crowd	85.0	dB(A) @ 1m	Boisterous crowd	85.0	dB(A) @ 1m
Distance to receiver	1040.0	m	Distance to receiver	1090.0	m
Barrier Attenuation	0.0	dB	Barrier Attenuation	0.0	dB
Distance attenuation	-60.3	dB	Distance attenuation	-60.7	dB
Façade reflection	2.5	dB(A)	Façade reflection	2.5	dB(A)
Impact at Façade	27.2	dB(A)	Impact at Façade	26.8	dB(A)
Impact inside	19.7	dB(A)	Impact inside	<20	dB(A)

Onsite Activities Impacting					
Dwellings due Southwest			**Dwellings due West**		
Festival band music	110.0	dB(A) @ 3m	Festival band music	110.0	dB(A) @ 3m
Distance to receiver	1050.0	m	Distance to receiver	1090.0	m
Barrier Attenuation	0.0	dB	Barrier Attenuation	0.0	dB
Distance attenuation	-50.9	dB	Distance attenuation	-51.2	dB
Façade reflection	2.5	dB(A)	Façade reflection	2.5	dB(A)
Impact at Façade	61.6	dB(A)	Impact at Façade	61.3	dB(A)
Impact inside	54.1	dB(A)	Impact inside	53.8	dB(A)
Rw to achieve 45 dB(A) inside	20.1		Rw to achieve 45 dB(A) inside	19.8	
Deliveries	87.0	dB(A) @ 1m	Deliveries	87.0	dB(A) @ 1m
Distance to receiver	1150.0	m	Distance to receiver	1200.0	m
Barrier Attenuation	0.0	dB	Barrier Attenuation	0.0	dB
Distance attenuation	-61.2	dB	Distance attenuation	-61.6	dB
Façade reflection	2.5	dB(A)	Façade reflection	2.5	dB(A)
Impact at Façade	28.3	dB(A)	Impact at Façade	27.9	dB(A)
Impact inside	20.8	dB(A)	Impact inside	20.4	dB(A)
Waste Collection	97.0	dB(A) @ 1m	Waste Collection	97.0	dB(A) @ 1m
Distance to receiver	1150.0	m	Distance to receiver	1200.0	m
Barrier Attenuation	0.0	dB	Barrier Attenuation	0.0	dB
Distance attenuation	-61.2	dB	Distance attenuation	-61.6	dB
Façade reflection	2.5	dB(A)	Façade reflection	2.5	dB(A)
Impact at Façade	38.3	dB(A)	Impact at Façade	37.9	dB(A)
Impact inside	30.8	dB(A)	Impact inside	30.4	dB(A)
Cluster of A/C condensor units	55	dB(A) @ 1m	Cluster of A/C condensor units	55	dB(A) @ 1m
Number of condensor units	3	units	Number of condensor units	3	units
Combined source level	60	dB(A) @ 1m	Combined source level	60	dB(A) @ 1m
Distance source to receiver	1125	m	Distance source to receiver	1230	m
Distance attenuation	-61.0	dB(A)	Distance attenuation	-61.8	dB(A)
Directivity	0	dB(A)	Directivity	0	dB(A)
Façade reflection	2.5	dB(A)	Façade reflection	2.5	dB(A)
Impact at façade	<20	dB(A)	Impact at façade	<20	dB(A)
Impact inside opern window	<20	dB(A)	Impact inside opern window	<20	dB(A)
Commercial A/C Plant	70.0	dB(A) @ 1m	Commercial A/C Plant	70.0	dB(A) @ 1m
Distance to receiver	1125.0	m	Distance to receiver	1230.0	m
Barrier Attenuation	0.0	dB	Barrier Attenuation	0.0	dB
Distance attenuation	-61.0	dB	Distance attenuation	-61.8	dB
Façade reflection	2.5	dB(A)	Façade reflection	2.5	dB(A)
Impact at Façade	<20	dB(A)	Impact at Façade	<20	dB(A)
Impact inside	<20	dB(A)	Impact inside	<20	dB(A)
Refrigeration plant	75.0	dB(A) @ 1m	Refrigeration plant	75.0	dB(A) @ 1m
Distance to receiver	1125.0	m	Distance to receiver	1230.0	m
Barrier Attenuation	0.0	dB	Barrier Attenuation	0.0	dB
Distance attenuation	-61.0	dB	Distance attenuation	-61.8	dB
Façade reflection	2.5	dB(A)	Façade reflection	2.5	dB(A)
Impact at Façade	<20	dB(A)	Impact at Façade	<20	dB(A)
Impact inside	<20	dB(A)	Impact inside	<20	dB(A)

Onsite Activities Impacting		
Dwellings due East Across Road		
Car door closure	83.0	dB(A) @ 1m
Distance to receiver	585.0	m
Barrier Attenuation	0.0	dB
Distance attenuation	-55.3	dB
Façade reflection	2.5	dB(A)
Impact at Façade	30.2	dB(A)
Impact inside	22.7	dB(A)
Car bypass @ 5km/hr	77.0	dB(A) @ 1m
Distance to receiver	570.0	m
Barrier Attenuation	0.0	dB
Distance attenuation	-55.1	dB
Façade reflection	2.5	dB(A)
Impact at Façade	24.4	dB(A)
Impact inside	<20	dB(A)
Alfresco dining at canteen	75.0	dB(A) @ 1m
Distance to receiver	705.0	m
Barrier Attenuation	0.0	dB
Distance attenuation	-57.0	dB
Façade reflection	2.5	dB(A)
Impact at Façade	20.5	dB(A)
Impact inside	<20	dB(A)
Referee whistle	93.0	dB(A) @ 1m
Distance to receiver	475.0	m
Barrier Attenuation	0.0	dB
Distance attenuation	-53.5	dB
Façade reflection	2.5	dB(A)
Impact at Façade	42.0	dB(A)
Impact inside	34.5	dB(A)
Children at play	80.0	dB(A) @ 1m
Distance to receiver	475.0	m
Barrier Attenuation	0.0	dB
Distance attenuation	-53.5	dB
Façade reflection	2.5	dB(A)
Impact at Façade	29.0	dB(A)
Impact inside	21.5	dB(A)
Boisterous crowd	85.0	dB(A) @ 1m
Distance to receiver	475.0	m
Barrier Attenuation	0.0	dB
Distance attenuation	-53.5	dB
Façade reflection	2.5	dB(A)
Impact at Façade	34.0	dB(A)
Impact inside	26.5	dB(A)

Onsite Activities Impacting		
Dwellings due Southwest		
Festival band music	110.0	dB(A) @ 3m
Distance to receiver	480.0	m
Barrier Attenuation	0.0	dB
Distance attenuation	-44.1	dB
Façade reflection	2.5	dB(A)
Impact at Façade	68.4	dB(A)
Impact inside	60.9	dB(A)
Rw to achieve 45 dB(A) inside	26.9	
Deliveries	87.0	dB(A) @ 1m
Distance to receiver	570.0	m
Barrier Attenuation	0.0	dB
Distance attenuation	-55.1	dB
Façade reflection	2.5	dB(A)
Impact at Façade	34.4	dB(A)
Impact inside	26.9	dB(A)
Waste Collection	97.0	dB(A) @ 1m
Distance to receiver	570.0	m
Barrier Attenuation	0.0	dB
Distance attenuation	-55.1	dB
Façade reflection	2.5	dB(A)
Impact at Façade	44.4	dB(A)
Impact inside	36.9	dB(A)
Cluster of A/C condensor units	55	dB(A) @ 1m
Number of condensor units	3	units
Combined source level	60	dB(A) @ 1m
Distance source to receiver	545	m
Distance attenuation	-54.7	dB(A)
Directivity	0	dB(A)
Façade reflection	2.5	dB(A)
Impact at façade	<20	dB(A)
Impact inside opern window	<20	dB(A)
Commercial A/C Plant	70.0	dB(A) @ 1m
Distance to receiver	545.0	m
Barrier Attenuation	0.0	dB
Distance attenuation	-54.7	dB
Façade reflection	2.5	dB(A)
Impact at Façade	<20	dB(A)
Impact inside	<20	dB(A)
Refrigeration plant	75.0	dB(A) @ 1m
Distance to receiver	545.0	m
Barrier Attenuation	0.0	dB
Distance attenuation	-54.7	dB
Façade reflection	2.5	dB(A)
Impact at Façade	22.8	dB(A)
Impact inside	<20	dB(A)

Onsite Construction Activities Impacting					
Dwellings due East			**Bed and Breakfast due Southeast**		
Excavator	88	dB(A) @ 7m	Excavator	88	dB(A) @ 7m
Distance to receiver	100	m	Distance to receiver	680	m
Barrier Screening	0	dB(A)	Barrier Screening	0	dB(A)
Distance attenuation	-23.1	dB(A)	Distance attenuation	-39.75	dB(A)
Façade reflection	2.5	dB(A)	Façade reflection	2.5	dB(A)
Impact at Façade	67	dB(A)	Impact at Façade	51	dB(A)
Impact inside	60	dB(A)	Impact inside	43	dB(A)
Dozer	87	dB(A) @ 7m	Dozer	87	dB(A) @ 7m
Distance to receiver	100	m	Distance to receiver	680	m
Building Screening	0	dB(A)	Building Screening	0	dB(A)
Building Screening	-23.1	dB(A)	Building Screening	-39.75	dB(A)
Façade reflection	2.5	dB(A)	Façade reflection	2.5	dB(A)
Impact at Façade	66	dB(A)	Impact at Façade	50	dB(A)
Impact inside	59	dB(A)	Impact inside	42	dB(A)
Front-end Loader	85	dB(A) @ 7m	Front-end Loader	85	dB(A) @ 7m
Distance to receiver	100	m	Distance to receiver	680	m
Barrier Screening	0	dB(A)	Barrier Screening	0	dB(A)
Distance attenuation	-23.1	dB(A)	Distance attenuation	-39.75	dB(A)
Façade reflection	2.5	dB(A)	Façade reflection	2.5	dB(A)
Impact at Façade	64	dB(A)	Impact at Façade	48	dB(A)
Impact inside	57	dB(A)	Impact inside	40	dB(A)
Truck Unloading	83	dB(A) @ 7m	Truck Unloading	83	dB(A) @ 7m
Distance to receiver	100	m	Distance to receiver	680	m
Building Screening	0	dB(A)	Building Screening	0	dB(A)
Distance attenuation	-23.1	dB(A)	Distance attenuation	-39.75	dB(A)
Façade reflection	2.5	dB(A)	Façade reflection	2.5	dB(A)
Impact at Façade	62	dB(A)	Impact at Façade	46	dB(A)
Impact inside	55	dB(A)	Impact inside	38	dB(A)
Generator	75	dB(A) @ 7m	Generator	75	dB(A) @ 7m
Distance to receiver	100	m	Distance to receiver	680	m
Building Screening	0	dB(A)	Building Screening	0	dB(A)
Distance attenuation	-23.1	dB(A)	Distance attenuation	-39.75	dB(A)
Façade reflection	2.5	dB(A)	Façade reflection	2.5	dB(A)
Impact at Façade	54	dB(A)	Impact at Façade	38	dB(A)
Impact inside	47	dB(A)	Impact inside	30	dB(A)

