

File Ref: 09/167
Your Ref: PSC2007-3531

05 August 2010

The General Manager
PORT STEPHENS COUNCIL
P.O Box 42
Raymond Terrace NSW 2324

Attention: Mr Matthew Borsato

**Subject: Planning Proposal for the Rezoning of
Lots 411 – 413 DP 1063902, Medowie Road, Medowie**

Dear Matthew,

As previously discussed and requested by Council, please find enclosed the following:

- 2 x bound copies of the Planning Proposal to support the rezoning of the above land.
- 1 x CD containing electronic copy of submission.

With regards to the Aboriginal Heritage Due Diligence Assessment, only a draft version of the report is available at this time. I request that the assessment of the rezoning proposal proceeds and as soon as the final version is available it will be forwarded to Council for inclusion.

I trust this information will satisfy Council's requirements, however, if further information or assistance is required, please do not hesitate to contact our office.

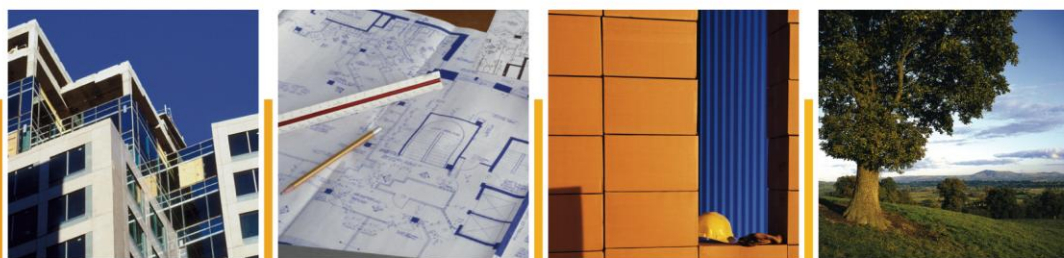
Yours faithfully
HDB Town Planning & Design


Keith Blackmore
Principal Planner

Enclosures – 2 x bound copies of Rezoning Planning Proposal
1 x CD containing electronic copy of Planning Proposal



URBAN DESIGN & PLANNING REPORT



PLANNING PROPOSAL

For

PROPOSED REZONING

Lots 411- 413, DP 10633902

Medowie Road, Medowie

Prepared for

Wendy Morris

August 2010

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Planning Proposal

For

Rezoning at Lots 411- 413 DP 1063902
Medowie Road, Medowie

Prepared for

Wendy Morris

August 2010

Prepared By



Document History and Status

Issue	Revision	Issued To	Qty	Issue Date	Author	Reviewed
1	Draft	HDB	1	2/8/10	PS	KB
2	Draft	M. Rathborne	1	4/8/10	PS	M. Rathborne
3	Final	PSSC	1	5/8/10	PS/KB	



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Printed: 5/08/2010
File Reference: 09/167
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HDB Reference Number: 09/167

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Appendix C – Preliminary Geotechnical Assessment by Coffey Geotechnics dated 16 July 2010

Appendix D – Bushfire Threat Assessment by HDB dated June 2010

Appendix E – Aboriginal Heritage Due Diligence Assessment by Len Roberts (Archaeologist) dated 28/7/2010 (Draft pending LALC endorsement)

Appendix F – Title Search and Deposited Plan

Appendix G – Proposed Zone Map and Concept Master Plan

PREAMBLE

The subject land was first considered for rezoning by Port Stephens Shire Council on 26th February 2008. The proponent at the time was Citta Property Group and the land the subject of the rezoning included land on both sides of Medowie Road. Following Council's resolution to support the rezoning, the matter was referred to the NSW Department of Planning pursuant to Section 54(4) of the Act (at that time). Council's notification letter was dated 26th March 2008. The Citta Property Group has since withdrawn their involvement with the project.

HDB Town Planning & Design were subsequently engaged by the owner of the property Ms Wendy Morris to prepare a Feasibility Assessment and Concept Master Plan as a basis for proceeding with the rezoning of Lots 411-413 DP 1063902, Medowie Road, Medowie. Around the same time, the Pacific Dunes developer engaged Dickson Rothschild Architects and Planners to review the potential of their land and to progress their rezoning.

At a joint meeting with Council officers on 27th November 2009, it was agreed that the application to rezone the land remained current and that on completion of the required studies (flooding, archaeology, ecology), it was desirable that a combined revised rezoning proposal be submitted and considered by Council for public authority consultation under Section 62 of the Act (at the time). Council has since advised that the original rezoning proposal is to now to be split and proceed separately, and has requested that individual Planning Proposals be prepared. It understood that the decision as to the rezoning process to be followed by each will be made by Council in consultation with the NSW Department of Planning (either via the original LEP Amendment process under Part 3 of the Act or be moved across into the Gateway Plan-making Process at the appropriate stage).

The site the subject of this Planning Proposal, is currently zoned 1(c1) Rural Small Holdings. This Proposal seeks an amendment to Port Stephens LEP 2000 to provide for a mix of uses on the site by rezoning the land 2(a) Residential, 3(a) General Business, 6(a) General Recreation and 6(c) Special Recreation.

SITE AND LOCALITY DETAILS

The site is irregular in shape with an area of 42.68 Ha. Within Lot 411, there is an easement for electricity to the north east, and a sewage pump located on Lot 413 to the central north. A SEPP 14 Wetland is situated on south/ central western section of the subject site.

The site falls typically from east to west; however there is also a north to south fall on the eastern side of the site. Along the northern boundary there is a 2.39m fall from east to west. From the north east corner of Lot 412 there is an east-west fall of 8.77m, a 6.11m south-north fall to the northern boundary of the site and a 4.07m north-south fall to the southern boundary. The southern boundary has an east-west fall of 3.76m.

There is a drainage corridor located in the south east corner of Lot 412, which runs into the SEPP 14 Wetland. The site also contains Koala Habitat which runs predominantly through the centre of Lots 412 and 413 from the northern boundary to the SEPP 14 Wetland.

The majority of the southern portion of the site is covered by wetlands associated with the Campvale Drainage catchment, with two smaller wetlands in the northern part of the site isolated by the existing figure eight race track. A corridor of vegetation extends from the northern side of the wetland through the middle of the site to the northern boundary where it connects with a cluster of trees. The remainder of the site is cleared grassland with scattered trees.

Currently the site has a dwelling house, go cart track, a substation, and a tennis court on the northern half of the site and a dwelling and a substation on the southern half of the site. The dwelling houses, go cart track and tennis court will be demolished as part of the development proposal. The sewage pump station on the northern boundary of the site will remain. The electrical substation and easement will remain as part of the proposed development.

The north of the site is surrounded by rural residential properties. To the immediate south, the site is bound by Richardson Road and environmentally sensitive land, to the immediate east is Medowie Road and to the west is densely vegetated land. To the east of Medowie Road is the Pacific Dunes Golf Course and residential estate.

Surrounding land use zones consist of 1(c1) - Rural Small Holdings, 1(c2) - Rural Small Holdings, 1(c5) - Rural Small Holdings, 6(a) - General Recreation, 6(c) - Special Recreation, 7(c) - Environment Protection (Water Catchment). Residential estates are located to the north, and north east of the site within 100m to 3km from the site. Medowie's retail area is located approximately 2.5km north of the site on Ferodale Road.

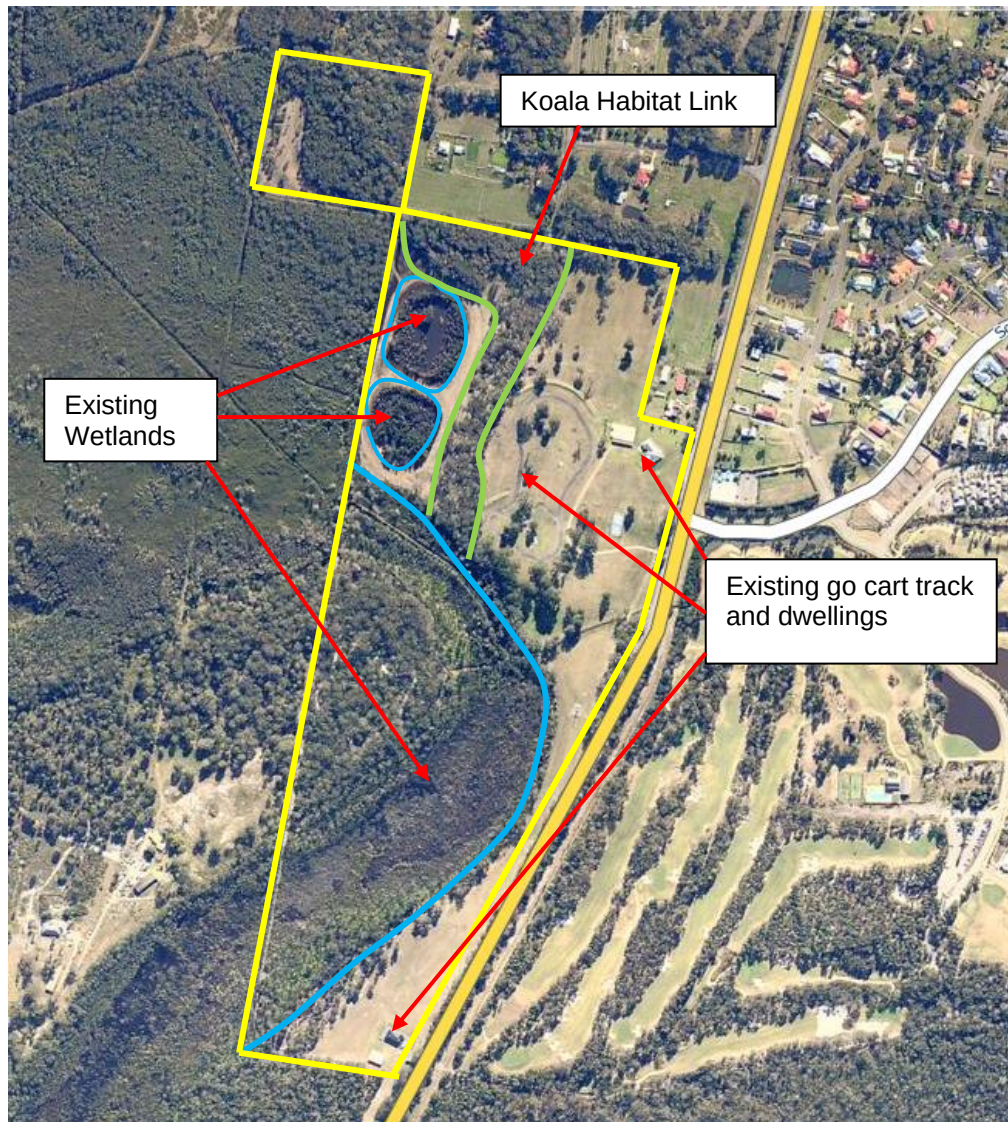


Figure 1 – Subject Site and Main Topographical Features

PART 1 - OBJECTIVES OR INTENDED OUTCOMES

The subject land is currently zoned 1(c1) Rural Small Holdings. This proposal seeks to rezone the land to 2(a) Residential, 3(a) General Business, 6(a) General Recreation and 6(c) Special Recreation. On this basis, the objective or intended outcome of this planning proposal is:

To enable the development of Lots 411 to 413, DP 1063902, Medowie Road, Medowie for residential, commercial and recreation purposes generally in accordance with the Port Stephens Community Settlement and Infrastructure Strategy (CSIS) 2007 and the Port Stephens Council Medowie Strategy 2009.

PART 2 - EXPLANATION OF THE PROVISIONS

The objectives or intended outcomes are to be achieved by way of amendment to the Port Stephens LEP 2000 Land Zoning Map as shown in **Figure 2** below.

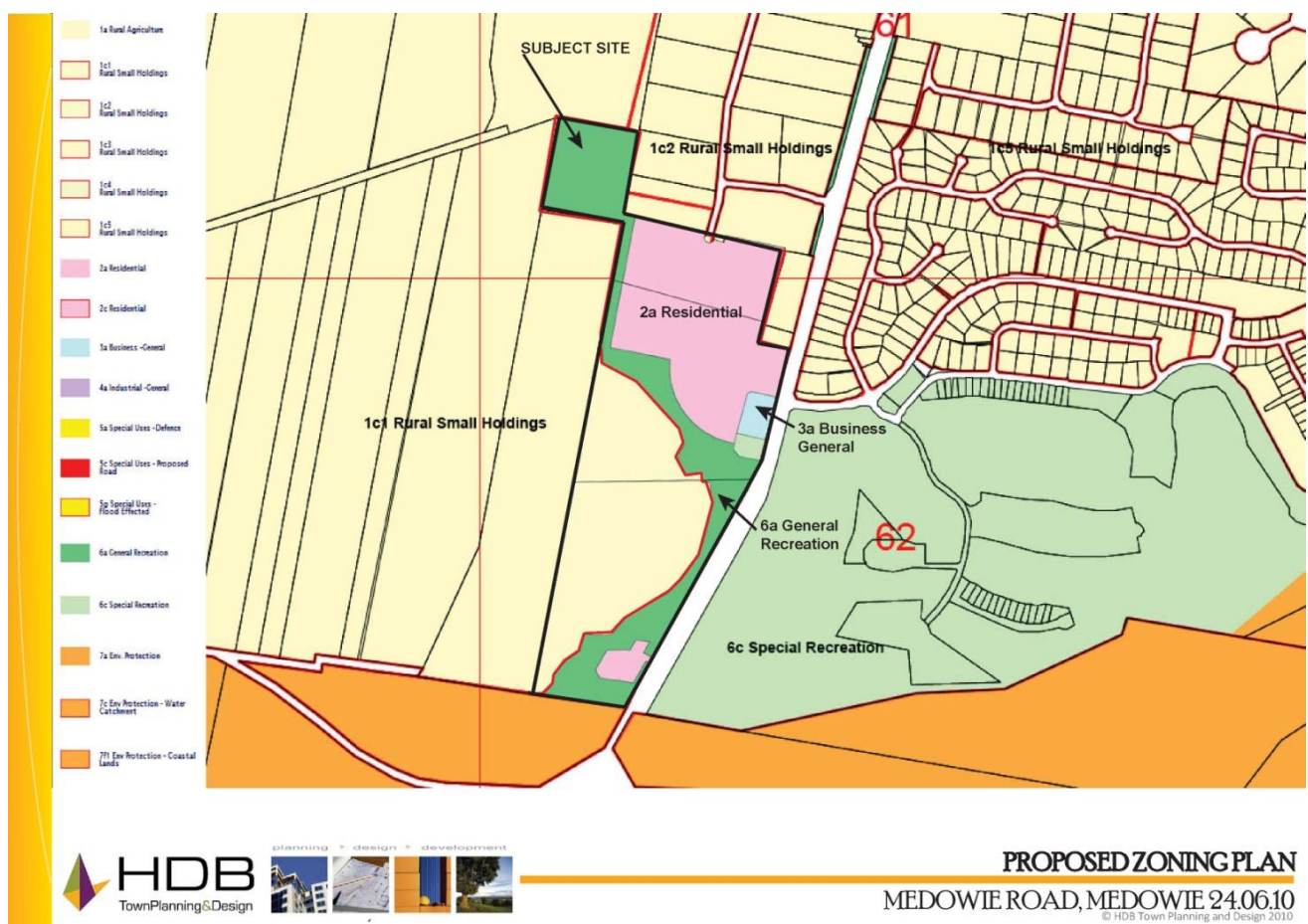


Figure 2 – Proposed Zoning Map Amendments

PART 3 - JUSTIFICATION

3.1 Section A – Need for the Planning Proposal.

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

This planning proposal is in response to the recommendations of the following strategic studies and reports.

Port Stephens Community Settlement and Infrastructure Strategy (CSIS) 2007

The Port Stephens Community Settlement and Infrastructure Strategy (CSIS) 2007 incorporates the strategic directions of the Lower Hunter Regional Strategy 2006 and identifies Medowie as one of only two significant new release areas for urban development in the Port Stephens LGA for the next 25 years.

The CSIS identifies the following for Medowie:

- Medowie as a release area >2,000 dwellings over the duration of 15-20 years;
- Approximate ultimate yield totalling 3,000 lots;
- Average persons per dwelling is 2.1;
- Average density of 15 dwellings per hectare (Net).
- A projected population increase of approximately 8,100 persons;
- Areas outside existing and identified urban release areas should retain existing rural zonings;
- By 2031 a shift from 85% to 80% of detached dwellings and from 15% to 20% attached or multi-unit dwellings to provide for a greater mix of housing styles and allotment sizes to provide for changing demographics and to facilitate greater choice, affordability and social diversity; and,
- Mixed use urban centre and neighbourhoods encouraged in new and existing development with an increase in average density of dwellings in the new urban release area moving towards more efficient use of land.

(Note: Additional investigations and consultation undertaken as part of the Medowie Strategy indicated that variations from the CSIS in some instances for Medowie are appropriate).

Port Stephens Council Medowie Strategy 2009

The Port Stephens Council Medowie Strategy 2009 indicates that the site is appropriate for Rural Small Holdings, Environmental Living, Residential, Town houses and Villas, Commercial, Community Use, Open Space and Private Recreational uses. Proposed typical land uses for the site as extracted from the Medowie Strategy are shown in **Figure 3** below.

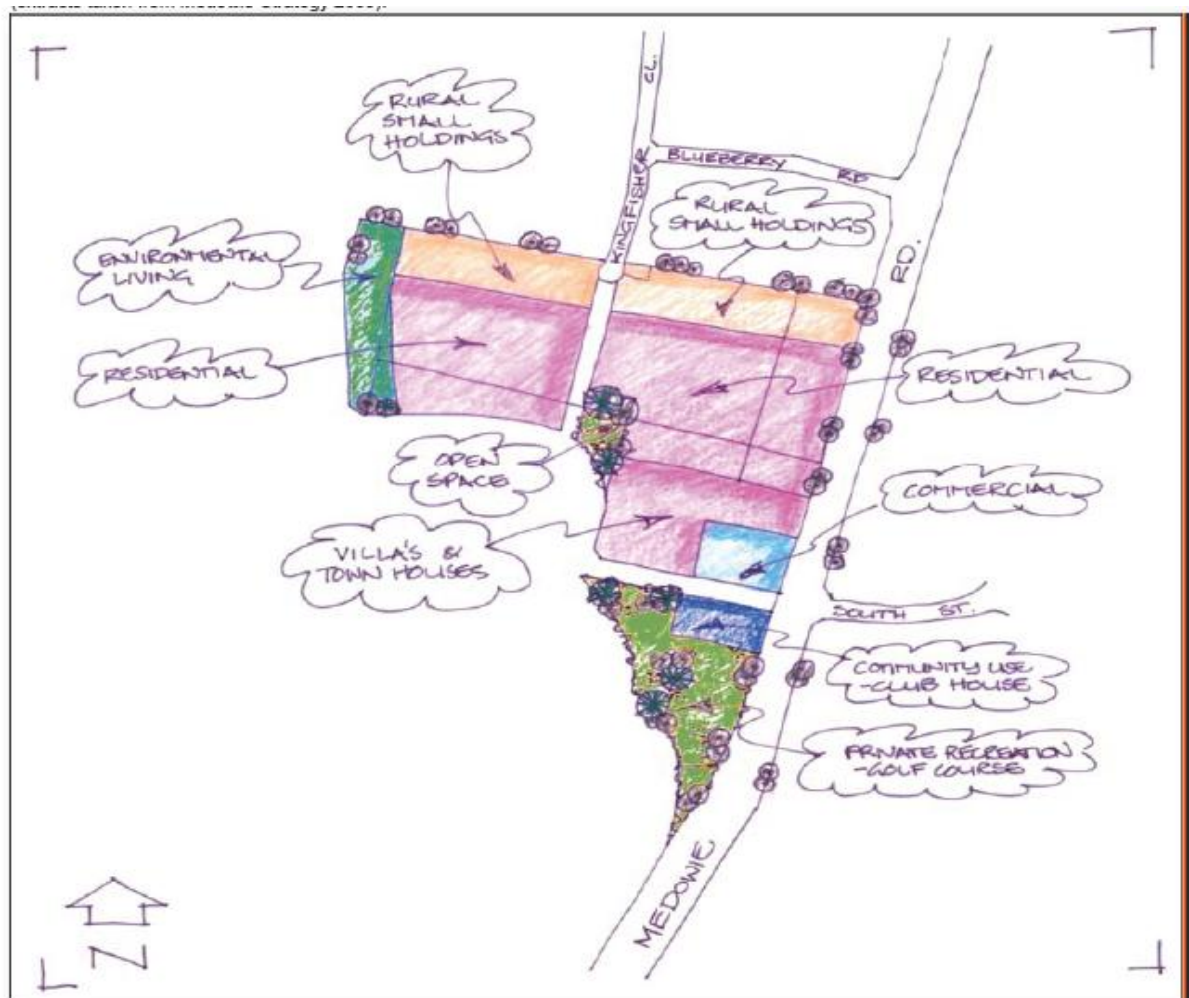


Figure 3 – Extract from Medowie Strategy – Proposed Zones

Concept Master Plan

The Concept Master Plan prepared by HDB (shown as **Figure 4**) investigated the existing site, its constraints and the opportunities the site presents for future development. Based on the findings, a change of the zoning of the land is being sought.

The concept plan proposes a mix of environmental living, rural residential, residential, medium density and seniors living lots combined with both retail and a recreation precincts and an open space corridor surrounding the SEPP 14 Wetland.

The proposal has the potential to provide a total yield of 10.98 dwellings per hectare (Net), consisting of 14 Environmental Living lots, 8 Rural Residential lots, 50 Residential lots, 39 Villa/Townhouse lots, 11 Seniors Living lots, 2,615sqm of retail space, 1,675sqm of recreational space, 198 public parking spaces, 7.29Ha of public open space (including potential for 2 sports ovals and car park), and 15.64Ha of SEPP 14 Wetlands (to be retained).

Pedestrian links will be incorporated throughout the design to promote a walkable/ pedestrian friendly community and to incorporate accessibility to all aspects of the development. Lots are proposed to face the open space to offer casual surveillance of the open space areas and improved amenity for residents.

Extensive establishment and embellishment of the SEPP 14 wetlands will create a natural environment consistent with the principles of ecologically sustainable development. A Koala Habitat corridor is located through the site and will be retained to link the SEPP 14 Wetlands and vegetated areas to the west of the site.

The objectives and aims of the Master Planned development are to:

- Provide a variety of residential housing types in the neighbourhood to foster a diverse community, provide for wide marketability and respond to the local character.
- Locate low density development adjacent to existing rural properties and increase density of development on the surrounds of local facilities, public transport and open space to optimise these land uses.
- Incorporate landscape features inclusive of drainage swales, open space and street design to reflect the local character of Medowie.
- Provide visual links to open space areas through road connections.
- Enhance the existing SEPP 14 wetlands and existing vegetated areas.
- Retain the majority of the Koala Habitat link within larger lots.

Please refer to **Figure 4** Concept Master Plan below:

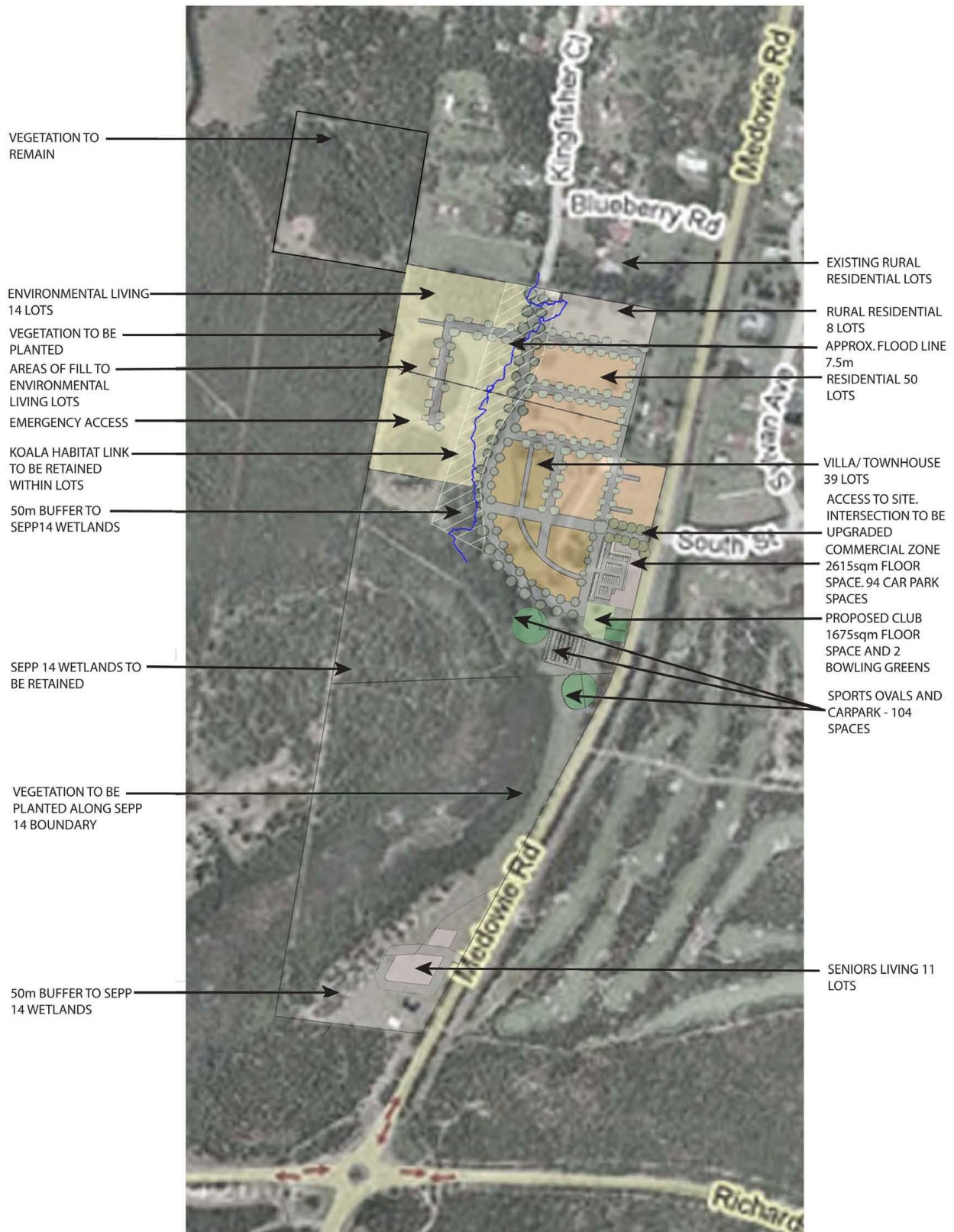


Figure 4 – Concept Master Plan

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

The existing 1(c1) - Rural Small Holdings zone applying to the land has limited permissible uses and inconsistent objectives with the intended use of the land. A change of zoning via an LEP amendment is the only available option to facilitate the proposed development of the land.

3.1.3 Is there a net community benefit?

The following Net Community Benefit Test (adapted from draft Centres Policy) has been completed to determine if the proposed rezoning would produce a net community benefit.

- The Planning Proposal is compatible with agreed State and regional strategic directions for development in the area.
- The Planning Proposal is located in a strategic centre nominated within the Lower Hunter Regional Strategy.
- The Planning Proposal will not create a precedent or create or change the expectations of the landowner or other landholders.
- The cumulative effects of other spot rezoning proposals in the locality have been considered. The Planning Proposal will result in outcomes envisaged by the adopted planning strategies for the locality.
- Development resulting from the Planning Proposal will result in a net increase in permanent employment generating activities in the area.
- The Planning Proposal will result in an additional supply of land of various sizes in the area and as a consequence impact positively upon the supply of residential land and therefore housing supply and affordability
- It has been confirmed that the existing public infrastructure is capable of servicing the proposed site. Provision for pedestrian and cycle access will be included in the final subdivision design and open space areas. Public transport is currently available to the location.
- The Planning Proposal includes the provision of land for a local neighbourhood shopping centre and recreation facilities. This will limit the need to travel to the larger commercial centres. Accessible public transport and cycle/pedestrian facilities will assist in limiting the reliance on car use. However, as a result of the increased population in the area, the Planning Proposal will inevitably result in an increase in the reliance on the car for transport to employment and other services not available in the immediate locality. There will be

some adverse amenity impacts likely to arise from the development of vacant rural land for urban purposes. Road safety will be properly addressed via good urban design and appropriate traffic management initiatives.

- There are no “significant Government investments in infrastructure or services in the area whose patronage will be affected by the proposal”.
- The land is constrained by some environmental factors (ie. flooding, wetlands, sensitive ecological communities and habitat). The Planning Proposal gives proper consideration to those constraints and seeks to maintain and/or enhance the current biodiversity values in the locality.
- The Planning Proposal will result in development compatible with surrounding land uses. Consideration has been given to the avoidance of conflicts of land use and the transition of densities between different land uses. The existing rural residential character will be impacted on the immediate site. However, with appropriate landscape treatment, controls on the quality of housing and retention of substantial stands of vegetation, the surrounding land uses and the wider community will see little change. The inclusion of substantial areas of enhanced public open space will see an improvement in the public domain available to the general community.
- The Planning Proposal will see an increase in the choice and competition by increasing the number of retail and commercial premises operating in the area.
- The Planning Proposal will result in an attractive and desirable local community in balance with the environment in the future.
- The Planning Proposal is consistent with the long term development strategies for the area. It will result in the creation of an attractive local residential neighbourhood with all essential services immediately available or within an easy commute by private or public transport. On this basis, it is considered that the proposal is in the public interest. The implications of the development not proceeding include a deficiency in the supply of land and housing in the area and the underutilization of land suitable for urban purposes.

Based on the answers above, it is evident that the Planning Proposal will result in a “Net Community Benefit”.

3.2 Section B – Relationship to strategic planning framework.

3.2.1 Is the planning proposal consistent with the objectives and actions contained within the applicable regional or sub-regional strategy (including the Sydney Metropolitan strategy and exhibited draft strategies)?

The Lower Hunter Regional Development Strategy was developed to guide the regions growth over the next 25 years by identifying future development areas, principal land use types, settlement patterns and conservation outcomes. In particular the strategy will:

- Ensure that sufficient employment lands are available to cater for 66,000 new jobs.
- Plan for an additional 160,000 residents and 115,000 new dwellings
- Establish important green corridors, to protect and even enhance the Region's strong environmental and biodiversity assets.
- Reinforce the role of the Newcastle city centre as the regional city.

The objective of the proposal to supply additional residential, business and recreational land to the fast growing population is consistent with the objectives of this regional strategy.

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

The Port Stephens Community Settlement and Infrastructure Strategy (CSIS) 2007 identifies Medowie as a significant urban release area. The Medowie Strategy nominates the site as being suitable for Rural Small Holdings, Environmental Living, Residential, Town house and Villa's, Commercial, Community Use, Open Space and Private Recreational uses. The proposed rezoning will allow for a mix of the nominated uses that responds to the environmental sensitivities of the land in accordance with the Council's strategic plans.

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

The following SEPP's are relevant to the Planning Proposal:

State Environmental Planning Policies No. 14 – Coastal Wetlands

Aims and Objectives

The aim of this policy is to ensure that the coastal wetlands are preserved and protected in the environmental and economic interests of the State.

The proposed rezoning strategy has been formulated to protect the integrity of the existing SEPP 14 wetland located on the western side of the site, and incorporates a 50m buffer to ensure no disturbance is caused. The concept plan for the proposal also includes additional planting along

the edge of the wetland boundary to provide further protection and enhancement of the habitat for fauna within the local area.

State Environmental Planning Policies No. 44 – Koala Habitat Protection

Aims and Objectives

This Policy aims to encourage the proper conservation and management of areas of natural vegetation that provide habitat for koalas to ensure a permanent free-living population over their present range and reverse the current trend of koala population decline:

- (a) By requiring the preparation of plans of management before development consent can be granted in relation to areas of core koala habitat, and*
- (b) By encouraging the identification of areas of core koala habitat, and*
- (c) By encouraging the inclusion of areas of core koala habitat in environment protection zones.*

The proposed rezoning seeks to retain a majority of the Koala Habitat on site by proposing larger environmental living lots to reduce the number of trees requiring removal. In addition to the retention of the majority of the Koala Habitat, replacement planting will be provided along the boundary to the SEPP 14 Wetlands and within the site boundaries along the edge and to the north of the SEPP 14 Wetlands to provide an improved Koala Habitat Link through the entire site from north to south.

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

This section addresses all relevant s.117 Directions which are applicable to the subject site and its proposed use. Please refer to table over.

LOCAL PLANNING DIRECTIONS Section 117(2) of the <i>Environmental Planning and Assessment Act 1979</i>		
Direction Name & Number	Application of Direction	Comment
1. Employment and Resources		
1.1 Business and Industrial Zones	Objectives 1.The objectives of this direction are to: a. Encourage employment growth in suitable locations, b. Protect employment land in business and industrial zones, and c. Support the viability of identified strategic centres Where this direction applies 2.This direction applies to all relevant planning authorities When this direction applies 3. This direction applies when a relevant planning authority prepares a planning proposal that will affect land within an existing or proposed business or industrial zone (including the alteration of any existing business or industrial zone boundary).	The proposal is consistent with the objectives of this direction. The concept plan proposes a mix of land uses. The size of the proposed commercial zone will not detract from the existing commercial area of Medowie and will support the growth of the area providing additional services to the population and encourage economic growth.
1.2 Rural Zones	Objective 1.The objective of this direction is to protect the agricultural production value of rural land Where this direction applies 2. Clause 4(a) of this direction applies to all relevant planning authorities. Clause 4 (b) of this direction applies in the following government areas: Ashfield, Auburn, Bankstown, Baulkham Hills, Blacktown, Blue Mountains, Botany Bay, Burwood, Camden, Campbelltown, Canada Bay, Canterbury, City of Sydney, Fairfield, Gosford, Hawkesbury, Holroyd, Hornsby, Hunters Hill, Hurtsville, Kogarah, Ku-ring-gai, Lake Macquarie, Lane Cove, Leichardt, Liverpool, Manly, Marrickville, Mosman, Newcastle, North Sydney, Parramatta, Sutherland, Warringah, Waverley, Willoughby, Wollondilly, Woolahra, Wollongong, Wyong.	The proposal is consistent with the objectives of this direction. The land is currently used for rural residential purposes and the nature and location of the land would not support significant agricultural production. The proposed use represents the best possible use for the site and will not result in the decrease of agricultural production of the land.

	When this direction applies 3.This direction applies when a relevant planning authority prepares a planning proposal that will affect land within an existing or proposed rural zone (including the alteration of any existing rural zone boundary)	
1.5 Rural Lands	Objective 1.The objectives of this direction are to: - protect the agricultural production value of rural land, - facilitate the orderly and economic development of rural lands for rural and related purposes. Where this direction applies 2.This direction applies to all planning proposals to which State Environmental Planning Policy (Rural Lands) 2008 applies, which includes all government area in the state other than the following government areas: Ashfield, Auburn, Bankstown, Baulkham Hills, Blacktown, Blue Mountains, Botany Bay, Burwood, Camden, Campbelltown, Canada Bay, Canterbury, City of Sydney, Fairfield, Gosford, Hawkesbury, Holroyd, Hornsby, Hunters Hill, Hurtsville, Kogarah, Ku-ring-gai, Lake Macquarie, Lane Cove, Leichardt, Liverpool, Manly, Marrickville, Mosman, Newcastle, North Sydney, Parramatta, Penrith, Pittwater, Randwick, Rockdale, Ryde, Strathfield, Sutherland, Warringah, Waverley, Willoughby, Wollondilly, Woolahra, Wollongong, Wyong. When this direction applies 3.This direction applies when: - A relevant planning authority prepares a planning proposal that will affect land within an existing or proposed rural or environment protection zone (including the alteration of any existing rural or environment protection zone boundary) or - A relevant planning authority prepares a planning proposal that changes the existing minimum lot size on land within a rural or environment protection zone.	The proposal does not represent the loss of agricultural production value of rural land.
2. Environment and Heritage		
2.1 Environment Protection Zones	Objective 1.The objective of this direction is to protect and conserve environmentally sensitive areas	The site currently supports a large coastal Wetland and Koala Habitat. Detailed investigation regarding these areas of the site

	Where this direction applies 2.This direction applies to all relevant planning authorities When this direction applies 3.This direction applies when a relevant planning authority prepares a planning proposal	has been undertaken and the development has been designed around the retention of these areas. Appropriate offsets and mitigation measures are proposed to ensure the protection and enhancement of these areas.
2.2 Coastal protection	Objective 1. The objective of this direction is to implement the principles in the NSW Coastal Policy. Where this direction applies 2. This direction applies to the coastal zone, as defined in the Coastal Protection Act 1979. When this direction applies 3.This direction applies when a relevant planning authority prepares a planning proposal that applies to land within the coastal zone	The proposal is consistent with objectives of the NSW Coastal Policy.
3. Housing Infrastructure and Urban Development		
3.1 Residential Zones	Objective 1.Theobjectives of this direction are: a. To encourage a variety and choice of housing types to provide for existing and future housing needs, b. To make efficient use of existing infrastructure and services and ensure that new housing has appropriate access to infrastructure and services, and c. To minimise the impact of residential development on the environment and resource lands Where this direction applies 2.This direction applies to all relevant planning authorities When this direction applies 3.This direction applies when a relevant planning authority prepares a planning proposal that will affect land within: (a) An existing or proposed residential zone (including the alteration of any existing residential zone boundary), (b) Any other zone in which significant residential development is permitted or	The concept design proposes a variety of different housing options including large environmental living lots, rural residential lots, residential lots and villa/townhouse lots. The concept layout has been designed to avoid vegetation removal and impact on the existing wetland in order to minimise the environmental effects. Future residents will have appropriate access to infrastructure and services both

	proposed to be permitted.	on site and locally in Medowie.
3.5 Development near Licensed Aerodromes.	Objectives 1. The objectives of this direction are: - To ensure the effective and safe operation of aerodromes, and - To ensure that their operation is not compromised by development that constitutes an obstruction, hazard or potential hazard to aircraft flying in the vicinity, and - To ensure development for residential purposes or human occupation, if situated on land within the Australian Noise Exposure Forecast (ANEF) contours of between 20 and 25, incorporates appropriate mitigation measures so that the development is not adversely affected by aircraft noise. Where this direction applies 2. This direction applies to all relevant planning authorities. When this direction applies 3. This direction applies when a relevant planning authority prepares a planning proposal that will create, alter or remove a zone or a provision relating to land subject to noise from a licensed aerodrome.	The site is not currently affected by ANEF contours. However the Royal Australian Air Force based at Williamtown is planning for the progressive introduction of the Joint Strike Fighter military aircraft commencing from 2017-2018. Australian Noise Exposure Forecast ANEF 2025 has been produced to predict aircraft noise impacts by the year 2025. The ANEF 2025 predicts the southern half of the site will be affected by Aircraft Noise Contours between 20-25. Appropriate building design can ensure the proposed development of the site will not be impacted by the change predicted in the ANEF. Appropriate mitigation measures will be proposed at development application stage to ensure this issue is adequately addressed.
4. Hazard and Risk		
4.1 Acid sulphate soils	Objective 1. The objective of this direction is to avoid significant adverse environmental impacts from the use of land that has a probability of containing acid sulphate soils Where this direction applies 2. This direction applies to all relevant planning authorities that are responsible for land having a probability of containing acid sulphate soils, as shown on Acid Sulphate Soils Planning Maps held by the Department of Planning. When this direction applies 3. This direction applies when a relevant planning authority prepares a planning proposal	Field screening results indicate that ASS is unlikely to be encountered within 2.0m depth. Should excavation to a depth exceeding 2m be required further investigations will be undertaken at DA stage.

	that will apply to land having a probability of containing acid sulphate soils as shown on the Acid Sulphate Soils Planning Maps.	
4.3 Flood Prone Land	Objective 1.The objectives of this direction are: a. To ensure that development on flood prone land is consistent with the NSW Government's Flood Prone Land Policy and the principles of the Floodplain Development Manual 2005, and b. To ensure that the provisions of an LEP on flood prone land is commensurate with flood hazard and includes consideration of the potential flood impacts both on and off the subject land. Where this direction applies 2. This direction applies to all relevant planning authorities that are responsible for flood prone land within their LGA. When this direction applies 3. This direction applies when a relevant planning authority prepares a planning proposal that creates, removes or alters a zone or a provision that affects flood prone land	Part of the site is subject to flooding. However future development of the site will alter the existing topography and therefore alter the flood line ensuring future residents are not subject to flood hazards.
4.4 Planning for Bushfire Protection	Objective 1.The objectives of this direction are: a. To protect life, property and the environment from bush fire hazards, by discouraging the establishment of incompatible land uses in bush fire prone areas, and b. To encourage sound management of bushfire prone areas Where this direction applies 2. This direction applies to all local government areas in which the responsible Council is required to prepare a bush fire prone land map under section 146 of the Act, or, until such a map has been certified by the Commissioner of the NSW Rural Fire Service, a map referred to in Schedule 6 of the Act. When this direction applies 3. This direction applies when a relevant planning authority prepares a planning proposal that affects, or is in proximity to land mapped as bushfire prone land	A detailed bushfire assessment has been undertaken to ensure appropriate bushfire mitigation measures can be implemented to ensure the development is protected from bushfire hazards.

5. Regional Planning

5.1 Implementation of Regional Strategies

Objective

1.The objective of this direction is to give legal effect to the vision, land use strategy, policies, outcomes and actions contained in regional strategies

Where this direction applies

2.This direction applies to land which the following regional strategies apply:

- (a) Far North Coast Regional Strategy
- (b) Lower Hunter Regional Strategy
- (c) Illawarra Regional Strategy
- (d) South Coast Regional Strategy
- (e) Sydney – Canberra Corridor Regional Strategy
- (f) Central Coast Regional Strategy
- (g) Mid North Coast Regional Strategy

When this direction applies

3. This direction applies when a relevant planning authority prepares a planning proposal.

What a relevant planning authority must do if this direction applies

4.Planning proposals must be consistent with a regional strategy released by the Minister for Planning

The proposal is consistent with the aims and objectives of the Lower Hunter Regional Strategy, the Port Stephens Community Settlement and Infrastructure Strategy 2007 and the Council's Medowie Strategy 2009.

3.3 Section C – Environmental, social and economic impact.

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

A preliminary assessment has been undertaken by Wildthing Environmental Consultants (**Refer to Appendix A – Ecological Constraints Study**) to consider those matters listed in Section 5A (2) of the Environmental Planning and assessment Act 1979 and the *Threatened Species Assessment Guidelines* prepared by NSW DECC. The assessment identifies the ecologically sensitive locations that may constrain the development of the subject land or those that may potentially be impacted by development of land in the vicinity. All native flora and fauna were taken into consideration, with a particular focus on threatened species and communities common in the locality.

A number of ecologically sensitive matters have been identified including:

1. the existence of a substantial area of Swamp Sclerophyll Forrest (endangered ecological community);
2. the existence of prime Koala Habitat;
3. SEPP 14 wetlands to the west of the site and smaller wetland areas within the site, and the presence of the Wallum Froglet (endangered species); and,
4. a number of hollow bearing trees on the site.

An extract from the Preliminary Assessment by Wildthing Environmental Consultants which summarises the findings and recommendations is provided below:

- *One endangered ecological community (Swamp Sclerophyll Forest) was present on site. It is expected that some of this assemblage along the northern boundary of the site (approx. 1.0 ha) will be removed as a result of the current concept plan. The concept plan also provides an offset area (approx. 8.5ha) along the western portion of the site and a 50-70m-retention zone for trees within the proposed rural-residential lots along the proposed main road reserve. Replanting of trees and/or rehabilitation of the remaining vegetation involving weed management and planting shrub species consistent with this community should occur within the proposed offset areas. It may also be possible to include the wetland area which encompasses approximately 18ha within the proposed offset area, however further investigation is required to ascertain the amount of SSF present within the wetland.*
- *The SSF community is also listed as primary Koala habitat under the Port Stephens Comprehensive Koala Plan of Management (CKPoM) and provides a Koala habitat link through the site connecting habitat to the north and south. Given that the current concept plan retains the a large portion of this link on site within rural-residential lots the proposal is unlikely to have a significant impact on Koala habitat in the local area provided a number of*

actions are taken to protect Koalas within an urban landscape. The provision of offset areas along the west of the site is also likely to mitigate this to a point although it will take time for the trees planted within the offset areas to become established. The provision to retain trees within a 50-70m retention zone within the rural-residential lots will provide an urban link during this time helping to maintain a link through the site during the time the trees within the offset area become established. The more trees to be retained within the development area the better.

- *Given the provision to retain Koala habitat trees within an urban landscape a number of Koala protection measures will also need to be considered including reduced speed limits, exclusion or containment of dogs, Koala friendly fencing and long-term management of Koala habitat areas on site.*
- *It should be noted that further investigation would be required at the Development Application stage when the final lot design is being considered. At this stage the full impact of the development can be quantified and depending on design and availability of offsets an SIS may be required.*
- *Crinia tinnula (Wallum Froglet) was observed calling from the large wetland area in the west of the site. This wetland is included as part of the retention area within the concept plan, which is therefore unlikely to have a major impact on this species on site. The two small wetlands in the northwest of the site are also considered to be habitat for this species. These wetlands were dry at the time of the survey but are likely to be utilised when they become inundated. Given the large area of habitat available within the large wetland the removal of these two small wetlands is unlikely to have significant impact upon this species however further searches and relocation of specimens may be warranted prior to any works taking place.*
- *A number of hollow-bearing trees may be removed as a result of the concept plan and these will need to be replaced with nest boxes at a ratio of at least 2:1 (2 nest boxes installed for every hollow removed). These would be installed in the remaining trees on site and within the proposed offset areas prior to clearance of any hollow-bearing trees.*

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

3.3.2.1 - Contamination and Geotechnical Investigations

Coffey Environments Pty Ltd was commissioned to carry out a Preliminary Contamination Assessment (PCA). The objectives of the assessment were to:

- *Identify potentially contaminating activities that are currently being performed on the site and that may have been performed on the site in the past and;*

- *Assess the Areas of Environmental Concern (AEC) and Chemicals of Concern (COC) for the site.*

A site history review and walkover identified six areas of concern: namely areas of fill, current buildings, septic tanks, wastewater pumping station, potential historical agricultural activities and the electrical transformer yard. Three soil samples were taken from the fill sites and analysed for contaminants including heavy metals, hydrocarbons, pesticides and asbestos.

Laboratory results indicated that concentrations of contaminants were either not detected above laboratory detection limits, or were below adopted human health and phytotoxicity investigation levels. Asbestos was not detected on the site.

The assessment concludes that the likelihood for significant contamination to be present in the existing fill on the site is considered to be low and is suitable for reuse on site. The report also recommends that a Phase 2 Environmental Site Assessment (ESA) be carried out at the Development Application Stage when detailed design is finalised. The PCA is attached, (See **Appendix B – Preliminary Contamination Assessment**).

Coffey Geotechnics Pty Ltd was commissioned to undertake geotechnical site investigations (See **Appendix C – Preliminary Geotechnical Assessment**). The investigation and reporting included assessment of:

- Risk of slope instability and associated geotechnical constraints;
- Site preparation;
- Excavation conditions;
- Suitability of the site soils for use as fill and on fill construction procedures;
- Special requirements for construction procedures and or site drainage;
- ASS conditions and requirements for an acid sulphate soil management plan;

Seven test pits were excavated and laboratory testing completed. It was found that the site is underlain with stiff alluvial and residual clays, and alluvial/aeolian sand of variable density. The Geotechnical Report identifies no particular issues of concern and makes recommendations in regards to foundation type, excavation, filling, retaining walls and drainage.

The outcome of the investigations concluded that the site is considered to have an overall low risk of slope instability and it would be normal practice in the Port Stephens area for residential development to proceed on a block with this risk level classification.

The Acid Sulphate Soils Risk Map for Williamstown indicates there is a probability of finding Acid Sulphate Soils in some areas of the site however this does not apply to the northern portion of the site. Field screening results indicate that it is unlikely that Acid Sulphate Soils will be encountered within 2.0m depth. The report recommends that should deeper excavation be required, further investigations should be carried out at the time. The report concludes that:

“The proposed development is assessed to have an overall low risk of slope instability and it is considered that the site is appropriate for residential development subject to the geotechnical constraints on development detailed within the Geotechnical Report”.

3.3.2.2 - Bushfire

Part of the site is identified as being Bushfire Prone by Port Stephens Council's Bushfire Prone Land Map (See **Figure 5** below).

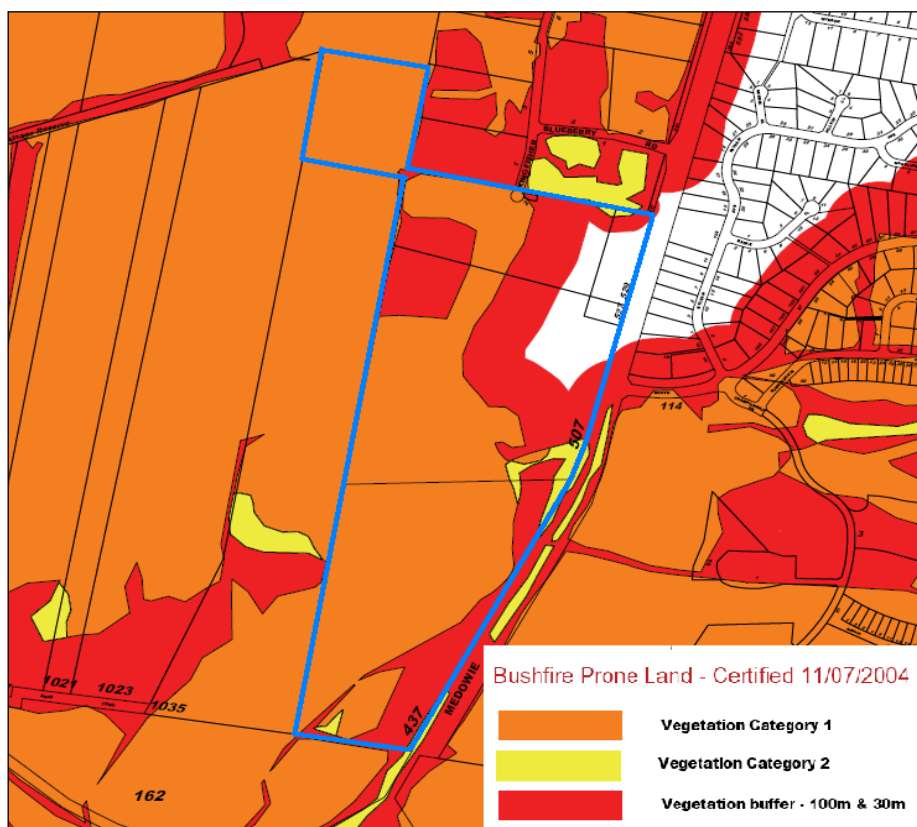


Figure 5 – Bushfire Prone Land Map

A detailed Bushfire Threat Assessment has been undertaken by HDB to assess the proposed rezoning against Planning for Bushfire Protection 2006 and Section 117 direction No.19 (Planning for Bushfire Protection).

The Bushfire Assessment concludes that subject to the provision of the required Asset Protection Zones surrounding all proposed residential development, the proposed development (as detailed in the Concept Plan) generally complies with the above requirements.

The Bushfire Threat Assessment is attached, (See **Appendix D – Bushfire Threat Assessment**)

3.3.2.3 - Aboriginal Archaeology

A Due Diligence Assessment (as per the draft guidelines provided by DECCW) has been completed by Len Roberts (Archaeologist) – (See **Appendix E – Draft Aboriginal Heritage Due Diligence Assessment**). It was found that the subject site has previously been substantially disturbed through the clearing of trees, importation of fill and construction of residential dwellings, and that the only undisturbed aspect of the site is the large wetland.

An archaeological record search indicated that there are 28 objects listed on the AHIMS database within a 5km radius of the subject site. Further examination of documentation suggests that archaeological evidence being found on site would be quite possible if the site was in an undisturbed state. A field assessment was conducted by Len Roberts and representatives of the Aboriginal Community. The site walk over confirmed that the site is heavily modified right up to the edge of the wetland and that, as a consequence, the existence of evidence being found on site would be highly unlikely. The most likely location for evidence on the edge of the existing wetland was examined. However no objects of Aboriginal significance were observed.

The Assessment makes the following recommendations:

1. *Further investigation is not warranted.*
2. *Application for a permit to harm an Aboriginal Object is not required.*
3. *Whilst it is considered extremely unlikely that archaeological evidence will be uncovered through the activity due to the disturbed nature of the land and whilst the activity will be conducted away from the wetlands it may be prudent to have a representative/s of the Aboriginal community be on site during any excavation.*
4. *If Aboriginal objects are later found when carrying out the activity, work must cease, DECCW notified and application for an AHIP if objects are likely to be harmed.*

3.3.2.4 - Flooding

The subject site is relatively flat. The lower lying areas are considered to be flood liable, due to the proximity to the existing wetland and reasonably close proximity to the Campvale Drain and the ground water catchment areas of the Tomago Sand Beds. The southeast and partial northeast corners of the site are not affected by flooding as per the Port Stephens Council Mapping information. It is understood that Council is well advanced in the preparation of a Flood Study and a Floodplain Management Strategy for the catchment and that this information will clarify the levels for future development.

Appropriate construction measures through the use of fill in affected areas can be undertaken to ensure protection to development and to ensure the safety of future residents of the site. The Medowie Strategy acknowledges that the perimeter of the flood liable land will be modified once development on the subject land alters the existing topography.

3.3.2.5 - Aircraft Noise

The site is not currently affected by ANEF contours however the Royal Australian Air Force (RAAF) based at Williamtown is planning for the progressive introduction of the Joint Strike Fighter military aircraft commencing from 2017-2018. Australian Noise Exposure Forecast ANEF 2025 has been produced to predict aircraft noise impacts by the year 2025. The ANEF 2025 predicts the southern half of the site below the proposed residential zoned land will be affected by Aircraft Noise Contours between 20-25. These noise levels are not prohibitive of residential development. With appropriate building design and standard noise attenuation measures, any residential development in this location will not be unreasonably impacted by the changes predicted in the updated ANEF. Appropriate mitigation measures will be proposed at Development Application stage to ensure this issue is adequately addressed.

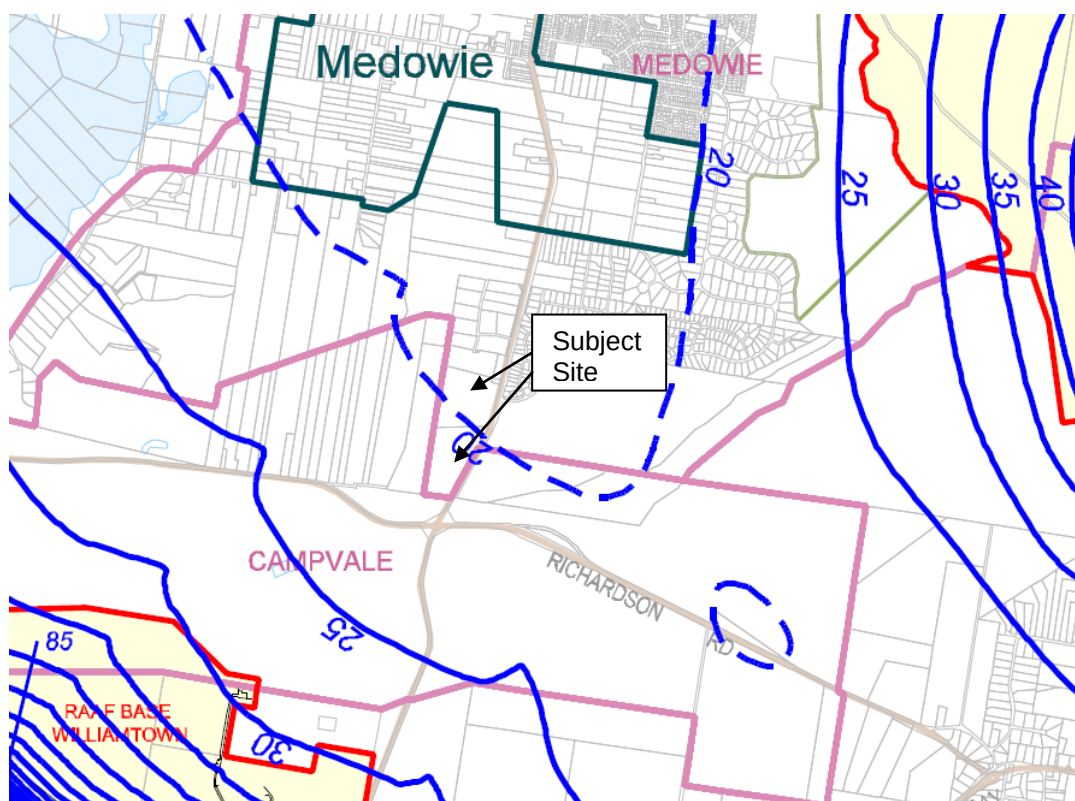


Figure 6 – Extract from ANEF 2025

3.3.3 How has the planning proposal adequately addressed any social and economic effects?

The social and economic benefits to the community likely to result from the Planning Proposal are those usually associated with: the provision of employment opportunities within the commercial and recreation areas; provision of additional transport services; additional outdoor/ indoor recreational areas; bicycle and pedestrian tracks; and, the provision of additional housing choice including affordable housing opportunities. There is no evidence to suggest that there will be any significant adverse social or economic effects resulting from the proposal.

3.4 Section D – State and Commonwealth Interest.

3.4.1 Is there adequate public infrastructure for the planning proposal?

Traffic, Transport and Access

Primary access to the site is off Medowie Road, a proposed extension of South Street. This will create the need for an intersection upgrade at this point due to the increase in traffic, not only through additional housing stock, but as a result of other community members accessing the proposed retail and recreational areas.

Secondary access will be from Kingfisher Close; this access is intended to ease the traffic impact at the Medowie Road/ South Street intersection. It is proposed this access will be a left in/ left out only access onto Medowie Road.

Water Supply

The proposed development is located within the Williamstown/Medowie Water Supply System. The maximum ground level within the development site is approximately RL16m. An additional water demand of 150ET is expected from the proposed development. Under peak day demand conditions a minimum residual pressure of 20m needs to be maintained throughout the development area. Hunter Water has confirmed that there is currently appropriate pressure to meet this criterion.

Sewer

Hunter Water has advised that there is currently insufficient capacity at Medowie No. 12 WWPS. However there is sufficient capacity at the Raymond Terrace WWTW to cater for the additional load (150ET) from the proposed development. A developer funded wastewater servicing strategy in consultation with Hunter Water will be required prior to the development on the site.

Stormwater Management

Water quality management will be undertaken to create a reduced pollutant flow into the SEPP 14 Wetlands. Provision of swales and drainage basins will reduce peak flow rates and potentially reduce the size and cost of drainage systems. These systems will be located within the open space areas, integrated into the landscape throughout the recreational areas.

Other Public Infrastructure

Port Stephens Council provides a regular waste collection and recycling service and all other essential services such as health, education and emergency services are available within Medowie

township or at nearby Raymond Terrace. Medowie town centre and Raymond Terrace are both easily accessible by car or public transport (Blue Ribbon Bus Service).

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

No government authorities other than Council have been consulted at this stage. In accordance with the advice provided in the Department of Planning *Guide to Preparing Planning Proposals*, this section is to be completed following consultation with the State and Commonwealth Public Authorities identified in the gateway determination.

PART 4 - COMMUNITY CONSULTATION

The gateway determination will specify the community consultation that must be undertaken on the planning proposal.

It is anticipated that this Planning Proposal will be classified as “Low Impact” as the proposal is consistent with the pattern of surrounding land use zones and/or land uses; is consistent with the strategic planning framework; presents no issues with regard to infrastructure servicing; is not a principal LEP; and does not involve reclassifying public land.

As such, the exhibition period will likely be 14 days.

Typically the community consultation will involve the giving of notice of the public exhibition of the planning proposal:

- In a newspaper that circulates in the area affected by the planning proposal;
- On the web-site of Port Stephens Council; and
- In writing to adjoining landowners.

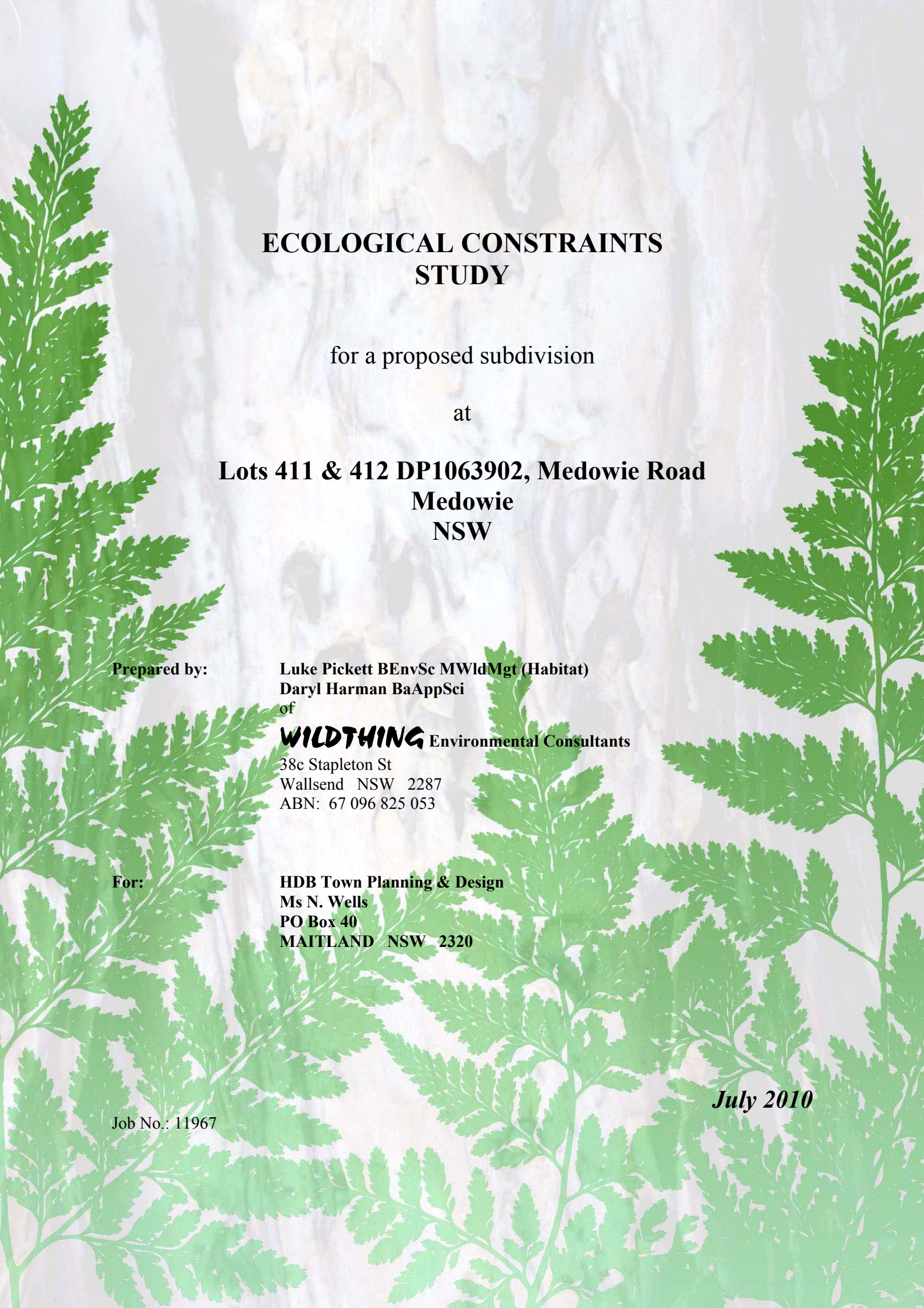
The written notice must:

- Give a brief description of the objectives or intended outcomes of the planning proposal;
- Indicate the land affected by the planning proposal;
- State where and when the planning proposal can be inspected;
- Give the name and address of the RPA for the receipt of submissions; and
- Indicate the last date for submissions.

During the exhibition period, the following material must be made available for inspection:

- The planning proposal, in the form approved for community consultation by the Director
- General of Planning;
- The gateway determination; and
- Any studies relied upon by the planning proposal.

The community consultation will be complete only when the Council has considered any submissions made concerning the proposed LEP amendment and the report on any public hearing into the proposed LEP [EP&A Act s. 57(8)]. It is considered that the Planning Proposal is not of such significance and will not raise sufficient community interest to warrant a public hearing.



ECOLOGICAL CONSTRAINTS STUDY

for a proposed subdivision

at

**Lots 411 & 412 DP1063902, Medowie Road
Medowie
NSW**

Prepared by:

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Job No.: 11967

July 2010

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1.0 INTRODUCTION

This Ecological Constraints Report has been produced to provide an informed preliminary assessment and comment on any potential site-specific ecological constraints that may effect the development of Lots 411 & 412 DP1063902, Medowie Road, Medowie NSW (Figure 1). All native flora and fauna have been taken into consideration with a particular focus on threatened species and communities reported from the locality.

1.1 GENERAL DESCRIPTION OF THE SITE

The site (Lots 411 & 412 DP1063902, Medowie Road) is approximately 44 ha in size. The site is located on the southern side of the Medowie township and is bordered by rural residential properties to the north, Medowie Road and Pacific Dunes Golf Course to the east and vegetated land to the south and west of the site.

A large portion of the site consists of a parkscape currently managed by regular mowing. A large wetland is located in the west of the site and two small wetlands isolated by a figure eight racetrack are located in the north west of the site. A bitumen racetrack is also located in the north of the site with a strip of large trees dominated by *Eucalyptus robusta* (Swamp Mahogany) and *Eucalyptus tereticornis* (Forest Red Gum) extending between the two racetracks from the northern boundary to the large wetland on site. A number of very large *Pinus sp.* were also located to the south of the bitumen racetrack. A site map is shown in Figure 2. Photos showing the vegetation present on site are shown in Figures 3 and 4.

1.2 CONCEPT PLAN

The proposal involves the rezoning of the site to provide for a residential, rural-residential and mixed-use development. A concept plan is shown in Figure 5.

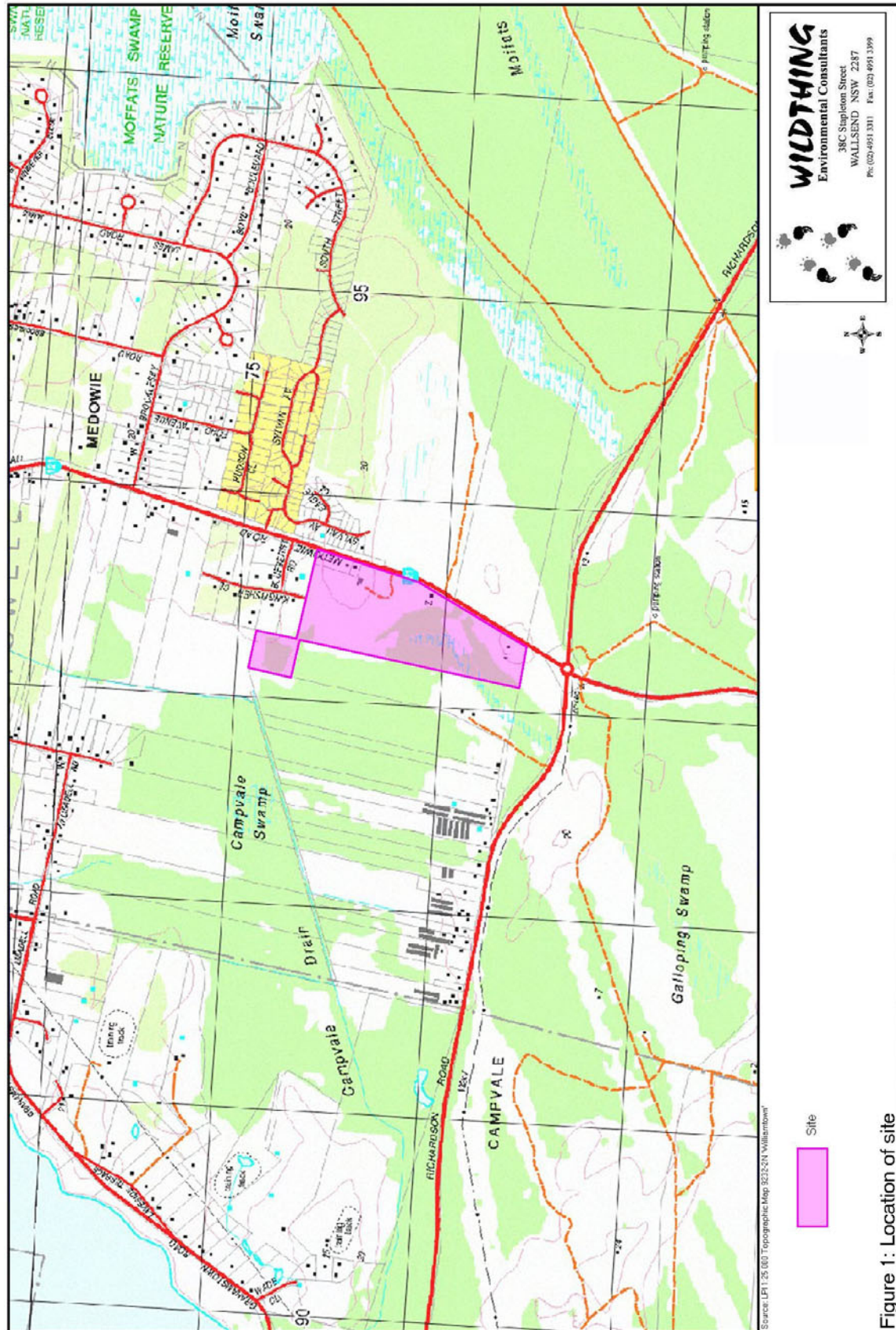


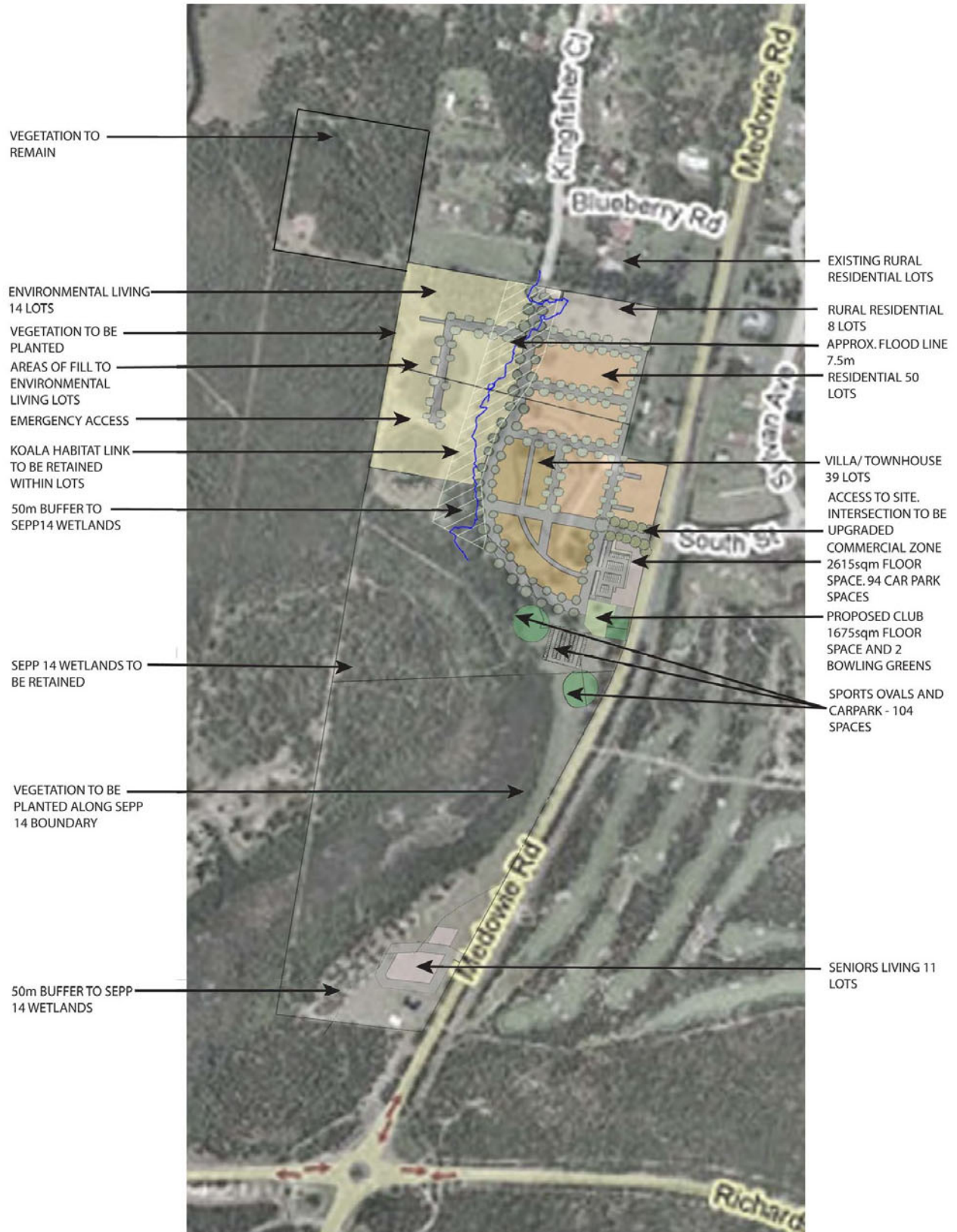




Figure 3: Photo from northwest of site looking east showing strip of trees between the two racetracks on site.



Figure 4: Photo from southern portion of site looking west towards the large wetland on site.



2.0 SCOPE OF THE STUDY

This report was designed to assess the study area and identify any developmental constraints in ecological terms that may effect its future development potential. The assessment includes mapping the plant communities and habitats, and a survey of the fauna using the study area. Survey methods have been confined to the study area, although surrounding areas have been considered in the habitat assessment.

2.1 LEGISLATIVE REQUIREMENTS

As an ecological constraints study, this report combines surveys undertaken to determine the presence or absence of ‘endangered’ or ‘vulnerable’ (collectively referred to as ‘threatened’) species and their habitats. This study is a preliminary assessment within the overall planning phase, and is aimed at providing informed comment on the likely implications of future development of the site. Legislation which has been considered in the production of this report includes the Environmental Planning and Assessment (EPA) Act (1979) and the Threatened Species Conservation (TSC) Act (1995), which requires consideration of the impact of proposed developments upon protected fauna and flora, particularly threatened species. Also considered in this report was the applicability of Port Stephens Comprehensive Koala Plan of Management (CKPoM) and the Commonwealth Environment Protection and Biodiversity Conservation Act (1999).

Fieldwork undertaken by Wildthing Environmental Consultants was carried out under the following NPWS Scientific Investigation Licence S10475 Luke Pickett

Animal Care and Ethics Approval is under Animal Research Authority Issue by the Director General of NSW Agriculture (File No. 08 – 361) for the Fauna Survey for Biodiversity and Impact Assessment.

3.0 METHODOLOGY

3.1 VEGETATION SURVEY METHODOLOGY

The initial determination of the basic vegetation community boundaries was undertaken through the review of an orthophoto covering the site. Following this, a ground survey was conducted to confirm vegetation on site and also involved a habitat assessment for threatened species across the site. This involved walking throughout the entire study site, visiting the full range of potential habitats.

3.2 HABITAT SURVEY METHODOLOGY

Habitat may be defined as the physical and biological environment required for the survival of a specific population of a species. In modern usage, habitat has also come to be regarded as an association of landform and plant life, which provides sustenance and shelter for a particular fauna assemblage. While the former definition is often that invoked by legislation requiring the consideration of the impact of a development on a threatened species, the latter probably has equal validity from an ecological point of view.

The methodology employed by this habitat survey used the vegetation community data combined, where relevant, with geomorphological features to provide a basis for a subjective habitat assessment aimed at placing the ecological status of this site within a local perspective.

3.2.1 GENERAL HABITAT FOR NATIVE SPECIES

From the vegetation assessment and general description of the site and surrounding areas, a subjective assessment of the general habitat value of the site was made. Considered in this assessment were:

- occurrence of that habitat type in the general vicinity;
- degree of disturbance and degradation;
- area occupied by that habitat on site;
- continuity with similar habitat adjacent to the site, or connection with similar habitat off site, by way of corridors; and
- structural and floral diversity.

3.2.2 HABITAT FOR SIGNIFICANT SPECIES

The study area was evaluated as potential habitat for each of the threatened species reported on the Department of Environment, Climate Change and Water (DECCW) Database and the Department of Environment, Water, Heritage and the Arts (DEWHA) on-line Database from within 10km of the study area. This evaluation was based mainly on the specific requirements of each species in regards to home range, feeding, roosting, breeding, movement patterns and corridor requirements for fauna, and vegetation associations, topography, soil, light and hydrological requirements for flora.

3.3 FAUNA SURVEY METHODOLOGY

The fauna survey undertaken consisted of an assessment of the potential use of the study area by any threatened species identified in the DECCW and DEWHA databases and the recording of species observed onsite as described below.

3.3.1 DIURNAL SURVEYS

The diurnal surveys undertaken on the site involved:

- avifauna surveys;
- reptile searches; and,
- searches for secondary indications of fauna presence.

The surveys for diurnal avifauna species were conducted during the site visit and involved identifying the birds seen and heard at various points in the study area during a 20 minute period. Incidental observations of avifauna during other surveys were also recorded.

Diurnal searches for reptiles involved searching in likely habitat such as leaf litter and fallen timber during peak activity times i.e. mid-morning – early-afternoon.

Secondary indications (scratches, scats, diggings, tracks etc.) of resident fauna were noted and included searches for scratch marks on tree trunks, scats with particular attention to Koala feed trees, whitewash and regurgitation pellets from Owls, chewed (*Allo*)*Casuarina* cones from Black-Cockatoos, fruit remains from Fruit-Doves, and other obvious features such as raptor nests.

3.4 SURVEY DATES, TIMES & WEATHER CONDITIONS

A summary of the time spent on site and the prevailing weather conditions is contained below in Table 1.

Table 1: Survey dates, times and weather conditions

DATE	TIME	WORK COMPLETED	WEATHER
01/05/07	8:30 – 1300	Site Inspection SEPP 14 Boundary Definition Vegetation Survey Search for Reptiles Avifauna Survey Searches for Secondary Indications of Fauna	Sunny $\approx 19-27^{\circ}\text{C}$,

3.5 SIGNIFICANT SPECIES

The following threatened species listed in Table 2 have been recorded on the DECCW Database within 10km of the site or have habitat according to the DEWHA (*) on-line database within 10km of the site.

Table 2: Threatened Species Considered.

Scientific Name	Common Name	TSC Act 1995	EPBC Act 1999
<i>Angophora inopina</i>	Charmhaven Apple	V	V
* <i>Allocasuarina defungens</i>	Dwarf Heath Casuarina	E	E
<i>Asperula asthenes</i>	Trailing Woodruff	V	
<i>Callistemon linearifolius</i>	Netted Bottle Brush	V	
<i>Diuris arenaria</i>	Tomaree Doubletail	E	
<i>Eucalyptus camfieldii</i>	Camfield's Stringybark	V	V
<i>Eucalyptus parramattensis</i> ssp. <i>decadens</i>	Drooping Red Gum	V	V
<i>Grevillea parviflora</i> ssp. <i>parviflora</i>	Small-flowered Grevillea	V	V
<i>Maundia triglochinos</i>		V	
<i>Melaleuca biconvexa</i>	Biconvex Paperbark	V	V
<i>Persicaria elatior</i>	Knotweed	V	V
<i>Rulingia prostrata</i>	Dwarf Kerrawang	E	E
<i>Tetradlea juncea</i>	Black-eyed Susan	V	V
<i>Crinia tinnula</i>	Wallum Froglet	V	
* <i>Litoria aurea</i>	Green and Golden Bell Frog	E	V
* <i>Mixophyes balbus</i>	Stuttering Frog	V	V
<i>Botaurus poiciloptilus</i>	Australian Bittern	V	
<i>Charadrius mongolus</i>	Lesser Sand-plover	V	
<i>Ephippiorhynchus asiaticus</i>	Black-necked Stock	E	
<i>Haematopus longirostris</i>	Pied Oystercatcher	V	
<i>Ixobrychus flavicollis</i>	Black Bittern	V	
<i>Limosa limosa</i>	Black-tailed Godwit	V	
<i>Oxyura australis</i>	Blue-billed Duck	V	
* <i>Rostratula benghalensis</i> ssp. <i>australis</i>	Australian Painted Snipe	E	
<i>Sterna albifrons</i>	Little Tern	E	
<i>Stictonetta naevosa</i>	Freckled Duck	V	
<i>Xenus cinereus</i>	Terek Sandpiper	V	
<i>Pandion haliaetus</i>	Osprey	V	
<i>Burhinus grallarius</i>	Bush Stone-curlew	E	
<i>Calyptrorhynchus lathami</i>	Glossy Black-Cockatoo	V	
<i>Climacteris picumnus</i> ssp. <i>victoriae</i>	Brown Treecreeper	V	
<i>Glossopsitta pusilla</i>	Little Lorikeet	V	
<i>Lathamus discolor</i>	Swift Parrot	E	E
<i>Neophema pulchella</i>	Turquoise Parrot	V	
<i>Pomatostomus temporalis</i> ssp. <i>temporalis</i>	Grey-crowned Babbler	V	
<i>Pyrrholaemus sagittatus</i>	Speckled Warbler	V	
<i>Ptilinopus magnificus</i>	Wompoo Fruit-Dove	V	
<i>Xanthomyza phrygia</i>	Regent Honeyeater	E	E
<i>Ninox strenua</i>	Powerful Owl	V	
<i>Tyto capensis</i>	Grass Owl	V	
<i>Tyto novaehollandiae</i>	Masked Owl	V	
<i>Cercartetus nanus</i>	Eastern Pygmy-possum	V	
<i>Dasyurus maculatus</i> ssp. <i>maculatus</i>	Tiger Quoll	V	V
<i>Petaurus australis</i>	Yellow-bellied Glider	V	
<i>Petaurus norfolcensis</i>	Squirrel Glider	V	
<i>Phascogale tapoatafa</i>	Brush-tailed Phascogale	V	
<i>Phascogale cinereus</i>	Koala	V	
<i>Potorous tridactylus</i> ssp. <i>tridactylus</i>	Long-nosed Potoroo	V	V
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V	V
* <i>Chalinolobus dwyeri</i>	Large Pied Bat	V	V

Scientific Name	Common Name	TSC Act 1995	EPBC Act 1999
<i>Falsistrellus tasmaniensis</i>	Eastern False Pipistrelle	V	
<i>Miniopterus australis</i>	Little Bentwing-bat	V	
<i>Miniopterus schreibersii</i> ssp. <i>oceanensis</i>	Large Bentwing-bat	V	
<i>Mormopterus norfolkensis</i>	Eastern Freetail-bat	V	
<i>Myotis macropus</i>	Southern Myotis	V	
<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheath-tail-bat	V	
<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat	V	
Emu population in the NSW North Coast Bioregion and Port Stephens LGA		E	

E=Endangered Species

E2=Endangered Population

V=Vulnerable Species

CE=Critically Endangered

A number of ocean and beach-specific species were recorded within 10km of the site including Albatrosses, Petrels and turtles. These were not considered due to the distance of the site from suitable ocean / lake / beach habitat.

4.0 RESULTS

4.1 VEGETATION SURVEY RESULTS

A general description of the flora assemblages identified on site is given below. The relative distribution of the vegetation communities denoted is shown in Figure 6*.

*Note on Vegetation Community Distribution Map: A map of vegetation of any area seeks to describe the distribution of the plant species in that area by defining a number of vegetation units (assemblages or communities) which are relatively internally homogenous. Whilst such mapping is a convenient tool, it greatly oversimplifies the real situation. Plants rarely occur in well defined communities with distinct boundaries. Accordingly vegetation units used for the accompanying map should be viewed as indicative of their extent rather than being precise edges of communities.

4.1.1 FLORA ASSEMBLAGES

The site was found to support four major vegetation communities, being Coastal Sand Apple – Blackbutt Forest, Swamp Mahogany - Paperbark Forest, Freshwater Wetland and Pasture. Swamp Mahogany - Paperbark Forest is listed as an Endangered Ecological Community and as such is assessed further in Section 5.0. The four vegetation communities identified on site are described below.

Coastal Sand Apple – Blackbutt Forest

This assemblage is found on slightly higher ground generally within the eastern portion of the site. The canopy height is variable approx. 15m adjacent to the wetland ranging to 25m high along Medowie Road. This assemblage is dominated by *Angophora costata* (Smooth-barked Apple) with *Eucalyptus pilularis* (Blackbutt), *Corymbia gummifera* (Red Bloodwood) and *Eucalyptus signata* (Scribbly Gum) also present. The understorey is regularly mown and generally consists of exotic grass species. A small area of understorey in the south of the site has been recently cleared and is now dominated by *Pteridium esculentum* (Bracken) and *Imperata cylindrica* var. *major* (Blady Grass).

Swamp Mahogany - Paperbark Forest

This assemblage was found on generally flat low-lying ground in the west of the site. The canopy is approximately 20m high and is dominated by *Eucalyptus robusta* (Swamp Mahogany) and *Melaleuca quinquenervia* (Broad-leafed Paperbark) with *Eucalyptus tereticornis* (Forest Red Gum) and *Eucalyptus resinifera* (Red Mahogany) also present. A large proportion of this assemblage in the north of the site has a managed understorey resulting in a parkscape. An area in the north of the site and along the periphery of wetland in the west of the site contained an intact understorey with a dense shrub and ground layer with *Gahnia clarkei*, *Pteridium esculentum* (Bracken), *Leptospermum polygalifolium* (Lemon-scented Tea-Tree), *Glochidion ferdinandi* (Cheese Tree) and *Elaeocarpus reticulatus* (Blueberry Ash) present throughout. The two small wetlands in the north west of the site appear to be subject to regular inundation and contain a monotypic canopy of *M. quinquenervia*.



Freshwater Wetland

This assemblage was found on ground subject to regular inundation in the west of the site with larger tree species restricted to the edge of the assemblage with shrubs and sedges dominant throughout the remainder of the assemblage. Species noted throughout this assemblage included *M. quinquenervia*, *Melaleuca sieberi* (Sieber's Paperbark), *Philydrum lanuginosum* (Woolly Frogmouth), *Gahnia clarkei*, *Gahnia sieberiana* and *Phragmites australis* (Native Reed).

Pasture

This assemblage was found across the majority of the east portion of the site and is regularly mown. This is reflected with the species present with the assemblage mostly composed of introduced species including *Pennisetum clandestinum* (Kikuyu), *Axonopus affinis* (Narrow-leaf Carpet Grass), *Paspalum dilatatum* (Paspalum), *Verbena bonariensis* (Purple Top) and *Senecio madagascariensis* (Fireweed).

4.1.2 THREATENED PLANTS AND ECOLOGICAL COMMUNITIES

Three threatened flora species have been previously identified and recorded on the DECCW and the DEWHA databases within 10km of the site, these being:

<i>Angophora inopina</i>	Charmhaven Apple
* <i>Allocasuarina defungens</i>	Dwarf Heath Casuarina
<i>Asperula asthenes</i>	Trailing Woodruff
<i>Callistemon linearifolius</i>	Netted Bottle Brush
<i>Diuris arenaria</i>	Tomaree Doubletail
<i>Eucalyptus camfieldii</i>	Camfield's Stringybark
<i>Eucalyptus parramattensis</i> ssp. <i>decadens</i>	Drooping Red Gum
<i>Grevillea parviflora</i> ssp. <i>parviflora</i>	Small-flowered Grevillea
<i>Maundia triglochinosoides</i>	
<i>Melaleuca biconvexa</i>	Biconvex Paperbark
<i>Persicaria elatior</i>	Knotweed
<i>Rulingia prostrata</i>	Dwarf Kerrawang
<i>Tetratheca juncea</i>	Black-eyed Susan

During the flora survey no specimens of the abovementioned species were found. Apart from *Allocasuarina defungens*, *Asperula asthenes*, *Eucalyptus camfieldii* and *Grevillea parviflora* ssp. *parviflora* habitat of varying quality was found to be available for the remaining above threatened species. The majority of the proposed development area has a highly disturbed understorey due to regular mowing and the above threatened species would be unlikely to be present in this area.

It must be noted that the fieldwork was carried out outside the flowering season for *D. arenaria* (August – September). Accordingly such cases, greater emphasis is placed upon the habitat assessments undertaken specifically for the threatened species, which are contained within Section 4.2.3 of this report.

4.2 HABITAT SURVEY RESULTS

4.2.1 HABITAT DESCRIPTION & DISTRIBUTION IN THE VICINITY

The site is believed to provide habitat for a number of native fauna species. The site offers potential foraging and nesting habitat for several guilds of avifauna. Nectivorous species would find seasonal foraging resources, in the form of flowering myrtaceous species. The presence of myrtaceous species would also offer potential seasonal foraging habitat for Flying Foxes.

Birds of prey are accommodated by the availability of prey such as small birds and reptiles. Hollow bearing trees required by some species of avifauna and microchiropteran bats for nesting or roosting was also available, however large hollows required by some species (owls, cockatoos) were absent.

The large wetland on site offers suitable habitat for a range of freshwater wetland specific species including birds (Bitterns, ducks, etc.), frogs and small terrestrial mammals (Rodents, wallabies and possums).

Potential hunting habitat for microchiropteran bats was available over the majority of the site. Roosting habitat in the form of caves and similar man made structures, which is required by certain species of microchiropteran bat, was also found to be absent.

Due to the occurrence of a large number of preferred Koala feed trees the site is also considered to contain core Koala habitat within the swamp forest areas on site.

4.2.2 HABITAT FOR SIGNIFICANT SPECIES

An assessment of habitat has been undertaken for the threatened species, which have been identified within 10km of the site on the DECCW Database and the DEWHA Online Database. The results of the assessment are displayed in Table 2 below.

Table 3: Habitat Assessment for Threatened Species

SPECIES	STATUS	HABITAT PREFERRED	LIKELIHOOD OF OCCURRENCE WITHIN STUDY AREA
<i>Angophora inopina</i> Charmhaven Apple	TSC Act – V	Found within Open Woodland/Forest assemblages in co-dominant distribution with <i>Eucalyptus haemastoma</i> (Scribbly Gum), <i>Corymbia gummifera</i> (Red Bloodwood) and <i>Eucalyptus capitellata</i> (Brown Stringybark), as well as within wet-dry heath, and Swamp Forest communities.	Low Habitat is available within the swamp forest communities on site but this is considered marginal due to the lack of preferred soil characteristics and vegetation associations.
<i>Allocasuarina defungens</i> Dwarf Heath Casuarina	TSC Act-E1 ROTAP 2E	A small erect shrub occurring on sand in the Nabiac area and farther north in the NSW North Coast Region.	Unlikely Habitat is not available on site due to the lack of preferred soil characteristics and distance from known populations.
<i>Asperula asthenes</i> Trailing Woodruff	TSC Act-V ROTAP 3VC-	Damp Sites, often along riverbanks. The major portion of the distribution of this species occurs in the Great Lakes LGA. Populations are known from North Karuah and The Branch areas.	Unlikely The site is located to the south of the known distribution of this species and is unlikely to occur on site.
<i>Callistemon linearifolius</i>	TSC Act – V ROTAP – 2RCi	Dry sclerophyll forest on the coast and adjacent ranges.	Low Habitat is available within the dry forest areas on site however this is considered marginal due to the managed nature of the understorey.
<i>Diuris arenaria</i> Sand Double-tail	TSC Act - E	Coastal heath, Dry Sclerophyll Forest with patches of <i>Themeda triandra</i> (Kangaroo Grass) on sandy flats.	Low Habitat is available within the dry forest areas on site however this is considered marginal due to the

SPECIES	STATUS	HABITAT PREFERRED	LIKELIHOOD OF OCCURRENCE WITHIN STUDY AREA
			managed nature of the understorey.
<i>Eucalyptus camfieldii</i> Heart-leaved Stringybark	TSC Act – V EPBC Act – V ROTAP – 2VCi	Predominantly found in dry sclerophyll forest on sandstone and laterite plateaus and ridges from the Royal National Park to Gosford. Some isolated occurrences have been found outside this area, although generally in similar habitat. It has been reported from the Norah Head area as occurring on Aeolian sand dunes. Commonly associated species include <i>Eucalyptus eugenioides</i> (Narrow-leaved Stringybark) and <i>E. haemastoma</i> (Scribbly Gum).	Unlikely Habitat is not available on site due to the lack of preferred soil characteristics.
<i>Eucalyptus parramattensis</i> ssp. <i>parramattensis</i> Drooping Red Gum	TSC Act – E2	Generally occupies deep, low-nutrient sands, often those subject to periodic inundation or where water tables are relatively high. It occurs in dry sclerophyll woodland with dry heath understorey. It also occurs as an emergent in dry or wet heathland. Often where this species occurs, it is a community dominant. In the Kurri Kurri area, <i>E. parramattensis</i> subsp. <i>decadens</i> is a characteristic species of 'Kurri Sand Swamp Woodland and in the Tomago Sandbeds area, the species is usually associated with the 'Tomago Swamp Woodland'.	Low Habitat is available within the swamp forest communities on site but this is considered marginal due to the lack of preferred vegetation associations.
<i>Grevillea parviflora</i> ssp. <i>parviflora</i> Small-flowered Grevillea	TSC Act – V EPBC Act – V	Occurs in light clayey soils in woodlands.	Unlikely No habitat is available due to the lack of preferred soil characteristics.
<i>Maundia triglochinoides</i>	TSC Act – V	Grows in swamps, creeks or shallow freshwater 30-60cm deep on heavy clay with low nutrients.	Low-Moderate Habitat is available for this species within the wetland areas with standing water.
<i>Melaleuca biconvexa</i>	TSC Act – V EPBC Act – V	Occurs in dense stands adjacent to watercourses, in association with other <i>Melaleuca</i> species or as an understorey species in wet forest.	Low-Moderate Habitat is available for this species within the large wetland on site.
<i>Persicaria elatior</i> Tall Knotweed	TSC Act – V EPBC Act – V ROTAP – 3V	Occurs in damp places such as swamps and margins of dams.	Low-Moderate Habitat is available for this species within the large wetland on site.
<i>Rulingia prostrata</i> Dwarf Kerrawang	TSC Act – E EPBC Act – E ROTAP – 2ECi	Mainly in gullies along the escarpment, south from Picton Lakes, with a disjunct occurrence at the Tomago Sandbeds near Newcastle. In the Tomago sandbeds area it occurs locally as a pioneer species in ecotonal swamp forest	Low Habitat is available for this species along the margin of the large

SPECIES	STATUS	HABITAT PREFERRED	LIKELIHOOD OF OCCURRENCE WITHIN STUDY AREA
		containing <i>Eucalyptus haemastoma</i> , <i>Eucalyptus robusta</i> and <i>Melaleuca quinquenervia</i> , on heavy organic sandy soils in Pleistocene sands.	wetland area on site.
<i>Tetratheca juncea</i> Black-eyed Susan	TSC Act – V EPBC Act – V ROTAP – 3VCa	Heath and Dry Sclerophyll Forests on low nutrient soil with a dense understorey of grasses. Is most commonly found associated with species including, <i>Angophora costata</i> (Smooth-barked Apple), <i>Eucalyptus globoidea</i> (White Stringybark), <i>Corymbia gummifera</i> (Red Bloodwood) and <i>Acacia myrtifolia</i> (Myrtle Wattle).	Low Habitat is available within the dry forest areas on site however this is considered marginal due to the managed nature of the understorey.
<i>Crinia tinnula</i> Wallum Froglet	TSC Act – V	Found only in acid paperbark swamps and sedge swamps of the coastal 'wallum' country.	Occurs On Site Habitat is available for this species within the wetland areas on site. This species was observed calling regularly from the large wetland on site.
<i>Litoria aurea</i> Green and Golden Bell Frog	TSC Act – V EPBC Act – V	Inhabits a range of waterbodies including swamps, lagoons, streams and ponds as well as dams, drains and storm water basins.	Low Habitat is available for this species within the wetland areas on site however no records for this species have been recorded within 10km of the site.
<i>Mixophyes balbus</i> Stuttering Frog	TSC Act – E EPBC Act – V	Prefers riparian vegetation or other moist vegetation communities, generally on rich organic soils. Deep leaf litter and/or thick cover is necessary for this species. Water quality must be of a high standard, and the species occurs in 1 st to 3 rd order streams (i.e. 'young' streams), and is absent from ponds and ephemeral pools.	Unlikely No habitat is available due to the lack of required stream attributes.
<i>Botaurus poiciloptilus</i> Australasian Bittern	TSC Act – V	The Australasian Bittern lives alone or in loose groups and favours permanent fresh-waters dominated by sedges, rushes, reeds or cutting grasses (eg. Phragmites, Scirpus, Eleocharis, Juncus, Typha, Baumea and Gahnia) and feeds on insects, small fish, eels, frogs and other aquatic life, sometimes in ricefields.	Low-Moderate Habitat is available for this species within the large wetland on site.
<i>Charadrius mongolus</i> Lesser Sand Plover	TSC Act – V	Inhabits sheltered bays, harbours and estuaries with large intertidal sandflats or mudflats.	Unlikely No habitat is available for this species due to the lack of suitable waterbodies and wetlands.
<i>Ephippiorhynchus asiaticus</i> Black-necked Stork	TSC Act – E	Inhabits swamps associated with river systems and large permanent pools but sometimes appears on the coast or in estuaries. It has also been recorded on farm	Low Habitat is available for this species

SPECIES	STATUS	HABITAT PREFERRED	LIKELIHOOD OF OCCURRENCE WITHIN STUDY AREA
		dams and sewage treatment ponds.	within the wetland areas on site.
<i>Haematopus longirostris</i> Pied Oystercatcher	TSC Act – V	Roosts on sandy beaches, spits, dunes, lagoons and inlets, particularly if there are mud flats nearby. They forage on exposed sand, mud, rock or coral for molluscs, worms, crabs and small fish.	Unlikely No habitat is available for this species due to the lack of suitable waterbodies and wetlands.
<i>Ixobrychus flavicollis</i> Black Bittern	TSC Act – V	The Black Bittern is solitary, living near water in mangroves and other trees which need to form only a narrow fringe of cover. The Black Bittern feeds on small fish and invertebrates.	Low Habitat is available for this species within the large wetland on site.
<i>Limosa limosa</i> Black-tailed Godwit	TSC Act – V	Primarily coastal, including tidal mudflats, river edges, sandy beaches, brackish swamps as well as the shallows of lakes, reservoirs and sewage farms. However, this species also occurs inland on mudflats, muddy lakes and swamps at low tide.	Unlikely No habitat is available for this species due to the lack of suitable waterbodies and wetlands.
<i>Oxyura australis</i> Blue-billed Duck	TSC Act – V	This duck is almost wholly aquatic, preferring deepwater in large permanent wetlands or dams where aquatic flora is abundant	Low Habitat is available for this species within the large wetland on site.
<i>Rostratula australis</i> Australian Painted Snipe	TSC Act – E EPBC Act – V	The Australian Painted Snipe is usually found within marshes where there is moderate cover.	Low Habitat is available for this species within the large wetland on site.
<i>Sterna albifrons</i> Little Tern	TSC Act – E1	The typical features of the nesting area are a sandy substrate, flat or gently sloping topography, abundant shells and pebbles and little vegetation.	Unlikely No habitat is available for this species due to the lack of beach habitat.
<i>Stictonetta naevosa</i> Freckled Duck	TSC Act – V	Open lakes and wetlands surrounded by thick vegetation, especially swamps in which lignum, cumbungi or paperbarks grow. Permanent or temporary wetlands of varying salinity are known to be used.	Low Habitat is available for this species within the large wetland on site.
<i>Xenus cinereus</i> Terek Sandpiper	TSC Act – V	Inhabits tidal mudflats, estuaries, shores and reefs, offshore islands and muddy edges of coastal swamps.	Unlikely No habitat is available for this species due to the lack of suitable waterbodies and wetlands.
<i>Pandion haliaetus</i> Osprey	TSC Act – V	Open and swamp forest adjacent to the coast or estuaries, fishing mainly in brackish or salt water.	Unlikely No habitat is available due to the distance from suitable fishing locations.
<i>Burhinus grallarius</i> Bush Stone-curlew	TSC Act – E	This species inhabits dry open forest and woodland with an open grassy understorey that has not been overgrazed. It prefers woodland with many fallen	Low Habitat is available outside the

SPECIES	STATUS	HABITAT PREFERRED	LIKELIHOOD OF OCCURRENCE WITHIN STUDY AREA
		branches where it roosts during the day. It has also been known to utilise coastal scrub, mangrove fringes, golf courses and plantations.	wetland areas on site although this is considered marginal due to the managed nature of the understorey.
<i>Calyptorhynchus lathamii</i> Glossy Black-Cockatoo	TSC Act – V	Lowland coastal forests, dense mountain forests, semi-arid woodland and trees bordering watercourses, with (Allo)Casuarina trees for foraging.	Low Marginal foraging habitat is available in the form of <i>Casuarina glauca</i> (Swamp She-oak) and the introduced <i>Pinus radiata</i> (Radiata Pine). Roosting habitat is absent due to a lack of suitably sized hollows.
<i>Climacteris picumnus victoriae</i> Brown Treecreeper	TSC Act – V	Occupies Eucalypt woodlands, particularly open woodlands lacking a dense understorey, River Red Gums on watercourses and around lakeshores. It is sedentary and nests in tree hollows within permanent territories.	Low Marginal habitat is available within the dry forest areas on site.
<i>Glossopsitta pusilla</i> Little Lorikeet	TSC Act – V	Tall Open Forests, woodlands, orchards, parks and street trees.	Moderate Foraging and nesting habitat is available within the trees on site.
<i>Lathamus discolor</i> Swift Parrot	TSC Act – E EPBC Act – E	Open Forest to Woodland, also street trees and in parks and gardens, winter flowering eucalypts for feeding. This species nests in Tasmania during the summer months.	Low - Moderate Foraging habitat, in the form of winter flowering myrtaceous species <i>E. robusta</i> (Swamp Mahogany) and <i>E. tereticornis</i> (Forest Red Gum), is available within the study area.
<i>Neophema pulchella</i> Turquoise Parrot	TSC Act – V	Lives on the edges of Eucalypt woodland adjoining clearings and on timbered ridges and creeks in farmland. It has also been recorded utilising roadside verges and orchards. Nests in small hollow branches of Eucalypts.	Low Foraging and nesting habitat is available within the trees on site, however this species is more commonly encountered further inland.
<i>Pomatostomus temporalis</i> ssp. <i>temporalis</i> Grey-crowned Babbler	TSC Act – V	Open forest, woodland, scrubland, farmland and outer suburbs. Prefers woodlands with regenerating trees, tall shrubs, and an intact ground cover of grass and forbs.	Unlikely No habitat is available due to the disturbed nature of the study area including a lack of suitable ground

SPECIES	STATUS	HABITAT PREFERRED	LIKELIHOOD OF OCCURRENCE WITHIN STUDY AREA
			cover and regenerating trees.
<i>Ptilinopus magnificus</i> Wompoo Fruit-Dove	TSC Act – V	Inhabits the canopy of sub-tropical, warm-temperate and littoral rainforests. Favoured feed trees include Figs, Laurels, Myrtles and native Tamarind.	Low Marginal foraging habitat is available for this species in the form of a small number of fruit-bearing trees.
<i>Pyrholaemus sagittatus</i> Speckled Warbler	TSC Act-V	Speckled Warblers live in a wide range of eucalypt-dominated vegetation that has a grassy understorey, often on rocky ridges or in gullies. It builds a domed nest of grass, bark shreds and moss, lined with fur on the ground.	Unlikely No habitat is available due to the disturbed nature of the study area including a lack of suitable ground cover.
<i>Xanthomyza phrygia</i> Regent Honeyeater	TSC Act – E EPBC Act – E	Temperate woodlands and open forest, including forest edges, preferring to forage on large-flowered Eucalypts.	Low Nesting and foraging habitat is present in the trees within the study area and may be utilised during migration.
<i>Ninox strenua</i> Powerful Owl	TSC Act – V	Inhabits a wide range of vegetation types from wet Eucalypt forests with a Rainforest understorey to Dry Open Forests and Woodlands. The species has been recorded utilising disturbed habitats such as exotic pine plantations and large trees in parks and gardens. Powerful Owls nest in a slight depression in the wood-mould on the base of a cavity in a large old tree, sometimes in excess of 25 metres above the ground.	Low Hunting habitat is available for this species on the site. No nesting habitat is available due to the lack of suitably sized hollows.
<i>Tyto capensis</i> Grass Owl	TSC Act – V	This species roost and nest on the ground, in crops or in thick grass tussock often associated with swamps.	Low Habitat is available within the large wetland on site which contains suitable groundcover for this species.
<i>Tyto novaehollandiae</i> Masked Owl	TSC Act – V	A range of wooded habitats that contain mature trees with large hollows for roosting and nesting, and more open areas for hunting.	Low Hunting habitat is available for this species on the site. No nesting habitat is available due to the lack of suitably sized hollows.
<i>Cercartetus nanus</i> Eastern Pygmy Possum	TSC Act – V	Found in wet and dry eucalypt forest, subalpine woodland, coastal <i>Banksia</i> sp. woodland and heath.	Low Marginal habitat is available for this species within the large

SPECIES	STATUS	HABITAT PREFERRED	LIKELIHOOD OF OCCURRENCE WITHIN STUDY AREA
			wetland area which contains a mosaic of heath habitat.
<i>Dasyurus maculatus</i> ssp. <i>maculatus</i> Tiger Quoll	TSC Act – V EPBC Act – E	Inhabits sclerophyll forests, rainforests and coastal woodlands. Nests are made in rock caves and hollow logs or trees, and basking sites are usually found nearby.	Low Marginal habitat is available within the large wetland area on site.
<i>Petaurus australis</i> Yellow-bellied Glider	TSC Act – V	It occurs patchily in tall, mature Wet Eucalypt Forest, at a density 0.05-0.14 individuals per hectare in preferred habitat.	Unlikely No habitat is available for this species due to lack of tall forest and paucity of suitable hollow-bearing trees.
<i>Petaurus norfolcensis</i> Squirrel Glider	TSC Act – V	Dry sclerophyll forests and woodlands with exudates for foraging and hollows for nesting.	Low Marginal habitat is available within the forest areas, however the disturbed nature of the site and paucity of hollows is likely to limit the use of the site by this species.
<i>Phascogale tapoatafa</i> Brush-tailed Phascogale	TSC Act – V	Sparsely distributed outside the semi-arid zone in dry sclerophyll forest and monsoonal forest and woodland.	Low Marginal habitat is available within the forest areas, however the disturbed nature of the site and paucity of hollows is likely to limit the use of the site by this species.
<i>Phascolarctos cinereus</i> Koala	TSC Act – V	The Koala is limited to areas where there are acceptable food trees. Its diet is generally restricted to that of Eucalypt leaves and much less-often, non-Eucalypt foliage. The foliage of <i>Eucalyptus camaldulensis</i> (River Red Gum), <i>E. tereticornis</i> (Forest Red Gum), <i>E. punctata</i> (Grey Gum), <i>E. viminalis</i> (Manna Gum), and <i>E. robusta</i> (Swamp Mahogany) are some of the preferred Eucalypt species. Koalas use a wide variety of tree sizes, and do not preferentially use large or tall trees in NSW forests, although this has been listed as a habitat preference in areas where trees are generally small, stunted, or nutrient deprived.	High The forest areas in the low-lying areas on site are dominated by Koala feed tree species <i>E. robusta</i> (Swamp Mahogany) and <i>E. tereticornis</i> (Forest Red Gum).
<i>Potorous tridactylus</i> Long-nosed Potoroo	TSC Act – V EPBC Act – V	The Long-nosed Potoroo is known from a variety of habitats, including rainforest, Open Forests & Woodlands with dense groundcover, and dense, wet coastal heathlands. Soft (often sandy) substrates are preferred by this species.	Low Habitat is available within the large wetland area on site.

SPECIES	STATUS	HABITAT PREFERRED	LIKELIHOOD OF OCCURRENCE WITHIN STUDY AREA
		They feed predominantly on fungi, subterranean insects, succulent roots, tubers, seeds and fruits.	
<i>Pteropus poliocephalus</i> Grey-headed Flying-Fox	TSC Act – V EPBC Act – V	Wet and Dry Sclerophyll Forests, Rainforest, Mangroves and Paperbark swamps and Banksia Woodlands.	High The study area contains foraging habitat for this species. Roosting habitat is not considered to be present.
<i>Chalinolobus dwyeri</i> Large-eared Pied Bat	TSC Act – V EPBC Act – V	This species has been found occupying Dry Sclerophyll Forest and Woodland. Roosts in caves, abandoned mud-nests of Fairy Martins and mine tunnels.	Low Hunting habitat is present within the study area, although roosting habitat is lacking due to the absence of caves or suitable structures.
<i>Falsistrellus tasmaniensis</i> Eastern False Pipistrelle	TSC Act – V	Inhabits sclerophyll forests and has been observed roosting in holes and hollow trunks of Eucalypts.	Low-Moderate Hunting and roosting habitat is available for this species within the study area.
<i>Miniopterus australis</i> Little Bentwing-bat	TSC Act – V	Tropical Rainforest to warm-temperate Wet and Dry Sclerophyll Forest; caves or similar structures for roosting.	Low-Moderate Hunting habitat is present within the study area, although roosting habitat is lacking due to the absence of caves or suitable structures.
<i>Miniopterus schreibersii oceanensis</i> Large Bentwing-bat	TSC Act – V	Wet and Dry Tall Open Forest, Rainforest, Monsoon Forest, Open Woodland, Paperbark Forests and Open Grasslands; caves or similar structures for roosting. It occasionally uses tree hollows.	Low-Moderate Hunting and roosting habitat is available for this species within the study area.
<i>Mormopterus norfolkensis</i> East Coast Freetail-bat	TSC Act – V	This species appears to live in Sclerophyll Forests and Woodland. Roosts in tree hollows or under loose bark.	Low-Moderate Hunting and roosting habitat is available for this species within the study area.
<i>Myotis macropus</i> Southern Myotis	TSC Act – V	Various habitats of the coast and adjacent ranges with suitable waterbodies for hunting; caves or similar structures for roosting. It occasionally uses tree hollows.	Low-Moderate Hunting and roosting habitat is available for this species within the study area.

SPECIES	STATUS	HABITAT PREFERRED	LIKELIHOOD OF OCCURRENCE WITHIN STUDY AREA
<i>Saccolaimus flaviventris</i> Yellow-bellied Sheath-tail-bat	TSC Act – V	Has been reported from a wide variety of habitats. Roosts in tree hollows, animal burrows, dry clay cracks, under rock slabs and in abandoned Sugar Glider nests.	Low-Moderate Marginal hunting and roosting habitat is available for this species within the study area.
<i>Scoteanax rueppellii</i> Greater Broad-nosed Bat	TSC Act – V	Tree-lined creeks, woodland/clearing ecotones and rainforest creeks, roosting mainly in tree hollows.	Low-Moderate Marginal hunting and roosting habitat is available for this species within the study area.
Emu population in the NSW North Coast Bioregion and Port Stephens LGA.	TSC Act – E2	Predominantly open habitats, including plains, grasslands, woodlands and scrubs, and may occur occasionally in forest.	Unlikely Habitat is not available for this species as the site is fenced precluding access for this species.

4.3 FAUNA SURVEY RESULTS

4.3.1 DIURNAL SURVEYS

A number of avifauna species were identified on site during the survey including *Gymnorhina tibicen* (Magpie), *Trichoglossus haematodus* (Rainbow Lorikeet), *Rhipidura fuliginosa* (Grey Fantail), *Stipiturus malachurus* (Southern Emu-Wren), *Manorina melanocephala* (Noisy Miner), *Corvus coronoides* (Australian Raven), *Grallina cyanoleuca* (Magpie-lark) and *Cacatua roseicapilla* (Galah). No observed bird species are recognised as being threatened under the Threatened Species Conservation Act (1995) or the Environment Protection and Biodiversity Conservation Act (1999).

Two species of reptile was observed during the survey, being *Lampropholis delicata* (Grass Skink) and *Pseudechis porphyriacus* (Red-bellied Black Snake). These species are not recognised as threatened.

One species of frog, *Crinia tinnula* (Wallum Froglet) was heard calling within the large wetland in the west of the site. This species is listed as Vulnerable under the TSC Act 1995 and has been considered further in Section 5.0.

Scats were observed under a number of the trees onsite however the age of the scats did not allow them to be positively identified. Considering the scats were likely to be consistent with *Phascolarctos cinereus* (Koala) and were found within primary Koala habitat this species has been considered further in Section 5.0.

5.0 THREATENED SPECIES ASSESSMENT

Swamp Sclerophyll Forest (SSF), an Endangered Ecological Community (EEC) under Part 3 of Schedule 1 of the Threatened Species Conservation Act (1995), was present within the low-lying areas in the north of the site. For the majority of this community the understorey was heavily disturbed dominated by exotic grass species that were regularly maintained resulting in a parkscape appearance. A small area along the northern boundary has a relatively intact understorey and two small wetland areas in the northwest of the site are also consistent with this community. It is expected that some of this assemblage along the northern boundary of the site (approx. 1.0 ha) will be removed as a result of the current concept plan. The concept plan also provides an offset area (approx. 8.5ha) along the western portion of the site and a 50-70m-retention zone for trees within the proposed rural-residential lots along the proposed main road reserve. Replanting of trees and/or rehabilitation of the remaining vegetation involving weed management and planting shrub species consistent with this community should occur within the proposed offset areas. It may also be possible to include the wetland area which encompasses approximately 18ha within the proposed offset area, however further investigation is required to ascertain the amount of SSF present within the wetland.

The SSF community is also listed as primary Koala habitat under the Port Stephens Comprehensive Koala Plan of Management (CKPoM). This has been considered further in Section 6.0. This community provides a Koala habitat link through the site connecting habitat to the north and south. Scats that are likely to be consistent with Koala were found beneath a number of the trees on site however further studies would be required to verify this. Given that the current concept plan retains the a large portion of this link on site within rural-residential lots the proposal is unlikely to have a significant impact on Koala habitat in the local area provided a number of actions are taken to protect Koalas within an urban landscape. The provision of offset areas along the west of the site is also likely to mitigate this to a point although it will take time for the trees planted within the offset areas to become established. The provision to retain trees within a 50-70m retention zone within the rural-residential lots will provide an urban link during this time helping to maintain a link through the site during the time the trees within the offset area become established. The more trees to be retained within the development area the better.

It should be noted that further investigation would be required at the Development Application stage when the final lot design is being considered. At this stage the full impact of the development can be quantified and depending on design and availability of offsets an SIS may be required.

Crinia tinnula (Wallum Froglet) was observed calling from the large wetland area in the west of the site. This wetland is included as part of the retention area within the concept plan and is unlikely to have a major impact on this species on site. The two small wetlands in the northwest of the site are

also considered to be habitat for this species. These wetlands were dry at the time of the survey but are likely to be utilised when they become inundated. Given the large area of habitat available within the large wetland the removal of these two small wetlands is unlikely to have significant impact upon this species however further searches and relocation of specimens may be warranted prior to any works taking place.