Onsite Construction Activities Impacting					
Dwellings due Southwest			**Dwellings due West**		
Excavator	88	dB(A) @ 7m	Excavator	88	dB(A) @ 7m
Distance to receiver	1000	m	Distance to receiver	1000	m
Barrier Screening	0	dB(A)	Barrier Screening	0	dB(A)
Distance attenuation	-43.1	dB(A)	Distance attenuation	-43.1	dB(A)
Façade reflection	2.5	dB(A)	Façade reflection	2.5	dB(A)
Impact at Façade	47	dB(A)	Impact at Façade	47	dB(A)
Impact inside	40	dB(A)	Impact inside	40	dB(A)
Dozer	87	dB(A) @ 7m	Dozer	87	dB(A) @ 7m
Distance to receiver	1000	m	Distance to receiver	1000	m
Building Screening	0	dB(A)	Building Screening	0	dB(A)
Building Screening	-43.1	dB(A)	Building Screening	-43.1	dB(A)
Façade reflection	2.5	dB(A)	Façade reflection	2.5	dB(A)
Impact at Façade	46	dB(A)	Impact at Façade	46	dB(A)
Impact inside	39	dB(A)	Impact inside	39	dB(A)
Front-end Loader	85	dB(A) @ 7m	Front-end Loader	85	dB(A) @ 7m
Distance to receiver	1000	m	Distance to receiver	1000	m
Barrier Screening	0	dB(A)	Barrier Screening	0	dB(A)
Distance attenuation	-43.1	dB(A)	Distance attenuation	-43.1	dB(A)
Façade reflection	2.5	dB(A)	Façade reflection	2.5	dB(A)
Impact at Façade	44	dB(A)	Impact at Façade	44	dB(A)
Impact inside	37	dB(A)	Impact inside	37	dB(A)
Truck Unloading	83	dB(A) @ 7m	Truck Unloading	83	dB(A) @ 7m
Distance to receiver	1000	m	Distance to receiver	1000	m
Building Screening	0	dB(A)	Building Screening	0	dB(A)
Distance attenuation	-43.1	dB(A)	Distance attenuation	-43.1	dB(A)
Façade reflection	2.5	dB(A)	Façade reflection	2.5	dB(A)
Impact at Façade	42	dB(A)	Impact at Façade	42	dB(A)
Impact inside	35	dB(A)	Impact inside	35	dB(A)
Generator	75	dB(A) @ 7m	Generator	75	dB(A) @ 7m
Distance to receiver	1000	m	Distance to receiver	1000	m
Building Screening	0	dB(A)	Building Screening	0	dB(A)
Distance attenuation	-43.1	dB(A)	Distance attenuation	-43.1	dB(A)
Façade reflection	2.5	dB(A)	Façade reflection	2.5	dB(A)
Impact at Façade	34	dB(A)	Impact at Façade	34	dB(A)
Impact inside	27	dB(A)	Impact inside	27	dB(A)

Onsite Construction Activities Impacting		
Dwellings due East Across Road		
Excavator	88	dB(A) @ 7m
Distance to receiver	470	m
Barrier Screening	0	dB(A)
Distance attenuation	-36.54	dB(A)
Façade reflection	2.5	dB(A)
Impact at Façade	54	dB(A)
Impact inside	46	dB(A)
Dozer	87	dB(A) @ 7m
Distance to receiver	470	m
Building Screening	0	dB(A)
Building Screening	-36.54	dB(A)
Façade reflection	2.5	dB(A)
Impact at Façade	53	dB(A)
Impact inside	45	dB(A)
Front-end Loader	85	dB(A) @ 7m
Distance to receiver	470	m
Barrier Screening	0	dB(A)
Distance attenuation	-36.54	dB(A)
Façade reflection	2.5	dB(A)
Impact at Façade	51	dB(A)
Impact inside	43	dB(A)
Truck Unloading	83	dB(A) @ 7m
Distance to receiver	470	m
Building Screening	0	dB(A)
Distance attenuation	-36.54	dB(A)
Façade reflection	2.5	dB(A)
Impact at Façade	49	dB(A)
Impact inside	41	dB(A)
Generator	75	dB(A) @ 7m
Distance to receiver	470	m
Building Screening	0	dB(A)
Distance attenuation	-36.54	dB(A)
Façade reflection	2.5	dB(A)
Impact at Façade	41	dB(A)
Impact inside	33	dB(A)

NOISE COMPLAINT RECORD

Initial Complaint Recording

Date & Time of record:_____

Name of Complainant (if given): _____

Complainant Telephone Number: _____

Address of complainant (if given):_____
_____
_____

Identification and description of noise source (e.g. hammering between 10am and 4pm):
_____
_____

Time of day noise is occurring: _____

Number of days the noise has occurred: _____

Complaint Investigation & Remediation

Liaison with noise source operator:_____

Recommended control (e.g. relocate plant): _____

Verification that noise controls have been implemented: _____

Follow-up Complainant

Contact date: _____

Complainant comment (e.g. is noise still annoying ? – if yes, refer to Note below): _____
_____
_____

NOTE
If complainant is still affected after all reasonable steps have been taken to ameliorate the noise, specialist advice should be sought from a qualified acoustical consultant.

Ewingsdale Road: Weekday Existing

Segment		Abbrev	Leq	Seg Group	Group Total
1	Ewingsdale Road	ER	65.6		

Leq(24hour) (shown in the HOURLY SUMMARY) = 65.6 dB(A)

HOURLY SUMMARY OF NOISE LEVELS

HOUR	Seg 1	HOURLY TOTAL
00 - 01	55.5	55.5
01 - 02	54.6	54.6
02 - 03	54.6	54.6
03 - 04	55.1	55.1
04 - 05	54.6	54.6
05 - 06	58.7	58.7
06 - 07	63.8	63.8
07 - 08	66.9	66.9
08 - 09	68.7	68.7
09 - 10	68.4	68.4
10 - 11	68.0	68.0
11 - 12	67.7	67.7
12 - 13	68.0	68.0
13 - 14	67.7	67.7
14 - 15	68.1	68.1
15 - 16	68.7	68.7
16 - 17	68.6	68.6
17 - 18	68.3	68.3
18 - 19	65.4	65.4
19 - 20	63.3	63.3
20 - 21	62.5	62.5
21 - 22	62.0	62.0
22 - 23	60.3	60.3
23 - 24	57.6	57.6

Leq(0000-2400hrs) = 65.6 dB(A)

INPUT DATA	Seg 1 ER
Total Flow (veh/18h)	
Heavy Vehicles (%)	
SPEED:	
Average (km/h)	
Origin (Zone or Est)	
Road RL (m)	1
Road Gradient (%)	1
ROAD SURFACE:	
Surface Type (B,C,P)	B
Texture Depth (mm)	2
Dist Road-Rec (m)	30
Absorbing Ground (%)	100
Av Prop Ht (m)	1.3
Angle View (deg)	180
SPECIAL ADJUSTMENT?	
Value (±dBA)	
Comment	
BARRIERS ?	
1:Dist Road-Barr (m)	
Barrier RL (m)	
Description	
2:Dist Road-Barr (m)	
Barrier RL (m)	
Description	
3:Dist Road-Barr (m)	
Barrier RL (m)	
Description	
REFLECTORS ONLY ?	
Refl Angle View (deg)	
COMBINED REFL/BARR?	
Reflector RL (m)	
Reflector Tilt (deg)	
DistanceBetween (m)	
Either on Embankment?	

Ground RL at Receiver:	1.0
Height of Receiver above ground:	1.8
Road Surface Corrections supplied by:	CRTN
Building Facade at Receiver:	Yes
User's overall adjustment to CRTN:	0.0
Leq factor: 1hr:	-3.0

INPUT DATA (TRAFFIC)

HOUR	SegNo	Flow veh/h	%HV	SpAv km/h	Speed Orig	SegNo	Flow veh/h	%HV	SpAv km/h	Speed Orig
00 - 01	1	61	4.7	100	Z					
01 - 02	1	50	4.7	100	Z					
02 - 03	1	50	4.7	100	Z					
03 - 04	1	56	4.7	100	Z					
04 - 05	1	50	4.7	100	Z					
05 - 06	1	130	4.7	100	Z					
06 - 07	1	419	4.7	100	Z					
07 - 08	1	843	4.7	100	Z					
08 - 09	1	1299	4.7	100	Z					
09 - 10	1	1206	4.7	100	Z					
10 - 11	1	1087	4.7	100	Z					
11 - 12	1	1029	4.7	100	Z					
12 - 13	1	1099	4.7	100	Z					
13 - 14	1	1024	4.7	100	Z					
14 - 15	1	1135	4.7	100	Z					
15 - 16	1	1291	4.7	100	Z					
16 - 17	1	1268	4.7	100	Z					
17 - 18	1	1168	4.7	100	Z					
18 - 19	1	608	4.7	100	Z					
19 - 20	1	371	4.7	100	Z					
20 - 21	1	310	4.7	100	Z					
21 - 22	1	273	4.7	100	Z					
22 - 23	1	186	4.7	100	Z					
23 - 24	1	101	4.7	100	Z					

CORRECTIONS	Seg 1 ER
Total Flow 18h (Ch3)	
Low Flow 18h (Ch12)	
Heavy Vehicles (Ch4)	
{SpChange,km/h} (Ch5)	
Road Gradient (Ch6)	0.3
Road Surface (CRTN)	
Dist Road-Rec (Ch7)	-4.0
{h,metres} (Ch7)	1.3
Av Prop Ht (Ch8)	-3.8
Angle View (Ch10)	0.0
Special (User)	0.0
BARRIERS	
Barrier Absent (Ch8)	
1:Pot Barr Corr (Ch9)	
{PathDiff,metres} (P21)	
Description	
2:Pot Barr Corr (Ch9)	
{PathDiff,metres} (P21)	
Description	
3:Pot Barr Corr (Ch9)	
{PathDiff,metres} (P21)	
Description	
Barr Multiple Effect:	
Barr Numbers	
Pot Barr Corr (P35)	
REFLECTORS	
Refl Angle of View (P26)	
COMBINED REFL/BARR	
Correction (P36)	
{Y} (P36)	
{W} (P36)	
{Alpha} (P36)	
{Delta1} (P36)	
{Delta2} (Ch13)	
{Delta3} (Ch13)	
{Delta4} (Ch14)	
{Delta5} (Ch15)	

Building facade at receiver: +2.5
User's overall adjust to CRTN: 0
Leq factor: 1hr = -3.0

CORRECTIONS TRAFFIC

HOUR	SegNo	Flow Ch2	LoFlo Ch12	%HV Ch4	SpCh {Ch5}	RSurf CRTN	SegNo	Flow Ch2	LoFlo Ch12	%HV Ch4	SpCh {Ch5}	RSurf CRTN
00 - 01	1	57.1	0.0	3.4	-0.8	0.0						
01 - 02	1	56.2	0.0	3.4	-0.8	0.0						
02 - 03	1	56.2	0.0	3.4	-0.8	0.0						
03 - 04	1	56.7	0.0	3.4	-0.8	0.0						
04 - 05	1	56.2	0.0	3.4	-0.8	0.0						
05 - 06	1	60.3	0.0	3.4	-0.8	0.0						
06 - 07	1	65.4	0.0	3.4	-0.8	0.0						
07 - 08	1	68.5	0.0	3.4	-0.8	0.0						
08 - 09	1	70.3	0.0	3.4	-0.8	0.0						
09 - 10	1	70.0	0.0	3.4	-0.8	0.0						
10 - 11	1	69.6	0.0	3.4	-0.8	0.0						
11 - 12	1	69.3	0.0	3.4	-0.8	0.0						
12 - 13	1	69.6	0.0	3.4	-0.8	0.0						
13 - 14	1	69.3	0.0	3.4	-0.8	0.0						
14 - 15	1	69.7	0.0	3.4	-0.8	0.0						
15 - 16	1	70.3	0.0	3.4	-0.8	0.0						
16 - 17	1	70.2	0.0	3.4	-0.8	0.0						
17 - 18	1	69.9	0.0	3.4	-0.8	0.0						
18 - 19	1	67.0	0.0	3.4	-0.8	0.0						
19 - 20	1	64.9	0.0	3.4	-0.8	0.0						
20 - 21	1	64.1	0.0	3.4	-0.8	0.0						
21 - 22	1	63.6	0.0	3.4	-0.8	0.0						
22 - 23	1	61.9	0.0	3.4	-0.8	0.0						
23 - 24	1	59.2	0.0	3.4	-0.8	0.0						

Ewingsdale Road: Weekday Proposed Development

Segment		Abbrev	Leq	Seg Group	Group Total
1	Ewingsdale Road	ER	65.7		

Leq(24hour) (shown in the HOURLY SUMMARY) = 65.7 dB(A)

HOURLY SUMMARY OF NOISE LEVELS

HOUR	Seg 1	HOURLY TOTAL
00 - 01	55.5	55.5
01 - 02	54.6	54.6
02 - 03	54.6	54.6
03 - 04	55.1	55.1
04 - 05	54.6	54.6
05 - 06	58.7	58.7
06 - 07	63.8	63.8
07 - 08	66.9	66.9
08 - 09	68.7	68.7
09 - 10	68.4	68.4
10 - 11	68.0	68.0
11 - 12	67.7	67.7
12 - 13	68.0	68.0
13 - 14	67.7	67.7
14 - 15	68.1	68.1
15 - 16	68.7	68.7
16 - 17	68.6	68.6
17 - 18	68.3	68.3
18 - 19	68.0	68.0
19 - 20	63.3	63.3
20 - 21	62.5	62.5
21 - 22	62.0	62.0
22 - 23	60.3	60.3
23 - 24	57.6	57.6

Leq(0000-2400hrs) = 65.7 dB(A)

INPUT DATA	Seg 1 ER
Total Flow (veh/18h)	
Heavy Vehicles (%)	
SPEED:	
Average (km/h)	
Origin (Zone or Est)	
Road RL (m)	1
Road Gradient (%)	1
ROAD SURFACE:	
Surface Type (B,C,P)	B
Texture Depth (mm)	2
Dist Road-Rec (m)	30
Absorbing Ground (%)	100
Av Prop Ht (m)	1.3
Angle View (deg)	180
SPECIAL ADJUSTMENT?	
Value (±dBA)	
Comment	
BARRIERS ?	
1:Dist Road-Barr (m)	
Barrier RL (m)	
Description	
2:Dist Road-Barr (m)	
Barrier RL (m)	
Description	
3:Dist Road-Barr (m)	
Barrier RL (m)	
Description	
REFLECTORS ONLY ?	
Refl Angle View (deg)	
COMBINED REFL/BARR?	
Reflector RL (m)	
Reflector Tilt (deg)	
DistanceBetween (m)	
Either on Embankment?	