While no other threatened species were recorded on site during the brief site inspection, of the remaining 56 threatened species considered in this report, 41 were considered to have potential habitat resources of varying quality across the site. 11 of these species are wetland-specific and given the retention of the large wetland on site the current concept plan is unlikely to significantly impact upon these species. The removal of vegetation as shown in the concept plan may be seen as an incremental decline of habitat in the local area for the remaining 30 species considered, however the amelioration of proposed offset areas is likely to mitigate the loss of this habitat for these species.

A number of hollow-bearing trees may also be removed as a result of the concept plan and these will need to be replaced with nest boxes at a ratio of at least 2:1 (2 nest boxes installed for every hollow removed). These would be installed in the remaining trees on site and within the proposed offset areas prior to clearance of any hollow-bearing trees.

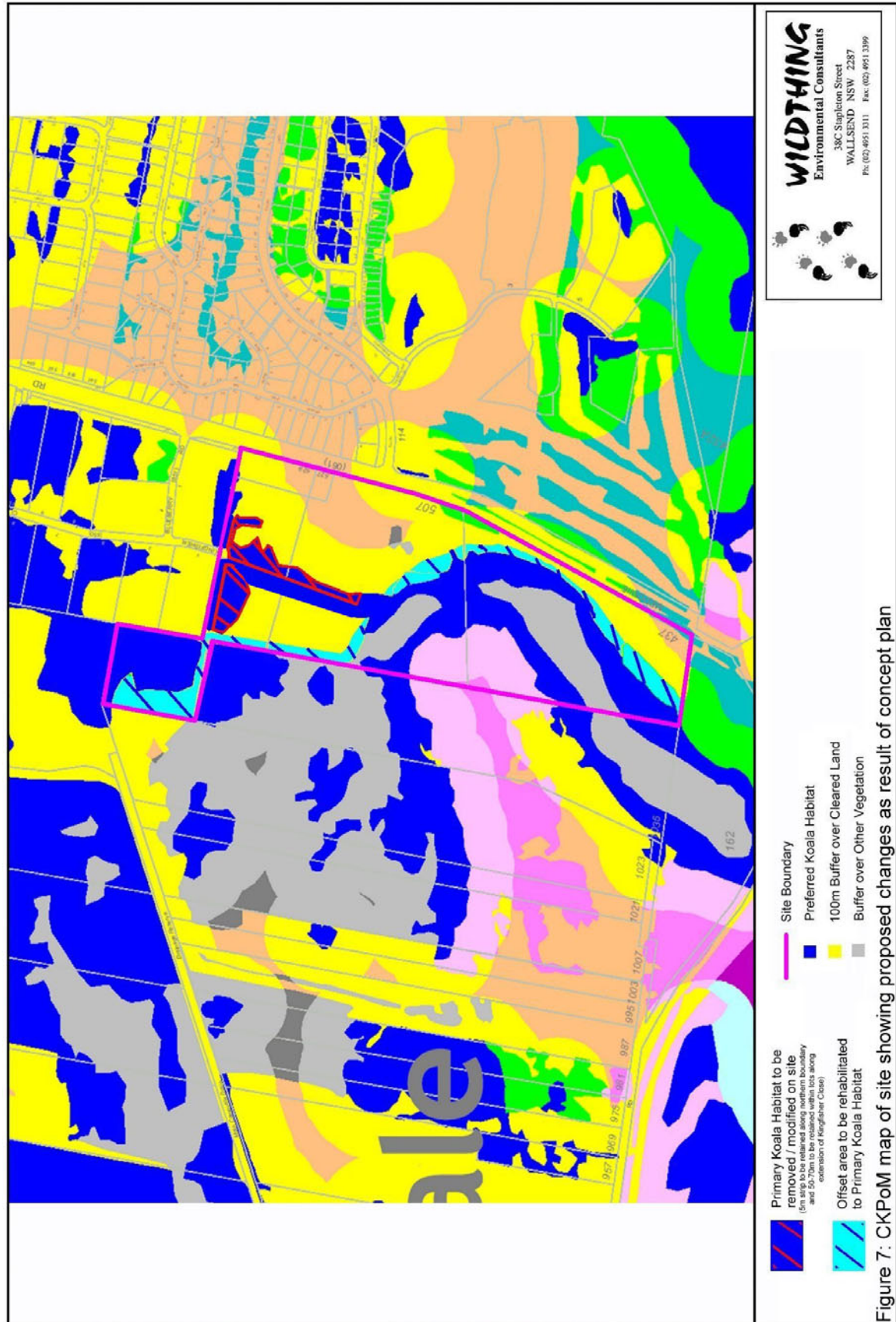
6.0 CONSIDERATION OF THE PORT STEPHENS COMPREHENSIVE KOALA PLAN OF MANAGEMENT

The site is situated within Port Stephens Shire Council and is subject to the Port Stephens Comprehensive Koala Plan of Management (CKPoM). The principal aim of the Port Stephens CKPoM is to encourage the proper conservation and management of areas of natural vegetation that provide habitat for Koalas to ensure a permanent free-living population over their present range and the reverse the current trend of Koala population decline.

The CKPoM mapping shows that the site contains primary Koala habitat linking habitat to the north and south of the site. The fieldwork on site confirmed the presence of primary Koala habitat and is consistent with that mapped in the CKPoM. The concept plan is likely to result in the removal of Koala habitat in the north of the site reducing the amount of linking habitat and converting the rural link into an urban link.

The proposed offset area runs along the western boundary and the large wetland on site and has the capacity to replace the loss of any Koala feed trees at a ratio of at least 4:1 (4 trees planted for every tree removed). Once these trees become established the offset area will provide a link to habitat to the north and south of the site. However the amount of time needed for adequate growth of the replacement trees is quite long and the retention of as many mature Koala feed trees as possible within the scope of the proposal will be required. Currently the concept plan allows for the retention of a large proportion of trees within the proposed rural-residential lots and an expanded road reserve of approximately 5m. It is difficult to ascertain the number of trees that this will retain at this stage but is likely to provide an urban link through the site allowing time for the planted trees to form an established link to habitat to the north and south of the site. Figure 7 shows the CKPoM map of the site with the proposed changes as a result of the current concept plan.

Given the provision to retain Koala habitat trees within an urban landscape a number of Koala protection measures will also need to be considered including reduced speed limits, exclusion or containment of dogs, Koala friendly fencing and long-term management of Koala habitat areas on site.



7.0 CONSIDERATION OF THE COMMONWEALTH ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999

In a Statement of Effect on Threatened Flora and Fauna an assessment will be undertaken to determine whether or not the proposal has, or is likely to have, a significant impact on a matter of National Environmental Significance. Matters of National Environmental Significance are:

- World Heritage properties
- Wetlands recognised under the Ramsar Convention as having international significance
- Listed threatened species and communities
- Migratory species protected under international agreements
- Nuclear activities
- Commonwealth marine environment

For the study area, the matters of National Environmental Significance, which will be given priority in the assessment, are listed threatened species and communities. There are sixteen threatened species which are listed in the EPBC Act and will be given consideration in the assessment:

<i>Allocasuarina defungens</i>	Dwarf Heath Casuarina
<i>Angophora inopina</i>	Charmhaven Apple
<i>Eucalyptus camfieldii</i>	Camfield's Stringybark
<i>Eucalyptus parramattensis</i> ssp. <i>decadens</i>	Drooping Red Gum
<i>Melaleuca biconvexa</i>	Biconvex Paperbark
<i>Persicaria elatior</i>	Knotweed
<i>Rulingia prostrata</i>	Dwarf Kerrawang
<i>Litoria aurea</i>	Green and Golden Bell Frog
<i>Mixophyes balbus</i>	Stuttering Frog
<i>Lathamus discolor</i>	Swift Parrot
<i>Rostratula australis</i>	Australian Painted Snipe
<i>Xanthomyza phrygia</i>	Regent Honeyeater
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat
<i>Dasyurus maculatus</i> ssp. <i>maculatus</i>	Tiger Quoll
<i>Potorous tridactylus</i> ssp. <i>tridactylus</i>	Long-nosed Potoroo
<i>Pteropus poliocephalus</i>	Grey-headed Flying Fox

Based on the results of the fieldwork and the habitat assessment it is considered unlikely that the above sixteen species would place any large constraints on the potential development of the study area. For those species considered to have potential habitat present on site, the removal of vegetation may be viewed as contributing to the incremental decline of habitat available for these species in the locality.

8.0 SUMMARY OF ECOLOGICAL CONSTRAINTS AND MANAGEMENT REQUIREMENTS

A summary of the potential ecological constraints to the development of the site provided throughout the report is summarised below.

- One endangered ecological community (Swamp Sclerophyll Forest) was present on site. . It is expected that some of this assemblage along the northern boundary of the site (approx. 1.0 ha) will be removed as a result of the current concept plan. The concept plan also provides an offset area (approx. 8.5ha) along the western portion of the site and a 50-70m-retention zone for trees within the proposed rural-residential lots along the proposed main road reserve. Replanting of trees and/or rehabilitation of the remaining vegetation involving weed management and planting shrub species consistent with this community should occur within the proposed offset areas. It may also be possible to include the wetland area which encompasses approximately 18ha within the proposed offset area, however further investigation is required to ascertain the amount of SSF present within the wetland.
- The SSF community is also listed as primary Koala habitat under the Port Stephens Comprehensive Koala Plan of Management (CKPoM) and provides a Koala habitat link through the site connecting habitat to the north and south. Given that the current concept plan retains the a large portion of this link on site within rural-residential lots the proposal is unlikely to have a significant impact on Koala habitat in the local area provided a number of actions are taken to protect Koalas within an urban landscape. The provision of offset areas along the west of the site is also likely to mitigate this to a point although it will take time for the trees planted within the offset areas to become established. The provision to retain trees within a 50-70m retention zone within the rural-residential lots will provide an urban link during this time helping to maintain a link through the site during the time the trees within the offset area become established. The more trees to be retained within the development area the better.
- Given the provision to retain Koala habitat trees within an urban landscape a number of Koala protection measures will also need to be considered including reduced speed limits, exclusion or containment of dogs, Koala friendly fencing and long-term management of Koala habitat areas on site
- It should be noted that further investigation would be required at the Development Application stage when the final lot design is being considered. At this stage the full impact of the development can be quantified and depending on design and availability of offsets an SIS may be required.

- *Crinia tinnula* (Wallum Froglet) was observed calling from the large wetland area in the west of the site. This wetland is included as part of the retention area within the concept plan, which is therefore unlikely to have a major impact on this species on site. The two small wetlands in the northwest of the site are also considered to be habitat for this species. These wetlands were dry at the time of the survey but are likely to be utilised when they become inundated. Given the large area of habitat available within the large wetland the removal of these two small wetlands is unlikely to have significant impact upon this species however further searches and relocation of specimens may be warranted prior to any works taking place.
- A number of hollow-bearing trees may be removed as a result of the concept plan and these will need to be replaced with nest boxes at a ratio of at least 2:1 (2 nest boxes installed for every hollow removed). These would be installed in the remaining trees on site and within the proposed offset areas prior to clearance of any hollow-bearing trees.

9.0 CONCLUSION

The flora, fauna and habitat assessments undertaken for Lots 411 & 412 DP1063902, Medowie Road, Medowie NSW have attempted to highlight the issues, particularly in relation to threatened species and communities, that may pose constraints and management requirements to the development of this site.

The assessment has highlighted three major issues, these being:

- The presence of Swamp Sclerophyll Forest (SSF), an EEC, on site;
- The presence of Primary Koala Habitat forming a link between primary habitat to the north and south of the site; and
- The presence of *Crinia tinnula* (Wallum Froglet) within the large wetland in the west of the site.

SSF was present within the low-lying areas in the north of the site. For the majority of this community the understorey was heavily disturbed dominated by exotic grass species that were regularly maintained resulting in a parkscape appearance. A small area along the northern boundary has a relatively intact understorey and two small wetland areas in the northwest of the site are also consistent with this community. It is expected that some of this assemblage along the northern boundary of the site (approx. 1.0 ha) will be removed as a result of the current concept plan. The concept plan also provides an offset area (approx. 8.5ha) along the western portion of the site and a 50-70m-retention zone for trees within the proposed rural-residential lots along the proposed main road reserve. Replanting of trees and/or rehabilitation of the remaining vegetation involving weed management and planting shrub species consistent with this community should occur within the proposed offset areas. It may also be possible to include the wetland area which encompasses approximately 18ha within the proposed offset area, however further investigation is required to ascertain the amount of SSF present within the wetland.

The SSF community is also listed as primary Koala habitat under the Port Stephens CKPoM. This community provides a Koala habitat link through the site connecting habitat to the north and south. Given that the current concept plan retains the a large portion of this link on site within rural-residential lots the proposal is unlikely to have a significant impact on Koala habitat in the local area provided a number of actions are taken to protect Koalas within an urban landscape. The provision of offset areas along the west of the site is also likely to mitigate this to a point although it will take time for the trees planted within the offset areas to become established. The provision to retain trees within a 50-70m retention zone within the rural-residential lots will provide an urban link during this time helping to maintain a link through the site during the time the trees within the offset area become established. The more trees to be retained within the development area the better.

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While no other threatened species were recorded on site during the brief site inspection, of the remaining 56 threatened species considered in this report, 41 were considered to have potential habitat resources of varying quality across the site. 11 of these species are wetland-specific and given the retention of the large wetland on site the current concept plan is unlikely to significantly impact upon these species. The removal of vegetation as shown in the concept plan may be seen as an incremental decline of habitat in the local area for the remaining 30 species considered, however the amelioration of proposed offset areas is likely to mitigate the loss of this habitat for these species.

Considerations have been made to the Commonwealth Environment Protection and Biodiversity Conservation (EPBC) Act 1999. It was determined that the proposed concept plan of the site is unlikely to have a significant impact on a matter of National Environmental Significance.

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**PRELIMINARY CONTAMINATION
ASSESSMENT
PROPOSED MIXED USE REZONING
MEDOWIE ROAD, MEDOWIE NSW**

Prepared for:

HDB Town Planning and Design
PO Box 40
MAITLAND NSW 2320

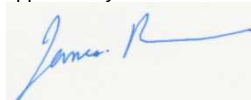
Report Date: 30 June 2010
Project Ref: ENVIWARA00340AB

Written/Submitted by:



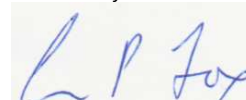
Damien Hendrickx
Environmental Scientist

Approved by:



James McMahon
Business Manager - Newcastle

Reviewed by:



Laurie Fox
Associate Environmental Geologist

30 June 2010

HDB Town Planning and Design
PO Box 40
MAITLAND NSW 2320

Attention: Natasha Wells

Dear Natasha

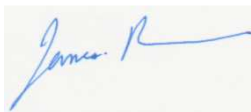
**RE: PRELIMINARY CONTAMINATION ASSESSMENT
PROPOSED MIXED USE REZONING
MEDOWIE ROAD, MEDOWIE NSW**

Coffey Environments Australia Pty Ltd (Coffey) is pleased to provide our Preliminary Contamination Assessment (PCA) report for the above site.

We draw your attention to the enclosed sheet entitled "Important Information about your Coffey Environmental Report" which should be read in conjunction with the report.

We trust that our report meets with your requirements. If you require any further information regarding our report, please do not hesitate to contact Damien Hendrickx or the undersigned on (02) 4016 2300.

For and on behalf of Coffey Environments Australia Pty Ltd



James McMahon
Business Manager - Newcastle

RECORD OF DISTRIBUTION

No. of copies	Report File Name	Report Status	Date	Prepared for:	Initials
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1	ENVIWARA00340AB-R01.doc	Final	30 June 2010	Coffey Environments Pty Ltd	

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ABBREVIATIONS

AEC	Area of Environmental Concern
Bgs	below ground surface
BTEX	Benzene, Toluene, Ethylbenzene and Xylenes
COC	Contaminant of Concern
ID	Identification
IP	Interface Probe
mg/kg	milligrams per kilogram
NATA	National Association of Testing Authorities
NEHF	National Environmental Health Forum
NEPM	National Environment Protection Measure
NSW DEC	Department of Environment and Conservation of New South Wales
NSW DECCW	Department of Environment, Climate Change and Water of New South Wales
NSW EPA	Environment Protection Authority of New South Wales
OCP	Organochlorine Pesticide
OPP	Organophosphorous Pesticides
PAH	Polycyclic Aromatic Hydrocarbon
PCA	Preliminary Contamination Assessment
PCB	Polychlorinated Biphenyl
PID	Photoionisation Detector
Ppm	parts per million
QA	Quality Assurance
QC	Quality Control
RPD	Relative Percent Difference

ABBREVIATIONS

SEPP	State Environmental Planning Policy
SOP	Standard Operating Procedures
TDS	Total Dissolved Solids
TP	Test Pit
TPH	Total Petroleum Hydrocarbon

EXECUTIVE SUMMARY

Coffey Environments Australia Pty Ltd (Coffey) was commissioned by HDB Town Planning and Design Pty Ltd (HDB) to undertake a Preliminary Contamination Assessment (PCA) for a site at Medowie Road, Medowie. It is understood that the site is to be rezoned to facilitate development of residential properties and open space areas. The site is identified as Lots 411-413 DP 1063902 and has an area of approximately 18 hectares.

The objectives of the PCA were to identify potentially contaminating activities that are currently being performed on the site and that may have been performed on the site in the past, to assess areas of environmental concern (AECs) and chemicals of concern (COCs) for the site, and to prepare a PCA report for the site to accompany the appropriate HDB documentation being forwarded to Port Stephens Council.

In order to meet the objectives, the works undertaken included a site history review, a site walkover, intrusive field investigations including test pitting and soil sampling, laboratory analysis of selected samples, and preparation of this PCA report.

The site history review identified that the site has been owned / occupied by private landholders since 1904. A review of historical aerial photography indicated that the northern half of the site has largely been cleared for the past 50 to 60 years, with a number of residential buildings being developed in this time. The northern half of the site also appears to have been used for agricultural prior to the 1950's. Over the past 10 to 20 years, an electrical transformer yard has been constructed, as well as a paved racing track surrounded by two fill mounds. The southern half of the site was largely vegetated until approximately 10-15 years ago, when the majority of the southern half was cleared to enable construction of residential buildings. Some of these features were observed during the site walkover.

The site history review and site walkover identified six AECs, relating areas of fill on the site, current buildings, septic tanks, the wastewater pumping station, potential historical agricultural activities and the electrical transformer yard. To provide a preliminary assessment of the fill on the site, three soil samples were collected and analysed for a number of COCs, including heavy metals, hydrocarbons, pesticides and asbestos.

The results of the laboratory analysis indicated that concentrations of contaminants were either not detected above laboratory detection limits, or were below adopted human health and phytotoxicity investigation levels. Asbestos was also not detected in the samples analysed. Based on the results of the PCA, the likelihood for significant contamination to be present in the fill around the racing track and the gravel driveway is considered to be low, and this fill is suitable to remain on site.

Coffey recommends that a Phase 2 Environmental Site Assessment (ESA) be carried out at the Development Application stage. The following works should be included in the Phase 2 ESA:

- Additional investigations targeting the septic tanks, the electrical transformer, areas of previous agricultural activity and the site boundary adjacent to the wastewater pumping station;
- A hazardous materials survey on the buildings currently on the site if these are to be removed during construction works; and
- If the wastewater treatment plant and / or the electrical transformer yard are to be removed during construction works, additional sampling of the resultant excavations should be carried out.

Further environmental investigations (including waste classification of material to be disposed offsite) may be required during the construction of the buildings on the site.

1 INTRODUCTION

1.1 General

This report presents the findings of a Preliminary Contamination Assessment (PCA) undertaken by Coffey Environments Australia Pty Ltd (Coffey) at Medowie Road, Medowie NSW (the site). The location of the site is shown on Figure 1.

The PCA was commissioned by HDB Town Planning and Design Pty Ltd (HDB) in response to a Coffey proposal (Reference ENVIWARA00340AB-P01 dated 8 March 2010). Coffey understands that HDB has been engaged to prepare a rezoning report for a proposed mixed use (open space and residential) site. It is further understood that HDB require an assessment of potential contamination issues at the site. The findings of the assessment will be forwarded with additional HDB documentation to Port Stephens Council (Council). The PCA was undertaken along with a Coffey preliminary geotechnical assessment (Reference ENVIWARA00340AB-AB). The geotechnical report should be read in conjunction with this report.

This report has been written in accordance with the relevant sections in the NSW EPA (1997) *Guidelines for Consultants Reporting on Contaminated Sites*. This report must be read in conjunction with the attached sheet entitled "Important Information about your Coffey Environmental Report", which can be found at the end of this report.

1.2 Objectives

The objectives of the PCA were to:

- Identify potentially contaminating activities that are currently being performed on the site and that may have been performed on the site in the past;
- Assess Areas of Environmental Concern (AECs) and Chemicals of Concern (COCs) for the site; and
- Prepare a PCA report for the site to accompany the appropriate HDB documentation forwarded to Council.

1.3 Scope of Works

In order to achieve the above objectives, the following scope of works was undertaken:

- A desktop study of past activities at the site with the potential to cause contamination, including:
 - o Interviews with people familiar with the site history;
 - o A review of historical ownership of the three lots comprising the site;
 - o A review of aerial photography from the past 50 to 60 years;
 - o A review of Council Section 149 Planning Certificates for one of the three lots comprising the site;
 - o A review of NSW WorkCover Dangerous Goods Records for the site; and
 - o A review of NSW DECCW notices applying to the site and nearby properties.

- An assessment of the site topography, geology and hydrogeology including site drainage and regional groundwater usage through a search of nearby registered groundwater bores;
- A site walkover to identify AECs and potential COCs;
- Soil sampling from fill materials encountered in the test pits excavated for the concurrent preliminary geotechnical assessment (Reference ENVIWARA00340AB-AB);
- Soil sampling from other areas on the site where fill had been placed;
- Field screening of soil samples with a Photoionisation Detector (PID) to assess the potential presence of volatile contamination;
- Laboratory analysis of selected samples for identified COCs; and
- Preparation of this PCA report.

2 SITE DESCRIPTION

2.1 Site Location and Identification

General site information is provided below in Table 1.

TABLE 1 – SUMMARY OF SITE DETAILS

Site Address:	The site is located on the western side of Medowie Road in a residential area of Medowie.
Approximate Total Site Area:	18 hectares.
Title Identification Details:	Lots 411-413 DP 1063902, in the Parish of Stowell and the County of Gloucester.
Current Zoning:	1 (c1) and 1 (c2) – Small Rural Holdings.
Previous Landuse:	Historical evidence indicates that the site has historically been used for rural-residential purposes.
Current Landuse:	Primarily rural-residential, though an electrical transformer yard is located near the middle of the site.
Proposed Landuse:	It is understood that the site will be used for residential land use and open space.
Adjoining Site Uses:	- Residential properties, Kingfisher Close and the Medowie Wastewater Pumping Station to the north; - Vacant bushland to the south; - Medowie Road and the Pacific Dunes Golf Course to the east; and - Vacant bushland and a State Environmental Planning Policy (SEPP) 14 Wetland to the west.
Site Coordinates:	The centre of the site is located approximately at 32°45'55"S, 151°51'49"E.

2.2 Summary of Site Features

Features identified on the site are summarised below:

- Two residential properties are located on the site, one at the northern end and one at the southern end. Both residential properties consist of a single storey brick dwelling and a weatherboard shed;
- The majority of the site is covered with grass, with a number of medium to high trees scattered throughout the site and lining the site boundaries;
- A small creek / drain is located in the middle of the site;
- An electrical transformer yard is located near the middle of the site; and
- A tennis court and paved racing track is located near the northern residence.

2.3 Site Topography and Drainage

Reference to the 1:100,000 Newcastle Topographic Map indicates that the site is situated in a low-lying area to the east of the Grahamstown Storage Reservoir. The topographical map indicates that the elevation of the site ranges from 10-20m AHD in the southern sections of the site and rises to an elevation of approximately 20m AHD in the northern sections, indicating that the site slopes down to the south slightly. The site walkover identified that the site surface in the northern half slopes to the south towards the drain / creek in the middle of the site. The surface in the southern half of the site was observed to be relatively flat.

Drainage at the northern half of the site is anticipated to follow the site surface topography and flow to the south towards the creek / drain in the middle of the site. Drainage at the southern half site is anticipated to occur by infiltration into the surface soils, with excessive surface water runoff likely to accumulate in pools in this area of the site.

Water from the creek / drain in the middle of the site is likely to flow towards Moffats Swamp, located approximately 1.3km east of the site.

2.4 Local Geology and Hydrogeology and Local Groundwater Usage

Reference to the 1:250,000 Newcastle Geological Map indicates that the site is underlain by the following geological formations:

- The Tomago Sand Beds comprising marine and freshwater Quaternary Alluvium deposits of gravel, sand, silts and clays; and
- The Tomago Coal measures comprising shale, mudstone, sandstone, tuff and coal

Groundwater beneath the site is anticipated to occur in residual soils in the northern half of the site, and in marine or alluvial soils in the southern half of the site. Local groundwater flow is anticipated to be to the east towards Moffats Swamp (located approximately 1.3km east of the site).

A search of registered groundwater bores located within a 2km radius of the site was undertaken. The search revealed that there are 61 bores registered within this radius. The bore details are included in Appendix A, and the details of the six closest bores to the site are summarised below in Table 2.

TABLE 2 – SUMMARY OF GROUNDWATER BORE DATA FOR THE SIX CLOSEST BORES TO SITE

BORE ID	STATUS	PURPOSE	APPROXIMATE DISTANCE FROM SITE	STANDING WATER LEVEL (MBGL)
GW079579	Unknown	Unknown	80m east of north-eastern section of site	Unknown
GW079976	Unknown	Unknown	60m south of southern boundary	Unknown
GW079977	Unknown	Unknown	50m west of south-western section of site	Unknown
GW079978	Unknown	Unknown	50m south-east of south-eastern corner of site	Unknown
GW079980	Unknown	Unknown	180m east of central section of site	Unknown
GW080264	Active	Test Bore	100m east of central section of the site	Unknown
NOTES: <i>mbgl= metres below ground level</i>				

Water quality data was provided for registered bore GW013359, which is a private bore used for domestic, farming and stock purposes. This particular bore is located approximately 570m north-east of the site boundary. The data indicated that the water in this bore had a pH value of 6.3 units, a total dissolved solid (TDS) concentration of 2,637 mg/L and a chloride concentration of 1297 mg/L. The results indicate that the water in the bore has a near neutral pH value and is slightly saline.

2.5 Acid Sulfate Soils

Reference to the Williamstown 1:25,000 Acid Sulfate Soils Risk Map indicates that there are some areas of the site where there is a probability of acid sulfate soils (ASS) being encountered. In these areas (mainly in the southern and western areas of the site) the risk map a low probability of acid sulfate soils at depths of greater than 1 metre below the ground surface. According to the risk map there is no known occurrence of acid sulfate soils in the northern areas of the site.

Selected soil samples were screened for the presence of ASS as part of the preliminary geotechnical assessment. The results of the screening tests can be found in Coffey's geotechnical report for the site (Reference ENVIWARA00340AB-AB).

3 SITE HISTORY REVIEW

The site history review was undertaken as part of the PCA, and included:

- A review of historical ownership of the three lots comprising the site;
- A review of aerial photography from the past 50 to 60 years;
- A site walkover to help identify current and previous activities carried out on the site, to help identify AECs and COCs and to help identify surrounding land uses;
- Interviews with people familiar with the site history;
- A review of Council Section 149 Planning Certificates for one of the three lots comprising the site;
- A review of NSW WorkCover Dangerous Goods Records for the site; and
- A review of NSW DECCW notices applying to the site and nearby properties.

The information provided from the above reviews is summarised in the sections below.

3.1 Historical Titles Search

A search of historical titles for the three lots comprising the site was undertaken by Advanced Legal Search Pty Ltd. Lists of past registered proprietors for the five lots were obtained back to 1904. The results of the search are included in Appendix B.

The historical titles search indicated that the three lots have been owned by a number of private landholders since 1904. The private landholders included farmers and business managers. The current landholder for Lot 411 DP 1063902 has occupied the lot since 1977, while the current landholder for Lots 412 and 413 DP 1063902 has occupied the lots from 2009 and 2010 respectively.

3.2 Aerial Photograph Review

Aerial photographs of the site were purchased from the Department of Land and Property Mapping and reviewed by a Coffey Environmental Scientist. The results of the aerial photograph review are summarised below in Table 3. The aerial photographs are presented in Appendix C.

TABLE 3 – AERIAL PHOTOGRAPH REVIEW

YEAR	SITE	SURROUNDING LAND
1954	The site is composed of two distinct areas. The northern half of the site appears to be largely cleared, with a number of trees scattered throughout. A building appears to be located near the middle of the northern section. There also appears to be crops (possibly an orchard) located near the middle of the site. The southern section of the site appears to consist largely of bushland.	The majority of the surrounding land appears to be vegetated (consisting of bushland). There appears to be a few cleared areas around the site (particularly to the east and north) and crops appear to have been grown in cleared areas to the north. Medowie Road to the east of the site and Richardson Road to the south of the site appear to have been constructed. These appear to be the only two roads in the vicinity of the site. The Pacific Dunes Golf Course appears to have not yet been constructed.
1966	There appears to have been more clearing of the northern section of the site since 1954. The crops that appeared in the 1954 aerial near the middle of the site appear to be no longer present. The remainder of the site appears to have been largely unchanged	More properties to the north and west appear to have been cleared. Areas to the south and east appear to have remained largely vegetated. Road layouts in close proximity to the site appear to be similar to 1954. Roads appear to have been constructed further north of the site.
1975	There appears to have been more clearing of the site from 1966. The eastern side of the site now appears to be largely cleared, as well as the south-eastern corner. There also appears to be some new buildings in the northern half of the site. The western side of the southern half of the site appears to have remained vegetated.	There appears to have been more land cleared to the west of the site, with buildings constructed on these cleared properties. The buildings appear to consist largely of residential and agricultural buildings. There appears to be a few new buildings to the north of the site. Road layouts around the site appear to have been unchanged from 1966.
1983	The majority of the site now appears to have been cleared, with a few trees appearing to be scattered throughout the site. A small building appears to have been constructed near the middle of the site (likely to be the current-day electrical transformer).	The surrounding land uses appear to be largely unchanged from 1975. There appear to be a few new residential buildings to the west and north of the site. The areas to the east and south of the site appear to have remained largely vegetated.

YEAR	SITE	SURROUNDING LAND
	There also appears to be a number of tracks throughout the site, with a circular track located in the northern half of the site.	Some new roads appear to have been constructed to the east of the site. Other roads around the site appear to be largely unchanged from 1975.
1993	There appear to have been some significant changes to the site since 1983. The northern half of the site now appears to contain a paved track and a driveway leading from Medowie Road to the northern residence. There also appear to be two areas in the northern half of the site that may have been used for agricultural activity (possibly orchard growing) in this time, with one area located north of the racing track and the other between the gravel driveway and the creek / drain.. The southern half of the site appears to have been largely cleared, with the areas near the southern boundary appearing to have been recently cleared and stripped of grass cover (possibly for development of the present-day southern residence).	There appears to be a marsh / swamp area to the west of the northern half of the site. More residential buildings appear to have been constructed in areas to the west and north of the site. A large portion of land to the east of the site appears to have been cleared, possibly for construction of the present-day Pacific Dunes Golf Course. There appears to be new roads constructed to the south of the site.
2004	The site appears to resemble the current-day layout. The southern half of the site appears to have been grassed and buildings appear to have been constructed in this area. The present-day tennis court also appears to have been constructed.	The swamp / marsh area appears to now consist of two sinks / pools that are vegetated, with an access track surrounding them. The Pacific Dunes Golf Course to the east of the site appears to have been constructed. There appears to have been an increase in residential areas to the north of the site, with more land appearing to have been cleared. New roads in these residential areas appear to have been constructed. A few areas to the south of the site appear to have been cleared, though the majority of the areas south of the site appear to have remained vegetated.

YEAR	SITE	SURROUNDING LAND
2010 (Google Earth Image)	The site appears to be similar to the 2004 aerial photograph.	The surrounding areas of the site appear to be similar to the 2004 aerial photograph.

3.3 Site Observations

A Coffey Environmental Scientist visited the site on 14 May 2010. Site photographs were taken during the visit, and are shown in Appendix D. The current site layout and features are shown on Figure 2.

The observations noted during the site walkover are summarised below:

- The majority of the site is cleared and grassed, with medium to high trees scattered throughout.
- The site can be divided into a northern half and a southern half, with a small drain / creek running east to west through the middle of the site.
- An electrical transformer yard is located near the middle of the site (Photograph 1). The transformer yard was observed to be surrounded by a wire fence and consist of two telegraph poles and an electrical generator.
- There are two residences currently on the site – one at the northern end and one at the southern end.
- Two sheds were located near the residences. These sheds were observed to be used for storage of vehicles and general household items.
- A gravel driveway was observed leading to the northern residence (Photograph 2). A tennis court was observed near this gravel driveway.
- The small creek / drain that cuts through the middle of the site was observed to be partially filled with water (Photograph 3). Two small bridges (suitable for vehicular traffic) were observed to cross over this drain / creek.
- A bitumen paved racing track was observed near the northern residence (Photograph 4). The pavement was observed to be in good condition, and free of major cracks or staining.
- Two fill mounds were observed around the racing track, acting as buffers for vehicles using the track. One fill mound was observed around the south-western section of the track (Photograph 5) and the other fill mound was observed around the northern side of the track (Photograph 6).
- A swamp / marsh area was observed adjacent to the north-western section of the site (Photograph 7). This section was observed to consist of a filled area with two small circular sections in the centre containing water. Concrete slabs were also identified in this area.
- Stockpiles of soil were identified in a number of areas around the site, including one near the northern racing track (Photograph 8). This stockpile consisted mainly of sandy soils and was inferred to have probably originated elsewhere on the site, or adjacent to the site.

- The Medowie Wastewater Pumping Station was identified along the northern boundary of the site, next to the southern end of Kingfisher Close (Photograph 10). The pumping station consisted of concrete pavements and a control terminal.
- The southern residence consisted of a brick house with a tiled roof (Photograph 11). A storage shed was also identified in this area (Photograph 11).
- Two septic tanks were identified near the southern residence (Photograph 12). The majority of the tanks were buried beneath the ground with only the top of the tanks visible from the surface.

3.4 Interviews

An interview was held with Mr Norman Fraser, who is the current owner of Lot 411 DP 1063902, and who had, at one point, owned the other two lots comprising the site. Mr Fraser is aware of the history of the site over approximately the past 30 years.

The interview revealed the following information:

- The site has been used for rural residential purposes over approximately the last 60 years, though the southern half of the site was only developed for residential purposes over approximately the last 30 years.
- The bitumen racing track was designed in the 1980's, and has been used by small vehicles (such as go-carts).
- The fill mounds around the track and the stockpiles of soil around the site originated from other areas on the site.

3.5 Section 149 Planning Certificates

The Section 149 Planning Certificate for Lot 12 DP 1063902 was obtained from Port Stephens Council. A copy of this certificate is provided in Appendix E. Information provided in the certificate is presented below:

- The lot is zoned as 1 (c1) and 1 (c2) – Small Rural Holdings;
- The lot does not include a critical habitat and is not located within a conservation area;
- The lot is not located within a proclaimed mine subsidence district;
- The lot is located in an “environmentally sensitive area” due to its proximity to a SEPP 14 Wetland indicating that Complying Development under the General Housing, Housing Internal Alterations and General commercial and Industrial Codes may not be carried out on the lot;
- The lot is located on an area that may be wholly or partially flood prone land;
- The lot is listed as bushfire prone land; and
- The lot is not affected by a site contamination notice outlined in Section 59 (2) of the Contaminated Land Management Act (1997).

3.6 NSW WorkCover Dangerous Goods Records

A search of the NSW WorkCover database for licenses to store dangerous goods at the site was carried out as part of the site history review. A copy of the search results is provided in Appendix F.

The search indicated that no records were available in the NSW WorkCover database relating to licensed dangerous goods being located on the site.

3.7 NSW DECCW Notices

A search of the NSW DECCW database revealed that one property in the Port Stephens Local Government Area is registered as having a current notice. The property is located at Tomago and relates to a request for an investigation and remediation plan for soil and groundwater contamination at the property.

Coffey considers that the property is not located within close proximity to the site, and therefore the probability of contaminated soil and / or groundwater originating from the property impacting the site is considered to be very low.

A copy of the database search is provided in Appendix G.

3.8 Summary of Site History

The information obtained from the site history review is summarised below:

- The site has historically been owned / occupied by private landholders, including farmers and business managers;
- Prior to the 1950's, the northern half of the site appears to have been used for agricultural purposes (crop growing). The northern half of the site also appears to have been used for agricultural activities in the 1990's;
- The northern half of the site has primarily been cleared since the 1950's, with residential buildings being developed on the site over the past 50 to 60 years;
- The southern half of the site appears to have been partially cleared in the 1970's, and extensively cleared in the 1990's;
- Residential buildings were developed on the southern half of the site over the last 10 to 20 years;
- Surrounding land uses have consisted of increasing residential areas to the north and west over the last 50 to 60 years. Areas to the east and south of the site were largely undeveloped until approximately 10 to 15 years ago, with the development of new roads to the south and new residential areas and a golf course to the east; and
- The current site features (including the racing track) were developed over the past 30 years.

3.9 Gaps in the Site History

The gaps in the site history identified in the review are as follows:

- The land use prior to the 1950's is not known, though assumed to have consisted of either undeveloped land, rural-residential land uses and / or agricultural purposes;

- It is unknown if fill was imported onto the southern half of the site during the extensive clearing and development of the southern half in the 1990's; and
- The operation of the wastewater treatment system on the northern boundary of the site is not known.

4 POTENTIAL AREAS AND CHEMICALS OF ENVIRONMENTAL CONCERN

Based on the site history review and the site walkover, the potential AECs and COCs identified for the site are presented below in Table 4 (below).

TABLE 4 – POTENTIAL AECS AND COCS

AEC	POTENTIALLY CONTAMINATING ACTIVITY	POTENTIAL COCS	LIKELIHOOD OF CONTAMINATION*	COMMENT
1 (Fill mounds around racing track and on gravel driveway)	Fill of unknown origin used to construct fill mounds and driveway	Heavy metals, TPH, BTEX, PAH, OCP, PCB, Asbestos	Low-medium	Two fill mounds are located around the racing track. The site history review indicated that the fill mounds were constructed from soils excavated elsewhere on the site.
2 (Buildings currently on site)	Hazardous materials (e.g. asbestos, lead in paint) used to construct buildings	Asbestos, lead in paint	Low	Hazardous building materials were not observed during the site walkover.
3 (Septic Tanks)	Treatment of sewerage	pH, fluoride, cyanide, E.coli, Faecal coliforms and salmonella	Low-medium	The tanks were observed to be partially buried. The visible parts of the tanks were observed to be in good condition.
4 (Medowie Wastewater Pumping Station along the northern site boundary)	Pumping of wastewater near the site	Heavy metals, TPH, BTEX, OCP, PCB, pH, fluoride,	Low	The pumping station was observed to be partially buried with a concrete-lined surface and an aboveground generator / control panel.

AEC	POTENTIALLY CONTAMINATING ACTIVITY	POTENTIAL COCS	LIKELIHOOD OF CONTAMINATION*	COMMENT
5 (Electrical substation)	Potential leakages from transformers	PCB	Low	The surface of the substation was observed to be primarily concrete lined though a gravel surface was observed in some areas. The fill was observed to be confined to the areas within the substation fence.
6 (Northern section of site)	Potential historical use of pesticides and herbicides for potential historical agricultural activities	Heavy metals, OCP, OPP	Low-medium	Aerial photography indicates that agricultural activities may have been conducted on the site prior to the 1950's and in the 1990's.
NOTES: <i>* = It is important to note that this is not an assessment of the financial risk associated with the AEC in the event contamination is detected, but a qualitative assessment of the probability of contamination being detected at the potential AEC.</i> <i>Metals - Arsenic, Cadmium, Chromium, Copper, Lead, Mercury, Nickel and Zinc; BTEX - Benzene, Toluene, Ethylbenzene and Xylenes; TPH - Total Petroleum Hydrocarbons; PAH - Polycyclic Aromatic Hydrocarbons; OCP - Organochlorine Pesticides; PCB – Polychlorinated Biphenyls; OPP – Organophosphorous Pesticides</i>				

5 ASSESSMENT CRITERIA

5.1 Soil Investigation Levels

The investigation levels for soil were established based on the following references:

- NSW DEC Guidelines for the NSW Auditor Scheme (Second Edition) (DEC, 2006);
- NSW EPA, Guidelines for Assessing Service Station Sites (NSW EPA, 1994); and
- National Environmental Protection Council (NEPC) National Environmental Protection (Assessment of Site Contamination) Measure (NEPM) (NEPC, 1999).

The NSW DEC (2006) and NEPC (1999) present health-based investigation levels for different land uses (e.g. industrial / commercial, residential, recreational etc.) as well as provisional phytotoxicity based investigation levels.

The proposed land use is likely to be a mixture of residential and open space areas. Therefore, the following investigation levels have been adopted:

- The human health guidelines for residential land use with accessible soils (Column 1 of Appendix II in the NSW DEC 2006 Guidelines); and
- The provisional phytotoxicity guidelines (Column 5 of Appendix II in the NSW DEC 2006 Guidelines).

The NSW DEC (2006) Guidelines do not provide investigation levels for volatile petroleum hydrocarbon compounds. The NSW EPA (1994) Guidelines for Assessing Service Station Sites provide an indication of acceptable threshold levels for cleanup of total petroleum hydrocarbon (TPH) compounds at service station sites to be reused for sensitive land uses. For semi-volatile petroleum hydrocarbons (C16-C35 and >C35) investigation levels are provided in the NSW DEC (2006) Guidelines, however, these are based on the NEPC 1999 health-based investigation levels, which require the laboratory analysis to unequivocally differentiate between aromatic and aliphatic compounds. Therefore, the investigation levels provided in the NSW EPA (1994) Guidelines have been adopted in this assessment.

The NSW DEC (2006) Guidelines state that there are currently no national or NSW DEC endorsed guidelines relating to human health or environmental investigation of material containing asbestos on sites. Site Auditors must exercise their judgement when assessing if a site is suitable for a specific use in light of evidence that asbestos may be a chemical of concern. Enhealth (2005) *Guidelines for Asbestos in the Non-Occupational Environment* provides some guidance on assessing and managing asbestos in soil although does not provide a threshold concentration or investigation level for asbestos. For this site, Coffey has adopted conservative criteria for asbestos (both fibrous and cemented fragments) of 'no detectable asbestos present in surface soils'.

The relevant soil investigation levels are summarised in Table LR1.

6 FIELD AND LABORATORY PROGRAMME

6.1 Sampling Plan

The total area of the site is approximately 18 hectares. The NSW EPA (1995) Sampling Design Guidelines recommends that for areas greater than five hectares in total, these should be sub-divided into smaller areas with each sub-divided area sampled individually, subject to site history and the location of AECs. Using this method, a total of 205 sampling locations would be required to characterise this site.

For the purposes of this preliminary assessment, the site sampling and analysis plan was designed to target the fill on the site, as well as to compliment the geotechnical assessment. Seven test pits were excavated, at the locations shown on Figure 2. The test pits were positioned at the following locations:

- TP1 at the northern end of the site;
- TP2 in the swamp / marsh area to the west of the northern half of the site (discussions with HDB after fieldwork indicated that this area was not part of the site);
- TP3 in the northern fill mound around the racing track;
- TP4 near the shed of the northern residence;
- TP5 near the gravel track leading from Medowie Road to the northern residence;
- TP6 near the electrical transformer yard near the middle of the site; and
- TP7 near the southern residence.

In addition, one sample (Test Location 2) was taken from the south-western fill mound around the racing track.

6.2 Soil Sampling

Fieldwork for the investigation was undertaken on 21 May 2010 by a Coffey Engineering Geologist. Seven test pits (TP1-TP7) were excavated in locations shown on Figure 2.

The test pits were excavated to practical depths, ranging from approximately 0.2m to approximately 2.4m below ground surface (bgs). The test pits were terminated at these depths due to practical excavator refusal or collapsing material resulting in difficulties in keeping the test pits open.

Environmental soil samples were collected when fill was observed in, or adjacent to, the test pits. Soil samples were also collected from the two fill mounds around the racing track. The samples were collected from the centre of the excavator bucket. A clean pair of disposable gloves was used for each discrete sample.

The samples were divided into two subsamples. The first subsamples were placed into 250mL laboratory supplied glass jars for laboratory analysis. The second subsamples were placed into zip-lock plastic bags for headspace screening. Each sample was placed into an ice-chilled esky and remained chilled during transportation to the laboratory.

6.3 Laboratory Analysis

The soil samples taken from areas of fill were analysed for a variety of COCs. The samples were dispatched to the NATA-accredited SGS laboratory in Alexandria, NSW. The samples were dispatched to the laboratory under chain of custody conditions.

The samples were analysed for the following:

- Heavy metals (As, Cd, Cr, Cu, Pb, Hg, Ni, Zn) – three samples;
- Total Petroleum Hydrocarbons (TPH) – three samples;
- Benzene, Toluene, Ethylbenzene and Total Xylenes (BTEX) – three samples;
- Polycyclic Aromatic Hydrocarbons (PAH) – three samples;
- Organochlorine Pesticides (OCP) – three samples;
- Polychlorinated Biphenyls (PCB) – three samples; and
- Asbestos – three samples.

7 QUALITY ASSURANCE / QUALITY CONTROL RESULTS AND DATA USABILITY

Sampling activities were undertaken in accordance with Coffey's Standard Operating Procedures (SOPs), which are based on industry accepted practice. The assessment of field and laboratory QA / QC procedures is included in a data validation report, which is attached in Appendix H.

In order to assess field quality assurance / quality control (QA / QC) procedures, one duplicate sample (QC1) was collected of primary sample TP3 0.0-0.1 and was dispatched to the laboratory with the primary samples.

Samples were received by SGS within the recommended holding times. Copies of the Chain of Custody documentation are included in Appendix K.

Table LR2 presents the relative percentage differences (RPDs) between the primary sample and the duplicate sample analysed. A review of the analytical results indicates that RPDs were within the acceptable range of 0 to 50%.

The laboratory internal QA / QC reports indicated that appropriate laboratory QA / QC procedures and rates were undertaken, and that:

- Surrogate, matrix spike and laboratory control sample recoveries were within the acceptable range of 70 to 130%; and
- Method blanks were free of contamination and duplicate RPDs were within the acceptable ranges.

Based on the assessment provided in Appendix H it is considered that the field and laboratory methods for soil are appropriate and that the data obtained is usable and considered to reasonably represent the concentrations at the sampling points at the time of sampling.

8 RESULTS OF INVESTIGATION

8.1 Subsurface Conditions

Test pit logs and explanation sheets are provided in Appendix I. The subsurface conditions encountered are summarised below in Tables 5 and 6.

TABLE 5 – SUMMARY OF SUBSURFACE SOIL TYPES

UNIT	SOIL TYPE	DESCRIPTION
1	TOPSOIL	CLAY, low plasticity, dark brown with organics and SAND, fine to medium grained, dark grey with some organics
2	FILL	CLAY, low plasticity, brown with some angular gravel
3	AEOLIAN / ESTUARINE	SAND, fine to medium grained, pale grey to black / brown with indurated coffee rock
4	ALLUVIAL CLAY	CLAY, high plasticity, brown
5	RESIDUAL CLAY	CLAY, low to high plasticity, orange / red mottled with traces of fine to medium grained sand
6	HIGHLY WEATHERED ROCK	CLAY, high plasticity, grey / red / yellow mottled with a trace of fine grained sand

TABLE 6 – SUMMARY OF SOIL UNITS AT EACH LOCATION (DEPTH IN METRES)

LOCATION	UNIT 1 (TOPSOIL)	UNIT 2 (FILL)	UNIT 3 (SHALLOW MARINE)	UNIT 4 (ALLUVIAL CLAY)	UNIT 5 (RESIDUAL CLAY)	UNIT 6 (HIGHLY WEATHERED ROCK)
TP1	0.0-0.2	-	-	0.2-1.8	1.8->2.4	-
TP2	-	0.0-0.2	-	0.2-0.8	0.8-1.4	1.4->2.3
TP3	-	0.0->0.2	-	-	-	-
TP4	0.0-0.1	-	-	-	0.1-1.2	1.2->2.0
TP5	-	-	0.0->1.7	-	-	-
TP6	0.0-0.2	-	0.2->2.1	-	-	-
TP7	-	-	0.0->2.1	-	-	-

Staining was not observed in the test pits. A strong odour was observed in the aeolian / estuarine soil in TP6 from 0.8m depth, though this was considered to be a natural odour, originating from organic content in the soil.

Minor groundwater inflows were recorded in alluvial clays in TP1 at 1.0m bgs and in aeolian / estuarine soils in TP6 at 1.5m bgs. It is inferred that groundwater beneath the site is likely to be present in the aeolian / estuarine soils of the Tomago Sand Beds at depths of approximately 2-3m bgs. Variations in groundwater depth may occur due to factors such as rainfall and climatic conditions. Groundwater beneath the site is anticipated to flow to the east towards Moffats Swamp.

8.2 PID Results

A PID was used to screen the samples for volatile compounds. The results of the screening are included in Appendix J. The results were recorded at 0.0ppm for the samples screened.

8.3 Laboratory Results

Soil analytical results are summarised in Table LR1. The laboratory analytical reports are included in Appendix K.

The laboratory results were compared to the investigation levels described in Section 5.1. The comparison indicated that contaminant concentrations were either below laboratory reporting limits or the adopted investigation levels.

Asbestos was not detected in the samples analysed. Organic fibres were detected in one sample, TP3 0.1-0.2.

9 DISCUSSION

Based on the information that was provided by the site history review and the site walkover, six AECs were identified. For the purposes of this preliminary assessment, six test pits (TP1-TP6) were excavated across the site targeting areas of fill as well as to compliment the geotechnical assessment. Selected soil samples of fill were analysed for a number of COCs, including heavy metals, hydrocarbons, pesticides and asbestos.

The results of the laboratory analysis indicated concentrations of the contaminants tested were either not detected above the laboratory detection limits, or were recorded below the adopted investigation levels. Asbestos was also not detected in the samples analysed.

There were a number of limitations identified during the PCA. These limitations are discussed below:

- A number of gaps were identified in the site history review (including the potential historical agricultural use of parts of the site and the operation of the wastewater treatment plant); and;
- A number of AECs were not investigated in this assessment. The AECs that were not investigated included the wastewater treatment plant, the electrical substation, the septic tanks, previous areas of potential agricultural activity and the buildings currently on the site.

10 CONCLUSION AND RECOMMENDATIONS

Environmental soil samples were taken from areas of fill across the site (the two fill mounds surrounding the racing track and the gravel driveway). The results of the laboratory analysis of the samples indicated that significant contamination is unlikely to be present in these fill areas.

A number of AECs identified at the site were not investigated during the PCA. The AECs not investigated during this assessment included the buildings currently on the site, the septic tanks, the wastewater treatment plant and the electrical substation.

Coffey recommends that a Phase 2 Environmental Site Assessment (ESA) be carried out at the Development Application stage. The following works should be included in the Phase 2 ESA:

- Additional investigations targeting the septic tanks, the electrical transformer, areas of previous agricultural activity and the site boundary adjacent to the wastewater pumping station;
- A hazardous materials survey on the buildings currently on the site if these are to be removed during construction works; and
- If the wastewater treatment plant and / or the electrical transformer yard are to be removed during construction works, additional sampling of the resultant excavations should be carried out.

The fill currently on the site in the mounds around the racing track and the gravel driveway is suitable to remain on site.

Waste classification of material to be disposed offsite may be required during the construction of the buildings on the site. The need for waste classification would be more satisfactorily assessed once the final lot areas and locations and building designs are identified.

11 LIMITATIONS

The findings within this report are the result of discrete/specific sampling practices used in accordance with normal practices and standards. To the best of our knowledge they represent a reasonable interpretation of the general conditions of the site. Under no circumstances, however, can it be considered that these findings represent the actual state of the site at all points.

It is the nature of contaminated site investigations that the degree of variability in site conditions cannot be known completely and no sampling and analysis program can eliminate all uncertainty concerning the condition of the site. Professional judgement must be exercised in the collection and interpretation of the data.

The investigations undertaken were limited by access constraints and are considered to provide an assessment of the likely contamination conditions at the locations sampled.

In preparing this report, current guidelines for assessment and management of contaminated land were followed. This work has been conducted in good faith in accordance with Coffey Environments understanding of the client's brief and general accepted practice for environmental consulting.

This report was prepared for HDB Town Planning and Design Pty Ltd with the objective of assessing the presence of contamination on the site that could potentially impact on the use of the property for mixed residential and commercial use. No warranty, expressed or implied, is made as to the information and professional advice included in this report. The report is not intended for other parties or other uses. Anyone using this document does so at their own risk and should satisfy themselves concerning its applicability and, where necessary, should seek expert advice in relation to the particular situation.

This report does not cover hazardous building materials issues. Information within the report including test pit logs should not be used for geotechnical investigation purposes.

12 REFERENCES

- Advanced Legal Search Pty Ltd (2010)** Historical Titles Search for Lots 411-413 DP 1063902.
- Coffey Environments Australia Pty Ltd (2010)** Proposed Mixed Use Development, Lots 411, 412, 413 DP 1063902 Medowie Road, Medowie, Fee Proposal for Preliminary Contamination Assessment and Geotechnical Assessment, Reference ENVIWARA00340AB-P01 dated 8 March 2010.
- Coffey Geotechnics (2010)** Proposed Mixed Use Rezoning, Medowie, Geotechnical Assessment (Reference ENVIWARA00340AB-AB)
- Department of Land and Property Mapping (2010)** Aerial Photography for Medowie (1954, 1966, 1975, 1983, 1993, 2004)
- Division of National Mapping (1983)** 1:100,000 Newcastle Topographic Map, Edition 1, Map 9232.
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- National Environmental Protection Council (1999)** National Environmental Protection (Assessment of Site Contamination) Measure 1999, Schedule B (1) – Guideline on the Investigation Levels for Soil and Groundwater.
- NSW DEC (2006)** Guidelines for the NSW Site Auditor Scheme. ISBN0-7313 0177 3
- NSW DECCW (2010)** Register of Contaminated Sites: Port Stephens Local Government Area, accessed from <http://www.environment.nsw.gov.au/prclmapp/searchregister.aspx>.
- NSW EPA (1995)** Sampling Design Guidelines. ISBN 0-7310-3756-1.
- NSW EPA (1997)** Guidelines for Consultants Reporting on Contaminated Sites. ISBN 0 7310 3892 4.
- NSW EPA (1994)** Guidelines for Assessing Service Station Sites. ISBN 0-7310-3712-X.
- NSW Office of Water (2010)** Groundwater Bore Search for Medowie, Reference 4293/2010.
- Port Stephens Council (2010)** Section 149 Planning Certificate for Lot 412 DP 1063902.

Important information about your **Coffey** Environmental Report

Uncertainties as to what lies below the ground on potentially contaminated sites can lead to remediation costs blow outs, reduction in the value of the land and to delays in the redevelopment of land. These uncertainties are an inherent part of dealing with land contamination. The following notes have been prepared by Coffey to help you interpret and understand the limitations of your report.

Your report has been written for a specific purpose

Your report has been developed on the basis of a specific purpose as understood by Coffey and applies only to the site or area investigated. For example, the purpose of your report may be:

- To assess the environmental effects of an on-going operation.
- To provide due diligence on behalf of a property vendor.
- To provide due diligence on behalf of a property purchaser.
- To provide information related to redevelopment of the site due to a proposed change in use, for example, industrial use to a residential use.
- To assess the existing baseline environmental, and sometimes geological and hydrological conditions or constraints of a site prior to an activity which may alter the sites environmental, geological or hydrological condition.

For each purpose, a specific approach to the assessment of potential soil and groundwater contamination is required. In most cases, a key objective is to identify, and if possible, quantify risks that both recognised and unrecognised contamination pose to the proposed activity. Such risks may be both financial (for example, clean up costs or limitations to the site use) and physical (for example, potential health risks to users of the site or the general public).

Scope of Investigations

The work was conducted, and the report has been prepared, in response to specific instructions from the client to whom this report is addressed, within practical time and budgetary constraints, and in reliance on certain data and information made available to Coffey. The analyses, evaluations, opinions and conclusions presented in this report are based on those instructions, requirements, data or information, and they could change if such instructions etc. are in fact inaccurate or incomplete.

Subsurface conditions can change

Subsurface conditions are created by natural processes and the activity of man and may change with time. For example, groundwater levels can vary with time, fill may be placed on a site and pollutants may migrate with time. Because a report is based on conditions which existed at the time of the subsurface exploration, decisions should not be based on a report whose adequacy may have been affected by time. Consult Coffey to be advised how time may have impacted on the project and/or on the property.

Interpretation of factual data

Environmental site assessments identify actual subsurface conditions only at those points where samples are taken and when they are taken. Data derived from indirect field measurements and sometimes other reports on the site are interpreted by geologists, engineers or scientists to provide an opinion about overall site conditions, their likely impact with respect to the report purpose and recommended actions. Actual conditions may differ from those inferred to exist, because no professional, no matter how well qualified, can reveal what is hidden by earth, rock and time. The actual interface between materials may be far more gradual or abrupt than assumed based on the facts obtained. Nothing can be done to change the actual site conditions which exist, but steps can be taken to reduce the impact of unexpected conditions. For this reason, parties involved with land acquisition, management and/or redevelopment should retain the services of Coffey through the development and use of the site to identify variances, conduct additional tests if required, and recommend solutions to unexpected conditions or other problems encountered on site.

Important information about your **Coffey** Environmental Report

Your report will only give preliminary recommendations

Your report is based on the assumption that the site conditions as revealed through selective point sampling are indicative of actual conditions throughout an area. This assumption cannot be substantiated until project implementation has commenced and therefore your report recommendations can only be regarded as preliminary. Only Coffey, who prepared the report, is fully familiar with the background information needed to assess whether or not the report's recommendations are valid and whether or not changes should be considered with redevelopment or on-going use of the site. If another party undertakes the implementation of the recommendations of this report there is a risk that the report will be misinterpreted and Coffey cannot be held responsible for such misinterpretation.