Ground RL at Receiver:	1.0
Height of Receiver above ground:	1.8
Road Surface Corrections supplied by:	CRTN
Building Facade at Receiver:	Yes
User's overall adjustment to CRTN:	0.0
Leq factor: 1hr:	-3.0

INPUT DATA (TRAFFIC)

HOUR	SegNo	Flow veh/h	%HV	SpAv km/h	Speed Orig	SegNo	Flow veh/h	%HV	SpAv km/h	Speed Orig
00 - 01	1	61	4.7	100	Z					
01 - 02	1	50	4.7	100	Z					
02 - 03	1	50	4.7	100	Z					
03 - 04	1	56	4.7	100	Z					
04 - 05	1	50	4.7	100	Z					
05 - 06	1	130	4.7	100	Z					
06 - 07	1	419	4.7	100	Z					
07 - 08	1	843	4.7	100	Z					
08 - 09	1	1299	4.7	100	Z					
09 - 10	1	1206	4.7	100	Z					
10 - 11	1	1087	4.7	100	Z					
11 - 12	1	1029	4.7	100	Z					
12 - 13	1	1099	4.7	100	Z					
13 - 14	1	1024	4.7	100	Z					
14 - 15	1	1135	4.7	100	Z					
15 - 16	1	1291	4.7	100	Z					
16 - 17	1	1268	4.7	100	Z					
17 - 18	1	1168	4.7	100	Z					
18 - 19	1	1107	4.7	100	Z					
19 - 20	1	371	4.7	100	Z					
20 - 21	1	310	4.7	100	Z					
21 - 22	1	273	4.7	100	Z					
22 - 23	1	186	4.7	100	Z					
23 - 24	1	101	4.7	100	Z					

CORRECTIONS	Seg 1 ER
Total Flow 18h (Ch3)	
Low Flow 18h (Ch12)	
Heavy Vehicles (Ch4)	
{SpChange,km/h} (Ch5)	
Road Gradient (Ch6)	0.3
Road Surface (CRTN)	
Dist Road-Rec (Ch7)	-4.0
{h,metres} (Ch7)	1.3
Av Prop Ht (Ch8)	-3.8
Angle View (Ch10)	0.0
Special (User)	0.0
BARRIERS	
Barrier Absent (Ch8)	
1:Pot Barr Corr (Ch9)	
{PathDiff,metres} (P21)	
Description	
2:Pot Barr Corr (Ch9)	
{PathDiff,metres} (P21)	
Description	
3:Pot Barr Corr (Ch9)	
{PathDiff,metres} (P21)	
Description	
Barr Multiple Effect:	
Barr Numbers	
Pot Barr Corr (P35)	
REFLECTORS	
Refl Angle of View (P26)	
COMBINED REFL/BARR	
Correction (P36)	
{Y} (P36)	
{W} (P36)	
{Alpha} (P36)	
{Delta1} (P36)	
{Delta2} (Ch13)	
{Delta3} (Ch13)	
{Delta4} (Ch14)	
{Delta5} (Ch15)	

Building facade at receiver: +2.5
User's overall adjust to CRTN: 0
Leq factor: 1hr = -3.0

CORRECTIONS TRAFFIC

HOUR	SegNo	Flow Ch2	LoFlo Ch12	%HV Ch4	SpCh {Ch5}	RSurf CRTN	SegNo	Flow Ch2	LoFlo Ch12	%HV Ch4	SpCh {Ch5}	RSurf CRTN
00 - 01	1	57.1	0.0	3.4	-0.8	0.0						
01 - 02	1	56.2	0.0	3.4	-0.8	0.0						
02 - 03	1	56.2	0.0	3.4	-0.8	0.0						
03 - 04	1	56.7	0.0	3.4	-0.8	0.0						
04 - 05	1	56.2	0.0	3.4	-0.8	0.0						
05 - 06	1	60.3	0.0	3.4	-0.8	0.0						
06 - 07	1	65.4	0.0	3.4	-0.8	0.0						
07 - 08	1	68.5	0.0	3.4	-0.8	0.0						
08 - 09	1	70.3	0.0	3.4	-0.8	0.0						
09 - 10	1	70.0	0.0	3.4	-0.8	0.0						
10 - 11	1	69.6	0.0	3.4	-0.8	0.0						
11 - 12	1	69.3	0.0	3.4	-0.8	0.0						
12 - 13	1	69.6	0.0	3.4	-0.8	0.0						
13 - 14	1	69.3	0.0	3.4	-0.8	0.0						
14 - 15	1	69.7	0.0	3.4	-0.8	0.0						
15 - 16	1	70.3	0.0	3.4	-0.8	0.0						
16 - 17	1	70.2	0.0	3.4	-0.8	0.0						
17 - 18	1	69.9	0.0	3.4	-0.8	0.0						
18 - 19	1	69.6	0.0	3.4	-0.8	0.0						
19 - 20	1	64.9	0.0	3.4	-0.8	0.0						
20 - 21	1	64.1	0.0	3.4	-0.8	0.0						
21 - 22	1	63.6	0.0	3.4	-0.8	0.0						
22 - 23	1	61.9	0.0	3.4	-0.8	0.0						
23 - 24	1	59.2	0.0	3.4	-0.8	0.0						

Ewingsdale Road: Saturday Existing

Segment		Abbrev	Leq	Seg Group	Group Total
1	Ewingsdale Road	ER	64.7		

Leq(24hour) (shown in the HOURLY SUMMARY) = 64.7 dB(A)

HOURLY SUMMARY OF NOISE LEVELS

HOUR	Seg 1	HOURLY TOTAL
00 - 01	57.9	57.9
01 - 02	55.6	55.6
02 - 03	54.8	54.8
03 - 04	54.6	54.6
04 - 05	54.9	54.9
05 - 06	56.7	56.7
06 - 07	60.5	60.5
07 - 08	63.3	63.3
08 - 09	65.7	65.7
09 - 10	66.9	66.9
10 - 11	67.5	67.5
11 - 12	68.0	68.0
12 - 13	67.8	67.8
13 - 14	67.7	67.7
14 - 15	67.3	67.3
15 - 16	67.3	67.3
16 - 17	67.1	67.1
17 - 18	66.6	66.6
18 - 19	65.3	65.3
19 - 20	63.6	63.6
20 - 21	62.5	62.5
21 - 22	62.2	62.2
22 - 23	62.1	62.1
23 - 24	60.2	60.2

Leq(0000-2400hrs) = 64.7 dB(A)

INPUT DATA	Seg 1 ER
Total Flow (veh/18h)	
Heavy Vehicles (%)	
SPEED:	
Average (km/h)	
Origin (Zone or Est)	
Road RL (m)	1
Road Gradient (%)	1
ROAD SURFACE:	
Surface Type (B,C,P)	B
Texture Depth (mm)	2
Dist Road-Rec (m)	30
Absorbing Ground (%)	100
Av Prop Ht (m)	1.3
Angle View (deg)	180
SPECIAL ADJUSTMENT?	
Value (±dBA)	
Comment	
BARRIERS ?	
1:Dist Road-Barr (m)	
Barrier RL (m)	
Description	
2:Dist Road-Barr (m)	
Barrier RL (m)	
Description	
3:Dist Road-Barr (m)	
Barrier RL (m)	
Description	
REFLECTORS ONLY ?	
Refl Angle View (deg)	
COMBINED REFL/BARR?	
Reflector RL (m)	
Reflector Tilt (deg)	
DistanceBetween (m)	
Either on Embankment?	

Ground RL at Receiver:	1.0
Height of Receiver above ground:	1.8
Road Surface Corrections supplied by:	CRTN
Building Facade at Receiver:	Yes
User's overall adjustment to CRTN:	0.0
Leq factor: 1hr:	-3.0

INPUT DATA (TRAFFIC)

HOUR	SegNo	Flow veh/h	%HV	SpAv km/h	Speed Orig	SegNo	Flow veh/h	%HV	SpAv km/h	Speed Orig
00 - 01	1	108	4.7	100	Z					
01 - 02	1	63	4.7	100	Z					
02 - 03	1	52	4.7	100	Z					
03 - 04	1	50	4.7	100	Z					
04 - 05	1	54	4.7	100	Z					
05 - 06	1	81	4.7	100	Z					
06 - 07	1	195	4.7	100	Z					
07 - 08	1	372	4.7	100	Z					
08 - 09	1	651	4.7	100	Z					
09 - 10	1	857	4.7	100	Z					
10 - 11	1	979	4.7	100	Z					
11 - 12	1	1087	4.7	100	Z					
12 - 13	1	1051	4.7	100	Z					
13 - 14	1	1025	4.7	100	Z					
14 - 15	1	943	4.7	100	Z					
15 - 16	1	925	4.7	100	Z					
16 - 17	1	885	4.7	100	Z					
17 - 18	1	800	4.7	100	Z					
18 - 19	1	589	4.7	100	Z					
19 - 20	1	394	4.7	100	Z					
20 - 21	1	307	4.7	100	Z					
21 - 22	1	286	4.7	100	Z					
22 - 23	1	280	4.7	100	Z					
23 - 24	1	180	4.7	100	Z					

CORRECTIONS	Seg 1 ER
Total Flow 18h (Ch3)	
Low Flow 18h (Ch12)	
Heavy Vehicles (Ch4)	
{SpChange,km/h} (Ch5)	
Road Gradient (Ch6)	0.3
Road Surface (CRTN)	
Dist Road-Rec (Ch7)	-4.0
{h,metres} (Ch7)	1.3
Av Prop Ht (Ch8)	-3.8
Angle View (Ch10)	0.0
Special (User)	0.0
BARRIERS	
Barrier Absent (Ch8)	
1:Pot Barr Corr (Ch9)	
{PathDiff,metres} (P21)	
Description	
2:Pot Barr Corr (Ch9)	
{PathDiff,metres} (P21)	
Description	
3:Pot Barr Corr (Ch9)	
{PathDiff,metres} (P21)	
Description	
Barr Multiple Effect:	
Barr Numbers	
Pot Barr Corr (P35)	
REFLECTORS	
Refl Angle of View (P26)	
COMBINED REFL/BARR	
Correction (P36)	
{Y} (P36)	
{W} (P36)	
{Alpha} (P36)	
{Delta1} (P36)	
{Delta2} (Ch13)	
{Delta3} (Ch13)	
{Delta4} (Ch14)	
{Delta5} (Ch15)	

Building facade at receiver: +2.5
User's overall adjust to CRTN: 0
Leq factor: 1hr = -3.0