Your report is prepared for specific purposes and persons

To avoid misuse of the information contained in your report it is recommended that you confer with Coffey before passing your report on to another party who may not be familiar with the background and the purpose of the report. In particular, a due diligence report for a property vendor may not be suitable for satisfying the needs of a purchaser. Your report should not be applied for any purpose other than that originally specified at the time the report was issued.

Interpretation by other professionals

Costly problems can occur when other professionals develop their plans based on misinterpretations of a report. To help avoid misinterpretations, retain Coffey to work with other professionals who are affected by the report. Have Coffey explain the report implications to professionals affected by them and then review plans and specifications produced to see how they have incorporated the report findings.

Data should not be separated from the report

The report as a whole presents the findings of the site assessment and the report should not be copied in part or altered in any way. Logs, figures, laboratory data, drawings, etc. are customarily included in our reports and are developed by scientists, engineers or geologists based on their interpretation of field logs (assembled by field personnel), field testing and laboratory evaluation of field samples. This information should not under any circumstances be redrawn for inclusion in other documents or separated from the report in any way.

Contact Coffey for additional assistance

Coffey is familiar with a variety of techniques and approaches that can be used to help reduce risks for all parties to land development and land use. It is common that not all approaches will be necessarily dealt with in your environmental site assessment report due to concepts proposed at that time. As a project progresses through planning and design toward construction and/or maintenance, speak with Coffey to develop alternative approaches to problems that may be of genuine benefit both in time and cost.

Responsibility

Environmental reporting relies on interpretation of factual information based on judgement and opinion and has a level of uncertainty attached to it, which is far less exact than other design disciplines. This has often resulted in claims being lodged against consultants, which are unfounded. To help prevent this problem, a number of clauses have been developed for use in contracts, reports and other documents. Responsibility clauses do not transfer appropriate liabilities from Coffey to other parties but are included to identify where Coffey's responsibilities begin and end. Their use is intended to help all parties involved to recognise their individual responsibilities. Read all documents from Coffey closely and do not hesitate to ask any questions you may have.

Tables

**Preliminary Contamination Assessment
Meadowie Road, Meadowie NSW**

Table LR1 - Summary of Soil Laboratory Results

All results in mg/kg

Sample ID	HUMAN HEALTH INVESTIGATION LEVELS	PHYTOTOXICITY INVESTIGATION LEVELS	LABORATORY DETECTION LIMIT	TP3	TP5	Test Location 2
Depth (m)				0.0-0.1	0.0-0.1	0.0-0.1
Date of Sampling				21/5/2010	21/5/2010	21/5/2010
Metals						
Arsenic	100 ¹	20 3	3	<3	<3	<3
Cadmium	20 ¹	3 3	0.3	<0.3	<0.3	<0.3
Chromium	100 ¹	400 3	0.3	23	0.8	45
Copper	1000 ¹	100 3	0.5	2.6	0.7	2
Lead	300 ¹	600 3	1	9.5	9.7	6
Nickel	600 ¹	60 3	0.5	3.9	<0.5	1.6
Zinc	7000 ¹	200 3	0.5	11	26	13
Mercury	15 ¹	1 3	0.05	<0.05	<0.05	<0.05
Total Petroleum Hydrocarbons						
C6 - C9 Fraction	65 ²		20	<20	<20	<20
C10 - C14 Fraction			20	<20	<20	<20
C15 - C28 Fraction			50	<50	<50	<50
C29 - C36 Fraction			50	<50	<50	<50
Total C10-C36	1000 ²			<20	<20	<20
BTEX						
Benzene	1 ²		0.1	<0.1	<0.1	<0.1
Toluene	1.4 ²		0.1	<0.1	<0.1	<0.1
Ethylbenzene	3.1 ²		0.1	<0.1	<0.1	<0.1
Total Xylene	14 ²		0.3	<0.3	<0.3	<0.3
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene	1 ¹		0.05	<0.05	<0.05	0.05
Total PAHs	20 ¹		1.7	<1.7	<1.7	1.76
Organochlorine Pesticides						
Aldrin & dieldrin	10 ¹		0.1	<0.1	<0.1	<0.1
DDT+DDE+DDD	200 ¹		0.1	<0.1	<0.1	<0.1
Heptachlor	10 ¹		0.1	<0.1	<0.1	<0.1
Chlordane	50 ¹		0.1	<0.1	<0.1	<0.1
Polychlorinated Biphenyls						
Total PCBs	10 ¹		0.9	<0.9	<0.9	<0.9
Asbestos	Not detected		detection	Not detected	Not detected	Not detected

Notes:

Result
Result

Concentration exceeds adopted human health investigation levels

Concentration exceeds adopted phytotoxicity investigation levels

¹ NSW DEC (2006) Guidelines for the NSW Site Auditor Scheme (2nd Edition) - Appendix II, Column 1 (residential with accessible soils)

² Based on NSW EPA (1994) Guidelines for Assessing Service Station Sites

³ NSW DEC (2006) Guidelines for the NSW Site Auditor Scheme (2nd Edition) - Appendix II, Column 5 (provisional phytotoxicity levels)

Table LR2 - Summary of Duplicate Sample Results

All results in mg/kg

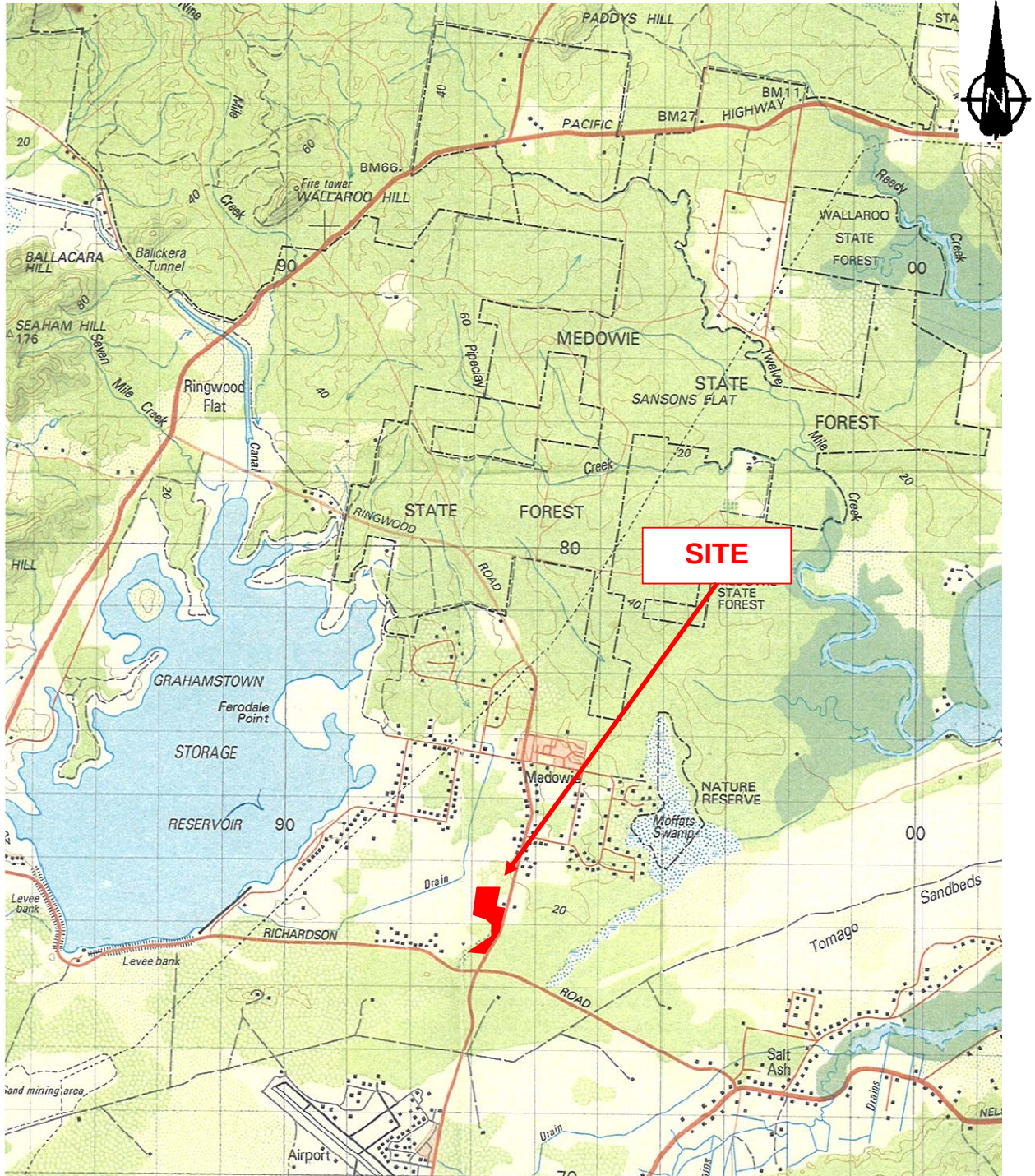
Sample ID	TP3	QC1	RPD%
Depth (m)	0.0-0.1		
Date of Sampling	21/5/2010	21/5/2010	
Laboratory	SGS	SGS	
Metals			
Arsenic	<3	<3	NC
Cadmium	<0.3	<0.3	NC
Chromium	23	26	12%
Copper	2.6	2.8	7%
Lead	9.5	9.3	2%
Nickel	3.9	4.7	19%
Zinc	11	14	24%
Mercury	<0.05	<0.05	NC
Total Petroleum Hydrocarbons			
C6 - C9 Fraction	<20	<20	NC
C10 - C14 Fraction	<20	<20	NC
C15 - C28 Fraction	<50	<50	NC
C29 - C36 Fraction	<50	<50	NC
Total C10-C36	<20	<20	NC
BTEX			
Benzene	<0.1	<0.1	NC
Toluene	<0.1	<0.1	NC
Ethylbenzene	<0.1	<0.1	NC
Total Xylene	<0.3	<0.3	NC
Polycyclic Aromatic Hydrocarbons			
Benzo(a)pyrene	<0.05	<0.05	NC
Total PAHs	<1.7	<1.7	NC
Organochlorine Pesticides			
Aldrin & dieldrin	<0.1	<0.1	NC
DDT+DDE+DDD	<0.1	<0.1	NC
Heptachlor	<0.1	<0.1	NC
Chlordane	<0.1	<0.1	NC
Polychlorinated Biphenyls			
Total PCBs	<0.9	<0.9	NC

Notes:

RPD	RPD exceeds control limit of 50%
	NC RPD not calculated either the primary or duplicate samples (or both) did not produce results

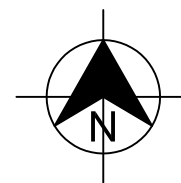
Figures

**Preliminary Contamination Assessment
Meadowie Road, Meadowie NSW**



Source: Division of National Mapping (1983) 1:100,000
Newcastle Topographic Map, Edition 1, Map 9232

drawn	DCH	 SPECIALISTS IN ENVIRONMENTAL, SOCIAL AND SAFETY PERFORMANCE	client:	HDB TOWN PLANNING AND DESIGN	
approved			project:	PROPOSED MIXED USE REZONING MEDOWIE ROAD, MEDOWIE NSW PRELIMINARY CONTAMINATION ASSESSMENT	
date	21/05/2010		title:	SITE LOCATION	
scale	1:100,000		project no:	ENVIWARA00340AB	figure no: FIGURE 1
original size	A4				



1: 4000 0 40 80 120 160 200m

drawn	NLS
approved	DCH
date	31-05-10
scale	1:4000
original size	A3



client:	HDB TOWN PLANNING AND DESIGN	
project:	PROPOSED MIXED USE REZONING MEDOWIE ROAD, MEDOWIE, NSW PRELIMINARY CONTAMINATION ASSESSMENT	
title:	SITE FEATURES PLAN	
project no:	ENVIWARA00340AB	figure no: FIGURE 2

Appendix A

Groundwater Bore Search

**Preliminary Contamination Assessment
Medowie Road, Medowie NSW**

IMPORTANT INFORMATION ABOUT YOUR DATABASE EXTRACT

REASONS FOR OBTAINING A DATABASE EXTRACT

A database extract may be requested to provide basic groundwater information around a site of interest. Such a request is usually forwarded by environmental consultants wishing to carry out site assessments for a property. Licenced water bore drillers may also request the information to provide the basis for quoting on installing a bore.

COMPOSITION OF A DATABASE EXTRACT

A database extract is a compilation of **Work Summary Reports** for individual groundwater works located within the area of interest specified in the request. A groundwater work may be any one of a number of installations including bores, wells, excavations, spearpoints or infiltration galleries.

LIMITATIONS OF WORK SUMMARY DATA

The Work Summary Reports are tabulations of data mostly provided by licenced water bore drillers on a completion report known as a **Form 'A'**. The Form 'A' reports are hand written and may be incomplete or contain vague descriptions of aspects of the completed work. In any given area of interest, there may be several groundwater works, however, there may be little data recorded for each installation. In addition, as different individual works may have been constructed by different drillers, any data provided may vary in accuracy and content.

All work summaries include a caution relating to the limitations inherent in the data provided: *"Warning To Clients: This raw data has been supplied to the Department by drillers, licensees and other sources. The Department does not verify the accuracy of this data. This data is presented for use by you at your own risk. You should consider verifying this data before relying on it. Professional hydrogeological advice should be sought in interpreting and using this data."*

DATA IN INDIVIDUAL WORK SUMMARY REPORTS REFERS TO A UNIQUE SITUATION

Every aspect of a work summary report is specific to the location and time of completion, and does not take into account variations in hydrogeological regimes either spatially or temporally. Works identified around a site of interest may have completion dates ranging over a period of years, often over a period of decades. Any measurements associated with the works may also be subject to changes that might have occurred in the period between the completion of one work and the installation of another nearby. Works located at long distances from the site of interest may have little relevance to local conditions.

A DATABASE EXTRACT IS NOT A SUBSTITUTE FOR SITE-SPECIFIC ASSESSMENTS

Whilst professional hydrogeological judgement may be applied to provide a general understanding of groundwater conditions based on the information included in a database extract, the work summaries should not be relied on to answer all of the questions relating to a given site. Even in largely homogeneous ground, variations in geology can occur which may affect groundwater conditions and can only be identified on a site-specific basis.



IMPORTANT INFORMATION ABOUT YOUR DATABASE EXTRACT

ELEMENTS OF A WORK SUMMARY REPORT

Date/Time :20-Aug-2003 01:10 PM
User :GUEST
Report :RMGW001D.QRP
Executable :S:\NSP\PROD32\Ground.exe
Exe Date :29-Nov-2002
System :Groundwater
Database :dlwep

DEPARTMENT OF INFRASTRUCTURE, PLANNING AND NATURAL RESOURCES
Work Summary

GW075004

License :
Work Type :Bore
Work Status :Unknown
Construct. Method :Rotary
Owner Type :
Commenced Date :
Completion Date :07-Jul-1997
Contractor Name :J.H. ISELT
Driller :1435
Property :
GWMA :
GW Zone :
Final Depth : 60.00 m
Drilled Depth : 60.00 m
Standing Water Level :
Salinity :
Yield : 0.20 L/s
Intended Purpose(s) : MONITORING BORE

Site Details

Site Chosen By : Hydrogeologist
County : CUMBERLAND
Form A sCUMBERLAND
Licensed :
Region :10 - SYDNEY SOUTH COAST
River Basin :212 - HAWKESBURY RIVER
Area / District :
Elevation :
Elevation Source :
GS Map : AMG Zone 56
Coordinate Source :Map Interpretation
Parish : MAROOTA
Portion/Lot DP : LT2 DP228308
CMA Map :5031-25
Grid Zone :56N
Lower PORTLAND
Scale :1:25,000
Northing :2295140
Easting :213737.5
Latitude (S) :33° 28' 1"
Longitude (E) :150° 59' 43"

Construction

N	Y	Component	Type	From (m)	To (m)	OB (m)	ID (m)	Interval	Details
1		Hole	Hole	0.00	24.00	200			Rotary
1		Hole	Hole	24.00	60.00	160			Rotary
1		Backfill	Backfill	3.00	20.00				
1		Casing	P.V.C.	-0.75	60.00	90	80		C:-3-In. Screwed and Threaded, Sealed on Bottom; Cup (Unknown), PVC Class 12, A: 2mm (Unknown)
1		Operating Screen	Screen	24.00	27.00	90			Graded; GS: 5-10mm
1		Annulus	Waterworn/Rounded	30.00	60.00				

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	SWL (m)	B.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
53.00	54.00	1.00	Consolidated	44.80	60.00	0.20	60.00	1.00	Fresh

Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	0.40	0.40	Topsoil	Topsoil	
0.40	7.50	7.10	Sand Coarse	Sand	
7.50	9.00	1.50	Clay Red/White	Clay	
9.00	15.50	6.50	Gravel Fine	Gravel	
15.50	19.70	4.20	Clay Red	Clay	
19.70	24.70	5.00	Gravel Fine	Gravel	
24.70	28.00	3.30	Sand Coarse	Sand	
28.00	31.50	3.50	Sandstone White	Sandstone	
31.50	37.30	5.80	Ironstone	Ironstone	
37.30	39.50	2.20	Clay Red/White	Clay	
39.50	53.00	13.50	Sandstone Yellow	Sandstone	
53.00	54.00	1.00	Sandstone Yellow DB	Sandstone	
54.00	60.00	6.00	Sandstone Yellow	Sandstone	

Pumping Tests - Summaries

Pumping Test Type	Date	Duration (hr)	SWL (m)	B.D.L. (m)	Yield (L/s)	Inside Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By
Single-Rate Pumping Test	07-Jul-1997	1.00	44.80	60.00	0.20		Airlift	Probe	Container of known vol.	J.H. Iselt

Pumping Tests - Readings

Pumping Test Type	Date	Time (mins)	SWL (m)	B.D.L. (m)	Yield (L/s)	Inside Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By
(No Pumping Test Reading Details Found)										

Chemical Treatment

Treatment	Method	Duration	Success
(No Chemical Treatment Details Found)			

Development

Method	Time Taken	Other Development Method
Air	1.00	

Remarks

Form A Remarks:
Rem: Gravel pack from 30m to 60m, Boreto plug from 20m to 28m, Backfill from 38m to 3m, Boreto Plug from 3m to 1m
*** End of GW075004 ***
*** End of Report ***

Warning To Clients: This raw data has been supplied to the Department by drillers, licensees and other sources. The Department does not verify the accuracy of this data. The data is presented for use by you at your own risk. You should consider verifying this data before relying on it. Professional hydrogeological advice should be sought in interpreting and using this data.

A Report header indicating date and time of printing (only appears on the first page of the extract).

B Registered Groundwater Work No. and Licence No.

C The type of work, method of construction and date of construction.

D Proposed (intended) use of the work and licensed (authorised) use of the work.

E Depth drilled (drilled depth) and depth completed (final depth).

F Measurements of water level, yield and salinity at completion (may represent groundwater from several water bearing zones).

G Details of where the work was located.

H Construction information of completed work relating to hole, casing components and screen.

I Details of individual water bearing zones in the rock or strata that was drilled.

J Driller's description of the rock or strata that was drilled.

K Summary and details of any pumping tests carried out.

L Details of any chemical treatment or disinfection of the completed work.

M Description of the method used to clean or develop the completed work.

N General comments relating any other information about the work.

O Warning on data limitations

IMPORTANT INFORMATION ABOUT YOUR DATABASE EXTRACT

FREQUENTLY ASKED QUESTIONS

Will the data indicate where the water table is located?

No. In order to accurately determine the water table depth for a site, monitoring bores must be drilled and constructed on the property to allow access to the groundwater. Even if the data relates to a bore known to exist at the site of interest, the depth to water is not static, and is likely to vary somewhat from the value recorded at the time of construction.

Will the data indicate groundwater flow directions?

No. In order to gain an impression of the direction of groundwater flow, the levels across the site must be triangulated. That is, a minimum of three monitoring locations must be installed, surveyed to a common datum and measurements of water level recorded in each bore at the same time. Even then, the differences may be so slight as to prevent an accurate assessment.

Why are the final depth and the drilled depth not the same?

The final depth refers to the depth of construction of the work. The drilled depth refers to the depth actually reached during drilling. In some cases, a hole may be completed by inserting casing to a level well above that reached by drilling. This is done to exclude ground below the identified water bearing zones. If the drilled depth greatly exceeds the final depth, it is likely that the hole was continued for little benefit. If the final depth is greater than the drilled depth, there has probably been a data entry error.

What are Water Bearing Zones?

Water bearing zones are the layers or fractured intervals where water flows into the hole during drilling. The depth, yield and salinity recorded for each water bearing zone indicate the groundwater available for extraction. Depths from and to indicate the level at which the water bearing zone started and finished. The yield (in litres per second or L/s) is a rough estimate of how quickly groundwater flowed into the hole. The salinity measurement or description is a relative estimate of the groundwater quality.

Why are there different salinity or yield measurements in the summary at the top of the sheet compared with those indicated in the water bearing zones?

The measurements provided at the top of the sheet usually relate to those recorded once the work was completed. Measurements for individual water bearing zones usually relate to those taken when each zone is intersected. In some cases the summary measurements may be noted as an average of the measured yield or salinity for individual zones, or as a total of these.

IMPORTANT INFORMATION ABOUT YOUR DATABASE EXTRACT

FREQUENTLY ASKED QUESTIONS

Is there a fee for the data?

No. The data itself does not attract a charge, however an administrative fee is levied to cover the costs of extracting the information. The current cost for an extract is indicated on the documents accompanying the request form.

DISCLAIMER STATEMENT

The attached map has been compiled from various sources and the publisher and/or contributors accept no responsibility for any injury, loss or damage arising from its use, or errors, or omissions therein. While care is taken to ensure a high degree of accuracy, users are invited to notify the Water Monitoring Department of Water &* Energy of any map discrepancies.

Date/Time :14-May-2010 1:18 PM
 User :PCLARKE
 Report :RMGW001D.QRP
 Executable :S:\G5\PROD32\Ground.exe
 Exe Date :21-Apr-2010
 System :Groundwater
 Database :Edbp



NSW OFFICE OF WATER Work Summary

GW013359

Converted From HYDSYS

Licence :20BL005515	Licence Status Active	Intended Purpose(s)
Work Type :Bore	Authorised Purpose(s)	GENERAL USE
Work Status :(Unknown)	DOMESTIC	
Construct. Method :Cable Tool	FARMING	
Owner Type :Private	STOCK	
Commenced Date :	Final Depth :	49.40 m
Completion Date :01-Oct-1956	Drilled Depth :	49.40 m
Contractor Name :		
Driller :		
Assistant Driller's Name :		
Property : - N/A	Standing Water Level :	
GWMA : -	Salinity :	1001-3000 ppm
GW Zone : -	Yield :	

Site Details

Site Chosen By	County	Parish	Portion/Lot DP
	Form A :GLOUCESTER	STOWELL	144
	Licensed :GLOUCESTER	STOWELL	PT 144
Region :20 - HUNTER		CMA Map :9232-2N	WILLIAMTOWN
River Basin :210 - HUNTER RIVER		Grid Zone :56/1	Scale :1:25,000
Area / District :			
Elevation :		Northing :6375021	Latitude (S) :32° 45' 27"
Elevation Source :(Unknown)		Easting :394074	Longitude (E) :151° 52' 9"
GS Map :0053D4	MGA Zone :56	Coordinate Source :GD,,ACC.MAP	

Construction Negative depths indicate Above Ground Level;

H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity;PL-Placement of Gravel Pack;PC-Pressure

Item	Quantity	Unit	Material	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details
1	1	Casing	Threaded Steel	-0.60	48.20	152			Suspended in Clamps

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
48.80	49.40	0.60	Unconsolidated	34.10		0.38			1001-3000 ppm

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
0.00	12.19	12.19	Clay Grey	Clay	
12.19	12.50	0.31	Ironstone	Ironstone	
12.50	39.62	27.12	Clay Grey	Clay	
39.62	49.38	9.76	Clay Red Water Supply	Clay	

Remarks

*** End of GW013359 ***

NSW OFFICE OF WATER

Work Summary

GW053267

Converted From HYDSYS

Licence :20BL119293		Licence Status Cancelled	Intended Purpose(s) IRRIGATION
Work Type :Spear		Authorised Purpose(s) DOMESTIC	
Work Status :(Unknown)		IRRIGATION	
Construct. Method :Auger		STOCK	
Owner Type :Private			
Commenced Date :	Final Depth :	11.30 m	
Completion Date :01-Apr-1981	Drilled Depth :	11.30 m	
Contractor Name :K.F. & B.L. GIGGINS PTY LTD			
Driller :720 GIGGINS, Kenneth Frank			
Assistant Driller's Name :			
Property : - N/A		Standing Water Level :	3.60 m
GWMA : -		Salinity :	(Unknown)
GW Zone : -		Yield :	

Site Details

Site Chosen By	County	Parish	Portion/Lot DP
	Form A :GLOUCESTER	STOWELL	148
	Licensed :GLOUCESTER	STOWELL	148
Region :20 - HUNTER		CMA Map :9232-2N	WILLIAMTOWN
River Basin :210 - HUNTER RIVER		Grid Zone :56/1	Scale :1:25,000
Area / District :			
Elevation :		Northing :6373988	Latitude (S) :32° 46' 0"
Elevation Source :(Unknown)		Easting :392523	Longitude (E) :151° 51' 9"
GS Map :0053D4	MGA Zone :56	Coordinate Source :GD.,ACC.MAP	

Construction

Negative depths indicate Above Ground Level;

H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity;PL-Placement of Gravel Pack;PC-Pressure

Order	Component	Type	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details
1	1	Opening Screen	9.50	11.30	90		1	Stainless Steel; SL: 0mm; A: .3mm
1	1	Annulus Waterworm/Rounded	8.00	11.30	0			Graded; GS: 1.59-4.76mm

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
6.00	11.30	5.30	Unconsolidated	3.60		6.32			(Unknown)

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
0.00	2.00	2.00	Topsoil	Topsoil	
2.00	6.00	4.00	Sand Indurated	Sand	
6.00	11.30	5.30	Sand Water Supply	Sand	

Remarks

*** End of GW053267 ***

GW079469

Site Details

Construction

H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity;PL-Placement of Gravel Pack;PC-Pressure Cemented;CS-Cement Slurry;C-Compaction;C-Compaction									
Item	Comp. Pump	Type	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details	

Water Bearing Zones

(No Water Bearing Zone Details Found)

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
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Remarks

*** End of GW079469 ***

GW079472

Site Details

Construction

H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity;PL-Placement of Gravel Pack;PC-Pressure Cemented;CS-Cement Slurry;C-Compaction;C-Compaction									
Well ID	Well Name	Well Type	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details	

(No Construction Details Found)

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
(No Water Bearing Zone Details Found)									

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
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Form A Remarks:
HUNTER WATER CORPORATION
TOMAGO
BORE: PS12(1) Reviewed data - nothing to update.

*** End of GW079472 ***

GW079473

Site Details

Construction

H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity;PL-Placement of Gravel Pack;PC-Pressure Cemented;CS-Cement Slurry;C-Compaction;C-Centralisers									
Well	Comp. Pump	Type	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details	

Water Bearing Zones

Drillers Log

Remarks

*** End of GW079473 ***

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GW079503

Site Details

Construction

Cemented Compump, CE	Centralisers	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details
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Water Bearing Zones

(No Water Bearing Zone Details Found)

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
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Remarks

*** End of GW079503 ***

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NSW OFFICE OF WATER

Work Summary

GW079524

Licence :	Licence Status	Intended Purpose(s)
Work Type : Bore	Authorised Purpose(s)	
Work Status : (Unknown)		
Construct. Method : (Unknown)		
Owner Type : (Unknown)		
Commenced Date :	Final Depth :	
Completion Date :	Drilled Depth :	
Contractor Name :		
Driller :		
Assistant Driller's Name :		
Property :	Standing Water Level :	
GWMA : -	Salinity :	
GW Zone : -	Yield :	

Site Details

Site Chosen By	County	Parish	Portion/Lot DP
	Form A : Licensed :		
Region : 20 - HUNTER		CMA Map :	
River Basin :		Grid Zone :	Scale :
Area / District :			
Elevation :		Northing : 6372963	Latitude (S) : 32° 46' 33"
Elevation Source :		Easting : 391613	Longitude (E) : 151° 50' 34"
GS Map :	MGA Zone : 56	Coordinate Source :	

Construction

Negative depths indicate Above Ground Level;

H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity;PL-Placement of Gravel Pack;PC-Pressure
 Cemented Compartment Centralisers From (m) To (m) OD (mm) ID (mm) Interval Details

(No Construction Details Found)

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
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(No Water Bearing Zone Details Found)

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
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Remarks

Form A Remarks:
 HUNTER WATER CORPORATION
 TOMAGO
 BORE: SK3481 Reviewed data - nothing to update.

*** End of GW079524 ***

GW079525

Site Details

Construction

H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity;PL-Placement of Gravel Pack;PC-Pressure Cemented;CS-Compump;CE-Centralisers									
Well	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details			

Water Bearing Zones

(No Water Bearing Zone Details Found)

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
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Remarks

*** End of GW079525 ***

8

GW079526

Site Details

Construction

H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity;PL-Placement of Gravel Pack;PC-Pressure Cemented;CS-Cement Slurry;C-Compaction;C-Centralisers									
Well	Comp. Pump	Type	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details	

(No Construction Details Found)

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
(No Water Bearing Zone Details Found)									

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
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Form A Remarks:
HUNTER WATER CORPORATION
TOMAGO
BORE: SK3483 Reviewed data - nothing to update.

*** End of GW079526 ***

GW079527

Site Details

Construction

H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity;PL-Placement of Gravel Pack;PC-Pressure Cemented;CS-Compump;CE-Centralisers									
Well	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details			

(No Construction Details Found)

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
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(No Water Bearing Zone Details Found)

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
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*** End of GW079527 ***

NSW OFFICE OF WATER

Work Summary

GW079528

Licence :	Licence Status	Intended Purpose(s)
Work Type : Bore	Authorised Purpose(s)	
Work Status : {Unknown}		
Construct. Method : {Unknown}		
Owner Type : {Unknown}		
Commenced Date :	Final Depth :	
Completion Date :	Drilled Depth :	
Contractor Name :		
Driller :		
Assistant Driller's Name :		
Property :	Standing Water Level :	
GWMA : -	Salinity :	
GW Zone : -	Yield :	

Site Details

Site Chosen By	County	Parish	Portion/Lot DP
	Form A : Licensed :		
Region : 20 - HUNTER		CMA Map :	
River Basin :		Grid Zone :	Scale :
Area / District :			
Elevation :		Northing : 6373376	Latitude (S) : 32° 46' 20"
Elevation Source :		Easting : 392247	Longitude (E) : 151° 50' 58"
GS Map :	MGA Zone : 56	Coordinate Source :	

Construction

Negative depths indicate Above Ground Level;

H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity;PL-Placement of Gravel Pack;PC-Pressure
 C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity;PL-Placement of Gravel Pack;PC-Pressure

Interval Details
 (No Construction Details Found)

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
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(No Water Bearing Zone Details Found)

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
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Remarks

Form A Remarks:
 HUNTER WATER CORPORATION
 TOMAGO
 BORE: SK3485 Reviewed data - nothing to update.

*** End of GW079528 ***

GW079535

Site Details

Construction

H-Hole; P-Pipe; OD-Outside Diameter; ID-Inside Diameter; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; Comp-Comp; C-Centralisers									
From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details				

Water Bearing Zones

(No Water Bearing Zone Details Found)

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
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Remarks

*** End of GW079535 ***

NSW OFFICE OF WATER

Work Summary

GW079539

Licence :	Licence Status	Intended Purpose(s)
Work Type : Bore	Authorised Purpose(s)	
Work Status : (Unknown)		
Construct. Method : (Unknown)		
Owner Type : (Unknown)		
Commenced Date :	Final Depth :	
Completion Date :	Drilled Depth :	
Contractor Name :		
Driller :		
Assistant Driller's Name :		
Property :	Standing Water Level :	
GWMA : -	Salinity :	
GW Zone : -	Yield :	

Site Details

Site Chosen By	County	Parish	Portion/Lot DP
	Form A : Licensed :		
Region : 20 - HUNTER		CMA Map :	
River Basin :		Grid Zone :	Scale :
Area / District :			
Elevation :		Northing : 6371971	Latitude (S) : 32° 47' 6"
Elevation Source :		Easting : 393143	Longitude (E) : 151° 51' 32"
GS Map :	MGA Zone : 56	Coordinate Source :	

Construction

Negative depths indicate Above Ground Level;

H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity;PL-Placement of Gravel Pack;PC-Pressure
 Cemented;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity;PL-Placement of Gravel Pack;PC-Pressure

Interval Details
 (No Construction Details Found)

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
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(No Water Bearing Zone Details Found)

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
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Remarks

Form A Remarks:
 HUNTER WATER CORPORATION
 TOMAGO
 BORE: SK3496 Reviewed data - nothing to update.

*** End of GW079539 ***

NSW OFFICE OF WATER

Work Summary

GW079576

Licence :	Licence Status	Intended Purpose(s)
Work Type : Bore	Authorised Purpose(s)	
Work Status : {Unknown}		
Construct. Method : {Unknown}		
Owner Type : {Unknown}		
Commenced Date :	Final Depth :	
Completion Date :	Drilled Depth :	
Contractor Name :		
Driller :		
Assistant Driller's Name :		
Property :	Standing Water Level :	
GWMA : -	Salinity :	
GW Zone : -	Yield :	

Site Details

Site Chosen By	County	Parish	Portion/Lot DP
	Form A : Licensed :		
Region : 20 - HUNTER		CMA Map :	
River Basin :		Grid Zone :	Scale :
Area / District :			
Elevation :		Northing : 6372435	Latitude (S) : 32° 46' 51"
Elevation Source :		Easting : 394567	Longitude (E) : 151° 52' 27"
GS Map :	MGA Zone : 56	Coordinate Source :	

Construction

Negative depths indicate Above Ground Level;

H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity;PL-Placement of Gravel Pack;PC-Pressure
 Cemented Compaction Gravel Centralisers From (m) To (m) OD (mm) ID (mm) Interval Details

(No Construction Details Found)

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
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(No Water Bearing Zone Details Found)

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
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Remarks

Form A Remarks:
 HUNTER WATER CORPORATION
 TOMAGO
 BORE: SK3537 Reviewed data - nothing to update.

*** End of GW079576 ***

GW079597

Site Details

Construction

H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity;PL-Placement of Gravel Pack;PC-Pressure Cemented;CS-Cement Slurry;C-Compaction;C-Centralisers									
Well	Comp. Pump	Type	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details	

Water Bearing Zones

(No Water Bearing Zone Details Found)

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
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Remarks

*** End of GW079597 ***

15

GW079633

Site Details

Construction

H-Hole; P-Pipe; OD-Outside Diameter; ID-Inside Diameter; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; Comp-Comp; C-Centralisers									
From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details				

Water Bearing Zones

Drillers Log

Remarks

*** End of GW079633 ***

16

GW079650

Site Details

Construction

H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity;PL-Placement of Gravel Pack;PC-Pressure Cemented;CS-Cement Slurry;C-Compaction;C-Centralisers									
Well	Comp. Pump	Type	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details	

Water Bearing Zones

(No Water Bearing Zone Details Found)

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
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Remarks

*** End of GW079650 ***

NSW OFFICE OF WATER

Work Summary

GW079651

Licence :	Licence Status	Intended Purpose(s)
Work Type : Bore	Authorised Purpose(s)	
Work Status : (Unknown)		
Construct. Method : (Unknown)		
Owner Type : (Unknown)		
Commenced Date :	Final Depth :	
Completion Date :	Drilled Depth :	
Contractor Name :		
Driller :		
Assistant Driller's Name :		
Property :	Standing Water Level :	
GWMA : -	Salinity :	
GW Zone : -	Yield :	

Site Details

Site Chosen By	County	Parish	Portion/Lot DP
	Form A : Licensed :		
Region : 20 - HUNTER		CMA Map :	
River Basin :		Grid Zone :	Scale :
Area / District :			
Elevation :		Northing : 6372062	Latitude (S) : 32° 47' 3"
Elevation Source :		Easting : 392671	Longitude (E) : 151° 51' 14"
GS Map :	MGA Zone : 56	Coordinate Source :	

Construction

Negative depths indicate Above Ground Level;
H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity;PL-Placement of Gravel Pack;PC-Pressure
Cemented Compartment Centralisers From (m) To (m) OD (mm) ID (mm) Interval Details

(No Construction Details Found)

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
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(No Water Bearing Zone Details Found)

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
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Remarks

Form A Remarks:
HUNTER WATER CORPORATION
TOMAGO
BORE: SK5776 Reviewed data - nothing to update.

*** End of GW079651 ***

GW079652

Licence : Work Type : Bore Work Status : (Unknown) Construct. Method : (Unknown) Owner Type : (Unknown)		Licence Status Authorised Purpose(s)		Intended Purpose(s)	
Commenced Date : Completion Date :		Final Depth : Drilled Depth :			
Contractor Name : Driller : Assistant Driller's Name :					
Property : GWMA : - GW Zone : -		Standing Water Level : Salinity : Yield :			

Site Details

Site Chosen By	County	Parish	Portion/Lot DP
	Form A : Licensed :		
Region :20 - HUNTER		CMA Map :	
River Basin :		Grid Zone :	Scale :
Area / District :			
Elevation :		Northing :6372079	Latitude (S) :32° 47' 2"
Elevation Source :		Easting :392885	Longitude (E) :151° 51' 22"
GS Map :	MGA Zone :56	Coordinate Source :	

Construction

Negative depths indicate Above Ground Level;

H-Hole; P-Pipe; OD-Outside Diameter; ID-Inside Diameter; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; CS-Comp. Centralisers						
Item No.	Comp. Centralisers	From (m)	To (m)	OD (mm)	ID (mm)	Interval Details

(No Construction Details Found)

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
(No Water Bearing Zone Details Found)									

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
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Remarks

Form A Remarks:
HUNTER WATER CORPORATION
TOMAGO
BORE: SK5777 Reviewed data - nothing to update.

*** End of GW079652 ***

GW079653

Site Details

Construction

H-Hole; P-Pipe; OD-Outside Diameter; ID-Inside Diameter; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; CS-Comp. Centralisers						
Item No.	Comp. Centralisers	From (m)	To (m)	OD (mm)	ID (mm)	Interval Details

Water Bearing Zones

(No Water Bearing Zone Details Found)

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
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Remarks

*** End of GW079653 ***

20

GW079685

Site Details

Construction

H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity;PL-Placement of Gravel Pack;PC-Pressure Cemented;CS-Cement Slurry;C-Compaction;C-Centralisers									
Well	Comp. Pump	Type	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details	

(No Construction Details Found)

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
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(No Water Bearing Zone Details Found)

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
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*** End of GW079685 ***

NSW OFFICE OF WATER

Work Summary

GW079687

Licence :	Licence Status	Intended Purpose(s)
Work Type : Bore	Authorised Purpose(s)	
Work Status : {Unknown}		
Construct. Method : {Unknown}		
Owner Type : {Unknown}		
Commenced Date :	Final Depth :	
Completion Date :	Drilled Depth :	
Contractor Name :		
Driller :		
Assistant Driller's Name :		
Property :	Standing Water Level :	
GWMA : -	Salinity :	
GW Zone : -	Yield :	

Site Details

Site Chosen By	County	Parish	Portion/Lot DP
	Form A : Licensed :		
Region : 20 - HUNTER		CMA Map :	
River Basin :		Grid Zone :	Scale :
Area / District :			
Elevation :		Northing : 6372647	Latitude (S) : 32° 46' 44"
Elevation Source :		Easting : 391880	Longitude (E) : 151° 50' 44"
GS Map :	MGA Zone : 56	Coordinate Source :	

Construction

Negative depths indicate Above Ground Level;
H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity;PL-Placement of Gravel Pack;PC-Pressure
Cemented Compartment Centralisers From (m) To (m) OD (mm) ID (mm) Interval Details

(No Construction Details Found)

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
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(No Water Bearing Zone Details Found)

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
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Remarks

Form A Remarks:
HUNTER WATER CORPORATION
TOMAGO
BORE: SK7226 Reviewed data - nothing to update.

*** End of GW079687 ***

NSW OFFICE OF WATER

Work Summary

GW079690

Licence :	Licence Status	Intended Purpose(s)
Work Type : Bore	Authorised Purpose(s)	
Work Status : {Unknown}		
Construct. Method : {Unknown}		
Owner Type : {Unknown}		
Commenced Date :	Final Depth :	
Completion Date :	Drilled Depth :	
Contractor Name :		
Driller :		
Assistant Driller's Name :		
Property :	Standing Water Level :	
GWMA : -	Salinity :	
GW Zone : -	Yield :	

Site Details

Site Chosen By	County	Parish	Portion/Lot DP
	Form A : Licensed :		
Region : 20 - HUNTER		CMA Map :	
River Basin :		Grid Zone :	Scale :
Area / District :			
Elevation :		Northing : 6373166	Latitude (S) : 32° 46' 27"
Elevation Source :		Easting : 392442	Longitude (E) : 151° 51' 6"
GS Map :	MGA Zone : 56	Coordinate Source :	

Construction

Negative depths indicate Above Ground Level;

H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity;PL-Placement of Gravel Pack;PC-Pressure
 Cemented;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity;PL-Placement of Gravel Pack;PC-Pressure

Interval Details
 (No Construction Details Found)

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
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(No Water Bearing Zone Details Found)

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
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Remarks

Form A Remarks:
 HUNTER WATER CORPORATION
 TOMAGO
 BORE: SK7666 Reviewed data - nothing to update.

*** End of GW079690 ***

NSW OFFICE OF WATER

Work Summary

GW079707

Licence :	Licence Status	Intended Purpose(s)
Work Type : Bore	Authorised Purpose(s)	
Work Status : {Unknown}		
Construct. Method : {Unknown}		
Owner Type : {Unknown}		
Commenced Date :	Final Depth :	
Completion Date :	Drilled Depth :	
Contractor Name :		
Driller :		
Assistant Driller's Name :		
Property :	Standing Water Level :	
GWMA : -	Salinity :	
GW Zone : -	Yield :	

Site Details

Site Chosen By	County	Parish	Portion/Lot DP
	Form A : Licensed :		
Region : 20 - HUNTER		CMA Map :	
River Basin :		Grid Zone :	Scale :
Area / District :			
Elevation :		Northing : 6372494	Latitude (S) : 32° 46' 49"
Elevation Source :		Easting : 393734	Longitude (E) : 151° 51' 55"
GS Map :	MGA Zone : 56	Coordinate Source :	

Construction

Negative depths indicate Above Ground Level;
H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity;PL-Placement of Gravel Pack;PC-Pressure
Cemented Compaction Centralisers

From (m)	To (m)	OD (mm)	ID (mm)	Interval Details
(No Construction Details Found)				

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
(No Water Bearing Zone Details Found)									

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
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Remarks

Form A Remarks:
HUNTER WATER CORPORATION
TOMAGO
BORE: SK8332 Reviewed data - nothing to update.

*** End of GW079707 ***

GW079931

Site Details

Construction

H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity;PL-Placement of Gravel Pack;PC-Pressure Cemented;CS-Cement Slurry;C-Compaction;C-Centralisers									
Well	Comp. Pump	Type	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details	

(No Construction Details Found)

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
(No Water Bearing Zone Details Found)									

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
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Form A Remarks:
RZM MONITORING BORE SK 7225 Reviewed data - nothing to update.

*** End of GW079931 ***

GW079932

Licence : Work Type : Bore Work Status : (Unknown) Construct. Method : (Unknown) Owner Type : (Unknown)		Licence Status Authorised Purpose(s)		Intended Purpose(s)	
Commenced Date : Completion Date :		Final Depth : Drilled Depth :			
Contractor Name : Driller : Assistant Driller's Name :					
Property : GWMA : - GW Zone : -		Standing Water Level : Salinity : Yield :			

Site Details

Site Chosen By	County	Parish	Portion/Lot DP
	Form A :GLOUCESTER	TOMAREE	
	Licensed :		
Region :20 - HUNTER		CMA Map :	
River Basin :		Grid Zone :	Scale :
Area / District :			
Elevation :	10.09 m (A.H.D.)	Northing :6372347	Latitude (S) :32° 46' 53"
Elevation Source :		Easting :391886	Longitude (E) :151° 50' 44"
GS Map :	MGA Zone :56	Coordinate Source :	

Construction

Negative depths indicate Above Ground Level;

H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity;PL-Placement of Gravel Pack;PC-Pressure Cemented;CS-Cement Slurry;C-Compaction;C-Compaction									
Item	Comp. Pump	Type	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details	

(No Construction Details Found)

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
(No Water Bearing Zone Details Found)									

(No Water Bearing Zone Details Found)

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
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Remarks

Form A Remarks:
RZM MONITORING BORE SK 7227 Reviewed data - nothing to update.

*** End of GW079932 ***

GW079935

Site Details

Construction

H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity;PL-Placement of Gravel Pack;PC-Pressure Cemented;CS-Cement Slurry;C-Compaction;C-Centralisers									
Well	Comp. Pump	Type	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details	

(No Construction Details Found)

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
(No Water Bearing Zone Details Found)									

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
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*** End of GW079935 ***

NSW OFFICE OF WATER

Work Summary

GW079936

Licence :	Licence Status	Intended Purpose(s)
Work Type : Bore	Authorised Purpose(s)	
Work Status : (Unknown)		
Construct. Method : (Unknown)		
Owner Type : (Unknown)		
Commenced Date :	Final Depth :	
Completion Date :	Drilled Depth :	
Contractor Name :		
Driller :		
Assistant Driller's Name :		
Property :	Standing Water Level :	
GWMA : -	Salinity :	
GW Zone : -	Yield :	

Site Details

Site Chosen By	County	Parish	Portion/Lot DP
	Form A :GLOUCESTER	TOMAREE	
	Licensed :		
Region : 20 - HUNTER		CMA Map :	
River Basin :		Grid Zone :	Scale :
Area / District :			
Elevation : 9.89 m (A.H.D.)		Northing : 6373553	Latitude (S) : 32° 46' 14"
Elevation Source :		Easting : 392163	Longitude (E) : 151° 50' 55"
GS Map :	MGA Zone : 56	Coordinate Source :	

Construction

Negative depths indicate Above Ground Level;
H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity;PL-Placement of Gravel Pack;PC-Pressure
Cemented Compump Type From (m) To (m) OD (mm) ID (mm) Interval Details

(No Construction Details Found)

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
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(No Water Bearing Zone Details Found)

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
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Remarks

Form A Remarks:
RZM MONITORING BORE SK 7232 Reviewed data - nothing to update.

*** End of GW079936 ***

NSW OFFICE OF WATER

Work Summary

GW079938

Licence :	Licence Status	Intended Purpose(s)
Work Type : Bore	Authorised Purpose(s)	
Work Status : (Unknown)		
Construct. Method : (Unknown)		
Owner Type : (Unknown)		
Commenced Date :	Final Depth :	
Completion Date :	Drilled Depth :	
Contractor Name :		
Driller :		
Assistant Driller's Name :		
Property :	Standing Water Level :	
GWMA : -	Salinity :	
GW Zone : -	Yield :	

Site Details

Site Chosen By	County	Parish	Portion/Lot DP
	Form A :GLOUCESTER	TOMAREE	
	Licensed :		
Region : 20 - HUNTER		CMA Map :	
River Basin :		Grid Zone :	Scale :
Area / District :			
Elevation : 6.09 m (A.H.D.)		Northing : 6372964	Latitude (S) : 32° 46' 34"
Elevation Source :		Easting : 392774	Longitude (E) : 151° 51' 18"
GS Map :	MGA Zone : 56	Coordinate Source :	

Construction

Negative depths indicate Above Ground Level;

H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity;PL-Placement of Gravel Pack;PC-Pressure Cemented Compaction Centralisers

From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details
(No Construction Details Found)					

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
(No Water Bearing Zone Details Found)									

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
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Remarks

Form A Remarks:
RZM MONITORING BORE SK 7332 Reviewed data - nothing to update.

*** End of GW079938 ***

NSW OFFICE OF WATER

Work Summary

GW079942

Licence :	Licence Status	Intended Purpose(s)
Work Type : Bore	Authorised Purpose(s)	
Work Status : (Unknown)		
Construct. Method : (Unknown)		
Owner Type : (Unknown)		
Commenced Date :	Final Depth :	
Completion Date :	Drilled Depth :	
Contractor Name :		
Driller :		
Assistant Driller's Name :		
Property :	Standing Water Level :	
GWMA : -	Salinity :	
GW Zone : -	Yield :	

Site Details

Site Chosen By	County	Parish	Portion/Lot DP
	Form A :GLOUCESTER	TOMAREE	
	Licensed :		
Region : 20 - HUNTER		CMA Map :	
River Basin :		Grid Zone :	Scale :
Area / District :			
Elevation : 8.16 m (A.H.D.)		Northing : 6372664	Latitude (S) : 32° 46' 43"
Elevation Source :		Easting : 392780	Longitude (E) : 151° 51' 18"
GS Map :	MGA Zone : 56	Coordinate Source :	

Construction

Negative depths indicate Above Ground Level;

H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity;PL-Placement of Gravel Pack;PC-Pressure Cemented Compartment;C-Centralisers

From (m)	To (m)	OD (mm)	ID (mm)	Interval Details
(No Construction Details Found)				

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
(No Water Bearing Zone Details Found)									

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
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Remarks

Form A Remarks:
rZM MONITORING BORE SK 7337 Reviewed data - nothing to update.

*** End of GW079942 ***

NSW OFFICE OF WATER

Work Summary

GW079952

Licence :	Licence Status	Intended Purpose(s)
Work Type : Bore	Authorised Purpose(s)	
Work Status : (Unknown)		
Construct. Method : (Unknown)		
Owner Type : (Unknown)		
Commenced Date :	Final Depth :	
Completion Date :	Drilled Depth :	
Contractor Name :		
Driller :		
Assistant Driller's Name :		
Property :	Standing Water Level :	
GWMA : -	Salinity :	
GW Zone : -	Yield :	

Site Details

Site Chosen By	County	Parish	Portion/Lot DP
	Form A :GLOUCESTER	TOMAREE	
	Licensed :		
Region : 20 - HUNTER		CMA Map :	
River Basin :		Grid Zone :	Scale :
Area / District :			
Elevation : 8.60 m (A.H.D.)		Northing : 6372958	Latitude (S) : 32° 46' 34"
Elevation Source :		Easting : 392474	Longitude (E) : 151° 51' 7"
GS Map :	MGA Zone : 56	Coordinate Source :	

Construction

Negative depths indicate Above Ground Level;
H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity;PL-Placement of Gravel Pack;PC-Pressure
Cemented Compaction Centralisers

From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details
(No Construction Details Found)					

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
(No Water Bearing Zone Details Found)									

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
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Remarks

Form A Remarks:
RZM MONIROTING BORE SK 7657 Reviewed data - nothing to update.

*** End of GW079952 ***

GW079953

Site Details

Construction

H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity;PL-Placement of Gravel Pack;PC-Pressure Cemented;CS-Cement Slurry;C-Compaction;C-Centralisers									
Well	Comp. Pump	Type	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details	

(No Construction Details Found)

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
(No Water Bearing Zone Details Found)									

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
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Form A Remarks:
RZM MONITORING BORE SK 7658 Reviewed data - nothing to update.

*** End of GW079953 ***

GW079954

Site Details

Construction

H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity;PL-Placement of Gravel Pack;PC-Pressure Cemented;CS-Cement Slurry;C-Compaction;C-Centralisers									
Well	Comp. Pump	Type	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details	

(No Construction Details Found)

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
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(No Water Bearing Zone Details Found)

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
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*** End of GW079954 ***

GW079959

Site Details

Construction

H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity;PL-Placement of Gravel Pack;PC-Pressure Cemented;CS-Cement Slurry;C-Comp. Centralisers									
Well	Comp. Type	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details		

Water Bearing Zones

(No Water Bearing Zone Details Found)

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
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Remarks

*** End of GW079959 ***

GW079963

Site Details

Construction

H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity;PL-Placement of Gravel Pack;PC-Pressure Cemented;CS-Cement Slurry;C-Compaction;C-Compaction									
Item	Comp. Pump	Type	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details	

(No Construction Details Found)

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
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(No Water Bearing Zone Details Found)

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
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*** End of GW079963 ***

NSW OFFICE OF WATER

Work Summary

GW079966

Licence :	Licence Status	Intended Purpose(s)
Work Type : Bore	Authorised Purpose(s)	
Work Status : (Unknown)		
Construct. Method : (Unknown)		
Owner Type : (Unknown)		
Commenced Date :	Final Depth :	
Completion Date :	Drilled Depth :	
Contractor Name :		
Driller :		
Assistant Driller's Name :		
Property :	Standing Water Level :	
GWMA : -	Salinity :	
GW Zone : -	Yield :	

Site Details

Site Chosen By	County	Parish	Portion/Lot DP
	Form A :GLOUCESTER	TOMAREE	
	Licensed :		
Region : 20 - HUNTER		CMA Map :	
River Basin :		Grid Zone :	Scale :
Area / District :			
Elevation : 7.70 m (A.H.D.)		Northing : 6372376	Latitude (S) : 32° 46' 53"
Elevation Source :		Easting : 393385	Longitude (E) : 151° 51' 42"
GS Map :	MGA Zone : 56	Coordinate Source :	

Construction

Negative depths indicate Above Ground Level;

H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity;PL-Placement of Gravel Pack;PC-Pressure
 Cemented Compartment Centralisers From (m) To (m) OD (mm) ID (mm) Interval Details

(No Construction Details Found)

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
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(No Water Bearing Zone Details Found)

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
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Remarks

Form A Remarks:
 RZM MONITORING BORE SK 8094 Reviewed data - nothing to update.

*** End of GW079966 ***

NSW OFFICE OF WATER

Work Summary

GW079967

Licence :	Licence Status	Intended Purpose(s)
Work Type : Bore	Authorised Purpose(s)	
Work Status : (Unknown)		
Construct. Method : (Unknown)		
Owner Type : (Unknown)		
Commenced Date :	Final Depth :	
Completion Date :	Drilled Depth :	
Contractor Name :		
Driller :		
Assistant Driller's Name :		
Property :	Standing Water Level :	
GWMA : -	Salinity :	
GW Zone : -	Yield :	

Site Details

Site Chosen By	County	Parish	Portion/Lot DP
	Form A :GLOUCESTER	TOMAREE	
	Licensed :		
Region : 20 - HUNTER		CMA Map :	
River Basin :		Grid Zone :	Scale :
Area / District :			
Elevation : 10.90 m (A.H.D.)		Northing : 6372676	Latitude (S) : 32° 46' 43"
Elevation Source :		Easting : 393379	Longitude (E) : 151° 51' 41"
GS Map :	MGA Zone : 56	Coordinate Source :	

Construction

Negative depths indicate Above Ground Level;
H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity;PL-Placement of Gravel Pack;PC-Pressure
Cemented Compump Type Centralisers From (m) To (m) OD (mm) ID (mm) Interval Details

(No Construction Details Found)

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
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(No Water Bearing Zone Details Found)

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
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Remarks

Form A Remarks:
RZM MONITORING BORE SK 8095 Reviewed data - nothing to update.

*** End of GW079967 ***

GW079968

Site Details

Construction

H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity;PL-Placement of Gravel Pack;PC-Pressure Cemented;CS-Cement Slurry;C-Compaction;C-Centralisers									
Well	Comp. Pump	Type	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details	

(No Construction Details Found)

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
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(No Water Bearing Zone Details Found)

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
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*** End of GW079968 ***

GW079970

Licence :		Licence Status	
Work Type :Bore		Authorised Purpose(s)	Intended Purpose(s)
Work Status :(Unknown)			
Construct. Method :(Unknown)			
Owner Type :(Unknown)			
Commenced Date :	Final Depth :		
Completion Date :	Drilled Depth :		
Contractor Name :			
Driller :			
Assistant Driller's Name :			
Property :		Standing Water Level :	
GWMA : -		Salinity :	
GW Zone : -		Yield :	

Site Details

Site Chosen By		County	Parish	Portion/Lot DP
		Form A :GLOUCESTER	TOMAREE	
		Licensed :		
Region :20 - HUNTER			CMA Map :	
River Basin :			Grid Zone :	Scale :
Area / District :				
Elevation :	11.10 m (A.H.D.)		Northing :6372381	Latitude (S) :32° 46' 53"
Elevation Source :			Easting :393685	Longitude (E) :151° 51' 53"
GS Map :	MGA Zone :56		Coordinate Source :	

Construction Negative depths indicate Above Ground Level;

H-Hole; P-Pipe; OD-Outside Diameter; ID-Inside Diameter; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; CS-Comp. Centralisers						
Item No.	Comp. Centralisers	From (m)	To (m)	OD (mm)	ID (mm)	Interval Details

(No Construction Details Found)

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
(No Water Bearing Zone Details Found)									

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
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Remarks

Form A Remarks:
RZM MONITORING BORE SK 8098 Reviewed data - nothing to update.

*** End of GW079970 ***

GW079971

Site Details

Construction

H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity;PL-Placement of Gravel Pack;PC-Pressure Cemented;CS-Cement Slurry;Type									
Well	Comp	Pump	Type	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details

Water Bearing Zones

(No Water Bearing Zone Details Found)

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
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Remarks

*** End of GW079971 ***

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GW079972

Licence : Work Type : Bore Work Status : (Unknown) Construct. Method : (Unknown) Owner Type : (Unknown)		Licence Status Authorised Purpose(s)		Intended Purpose(s)	
Commenced Date : Completion Date :		Final Depth : Drilled Depth :			
Contractor Name : Driller : Assistant Driller's Name :					
Property : GWMA : - GW Zone : -		Standing Water Level : Salinity : Yield :			

Site Details

Site Chosen By		County	Parish	Portion/Lot DP
		Form A :GLOUCESTER	TOMAREE	
		Licensed :		
Region :20 - HUNTER			CMA Map :	
River Basin :			Grid Zone :	Scale :
Area / District :				
Elevation :	9.67 m (A.H.D.)		Northing :6372687	Latitude (S) :32° 46' 43"
Elevation Source :			Easting :393979	Longitude (E) :151° 52' 4"
GS Map :	MGA Zone :56	Coordinate Source :		

Construction

Negative depths indicate Above Ground Level;

H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity;PL-Placement of Gravel Pack;PC-Pressure Cemented;CS-Compump;CE-Centralisers									
Well	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details			

(No Construction Details Found)

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
(No Water Bearing Zone Details Found)									

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
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Remarks

Form A Remarks:
RZM MONITORING BORE SK 8100 Reviewed data - nothing to update.

*** End of GW079972 ***

GW079973

Site Details

Construction

H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity;PL-Placement of Gravel Pack;PC-Pressure Cemented;CS-Cement Slurry;C-Compaction;C-Centralisers									
Well	Comp. Pump	Type	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details	

Water Bearing Zones

(No Water Bearing Zone Details Found)

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
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Remarks

*** End of GW079973 ***

GW079974

Site Details

Construction

H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity;PL-Placement of Gravel Pack;PC-Pressure Cemented;CS-Cement Slurry;C-Compaction;C-Centralisers									
Well	Comp. Pump	Type	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details	

(No Construction Details Found)

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
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(No Water Bearing Zone Details Found)

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
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*** End of GW079974 ***

NSW OFFICE OF WATER

Work Summary

GW079975

Licence :	Licence Status	Intended Purpose(s)
Work Type : Bore	Authorised Purpose(s)	
Work Status : (Unknown)		
Construct. Method : (Unknown)		
Owner Type : (Unknown)		
Commenced Date :	Final Depth :	
Completion Date :	Drilled Depth :	
Contractor Name :		
Driller :		
Assistant Driller's Name :		
Property :	Standing Water Level :	
GWMA : -	Salinity :	
GW Zone : -	Yield :	

Site Details

Site Chosen By	County	Parish	Portion/Lot DP
	Form A :GLOUCESTER	TOMAREE	
	Licensed :		
Region : 20 - HUNTER		CMA Map :	
River Basin :		Grid Zone :	Scale :
Area / District :			
Elevation : 9.90 m (A.H.D.)		Northing : 6373564	Latitude (S) : 32° 46' 14"
Elevation Source :		Easting : 392763	Longitude (E) : 151° 51' 18"
GS Map :	MGA Zone : 56	Coordinate Source :	

Construction

Negative depths indicate Above Ground Level;

H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity;PL-Placement of Gravel Pack;PC-Pressure Cemented;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity;PL-Placement of Gravel Pack;PC-Pressure

Interval Details
(No Construction Details Found)

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
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(No Water Bearing Zone Details Found)

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
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Remarks

Form A Remarks:
RZM MONITORING BORE SK 8103 Reviewed data - nothing to update.

*** End of GW079975 ***

GW079976

Site Details

Construction

H-Hole; P-Pipe; OD-Outside Diameter; ID-Inside Diameter; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; Comp-Comp; C-Centralisers									
Well	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details			

Water Bearing Zones

(No Water Bearing Zone Details Found)

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
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Remarks

*** End of GW079976 ***

GW079977

Site Details

Construction

H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity;PL-Placement of Gravel Pack;PC-Pressure Cemented;CS-Cement Slurry;C-Compaction;C-Compaction									
Item	Comp. Pump	Type	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details	

(No Construction Details Found)

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
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(No Water Bearing Zone Details Found)

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
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*** End of GW079977 ***

GW079978

Site Details

Construction

H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity;PL-Placement of Gravel Pack;PC-Pressure Cemented;CS-Compump;CE-Centralisers									
From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details				

(No Construction Details Found)

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
(No Water Bearing Zone Details Found)									

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
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Form A Remarks:
RZM MONITORING BORE SK 8106 Reviewed data - nothing to update.

*** End of GW079978 ***

GW079979

Licence :		Licence Status	
Work Type :Bore		Authorised Purpose(s)	Intended Purpose(s)
Work Status :(Unknown)			
Construct. Method :(Unknown)			
Owner Type :(Unknown)			
Commenced Date :	Final Depth :		
Completion Date :	Drilled Depth :		
Contractor Name :			
Driller :			
Assistant Driller's Name :			
Property :		Standing Water Level :	
GWMA : -		Salinity :	
GW Zone : -		Yield :	

Site Details

Site Chosen By		County	Parish	Portion/Lot DP
		Form A :GLOUCESTER	TOMAREE	
		Licensed :		
Region :20 - HUNTER			CMA Map :	
River Basin :			Grid Zone :	Scale :
Area / District :				
Elevation :	9.20 m (A.H.D.)		Northing :6373581	Latitude (S) :32° 46' 14"
Elevation Source :			Easting :393662	Longitude (E) :151° 51' 53"
GS Map :	MGA Zone :56	Coordinate Source :		

Construction

Negative depths indicate Above Ground Level;

H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity;PL-Placement of Gravel Pack;PC-Pressure Cemented;CS-Cement Slurry;C-Compaction;C-Centralisers									
Well	Comp. Pump	Type	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details	

(No Construction Details Found)

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
(No Water Bearing Zone Details Found)									

(No Water Bearing Zone Details Found)

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
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Remarks

Form A Remarks:
RZM MONITORING BORE SK 8107 Reviewed data - nothing to update.

*** End of GW079979 ***

NSW OFFICE OF WATER

Work Summary

GW079980

Licence :	Licence Status	Intended Purpose(s)
Work Type : Bore	Authorised Purpose(s)	
Work Status : (Unknown)		
Construct. Method : (Unknown)		
Owner Type : (Unknown)		
Commenced Date :	Final Depth :	
Completion Date :	Drilled Depth :	
Contractor Name :		
Driller :		
Assistant Driller's Name :		
Property :	Standing Water Level :	
GWMA : -	Salinity :	
GW Zone : -	Yield :	

Site Details

Site Chosen By	County	Parish	Portion/Lot DP
	Form A :GLOUCESTER	TOMAREE	
	Licensed :		
Region : 20 - HUNTER		CMA Map :	
River Basin :		Grid Zone :	Scale :
Area / District :			
Elevation : 9.10 m (A.H.D.)		Northing : 6373881	Latitude (S) : 32° 46' 4"
Elevation Source :		Easting : 393657	Longitude (E) : 151° 51' 53"
GS Map :	MGA Zone : 56	Coordinate Source :	

Construction

Negative depths indicate Above Ground Level;

H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity;PL-Placement of Gravel Pack;PC-Pressure Cemented Compump;C-Centralisers

From (m)	To (m)	OD (mm)	ID (mm)	Interval Details
(No Construction Details Found)				

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
(No Water Bearing Zone Details Found)									

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
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Remarks

Form A Remarks:
RZM MONITORING BORE SK 8108 Reviewed data - nothing to update.

*** End of GW079980 ***

NSW OFFICE OF WATER

Work Summary

GW079981

Licence :	Licence Status	Intended Purpose(s)
Work Type : Bore	Authorised Purpose(s)	
Work Status : (Unknown)		
Construct. Method : (Unknown)		
Owner Type : (Unknown)		
Commenced Date :	Final Depth :	
Completion Date :	Drilled Depth :	
Contractor Name :		
Driller :		
Assistant Driller's Name :		
Property :	Standing Water Level :	
GWMA : -	Salinity :	
GW Zone : -	Yield :	

Site Details

Site Chosen By	County	Parish	Portion/Lot DP
	Form A :GLOUCESTER	TOMAREE	
	Licensed :		
Region : 20 - HUNTER		CMA Map :	
River Basin :		Grid Zone :	Scale :
Area / District :			
Elevation : 9.40 m (A.H.D.)		Northing : 6373886	Latitude (S) : 32° 46' 4"
Elevation Source :		Easting : 393956	Longitude (E) : 151° 52' 4"
GS Map :	MGA Zone : 56	Coordinate Source :	

Construction

Negative depths indicate Above Ground Level;
H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity;PL-Placement of Gravel Pack;PC-Pressure
Cemented Compump Type

From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details
(No Construction Details Found)					

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
(No Water Bearing Zone Details Found)									

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
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Remarks

Form A Remarks:
RZM MONITORING BORE SK 8110 Reviewed data - nothing to update.

*** End of GW079981 ***

GW079995

Site Details

Construction

H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity;PL-Placement of Gravel Pack;PC-Pressure Cemented;CS-Cement Slurry;C-Comp. Centralisers									
Well	Comp. Type	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details		

Water Bearing Zones

(No Water Bearing Zone Details Found)

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
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Remarks

*** End of GW079995 ***

NSW OFFICE OF WATER

Work Summary

GW080015

Licence :	Licence Status	Intended Purpose(s)
Work Type : Bore	Authorised Purpose(s)	
Work Status : (Unknown)		
Construct. Method : (Unknown)		
Owner Type : (Unknown)		
Commenced Date :	Final Depth :	
Completion Date :	Drilled Depth :	
Contractor Name :		
Driller :		
Assistant Driller's Name :		
Property :	Standing Water Level :	
GWMA : -	Salinity :	
GW Zone : -	Yield :	

Site Details

Site Chosen By	County	Parish	Portion/Lot DP
	Form A :GLOUCESTER	TOMAREE	
	Licensed :		
Region : 20 - HUNTER		CMA Map :	
River Basin :		Grid Zone :	Scale :
Area / District :			
Elevation : 8.40 m (A.H.D.)		Northing : 6372981	Latitude (S) : 32° 46' 34"
Elevation Source :		Easting : 394213	Longitude (E) : 151° 52' 14"
GS Map :	MGA Zone : 56	Coordinate Source :	

Construction

Negative depths indicate Above Ground Level;
H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity;PL-Placement of Gravel Pack;PC-Pressure
Cemented Compump Type

From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details
(No Construction Details Found)					

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
(No Water Bearing Zone Details Found)									

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
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Remarks

Form A Remarks:
RZM MONITORING BORE SK 8331 Reviewed data - nothing to update.

*** End of GW080015 ***

NSW OFFICE OF WATER

Work Summary

GW080264

Licence :20BL168422	Licence Status Active	Intended Purpose(s)
Work Type :Bore	Authorised Purpose(s)	TEST BORE
Work Status :(Unknown)	TEST BORE	
Construct. Method :(Unknown)		
Owner Type :Private		
Commenced Date :	Final Depth :	
Completion Date :15-Aug-2002	Drilled Depth :	
Contractor Name :		
Driller :		
Assistant Driller's Name :		
Property : - N/A	Standing Water Level :	
GWMA : -	Salinity :	
GW Zone : -	Yield :	

Site Details

Site Chosen By	County	Parish	Portion/Lot DP
	Form A :GLOUCESTER	STOWELL	LT125 DP1014528
	Licensed :GLOUCESTER	STOWELL	1 1040349
Region :20 - HUNTER		CMA Map :9232-2N	WILLIAMTOWN
River Basin :210 - HUNTER RIVER		Grid Zone :56/1	Scale :1:25,000
Area / District :			
Elevation : 0.00		Northing :6374219	Latitude (S) :32° 45' 53"
Elevation Source :(Unknown)		Easting :393713	Longitude (E) :151° 51' 55"
GS Map :	MGA Zone :56	Coordinate Source :	

Construction

Negative depths indicate Above Ground Level;

H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity;PL-Placement of Gravel Pack;PC-Pressure Cemented Compartment Centralisers

From (m)	To (m)	OD (mm)	ID (mm)	Interval Details
(No Construction Details Found)				

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
(No Water Bearing Zone Details Found)									

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
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Remarks

*** End of GW080264 ***

NSW OFFICE OF WATER

Work Summary

GW080265

Licence :20BL168422		Licence Status Active	Intended Purpose(s)
Work Type :Bore		Authorised Purpose(s)	TEST BORE
Work Status :(Unknown)			
Construct. Method :(Unknown)			
Owner Type :Private			
Commenced Date :	Final Depth :		
Completion Date :15-Aug-2002	Drilled Depth :		
Contractor Name :			
Driller :			
Assistant Driller's Name :			
Property : - N/A		Standing Water Level :	
GWMA : -		Salinity :	
GW Zone : -		Yield :	

Site Details

Site Chosen By	County	Parish	Portion/Lot DP
	Form A :GLOUCESTER	STOWELL	LT125 DP1014528
	Licensed :GLOUCESTER	STOWELL	1 1040349
Region :20 - HUNTER		CMA Map :9232-2N	WILLIAMTOWN
River Basin :209 - KARUAH RIVER		Grid Zone :56/1	Scale :1:25,000
Area / District :			
Elevation : 0.00		Northing :6374163	Latitude (S) :32° 45' 55"
Elevation Source :(Unknown)		Easting :394197	Longitude (E) :151° 52' 13"
GS Map :	MGA Zone :56	Coordinate Source :	

Construction

Negative depths indicate Above Ground Level;

H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity;PL-Placement of Gravel Pack;PC-Pressure Cemented Compaction Centralisers

From (m)	To (m)	OD (mm)	ID (mm)	Interval Details
(No Construction Details Found)				

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
(No Water Bearing Zone Details Found)									

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
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Remarks

Reviewed data - nothing to update.

*** End of GW080265 ***

NSW OFFICE OF WATER

Work Summary

GW080266

Licence :20BL168422	Licence Status Active	Intended Purpose(s)
Work Type :Bore	Authorised Purpose(s)	TEST BORE
Work Status :(Unknown)	TEST BORE	
Construct. Method :(Unknown)		
Owner Type :Private		
Commenced Date :	Final Depth :	
Completion Date :15-Aug-2002	Drilled Depth :	
Contractor Name :		
Driller :		
Assistant Driller's Name :		
Property : - N/A	Standing Water Level :	
GWMA : -	Salinity :	
GW Zone : -	Yield :	

Site Details

Site Chosen By	County	Parish	Portion/Lot DP
	Form A :GLOUCESTER	STOWELL	LT125 DP1014528
	Licensed :GLOUCESTER	STOWELL	1 1040349
Region :20 - HUNTER		CMA Map :9232-2N	WILLIAMTOWN
River Basin :209 - KARUAH RIVER		Grid Zone :56/1	Scale :1:25,000
Area / District :			
Elevation : 0.00		Northing :6374059	Latitude (S) :32° 45' 59"
Elevation Source :(Unknown)		Easting :394626	Longitude (E) :151° 52' 30"
GS Map :	MGA Zone :56	Coordinate Source :	

Construction

Negative depths indicate Above Ground Level;

H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity;PL-Placement of Gravel Pack;PC-Pressure Cemented;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity;PL-Placement of Gravel Pack;PC-Pressure

From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details
(No Construction Details Found)					

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
(No Water Bearing Zone Details Found)									

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
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Remarks

Reviewed data - nothing to update.

*** End of GW080266 ***

NSW OFFICE OF WATER

Work Summary

GW080391

Licence :20BL168684	Licence Status :Converted	Intended Purpose(s)
Work Type :Spear	Authorised Purpose(s)	DOMESTIC
Work Status :(Unknown)	DOMESTIC	IRRIGATION
Construct. Method :(Unknown)	IRRIGATION	STOCK
Owner Type :Private	STOCK	
Commenced Date :	Final Depth :	
Completion Date :14-May-2003	Drilled Depth :	
Contractor Name :		
Driller :		
Assistant Driller's Name :		
Property : - N/A	Standing Water Level :	
GWMA :025 - TOMAGO TOMAREE STOCKTON	Salinity :	
GW Zone :001 - TOMAGO	Yield :	

Site Details

Site Chosen By	County	Parish	Portion/Lot DP
	Form A :GLOUCESTER	STOWELL	LTA DP418757
	Licensed :GLOUCESTER	STOWELL	A 418757
Region :20 - HUNTER		CMA Map :9232-2N	WILLIAMTOWN
River Basin :210 - HUNTER RIVER		Grid Zone :56/1	Scale :1:25,000
Area / District :			
Elevation : 0.00		Northing :6373866	Latitude (S) :32° 46' 4"
Elevation Source :(Unknown)		Easting :392164	Longitude (E) :151° 50' 55"
GS Map :	MGA Zone :56	Coordinate Source :	

Construction

Negative depths indicate Above Ground Level;

H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity;PL-Placement of Gravel Pack;PC-Pressure Cemented;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity;PL-Placement of Gravel Pack;PC-Pressure

From (m) To (m) OD (mm) ID (mm) Interval Details

(No Construction Details Found)

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
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(No Water Bearing Zone Details Found)

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
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Remarks

Reviewed data - nothing to update.

*** End of GW080391 ***

NSW OFFICE OF WATER

Work Summary

GW200056

Licence :	Licence Status	Intended Purpose(s)
Work Type : Bore	Authorised Purpose(s)	MONITORING BORE
Work Status : (Unknown)		
Construct. Method :		
Owner Type : Mines		
Commenced Date :	Final Depth :	
Completion Date : 26-Apr-2001	Drilled Depth :	
Contractor Name :		
Driller :		
Assistant Driller's Name :		
Property :	Standing Water Level :	
GWMA : -	Salinity :	
GW Zone : -	Yield :	

Site Details

Site Chosen By	County	Parish	Portion/Lot DP
	Form A :		
	Licensed :		
Region : 20 - HUNTER		CMA Map :	
River Basin :		Grid Zone :	Scale :
Area / District :			
Elevation : 11.27 m (A.H.D.)		Northing : 6373376	Latitude (S) : 32° 46' 20"
Elevation Source :		Easting : 392247	Longitude (E) : 151° 50' 58"
GS Map :	MGA Zone : 56	Coordinate Source :	

Construction

Negative depths indicate Above Ground Level;

H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity;PL-Placement of Gravel Pack;PC-Pressure Cemented Compaction Type

Interval Details

(No Construction Details Found)

Water Bearing Zones

From (m) To (m) Thickness (m) WBZ Type S.W.L. (m) D.D.L. (m) Yield (L/s) Hole Depth (m) Duration (hr) Salinity (mg/L)

(No Water Bearing Zone Details Found)

Drillers Log

From (m) To (m) Thickness(m) Drillers Description Geological Material Comments

Remarks

Form A Remarks:
RZM Tomago Monitoring Bore; Bore Number SK3485

*** End of GW200056 ***

NSW OFFICE OF WATER

Work Summary

GW200058

Licence :	Licence Status	Intended Purpose(s)
Work Type : Bore	Authorised Purpose(s)	MONITORING BORE
Work Status : (Unknown)		
Construct. Method :		
Owner Type : Mines		
Commenced Date :	Final Depth :	
Completion Date :	Drilled Depth :	
Contractor Name :		
Driller :		
Assistant Driller's Name :		
Property :	Standing Water Level :	
GWMA : -	Salinity :	
GW Zone : -	Yield :	

Site Details

Site Chosen By	County	Parish	Portion/Lot DP
	Form A : Licensed :		
Region : 20 - HUNTER		CMA Map :	
River Basin :		Grid Zone :	Scale :
Area / District :			
Elevation : 9.15 m (A.H.D.)		Northing : 6372978	Latitude (S) : 32° 46' 33"
Elevation Source :		Easting : 393609	Longitude (E) : 151° 51' 50"
GS Map :	MGA Zone : 56	Coordinate Source :	

Construction

Negative depths indicate Above Ground Level;

H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity;PL-Placement of Gravel Pack;PC-Pressure Cemented Compaction;C-Centralisers

From (m) To (m) OD (mm) ID (mm) Interval Details

(No Construction Details Found)

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
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(No Water Bearing Zone Details Found)

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
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Remarks

Form A Remarks:
RZM Tomago Monitoring Bore; Bore Number SK3492

*** End of GW200058 ***

NSW OFFICE OF WATER

Work Summary

GW200073

Licence :	Licence Status	Intended Purpose(s)
Work Type : Bore	Authorised Purpose(s)	MONITORING BORE
Work Status : (Unknown)		
Construct. Method :		
Owner Type : Mines		
Commenced Date :	Final Depth :	
Completion Date :	Drilled Depth :	
Contractor Name :		
Driller :		
Assistant Driller's Name :		
Property :	Standing Water Level :	
GWMA : -	Salinity :	
GW Zone : -	Yield :	

Site Details

Site Chosen By	County	Parish	Portion/Lot DP
	Form A : Licensed :		
Region : 20 - HUNTER		CMA Map :	
River Basin :		Grid Zone :	Scale :
Area / District :			
Elevation : 8.01 m (A.H.D.)		Northing : 6372853	Latitude (S) : 32° 46' 37"
Elevation Source :		Easting : 392186	Longitude (E) : 151° 50' 56"
GS Map :	MGA Zone : 56	Coordinate Source :	

Construction

Negative depths indicate Above Ground Level;

H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity;PL-Placement of Gravel Pack;PC-Pressure Cemented Compaction;C-Centralisers

From (m) To (m) OD (mm) ID (mm) Interval Details

(No Construction Details Found)

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
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(No Water Bearing Zone Details Found)

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
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Remarks

Form A Remarks:
RZM Tomago Monitoring Bore; Bore Number SK7221

*** End of GW200073 ***

NSW OFFICE OF WATER

Work Summary

GW200075

Licence :	Licence Status	Intended Purpose(s)
Work Type : Bore	Authorised Purpose(s)	MONITORING BORE
Work Status : (Unknown)		
Construct. Method :		
Owner Type : Mines		
Commenced Date :	Final Depth :	
Completion Date :	Drilled Depth :	
Contractor Name :		
Driller :		
Assistant Driller's Name :		
Property :	Standing Water Level :	
GWMA : -	Salinity :	
GW Zone : -	Yield :	

Site Details

Site Chosen By	County	Parish	Portion/Lot DP
	Form A : Licensed :		
Region : 20 - HUNTER		CMA Map :	
River Basin :		Grid Zone :	Scale :
Area / District :			
Elevation : 8.69 m (A.H.D.)		Northing : 6373166	Latitude (S) : 32° 46' 27"
Elevation Source :		Easting : 392442	Longitude (E) : 151° 51' 6"
GS Map :	MGA Zone : 56	Coordinate Source :	

Construction

Negative depths indicate Above Ground Level;

H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity;PL-Placement of Gravel Pack;PC-Pressure Cemented Compump;C-Centralisers

From (m) To (m) OD (mm) ID (mm) Interval Details

(No Construction Details Found)

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
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(No Water Bearing Zone Details Found)

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
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Remarks

Form A Remarks:
RZM Tomago Monitoring Bore; Bore Number SK7666

*** End of GW200075 ***

NSW OFFICE OF WATER

Work Summary

GW200081

Licence :	Licence Status	Intended Purpose(s)
Work Type : Bore	Authorised Purpose(s)	MONITORING BORE
Work Status : (Unknown)		
Construct. Method :		
Owner Type : Mines		
Commenced Date :	Final Depth :	
Completion Date :	Drilled Depth :	
Contractor Name :		
Driller :		
Assistant Driller's Name :		
Property :	Standing Water Level :	
GWMA : -	Salinity :	
GW Zone : -	Yield :	

Site Details

Site Chosen By	County	Parish	Portion/Lot DP
	Form A : Licensed :		
Region : 20 - HUNTER		CMA Map :	
River Basin :		Grid Zone :	Scale :
Area / District :			
Elevation : 9.70 m (A.H.D.)		Northing : 6373034	Latitude (S) : 32° 46' 31"
Elevation Source :		Easting : 391591	Longitude (E) : 151° 50' 33"
GS Map :	MGA Zone : 56	Coordinate Source :	

Construction

Negative depths indicate Above Ground Level;

H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity;PL-Placement of Gravel Pack;PC-Pressure Cemented Compaction Grout;C-Centralisers

From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details
(No Construction Details Found)					

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
(No Water Bearing Zone Details Found)									

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
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Remarks

Form A Remarks:
RZM Tomago Monitoring Bore; Bore Number SK9567

*** End of GW200081 ***

*** End of Report ***

Project No.	Station No.	Pipe No.	Collect Dat	Collect Tim	Fraction No	Determina	Result	Units	Quality Cor	Parent Project No.
HISC0001	GW013359		26-Jul-57	0:00:00	195700021	Sulphate as	ND	mg/L	U	
HISC0001	GW013359		26-Jul-57	0:00:00	195700021	pH		6.3 pH	U	
HISC0001	GW013359		26-Jul-57	0:00:00	195700021	Solids - tot:		2637 mg/L	U	
HISC0001	GW013359		26-Jul-57	0:00:00	195700021	Chloride as		1296.981 mg/L	U	

Appendix B

Historical Titles Search

**Preliminary Contamination Assessment
Medowie Road, Medowie NSW**

ADVANCE LEGAL SEARCH PTY LIMITED

(ACN 077 067 068)

ABN 49 077 067 068

PO Box 149
Yagoona NSW 2199

Telephone: +612 9754 1590
Mobile: 0412 169 809
Facsimile: +612 9754 1364
Email: alsearch@optusnet.com.au

18th May 2010

COFFEY ENVIRONMENTS Pty Ltd

19 Warabrook Boulevard

WARABROOK NSW 2304

Attention: Damien Hendrickx

RE:

**Medowie Road, Medowie
Job Number: PO P14585DCH
Job Ref: ENVIWARA00340AB**

Note 1: Lot 411 DP 1063902

Note 2: Lot 412 DP 1063902

Note 3: Lot 413 DP 1063902

Note 1:

Current Search

Folio Identifier 411/1063902 (title attached)

DP 1063902 (plan attached)

Dated 10TH May 2010

Registered Proprietor:

NORMAN JAMES FRASER

Title Tree
Lot 411 DP 1063902

Folio Identifier 411/1063902

Folio Identifier 40/808163

Folio Identifier 4/587953

Certificate of Title Volume 13271 Folio 80

Certificate of Title Volume 12726 Folio 108

Certificate of Title Volume 9586 Folio 37

Certificate of Title Volume 5879 Folio 154

Certificate of Title Volume 4480 Folio 165

Certificate of Title Volume 1531 Folio 185

Summary of Proprietors Lot 411 DP 1063902

Year	Proprietor
	(Lot 411 DP 1063902)
2004 – todate	Norman James Fraser
	(Lot 40 DP 808163)
1991 – 2004	Norman James Fraser
	(Lot 4 DP 587953)
1988 – 1991	Norman James Fraser
	(Lot 4 DP 587953 – CTVol 13271 Fol 80)
1977 – 1988	Norman James Fraser, business manager
1977 – 1977	Erica Sybil Mirfin, married woman
	(Lot 3 DP 575403 – CTVol 12726 Fol 108)
1975 – 1977	Erica Sybil Mirfin, married woman
	(Lot 2 DP 503501 – CTVol 9586 Fol 37)
1964 – 1975	Erica Sybil Mirfin, married woman
1963 – 1964	Rees James, farmer
	(Part Portion 144 Parish Stowell – Area 691 Acres 2 Roods 14 Perches – CTVol 5879 Fol 154)
1948 – 1963	Rees James, farmer
	(Part Portion 144 Parish Stowell – Area 833 Acres 2 Roods 0 Perches – CTVol 4480 Fol 165)
1931 – 1948	Rees James, farmer
	(Portion 144 Parish Stowell – Area 873 Acres 2 Roods – CTVol 1531 Fol 185)
1904 – 1931	Daniel James, farmer

Note 2

Current Search

Folio Identifier 412/1063902 (title attached)

DP 1063902 (plan attached)

Dated 10TH May 2010

Registered Proprietor:

WENDY MAY MORRIS

Title Tree

Lot 412 DP 1063902

Folio Identifier 412/1063902

Folio Identifier 40/808163

Folio Identifier 4/587953

Certificate of Title Volume 13271 Folio 80

Certificate of Title Volume 12726 Folio 108

Certificate of Title Volume 9586 Folio 37

Certificate of Title Volume 5879 Folio 154

Certificate of Title Volume 4480 Folio 165

Certificate of Title Volume 1531 Folio 185

Summary of Proprietors Lot 412 DP 1063902

Year	Proprietor
	(Lot 412 DP 1063902)
2009 – todate	Wendy May Morris
2004 – 2009	Norman James Fraser
	(Lot 40 DP 808163)
1991 – 2004	Norman James Fraser
	(Lot 4 DP 587953)
1988 – 1991	Norman James Fraser
	(Lot 4 DP 587953 – CTVol 13271 Fol 80)
1977 – 1988	Norman James Fraser, business manager
1977 – 1977	Erica Sybil Mirfin, married woman
	(Lot 3 DP 575403 – CTVol 12726 Fol 108)
1975 – 1977	Erica Sybil Mirfin, married woman
	(Lot 2 DP 503501 – CTVol 9586 Fol 37)
1964 – 1975	Erica Sybil Mirfin, married woman
1963 – 1964	Rees James, farmer
	(Part Portion 144 Parish Stowell – Area 691 Acres 2 Roods 14 Perches – CTVol 5879 Fol 154)
1948 – 1963	Rees James, farmer
	(Part Portion 144 Parish Stowell – Area 833 Acres 2 Roods 0 Perches – CTVol 4480 Fol 165)
1931 – 1948	Rees James, farmer
	(Portion 144 Parish Stowell – Area 873 Acres 2 Roods – CTVol 1531 Fol 185)
1904 – 1931	Daniel James, farmer

Note 3:

Current Search

Folio Identifier 413/1063902 (title attached)

DP 1063902 (plan attached)

Dated 10TH May 2010

Registered Proprietor:

WENDY MAY MORRIS

Title Tree

Lot 413 DP 1063902

Folio Identifier 413/1063902

Folio Identifier 40/808163

Folio Identifier 4/587953

Certificate of Title Volume 13271 Folio 80

Certificate of Title Volume 12726 Folio 108

Certificate of Title Volume 9586 Folio 37

Certificate of Title Volume 5879 Folio 154

Certificate of Title Volume 4480 Folio 165

Certificate of Title Volume 1531 Folio 185

Summary of Proprietors Lot 413 DP 1063902

Year	Proprietor
	(Lot 413 DP 1063902)
2010 – todate	Wendy May Morris
2004 – 2010	Norman James Fraser
	(Lot 40 DP 808163)
1991 – 2004	Norman James Fraser
	(Lot 4 DP 587953)
1988 – 1991	Norman James Fraser
	(Lot 4 DP 587953 – CTVol 13271 Fol 80)
1977 – 1988	Norman James Fraser, business manager
1977 – 1977	Erica Sybil Mirfin, married woman
	(Lot 3 DP 575403 – CTVol 12726 Fol 108)
1975 – 1977	Erica Sybil Mirfin, married woman
	(Lot 2 DP 503501 – CTVol 9586 Fol 37)
1964 – 1975	Erica Sybil Mirfin, married woman
1963 – 1964	Rees James, farmer
	(Part Portion 144 Parish Stowell – Area 691 Acres 2 Roods 14 Perches – CTVol 5879 Fol 154)
1948 – 1963	Rees James, farmer
	(Part Portion 144 Parish Stowell – Area 833 Acres 2 Roods 0 Perches – CTVol 4480 Fol 165)
1931 – 1948	Rees James, farmer
	(Portion 144 Parish Stowell – Area 873 Acres 2 Roods – CTVol 1531 Fol 185)
1904 – 1931	Daniel James, farmer

Requested Parcel : Lot 412 DP 1063902

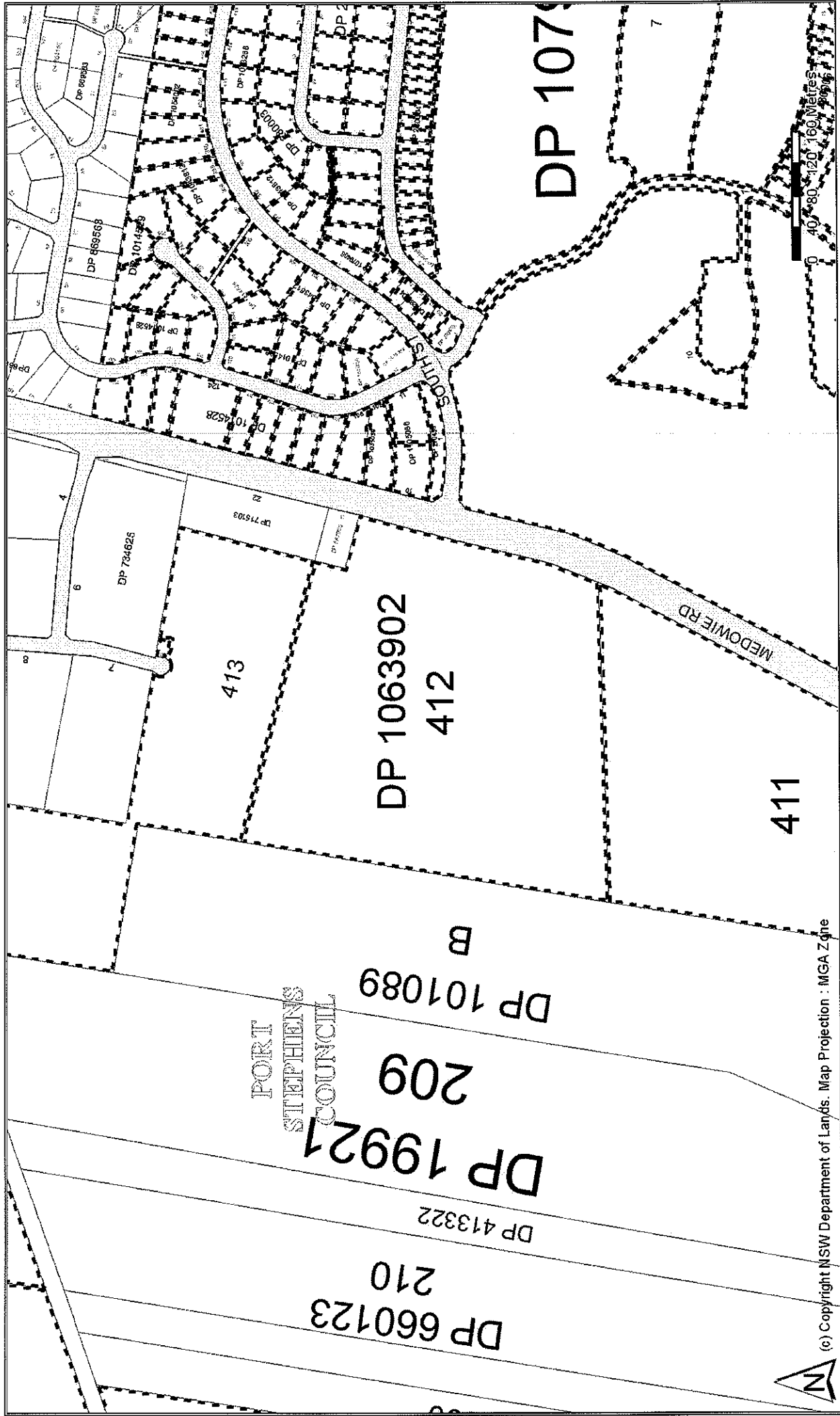
Identified Parcel : Lot 412 DP 1063902

Locality : MEDOWIE

LGA : PORT STEPHENS

Parish : STOWELL

County : GLOUCESTER





Morris Hayes & Edgar

LPI On-Line

Phone: (02) 9232 2411

Morris Hayes & Edgar hereby certifies that the information contained in this document has been provided electronically by the Registrar General in accordance with Section 96B(2) of the Real Property Act.

Information provided through Tri-Search an approved LPI NSW Information Broker

LAND AND PROPERTY INFORMATION NEW SOUTH WALES - TITLE SEARCH

FOLIO: 411/1063902

SEARCH DATE	TIME	EDITION NO	DATE
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10/5/2010	7:50 PM	6	27/5/2009

LAND

LOT 411 IN DEPOSITED PLAN 1063902
AT MEDOWIE
LOCAL GOVERNMENT AREA PORT STEPHENS
PARISH OF STOWELL COUNTY OF GLOUCESTER
TITLE DIAGRAM DP1063902

FIRST SCHEDULE

NORMAN JAMES FRASER

SECOND SCHEDULE (4 NOTIFICATIONS)

- 1 RESERVATIONS AND CONDITIONS IN THE CROWN GRANT(S)
- 2 DP1097094 EASEMENT FOR OVERHEAD ELECTRICITY CABLES AND ACCESS
THERE TO 15 METRES WIDE AFFECTING THE PART(S) SHOWN SO
BURDENED IN DP1097094
- 3 DP1097094 EASEMENT FOR ELECTRICITY SUBSTATION AND ACCESS THERETO
8.44 METRE(S) WIDE AFFECTING THE PART(S) SHOWN SO
BURDENED IN DP1097094
- 4 AE709245 MORTGAGE TO COMMONWEALTH BANK OF AUSTRALIA

NOTATIONS

UNREGISTERED DEALINGS: NIL

*** END OF SEARCH ***



Morris Hayes & Edgar

LPI On-Line

Phone: (02) 9232 2411

Morris Hayes & Edgar hereby certifies that the information contained in this document has been provided electronically by the Registrar General in accordance with Section 96B(2) of the Real Property Act.

Information provided through Tri-Search an approved LPI/NSW Information Broker

LAND AND PROPERTY INFORMATION NEW SOUTH WALES - TITLE SEARCH

FOLIO: 412/1063902

SEARCH DATE	TIME	EDITION NO	DATE
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10/5/2010	7:51 PM	4	16/4/2009

LAND

LOT 412 IN DEPOSITED PLAN 1063902
AT MEDOWIE
LOCAL GOVERNMENT AREA PORT STEPHENS
PARISH OF STOWELL COUNTY OF GLOUCESTER
TITLE DIAGRAM DP1063902

FIRST SCHEDULE

WENDY MAY MORRIS

(T AE609568)

SECOND SCHEDULE (3 NOTIFICATIONS)

- 1 RESERVATIONS AND CONDITIONS IN THE CROWN GRANT(S)
- 2 DP1097094 EASEMENT FOR OVERHEAD ELECTRICITY CABLES AND ACCESS
THERE TO 15 METRES WIDE AFFECTING THE PART(S) SHOWN SO
BURDENED IN DP1097094
- 3 AE609569 MORTGAGE TO COMMONWEALTH BANK OF AUSTRALIA

NOTATIONS

UNREGISTERED DEALINGS: NIL

*** END OF SEARCH ***



Morris Hayes & Edgar

LPI On-Line

Phone: (02) 9232 2411

Morris Hayes & Edgar hereby certifies that the information contained in this document has been provided electronically by the Registrar General in accordance with Section 96B(2) of the Real Property Act.

Information provided through Tri-Search an approved LPI/NSW Information Broker

LAND AND PROPERTY INFORMATION NEW SOUTH WALES - TITLE SEARCH

FOLIO: 413/1063902

SEARCH DATE	TIME	EDITION NO	DATE
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10/5/2010	7:52 PM	4	14/1/2010

LAND

LOT 413 IN DEPOSITED PLAN 1063902
AT MEDOWIE
LOCAL GOVERNMENT AREA PORT STEPHENS
PARISH OF STOWELL COUNTY OF GLOUCESTER
TITLE DIAGRAM DP1063902

FIRST SCHEDULE

WENDY MAY MORRIS

(T AF252489)

SECOND SCHEDULE (1 NOTIFICATION)

1 RESERVATIONS AND CONDITIONS IN THE CROWN GRANT(S)

NOTATIONS

UNREGISTERED DEALINGS: NIL

*** END OF SEARCH ***



Morris Hayes & Edgar

LPI On-Line

Phone: (02) 9232 2411

Morris Hayes & Edgar hereby certifies that the information contained in this document has been provided electronically by the Registrar General.

Information provided through Tri-Search an approved LPI/NSW Information Broker

LAND AND PROPERTY INFORMATION NEW SOUTH WALES - HISTORICAL SEARCH

SEARCH DATE

10/5/2010 7:54PM

FOLIO: 411/1063902

First Title(s): OLD SYSTEM

Prior Title(s): 40/808163

Recorded	Number	Type of Instrument	C.T. Issue
4/2/2004	DP1063902	DEPOSITED PLAN	FOLIO CREATED EDITION 1
16/8/2005	AB697680	MORTGAGE	
16/8/2005	AB697681	MORTGAGE	EDITION 2
21/10/2005	AB855641	SUB-MORTGAGE	
23/8/2006	DP1097094	DEPOSITED PLAN	EDITION 3
28/8/2006	AC555463	DEPARTMENTAL DEALING	
19/9/2006	AC608541	DEPARTMENTAL DEALING	EDITION 4
19/9/2006	AC608600	DEPARTMENTAL DEALING	EDITION 5
20/3/2008	AD838206	CAVEAT	
27/5/2009	AE709242	WITHDRAWAL OF CAVEAT	
27/5/2009	AE709243	DISCHARGE OF MORTGAGE	
27/5/2009	AE709244	DISCHARGE OF MORTGAGE	
27/5/2009	AE709245	MORTGAGE	EDITION 6

*** END OF SEARCH ***



Morris Hayes & Edgar

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LAND AND PROPERTY INFORMATION NEW SOUTH WALES - HISTORICAL SEARCH

SEARCH DATE

10/5/2010 7:55PM

FOLIO: 412/1063902

First Title(s): OLD SYSTEM

Prior Title(s): 40/808163

Recorded	Number	Type of Instrument	C.T. Issue
-----	-----	-----	-----
4/2/2004	DP1063902	DEPOSITED PLAN	FOLIO CREATED EDITION 1
16/8/2005	AB697680	MORTGAGE	
16/8/2005	AB697681	MORTGAGE	EDITION 2
21/10/2005	AB855641	SUB-MORTGAGE	
23/8/2006	DP1097094	DEPOSITED PLAN	EDITION 3
20/3/2008	AD838206	CAVEAT	
16/4/2009	AE609565	WITHDRAWAL OF CAVEAT	
16/4/2009	AE609566	DISCHARGE OF MORTGAGE	
16/4/2009	AE609567	DISCHARGE OF MORTGAGE	
16/4/2009	AE609568	TRANSFER	
16/4/2009	AE609569	MORTGAGE	EDITION 4

*** END OF SEARCH ***



Morris Hayes & Edgar

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LAND AND PROPERTY INFORMATION NEW SOUTH WALES - HISTORICAL SEARCH

SEARCH DATE

10/5/2010 7:56PM

FOLIO: 413/1063902

First Title(s): OLD SYSTEM

Prior Title(s): 40/808163

Recorded	Number	Type of Instrument	C.T. Issue
-----	-----	-----	-----
4/2/2004	DP1063902	DEPOSITED PLAN	FOLIO CREATED EDITION 1
16/8/2005	AB697680	MORTGAGE	
16/8/2005	AB697681	MORTGAGE	EDITION 2
21/10/2005	AB855641	SUB-MORTGAGE	
20/3/2008	AD838206	CAVEAT	
23/4/2009	AE627593	WITHDRAWAL OF CAVEAT	
23/4/2009	AE627594	DISCHARGE OF MORTGAGE	
23/4/2009	AE627595	DISCHARGE OF MORTGAGE	EDITION 3
14/1/2010	AF252489	TRANSFER	EDITION 4

*** END OF SEARCH ***



Morris Hayes & Edgar

LPI On-Line

Phone: (02) 9232 2411

Morris Hayes & Edgar hereby certifies that the information contained in this document has been provided electronically by the Registrar General.

Information provided through Tri-Search an approved LPI/NSW Information Broker

LAND AND PROPERTY INFORMATION NEW SOUTH WALES - HISTORICAL SEARCH

SEARCH DATE

10/5/2010 7:57PM

FOLIO: 40/808163

First Title(s): OLD SYSTEM

Prior Title(s): 4/587953

Recorded	Number	Type of Instrument	C.T. Issue
12/2/1991	DP808163	DEPOSITED PLAN	FOLIO CREATED EDITION 1
21/10/1996	2547233	DISCHARGE OF MORTGAGE	
21/10/1996	2547234	MORTGAGE	EDITION 2
26/6/2002	8715738	DISCHARGE OF MORTGAGE	EDITION 3
8/8/2003	9861899	MORTGAGE	EDITION 4
20/1/2004	AA335563	DISCHARGE OF MORTGAGE	
4/2/2004	DP1063902	DEPOSITED PLAN	FOLIO CANCELLED RESIDUE REMAINS

*** END OF SEARCH ***



Morris Hayes & Edgar

LPI On-Line

Phone: (02) 9232 2411

Morris Hayes & Edgar hereby certifies that the information contained in this document has been provided electronically by the Registrar General.

Information provided through Tri-Search an approved LPI/NSW Information Broker

LAND AND PROPERTY INFORMATION NEW SOUTH WALES - HISTORICAL SEARCH

SEARCH DATE

10/5/2010 7:58PM

FOLIO: 4/587953

First Title(s): SEE PRIOR TITLE(S)

Prior Title(s): VOL 13271 FOL 80

Recorded	Number	Type of Instrument	C.T. Issue
-----	-----	-----	-----
28/3/1988		TITLE AUTOMATION PROJECT	LOT RECORDED FOLIO NOT CREATED
22/8/1988		CONVERTED TO COMPUTER FOLIO	FOLIO CREATED CT NOT ISSUED
12/2/1991	Z250526	APPLICATION	
12/2/1991	DP808163	DEPOSITED PLAN	FOLIO CANCELLED

*** END OF SEARCH ***

SIGNATURES AND SEALS ONLY

G. M.
M.G.A.

SURVEYORS (PRACTICE) REGULATION 2001 CLAUSE 32 (2)

MARK	M.G.A. COORDINATES		ZONE 56	
	EASTING	NORTHING	CLASS	ORDER
RM.27725	393 691 389	6 374 451 798	B	U
RM.27726	393 375 963	6 373 689 500	B	U
RM.73069	393 826 711	6 375 040 412	B	U

SOURCE: M.G.A. COORDINATES ADOPTED FROM
S.C.I.M.S. ON 7 MARCH 2003
COMBINED SCALE FACTOR 0.999737

Certified correct for the purposes of the
Real Property Act 1900 by the MORTGAGEE
SIGNED by LEONARDO MORAN as attorney
for Westpac Banking Corporation under
power of attorney Book 4299 No. 332

(Signature) Tier Three Attorney
By executing this instrument the attorney
states that the attorney has received no
notice of the revocation of the power of
attorney.

I certify that the attorney for the MORTGAGEE
with whom I am personally acquainted or as
to whose identity I am otherwise satisfied,
signed this instrument in my presence.

Signature of witness: [Signature]
Name of witness: NINA SIDON
Address of witness: 1 King Street
Concord West NSW

Crown Lands Office Approval

PLAN APPROVED
Land District:
Paper No.:
Field Book: pages:

Subdivision Certificate

I certify that the provisions of s. 100J of the Environmental Planning
and Assessment Act 1979 have been satisfied in relation to the
proposed Subdivision set out herein

(Insert 'subdivision' or 'new road')

*Authorized Person/General Manager/Accredited Certifier

Consent Authority: Port Stephens Council

Date of endorsement: 26 Sep 2003

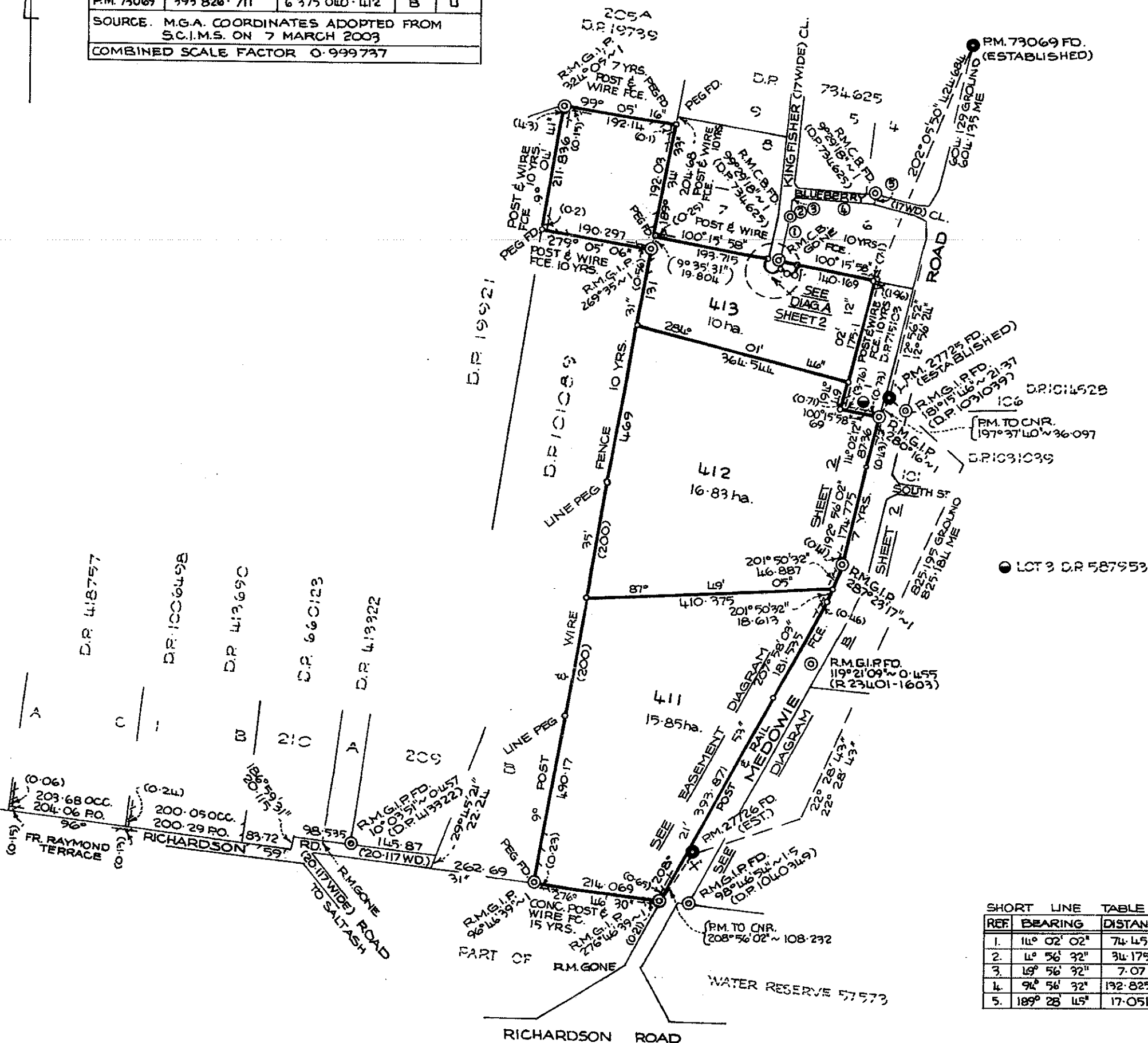
Accreditation No.:

Subdivision Certificate No.: 2003/137

File No.: 15-2001-1450-1

When the plan is to be lodged electronically in the Land Titles
Office, it should include a signature in an electronic or digital
format approved by the Registrar-General.

Delete whichever is inapplicable



DP1063902

Registered: 4-2-2004

Title System: TORRENS

Purpose: SUBDIVISION

Ref Map: PARISH #

Last Plan: DP808163, (DP19921)*

PLAN OF:
SUBDIVISION OF LOT 40
D.P. 808163

Lengths are in metres. Reduction Ratio 1:5000

L.G.A.: PORT STEPHENS

Locality: MEDOWIE

Parish: STOWELL

County: GLOUCESTER

This is sheet 1 of my plan in 2 sheets.
(Delete if inapplicable)

Surveyors (Practice) Regulation 2001
DARCY CHARLES MCLEWEE
of MCLEWEE ASSOCIATES PTY. LTD.
PO BOX 516 NEWCASTLE WEST
a surveyor registered under the Surveyors Act 1929, certify that
the survey represented in this plan is accurate, has been made
in accordance with the Surveyors (Practice) Regulation 2001
and was completed on 21 MARCH 2003
The survey relates to LOTS 411 TO 414 AND
EASEMENTS
(specify the land actually surveyed or specify any land shown
in the plan that is not the subject of the survey)

Signature: [Signature] Date: 15-5-03

Surveyor registered under the Surveyors Act 1929

Deum Line: X.O.Y. Type: Urban/Rural

Plans used in preparation of survey/compilation

DP 19739 DP 734625
DP 19921 DP 808163
DP 101089 DP 1014528
DP 413722 DP 1031039
D.P. 587953

PANEL FOR USE ONLY for statements or intention to
dedicate public roads, to create public reserves, drainage
reserves, easements, restrictions on the use of land or
positive covenants.

IT IS INTENDED

- (A) TO DEDICATE
(1) THE EXTENSION OF
KINGFISHER CLOSE TO THE
PUBLIC AS PUBLIC ROAD.
(2) TO CREATE
PURSUANT TO SECTION 88B
OF THE CONVEYANCING ACT
1919
(1) EASEMENT FOR OVERHEAD
ELECTRICITY CABLES AND
ACCESS THERETO 15 WIDE
(2) EASEMENT FOR ELECTRICITY
SUBSTATION AND ACCESS
THERETO 8-14 WIDE.

SHORT LINE TABLE

REF	BEARING	DISTANCE
1.	110° 02' 02"	74.45
2.	11° 56' 32"	34.175
3.	16° 56' 32"	7.07
4.	94° 56' 32"	132.825
5.	189° 28' 45"	17.051

Registered: 4-2-2004

This is sheet 2 of my plan in 2 sheets
dated 21 MARCH 2003

Surveyor registered under Surveyors Act 1929

This is sheet _____ of the plan of
sheets covered by my Certificate No. _____
of _____

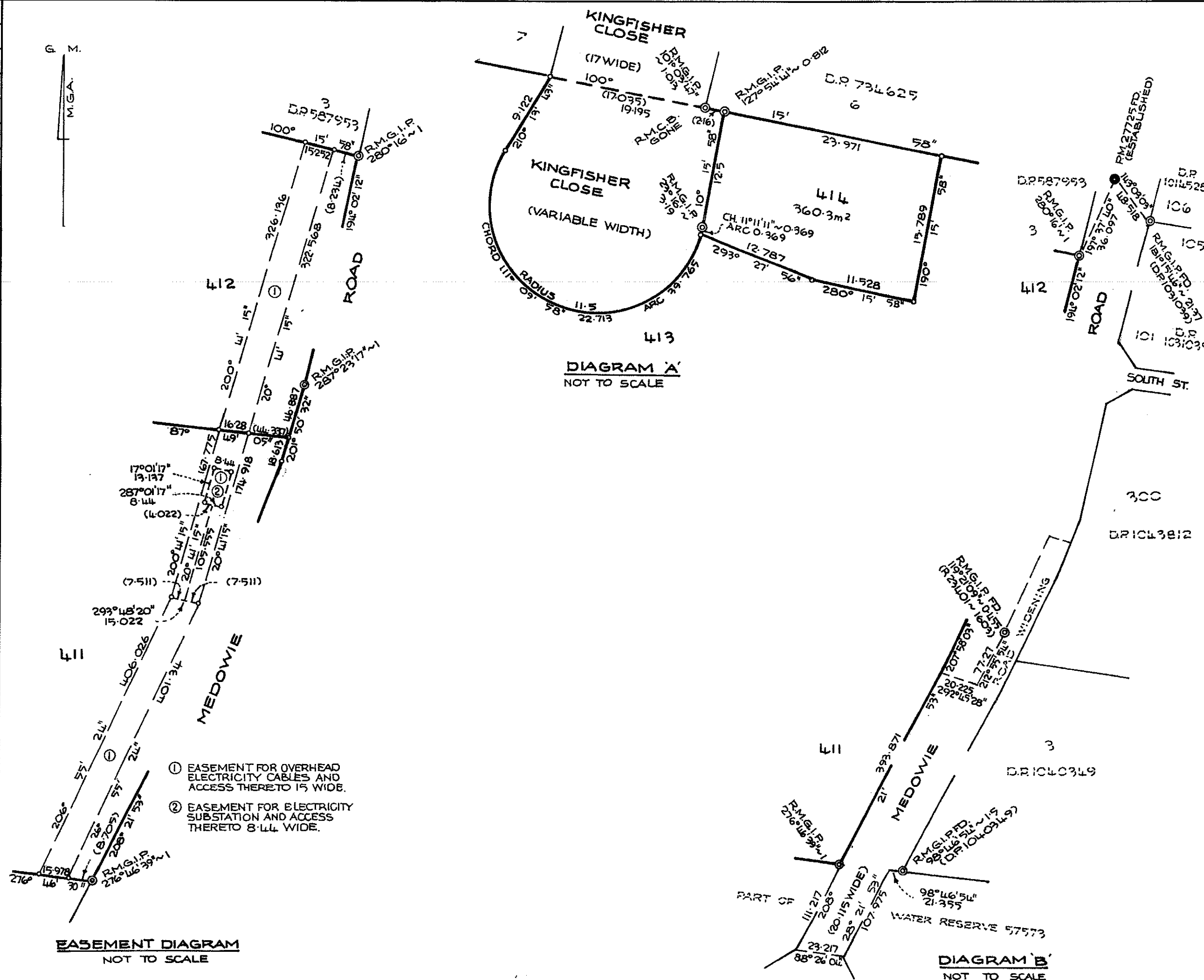
Recent Work

General Manager/Authorised Person

For use where space is insufficient in any panel on Plan Form 2

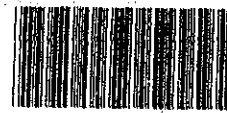
Reduction Ratio 1:

SURVEYOR'S REFERENCE: A.16575



NEW SOUTH WALES

CERTIFICATE OF TITLE
PROPERTY ACT, 1900



Appln. No. 7104

Prior Titles Vol. 12726 Fol. 108
Vol. 6159 Fol. 37

Vol. **13271** Fol. **80**



EDITION ISSUED

18 3 1977

certify that the person described in the First Schedule is the registered proprietor of the undermentioned estate in the land within described subject nevertheless to such exceptions encumbrances and interests as are shown in the Second Schedule.