CORRECTIONS TRAFFIC

HOUR	SegNo	Flow Ch2	LoFlo Ch12	%HV Ch4	SpCh {Ch5}	RSurf CRTN	SegNo	Flow Ch2	LoFlo Ch12	%HV Ch4	SpCh {Ch5}	RSurf CRTN
00 - 01	1	59.5	0.0	3.4	-0.8	0.0						
01 - 02	1	57.2	0.0	3.4	-0.8	0.0						
02 - 03	1	56.4	0.0	3.4	-0.8	0.0						
03 - 04	1	56.2	0.0	3.4	-0.8	0.0						
04 - 05	1	56.5	0.0	3.4	-0.8	0.0						
05 - 06	1	58.3	0.0	3.4	-0.8	0.0						
06 - 07	1	62.1	0.0	3.4	-0.8	0.0						
07 - 08	1	64.9	0.0	3.4	-0.8	0.0						
08 - 09	1	67.3	0.0	3.4	-0.8	0.0						
09 - 10	1	68.5	0.0	3.4	-0.8	0.0						
10 - 11	1	69.1	0.0	3.4	-0.8	0.0						
11 - 12	1	69.6	0.0	3.4	-0.8	0.0						
12 - 13	1	69.4	0.0	3.4	-0.8	0.0						
13 - 14	1	69.3	0.0	3.4	-0.8	0.0						
14 - 15	1	68.9	0.0	3.4	-0.8	0.0						
15 - 16	1	68.9	0.0	3.4	-0.8	0.0						
16 - 17	1	68.7	0.0	3.4	-0.8	0.0						
17 - 18	1	68.2	0.0	3.4	-0.8	0.0						
18 - 19	1	66.9	0.0	3.4	-0.8	0.0						
19 - 20	1	65.2	0.0	3.4	-0.8	0.0						
20 - 21	1	64.1	0.0	3.4	-0.8	0.0						
21 - 22	1	63.8	0.0	3.4	-0.8	0.0						
22 - 23	1	63.7	0.0	3.4	-0.8	0.0						
23 - 24	1	61.8	0.0	3.4	-0.8	0.0						

Ewingsdale Road: Saturday Proposed Development

Segment		Abbrev	Leq	Seg Group	Group Total
1	Ewingsdale Road	ER	65.0		

Leq(24hour) (shown in the HOURLY SUMMARY) = 65.0 dB(A)

HOURLY SUMMARY OF NOISE LEVELS

HOUR	Seg 1	HOURLY TOTAL
00 - 01	57.9	57.9
01 - 02	55.6	55.6
02 - 03	54.8	54.8
03 - 04	54.6	54.6
04 - 05	54.9	54.9
05 - 06	56.7	56.7
06 - 07	60.5	60.5
07 - 08	66.9	66.9
08 - 09	65.7	65.7
09 - 10	66.9	66.9
10 - 11	67.5	67.5
11 - 12	68.0	68.0
12 - 13	67.8	67.8
13 - 14	67.7	67.7
14 - 15	67.3	67.3
15 - 16	67.3	67.3
16 - 17	67.1	67.1
17 - 18	68.7	68.7
18 - 19	65.3	65.3
19 - 20	63.6	63.6
20 - 21	62.5	62.5
21 - 22	62.2	62.2
22 - 23	62.1	62.1
23 - 24	60.2	60.2

Leq(0000-2400hrs) = 65.0 dB(A)

INPUT DATA	Seg 1 ER
Total Flow (veh/18h)	
Heavy Vehicles (%)	
SPEED:	
Average (km/h)	
Origin (Zone or Est)	
Road RL (m)	1
Road Gradient (%)	1
ROAD SURFACE:	
Surface Type (B,C,P)	B
Texture Depth (mm)	2
Dist Road-Rec (m)	30
Absorbing Ground (%)	100
Av Prop Ht (m)	1.3
Angle View (deg)	180
SPECIAL ADJUSTMENT?	
Value (±dBA)	
Comment	
BARRIERS ?	
1:Dist Road-Barr (m)	
Barrier RL (m)	
Description	
2:Dist Road-Barr (m)	
Barrier RL (m)	
Description	
3:Dist Road-Barr (m)	
Barrier RL (m)	
Description	
REFLECTORS ONLY ?	
Refl Angle View (deg)	
COMBINED REFL/BARR?	
Reflector RL (m)	
Reflector Tilt (deg)	
DistanceBetween (m)	
Either on Embankment?	

Ground RL at Receiver:	1.0
Height of Receiver above ground:	1.8
Road Surface Corrections supplied by:	CRTN
Building Facade at Receiver:	Yes
User's overall adjustment to CRTN:	0.0
Leq factor: 1hr:	-3.0

INPUT DATA (TRAFFIC)

HOUR	SegNo	Flow veh/h	%HV	SpAv km/h	Speed Orig	SegNo	Flow veh/h	%HV	SpAv km/h	Speed Orig
00 - 01	1	108	4.7	100	Z					
01 - 02	1	63	4.7	100	Z					
02 - 03	1	52	4.7	100	Z					
03 - 04	1	50	4.7	100	Z					
04 - 05	1	54	4.7	100	Z					
05 - 06	1	81	4.7	100	Z					
06 - 07	1	195	4.7	100	Z					
07 - 08	1	854	4.7	100	Z					
08 - 09	1	651	4.7	100	Z					
09 - 10	1	857	4.7	100	Z					
10 - 11	1	979	4.7	100	Z					
11 - 12	1	1087	4.7	100	Z					
12 - 13	1	1051	4.7	100	Z					
13 - 14	1	1025	4.7	100	Z					
14 - 15	1	943	4.7	100	Z					
15 - 16	1	925	4.7	100	Z					
16 - 17	1	885	4.7	100	Z					
17 - 18	1	1275	4.7	100	Z					
18 - 19	1	589	4.7	100	Z					
19 - 20	1	394	4.7	100	Z					
20 - 21	1	307	4.7	100	Z					
21 - 22	1	286	4.7	100	Z					
22 - 23	1	280	4.7	100	Z					
23 - 24	1	180	4.7	100	Z					

CORRECTIONS	Seg 1 ER
Total Flow 18h (Ch3)	
Low Flow 18h (Ch12)	
Heavy Vehicles (Ch4)	
{SpChange,km/h} (Ch5)	
Road Gradient (Ch6)	0.3
Road Surface (CRTN)	
Dist Road-Rec (Ch7)	-4.0
{h,metres} (Ch7)	1.3
Av Prop Ht (Ch8)	-3.8
Angle View (Ch10)	0.0
Special (User)	0.0
BARRIERS	
Barrier Absent (Ch8)	
1:Pot Barr Corr (Ch9)	
{PathDiff,metres} (P21)	
Description	
2:Pot Barr Corr (Ch9)	
{PathDiff,metres} (P21)	
Description	
3:Pot Barr Corr (Ch9)	
{PathDiff,metres} (P21)	
Description	
Barr Multiple Effect:	
Barr Numbers	
Pot Barr Corr (P35)	
REFLECTORS	
Refl Angle of View (P26)	
COMBINED REFL/BARR	
Correction (P36)	
{Y} (P36)	
{W} (P36)	
{Alpha} (P36)	
{Delta1} (P36)	
{Delta2} (Ch13)	
{Delta3} (Ch13)	
{Delta4} (Ch14)	
{Delta5} (Ch15)	

Building facade at receiver: +2.5
User's overall adjust to CRTN: 0
Leq factor: 1hr = -3.0

CORRECTIONS TRAFFIC

HOUR	SegNo	Flow Ch2	LoFlo Ch12	%HV Ch4	SpCh {Ch5}	RSurf CRTN	SegNo	Flow Ch2	LoFlo Ch12	%HV Ch4	SpCh {Ch5}	RSurf CRTN
00 - 01	1	59.5	0.0	3.4	-0.8	0.0						
01 - 02	1	57.2	0.0	3.4	-0.8	0.0						
02 - 03	1	56.4	0.0	3.4	-0.8	0.0						
03 - 04	1	56.2	0.0	3.4	-0.8	0.0						
04 - 05	1	56.5	0.0	3.4	-0.8	0.0						
05 - 06	1	58.3	0.0	3.4	-0.8	0.0						
06 - 07	1	62.1	0.0	3.4	-0.8	0.0						
07 - 08	1	68.5	0.0	3.4	-0.8	0.0						
08 - 09	1	67.3	0.0	3.4	-0.8	0.0						
09 - 10	1	68.5	0.0	3.4	-0.8	0.0						
10 - 11	1	69.1	0.0	3.4	-0.8	0.0						
11 - 12	1	69.6	0.0	3.4	-0.8	0.0						
12 - 13	1	69.4	0.0	3.4	-0.8	0.0						
13 - 14	1	69.3	0.0	3.4	-0.8	0.0						
14 - 15	1	68.9	0.0	3.4	-0.8	0.0						
15 - 16	1	68.9	0.0	3.4	-0.8	0.0						
16 - 17	1	68.7	0.0	3.4	-0.8	0.0						
17 - 18	1	70.3	0.0	3.4	-0.8	0.0						
18 - 19	1	66.9	0.0	3.4	-0.8	0.0						
19 - 20	1	65.2	0.0	3.4	-0.8	0.0						
20 - 21	1	64.1	0.0	3.4	-0.8	0.0						
21 - 22	1	63.8	0.0	3.4	-0.8	0.0						
22 - 23	1	63.7	0.0	3.4	-0.8	0.0						
23 - 24	1	61.8	0.0	3.4	-0.8	0.0						

Ewingsdale Road: Weekday Ultimate

Segment		Abbrev	Leq	Seg Group	Group Total
1	Ewingsdale Road	ER	67.5		

Leq(24hour) (shown in the HOURLY SUMMARY) = 67.5 dB(A)

HOURLY SUMMARY OF NOISE LEVELS

HOUR	Seg 1	HOURLY TOTAL
00 - 01	57.4	57.4
01 - 02	54.6	54.6
02 - 03	55.8	55.8
03 - 04	57.0	57.0
04 - 05	56.3	56.3
05 - 06	60.7	60.7
06 - 07	65.8	65.8
07 - 08	68.8	68.8
08 - 09	70.7	70.7
09 - 10	70.4	70.4
10 - 11	69.9	69.9
11 - 12	69.7	69.7
12 - 13	70.0	70.0
13 - 14	69.6	69.6
14 - 15	70.1	70.1
15 - 16	70.7	70.7
16 - 17	70.6	70.6
17 - 18	70.2	70.2
18 - 19	67.4	67.4
19 - 20	65.2	65.2
20 - 21	64.5	64.5
21 - 22	63.9	63.9
22 - 23	62.2	62.2
23 - 24	59.6	59.6

Leq(0000-2400hrs) = 67.5 dB(A)

INPUT DATA	Seg 1 ER
Total Flow (veh/18h)	
Heavy Vehicles (%)	
SPEED:	
Average (km/h)	
Origin (Zone or Est)	
Road RL (m)	1
Road Gradient (%)	1
ROAD SURFACE:	
Surface Type (B,C,P)	B
Texture Depth (mm)	2
Dist Road-Rec (m)	30
Absorbing Ground (%)	100
Av Prop Ht (m)	1.3
Angle View (deg)	180
SPECIAL ADJUSTMENT?	
Value (±dBA)	
Comment	
BARRIERS ?	
1:Dist Road-Barr (m)	
Barrier RL (m)	
Description	
2:Dist Road-Barr (m)	
Barrier RL (m)	
Description	
3:Dist Road-Barr (m)	
Barrier RL (m)	
Description	
REFLECTORS ONLY ?	
Refl Angle View (deg)	
COMBINED REFL/BARR?	
Reflector RL (m)	
Reflector Tilt (deg)	
DistanceBetween (m)	
Either on Embankment?	

Ground RL at Receiver:	1.0
Height of Receiver above ground:	1.8
Road Surface Corrections supplied by:	CRTN
Building Facade at Receiver:	Yes
User's overall adjustment to CRTN:	0.0
Leq factor: 1hr:	-3.0

Ewingsdale Road: Weekday Ultimate Proposed Development

Segment		Abbrev	Leq	Seg Group	Group Total
1	Ewingsdale Road	ER	67.6		

Leq(24hour) (shown in the HOURLY SUMMARY) = 67.6 dB(A)

HOURLY SUMMARY OF NOISE LEVELS

HOUR	Seg 1	HOURLY TOTAL
00 - 01	57.4	57.4
01 - 02	54.6	54.6
02 - 03	55.8	55.8
03 - 04	57.0	57.0
04 - 05	56.3	56.3
05 - 06	60.7	60.7
06 - 07	65.8	65.8
07 - 08	68.8	68.8
08 - 09	70.7	70.7
09 - 10	70.4	70.4
10 - 11	69.9	69.9
11 - 12	69.7	69.7
12 - 13	70.0	70.0
13 - 14	69.6	69.6
14 - 15	70.1	70.1
15 - 16	70.7	70.7
16 - 17	70.6	70.6
17 - 18	70.2	70.2
18 - 19	69.2	69.2
19 - 20	65.2	65.2
20 - 21	64.5	64.5
21 - 22	63.9	63.9
22 - 23	62.2	62.2
23 - 24	59.6	59.6

Leq(0000-2400hrs) = 67.6 dB(A)

INPUT DATA	Seg 1 ER
Total Flow (veh/18h)	
Heavy Vehicles (%)	
SPEED:	
Average (km/h)	
Origin (Zone or Est)	
Road RL (m)	1
Road Gradient (%)	1
ROAD SURFACE:	
Surface Type (B,C,P)	B
Texture Depth (mm)	2
Dist Road-Rec (m)	30
Absorbing Ground (%)	100
Av Prop Ht (m)	1.3
Angle View (deg)	180
SPECIAL ADJUSTMENT?	
Value (±dBA)	
Comment	
BARRIERS ?	
1:Dist Road-Barr (m)	
Barrier RL (m)	
Description	
2:Dist Road-Barr (m)	
Barrier RL (m)	
Description	
3:Dist Road-Barr (m)	
Barrier RL (m)	
Description	
REFLECTORS ONLY ?	
Refl Angle View (deg)	
COMBINED REFL/BARR?	
Reflector RL (m)	
Reflector Tilt (deg)	
DistanceBetween (m)	
Either on Embankment?	

Ground RL at Receiver:	1.0
Height of Receiver above ground:	1.8
Road Surface Corrections supplied by:	CRTN
Building Facade at Receiver:	Yes
User's overall adjustment to CRTN:	0.0
Leq factor: 1hr:	-3.0

Ewingsdale Road: Saturday Ultimate

Segment		Abbrev	Leq	Seg Group	Group Total
1	Ewingsdale Road	ER	66.6		

Leq(24hour) (shown in the HOURLY SUMMARY) = 66.6 dB(A)

HOURLY SUMMARY OF NOISE LEVELS

HOUR	Seg 1	HOURLY TOTAL
00 - 01	59.9	59.9
01 - 02	57.6	57.6
02 - 03	56.7	56.7
03 - 04	56.3	56.3
04 - 05	56.8	56.8
05 - 06	58.6	58.6
06 - 07	62.4	62.4
07 - 08	65.2	65.2
08 - 09	67.7	67.7
09 - 10	68.9	68.9
10 - 11	69.4	69.4
11 - 12	69.9	69.9
12 - 13	69.8	69.8
13 - 14	69.6	69.6
14 - 15	69.3	69.3
15 - 16	69.2	69.2
16 - 17	69.0	69.0
17 - 18	68.6	68.6
18 - 19	67.2	67.2
19 - 20	65.5	65.5
20 - 21	64.4	64.4
21 - 22	64.1	64.1
22 - 23	64.0	64.0
23 - 24	62.1	62.1

Leq(0000-2400hrs) = 66.6 dB(A)

INPUT DATA	Seg 1 ER
Total Flow (veh/18h)	
Heavy Vehicles (%)	
SPEED:	
Average (km/h)	
Origin (Zone or Est)	
Road RL (m)	1
Road Gradient (%)	1
ROAD SURFACE:	
Surface Type (B,C,P)	B
Texture Depth (mm)	2
Dist Road-Rec (m)	30
Absorbing Ground (%)	100
Av Prop Ht (m)	1.3
Angle View (deg)	180
SPECIAL ADJUSTMENT?	
Value (±dBA)	
Comment	
BARRIERS ?	
1:Dist Road-Barr (m)	
Barrier RL (m)	
Description	
2:Dist Road-Barr (m)	
Barrier RL (m)	
Description	
3:Dist Road-Barr (m)	
Barrier RL (m)	
Description	
REFLECTORS ONLY ?	
Refl Angle View (deg)	
COMBINED REFL/BARR?	
Reflector RL (m)	
Reflector Tilt (deg)	
DistanceBetween (m)	
Either on Embankment?	

Ground RL at Receiver:	1.0
Height of Receiver above ground:	1.8
Road Surface Corrections supplied by:	CRTN
Building Facade at Receiver:	Yes
User's overall adjustment to CRTN:	0.0
Leq factor: 1hr:	-3.0

Ewingsdale Road: Saturday Ultimate Proposed Development

Segment		Abbrev	Leq	Seg Group	Group Total
1	Ewingsdale Road	ER	66.8		

Leq(24hour) (shown in the HOURLY SUMMARY) = 66.8 dB(A)

HOURLY SUMMARY OF NOISE LEVELS

HOUR	Seg 1	HOURLY TOTAL
00 - 01	59.9	59.9
01 - 02	57.6	57.6
02 - 03	56.7	56.7
03 - 04	56.3	56.3
04 - 05	56.8	56.8
05 - 06	58.6	58.6
06 - 07	62.4	62.4
07 - 08	67.9	67.9
08 - 09	67.7	67.7
09 - 10	68.9	68.9
10 - 11	69.4	69.4
11 - 12	69.9	69.9
12 - 13	69.8	69.8
13 - 14	69.6	69.6
14 - 15	69.3	69.3
15 - 16	69.2	69.2
16 - 17	69.0	69.0
17 - 18	70.0	70.0
18 - 19	67.2	67.2
19 - 20	65.5	65.5
20 - 21	64.4	64.4
21 - 22	64.1	64.1
22 - 23	64.0	64.0
23 - 24	62.1	62.1

Leq(0000-2400hrs) = 66.8 dB(A)

INPUT DATA	Seg 1 ER
Total Flow (veh/18h)	
Heavy Vehicles (%)	
SPEED:	
Average (km/h)	
Origin (Zone or Est)	
Road RL (m)	1
Road Gradient (%)	1
ROAD SURFACE:	
Surface Type (B,C,P)	B
Texture Depth (mm)	2
Dist Road-Rec (m)	30
Absorbing Ground (%)	100
Av Prop Ht (m)	1.3
Angle View (deg)	180
SPECIAL ADJUSTMENT?	
Value (±dBA)	
Comment	
BARRIERS ?	
1:Dist Road-Barr (m)	
Barrier RL (m)	
Description	
2:Dist Road-Barr (m)	
Barrier RL (m)	
Description	
3:Dist Road-Barr (m)	
Barrier RL (m)	
Description	
REFLECTORS ONLY ?	
Refl Angle View (deg)	
COMBINED REFL/BARR?	
Reflector RL (m)	
Reflector Tilt (deg)	
DistanceBetween (m)	
Either on Embankment?	

Ground RL at Receiver:	1.0
Height of Receiver above ground:	1.8
Road Surface Corrections supplied by:	CRTN
Building Facade at Receiver:	Yes
User's overall adjustment to CRTN:	0.0
Leq factor: 1hr:	-3.0

Appendix G

Lighting Guidelines Report

RIXONDESIGN
Design+Production

Ewingsdale Road
Byron Bay

Sports Facility

Lighting Guidelines Report

Prepared for

RIXONDESIGN PTY LTD
PO BOX 968 INDOOROOPILLY 4068
TEL 33787500 FACSIMILE 32510157
Email rdbne@rixondesign.com

We present this Lighting Design Guidelines Report for Ewingsdale Road Byron Bay Sports Facility prepared for Geolink Environmental Consultants.

1.1 Introduction

The Lighting Design Guidelines were developed in conjunction with the requirements of the following:

Full appreciation of the context of the area defined by the Site plan, the nature of the site, the recommendations of the Ecological Assessment Report and the location of existing housing adjacent to the site.

The current requirements of the Lighting Codes nominated under Australian and NZ Standards.

CASA and Airport Inspector requirements.

Efficient use of energy

1.2 Compliance with the current requirements of the Lighting Codes nominated under Australian / NZ Standards.

The lighting design will comply with all relevant Lighting AS/NZS Codes.

The Codes that are referenced in this Report are noted due to their significance as their application directly relates to the quality of the night environment and the prominence that the day / night environmental impact of lighting has on this site.

1.2.1 AS/NZS 4282 – Control of the Effects of Obtrusive Light.

This Standard sets out guidelines for the control of the obtrusive effects of outdoor lighting. It includes recommended limits for the relevant lighting parameters to control these effects. This standard will be used to ensure potentially adverse effects of outdoor lighting on nearby residents, fauna and users of adjacent roads.

With any outdoor lighting it will rarely be possible to contain all light within the boundaries of the property on which the lighting system is installed. Some light will inevitably be spilled outside the property boundaries, either directly or by reflection. The determination of when the spill light becomes obtrusive to others is difficult since both physiological and psychological effects are involved.

The objective of the AS/NZS 4282 Obtrusive Lighting standard is to provide a common basis for assessment of the likely effects of developments that involve the provision of outdoor lighting.

The control of these effects and the limiting values of the light technical parameters have been developed taking into account of the following:

The level of lighting existing in the area prior to the new use for the site.
The times that the proposed lighting is to operate.
The type of lighting technology available to light the development.
The use of readily available and easily understood technical data on the lighting installations, which can easily be verified at the design and assessment stages. The aim of this is to ensure the Standard is both credible and pragmatic in application.

The challenge then is to balance the conflicting requirements of the operational activity and environmental integrity.

AS4282 provides two sets of limiting values dependant on the levels of lighting. One is for application before a nominated or curfew hour (up to 11.00pm), and one, with lower values, is for application after that hour.

Because of this careful attention needs to be given to limitation of light spill, including consideration of the type of lighting, the mounting height, the type of floodlights (light distribution) and their specific location, aiming and the need for the fitting of louvers, baffles or shields.

RIXONDESIGN PTY LTD
PO BOX 968 INDOOROOPILLY 4068
TEL 33787500 FACSIMILE 32510157
Email rdbne@rixondesign.com

The AS/NZS 4282 key impact falls into two areas:

The illumination from spill light being obtrusive, and
The direct view of bright luminaries from normal viewing directions causing annoyance, distraction or even discomfort.

The ambient lighting existing in that environment will influence the tolerable levels in both of these areas.

Sky glow from artificial lighting is an area wide problem, which is less amenable to control. Because sky glow is caused both by reflected light (compounded by dust) and direct light. The problem can be reduced by utilizing the design approach that has been recommended by our Lighting Guidelines Report.

Location and Aiming of Lighting

The context for this site is the prime form giver to the design approach to lighting.