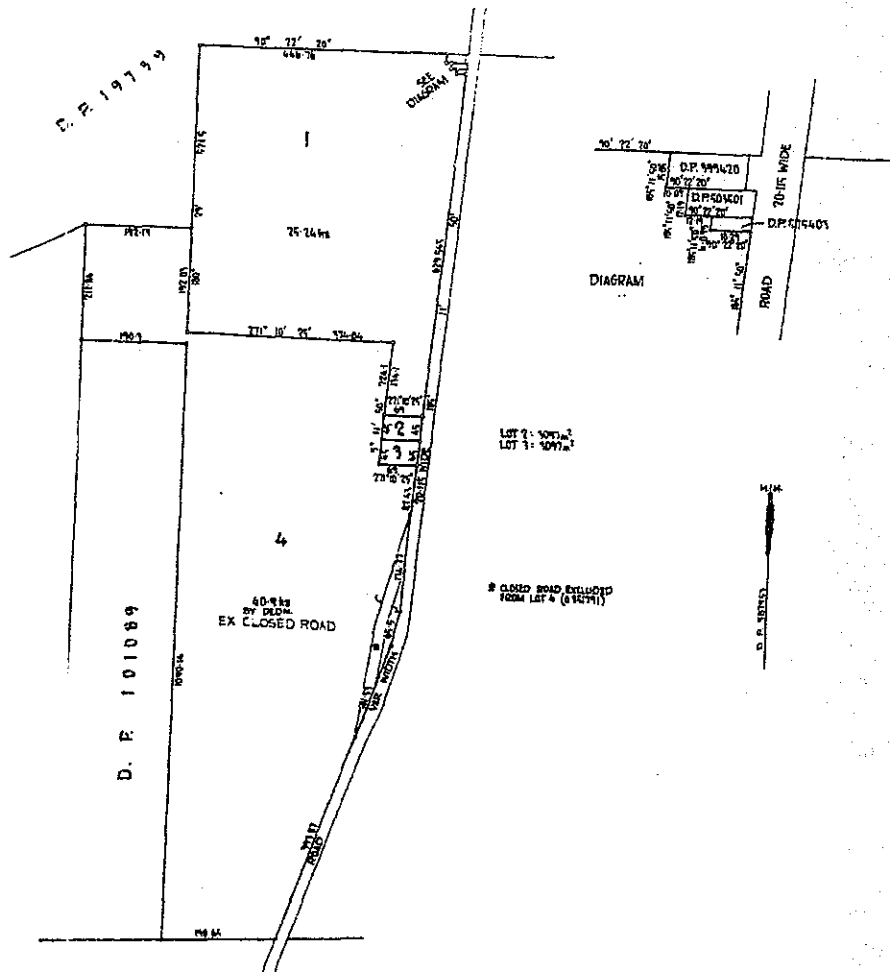
CANCELLED

Registrar General
SEE AUTO FOLIO



PLAN SHOWING LOCATION OF LAND

LENGTHS ARE IN METRES



ESTATE AND LAND REFERRED TO

Estate in Fee Simple in Lot 4 in Deposited Plan 587953 at Medowie in the Shire of Port Stephens Parish of Stowell and County of Gloucester being part of Portion 44 granted to Richard Windeyer on 27-2-1839. EXCEPTING THEREOUT the closed road shown in the plan hereon.

FIRST SCHEDULE

~~ERICA SYDIL MIRPIN~~ of Medowie, ~~Married~~ Woman.

SECOND SCHEDULE

1. Reservations and conditions, if any, contained in the Crown Grant above referred to.

NOTE: ENTRIES RULED THROUGH AND AUTHENTICATED BY THE SEAL OF THE REGISTRAR GENERAL ARE CANCELLED.

WARNING: THIS DOCUMENT MUST NOT BE REMOVED FROM THE LAND TILES OFFICE.

PERSONS ARE CAUTIONED AGAINST ALTERING OR ADDING TO THIS CERTIFICATE OR ANY NOTIFICATION HEREON

B97

/Req: B567153
/Doc: CT 13271-080
/Prt: 11-May-2010

FIRST SCHEDULE (continued)

REGISTERED PROPRIETOR

Norman James Fraser of Broadmeadow, Business Proprietor

CANCELLED

SEE ALSO 0105

SECOND SCHEDULE (continued)

INSTRUMENT

PARTICULARS

Mortgage

to The Commercial Bank of Australia Limited

ENTERED

Signature of
Registrar General

CANCELLATION

NOTE: ENTRIES RULED THROUGH AND AUTHENTICATED BY THE SEAL OF THE REGISTRAR GENERAL ARE CANCELLED

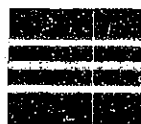
B97

/Req: B567158
/Doc: CT 12726-108
/Prt: 11-May-2010

PERSONS ARE CAUTIONED AGAINST ALTERING OR ADDING TO THIS CERTIFICATE

12726 108
Vol. Fol.

NEW SOUTH WALES



CERTIFICATE OF TITLE

LAND PROPERTY ACT, 1900

Vol. 12726 Fol. 108

CANCELLED

Edition issued 11-3-1975.



Appln. No. 7104

Prior Title Vol.9586 Fol.37

I certify that the person described in the First Schedule is the registered proprietor of the undermentioned estate in the land with described subject nevertheless to such exceptions encumbrances and interests as are shown in the Second Schedule.

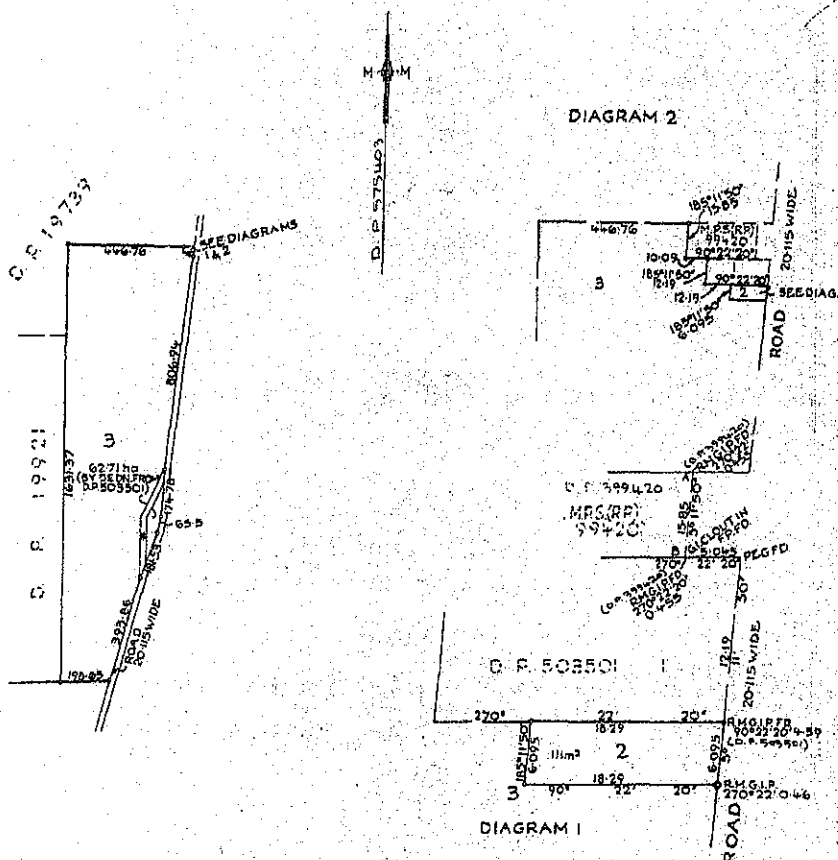
CANCELLED

Registrar General.



PLAN SHOWING LOCATION OF LAND

LENGTHS ARE IN METRES



ESTATE AND LAND REFERRED TO

Estate in Fee Simple in Lot 3 in Deposited Plan 575403 at Medowie in the Shire of Port Stephens Parish of Stowell and County of Gloucester being part of Portion 44 granted to Richard Windeyer on 27-2-1839.

FIRST SCHEDULE

ERICA SYBIL MIRFIN of Medowie, Married Woman.

SECOND SCHEDULE

1. Reservations and conditions, if any, contained in the Crown Grant above referred to.

NOTE: ENTRIES RULED THROUGH AND AUTHENTICATED BY THE SEAL OF THE REGISTRAR GENERAL ARE CANCELLED

FIRST SCHEDULE (continued)

REGISTERED PROPRIETOR

This deed is cancelled as to the whole
New Certificates of Title have issued on 7-3-1977.
for lots in Deposited Plan No. S 87953 as follows:-
Lots 1204 Vol 13271 Fol 274680 respectively



REGISTRAR GENERAL

[illegible]

NEW CERTIFICATES OF TITLE ISSUED ON: DP587933
NO DEALING TO BE REGISTERED WITHOUT REFERENCE TO
SURVEY DRAFTING BRANCH

SECOND SCHEDULE (continued)

[illegible]

NOTE: ENTERPRISE PUBLICATIONS WILL PRINT OUT THE VALUE OF THE PAPER CONVERTED TO CENTS.

M
NEW SOUTH WALES

CERTIFICATE OF TITLE
PROPERTY ACT, 1900, as amended.



9586-037

(For Grant and title reference
prior to first edition see
Deposited Plan.)

Vol. 9586 Fol. 37

1st Edition issued 5-12-1963.



CANCELLED ☒

I certify that the person described in the First Schedule is the registered proprietor of the undermentioned estate in the land within described subject nevertheless to such exceptions encumbrances and interests as are shown in the Second Schedule.

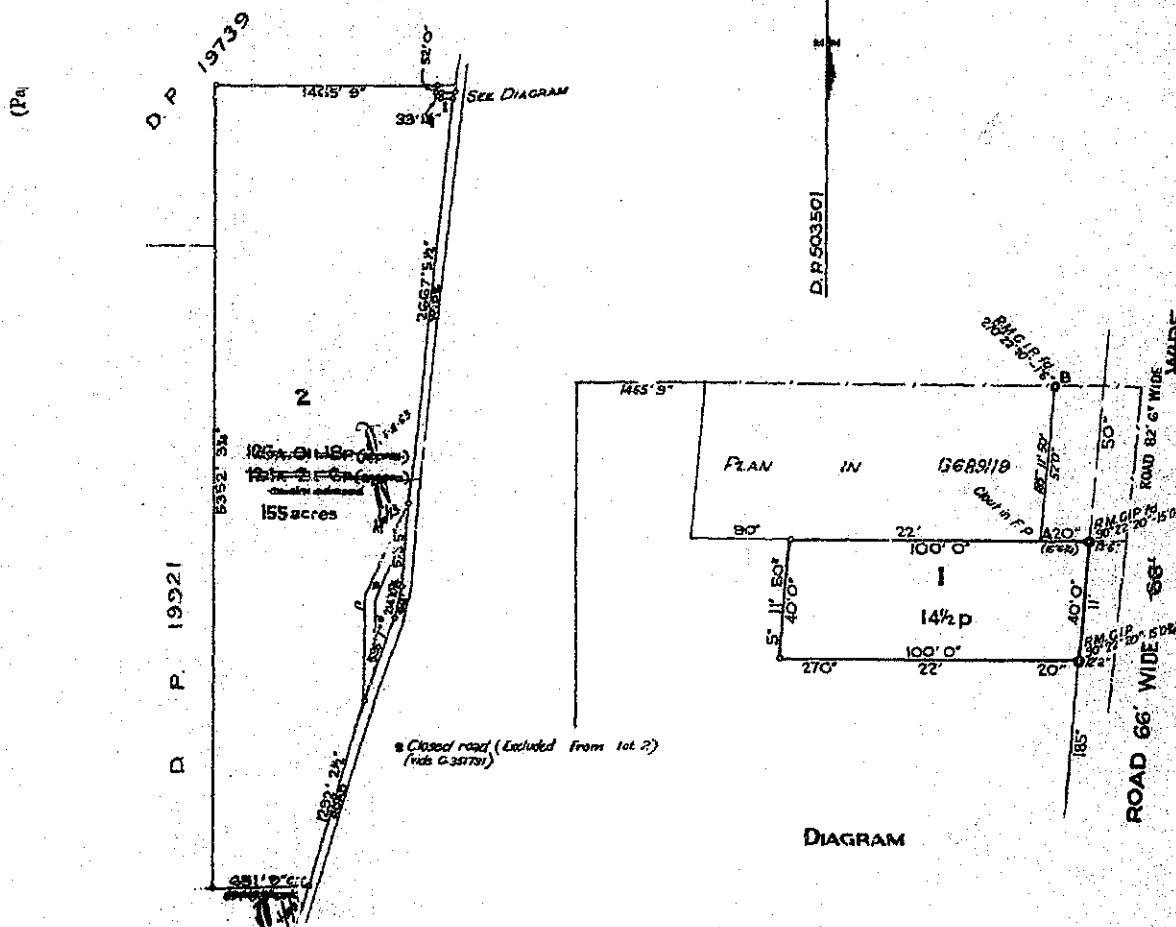
Witness

[Signature]

[Signature]
Registrar-General.



PLAN SHOWING LOCATION OF LAND



ESTATE AND LAND REFERRED TO.

Estate in Fee Simple in Lot 2 in Deposited Plan 503501 at Meadowie in the Shire of Port Stephens Parish of Stowell and County of Gloucester.

FIRST SCHEDULE (Continued overleaf)

~~REES JAMES, of Meadowie, Farmer~~

[Signature]
Registrar General.

SECOND SCHEDULE (Continued overleaf)

1. Reservations and conditions, if any, contained in the Crown Grant(s) referred to in the said Deposited Plan.

[Signature]
Registrar General.

NOTE: ENTRIES RULED THROUGH AND AUTHENTICATED BY THE SEAL OF THE REGISTRAR-GENERAL ARE CANCELLED

WARNING: THIS DOCUMENT MUST NOT BE REMOVED FROM THE LAND TITLES OFFICE

PERSONS ARE CAUTIONED AGAINST ALTERING OR ADDING TO THIS CERTIFICATE OR ANY NOTIFICATION HEREON

/Reg: B567164
/Doc: CT 09586-037
/Prt: 13-May-2010

FIRST SCHEDULE (continued)

REGISTERED PROPRIETOR

[illegible]

Vol. 9586 Fol. 37

SECOND SCHEDULE (continued)[illegible]

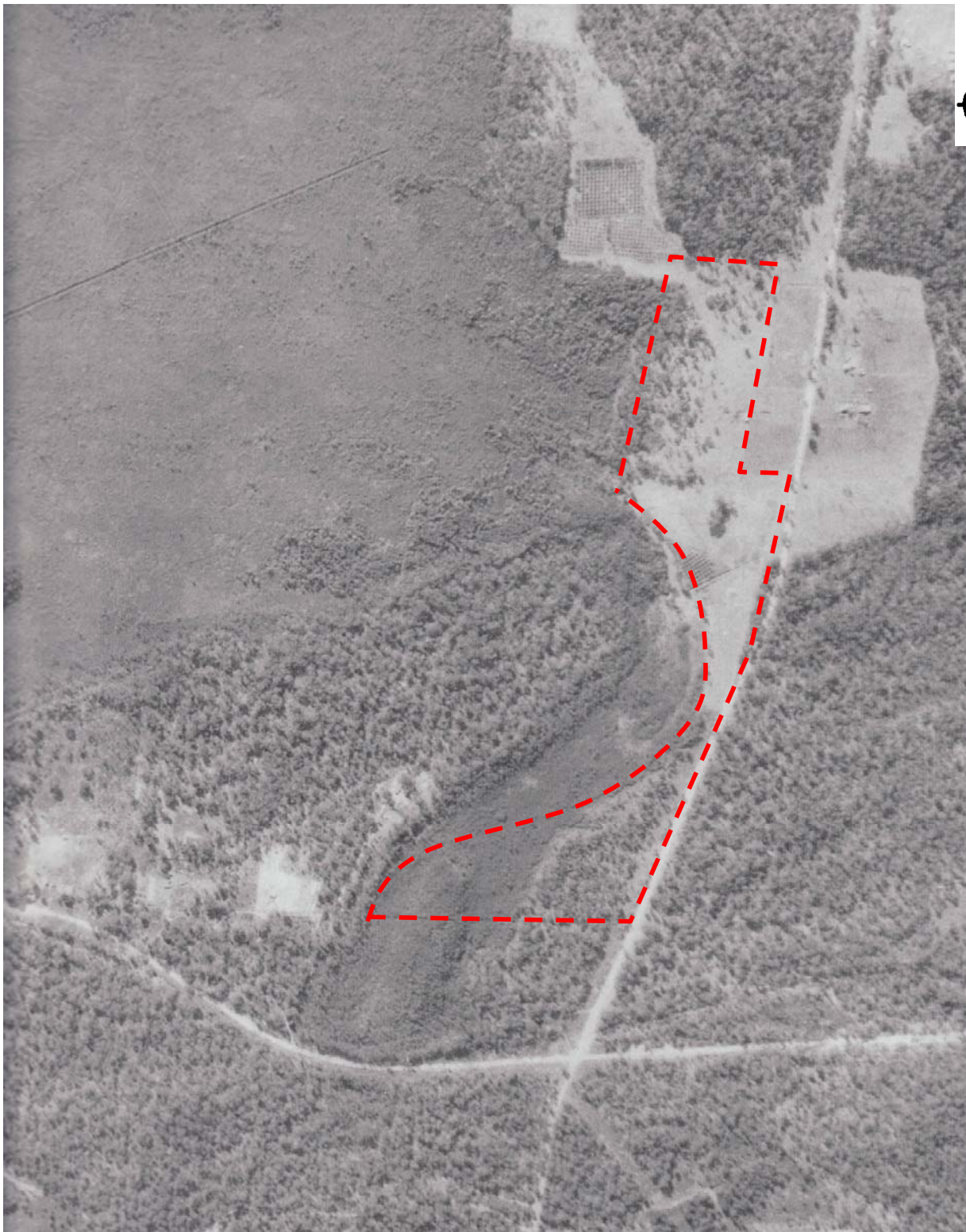
FORM No. 184A

NOTE: ENTRIES RULED THROUGH AND AUTHENTICATED BY THE SEAL OF THE REGISTRAR-GENERAL ARE CANCELLED

Appendix C

Aerial Photographs

**Preliminary Contamination Assessment
Medowie Road, Medowie NSW**



Legend:
Approximate Site Location

drawn	DCH	 coffey environments SPECIALISTS IN ENVIRONMENTAL, SOCIAL AND SAFETY PERFORMANCE	client:	HDB TOWN PLANNING AND DESIGN	
approved			project:	PROPOSED MIXED USE REZONING MEDOWIE ROAD, MEDOWIE NSW PRELIMINARY CONTAMINATION ASSESSMENT	
date	13/05/2010		title:	1954 AERIAL PHOTOGRAPH	
scale	NTS		project no:	ENVIWARA00340AB	figure no: 1954
original size	A4				



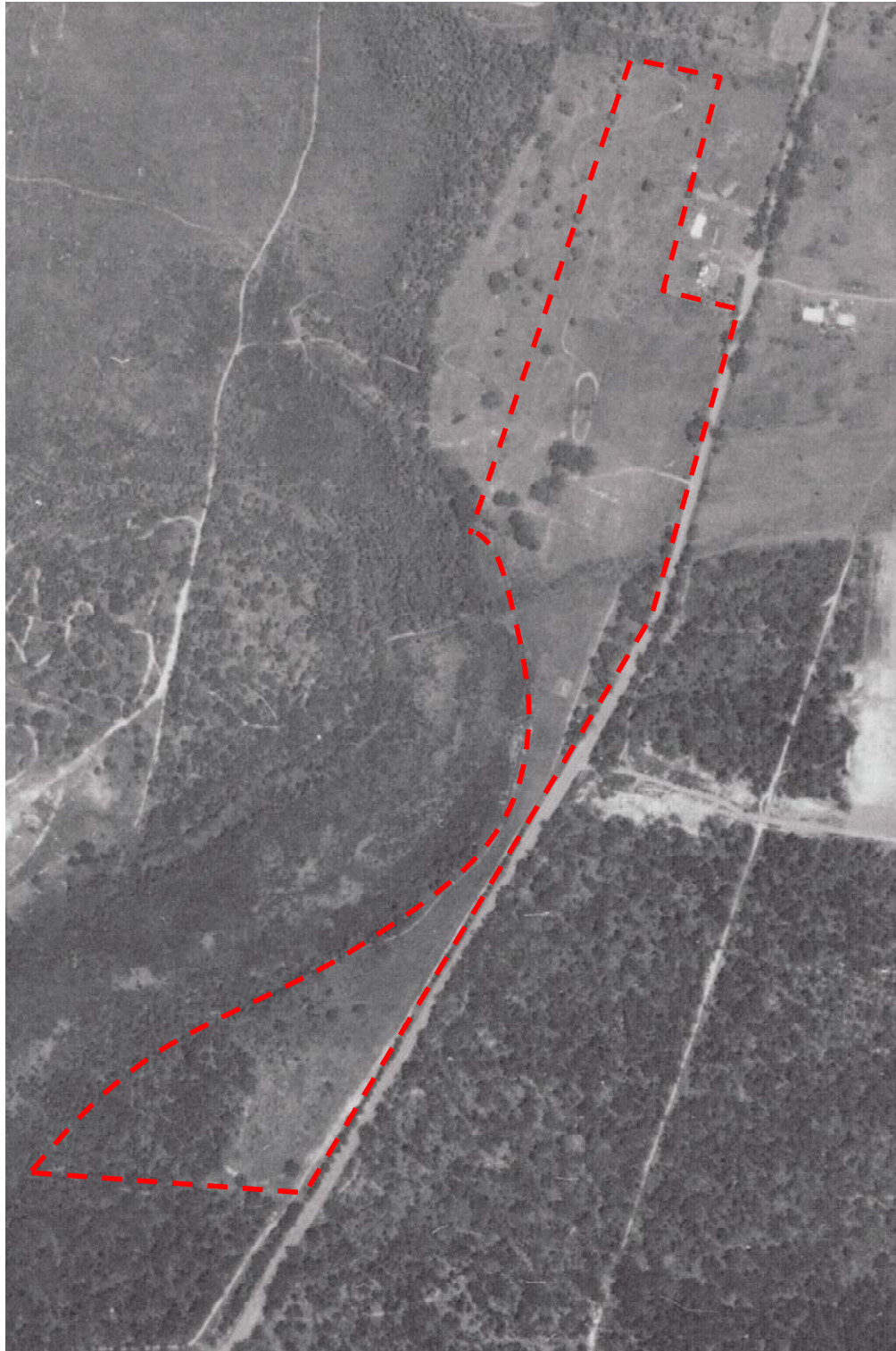
 **Legend:**
Approximate Site Location

drawn	DCH	 coffey environments SPECIALISTS IN ENVIRONMENTAL, SOCIAL AND SAFETY PERFORMANCE	client:	HDB TOWN PLANNING AND DESIGN	
approved			project:	PROPOSED MIXED USE REZONING MEDOWIE ROAD, MEDOWIE NSW PRELIMINARY CONTAMINATION ASSESSMENT	
date	13/05/2010		title:	1966 AERIAL PHOTOGRAPH	
scale	NTS		project no:	ENVIWARA00340AB	figure no: 1966
original size	A4				



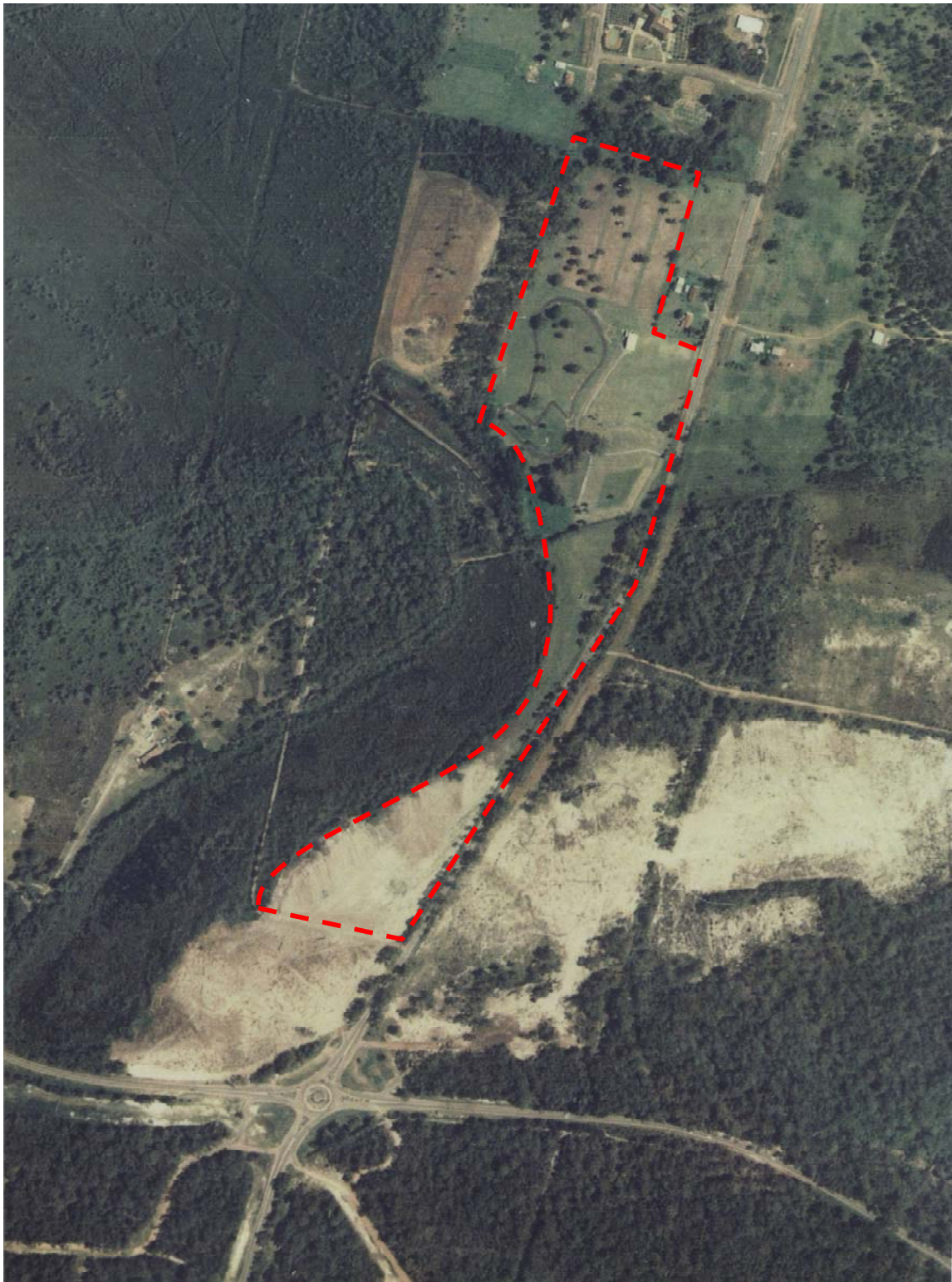
Legend:
Approximate Site Location

drawn	DCH	 SPECIALISTS IN ENVIRONMENTAL, SOCIAL AND SAFETY PERFORMANCE	client:	HDB TOWN PLANNING AND DESIGN	
approved			project:	PROPOSED MIXED USE REZONING MEDOWIE ROAD, MEDOWIE NSW PRELIMINARY CONTAMINATION ASSESSMENT	
date	13/05/2010		title:	1975 AERIAL PHOTOGRAPH	
scale	NTS		project no:	ENVIWARA00340AB	figure no: 1975
original size	A4				



Legend:
Approximate Site Location

drawn	DCH	 SPECIALISTS IN ENVIRONMENTAL, SOCIAL AND SAFETY PERFORMANCE	client:	HDB TOWN PLANNING AND DESIGN	
approved			project:	PROPOSED MIXED USE REZONING MEDOWIE ROAD, MEDOWIE NSW PRELIMINARY CONTAMINATION ASSESSMENT	
date	13/05/2010		title:	1983 AERIAL PHOTOGRAPH	
scale	NTS		project no:	ENVIWARA00340AB	figure no: 1983
original size	A4				



 **Legend:**
Approximate Site Location

drawn	DCH	 coffey environments SPECIALISTS IN ENVIRONMENTAL, SOCIAL AND SAFETY PERFORMANCE	client:	HDB TOWN PLANNING AND DESIGN	
approved			project:	PROPOSED MIXED USE REZONING MEDOWIE ROAD, MEDOWIE NSW PRELIMINARY CONTAMINATION ASSESSMENT	
date	13/05/2010		title:	1993 AERIAL PHOTOGRAPH	
scale	NTS		project no:	ENVIWARA00340AB	figure no: 1993
original size	A4				



 **Legend:**
Approximate Site Location

drawn	DCH	 SPECIALISTS IN ENVIRONMENTAL, SOCIAL AND SAFETY PERFORMANCE	client:	HDB TOWN PLANNING AND DESIGN	
approved			project:	PROPOSED MIXED USE REZONING MEDOWIE ROAD, MEDOWIE NSW PRELIMINARY CONTAMINATION ASSESSMENT	
date	13/05/2010		title:	2004 AERIAL PHOTOGRAPH	
scale	NTS		project no:	ENVIWARA00340AB	figure no: 2004
original size	A4				



Source: Google Earth, 2010

 **Legend:**
Approximate Site Location

drawn	DCH	 SPECIALISTS IN ENVIRONMENTAL, SOCIAL AND SAFETY PERFORMANCE	client:	HDB TOWN PLANNING AND DESIGN	
approved			project:	PROPOSED MIXED USE REZONING MEDOWIE ROAD, MEDOWIE NSW PRELIMINARY CONTAMINATION ASSESSMENT	
date	13/05/2010		title:	2010 AERIAL PHOTOGRAPH	
scale	NTS		project no:	ENVIWARA00340AB	figure no: 2010
original size	A4				

Appendix D

Site Photographs

**Preliminary Contamination Assessment
Medowie Road, Medowie NSW**



PHOTOGRAPH 1: The electrical substation (transformer yard) located near the middle of the site



PHOTOGRAPH 2: Looking towards the tennis court near the gravel driveway (shown in the foreground) near the middle of the site

drawn	DCH	 coffey environments SPECIALISTS IN ENVIRONMENTAL, SOCIAL AND SAFETY PERFORMANCE	client:	HDB TOWN PLANNING AND DESIGN	
approved			project:	PRELIMINARY CONTAMINATION ASSESSMENT PROPOSED MIXED USE REZONING MEDOWIE ROAD, MEDOWIE NSW	
date	14/05/2010		title:	SITE PHOTOGRAPHS	
scale			project no:	ENVIWARA00340AB	
original size	A4				



PHOTOGRAPH 3: Looking at the small drain that cuts east to west across the middle of the site



PHOTOGRAPH 4: The bitumen-paved racing track located near the northern residence on the site

drawn	DCH	 coffey environments SPECIALISTS IN ENVIRONMENTAL, SOCIAL AND SAFETY PERFORMANCE	client:	HDB TOWN PLANNING AND DESIGN	
approved			project:	PRELIMINARY CONTAMINATION ASSESSMENT PROPOSED MIXED USE REZONING MEDOWIE ROAD, MEDOWIE NSW	
date	14/05/2010		title:	SITE PHOTOGRAPHS	
scale			project no:	ENVIWARA00340AB	
original size	A4				



PHOTOGRAPH 5: Looking at one of the two fill mounds that act as buffers around the racing track. This fill mound is located along the south-western section of the track



PHOTOGRAPH 6: Looking at the two fill mounds located around the racing track. This fill mound is located along the northern side of the track

drawn	DCH	 SPECIALISTS IN ENVIRONMENTAL, SOCIAL AND SAFETY PERFORMANCE	client:	HDB TOWN PLANNING AND DESIGN	
approved			project:	PRELIMINARY CONTAMINATION ASSESSMENT PROPOSED MIXED USE REZONING MEDOWIE ROAD, MEDOWIE NSW	
date	14/05/2010		title:	SITE PHOTOGRAPHS	
scale			project no:	ENVIWARA00340AB	
original size	A4				



PHOTOGRAPH 7: Looking at the swamp / marsh area adjacent to the north-western section of the site.



PHOTOGRAPH 8: A stockpile of predominantly sandy soil near the racing track. This stockpile is inferred to have been created from soil excavated elsewhere on site

drawn	DCH	 SPECIALISTS IN ENVIRONMENTAL, SOCIAL AND SAFETY PERFORMANCE	client:	HDB TOWN PLANNING AND DESIGN	
approved			project:	PRELIMINARY CONTAMINATION ASSESSMENT PROPOSED MIXED USE REZONING MEDOWIE ROAD, MEDOWIE NSW	
date	14/05/2010		title:	SITE PHOTOGRAPHS	
scale			project no:	ENVIWARA00340AB	
original size	A4				



PHOTOGRAPH 9: The Medowie Wastewater Pumping Station, located along the northern boundary of the site



PHOTOGRAPH 10: Looking at some of the neighbouring buildings adjacent to the north-eastern section of the site. These buildings consisted of houses and sheds

drawn	DCH	 SPECIALISTS IN ENVIRONMENTAL, SOCIAL AND SAFETY PERFORMANCE	client:	HDB TOWN PLANNING AND DESIGN	
approved			project:	PRELIMINARY CONTAMINATION ASSESSMENT PROPOSED MIXED USE REZONING MEDOWIE ROAD, MEDOWIE NSW	
date	14/05/2010		title:	SITE PHOTOGRAPHS	
scale			project no:	ENVIWARA00340AB	
original size	A4				



PHOTOGRAPH 11: The house in the southern section of the site. A shed is also located in this section



PHOTOGRAPH 12: Septic tanks located near the southernmost house

drawn	DCH	 SPECIALISTS IN ENVIRONMENTAL, SOCIAL AND SAFETY PERFORMANCE	client:	HDB TOWN PLANNING AND DESIGN	
approved			project:	PRELIMINARY CONTAMINATION ASSESSMENT PROPOSED MIXED USE REZONING MEDOWIE ROAD, MEDOWIE NSW	
date	14/05/2010		title:	SITE PHOTOGRAPHS	
scale			project no:	ENVIWARA00340AB	
original size	A4				

Appendix E

Section 149 Planning Certificate

**Preliminary Contamination Assessment
Medowie Road, Medowie NSW**

SECTION 149 PLANNING CERTIFICATE

Applicant Ref.: Damien Hendrickk

Parcel No: 39464

APPLICANT DETAILS:

Applicant Name No: 579914

**COFFEY ENVIRONMENTS PTY LTD
19 WARABROOK BOULEVARDE
WARABROOK NSW 2304**

PROPERTY DESCRIPTION:

**507 Medowie Road MEDOWIE 2318
LOT: 412 DP: 1063902**

BACKGROUND INFORMATION:

This certificate provides information on how a property (such as land, a house, a commercial building, etc) may be used and the limits on its development. The certificate contains information Council is aware of through its records and environmental plans, along with data supplied by the State Government. The details contained in this certificate are limited to that required by Section 149 of the Environmental Planning and Assessment Act.

NAME OF LOCAL ENVIRONMENTAL PLAN APPLYING TO THE PROPERTY:

Port Stephens Local Environmental Plan 2000 – Gazetted on 29th December, 2000 in Government Gazette No. 170 and as subsequently amended.

DRAFT LOCAL ENVIRONMENTAL PLAN(S) EXHIBITED PURSUANT TO SECTION 66 (1)B OF THE EP&A ACT:

No Draft Local Environmental Plans currently exist which affect the site the subject of this certificate.

ZONING:

1(c1) - RURAL SMALL HOLDINGS

1(c2) - RURAL SMALL HOLDINGS



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The purposes for which development may be carried out in accordance with the above zones are as follows:

Zone Nos. 1(c1), 1(c2), 1(c3), 1(c4), 1(c5) - Rural Small Holdings

ITEM 1: Development allowed without development consent

- agriculture, and
- exempt development.

ITEM 2: Development allowed only with development consent

Development for the purpose of:

- advertisements,
- animal establishments,
- aquaculture,
- bed and breakfast establishments,
- bushfire hazard reduction,
- child care centres,
- clearing,
- community facilities,
- dams,
- dual occupancy housing,
- dwelling-houses,
- earthworks,
- educational establishments,
- exhibition homes,
- health consulting rooms,
- home employment,
- intensive agriculture,
- places of public worship,
- recreation areas,
- roadside stalls,
- rural industries,
- telecommunication facilities,
- utility installations,
- veterinary hospitals,
- subdivision permitted by clause 12.

ITEM 3: Development which is prohibited

Any development not included in Item 1 or 2.

Zone Nos. 1(c1), 1(c2), 1(c3), 1(c4), 1(c5) - Rural Small Holdings

ITEM 1: Development allowed without development consent

- agriculture, and
- exempt development.

ITEM 2: Development allowed only with development consent



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Development for the purpose of:

- advertisements,
- animal establishments,
- aquaculture,
- bed and breakfast establishments,
- bushfire hazard reduction,
- child care centres,
- clearing,
- community facilities,
- dams,
- dual occupancy housing,
- dwelling-houses,
- earthworks,
- educational establishments,
- exhibition homes,
- health consulting rooms,
- home employment,
- intensive agriculture,
- places of public worship,
- recreation areas,
- roadside stalls,
- rural industries,
- telecommunication facilities,
- utility installations,
- veterinary hospitals,
- subdivision permitted by clause 12.

ITEM 3: Development which is prohibited

Any development not included in Item 1 or 2.

SITE SPECIFIC CLAUSES APPLYING TO THE PROPERTY UNDER PORT STEPHENS LOCAL ENVIRONMENTAL PLAN(S):

The land the subject of this certificate is affected by access restrictions: CLAUSE 41 - DIRECT ACCESS TO CERTAIN ROADS IS RESTRICTED. Please contact Council's Strategic Planning Section for further information.

NAME OF EACH DEVELOPMENT CONTROL PLAN APPLYING TO THE PROPERTY:

A DCP adds further detail to Local Environmental Plans and may address issues such as building height, carparking etc. Copies of the plans are available from Council. This section includes any Development Control Plan prepared by the Director-General Planning NSW.

PORT STEPHENS DCP 2007 - DEVELOPMENT CONTROL PLAN 2007



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NAMES OF STATE ENVIRONMENTAL PLANNING POLICIES APPLYING TO THE PROPERTY:

Including Draft State Environmental Planning Policies exhibited pursuant to Section 39(2) of the EP&A Act.

S.E.P.P. NO 1 - DEVELOPMENT STANDARDS.

S.E.P.P. NO 4 - DEVELOPMENT WITHOUT CONSENT.

S.E.P.P. NO 6 - NUMBER OF STOREYS IN A BUILDING.

S.E.P.P. NO 8 - SURPLUS PUBLIC LAND.

S.E.P.P. NO 9 - GROUP HOMES.

S.E.P.P. NO 10 - RETENTION OF LOW COST RENT ACCOMMODATION.

S.E.P.P. NO 11 - TRAFFIC GENERATING DEVELOPMENTS.

S.E.P.P. NO 14 - COASTAL WETLANDS.

S.E.P.P. NO 15 - RURAL LANDSHARING COMMUNITIES.

S.E.P.P. NO 21 - CARAVAN PARKS.

S.E.P.P. NO 22 - SHOPS AND COMMERCIAL PREMISES.

S.E.P.P. NO 30 - INTENSIVE AGRICULTURE.

S.E.P.P. NO 33 - HAZARDOUS AND OFFENSIVE DEVELOPMENT.

S.E.P.P. NO 36 - PLANNING INITIATIVES FOR MANUFACTURED HOME ESTATES.

S.E.P.P. NO 37 - CONTINUED MINES AND EXTRACTIVE INDUSTRIES.

S.E.P.P. NO 44 - KOALA HABITAT PROTECTION.

S.E.P.P. NO 45 - PERMISSIBILITY OF MINING.

S.E.P.P. NO 50 - CANAL ESTATE DEVELOPMENT.

S.E.P.P. NO 55 - REMEDIATION OF LAND.

S.E.P.P. NO 65 - DESIGN QUALITY OF RESIDENTIAL FLAT DEVELOPMENT.

SEPP (MAJOR PROJECTS) 2005

SEPP (ARTC Rail Infrastructure)

SEPP (Building Sustainability Index: BASIX)

SEPP (Mining, Petroleum Production and Extractive Industries)



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SEPP - Exempt & Complying Development Codes effective 27 February 2009

WILLIAMS RIVER CATCHMENT REGIONAL ENVIRONMENTAL PLAN 1997.

DRAFT S.E.P.P. NO 66 - INTEGRATION OF LAND USE AND TRANSPORT.

DO THE PROPERTIES DIMENSIONS PERMIT THE ERECTION OF A DWELLING-HOUSE?

The erection of a dwelling-house (where permitted by the land use tables) may be prohibited because of a development standard relating to the minimum area on which a dwelling-house may be erected. This development standard is dependent upon the zoning of the land. Clauses 14, 19, 34 and 35 of Port Stephens Local Environmental Plan 2000 are relevant in this regard and can be found at Annexure A to this certificate.

DOES THE PROPERTY INCLUDE OR COMPRISE OF CRITICAL HABITAT?

Council's records indicate that the land subject of this certificate DOES NOT include or comprise of critical habitat.

IS THE PROPERTY IN A CONSERVATION AREA?

The property subject of this certificate is not within a conservation area.

IS AN ITEM OF ENVIRONMENTAL HERITAGE SITUATED ON THE PROPERTY?

No item(s) of Environmental Heritage are situated on the land the subject of this certificate.

IS THE PROPERTY PART OF ANY APPLICATION FOR "DECLARED STATE SIGNIFICANT DEVELOPMENT"?

Development is judged to be "State significant" if it involves development of economic, social or environmental significance to the State or regions. For more information contact Department of Planning.

Development to which State Environmental Planning Policy (Major Projects) applies has been declared as State significant development by the Minister for Planning.

WHETHER OR NOT THE LAND IS LAND ON WHICH COMPLYING DEVELOPMENT MAY BE CARRIED OUT UNDER EACH OF THE CODES FOR COMPLYING DEVELOPMENT IN STATE ENVIRONMENTAL PLANNING POLICY (EXEMPT AND COMPLYING DEVELOPMENT CODES) 2008?



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HOUSING INTERNAL ALTERATIONS CODE

GENERAL HOUSING CODE

Complying development under the General Housing Code **may not** be carried out on the land. The land is affected by one or more of the following specific land exemptions under clause 1.19 of that Policy:

- "Environmentally sensitive area" (see note below); or
- land that comprises, or on which there is, an **item that is listed on the State Heritage Register** under the Heritage Act 1977 or that is subject to an **interim heritage order** under the Heritage Act 1977, or land that comprises, or on which there is, a **heritage item or a draft heritage item**, or land within a **wilderness area** (identified under the *Wilderness Act 1987*); or
- land within a **heritage conservation area** or a **draft heritage conservation area**; or
- land that is reserved for a **public purpose in an environmental planning instrument**; or
- **unsewered land** to which *Drinking Water Catchments Regional Environmental Plan No 1* applies; or
- land identified on an **Acid Sulfate Soils Map** as being **Class 1 or Class 2**; or
- land that is **bush fire prone land**; or
- a **flood control lot**; or
- **excluded land** identified by an environmental planning instrument; or
- land in a foreshore area.

Complying development under the Housing Internal Alterations Code **may not** be carried out on the land. The land is affected by one or more of the following specific land exemptions under clause 1.19 of that Policy:

- "Environmentally sensitive area" (see note below); or
- Land that comprises, or on which there is, an **item that is listed on the State Heritage Register** under the Heritage Act 1977 or that is subject to an **interim heritage order** under the Heritage Act 1977, or land that comprises, or on which there is, a **heritage item or a draft heritage item**, or land within a **wilderness area** (identified under the *Wilderness Act 1987*).

Complying development under the General Commercial and Industrial Code **may not** be carried out on the land. The land is affected by one or more of the following specific land exemptions under clause 1.19 of that Policy:

- "Environmentally sensitive area" (see note below); or
- Land that comprises, or on which there is, an **item that is listed on the State Heritage Register** under the Heritage Act 1977 or that is subject to an **interim heritage order** under the Heritage Act 1977, or land that comprises, or on which there is, a **heritage item or a draft heritage item**, or land within a **wilderness area** (identified under the *Wilderness Act 1987*).

Note: Under the policy **environmentally sensitive area** means any of the following:

(a) the coastal waters of the State,



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- (b) a coastal lake,
- (c) land to which *State Environmental Planning Policy No 14— Coastal Wetlands* or *State Environmental Planning Policy No 26—Littoral Rainforests* applies,
- (d) land reserved as an aquatic reserve under the *Fisheries Management Act 1994* or as a marine park under the *Marine Parks Act 1997*,
- (e) land within a wetland of international significance declared under the Ramsar Convention on Wetlands or within a World heritage area declared under the World Heritage Convention,
- (f) land within 100m of land to which paragraph (c), (d) or (e) applies,
- (g) land identified in this or any other environmental planning instrument as being of high Aboriginal cultural significance or high biodiversity significance,
- (h) land reserved under the *National Parks and Wildlife Act 1974* or land to which Part 11 of that Act applies,
- (i) land reserved or dedicated under the *Crown Lands Act 1989* for the preservation of flora, fauna, geological formations or for other environmental protection purposes,
- (j) land identified as being critical habitat under the *Threatened Species Conservation Act 1995* or Part 7A of the *Fisheries Management Act 1994*.]

IS THE PROPERTY PART OF ANY APPLICATION FOR “DECLARED STATE SIGNIFICANT DEVELOPMENT”?

Development is judged to be “State significant” if it involves development of economic, social or environmental significance to the State or regions. For more information contact Department of Planning.

Development to which State Environmental Planning Policy (Major Projects) applies has been declared as State significant development by the Minister for Planning.

IS THE PROPERTY AFFECTED BY SECTION 38 OR 39 OF THE COASTAL PROTECTION ACT 1979?

Section 38 or Section 39 of the Coastal Protection Act is not applicable in respect to the site the subject of this Certificate.

IS THE PROPERTY IN A “PROCLAIMED MINE SUBSIDENCE DISTRICT” WITHIN THE MEANING OF SECTION 15 OF THE MINE SUBSIDENCE COMPENSATION ACT 1961?

Section 15 of the Mine Subsidence Compensation Act is not applicable in respect to the land the subject of this Certificate.

IS THE PROPERTY AFFECTED BY ROAD WIDENING OR ROAD REALIGNMENT?

Council's records indicate that the land the subject of this Certificate is NOT affected by any road widening or road realignment under:- (1) Section 25 of the Roads Act 1993; or (2) any environmental planning instrument; or (3) any resolution of the Council.



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ARE THERE ANY COUNCIL AND OTHER PUBLIC AUTHORITY POLICIES THAT RESTRICT DEVELOPMENT?

Council's records indicate that the land subject of this certificate is affected by RAAF Base Williamstown & Salt Ash Weapons Range 2025 ANEF (2nd Oct 2009). Included within the ANEF map is a table advising building site acceptability based on ANEF contours in accordance with AS 2021-2000. Copies of the ANEF map and table can be viewed on the Department of Defence website www.defence.gov.au/id/2025. Certain developments in high noise areas may be restrained in accordance AS 2021-2000

ARE THERE ANY FLOOD RELATED DEVELOPMENT CONTROLS?

Council's records indicate that the land may be wholly or partially flood prone land. On 19 December 2000, Council adopted a policy which restricts development on land so effected. Development on flood prone land is subject to flood related development controls. Information on the extent of flooding and development controls on land is available from Council's Strategic Planning Section and you are advised to make further enquiries.

IS THE LAND RESERVED FOR ACQUISITION?

Port Stephens Local Environmental Plan 2000 does not provide for the acquisition of the land subject of this certificate by a public authority, as referred to in Section 27 of the Act.

WHICH DEVELOPMENT CONTRIBUTION PLANS APPLY IF THIS PROPERTY IS DEVELOPED?

A Development Contribution Plan – commonly known as a Section 94 Plan – outlines the financial costs Council charges if a property is developed and Council believes the development will require additional services or facilities such as parks, road etc. Copies of the Plans are available from Council.

Port Stephens Section 94 Development Contribution Plan
Port Stephens Section 94a Development Contribution Plan

BUSHFIRE PRONE LAND

The land is shown as bush fire prone land in Council's records. Further details of any applicable restrictions on development of the land may be obtained on application to Council.

IS THE PROPERTY AFFECTED BY A PROPERTY VEGETATION PLAN UNDER THE NATIVE VEGETATION ACT 2003?

Council has not been notified of any Property Vegetation Plans under the Native Vegetation Act 2003 that affect the land to which this certificate applies.

SITE COMPATIBILITY CERTIFICATE & CONDITIONS FOR SENIORS HOUSING



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If the land to which *State Environmental Planning Policy (Housing for Seniors or People with a Disability) 2004* applies.

- a) Whether there is a current site compatibility certificate (seniors housing) of which council is aware.

Council is not aware of a site compatibility certificate (seniors housing) issued in respect of the subject land.

- b) Any terms referred to in clause 18(2) of the Policy that have been imposed as a condition of consent to a development application granted after 11th October 2007 in respect to the land to which this certificate relates.

No terms referred to in clause 18(2) of the policy have been imposed as a condition of development consent in respect of the land to which this certificate relates.

SITE COMPATIBILITY CERTIFICATES FOR INFRASTRUCTURE

Whether there is a valid site compatibility certificate (infrastructure) of which council is aware in respect of proposed development on land to which this certificate relates.

Council is not aware of a valid site compatibility certificate (infrastructure) issued in respect of proposed development on land to which the certificate relates.

SITE COMPATIBILITY CERTIFICATES AND CONDITIONS FOR AFFORDABLE RENTAL HOUSING

- a) Whether there is a current site compatibility certificate (affordable rental housing) of which the council is aware, in respect of proposed development on the land.

Council is not aware of a current site compatibility certificate (affordable rental housing) in respect of a proposed development on land to which the certificate relates.

- b) Any terms of a kind referred to in clause 17(1) or 37(1) of *State Environmental Planning Policy (Affordable Rental Housing) 2009* that have been imposed as a condition of consent to a development application in respect of the land.

No terms referred to in clause 17(1) or 37(1) of SEPP (affordable rental housing) have been imposed as a condition of a development consent in respect of the land to which this certificate relates.

PRESCRIBED MATTERS TO BE INCLUDED IN A PLANNING CERTIFICATE UNDER SECTION 59(2) OF THE CONTAMINATED LAND MANAGEMENT ACT 1997

Note. The following terms used are within the meaning of the *Contaminated Land Management Act 1997* (CLM Act) and additional matters to be specified in a planning certificate.



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(a) If the land (or part of the land) is significantly contaminated land at the date when this certificate is issued

Council's records indicate the land to which this certificate relates **IS NOT** significantly contaminated land

(b) If the land to which this certificate relates is subject to a management order at the date when this certificate is issued

Council's records indicate the land to which this certificate relates **IS NOT** subject to a management order

(c) If the land to which this certificate relates is the subject of an approved voluntary management proposal at the date when the certificate is issued

Council's records indicate the land to which this certificate relates **IS NOT** the subject of an approved voluntary management proposal

(d) If the land to which this certificate relates is subject to an ongoing maintenance order at the date when the certificate is issued

Council's records indicate the land to which this certificate relates **IS NOT** subject to an ongoing maintenance order.

(e) If the land to which this certificate relates is the subject of a site audit statement and a copy of such a statement has been provided at any time to Council

Council's records indicate the land to which this certificate relates **IS NOT** the subject of a site audit statement

THE FOLLOWING ADDITIONAL INFORMATION IS ISSUED UNDER SECTION 149(5):

This information is provided in accordance with Section 149(5) of the Environmental Planning & Assessment Act. Section 146(6) states that Council shall not incur any liability in respect of advice provided in good faith pursuant to Section 149(5) of the Act. If this information is to be relied upon, it should be independently checked.

Port Stephens Council must take into consideration the likely effect of proposed development on the heritage significance of a heritage item, heritage conservation area, archaeological site or potential archaeological site, and on its setting, when determining an application for consent to carry out development on land in its vicinity. Please contact Council's Strategic Planning Section for more information on 49800326.

When determining a development application on known or potential archaeological sites of both Aboriginal and non-Aboriginal heritage significance, Port Stephens Council must consider an assessment of how the proposed development would affect the conservation of the site and any relic known or reasonably likely to be located at the site. Please contact Council's Strategic Planning Section on 49800326 for more information.

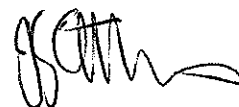


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Council resolved on 17 November, 1998 to adopt an amended Tree Preservation Order in accordance with the Environmental Planning and Assessment Act Model Provisions 1980 and Port Stephens Local Environmental Plan 2000. The Tree Preservation Order applies to the whole of the land within the Port Stephens Local Government Area. This order prohibits the ringbarking, cutting down, topping, lopping, pruning, removing, injuring or wilful destruction of any tree or trees specified in Council's policy, except with the written consent of the Council. Contact Council's Environmental Services Section by telephoning 49800169 for more information.

All areas of the Port Stephens local government area are now, or are forecast to be, affected by aircraft noise from time to time. Further information concerning the degree of impact of noise from aircraft can be obtained from the council's Sustainable Planning Group and you are advised to make further enquiries.

In addition to the zoning of the property, Clause 40 of LEP 2000 - Minor variation to zone boundaries applies to this site. This clause allows a twenty (20) metre variation between the boundaries of zones, permitting some flexibility in the control of development for different purposes throughout the Port Stephens Local Government Area.



For further information, please contact ..
Council's Strategic Planning Section

for **P G GESLING**
General Manager



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ANNEXURE A

CLAUSES 14, 19, 34 AND 35 OF PORT STEPHENS LOCAL ENVIRONMENTAL PLAN 2000 DWELLING-HOUSES

Clause 14 – Dwelling-houses and dual occupancy housing in rural zones

- (1) This clause applies to land within any rural zone.
- (2) The consent authority shall not consent to the erection of a dwelling-house or dual occupancy housing on an allotment of land to which this clause applies if:
 - (a) in the case of land within Zone No 1 (a)—the allotment has an area of less than 4,000 square metres, or
 - (b) in the case of land within Zone No 1 (c1), 1 (c2), 1 (c3) or 1 (c4)—the allotment has an area of less than 3,500 square metres, or
 - (c) in the case of land within Zone No 1 (c5)—the allotment has an area of less than 2,000 square metres, or
 - (d) in any case:
 - (i) if the allotment was created before the appointed day—the consent authority is of the opinion that the allotment was intended to be used for any one or more of the purposes (other than the purpose of a dwelling-house or dual occupancy housing) for which it could have been used (with or without the consent of the consent authority) under the environmental planning instrument under which it was created, or
 - (ii) if the allotment was created on or after the appointed day—the allotment was intended to be used for any one or more of the purposes (other than the purpose of a dwelling-house or dual occupancy housing) for which it may be used (with or without the consent of the consent authority) under this plan.
- (3) Despite subclause (2), the consent authority may consent to the erection of a dwelling-house or dual occupancy housing on any one or more of the allotments created to correspond to the parts into which a single allotment is (or was) divided by a public road.
- (4) However, the consent authority shall not consent to the erection of dual occupancy housing on land to which this clause applies unless the consent authority is satisfied that:
 - (a) the two dwellings are clustered giving the appearance of being an integrated development, and
 - (b) the two dwellings have shared infrastructure such as common driveway access, fire breaks and services, and
 - (c) any rural buildings are clustered, and
 - (d) any clearing necessary for the dwellings is minimised.
- (5) The consent authority shall not consent to the carrying out of development involving the erection of more than one dwelling-house on an allotment of land to which this clause applies unless the development is for the purpose of dual occupancy housing.
- (6) The subdivision of any dual occupancy housing shall not be permitted unless the subdivision may be carried out in accordance with the provisions of clause 13.
- (7) For the purposes of subclause (4) (d), clearing means any manner of destruction or removal of a tree, shrub or plant (otherwise than as exempted by the Council's adopted tree preservation order) and includes the severing or lopping of branches, limbs, stems or trunks of a tree, shrub or plant.

ANNEXURE A

CLAUSES 14, 19, 34 AND 35 OF PORT STEPHENS LOCAL ENVIRONMENTAL PLAN 2000 DWELLING-HOUSES

Clause 19 Dwelling-houses, dual occupancy housing and urban housing

1. Consent must not be granted to the erection of a dwelling-house, dual occupancy housing or urban housing on land in a zone, or on land within a precinct of the Nelson Bay (West) Area, specified in the Table to this subclause, unless:
 - (a) the allotment on which the existing or proposed building is or is proposed to be erected has an area of not less than the minimum area for each dwelling specified in the Table in respect of the type of housing, zone or precinct concerned, and
 - (b) the ratio of the gross floor area of the building to the site area of the allotment does not exceed the ratio identified for the relevant zone or precinct concerned, and
 - (c) the height of the building does not exceed the maximum height identified for the relevant zone or precinct concerned.

Table

HOUSING TYPE	ZONE	PRECINCT (where specified)	MINIMUM SITE AREA PER DWELLING	FLOOR SPACE RATIO	MAXIMUM HEIGHT
Dwelling-house	2(a), 2(c)	Unspecified Areas	500 m ²	0.5:1	9m
	2(a)	Hill Tops	600 m ²	0.5:1	9m
	2(a)				
Dual Occupancy Housing	2(a)	Unspecified Areas	300 m ²	0.5:1	8m
	2(c)	Unspecified Areas	250 m ²	0.5:1	8m
	2(a)	Upper Slopes	500 m ²	0.5:1	8m
	2(a), 2(c)	Foreshore and Lower Slopes	300 m ²	0.5:1	8m
	2(a), 2(c)	Town Centre Edge, Town Centre Housing, Wahgunyah Neighbourhood	250 m ²	0.5:1	8m
Urban Housing	2(a)	Upper Slopes	500 m ²	0.5:1	8m
	2(a)	Unspecified Areas	300 m ²	0.5:1	8m
	2(a)	Foreshore and Lower Slopes	300 m ²	0.5:1	8m
	2(a)	Town Centre Edge, Wahgunyah Neighbourhood	250 m ²	0.5:1	8m
	2(c)	Town Centre Housing	150 m ²	1.8:1	15m
	2(c)	Foreshore; Unspecified Areas	150 m ²	1.8:1	15m

ANNEXURE A

CLAUSES 14, 19, 34 AND 35 OF PORT STEPHENS LOCAL ENVIRONMENTAL PLAN 2000 DWELLING-HOUSES

Clause 34 - Subdivision within environment protection zone No. 7(f1)

- (1) The consent authority shall not consent to the subdivision of land within the environment protection zone No. 7(f1) unless each allotment to be created by the subdivision has an area of not less than 40 hectares.
- (2) Notwithstanding subclause (1), the consent authority may consent to a subdivision of land referred to in that sub-clause involving the creation of not more than one allotment having an area of less than 40 hectares if the consent authority is satisfied that:
 - (a) the allotment to be created is lawfully used for a purpose other than a dwelling-house, dual occupancy housing or agriculture, or
 - (b) the allotment to be created may, by reason of a development consent granted in respect of that allotment, lawfully be used for a purpose other than a dwelling-house, dual occupancy housing or agriculture.

Clause 35 - Development within all environment protection zones

- (1) The consent authority must not grant consent to a development application relating to land within an environment protection zone unless it is satisfied that:
 - (a) the carrying out of the proposed development will not harm or compromise ecological habitats, and
 - (b) the land is not subject to high bushfire hazard, andwhere a dwelling-house is permissible on the land (with or without the consent of the consent authority), each allotment to be created by any proposed subdivision has an area of land, suitable for the erection of a dwelling-house, which is not affected by slopes greater than 30%, and where a dwelling-house or dual occupancy housing is permissible on the land, any proposed building will have a height of no more than 9 metres in the case of a dwelling-house and 8 metres in the case of dual occupancy housing, and
 - (e) any subdivision will occur in an orderly and efficient manner and will not create undue demands on the provision of services and infrastructure for the locality, andthe land concerned has an adequate area of suitable soils available for on-site septic effluent disposal, located away from drainage lines and shallow or impervious soils, unless reticulated water and sewerage services are available.
- (2) The consent authority must not consent to the erection of a dwelling house or dual occupancy housing on an allotment having an area of less than 40 hectares created pursuant to a consent referred to in clause 34(2)

Appendix F NSW WorkCover Dangerous Goods Records

**Preliminary Contamination Assessment
Meadowie Road, Meadowie NSW**



Our Ref: D10/059335
Your Ref: Damien Hendrickx

12th May 2010

Attention: Mr Damien Hendrickx
Coffey Environments
19 warabrook Blvd
WARABROOK NSW 2304

Dear Mr Hendrickx,

RE SITE: 507 Medowie Rd Medowie NSW

I refer to your site search request received by WorkCover NSW on 10 May 2010 requesting information on licences to keep dangerous goods for the above site.

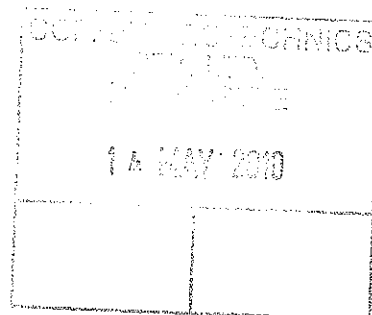
A search of the Stored Chemical Information Database (SCID) and the microfiche records held by WorkCover NSW has not located any records pertaining to the above-mentioned premises.

If you have any further queries please contact the Dangerous Goods Licensing Team on (02) 4321 5500.

Yours Sincerely

Brent Jones

Senior Licensing Officer
Dangerous Goods Team



WorkCover. Watching out for you.

WorkCover NSW ABN 77 682 742 966 92-100 Donnison Street Gosford NSW 2250 Locked Bag 2906 Lisarow NSW 2252
Telephone 02 4321 5000 Facsimile 02 4325 4145 WorkCover Assistance Service 13 10 50
DX 731 Sydney Website www.workcover.nsw.gov.au

Appendix G

NSW DECCW Notices

**Preliminary Contamination Assessment
Medowie Road, Medowie NSW**



You are here: [Home](#) > [Contaminated land](#) > [Record of EPA notices](#)



Search results

Your search for: LGA: Port Stephens Council

Matched 1 notice relating to 1 site.

Search Again

Refine Search

Suburb	Address	Site Name	Notices related to this site
Tomago Page 1 of 1	School Drive	Genkem Pty Ltd	1 current

10 May 2010

Appendix H Data Validation Report

**Preliminary Contamination Assessment
Medowie Road, Medowie NSW**

DATA COMPLETENESS

Field Considerations

	Yes / No	Comment
Were all critical locations sampled?	No	The area where historical aerial photography indicated crops may have been grown on the site was not sampled. The area around the Medowie wastewater Treatment System was not sampled.
Were all critical depths sampled?	Yes	
Were the SOPs appropriate and complied with?	Yes	
Was the sampler adequately experienced?	Yes	
Was the field documentation complete?	Yes	
Is a copy of the signed chain of custody form for each batch of samples included?	Yes	

Laboratory Considerations

	Yes / No	Comment
Were all critical samples analysed according to sampling plan?	Yes	
Were analytes analysed as per sampling plan?	Yes	
Were the laboratory methods appropriate?	Yes	
Were the laboratory methods adopted NATA endorsed?	No	The samples analysed for asbestos were not provided in separate subsamples. The laboratory therefore could not undertake a NATA-endorsed test for asbestos on these samples.
Was the NATA Seal on the laboratory reports?	No	The asbestos analysis was not NATA-endorsed, therefore a separate laboratory report was provided for the asbestos analysis.
Were the laboratory reports	Yes	

signed by an authorised person?		
Were the laboratory PQLs below the criteria?	Yes	
Was sample documentation complete?	Yes	
Were sample holding times complied with?	Yes	

COMPLETENESS CONCLUSION

	Yes / No	Comment
Was data adequately complete?	Yes	

DATA COMPARABILITY

Field considerations

	Yes / No	Comment
Was there more than one sampling round?	No	Only one sampling round was conducted
Were the same sampling methodology and SOPs used for all sampling?	Yes	Only one sampling round was conducted
Was all sampling undertaken by the same sampler?	Yes	
Were sample containers, preservation, filtering the same?	Yes	
Could climatic conditions (temperature, rainfall, wind) have influenced data comparability?	No	Only soil samples were taken – these are unlikely to have been affected by climatic conditions.
Were the same types of samples collected (filtered, size fractions etc) for each media?	Yes	

Laboratory Considerations

	Yes / No	Comment
Were the same analytical methods used (including clean up)?	Yes	
Were the PQLs the same?	Yes	
Were the same laboratories used?	Yes	
Were the units reported the same?	Yes	

COMPARABILITY CONCLUSION

	Yes / No	Comment
Was data adequately comparable?	Yes	

DATA REPRESENTATIVENESS**Field Considerations**

	Yes / No	Comment
Was appropriate media sampled?	Yes	
Was media identified sampled?	Yes	
Were the samples properly and adequately preserved? This includes keeping the samples chilled, where applicable.	Yes	
Were the samples in proper custody between the field and reaching the laboratory?	Yes	
Were the samples received by the laboratory in good condition?	Yes	

Laboratory Considerations

	Yes / No	Comment
Were all samples analysed according to SAQP?	NA	There was no SAQP for this assessment.

REPRESENTATIVENESS CONCLUSION

	Yes / No	Comment
Was data adequately representative?	Yes	

DATA PRECISION AND ACCURACY**Field considerations**

	Yes / No	Comment
Were the SOPs appropriate and complied with?	Yes	Based on available Coffey Environments Standard Operating Procedures.

Laboratory Considerations for Soil

	Metals	TPH	BTEX	PAH	OCP	PCB	Asbestos
Primary	3	3	3	3	3	3	3
Field QA/QC							
Intralab Dup	1, 33%	1, 33%	1, 33%	1, 33%	1, 33%	1, 33%	0
Interlab Dup	0	0	0	0	0	0	0
Trip Spike	NA	NA	0	NA	NA	NA	NA
Trip Blank	NA	NA	0	NA	NA	NA	NA
Wash Blanks	0	0	0	0	0	0	NA
LAB QA/QC							
Lab Blanks	1	1	1	1	1	1	0
Lab Dups	1	1	1	1	1	1	0
Matrix Spikes	0	0	0	1	0	0	0
Lab Control	2	1	1	0	1	1	0
Surrogate	0	0	1	3	1	1	0

	Yes / No	Comment
Field QA/QC		
Were an adequate number of field duplicates analysed?	Yes	
Were the RPDs of the field duplicates within control limits?	Yes	
Were an adequate number of trip blanks analysed?	No	No trip blanks were analysed for the sampling
Were the trip blanks free of contaminants	NA	
Were an adequate number of trip spikes analysed?	No	No trip spikes were analysed for the sampling
Were the trip spikes recoveries within control limits?	NA	
Were an adequate number of wash blanks analysed?	No	No wash blanks were analysed for the sampling
Were the wash blanks free of contaminants?	NA	
Lab QA/QC		
Were an adequate number of laboratory blank samples analysed?	Yes	
Were the blanks free of contaminants?	Yes	
Were an adequate number of laboratory matrix spikes and laboratory control samples analysed?	Yes	
Were an adequate number of surrogate spike samples analysed?	Yes	
Were the spikes recoveries within control limits?	Yes	

Were an adequate number of laboratory duplicates analysed?	Yes	
Were the laboratory duplicate RPDs within control limits?	Yes	

PRECISION AND ACCURACY CONCLUSION

	Yes / No	Comment
Was soil data adequately precise?	Yes	
Was soil data adequately accurate?	Yes	
Was water data adequately precise?	NA	
Was water data adequately accurate?	NA	

Table H1: Laboratory Methodologies (SGS) - Soil

Analysis	Method Based On	NATA Registered
TPH C6-C9/BTEX	Based on USEPA 5030B and 8260B	Yes
TPH C10-C36	SGS method SEO-020	Yes
PAH	SGS method SEO-030	Yes
Metals	SGS method SEM-010	Yes
OCP	Based on USEPA 8080/8082	Yes
PCB	Based on USEPA 8080/8082	Yes
Asbestos	SGS method AN602	Yes

Table H2: Holding Times (SGS) - Soil

Soil Analysis	Holding Time	Maximum Time Between Sampling and Extraction	Holding Times Met
TPH C6-C9/BTEX	14 days	7 days	Yes
TPH C10-C36	14 days	7 days	Yes
PAH	14 days	7 days	Yes
Metals	6 months	7 days	Yes
OCP	14 days	7 days	Yes
PCB	14 days	7 days	Yes
Asbestos	NA		

Appendix I

Test Pit Logs and Explanation Sheets

**Preliminary Contamination Assessment
Medowie Road, Medowie NSW**

Rock Description Explanation Sheet (1 of 2)

The descriptive terms used by Coffey are given below. They are broadly consistent with Australian Standard AS1726-1993.

DEFINITIONS: Rock substance, defect and mass are defined as follows:

Rock Substance In engineering terms rock substance is any naturally occurring aggregate of minerals and organic material which cannot be disintegrated or remoulded by hand in air or water. Other material is described using soil descriptive terms. Effectively homogenous material, may be isotropic or anisotropic.

Defect Discontinuity or break in the continuity of a substance or substances.

Mass Any body of material which is not effectively homogeneous. It can consist of two or more substances without defects, or one or more substances with one or more defects.

SUBSTANCE DESCRIPTIVE TERMS:

ROCK NAME Simple rock names are used rather than precise geological classification.

PARTICLE SIZE Grain size terms for sandstone are:
Coarse grained Mainly 0.6mm to 2mm
Medium grained Mainly 0.2mm to 0.6mm
Fine grained Mainly 0.06mm (just visible) to 0.2mm

FABRIC Terms for layering of penetrative fabric (eg. bedding, cleavage etc.) are:

Massive No layering or penetrative fabric.

Indistinct Layering or fabric just visible. Little effect on properties.

Distinct Layering or fabric is easily visible. Rock breaks more easily parallel to layering of fabric.

CLASSIFICATION OF WEATHERING PRODUCTS

Term	Abbreviation	Definition
Residual Soil	RS	Soil derived from the weathering of rock; the mass structure and substance fabric are no longer evident; there is a large change in volume but the soil has not been significantly transported.
Extremely Weathered Material	XW	Material is weathered to such an extent that it has soil properties, ie, it either disintegrates or can be remoulded in water. Original rock fabric still visible.
Highly Weathered Rock	HW	Rock strength is changed by weathering. The whole of the rock substance is discoloured, usually by iron staining or bleaching to the extent that the colour of the original rock is not recognisable. Some minerals are decomposed to clay minerals. Porosity may be increased by leaching or may be decreased due to the deposition of minerals in pores.
Moderately Weathered Rock	MW	The whole of the rock substance is discoloured, usually by iron staining or bleaching, to the extent that the colour of the fresh rock is no longer recognisable.
Slightly Weathered Rock	SW	Rock substance affected by weathering to the extent that partial staining or partial discolouration of the rock substance (usually by limonite) has taken place. The colour and texture of the fresh rock is recognisable; strength properties are essentially those of the fresh rock substance.
Fresh Rock	FR	Rock substance unaffected by weathering.

Notes on Weathering:

- AS1726 suggests the term "Distinctly Weathered" (DW) to cover the range of substance weathering conditions between XW and SW. For projects where it is not practical to delineate between HW and MW or it is judged that there is no advantage in making such a distinction. DW may be used with the definition given in AS1726.
- Where physical and chemical changes were caused by hot gasses and liquids associated with igneous rocks, the term "altered" may be substituted for "weathering" to give the abbreviations XA, HA, MA, SA and DA.

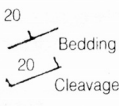
ROCK SUBSTANCE STRENGTH TERMS

Term	Abbreviation	Point Load Index, I_{s50} (MPa)	Field Guide
Very Low	VL	Less than 0.1	Material crumbles under firm blows with sharp end of pick; can be peeled with a knife; pieces up to 30mm thick can be broken by finger pressure.
Low	L	0.1 to 0.3	Easily scored with a knife; indentations 1mm to 3mm show with firm bows of a pick point; has a dull sound under hammer. Pieces of core 150mm long by 50mm diameter may be broken by hand. Sharp edges of core may be friable and break during handling.
Medium	M	0.3 to 1.0	Readily scored with a knife; a piece of core 150mm long by 50mm diameter can be broken by hand with difficulty.
High	H	1 to 3	A piece of core 150mm long by 50mm can not be broken by hand but can be broken by a pick with a single firm blow; rock rings under hammer.
Very High	VH	3 to 10	Hand specimen breaks after more than one blow of a pick; rock rings under hammer.
Extremely High	EH	More than 10	Specimen requires many blows with geological pick to break; rock rings under hammer.

Notes on Rock Substance Strength:

- In anisotropic rocks the field guide to strength applies to the strength perpendicular to the anisotropy. High strength anisotropic rocks may break readily parallel to the planar anisotropy.
- The term "extremely low" is not used as a rock substance strength term. While the term is used in AS1726-1993, the field guide therein makes it clear that materials in that strength range are soils in engineering terms.
- The unconfined compressive strength for isotropic rocks (and anisotropic rocks which fall across the planar anisotropy) is typically 10 to 25 times the point load index (I_{s50}). The ratio may vary for different rock types. Lower strength rocks often have lower ratios than higher strength rocks.

Rock Description Explanation Sheet (2 of 2)

COMMON DEFECTS IN ROCK MASSES		Diagram	Map Symbol	Graphic Log (Note 1)	DEFECT SHAPE	TERMS
Term	Definition				Planar	The defect does not vary in orientation
Parting	A surface or crack across which the rock has little or no tensile strength. Parallel or sub parallel to layering (eg bedding) or a planar anisotropy in the rock substance (eg, cleavage). May be open or closed.				Curved	The defect has a gradual change in orientation
Joint	A surface or crack across which the rock has little or no tensile strength, but which is not parallel or sub parallel to layering or planar anisotropy in the rock substance. May be open or closed.				Undulating	The defect has a wavy surface
Sheared Zone (Note 3)	Zone of rock substance with roughly parallel near planar, curved or undulating boundaries cut by closely spaced joints, sheared surfaces or other defects. Some of the defects are usually curved and intersect to divide the mass into lenticular or wedge shaped blocks.				Stepped	The defect has one or more well defined steps
Sheared Surface (Note 3)	A near planar, curved or undulating surface which is usually smooth, polished or slickensided.				Irregular	The defect has many sharp changes of orientation
Crushed Seam (Note 3)	Seam with roughly parallel almost planar boundaries, composed of disoriented, usually angular fragments of the host rock substance which may be more weathered than the host rock. The seam has soil properties.				Note: The assessment of defect shape is partly influenced by the scale of the observation.	
Infilled Seam	Seam of soil substance usually with distinct roughly parallel boundaries formed by the migration of soil into an open cavity or joint, infilled seams less than 1mm thick may be described as veneer or coating on joint surface.				ROUGHNESS TERMS	
Extremely Weathered Seam	Seam of soil substance, often with gradational boundaries. Formed by weathering of the rock substance in place.				Slickensided	Grooved or striated surface, usually polished
					Polished	Shiny smooth surface
					Smooth	Smooth to touch. Few or no surface irregularities
					Rough	Many small surface irregularities (amplitude generally less than 1mm). Feels like fine to coarse sand paper.
					Very Rough	Many large surface irregularities (amplitude generally more than 1mm). Feels like, or coarser than very coarse sand paper.
					COATING TERMS	
					Clean	No visible coating
					Stained	No visible coating but surfaces are discoloured
					Veneer	A visible coating of soil or mineral, too thin to measure; may be patchy
					Coating	A visible coating up to 1mm thick. Thicker soil material is usually described using appropriate defect terms (eg, infilled seam). Thicker rock strength material is usually described as a vein.
					BLOCK SHAPE TERMS	
					Blocky	Approximately equidimensional
					Tabular	Thickness much less than length or width
					Columnar	Height much greater than cross section

Notes on Defects:

1. Usually borehole logs show the true dip of defects and face sketches and sections the apparent dip.
2. Partings and joints are not usually shown on the graphic log unless considered significant.
3. Sheared zones, sheared surfaces and crushed seams are faults in geological terms.

Soil Description Explanation Sheet (1 of 2)

DEFINITION:

In engineering terms soil includes every type of uncemented or partially cemented inorganic or organic material found in the ground. In practice, if the material can be remoulded or disintegrated by hand in its field condition or in water it is described as a soil. Other materials are described using rock description terms.

CLASSIFICATION SYMBOL & SOIL NAME

Soils are described in accordance with the Unified Soil Classification (UCS) as shown in the table on Sheet 2.

PARTICLE SIZE DESCRIPTIVE TERMS

NAME	SUBDIVISION	SIZE
Boulders		>200 mm
Cobbles		63 mm to 200 mm
Gravel	coarse	20 mm to 63 mm
	medium	6 mm to 20 mm
	fine	2.36 mm to 6 mm
Sand	coarse	600 μ m to 2.36 mm
	medium	200 μ m to 600 μ m
	fine	75 μ m to 200 μ m

MOISTURE CONDITION

Dry Looks and feels dry. Cohesive and cemented soils are hard, friable or powdery. Uncemented granular soils run freely through hands.

Moist Soil feels cool and darkened in colour. Cohesive soils can be moulded. Granular soils tend to cohere.

Wet As for moist but with free water forming on hands when handled.

CONSISTENCY OF COHESIVE SOILS

TERM	UNDRAINED STRENGTH S_u (kPa)	FIELD GUIDE
Very Soft	<12	A finger can be pushed well into the soil with little effort.
Soft	12 - 25	A finger can be pushed into the soil to about 25mm depth.
Firm	25 - 50	The soil can be indented about 5mm with the thumb, but not penetrated.
Stiff	50 - 100	The surface of the soil can be indented with the thumb, but not penetrated.
Very Stiff	100 - 200	The surface of the soil can be marked, but not indented with thumb pressure.
Hard	>200	The surface of the soil can be marked only with the thumbnail.
Friable	–	Crumbles or powders when scraped by thumbnail.

DENSITY OF GRANULAR SOILS

TERM	DENSITY INDEX (%)
Very loose	Less than 15
Loose	15 - 35
Medium Dense	35 - 65
Dense	65 - 85
Very Dense	Greater than 85

MINOR COMPONENTS

TERM	ASSESSMENT GUIDE	PROPORTION OF MINOR COMPONENT IN:
Trace of	Presence just detectable by feel or eye, but soil properties little or no different to general properties of primary component.	Coarse grained soils: <5% Fine grained soils: <15%
With some	Presence easily detected by feel or eye, soil properties little different to general properties of primary component.	Coarse grained soils: 5 - 12% Fine grained soils: 15 - 30%

SOIL STRUCTURE

ZONING	CEMENTING
Layers Continuous across exposure or sample.	Weakly cemented Easily broken up by hand in air or water.
Lenses Discontinuous layers of lenticular shape.	Moderately cemented Effort is required to break up the soil by hand in air or water.
Pockets Irregular inclusions of different material.	

GEOLOGICAL ORIGIN

WEATHERED IN PLACE SOILS

Extremely weathered material Structure and fabric of parent rock visible.

Residual soil Structure and fabric of parent rock not visible.

TRANSPORTED SOILS

Aeolian soil Deposited by wind.

Alluvial soil Deposited by streams and rivers.

Colluvial soil Deposited on slopes (transported downslope by gravity).

Fill Man made deposit. Fill may be significantly more variable between tested locations than naturally occurring soils.

Lacustrine soil Deposited by lakes.

Marine soil Deposited in ocean basins, bays, beaches and estuaries.

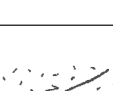
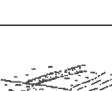
Soil Description Explanation Sheet (2 of 2)

SOIL CLASSIFICATION INCLUDING IDENTIFICATION AND DESCRIPTION

FIELD IDENTIFICATION PROCEDURES (Excluding particles larger than 60 mm and basing fractions on estimated mass)					USC	PRIMARY NAME
COARSE GRAINED SOILS More than 50% of materials less than 63 mm is larger than 0.075 mm	GRAVELS More than half of coarse fraction is larger than 2.0 mm	CLEAN GRAVELS (Little or no fines)	Wide range in grain size and substantial amounts of all intermediate particle sizes.		GW	GRAVEL
			Predominantly one size or a range of sizes with more intermediate sizes missing.		GP	GRAVEL
		GRAVELS WITH FINES (Appreciable amount of fines)	Non-plastic fines (for identification procedures see ML below)		GM	SILTY GRAVEL
			Plastic fines (for identification procedures see CL below)		GC	CLAYEY GRAVEL
	SANDS More than half of coarse fraction is smaller than 2.0 mm	CLEAN SANDS (Little or no fines)	Wide range in grain sizes and substantial amounts of all intermediate sizes		SW	SAND
			Predominantly one size or a range of sizes with some intermediate sizes missing.		SP	SAND
		SANDS WITH FINES (Appreciable amount of fines)	Non-plastic fines (for identification procedures see ML below).		SM	SILTY SAND
			Plastic fines (for identification procedures see CL below).		SC	CLAYEY SAND
FINE GRAINED SOILS More than 50% of material less than 63 mm is smaller than 0.075 mm	SILTS & CLAYS Liquid limit less than 50	IDENTIFICATION PROCEDURES ON FRACTIONS <0.2 mm.				
		DRY STRENGTH	DILATANCY	TOUGHNESS		
		None to Low	Quick to slow	None	ML	SILT
		Medium to High	None	Medium	CL	CLAY
	SILTS & CLAYS Liquid limit greater than 50	Low to medium	Slow to very slow	Low	OL	ORGANIC SILT
		Low to medium	Slow to very slow	Low to medium	MH	SILT
		High	None	High	CH	CLAY
		Medium to High	None	Low to medium	OH	ORGANIC CLAY
HIGHLY ORGANIC SOILS	Readily identified by colour, odour, spongy feel and frequently by fibrous texture.			Pt	PEAT	
• Low plasticity – Liquid Limit W _L less than 35%. • Medium plasticity – W _L between 35% and 50%.						

• Low plasticity – Liquid Limit W_L less than 35%. • Medium plasticity – W_L between 35% and 50%.

COMMON DEFECTS IN SOIL

TERM	DEFINITION	DIAGRAM	TERM	DEFINITION	DIAGRAM
PARTING	A surface or crack across which the soil has little or no tensile strength. Parallel or sub parallel to layering (eg bedding). May be open or closed.		SOFTENED ZONE	A zone in clayey soil, usually adjacent to a defect in which the soil has a higher moisture content than elsewhere.	
JOINT	A surface or crack across which the soil has little or no tensile strength but which is not parallel or sub parallel to layering. May be open or closed. The term 'fissure' may be used for irregular joints <0.2 m in length.		TUBE	Tubular cavity. May occur singly or as one of a large number of separate or inter-connected tubes. Walls often coated with clay or strengthened by denser packing of grains. May contain organic matter	
SHEARED ZONE	Zone in clayey soil with roughly parallel near planar, curved or undulating boundaries containing closely spaced, smooth or slickensided, curved intersecting joints which divide the mass into lenticular or wedge shaped blocks.		TUBE CAST	Roughly cylindrical elongated body of soil different from the soil mass in which it occurs. In some cases the soil which makes up the tube cast is cemented.	
SHEARED SURFACE	A near planar curved or undulating, smooth, polished or slickensided surface in clayey soil. The polished or slickensided surface indicates that movement (in many cases very little) has occurred along the defect.		INFILLED SEAM	Sheet or wall like body of soil substance or mass with roughly planar to irregular near parallel boundaries which cuts through a soil mass. Formed by infilling of open joints.	

Engineering Log - Excavation

Client: **HDB TOWN PLANNING AND DESIGN**

Principal:

Project: **PROPOSED MIXED USE DEVELOPMENT**

Test pit location: **MEDOWIE**

Excavation No. **TP 1**

Sheet 1 of 1

Office Job No.: **ENVIWARA00340AB**

Date started: **21.5.2010**

Date completed: **21.5.2010**

Logged by: **GDT**

Checked by:

equipment type and model: 4t Excavator Pit Orientation: Easting: m R.L. Surface: Not Measured
excavation dimensions: 3m long 0.5m wide Northing: m datum:

excavation information						material substance								
method	penetration			support	water	notes samples, tests, etc	depth metres	graphic log	classification symbol	material	moisture condition	consistency/ density index	pocket penetro- meter kPa	structure and additional observations
E	1	2	3	N					CL	TOPSOIL: CLAY, low plasticity, dark brown with organics.	M	F	100 200 300 400	TOPSOIL
							0.5		CH	CLAY: high plasticity, brown with trace rootlets.			X	ALLUVIAL
				Minor weep			1.0						X	
							1.5						X	
							2.0		CL	CLAY: low plasticity, orange mottled red with trace fine to medium grained sand.	W		X	RESIDUAL
							2.5			Bottom of hole collapse of side walls.				

Sketch

Test pit TP 1 terminated at 2.4m

method N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	support S shoring N nil penetration 1 2 3 4 no resistance ranging to refusal water water level on date shown water inflow water outflow	notes, samples, tests U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	classification symbols and soil description based on unified classification system moisture D dry M moist W wet W _p plastic limit W _L liquid limit	consistency/density index VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense
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Engineering Log - Excavation

Client: **HDB TOWN PLANNING AND DESIGN**

Principal:

Project: **PROPOSED MIXED USE DEVELOPMENT**

Test pit location: **MEDOWIE**

Excavation No. **TP 2**

Sheet 1 of 1

Office Job No.: **ENVIWARA00340AB**

Date started: **21.5.2010**

Date completed: **21.5.2010**

Logged by: **GDT**

Checked by:

equipment type and model: 4t Excavator				Pit Orientation:				Easting: m				R.L. Surface: Not Measured																																						
excavation dimensions: 3m long 0.5m wide				Northing: m				datum:																																										
excavation information								material substance																																										
method	penetration			support	water	notes samples, tests, etc	depth metres		graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro- meter kPa 100 200 300 400	structure and additional observations																																			
E	1	2	3	N	None Observed	E	0.5		CL	FILL: CLAY, low plasticity, brown with some angular gravel.	M	F		FILL																																				
									CH	CLAY: high plasticity, brown, some tree roots.	M	VSt			ALLUVIAL																																			
				E					CH	CLAY: high plasticity, orange brown.	St	X				RESIDUAL																																		
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Sketch

method N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator		support S shoring N nil penetration 1 2 3 4 no resistance ranging to refusal water water level on date shown water inflow water outflow		notes, samples, tests U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal		classification symbols and soil description based on unified classification system moisture D dry M moist W wet W _p plastic limit W _L liquid limit		consistency/density index VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense	
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Engineering Log - Excavation

Client: **HDB TOWN PLANNING AND DESIGN**

Date started: **21.5.2010**

Principal:

Date completed: **21.5.2010**

Project: **PROPOSED MIXED USE DEVELOPMENT**

Logged by: **GDT**

Test pit location: **MEDOWIE**

Checked by:

equipment type and model: 4t Excavator Pit Orientation: Easting: m R.L. Surface: Not Measured
excavation dimensions: 3m long 0.5m wide Northing: m datum:

excavation information						material substance								
method	penetration			support	water	notes samples, tests, etc	depth metres	graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro- meter kPa	structure and additional observations
E	1	2	3	N	Observed				CL	FILL: CLAY, low plasticity, brown with trace fine angular gravel.	M	F	100 200 300 400	FILL
						E					Test pit TP 3 terminated at 0.2m			
							0.5							
							1.0							
							1.5							
							2.0							
							2.5							

Sketch

method N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	support S shoring N nil penetration 1 2 3 4 no resistance ranging to refusal water water level on date shown water inflow water outflow	notes, samples, tests U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	classification symbols and soil description based on unified classification system moisture D dry M moist W wet W _p plastic limit W _L liquid limit	consistency/density index VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense
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Engineering Log - Excavation

Client: **HDB TOWN PLANNING AND DESIGN**

Principal:

Project: **PROPOSED MIXED USE DEVELOPMENT**

Test pit location: **MEDOWIE**

Excavation No. **TP 4**

Sheet 1 of 1

Office Job No.: **ENVIWARA00340AB**

Date started: **21.5.2010**

Date completed: **21.5.2010**

Logged by: **GDT**

Checked by:

equipment type and model: 4t Excavator Pit Orientation: Easting: m R.L. Surface: Not Measured
excavation dimensions: 3m long 0.5m wide Northing: m datum:

excavation information						material substance									
method	penetration			support	water	notes samples, tests, etc	depth metres		graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro- meter kPa	structure and additional observations
E	1	2	3	N			RL			CL	TOPSOIL: CLAY, low plasticity, dark brown with organics.	M	F	100	TOPSOIL
										CH	CLAY: high plasticity, orange mottled red.		St	200	RESIDUAL
						E								300	
														400	

Sketch

method N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	support S shoring N nil penetration 1 2 3 4 no resistance ranging to refusal water water level on date shown water inflow water outflow	notes, samples, tests U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	classification symbols and soil description based on unified classification system moisture D dry M moist W wet W _p plastic limit W _L liquid limit	consistency/density index VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense
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Engineering Log - Excavation

Client: **HDB TOWN PLANNING AND DESIGN**

Date started: **21.5.2010**

Principal:

Date completed: **21.5.2010**

Project: **PROPOSED MIXED USE DEVELOPMENT**

Logged by: **GDT**

Test pit location: **MEDOWIE**

Checked by:

equipment type and model: 4t Excavator Pit Orientation: Easting: m R.L. Surface: Not Measured
excavation dimensions: 3m long 0.5m wide Northing: m datum:

excavation information						material substance					
method	penetration	support	water	notes samples, tests, etc	depth RL metres	graphic log	classification symbol	material	moisture condition	consistency/density index	structure and additional observations
E	1 2 3	N					SP	SAND: fine to medium grained, pale grey, trace of fines.	M	L	SHALLOW MARINE
					0.5						
				E							
					1.0		SP	SAND: fine to medium grained, dark brown, highly indurated.		VD	COFFEE ROCK
				E							
					1.5		SP	SAND: fine to medium grained, grey to black, some tree roots.		MD	SHALLOW MARINE
					2.0						
					2.5			Become very hard to dig due to coffee rock layer above. Test pit TP 5 terminated at 1.7m			

Sketch

method N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	support S shoring N nil penetration 1 2 3 4 no resistance ranging to refusal water water level on date shown water inflow water outflow	notes, samples, tests U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	classification symbols and soil description based on unified classification system moisture D dry M moist W wet W _p plastic limit W _L liquid limit	consistency/density index VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense
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Engineering Log - Excavation

Client: **HDB TOWN PLANNING AND DESIGN**

Principal:

Project: **PROPOSED MIXED USE DEVELOPMENT**

Test pit location: **MEDOWIE**

Excavation No. **TP 6**

Sheet 1 of 1

Office Job No.: **ENVIWARA00340AB**

Date started: **21.5.2010**

Date completed: **21.5.2010**

Logged by: **GDT**

Checked by:

equipment type and model:				4t Excavator				Pit Orientation:				Easting: m				R.L. Surface: Not Measured			
excavation dimensions:				3m long 0.5m wide				Northing: m				datum:							
excavation information						material substance													
method	penetration			support	water	notes samples, tests, etc	depth RL metres		graphic log	classification symbol	material	moisture condition	consistency/ density index	pocket penetrometer kPa			structure and additional observations		
E	1	2	3	N						SP	TOPSOIL: SAND, fine to medium grained, dark grey with some organics.	M	L	100	200	300	400	TOPSOIL	
							0.5			SP	SAND: fine to medium grained, pale grey, trace of fines.							SHALLOW MARINE	
					E					SP	SAND: fine to medium grained, black to dark brown,highly indurated.		VD					COFFEE ROCK	
							1.0			SP	SAND: fine to medium grained, black to brown, trace of fines strong odour.		MD					SHALLOW MARINE	
					E														
							1.5					W							
							2.0												
							2.5				Hole collapse due to water. Test pit TP 6 terminated at 2.1m								

Sketch

method N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	support S shoring N nil penetration 1 2 3 4 no resistance ranging to refusal water water level on date shown water inflow water outflow	notes, samples, tests U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	classification symbols and soil description based on unified classification system moisture D dry M moist W wet W _p plastic limit W _L liquid limit	consistency/density index VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense
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Engineering Log - Excavation

Client: **HDB TOWN PLANNING AND DESIGN**

Date started: **21.5.2010**

Principal:

Date completed: **21.5.2010**

Project: **PROPOSED MIXED USE DEVELOPMENT**

Logged by: **GDT**

Test pit location: **MEDOWIE**

Checked by:

equipment type and model: 4t Excavator Pit Orientation: Easting: m R.L. Surface: Not Measured
excavation dimensions: 3m long 0.5m wide Northing: m datum:

excavation information						material substance						
method	penetration	support	water	notes samples, tests, etc	depth RL metres	graphic log	classification symbol	material	moisture condition	consistency/density index	pocket penetrometer kPa	structure and additional observations
E	1 2 3	N					SP	SAND: fine to medium grained, brown with trace of fines. Sides of hole collapsing.	M	L	100 200 300 400	SHALLOW MARINE
				E	0.5							
				E	1.0							
				E	1.5							
				E	2.0							
				E	2.5			Collapse of hole. Test pit TP 7 terminated at 2.1m				

Sketch

method	support	notes, samples, tests	classification symbols and soil description	consistency/density index
N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	S shoring N nil penetration 1 2 3 4 no resistance ranging to refusal water water level on date shown water inflow water outflow	U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	based on unified classification system moisture D dry M moist W wet Wp plastic limit WL liquid limit	VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense

Appendix J

PID Results

**Preliminary Contamination Assessment
Medowie Road, Medowie NSW**

[illegible]

Appendix K Laboratory Reports and Chain of Custody Documentation

**Preliminary Contamination Assessment
Meadowie Road, Meadowie NSW**

ANALYTICAL REPORT

31 May 2010

Coffey Environments Pty Ltd

Lot 101, 19 Warabrook Blvd

Warabrook

NSW 2304

Attention: **Damien Hendrickx**

Your Reference: ENVIWARA00340AB

Our Reference: SE78495

Samples: 5 Soils

Received: 25/05/2010

Preliminary Report Sent: Not Issued

These samples were analysed in accordance with your written instructions.

For and on Behalf of:

SGS ENVIRONMENTAL SERVICES

Sample Receipt: Angela Mamalicos

AU.SampleReceipt.Sydney@sgs.com

Production Manager: Huong Crawford

Huong.Crawford@sgs.com

Results Approved and/or Authorised by:



Edward Ibrahim

Laboratory Manager



Ly Kim Ha

Organics Signatory



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Page 1 of 16

BTEX in Soil Our Reference: Your Reference	UNITS -----	SE78495-2 TP3 - 0.1-0.2	SE78495-3 TP5 - 0.0-0.1	SE78495-4 Test Location 2 - 0.0-0.1	SE78495-5 QC1
Sample Matrix Date Sampled	-----	Soil 21/05/2010	Soil 21/05/2010	Soil 21/05/2010	Soil 21/05/2010
Date Extracted (BTEX)		27/05/2010	27/05/2010	27/05/2010	27/05/2010
Date Analysed (BTEX)		27/05/2010	27/05/2010	27/05/2010	27/05/2010
Benzene	mg/kg	<0.1	<0.1	<0.1	<0.1
Toluene	mg/kg	<0.1	<0.1	<0.1	<0.1
Ethylbenzene	mg/kg	<0.1	<0.1	<0.1	<0.1
m&p- Xylenes	mg/kg	<0.2	<0.2	<0.2	<0.2
o- Xylene	mg/kg	<0.1	<0.1	<0.1	<0.1
Total Xylenes	mg/kg	<0.3	<0.3	<0.3	<0.3
BTEX Surrogate (%)	%	94	104	102	101

TRH in soil with C6-C9 by P/T Our Reference: Your Reference	UNITS -----	SE78495-2 TP3 - 0.1-0.2	SE78495-3 TP5 - 0.0-0.1	SE78495-4 Test Location 2 - 0.0-0.1	SE78495-5 QC1
Sample Matrix Date Sampled	-----	Soil 21/05/2010	Soil 21/05/2010	Soil 21/05/2010	Soil 21/05/2010
Date Extracted (TRH C6-C9 PT)		27/05/2010	27/05/2010	27/05/2010	27/05/2010
Date Analysed (TRH C6-C9 PT)		27/05/2010	27/05/2010	27/05/2010	27/05/2010
TRH C ₆ - C ₉ P&T	mg/kg	<20	<20	<20	<20
Date Extracted (TRH C10-C36)		27/05/2010	27/05/2010	27/05/2010	27/05/2010
Date Analysed (TRH C10-C36)		27/05/2010	27/05/2010	27/05/2010	27/05/2010
TRH C ₁₀ - C ₁₄	mg/kg	<20	<20	<20	<20
TRH C ₁₅ - C ₂₈	mg/kg	<50	<50	<50	<50
TRH C ₂₉ - C ₃₆	mg/kg	<50	<50	<50	<50



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PAHs in Soil Our Reference: Your Reference	UNITS -----	SE78495-2 TP3 - 0.1-0.2	SE78495-3 TP5 - 0.0-0.1	SE78495-4 Test Location 2 - 0.0-0.1	SE78495-5 QC1
Sample Matrix Date Sampled	-----	Soil 21/05/2010	Soil 21/05/2010	Soil 21/05/2010	Soil 21/05/2010
Date Extracted		27/05/2010	27/05/2010	27/05/2010	27/05/2010
Date Analysed		27/05/2010	27/05/2010	27/05/2010	27/05/2010
Naphthalene	mg/kg	<0.10	<0.10	<0.10	<0.10
2-Methylnaphthalene	mg/kg	<0.10	<0.10	<0.10	<0.10
1-Methylnaphthalene	mg/kg	<0.10	<0.10	<0.10	<0.10
Acenaphthylene	mg/kg	<0.10	<0.10	<0.10	<0.10
Acenaphthene	mg/kg	<0.10	<0.10	<0.10	<0.10
Fluorene	mg/kg	<0.10	<0.10	<0.10	<0.10
Phenanthrene	mg/kg	<0.10	<0.10	<0.10	<0.10
Anthracene	mg/kg	<0.10	<0.10	<0.10	<0.10
Fluoranthene	mg/kg	<0.10	<0.10	0.11	<0.10
Pyrene	mg/kg	<0.10	<0.10	<0.10	<0.10
Benzo[a]anthracene	mg/kg	<0.10	<0.10	<0.10	<0.10
Chrysene	mg/kg	<0.10	<0.10	<0.10	<0.10
Benzo[b,k]fluoranthene	mg/kg	<0.20	<0.20	<0.20	<0.20
Benzo[a]pyrene	mg/kg	<0.05	<0.05	0.05	<0.05
Indeno[123-cd]pyrene	mg/kg	<0.10	<0.10	<0.10	<0.10
Dibenzo[ah]anthracene	mg/kg	<0.10	<0.10	<0.10	<0.10
Benzo[ghi]perylene	mg/kg	<0.10	<0.10	<0.10	<0.10
Total PAHs (sum)	mg/kg	<1.7	<1.7	<1.76	<1.7
Nitrobenzene-d5	%	115	111	118	104
2-Fluorobiphenyl	%	114	104	113	103
p -Terphenyl-d14	%	124	112	120	112



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OC Pesticides in Soil Our Reference: Your Reference	UNITS -----	SE78495-2 TP3 - 0.1-0.2	SE78495-3 TP5 - 0.0-0.1	SE78495-4 Test Location 2 - 0.0-0.1	SE78495-5 QC1
Sample Matrix Date Sampled	-----	Soil 21/05/2010	Soil 21/05/2010	Soil 21/05/2010	Soil 21/05/2010
Date Extracted		27/05/2010	27/05/2010	27/05/2010	27/05/2010
Date Analysed		27/05/2010	27/05/2010	27/05/2010	27/05/2010
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1
<i>alpha</i> -BHC	mg/kg	<0.1	<0.1	<0.1	<0.1
gamma-BHC (Lindane)	mg/kg	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1
<i>beta</i> -BHC	mg/kg	<0.1	<0.1	<0.1	<0.1
<i>delta</i> -BHC	mg/kg	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1
<i>o,p</i> -DDE	mg/kg	<0.1	<0.1	<0.1	<0.1
<i>alpha</i> -Endosulfan	mg/kg	<0.1	<0.1	<0.1	<0.1
<i>trans</i> -Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1
<i>cis</i> -Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1
<i>trans</i> -Nonachlor	mg/kg	<0.1	<0.1	<0.1	<0.1
<i>p,p</i> -DDE	mg/kg	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1
<i>o,p</i> -DDD	mg/kg	<0.1	<0.1	<0.1	<0.1
<i>o,p</i> -DDT	mg/kg	<0.1	<0.1	<0.1	<0.1
<i>beta</i> -Endosulfan	mg/kg	<0.1	<0.1	<0.1	<0.1
<i>p,p</i> -DDD	mg/kg	<0.1	<0.1	<0.1	<0.1
<i>p,p</i> -DDT	mg/kg	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1
Endrin Ketone	mg/kg	<0.1	<0.1	<0.1	<0.1
2,4,5,6-Tetrachloro-m-xylene (<i>Surrogate</i>)	%	111	100	117	109

PCBs in Soil Our Reference: Your Reference	UNITS -----	SE78495-2 TP3 - 0.1-0.2	SE78495-3 TP5 - 0.0-0.1	SE78495-4 Test Location 2 - 0.0-0.1	SE78495-5 QC1
Sample Matrix Date Sampled	-----	Soil 21/05/2010	Soil 21/05/2010	Soil 21/05/2010	Soil 21/05/2010
Date Extracted		27/05/2010	27/05/2010	27/05/2010	27/05/2010
Date Analysed		27/05/2010	27/05/2010	27/05/2010	27/05/2010
Arochlor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1
Arochlor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1
Arochlor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1
Arochlor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1
Arochlor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1
Arochlor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1
Arochlor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1
Arochlor 1262	mg/kg	<0.1	<0.1	<0.1	<0.1
Arochlor 1268	mg/kg	<0.1	<0.1	<0.1	<0.1
Total Positive PCB	mg/kg	<0.90	<0.90	<0.90	<0.90
PCB_Surrogate 1	%	111	100	117	109



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Metals in Soil by ICP-OES Our Reference: Your Reference	UNITS -----	SE78495-2 TP3 - 0.1-0.2	SE78495-3 TP5 - 0.0-0.1	SE78495-4 Test Location 2 - 0.0-0.1	SE78495-5 QC1
Sample Matrix Date Sampled	-----	Soil 21/05/2010	Soil 21/05/2010	Soil 21/05/2010	Soil 21/05/2010
Date Extracted (Metals)		27/05/2010	27/05/2010	27/05/2010	27/05/2010
Date Analysed (Metals)		27/05/2010	27/05/2010	27/05/2010	27/05/2010
Arsenic	mg/kg	<3	<3	<3	<3
Cadmium	mg/kg	<0.3	<0.3	<0.3	<0.3
Chromium	mg/kg	23	0.8	4.5	26
Copper	mg/kg	2.6	0.7	2.0	2.8
Lead	mg/kg	9.5	9.7	6	9.3
Nickel	mg/kg	3.9	<0.5	1.6	4.7
Zinc	mg/kg	11	26	13	14



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Mercury Cold Vapor/Hg Analyser Our Reference: Your Reference	UNITS -----	SE78495-2 TP3 - 0.1-0.2	SE78495-3 TP5 - 0.0-0.1	SE78495-4 Test Location 2 - 0.0-0.1	SE78495-5 QC1
Sample Matrix Date Sampled	-----	Soil 21/05/2010	Soil 21/05/2010	Soil 21/05/2010	Soil 21/05/2010
Date Extracted (Mercury)		27/05/2010	27/05/2010	27/05/2010	27/05/2010
Date Analysed (Mercury)		27/05/2010	27/05/2010	27/05/2010	27/05/2010
Mercury	mg/kg	<0.05	<0.05	<0.05	<0.05

Moisture					
Our Reference:	UNITS	SE78495-2	SE78495-3	SE78495-4	SE78495-5
Your Reference	-----	TP3 -	TP5 -	Test	QC1
		0.1-0.2	0.0-0.1	Location 2 -	
				0.0-0.1	
Sample Matrix	-----	Soil	Soil	Soil	Soil
Date Sampled		21/05/2010	21/05/2010	21/05/2010	21/05/2010
Date Analysed (moisture)		27/05/2010	27/05/2010	27/05/2010	27/05/2010
Moisture	%	20	6	9	19

Method ID	Methodology Summary
SEO-018	BTEX / C6-C9 Hydrocarbons - Soil samples are extracted with methanol, purged and concentrated by a purge and trap apparatus, and then analysed using GC/MS technique. Water samples undergo the same analysis without the extraction step. Based on USEPA 5030B and 8260B.
SEO-017	BTEX/TRH C6-C9 - Determination by Purge and Trap Gas Chromatography with Flame Ionisation Detection (FID) and Photo Ionisation Detection (PID). The surrogate spike used is aaa-trifluorotoluene.
SEO-020	Total Recoverable Hydrocarbons - determined by solvent extraction with dichloromethane / acetone for soils and dichloromethane for waters, followed by instrumentation analysis using GC/FID. Where applicable Solid Phase Extraction Manifold technique is used for aliphatic / aromatic fractionation.
SEO-030	Polynuclear Aromatic Hydrocarbons - determined by solvent extraction with dichloromethane / acetone for soils and dichloromethane for waters, followed by instrumentation analysis using GC/MS SIM mode.
SEO-005	OC/OP/PCB - Determination of a suite of Organchlorine Pesticides, Chlorinated Organo-phosphorus Pesticides and Polychlorinated Biphenyls (PCB's) by liquid-liquid extraction using dichloromethane for waters, or mechanical extraction using acetone / hexane for soils, followed by instrumentation analysis using GC/ECD. Based on USEPA 8081/8082.
SEM-010	Determination of elements by ICP-OES following appropriate sample preparation / digestion process. Based on USEPA 6010C / APHA 21st Edition, 3120B.
SEM-005	Mercury - determined by Cold-Vapour AAS following appropriate sample preparation or digestion process. Based on APHA 21st Edition, 3112B.
AN002	Preparation of soils, sediments and sludges undergo analysis by either air drying, compositing, subsampling and 1:5 soil water extraction where required. Moisture content is determined by drying the sample at 105 ± 5°C.

QUALITY CONTROL	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
BTEX in Soil								
Date Extracted (BTEX)				27/05/10	SE78495-3	27/05/2010 27/05/2010	LCS	27/05/10
Date Analysed (BTEX)				27/05/10	SE78495-3	27/05/2010 27/05/2010	LCS	27/05/10
Benzene	mg/kg	0.1	SEO-018	<0.1	SE78495-3	<0.1 <0.1	LCS	74%
Toluene	mg/kg	0.1	SEO-018	<0.1	SE78495-3	<0.1 <0.1	LCS	72%
Ethylbenzene	mg/kg	0.1	SEO-018	<0.1	SE78495-3	<0.1 <0.1	LCS	70%
m&p- Xylenes	mg/kg	0.2	SEO-017	<0.2	SE78495-3	<0.2 <0.2	LCS	65%
o- Xylene	mg/kg	0.1	SEO-018	<0.1	SE78495-3	<0.1 <0.1	LCS	67%
Total Xylenes	mg/kg	0.3	SEO-018	<0.3	SE78495-3	<0.3 <0.3	LCS	66%
BTEX Surrogate (%)	%	0	SEO-018	83	SE78495-3	104 109 RPD: 5	LCS	125%

QUALITY CONTROL	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
TRH in soil with C6-C9 by P/T								
Date Extracted (TRH C6-C9 PT)				27/05/10	SE78495-3	27/05/2010 27/05/2010	LCS	27/05/10
Date Analysed (TRH C6-C9 PT)				27/05/10	SE78495-3	27/05/2010 27/05/2010	LCS	27/05/10
TRH C6 - C9 P&T	mg/kg	20	SEO-018	<20	SE78495-3	<20 <20	LCS	80%
Date Extracted (TRH C10-C36)				27/05/2010	SE78495-3	27/05/2010 27/05/2010	LCS	27/05/2010
Date Analysed (TRH C10-C36)				27/05/2010	SE78495-3	27/05/2010 27/05/2010	LCS	27/05/2010
TRH C10 - C14	mg/kg	20	SEO-020	<20	SE78495-3	<20 [N/T]	LCS	97%
TRH C15 - C28	mg/kg	50	SEO-020	<50	SE78495-3	<50 [N/T]	LCS	99%
TRH C29 - C36	mg/kg	50	SEO-020	<50	SE78495-3	<50 [N/T]	LCS	77%



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QUALITY CONTROL	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
PAHs in Soil								
Date Extracted				27/05/10	SE78495-2	27/05/2010 27/05/2010	SE78495-3	27/05/10
Date Analysed				27/05/10	SE78495-2	27/05/2010 27/05/2010	SE78495-3	27/05/10
Naphthalene	mg/kg	0.1	SEO-030	<0.10	SE78495-2	<0.10 <0.10	SE78495-3	104%
2-Methylnaphthalene	mg/kg	0.1	SEO-030	<0.10	SE78495-2	<0.10 <0.10	[NR]	[NR]
1-Methylnaphthalene	mg/kg	0.1	SEO-030	<0.10	SE78495-2	<0.10 <0.10	[NR]	[NR]
Acenaphthylene	mg/kg	0.1	SEO-030	<0.10	SE78495-2	<0.10 <0.10	SE78495-3	103%
Acenaphthene	mg/kg	0.1	SEO-030	<0.10	SE78495-2	<0.10 <0.10	SE78495-3	118%
Fluorene	mg/kg	0.1	SEO-030	<0.10	SE78495-2	<0.10 <0.10	[NR]	[NR]
Phenanthrene	mg/kg	0.1	SEO-030	<0.10	SE78495-2	<0.10 <0.10	SE78495-3	109%
Anthracene	mg/kg	0.1	SEO-030	<0.10	SE78495-2	<0.10 <0.10	SE78495-3	117%
Fluoranthene	mg/kg	0.1	SEO-030	<0.10	SE78495-2	<0.10 <0.10	SE78495-3	110%
Pyrene	mg/kg	0.1	SEO-030	<0.10	SE78495-2	<0.10 <0.10	SE78495-3	112%
Benzo[a]anthracene	mg/kg	0.1	SEO-030	<0.10	SE78495-2	<0.10 <0.10	[NR]	[NR]
Chrysene	mg/kg	0.1	SEO-030	<0.10	SE78495-2	<0.10 <0.10	[NR]	[NR]
Benzo[b,k]fluoranthene	mg/kg	0.2	SEO-030	<0.20	SE78495-2	<0.20 <0.20	[NR]	[NR]
Benzo[a]pyrene	mg/kg	0.05	SEO-030	<0.05	SE78495-2	<0.05 <0.05	SE78495-3	107%
Indeno[123-cd]pyrene	mg/kg	0.1	SEO-030	<0.10	SE78495-2	<0.10 <0.10	[NR]	[NR]
Dibenzo[ah]anthracene	mg/kg	0.1	SEO-030	<0.10	SE78495-2	<0.10 <0.10	[NR]	[NR]
Benzo[ghi]perylene	mg/kg	0.1	SEO-030	<0.10	SE78495-2	<0.10 <0.10	[NR]	[NR]
Total PAHs (sum)	mg/kg	1.75	SEO-030	<1.7	SE78495-2	<1.7 <1.7	[NR]	[NR]
Nitrobenzene-d5	%	0	SEO-030	119	SE78495-2	115 90 RPD: 24	SE78495-3	126%
2-Fluorobiphenyl	%	0	SEO-030	110	SE78495-2	114 93 RPD: 20	SE78495-3	113%
p -Terphenyl-d14	%	0	SEO-030	123	SE78495-2	124 99 RPD: 22	SE78495-3	119%



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QUALITY CONTROL	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
OC Pesticides in Soil								
Date Extracted				27/05/2010	SE78495-4	27/05/2010 27/05/2010	LCS	27/05/2010
Date Analysed				27/05/2010	SE78495-4	27/05/2010 27/05/2010	LCS	27/05/2010
HCB	mg/kg	0.1	SEO-005	<0.1	SE78495-4	<0.1 <0.1	[NR]	[NR]
<i>alpha</i> -BHC	mg/kg	0.1	SEO-005	<0.1	SE78495-4	<0.1 <0.1	[NR]	[NR]
gamma-BHC (Lindane)	mg/kg	0.1	SEO-005	<0.1	SE78495-4	<0.1 <0.1	[NR]	[NR]
Heptachlor	mg/kg	0.1	SEO-005	<0.1	SE78495-4	<0.1 <0.1	LCS	95%
Aldrin	mg/kg	0.1	SEO-005	<0.1	SE78495-4	<0.1 <0.1	LCS	90%
<i>beta</i> -BHC	mg/kg	0.1	SEO-005	<0.1	SE78495-4	<0.1 <0.1	[NR]	[NR]
<i>delta</i> -BHC	mg/kg	0.1	SEO-005	<0.1	SE78495-4	<0.1 <0.1	LCS	79%
Heptachlor Epoxide	mg/kg	0.1	SEO-005	<0.1	SE78495-4	<0.1 <0.1	[NR]	[NR]
<i>o,p</i> -DDE	mg/kg	0.1	SEO-005	<0.1	SE78495-4	<0.1 <0.1	[NR]	[NR]
<i>alpha</i> -Endosulfan	mg/kg	0.1	SEO-005	<0.1	SE78495-4	<0.1 <0.1	[NR]	[NR]
<i>trans</i> -Chlordane	mg/kg	0.1	SEO-005	<0.1	SE78495-4	<0.1 <0.1	[NR]	[NR]
<i>cis</i> -Chlordane	mg/kg	0.1	SEO-005	<0.1	SE78495-4	<0.1 <0.1	[NR]	[NR]
<i>trans</i> -Nonachlor	mg/kg	0.1	SEO-005	<0.1	SE78495-4	<0.1 <0.1	[NR]	[NR]
<i>p,p</i> -DDE	mg/kg	0.1	SEO-005	<0.1	SE78495-4	<0.1 <0.1	[NR]	[NR]
Dieldrin	mg/kg	0.1	SEO-005	<0.1	SE78495-4	<0.1 <0.1	LCS	107%
Endrin	mg/kg	0.1	SEO-005	<0.1	SE78495-4	<0.1 <0.1	LCS	126%
<i>o,p</i> -DDD	mg/kg	0.1	SEO-005	<0.1	SE78495-4	<0.1 <0.1	[NR]	[NR]
<i>o,p</i> -DDT	mg/kg	0.1	SEO-005	<0.1	SE78495-4	<0.1 <0.1	[NR]	[NR]
<i>beta</i> -Endosulfan	mg/kg	0.1	SEO-005	<0.1	SE78495-4	<0.1 <0.1	[NR]	[NR]
<i>p,p</i> -DDD	mg/kg	0.1	SEO-005	<0.1	SE78495-4	<0.1 <0.1	[NR]	[NR]
<i>p,p</i> -DDT	mg/kg	0.1	SEO-005	<0.1	SE78495-4	<0.1 <0.1	LCS	114%
Endosulfan Sulphate	mg/kg	0.1	SEO-005	<0.1	SE78495-4	<0.1 <0.1	[NR]	[NR]
Endrin Aldehyde	mg/kg	0.1	SEO-005	<0.1	SE78495-4	<0.1 <0.1	[NR]	[NR]
Methoxychlor	mg/kg	0.1	SEO-005	<0.1	SE78495-4	<0.1 <0.1	[NR]	[NR]
Endrin Ketone	mg/kg	0.1	SEO-005	<0.1	SE78495-4	<0.1 <0.1	[NR]	[NR]
2,4,5,6-Tetrachloro-m-xy lene (<i>Surrogate</i>)	%	0	SEO-005	107	SE78495-4	117 117 RPD: 0	LCS	73%



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QUALITY CONTROL	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
PCBs in Soil								
Date Extracted				27/05/2010	SE78495-4	27/05/2010 27/05/2010	LCS	27/05/2010
Date Analysed				27/05/2010	SE78495-4	27/05/2010 27/05/2010	LCS	27/05/2010
Arochlor 1016	mg/kg	0.1	SEO-005	<0.1	SE78495-4	<0.1 <0.1	[NR]	[NR]
Arochlor 1221	mg/kg	0.1	SEO-005	<0.1	SE78495-4	<0.1 <0.1	[NR]	[NR]
Arochlor 1232	mg/kg	0.1	SEO-005	<0.1	SE78495-4	<0.1 <0.1	[NR]	[NR]
Arochlor 1242	mg/kg	0.1	SEO-005	<0.1	SE78495-4	<0.1 <0.1	[NR]	[NR]
Arochlor 1248	mg/kg	0.1	SEO-005	<0.1	SE78495-4	<0.1 <0.1	[NR]	[NR]
Arochlor 1254	mg/kg	0.1	SEO-005	<0.1	SE78495-4	<0.1 <0.1	[NR]	[NR]
Arochlor 1260	mg/kg	0.1	SEO-005	<0.1	SE78495-4	<0.1 <0.1	LCS	126%
Arochlor 1262	mg/kg	0.1	SEO-005	<0.1	SE78495-4	<0.1 <0.1	[NR]	[NR]
Arochlor 1268	mg/kg	0.1	SEO-005	<0.1	SE78495-4	<0.1 <0.1	[NR]	[NR]
Total Positive PCB	mg/kg	0.9	SEO-005	<0.90	SE78495-4	<0.90 <0.90	[NR]	[NR]
PCB_Surrogate 1	%	0	SEO-005	107	SE78495-4	117 117 RPD: 0	LCS	99%

QUALITY CONTROL	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Metals in Soil by ICP-OES								
Date Extracted (Metals)				27/05/2010	[NT]	[NT]	LCS	27/05/2010
Date Analysed (Metals)				27/05/2010	[NT]	[NT]	LCS	27/05/2010
Arsenic	mg/kg	3	SEM-010	<3	[NT]	[NT]	LCS	93%
Cadmium	mg/kg	0.3	SEM-010	<0.3	[NT]	[NT]	LCS	97%
Chromium	mg/kg	0.3	SEM-010	<0.3	[NT]	[NT]	LCS	99%
Copper	mg/kg	0.5	SEM-010	<0.5	[NT]	[NT]	LCS	98%
Lead	mg/kg	1	SEM-010	<1	[NT]	[NT]	LCS	96%
Nickel	mg/kg	0.5	SEM-010	<0.5	[NT]	[NT]	LCS	97%
Zinc	mg/kg	0.5	SEM-010	<0.5	[NT]	[NT]	LCS	96%



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QUALITY CONTROL	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Mercury Cold Vapor/Hg Analyser								
Date Extracted (Mercury)				27/05/2010	[NT]	[NT]	LCS	27/05/2010
Date Analysed (Mercury)				27/05/2010	[NT]	[NT]	LCS	27/05/2010
Mercury	mg/kg	0.05	SEM-005	<0.05	[NT]	[NT]	LCS	107%

QUALITY CONTROL	UNITS	LOR	METHOD	Blank
Hold sample- NO test required				
Sample on HOLD		[NT]		[NT]

QUALITY CONTROL	UNITS	LOR	METHOD	Blank
Moisture				
Date Analysed (moisture)				[NT]
Moisture	%	1	AN002	<1

QUALITY CONTROL	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
TRH in soil with C6-C9 by P/T			
Date Extracted (TRH C6-C9 PT)		SE78495-2	27/05/2010 27/05/2010
Date Analysed (TRH C6-C9 PT)		SE78495-2	27/05/2010 27/05/2010
TRH C6 - C9 P&T	mg/kg	SE78495-2	<20 [N/T]
Date Extracted (TRH C10-C36)		SE78495-2	27/05/2010 27/05/2010
Date Analysed (TRH C10-C36)		SE78495-2	27/05/2010 27/05/2010
TRH C10 - C14	mg/kg	SE78495-2	<20 <20
TRH C15 - C28	mg/kg	SE78495-2	<50 <50
TRH C29 - C36	mg/kg	SE78495-2	<50 <50



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Result Codes

[INS] :	Insufficient Sample for this test	[RPD] :	Relative Percentage Difference
[NR] :	Not Requested	*	Not part of NATA Accreditation
[NT] :	Not tested	[N/A] :	Not Applicable
[LOR] :	Limit of reporting		

Report Comments

Samples analysed as received. Solid samples expressed on a dry weight basis.