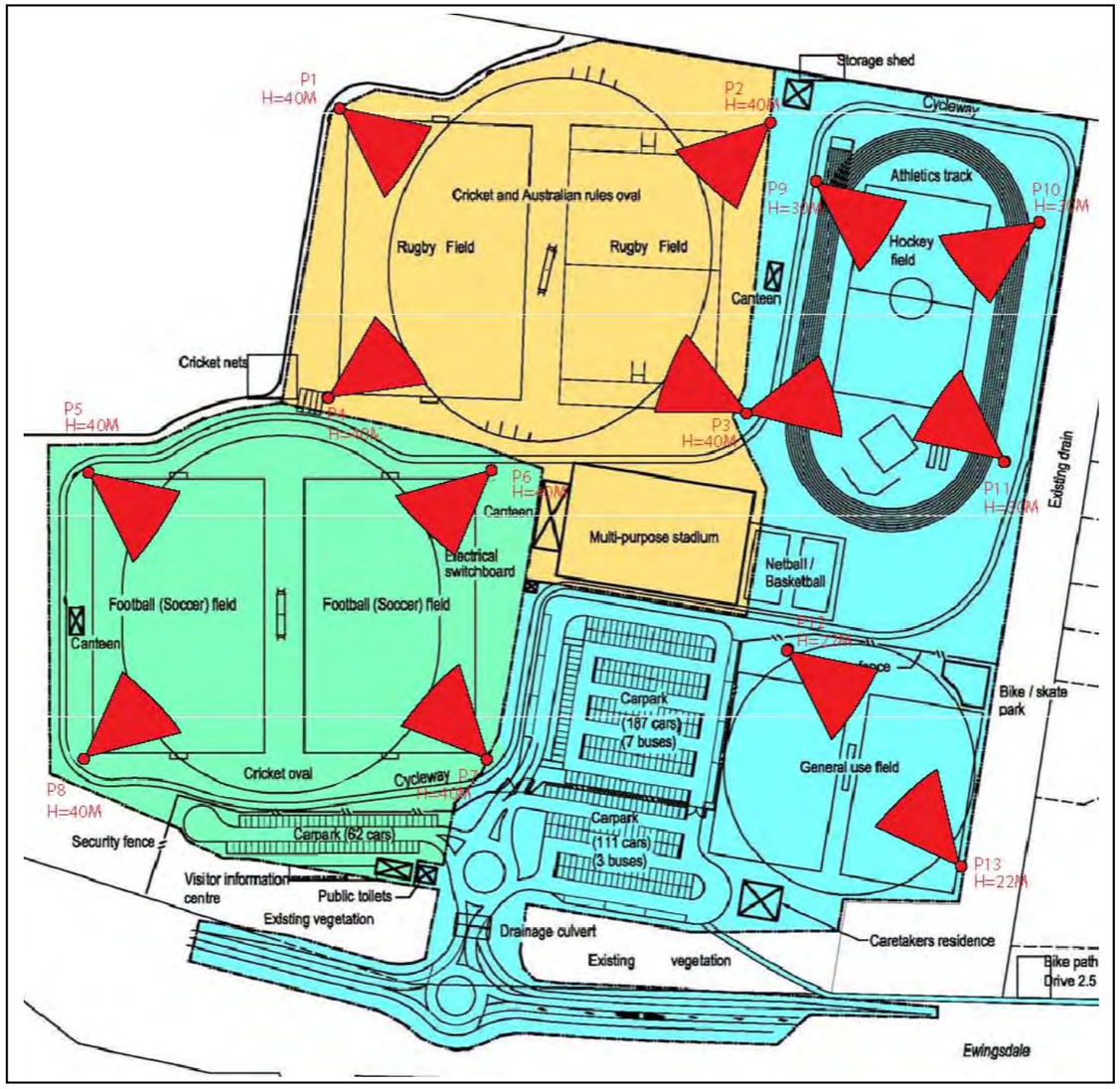
This is not a central city environment with high ambient lighting levels. It requires deliberate and well researched lighting solutions that will meet the needs of the operational requirements while at the same time take into account the natural context of the site.

1.2.2 AS/NZS 1158 P - Lighting for roads and public spaces—Pedestrian area (Category P) lighting—Performance and design requirements

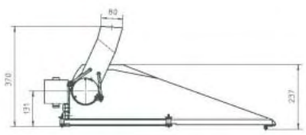
This Standard specifies performance and design requirements for Category P lighting schemes as described in AS/NZS 1158.0. It also specifies the luminaire data and other data that is needed to facilitate the lighting design and the assessment of compliance with the requirements of this Standard.

This Standard assigns various levels of required performance based on an assessment of degree of activity, risk of crime and the required aesthetic appeal. In achieving the required performance, attention should be paid to controlling adverse affects on the night time environment.

RIXONDESIGN PTY LTD
PO BOX 968 INDOOROOPILLY 4068
TEL 33787500 FACSIMILE 32510157
Email rdbne@rixondesign.com

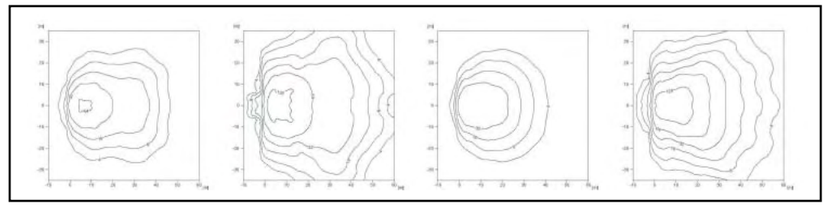


Sports Field Lighting



AS/NZS 1158 P - Lighting for roads and public spaces—Pedestrian area Category P lighting
AS/NZS 4282 – Control of the Effects of Obtrusive Light

1. The Poles will range in height from 22 to 40 metres.
2. The Sports lighting fittings will be based on a full cutoff aero screen design which provides no upward lighting component and low wind load.
3. The poles will have multiple fittings which we allow selected switching for competition and training.
4. The fittings will have variable reflector design to tailor and control light efficiently to specific areas.



Inappropriate light fittings

The fitting types illustrated should not be used as they do not have the control of glare nor do they efficiently light the sports fields.

There are many fittings of this type that can provide a lower capital cost than the aero screen fittings however our experience with Lighting Audits has been that the use of this fitting will result in ongoing issues with Residents that will require rectification and in most cases the fitting design prevents this from being achieved.

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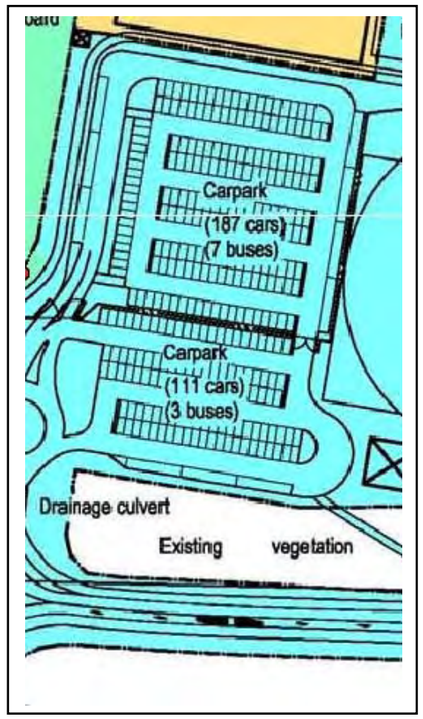
TEL 33787500 FACSIMILE 32510157
Email rdbne@rixondesign.com



Entry Road, Carpark and Pathway Lighting

AS/NZS 1158 P - Lighting for roads and public spaces—Pedestrian area Category P lighting
AS/NZS 4282 – Control of the Effects of Obtrusive Light

1 The Poles will range in height from 4.5m to 8m
2 The lighting fittings will be based on a full cutoff aero screen design which provides no upward lighting component and low wind load.
3 The fittings will have variable reflector design to tailor and control light efficiently to specific areas

2.3 Temporary Lighting for Events

While the design of lighting to the Event Areas is not part of this report we include the following guidelines which we consider are a necessary part of the Lighting Design Guidelines.

Requests must be made for CASA approval to operate searchlights, lasers or other powerful light sources. The use of Searchlight, laser or other powerful light displays or operations have to be discussed with CASA and relevant Airport Inspectors to assess any impact with Coolangatta Airport, other provincial airports or General Aviation. This may also apply if there are Emergency Helicopter Landing operations nearby.

The following information relating to the Event Stage Lighting will be required:

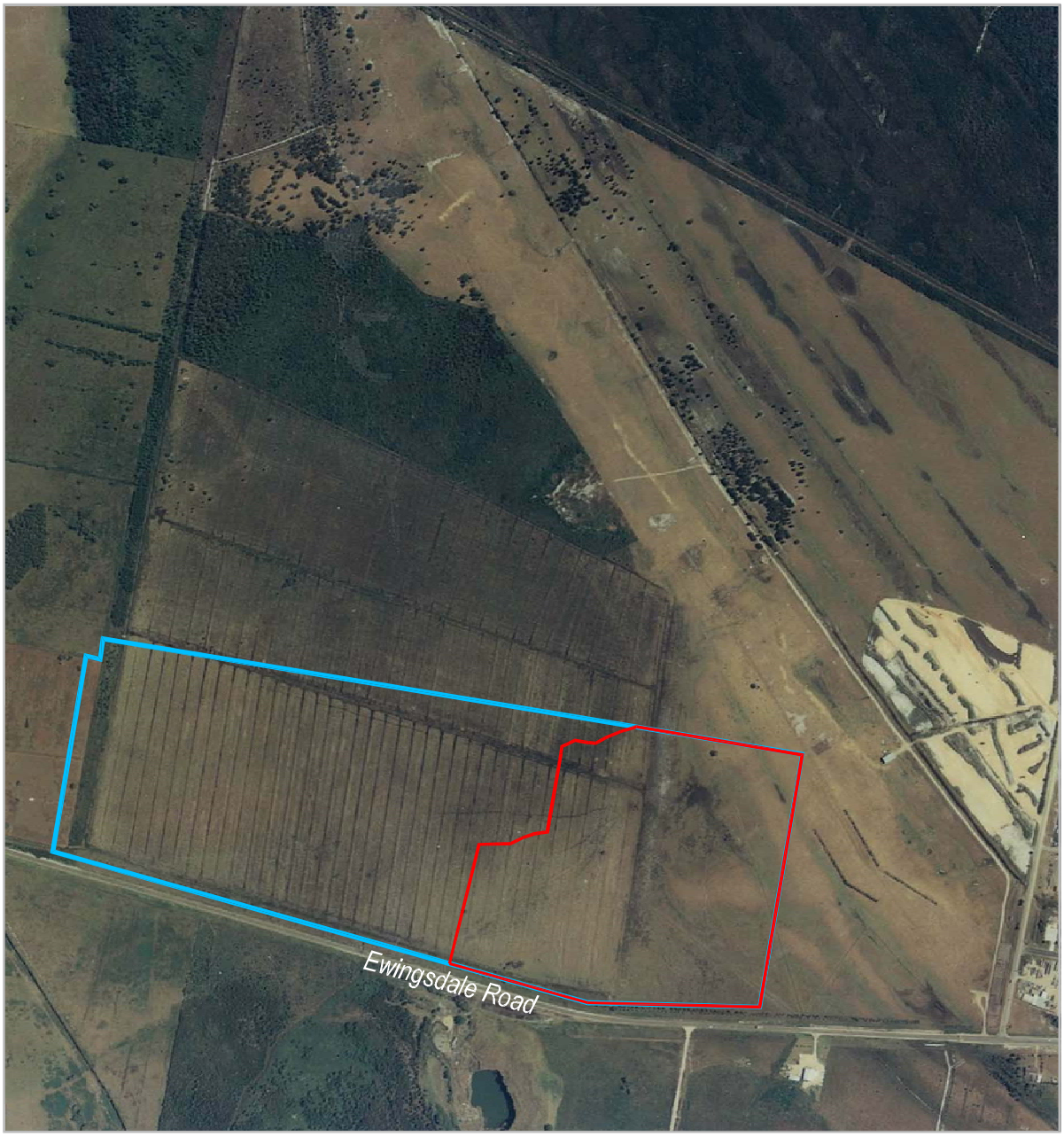
1. A statement of the design objectives for the lighting installation including confirmation of discussion with CASA relevant Airport Inspectors.
2. Plans illustrating the locations of the luminaires and critical locations considered in the design and response to CASA requirements.

RIXONDESIGN PTY LTD
PO BOX 968 INDOOROOPILLY 4068
TEL 33787500 FACSIMILE 32510157
Email rdbne@rixondesign.com

Appendix H

Historical Aerial Photos

Source: Byron Shire Council Date: May 2009



LEGEND

Sport and Cultural Complex site
Property boundary

North

0 200

1983 Aerial Image

Source: Byron Shire Council Date: May 2009

LEGEND

Sport and Cultural Complex site
Property boundary

North

0 200

2003 Aerial Image

Source: Byron Shire Council Date: May 2009

LEGEND

Sport and Cultural Complex site
Property boundary

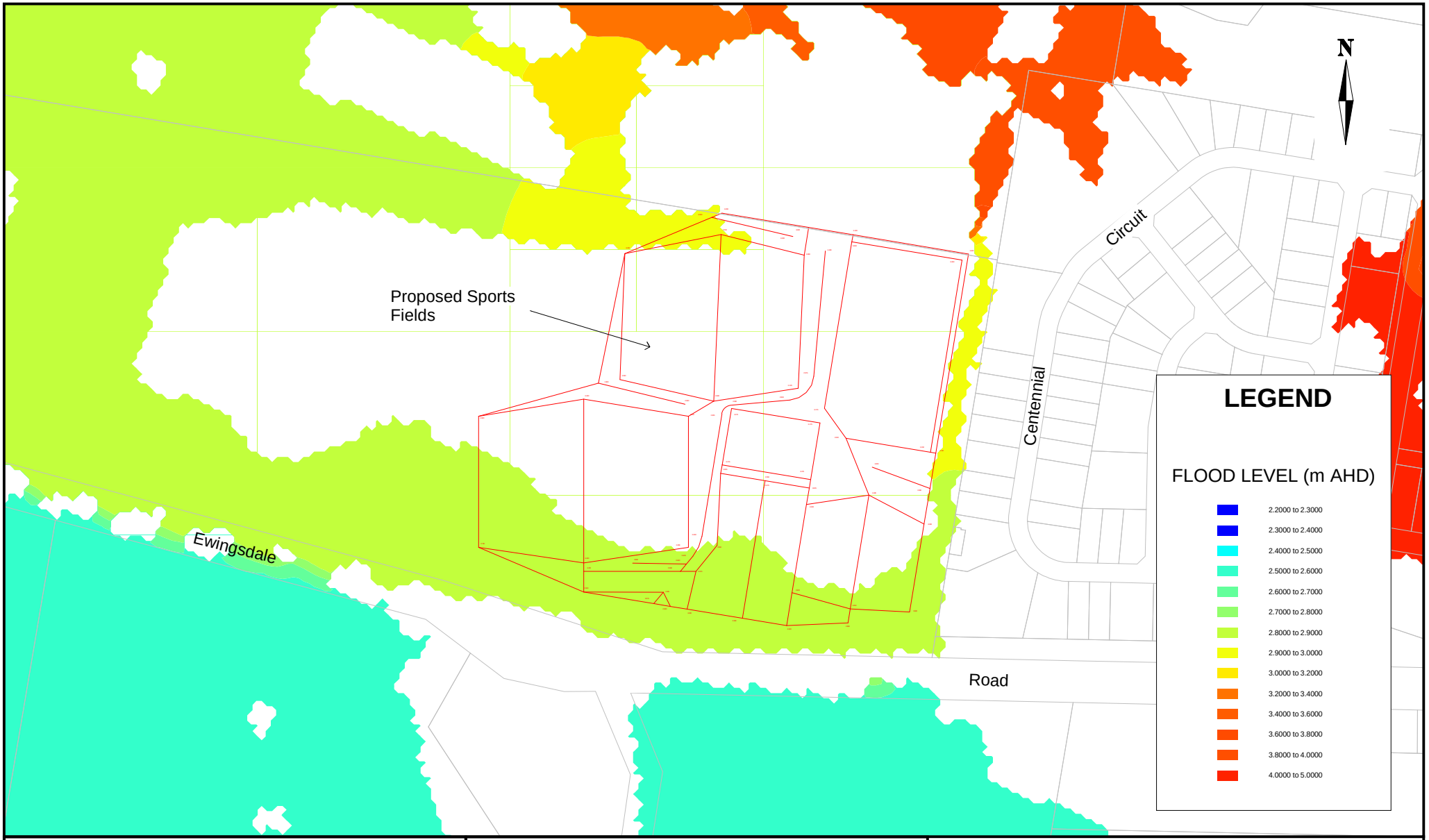
North

0 200

2006 Aerial Image

Appendix I

Flood Impact Assessment



For

Byron Shire Council

SMEC

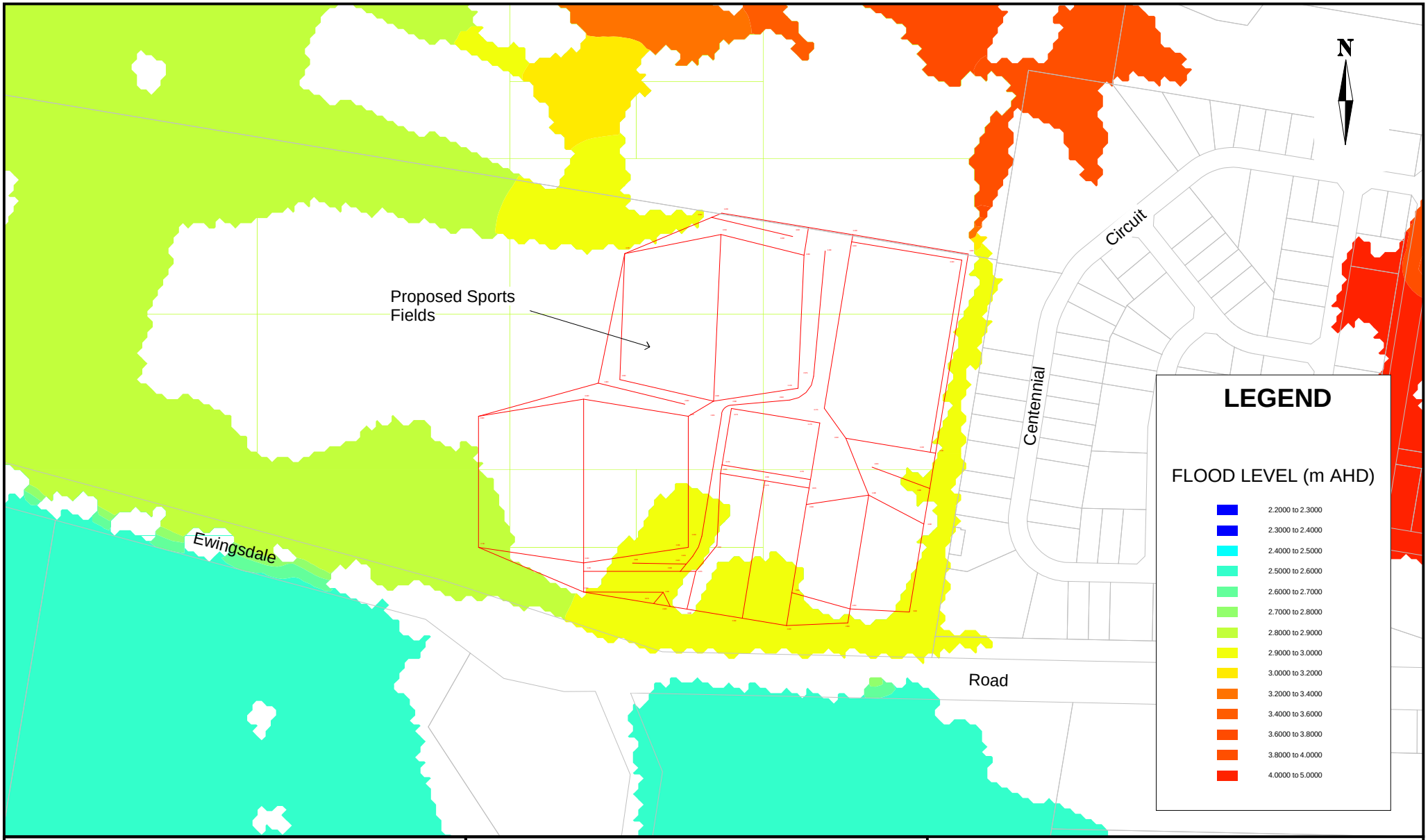
SMEC Australia Pty Ltd
ACN 065 475 149
Level 6 76 Berry Street
North Sydney NSW 2060 Australia
PH (02) 9925 5555 FAX (02) 9955 5566

Project Title
Flooding Assessment for Proposed Sports Fields in Ewingsdale Road

Figure 1 100 year ARI Flood Levels, Existing Topography
BSC Climate Change Scenario 2

Scale (1:5,000 at A4)
0 100 200
metres

Project No.
3001044



For

Byron Shire Council

SMEC

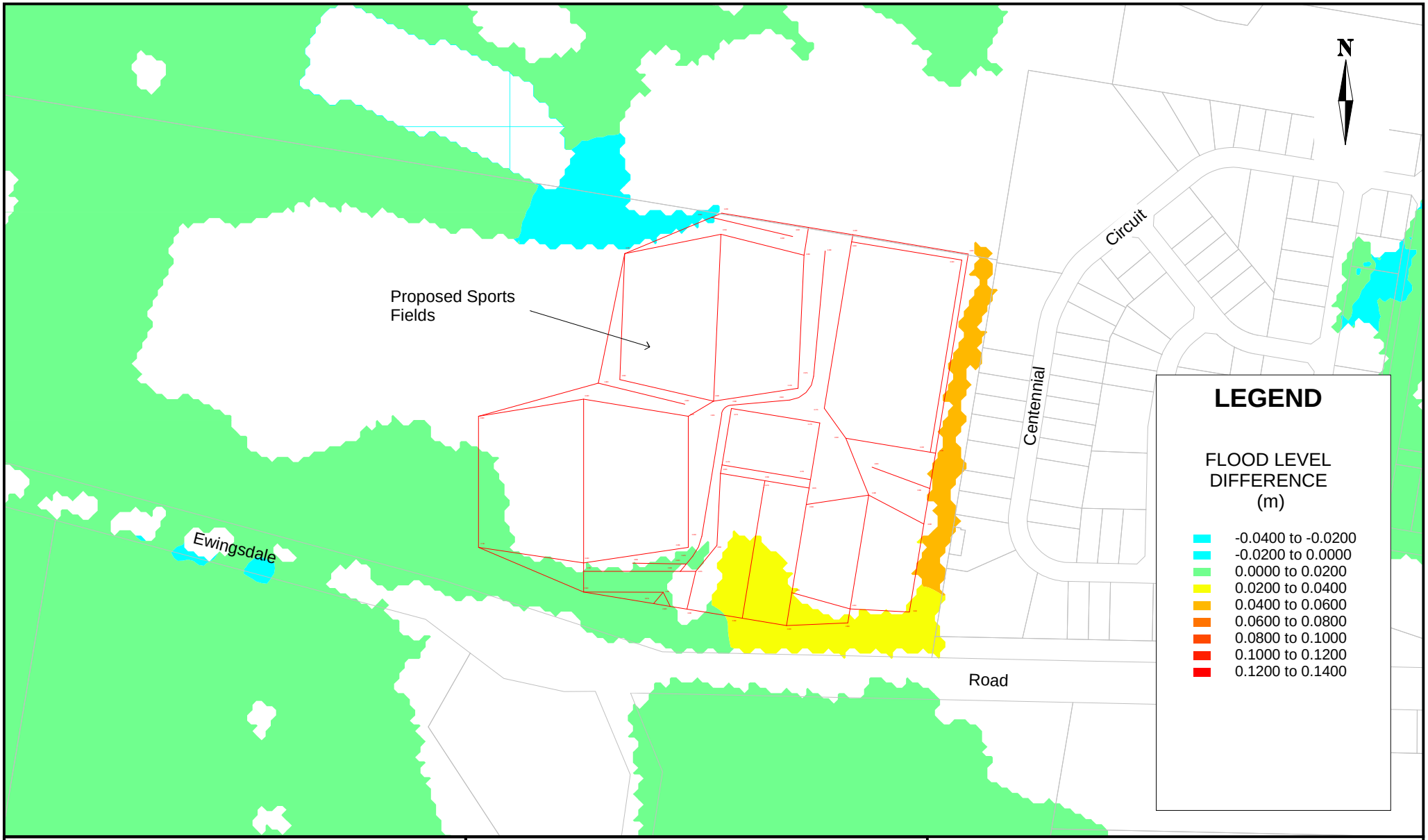
SMEC Australia Pty Ltd
ACN 065 475 149
Level 6 76 Berry Street
North Sydney NSW 2060 Australia
PH (02) 9925 5555 FAX (02) 9955 5566

Project Title
Flooding Assessment for Proposed Sports Fields in Ewingsdale Road

Figure 2 100 year ARI Flood Levels, Proposed Topography
BSC Climate Change Scenario 2

Scale (1:5,000 at A4)
0 100 200
metres

Project No.
3001044



For

Byron Shire Council

SMEC

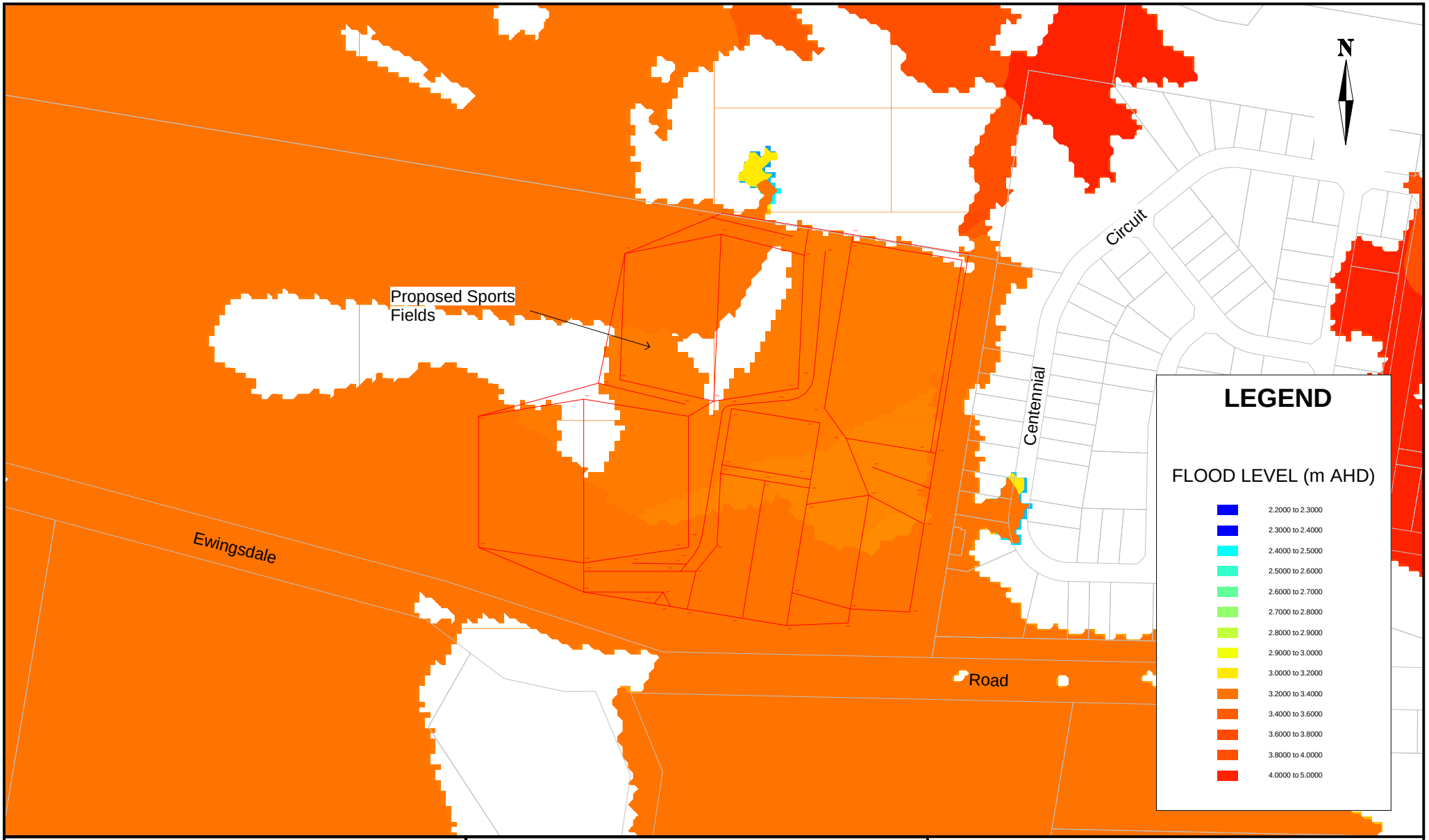
SMEC Australia Pty Ltd
ACN 065 475 149
Level 6 76 Berry Street
North Sydney NSW 2060 Australia
PH (02) 9925 5555 FAX (02) 9955 5566

Project Title
Flooding Assessment for Proposed Sports Fields in Ewingsdale Road

Figure 3 100 year ARI Flood Level Change
BSC Climate Change Scenario 2

Scale (1:5,000 at A4)
0 100 200
metres

Project No.
3001044



For

Byron Shire Council

SMEC

SMEC Australia Pty Ltd
ACN 065 475 149
Level 6 76 Berry Street
North Sydney NSW 2060 Australia
PH (02) 9925 5555 FAX (02) 9955 5566

Project Title
Flooding Assessment for Proposed Sports Fields in Ewingsdale Road

Figure 4 100 year ARI Flood Levels, Existing Topography
BSC Climate Change Scenario 4

Scale (1:5,000 at A4)
0 100 200
metres

Project No.
3001044

For

Byron Shire Council

SMEC

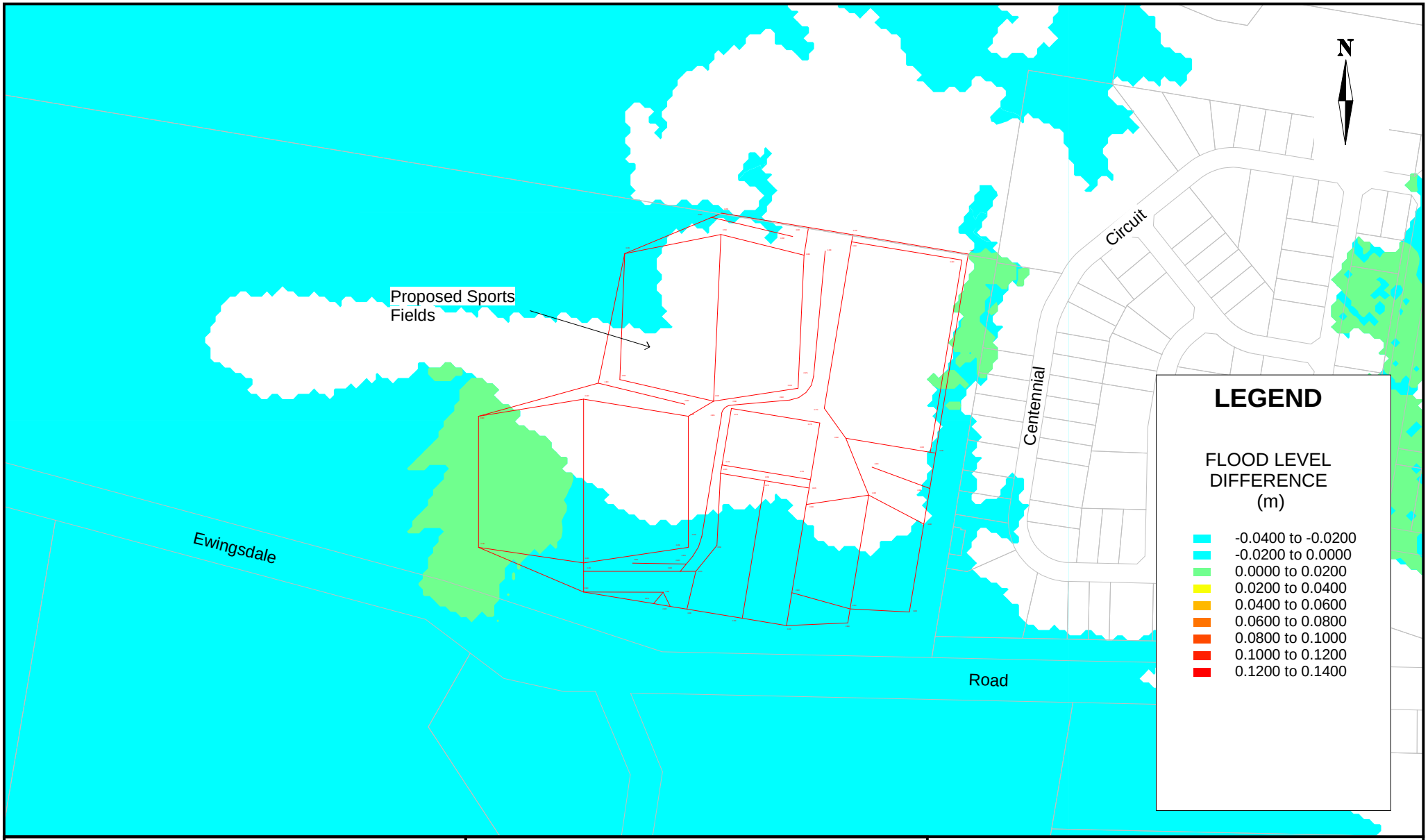
SMEC Australia Pty Ltd
ACN 065 475 149
Level 6 76 Berry Street
North Sydney NSW 2060 Australia
PH (02) 9925 5555 FAX (02) 9955 5566

Project Title
Flooding Assessment for Proposed Sports Fields in Ewingsdale Road

Figure 5 100 year ARI Flood Levels, Proposed Topography
BSC Climate Change Scenario 4

Scale (1:5,000 at A4)
0 100 200
metres

Project No.
3001044



For

Byron Shire Council

SMEC

SMEC Australia Pty Ltd
ACN 065 475 149
Level 6 76 Berry Street
North Sydney NSW 2060 Australia
PH (02) 9925 5555 FAX (02) 9955 5566

Project Title
Flooding Assessment for Proposed Sports Fields in Ewingsdale Road

Figure 6 100 year ARI Flood Level Change
BSC Climate Change Scenario 4

Scale (1:5,000 at A4)
0 100 200
metres

Project No.
3001044

Appendix J

Heritage Register Search Results

Department of
Environment and Climate Change (NSW)

Your reference : 1058192
Our reference : AHIMS #24717

GeoLINK Group
P.O. Box 9
Lennox Head NSW 2478

GeoLINK Received 12/1/09
Project 1058
☐ reviewed
☐ noted file-no action required
☐ action, as follows

Wednesday, 07 January 2009

Attention: Veronica Silver

Dear Sir or Madam:

Re: AHIMS Search for the following area at BSC Ewingsdale Sporting Fields ;Byron Bay;Lot 3 in DP 706286;Zone: 56;E: 555305 - 556414;N: 6831824 - 6832382;

I am writing in response to your recent inquiry in respect to Aboriginal objects and Aboriginal places registered with the NSW Department of Environment and Climate Change (DECC) at the above location.

A search of the DECC Aboriginal Heritage Information Management System (AHIMS) has shown that *0* Aboriginal objects and Aboriginal places are recorded in or near the above location. Please refer to the attached report for details.

The information derived from the AHIMS search is only to be used for the purpose for which it was requested. It is not to be made available to the public.

The following qualifications apply to an AHIMS search:

- AHIMS only includes information on Aboriginal objects and Aboriginal places that have been provided to DECC;
- Large areas of New South Wales have not been the subject of systematic survey or recording of Aboriginal history. These areas may contain Aboriginal objects and other heritage values which are not recorded on AHIMS;
- Recordings are provided from a variety of sources and may be variable in their accuracy. When an AHIMS search identifies Aboriginal objects in or near the area it is recommended that the exact location of the Aboriginal object be determined by re-location on the ground; and
- The criteria used to search AHIMS are derived from the information provided by the client and DECC assumes that this information is accurate.

All Aboriginal places and Aboriginal objects are protected under the *National Parks and Wildlife Act 1974* (NPW Act) and it is an offence to destroy, damage or deface them without the prior consent of the DECC Director-General. An Aboriginal object is considered to be known if:

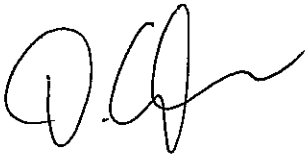
- It is registered on AHIMS;
- It is known to the Aboriginal community; or

PO Box 1967 Hurstville NSW 2220
43 Bridge Street Hurstville NSW 2220
Telephone (02) 9585 6345
Facsimile (02) 9585 6094
ABN 30 841 387 271
ahims@environment.nsw.gov.au
www.environment.nsw.gov.au

- It is located during an investigation of the area conducted for a development application.

If you considering undertaking a development activity in the area subject to the AHIMS search, DECC would recommend that an Aboriginal Heritage Assessment be undertaken. You should consult with the relevant consent authority to determine the necessary assessment to accompany your development application.

Yours Sincerely



Gordon, David
Administrator
Information Systems & Assessment Section
Culture & Heritage Division
Phone: 02 9585 6513
Fax: 02 9585 6094

List of Sites (Limited)

Lot 3 in DP 706286

Grid Reference Type = AGD (Australian Geodetic Datum), Zone = 56, Easting From = 555305, Easting to = 556414, Northing From = 6831824, Northing to = 6832382, Requestor like 2053%, Service ID = 24717, Feature Search Type = AHIMS Features

Site ID	Access Restrictions			Further Info Contact Id	Report ID	Validity Status
	Gender	General	Location			

No Site Recorded