Date Organics extraction commenced:

NATA Corporate Accreditation No. 2562, Site No 4354

Note: Test results are not corrected for recovery (excluding Air-toxics and Dioxins/Furans*)

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(www.sgs.com/terms_and_conditions.htm). Attention is drawn to the limitations of liability, indemnification and jurisdictional issues established therein.

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Quality Control Protocol

Method Blank: An analyte free matrix to which all reagents are added in the same volume or proportions as used in sample processing. The method blank should be carried through the complete sample preparation and analytical procedure. A method blank is prepared every 20 samples.

Duplicate: A separate portion of a sample being analysed that is treated the same as the other samples in the batch. One duplicate is processed at least every 10 samples.

Surrogate Spike: An organic compound which is similar to the target analyte(s) in chemical composition and behavior in the analytical process, but which is not normally found in environmental samples. Surrogates are added to samples before extraction to monitor extraction efficiency and percent recovery in each sample.

Internal Standard: Added to all samples requiring analysis for organics (where relevant) or metals by ICP after the extraction/digestion process; the compounds/elements serve to give a standard of retention time and/or response, which is invariant from run-to-run with the instruments.

Laboratory Control Sample: A known matrix spiked with compound(s) representative of the target analytes. It is used to document laboratory performance. When the results of the matrix spike analysis indicates a potential problem due to the sample matrix itself, the LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.

Matrix Spike: An aliquot of sample spiked with a known concentration of target analyte(s). The spiking occurs prior to sample preparation and analysis. A matrix spike is used to document the bias of a method in a given sample matrix.

Quality Acceptance Criteria

The QC criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here: <http://www.au.sgs.com/sgs-mp-au-env-qu-022-qa-qc-plan-en-09.pdf>



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ANALYTICAL REPORT

31 May 2010

Coffey Environments Pty Ltd

Lot 101, 19 Warabrook Blvd

Warabrook

NSW 2304

Attention: **Damien Hendrickx**

Your Reference: ENVIWARA00340AB - Asbestos

Our Reference: SE78495A

Samples: 5 Soils

Received: 25/05/2010

Preliminary Report Sent: Not Issued

These samples were analysed in accordance with your written instructions.

For and on Behalf of:

SGS ENVIRONMENTAL SERVICES

Client Services: Simon Matthews

Simon.Matthews@sgs.com

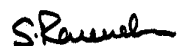
Sample Receipt: Angela Mamalicos

AU.SampleReceipt.Sydney@sgs.com

Laboratory Manager: Edward Ibrahim

Edward.Ibrahim@sgs.com

This report has been authorised by the undersigned:



Ravee Sivasubramaniam

Asbestos Signatory

Asbestos ID in soil Our Reference:	UNITS	SE78495A-2	SE78495A-3	SE78495A-4
Your Reference	-----	TP3 - 0.1-0.2	TP5 - 0.0-0.1	Test Location 2 - 0.0-0.1
Sample Matrix	-----	Soil	Soil	Soil
Date Sampled		21/05/2010	21/05/2010	21/05/2010
Date Analysed		31/05/2010	31/05/2010	31/05/2010
Sample Description		45g soil	66g clay,soil,rocks	42g soil
Asbestos ID in soil	-	No asbestos detected Organic fibres detected*	No asbestos detected	No asbestos detected

Method ID	Methodology Summary
AN602	Analysed using in house method AN602 - Qualitative identification of Asbestos Fibres, Synthetic Mineral Fibres and Organic Fibres in bulk samples (including building materials and soils) using Polarised Light Microscopy and Dispersion Staining Techniques. Our NATA Accreditation does not currently cover the identification of Synthetic Mineral Fibres and Organic Fibres, however, according to new NATA requirements, the reporting of these fibres is compulsory if detected.

Result Codes

[INS]	: Insufficient Sample for this test	[RPD]	: Relative Percentage Difference
[NR]	: Not Requested	*	: Not part of NATA Accreditation
[NT]	: Not tested	[N/A]	: Not Applicable

Report Comments

Sampled by the client

Even after disintegration it can be very difficult, or impossible, to detect the presence of asbestos in some asbestos-containing bulk materials using polarised light microscopy.

This is due to the low grade or small length or diameter of asbestos fibres present in the material, or to the fact that very fine fibres have been distributed intimately throughout the materials.

No respirable fibres detected using trace analysis technique.

Asbestos analysed by Approved Identifier Ravee Sivasubramaniam.

Samples analysed as received. Solid samples expressed on a dry weight basis.

Date Organics extraction commenced:

NATA Corporate Accreditation No. 2562, Site No 4354

Note: Test results are not corrected for recovery (excluding Air-toxics and Dioxins/Furans*)

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Quality Acceptance Criteria

The QC criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here: <http://www.au.sgs.com/sgs-mp-au-env-qu-022-qa-qc-plan-en-09.pdf>



Chain of Custody

Laboratory Quotation / Order No. **COFFEY**

Job No: **ENVICARA 00340AB**

Sheet **1** of **1**

Dispatch to: **SCS ENVIRONMENTAL**
Address & Phone No: **Unit 16, 33 MADDOCK ST ALEXANDRIA NSW 2015**

Sampled by:

GAVIN TIPPETT

Consigning Officer: **DAMIAN HENDRICK**

Date Dispatched: **24/5/10**

Attention:

SAMPLE RECEIPT

Courier Service: **TNT**

Consignment Note No:

Relinquished by:

[Signature]

Date: **24/5/10**

Time: **4:30pm**

Received by:

Daniel

Date: **25/5/10**

Time: **9:00am**

Comments

Sample Matrix:

Container Type and Preservative

Sample No.

Date Sampled

Analyses Required:

Sample Condition on Receipt

SOIL

GLASS, ICE

1 TP2 0.0-0.1
2 TP3 0.1-0.2
3 TP5 0.0-0.1
4 Test Location 2.0-1

21/5/10

HPD

PAHs

TPHs

MAHs = BTEX

Metals: 8

OC/PCs

Asbestos

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Qc1

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SCS

25/5/10
Daniel
4000

25/5/10
Daniel
4000

25/5/10
Daniel
4000

25/5/10
Daniel
4000

25/5/10
Daniel
4000

Special Laboratory Instructions: **8 Metals: AS, Cd, Cr, Cu, Pb, Hg, Ni, Zn**
NOTE: Separate sub-samples not provided for asbestos analysis. We will accept a non-PAMA report
Detection Limits:
Turnaround Required: **Standard**

JOB NUMBER MUST BE REFERENCED ON ALL SUBSEQUENT PAGES

**PROPOSED DEVELOPMENT
LOTS 411, 412, 413 MEDOWIE ROAD
MEDOWIE PRELIMINARY
GEOTECHNICAL ASSESSMENT**

HDB TOWN PLANNING AND DESIGN

ENVIWARA00340AB-AB
16 July 2010

16 July 2010

HDB TOWN PLANNING AND DESIGN
PO Box 40
MAITLAND NSW 2320

Attention: Penelope Scott

Dear Penelope

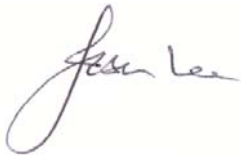
RE: PROPOSED MIXED USE DEVELOPMENT
LOTS 411, 412, 413 DP 1063902 MEDOWIE ROAD, MEDOWIE
PRELIMINARY GEOTECHNICAL ASSESSMENT

Coffey Geotechnics Pty Ltd (Coffey) is pleased to provide our Preliminary Geotechnical Assessment report for the above site.

We draw your attention to the enclosed sheet entitled "Important Information about your Coffey Report" which should be read in conjunction with the report.

We trust that our report meets with your requirements. If you require any further information regarding our report, please do not hesitate to contact Damien Hendrickx or the undersigned on (02) 4016 2300.

For and on behalf of Coffey Geotechnics Pty Ltd



Jason Lee

Principle – Newcastle Manager

CONTENTS

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2	FIELD INVESTIGATIONS	1
3	LABORATORY TESTING	2
4	SITE CONDITIONS	2
4.1	Surface Conditions	2
4.2	Subsurface Conditions	2
4.3	Acid Sulfate Soils	3
5	SITE PREPARATION (SAND AREAS)	3
6	SITE PREPARATION (CLAY AREAS)	4
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8	RISK OF SLOPE INSTABILITY	5
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Attachments 1, 2 and 3

Important Information about your Coffey Report

Figures

Figure AB1: Site Plan

Appendices

Appendix A: Results of field Investigations

Appendix B: Results of Acid Sulfate Screening Test

1 INTRODUCTION

This report presents the results of a geotechnical investigation carried out by Coffey Geotechnics Pty Ltd (Coffey) on behalf of HDB Town Planning and Design Pty Ltd (HDB) for the proposed mixed use development to be located on Lots 411, 412, 413 DP 1063902 Medowie Road, Medowie.

The work was commissioned by HDB in response to a Coffey proposal (Reference ENVIWARA00340AB-P01 dated 8 March 2010). Coffey understands that HDB has been engaged to prepare a rezoning report for a proposed mixed use (open space and residential) site. The findings of the assessment will be forwarded with additional HDB documentation to Port Stephens Council (Council). The Coffey preliminary geotechnical assessment was undertaken along with a Preliminary Contamination Assessment (PCA) report (Reference ENVIWARA00340AB-R01). The PCA report should be read in conjunction with this report.

The scope of the geotechnical assessment included providing recommendations on:

- Risk of slope instability and associated geotechnical constraints;
- Site preparation;
- Excavation conditions;
- The suitability of the site soils for use as fill and on fill construction procedures;
- Special requirements for construction procedures and or site drainage; and
- ASS conditions and requirements for an acid sulfate soil management plan.

The following report presents the results of field investigations and laboratory testing and provides discussion and recommendations relevant to the above scope of work.

2 FIELD INVESTIGATIONS

Field investigations were carried out on 21 May 2010 comprised of:

- Excavation of seven test pits (TP1 to TP7), using a rubber tracked excavator to depths varying from 1.7m to 2.4m, (except TP3 which was for surface environmental sampling only) with disturbed samples taken for subsequent laboratory testing;
- Site observations and mapping of site features.

Fieldwork was carried out in the full time presence of a Geotechnical Engineer from Coffey who located the test pits, directed all sampling and produced field logs of the test pits.

Engineering logs of the test pits are presented in Appendix A together with the explanation sheets defining the terms and symbols used in their preparation. Groundwater levels and inflows observed in the test pits were recorded at times and under the conditions stated on the engineering logs.

Test pits were located from aerial photos relative to existing site features at the time of field work. Test locations are shown on Figure AB1.

3 LABORATORY TESTING

Samples obtained during the field investigations were returned to Coffey NATA registered laboratories for Acid Sulfate Soil Screening.

Results of the laboratory testing are presented in Appendix B and discussed in the following sections of this report.

4 SITE CONDITIONS

4.1 Surface Conditions

The site is located on the western side of Medowie Road, Medowie, north of the Richardson Road intersection. It occupies an elongated area about 1000m by 300m, with the long axis orientated north south.

The site area is essentially flat and low lying with topographic relief on the site varying from about RL 10m AHD to RL 20m AHD. It is situated on a broad, flat area of wind blown sand deposits along the southern part of the site, with alluvial clays in the north western part of the site. These deposits overlie or lap onto a low ridge of residual soil situated in the north eastern part of the site.

Drainage at the northern half of the site is anticipated to follow the site surface topography and flow to the south towards a creek / drain in the middle of the site. Drainage over the southern half of the site is anticipated to occur by infiltration into the surface soils, with excessive surface water runoff likely to accumulate in pools in this area of the site.

Water from the creek / drain in the middle of the site is likely to flow towards Moffats Swamp, located approximately 1.3km east of the site.

At the time of the field investigations, trafficability over the majority of the site was found to be good and negotiable by two-wheel drive vehicle.

4.2 Subsurface Conditions

The site is underlain by the Pleistocene Aged Tomago Sand Member, an abandoned dunal barrier sequence of aeolian or wind blown sand dunes and sand sheets in the southern part of the site. Stiff to very stiff clays are present in the northern part of the site and are assessed to be extremely weathered (residual) rock with some areas of alluvial clays overlying. This sequence is underlain by basement rocks consisting of the Tomago Coal Measures, which contain interbedded sandstone, siltstone and coal, with some conglomerate.

For the purpose of this assessment, the subsurface conditions encountered in the investigation have been classified into Geotechnical Units as summarised in Table 1.

TABLE 1 – SUMMARY OF GEOTECHNICAL UNITS

UNIT	MATERIAL	DESCRIPTION
1	Alluvial Clay	Stiff to very Stiff, high plasticity
2	Alluvial / Aeolian Sand	Natural Sand profile of Variable density
3	Residual Clay	Stiff to very stiff Clays

It should be noted that small mounds of fill material are present in the area of the race track, as sampled in test location TP 2 and TP 3. No other fill was observed on site.

Groundwater inflows were encountered at 1.5m depth (TP 6) and 1.8m depth (TP 1).

4.3 Acid Sulfate Soils

Reference to the Williamstown 1:25,000 Acid Sulfate Soils Risk Map indicates that there are some areas of the site where there is a probability of acid sulfate soils (ASS) being encountered. In these areas (mainly in the southern and western areas of the site) the risk map a low probability of acid sulfate soils at depths of greater than 1 metre below the ground surface. According to the risk map there is no known occurrence of acid sulfate soils in the northern areas of the site.

The results of field screening indicate that ASS is unlikely to be encountered within about 2.0m depth. Should excavations and or foundations extend beyond this depth then further site specific data on ASS should be collected and assessed.

5 SITE PREPARATION (SAND AREAS)

Site preparation suitable for structure or pavement support in these areas should consist of:

- Areas for proposed lightly-loaded surface structures and pavements should be stripped to remove all vegetation, topsoil, root affected or other potentially deleterious materials, which may either be disposed to spoil or stockpiled for later landscaping purposes only;
- Following stripping, the exposed subgrade should be proof rolled to identify any wet or excessively deflecting material. All such areas should be over-excavated and replaced with a clean sand material;
- At design subgrade level for pavements or surface structures, the surface should be compacted for a depth of at least 1.0m to a minimum density index of 70% (AS1289 5.6.1);
- The top 300mm of subgrade below general pavement areas should be compacted to a minimum density index of 80% (AS1289 5.6.1);
- If site regrading is to occur or existing trees are to be removed, then approved clean sand fill should be compacted to a minimum density index of 70% (AS1289 5.6.1) in maximum lifts of 0.5m depth;
- Earthworks should be carried out in accordance with the recommendations outlined in AS3798-2007, '*Guidelines of Earthworks for Commercial and Residential Developments*'.

Based on the results of subsurface investigations, it is anticipated the majority of sand soils excavated from the proposed basement area would be suitable for re-use as fill around the building area including re-use as backfill for retaining wall structures.

6 SITE PREPARATION (CLAY AREAS)

The residential subdivision located in the northern portion of the site is underlain by clay soils. Where clay soils are encountered at subgrade level, site preparation and earthworks suitable for pavement and structure support should consist of:

- Prior to construction of roads and placement of any fill, the proposed areas should be stripped to remove all vegetation, topsoil, root affected or other potentially deleterious material. Stripping is generally expected to be required to depths of up to about 0.2m;
- Following stripping, the exposed subgrade materials should be proof rolled to identify any wet or excessively deflecting material. Any such areas should be over excavated and backfilled with an approved select material;
- Approved fill beneath roads should be placed in layers not exceeding 300mm loose thickness and compacted to a minimum density ratio of 95% Standard Compaction in accordance with AS1289 5.1.1 or equivalent. Clay subgrade fill should be placed and maintained at 60% to 90% of Optimum Moisture Content;
- The top 300mm of natural subgrade below pavements or the final 300mm of road subgrade replaced should be compacted to a minimum density ratio of 100% Standard Compaction or equivalent within the above stated moisture range;
- Residential site fill beneath structures should be compacted to a minimum density ratio of 95% Standard Compaction within $\pm 2\%$ of OMC;
- All fill should be supported by properly designed and constructed retaining walls or else battered at 1V:2H or flatter and protected against erosion.

Earthworks should be carried out in accordance with the recommendations outlined in AS3798-2007, '*Guidelines for Earthworks for Commercial and Residential Developments*'.

The clayey soils on site have not been subject to a site classification and further investigation and Laboratory testing would be required to provide site classification to AS2870 – 1996.

7 EXCAVATION CONDITIONS

Where excavation is required, it is anticipated that all site materials could be excavated by conventional bulldozer blade, excavator or backhoe bucket at least to the depths indicated on the appended field logs.

If excavation below the level of the water table is required, collapse of the sandy soils below the level of the water table is likely to occur.

8 RISK OF SLOPE INSTABILITY

The risk of slope instability for Lots 411, 412, 413 DP 1063902, Medowie Road has been based on the site observations recorded in Section 4.0. The principal site features used in the assessment are:

- Situated in an area of flat lying to gently undulating topography;
- Relatively undulating natural slope profile;
- Natural surface slopes typically in the order of 0° to 5°;
- Soil depth typically of 2.0m or greater;
- Soils typically comprise of residual and alluvial CLAY and SAND;
- No seepages observed;
- No concentration of surface waters observed;
- No evidence of overall slope instability observed.

On the basis of these site features the site is assessed to have an overall **Low** risk of slope instability in accordance with the classification system in Attachment 1.

It would be normal practice in the Port Stephens area for residential development to proceed on a block with this risk level classification. Development should be carried out in accordance with good hillside practice (as set out in Attachment 1, 2 and 3) and the specific geotechnical constraints defined below.

Recommended Geotechnical Constraints for Residential Development and Compliance of (Existing/Proposed) Development

Residential Allotment

Type of Structure:

There are no particular geotechnical constraints on the type of structures provided they are founded on footings designed and constructed in accordance with AS2870, '*Residential Slabs and Footings*'. Development should be designed to accommodate the natural slope profile.

Area for Development:

All of the lot is considered feasible for development from a slope stability viewpoint.

Development of the lot should be undertaken in accordance with good hillside construction practice and sound engineering principles as presented in Attachment 2.

Foundation Type:

Strip / pad footings and raft slabs, or pier and beam systems would be feasible from a slope stability viewpoint. (Raft slabs not generally suited to slopes > 1:3 due to slope modifications required.)

Foundations should not be founded within fill. This will require piered foundations to underlying natural ground, removal of the fill or removal and replacement of the fill to engineering specification.

This assessment should not be regarded as a site investigation for design of foundations, though general comments regarding foundation types are made so far as these affect slope stability.

Foundations should be designed and constructed in accordance with the recommendations and advice of AS2870, *'Residential Slabs and Footings'*.

Foundations near the crest of excavations should be taken to rock or founded behind or below a 1V:2H projection from the toe of the excavation.

Many soils and weak rocks in the Port Stephens area soften appreciably on exposure to air and water and care should be taken to cast foundations onto undisturbed material. Concrete should be poured within twenty four hours of excavation or else a blinding layer of concrete should be used.

Excavation:

Excavations should preferably not exceed 1.5m in depth and should be supported by properly designed and constructed retaining walls or else battered at 1V:2H or flatter and protected against erosion.

Excavations exceeding 1.5m in depth should be carried out in stages of no more than 4m width, with the exposed section retained / stabilised / assessed prior to excavation of the subsequent stage.

Excavations in competent sandstone / conglomerate (below the level of backhoe refusal) may be battered at 1V:1H.

Exposed faces are likely to undergo rapid degradation, fretting, ravelling and softening on exposure and batter protection or excavation retention measures should be implemented as soon as possible after exposure. Surface water flows from upslope areas should be diverted away from the cut face.

Drainage measures should be implemented above and behind all temporary and permanent excavations to avoid concentrated water flows on the face of the cut or infiltration into the soil / rock profile behind the cut.

Filling:

The depth of unsupported fill on the lot should not exceed 1.5m and should be battered at 1V:2H or flatter and protected against erosion. All fill greater than 1.5m deep should be supported by an engineer designed retaining wall.

Where fill is placed on slopes in excess of 1V:8H (7°), a prepared surface should be benched/stepped into the natural slope.

Details of filling (layer thickness, compaction, level of control, etc.) are unknown. The fill may be subject to consolidation settlement with time, and should be considered as uncontrolled fill in its present state unless records can be provide to confirm otherwise.

Retaining Walls:

Retaining walls should be designed for surcharge loading from slopes, retaining walls, structures and other existing/future improvements in the vicinity of the wall. Adequate subsurface and surface drainage should be provided behind all retaining walls.

Retaining walls should be designed by an experienced engineer familiar with the site conditions.

Excavations for the construction of retaining walls results in a temporary reduction in the stability of the adjacent area particularly during wet weather until the wall is complete. This increased risk can be managed or reduced by appropriate construction planning, using temporary support, staged excavation and control of drainage.

Rock work retaining walls are considered to be landscaping walls rather than structural retaining walls and their stability depends to a large extent on the methods and materials used in their construction, particularly the use of the granular backfill and the installation of adequate drainage behind the wall. The stability of rock work walls also depends on continued maintenance of the wall, with rebuilding of walls sometimes required.

Untreated timber walls should be considered as temporary rather than permanent structures as they are susceptible to fungal attack and rot degradation. No permanent structures should be built in the vicinity.

Access/Site Clearance:

Access and site modifications should comply with the recommendations above. Driveway access is usually restricted by Council's to a grade of 1V:4H (14°) or less.

Design of access must be such as to limit cut and fill to the constraints set out above.

Drainage and Sewage Disposal:

All collected stormwater run-off should be discharged / piped into the street drainage system, an interallotment drainage system, or existing watercourse in a controlled manner that limits erosion.

Septic wastes should be connected to the reticulated disposal system.

Where fill is placed across an existing watercourse, a culvert of adequate size to accommodate flood flows should be installed (subsoil drain along low point may also be required).

9 SUMMARY

The proposed development is assessed to have an overall **low** risk of slope instability and it is considered that the site is appropriate for residential development subject to the geotechnical constraints on development detailed in Section 8.

10 CONSTRUCTION RISK

The extent of testing associated with this assessment is limited to discrete locations, and variations in ground conditions can occur between and away from such locations. If conditions other than those described in this report are encountered during construction, further advice should be sought without delay.

Further discussion on the uses and limitations of this report are presented in the attached document, *'Important Information about your Coffey Report'*.

For and on behalf of Coffey Geotechnics Pty Ltd



Jason Lee

Principle – Newcastle Manager

Attachment 1: Classification of Risk of Slope Instability

ASSESSMENT OF RISK

Natural hill slopes are formed by processes which reflect the site geology, environment and climate. These processes include downslope movement of the near surface soil and rocks, in geological time all slopes are unstable. The area of influence of these downslope movements may range from local to regional and are rarely related to property boundaries. The natural processes may be affected by human intervention in the form of construction and related activities.

A landslide (or landslide) is a downslope movement of a soil or rock mass as a result of shear failure at the boundaries of the moving mass. Soil creep, which is extremely slow and occurs without a well defined surface, is not included as a landslide.

It is not technically feasible to assess the stability of a particular site in absolute terms such as stable or unstable. However, the degree of risk of slope movement can be assessed by the recognition of surface features supplemented by limited information on the regional and local subsurface profile and with the benefit of experience gained in similar geological environments. The degree of risk is categorised below:

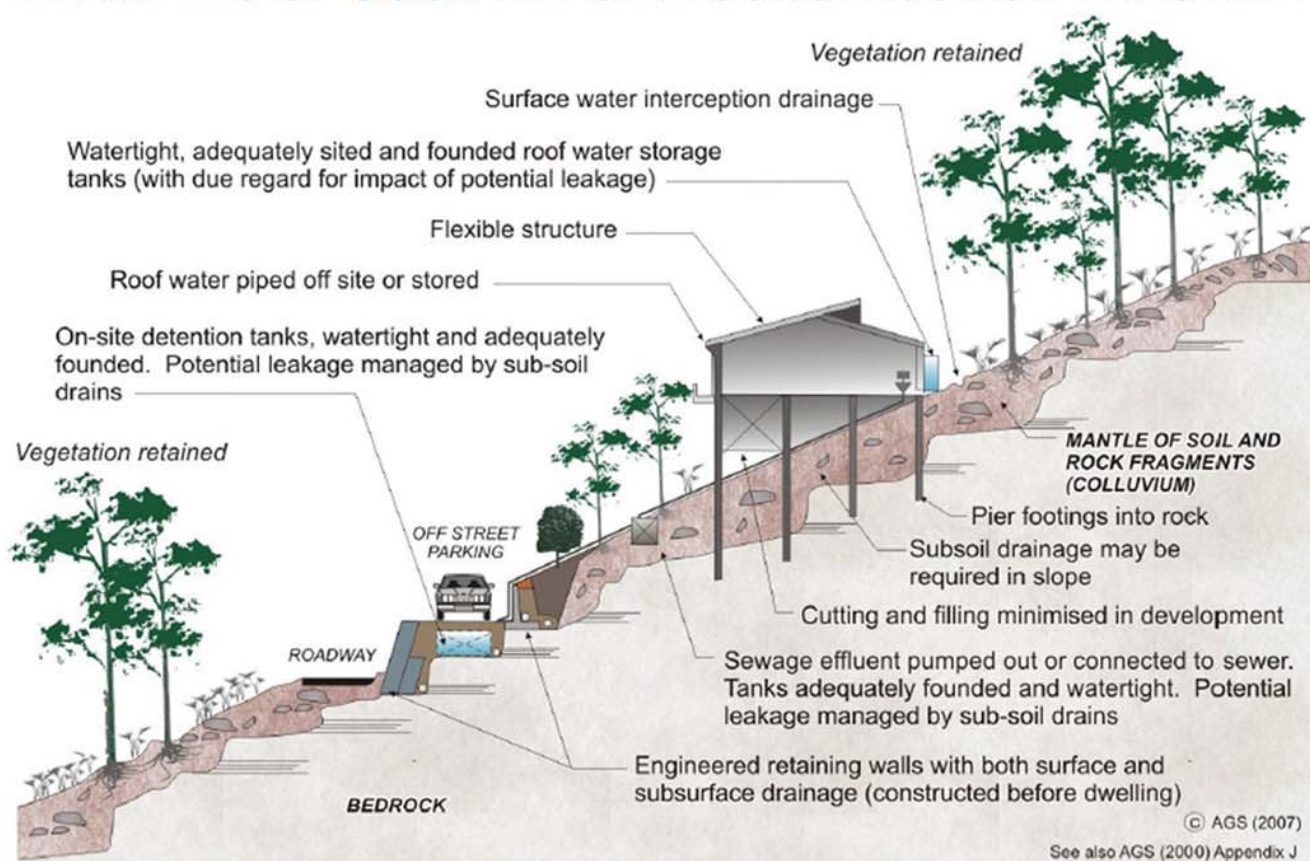
RISK OF INSTABILITY	EXPLANATION	IMPLICATIONS FOR DEVELOPMENT
VERY HIGH	Evidence of active or past landslips or rockface failure, extensive or rockface failure, extensive instability may occur.	Unsuitable for development unless major geotechnical work can satisfactorily improve the stability. Extensive geotechnical investigation necessary. Risk after development may be higher than usually accepted.
HIGH	Evidence of active soil creep or minor slips or rockface instability, significant instability may occur during and after extreme climatic conditions.	Development restrictions and/or geotechnical works required. Geotechnical investigation necessary. Risk after development may be higher than usually accepted.
MEDIUM	Evidence of possible soil creep or a steep soil covered slope, significant instability can be expected if the development does not have due regard for the site conditions.	Development restrictions may be required. Engineering practices suitable to hillside construction necessary. Geotechnical investigation may be needed. Risk after development generally no higher than usually accepted.
LOW	No evidence of instability observed, instability not expected.	Good engineering practices suitable for hillside construction required. Risk after development normally acceptable.
VERY LOW	Typically shallow soil cover with flat to gently sloping topography.	Good engineering practices should be followed.

Attachment 2: Some Guidelines for Hillside Construction

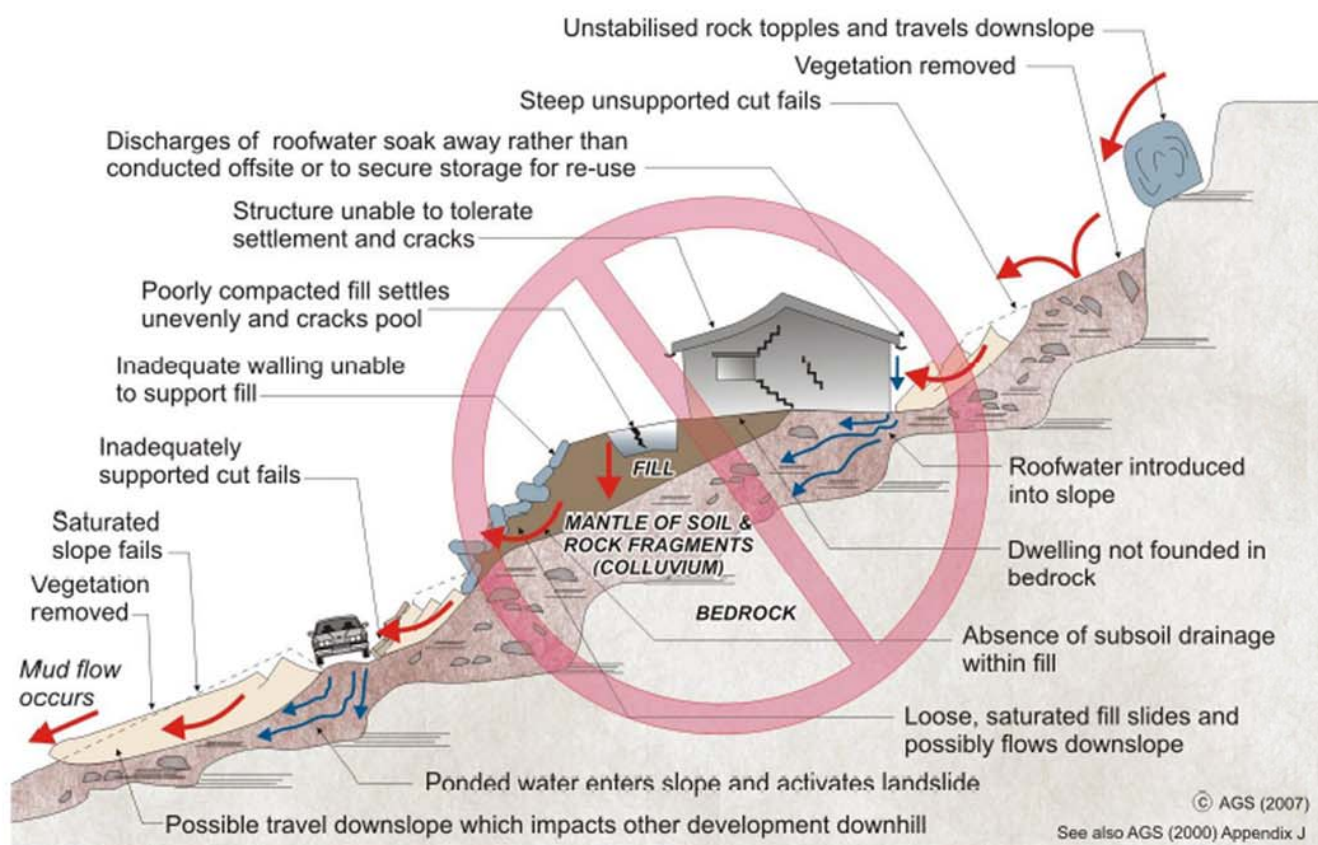
<i>GOOD ENGINEERING PRACTICE</i>		<i>POOR ENGINEERING PRACTICE</i>
ADVICE		
GEOTECHNICAL ASSESSMENT	Obtain advice from a qualified, experienced geotechnical practitioner at early stage of planning and before site works.	Prepare detailed plan and start site works before geotechnical advice.
PLANNING		
SITE PLANNING	Having obtained geotechnical advice, plan the development with the risk arising from the identified hazards and consequences in mind.	Plan development without regard for the Risk.
DESIGN AND CONSTRUCTION		
HOUSE DESIGN	Use flexible structures which incorporate properly designed brickwork, timber or steel frames, timber or panel cladding. Consider use of split levels. Use decks for recreational areas where appropriate.	Floor plans which require extensive cutting and filling. Movement intolerant structures.
SITE CLEARING	Retain natural vegetation wherever practicable.	Indiscriminately clear the site.
ACCESS & DRIVEWAYS	Satisfy requirements below for cuts, fills, retaining walls and drainage. Council specifications for grades may need to be modified. Driveways and parking areas may need to be fully supported on piers.	Excavate and fill for site access before geotechnical advice.
EARTHWORKS	Retain natural contours wherever possible.	Indiscriminatory bulk earthworks.
CUTS	Minimise depth. Support with engineered retaining walls or batter to appropriate slope. Provide drainage measures and erosion control.	Large scale cuts and benching. Unsupported cuts. Ignore drainage requirements
FILLS	Minimise height. Strip vegetation and topsoil and key into natural slopes prior to filling. Use clean fill materials and compact to engineering standards. Batter to appropriate slope or support with engineered retaining wall. Provide surface drainage and appropriate subsurface drainage.	Loose or poorly compacted fill, which if it fails, may flow a considerable distance including onto property below. Block natural drainage lines. Fill over existing vegetation and topsoil. Include stumps, trees, vegetation, topsoil, boulders, building rubble etc in fill.
ROCK OUTCROPS & BOULDERS	Remove or stabilise boulders which may have unacceptable risk. Support rock faces where necessary.	Disturb or undercut detached blocks or boulders.
RETAINING WALLS	Engineer design to resist applied soil and water forces. Found on rock where practicable. Provide subsurface drainage within wall backfill and surface drainage on slope above. Construct wall as soon as possible after cut/fill operation.	Construct a structurally inadequate wall such as sandstone flagging, brick or unreinforced blockwork. Lack of subsurface drains and weepholes.
FOOTINGS	Found within rock where practicable. Use rows of piers or strip footings oriented up and down slope. Design for lateral creep pressures if necessary. Backfill footing excavations to exclude ingress of surface water.	Found on topsoil, loose fill, detached boulders or undercut cliffs.
SWIMMING POOLS	Engineer designed. Support on piers to rock where practicable. Provide with under-drainage and gravity drain outlet where practicable. Design for high soil pressures which may develop on uphill side whilst there may be little or no lateral support on downhill side.	
DRAINAGE		
SURFACE	Provide at tops of cut and fill slopes. Discharge to street drainage or natural water courses. Provide general falls to prevent blockage by siltation and incorporate silt traps. Line to minimise infiltration and make flexible where possible. Special structures to dissipate energy at changes of slope and/or direction.	Discharge at top of fills and cuts. Allow water to pond on bench areas.
SUBSURFACE	Provide filter around subsurface drain. Provide drain behind retaining walls. Use flexible pipelines with access for maintenance. Prevent inflow of surface water.	Discharge roof runoff into absorption trenches.
SEPTIC & SULLAGE	Usually requires pump-out or mains sewer systems; absorption trenches may be possible in some areas if risk is acceptable. Storage tanks should be water-tight and adequately founded.	Discharge sullage directly onto and into slopes. Use absorption trenches without consideration of landslide risk.
EROSION CONTROL & LANDSCAPING	Control erosion as this may lead to instability. Revegetate cleared area.	Failure to observe earthworks and drainage recommendations when landscaping.
DRAWINGS AND SITE VISITS DURING CONSTRUCTION		
DRAWINGS	Building Application drawings should be viewed by geotechnical consultant	
SITE VISITS	Site Visits by consultant may be appropriate during construction/	
INSPECTION AND MAINTENANCE BY OWNER		
OWNER'S RESPONSIBILITY	Clean drainage systems; repair broken joints in drains and leaks in supply pipes. Where structural distress is evident see advice. If seepage observed, determine causes or seek advice on consequences.	

Attachment 3: Illustrations of Good and Poor Hillside Practise

EXAMPLES OF **GOOD** HILLSIDE CONSTRUCTION PRACTICE



EXAMPLES OF **POOR** HILLSIDE CONSTRUCTION PRACTICE



Important information about your **Coffey** Report

As a client of Coffey you should know that site subsurface conditions cause more construction problems than any other factor. These notes have been prepared by Coffey to help you interpret and understand the limitations of your report.

Your report is based on project specific criteria

Your report has been developed on the basis of your unique project specific requirements as understood by Coffey and applies only to the site investigated. Project criteria typically include the general nature of the project; its size and configuration; the location of any structures on the site; other site improvements; the presence of underground utilities; and the additional risk imposed by scope-of-service limitations imposed by the client. Your report should not be used if there are any changes to the project without first asking Coffey to assess how factors that changed subsequent to the date of the report affect the report's recommendations. Coffey cannot accept responsibility for problems that may occur due to changed factors if they are not consulted.

Subsurface conditions can change

Subsurface conditions are created by natural processes and the activity of man. For example, water levels can vary with time, fill may be placed on a site and pollutants may migrate with time. Because a report is based on conditions which existed at the time of subsurface exploration, decisions should not be based on a report whose adequacy may have been affected by time. Consult Coffey to be advised how time may have impacted on the project.

Interpretation of factual data

Site assessment identifies actual subsurface conditions only at those points where samples are taken and when they are taken. Data derived from literature and external data source review, sampling and subsequent laboratory testing are interpreted by geologists, engineers or scientists to provide an opinion about overall site conditions, their likely impact on the proposed development and recommended actions. Actual conditions may differ from those inferred to exist, because no professional, no matter how qualified, can reveal what is hidden by

earth, rock and time. The actual interface between materials may be far more gradual or abrupt than assumed based on the facts obtained. Nothing can be done to change the actual site conditions which exist, but steps can be taken to reduce the impact of unexpected conditions. For this reason, owners should retain the services of Coffey through the development stage, to identify variances, conduct additional tests if required, and recommend solutions to problems encountered on site.

Your report will only give preliminary recommendations

Your report is based on the assumption that the site conditions as revealed through selective point sampling are indicative of actual conditions throughout an area. This assumption cannot be substantiated until project implementation has commenced and therefore your report recommendations can only be regarded as preliminary. Only Coffey, who prepared the report, is fully familiar with the background information needed to assess whether or not the report's recommendations are valid and whether or not changes should be considered as the project develops. If another party undertakes the implementation of the recommendations of this report there is a risk that the report will be misinterpreted and Coffey cannot be held responsible for such misinterpretation.

Your report is prepared for specific purposes and persons

To avoid misuse of the information contained in your report it is recommended that you confer with Coffey before passing your report on to another party who may not be familiar with the background and the purpose of the report. Your report should not be applied to any project other than that originally specified at the time the report was issued.

Important information about your **Coffey** Report

Interpretation by other design professionals

Costly problems can occur when other design professionals develop their plans based on misinterpretations of a report. To help avoid misinterpretations, retain Coffey to work with other project design professionals who are affected by the report. Have Coffey explain the report implications to design professionals affected by them and then review plans and specifications produced to see how they incorporate the report findings.

Data should not be separated from the report*

The report as a whole presents the findings of the site assessment and the report should not be copied in part or altered in any way.

Logs, figures, drawings, etc. are customarily included in our reports and are developed by scientists, engineers or geologists based on their interpretation of field logs (assembled by field personnel) and laboratory evaluation of field samples. These logs etc. should not under any circumstances be redrawn for inclusion in other documents or separated from the report in any way.

Geoenvironmental concerns are not at issue

Your report is not likely to relate any findings, conclusions, or recommendations about the potential for hazardous materials existing at the site unless specifically required to do so by the client. Specialist equipment, techniques, and personnel are used to perform a geoenvironmental assessment. Contamination can create major health, safety and environmental risks. If you have no information about the potential for your site to be contaminated or create an environmental hazard, you are advised to contact Coffey for information relating to geoenvironmental issues.

Rely on Coffey for additional assistance

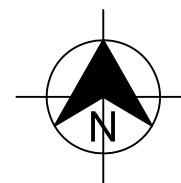
Coffey is familiar with a variety of techniques and approaches that can be used to help reduce risks for all parties to a project, from design to construction. It is common that not all approaches will be necessarily dealt with in your site assessment report due to concepts proposed at that time. As the project progresses through design towards construction, speak with Coffey to develop alternative approaches to problems that may be of genuine benefit both in time and cost.

Responsibility

Reporting relies on interpretation of factual information based on judgement and opinion and has a level of uncertainty attached to it, which is far less exact than the design disciplines. This has often resulted in claims being lodged against consultants, which are unfounded. To help prevent this problem, a number of clauses have been developed for use in contracts, reports and other documents. Responsibility clauses do not transfer appropriate liabilities from Coffey to other parties but are included to identify where Coffey's responsibilities begin and end. Their use is intended to help all parties involved to recognise their individual responsibilities. Read all documents from Coffey closely and do not hesitate to ask any questions you may have.

* For further information on this aspect reference should be made to "Guidelines for the Provision of Geotechnical information in Construction Contracts" published by the Institution of Engineers Australia, National headquarters, Canberra, 1987.

Figures



1: 4000 0 40 80 120 160 200m

drawn	NLS
approved	DCH
date	31-05-10
scale	1:4000
original size	A3

coffey
environments
SPECIALISTS IN ENVIRONMENTAL,
SOCIAL AND SAFETY PERFORMANCE

client:	HDB TOWN PLANNING AND DESIGN
project:	PROPOSED MIXED USE REZONING MEDOWIE ROAD, MEDOWIE, NSW PRELIMINARY CONTAMINATION ASSESSMENT
title:	SITE PLAN
project no:	ENVIWARA00340AB
figure no:	AB1

Appendix A

Results of field Investigations

Soil Description Explanation Sheet (1 of 2)

DEFINITION:

In engineering terms soil includes every type of uncemented or partially cemented inorganic or organic material found in the ground. In practice, if the material can be remoulded or disintegrated by hand in its field condition or in water it is described as a soil. Other materials are described using rock description terms.

CLASSIFICATION SYMBOL & SOIL NAME

Soils are described in accordance with the Unified Soil Classification (UCS) as shown in the table on Sheet 2.

PARTICLE SIZE DESCRIPTIVE TERMS

NAME	SUBDIVISION	SIZE
Boulders		>200 mm
Cobbles		63 mm to 200 mm
Gravel	coarse	20 mm to 63 mm
	medium	6 mm to 20 mm
	fine	2.36 mm to 6 mm
Sand	coarse	600 μ m to 2.36 mm
	medium	200 μ m to 600 μ m
	fine	75 μ m to 200 μ m

MOISTURE CONDITION

Dry Looks and feels dry. Cohesive and cemented soils are hard, friable or powdery. Uncemented granular soils run freely through hands.

Moist Soil feels cool and darkened in colour. Cohesive soils can be moulded. Granular soils tend to cohere.

Wet As for moist but with free water forming on hands when handled.

CONSISTENCY OF COHESIVE SOILS

TERM	UNDRAINED STRENGTH S_u (kPa)	FIELD GUIDE
Very Soft	<12	A finger can be pushed well into the soil with little effort.
Soft	12 - 25	A finger can be pushed into the soil to about 25mm depth.
Firm	25 - 50	The soil can be indented about 5mm with the thumb, but not penetrated.
Stiff	50 - 100	The surface of the soil can be indented with the thumb, but not penetrated.
Very Stiff	100 - 200	The surface of the soil can be marked, but not indented with thumb pressure.
Hard	>200	The surface of the soil can be marked only with the thumbnail.
Friable	–	Crumbles or powders when scraped by thumbnail.

DENSITY OF GRANULAR SOILS

TERM	DENSITY INDEX (%)
Very loose	Less than 15
Loose	15 - 35
Medium Dense	35 - 65
Dense	65 - 85
Very Dense	Greater than 85

MINOR COMPONENTS

TERM	ASSESSMENT GUIDE	PROPORTION OF MINOR COMPONENT IN:
Trace of	Presence just detectable by feel or eye, but soil properties little or no different to general properties of primary component.	Coarse grained soils: <5% Fine grained soils: <15%
With some	Presence easily detected by feel or eye, soil properties little different to general properties of primary component.	Coarse grained soils: 5 - 12% Fine grained soils: 15 - 30%

SOIL STRUCTURE

ZONING	CEMENTING
Layers Continuous across exposure or sample.	Weakly cemented Easily broken up by hand in air or water.
Lenses Discontinuous layers of lenticular shape.	Moderately cemented Effort is required to break up the soil by hand in air or water.
Pockets Irregular inclusions of different material.	

GEOLOGICAL ORIGIN

WEATHERED IN PLACE SOILS

Extremely weathered material Structure and fabric of parent rock visible.

Residual soil Structure and fabric of parent rock not visible.

TRANSPORTED SOILS

Aeolian soil Deposited by wind.

Alluvial soil Deposited by streams and rivers.

Colluvial soil Deposited on slopes (transported downslope by gravity).

Fill Man made deposit. Fill may be significantly more variable between tested locations than naturally occurring soils.

Lacustrine soil Deposited by lakes.

Marine soil Deposited in ocean basins, bays, beaches and estuaries.

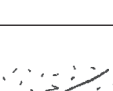
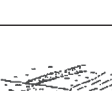
Soil Description Explanation Sheet (2 of 2)

SOIL CLASSIFICATION INCLUDING IDENTIFICATION AND DESCRIPTION

FIELD IDENTIFICATION PROCEDURES (Excluding particles larger than 60 mm and basing fractions on estimated mass)					USC	PRIMARY NAME
COARSE GRAINED SOILS More than 50% of materials less than 63 mm is larger than 0.075 mm	GRAVELS More than half of coarse fraction is larger than 2.0 mm	CLEAN GRAVELS (Little or no fines)	Wide range in grain size and substantial amounts of all intermediate particle sizes.		GW	GRAVEL
			Predominantly one size or a range of sizes with more intermediate sizes missing.		GP	GRAVEL
		GRAVELS WITH FINES (Appreciable amount of fines)	Non-plastic fines (for identification procedures see ML below)		GM	SILTY GRAVEL
			Plastic fines (for identification procedures see CL below)		GC	CLAYEY GRAVEL
	SANDS More than half of coarse fraction is smaller than 2.0 mm	CLEAN SANDS (Little or no fines)	Wide range in grain sizes and substantial amounts of all intermediate sizes		SW	SAND
			Predominantly one size or a range of sizes with some intermediate sizes missing.		SP	SAND
		SANDS WITH FINES (Appreciable amount of fines)	Non-plastic fines (for identification procedures see ML below).		SM	SILTY SAND
			Plastic fines (for identification procedures see CL below).		SC	CLAYEY SAND
FINE GRAINED SOILS More than 50% of material less than 63 mm is smaller than 0.075 mm	SILTS & CLAYS Liquid limit less than 50	IDENTIFICATION PROCEDURES ON FRACTIONS <0.2 mm.				
		DRY STRENGTH	DILATANCY	TOUGHNESS		
		None to Low	Quick to slow	None	ML	SILT
		Medium to High	None	Medium	CL	CLAY
	SILTS & CLAYS Liquid limit greater than 50	Low to medium	Slow to very slow	Low	OL	ORGANIC SILT
		Low to medium	Slow to very slow	Low to medium	MH	SILT
		High	None	High	CH	CLAY
		Medium to High	None	Low to medium	OH	ORGANIC CLAY
HIGHLY ORGANIC SOILS	Readily identified by colour, odour, spongy feel and frequently by fibrous texture.			Pt	PEAT	
• Low plasticity – Liquid Limit W _L less than 35%. • Medium plasticity – W _L between 35% and 50%.						

• Low plasticity – Liquid Limit W_L less than 35%. • Medium plasticity – W_L between 35% and 50%.

COMMON DEFECTS IN SOIL

TERM	DEFINITION	DIAGRAM	TERM	DEFINITION	DIAGRAM
PARTING	A surface or crack across which the soil has little or no tensile strength. Parallel or sub parallel to layering (eg bedding). May be open or closed.		SOFTENED ZONE	A zone in clayey soil, usually adjacent to a defect in which the soil has a higher moisture content than elsewhere.	
JOINT	A surface or crack across which the soil has little or no tensile strength but which is not parallel or sub parallel to layering. May be open or closed. The term 'fissure' may be used for irregular joints <0.2 m in length.		TUBE	Tubular cavity. May occur singly or as one of a large number of separate or inter-connected tubes. Walls often coated with clay or strengthened by denser packing of grains. May contain organic matter	
SHEARED ZONE	Zone in clayey soil with roughly parallel near planar, curved or undulating boundaries containing closely spaced, smooth or slickensided, curved intersecting joints which divide the mass into lenticular or wedge shaped blocks.		TUBE CAST	Roughly cylindrical elongated body of soil different from the soil mass in which it occurs. In some cases the soil which makes up the tube cast is cemented.	
SHEARED SURFACE	A near planar curved or undulating, smooth, polished or slickensided surface in clayey soil. The polished or slickensided surface indicates that movement (in many cases very little) has occurred along the defect.		INFILLED SEAM	Sheet or wall like body of soil substance or mass with roughly planar to irregular near parallel boundaries which cuts through a soil mass. Formed by infilling of open joints.	

Rock Description Explanation Sheet (1 of 2)

The descriptive terms used by Coffey are given below. They are broadly consistent with Australian Standard AS1726-1993.

DEFINITIONS: Rock substance, defect and mass are defined as follows:

Rock Substance In engineering terms rock substance is any naturally occurring aggregate of minerals and organic material which cannot be disintegrated or remoulded by hand in air or water. Other material is described using soil descriptive terms. Effectively homogenous material, may be isotropic or anisotropic.

Defect Discontinuity or break in the continuity of a substance or substances.

Mass Any body of material which is not effectively homogeneous. It can consist of two or more substances without defects, or one or more substances with one or more defects.

SUBSTANCE DESCRIPTIVE TERMS:

ROCK NAME Simple rock names are used rather than precise geological classification.

PARTICLE SIZE Grain size terms for sandstone are:
Coarse grained Mainly 0.6mm to 2mm
Medium grained Mainly 0.2mm to 0.6mm
Fine grained Mainly 0.06mm (just visible) to 0.2mm

FABRIC Terms for layering of penetrative fabric (eg. bedding, cleavage etc.) are:

Massive No layering or penetrative fabric.

Indistinct Layering or fabric just visible. Little effect on properties.

Distinct Layering or fabric is easily visible. Rock breaks more easily parallel to layering of fabric.

CLASSIFICATION OF WEATHERING PRODUCTS

Term	Abbreviation	Definition
Residual Soil	RS	Soil derived from the weathering of rock; the mass structure and substance fabric are no longer evident; there is a large change in volume but the soil has not been significantly transported.
Extremely Weathered Material	XW	Material is weathered to such an extent that it has soil properties, ie, it either disintegrates or can be remoulded in water. Original rock fabric still visible.
Highly Weathered Rock	HW	Rock strength is changed by weathering. The whole of the rock substance is discoloured, usually by iron staining or bleaching to the extent that the colour of the original rock is not recognisable. Some minerals are decomposed to clay minerals. Porosity may be increased by leaching or may be decreased due to the deposition of minerals in pores.
Moderately Weathered Rock	MW	The whole of the rock substance is discoloured, usually by iron staining or bleaching, to the extent that the colour of the fresh rock is no longer recognisable.
Slightly Weathered Rock	SW	Rock substance affected by weathering to the extent that partial staining or partial discolouration of the rock substance (usually by limonite) has taken place. The colour and texture of the fresh rock is recognisable; strength properties are essentially those of the fresh rock substance.
Fresh Rock	FR	Rock substance unaffected by weathering.

Notes on Weathering:

- AS1726 suggests the term "Distinctly Weathered" (DW) to cover the range of substance weathering conditions between XW and SW. For projects where it is not practical to delineate between HW and MW or it is judged that there is no advantage in making such a distinction, DW may be used with the definition given in AS1726.
- Where physical and chemical changes were caused by hot gasses and liquids associated with igneous rocks, the term "altered" may be substituted for "weathering" to give the abbreviations XA, HA, MA, SA and DA.

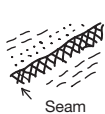
ROCK SUBSTANCE STRENGTH TERMS

Term	Abbreviation	Point Load Index, $I_{p(50)}$ (MPa)	Field Guide
Very Low	VL	Less than 0.1	Material crumbles under firm blows with sharp end of pick; can be peeled with a knife; pieces up to 30mm thick can be broken by finger pressure.
Low	L	0.1 to 0.3	Easily scored with a knife; indentations 1mm to 3mm show with firm bows of a pick point; has a dull sound under hammer. Pieces of core 150mm long by 50mm diameter may be broken by hand. Sharp edges of core may be friable and break during handling.
Medium	M	0.3 to 1.0	Readily scored with a knife; a piece of core 150mm long by 50mm diameter can be broken by hand with difficulty.
High	H	1 to 3	A piece of core 150mm long by 50mm can not be broken by hand but can be broken by a pick with a single firm blow; rock rings under hammer.
Very High	VH	3 to 10	Hand specimen breaks after more than one blow of a pick; rock rings under hammer.
Extremely High	EH	More than 10	Specimen requires many blows with geological pick to break; rock rings under hammer.

Notes on Rock Substance Strength:

- In anisotropic rocks the field guide to strength applies to the strength perpendicular to the anisotropy. High strength anisotropic rocks may break readily parallel to the planar anisotropy.
- The term "extremely low" is not used as a rock substance strength term. While the term is used in AS1726-1993, the field guide therein makes it clear that materials in that strength range are soils in engineering terms.
- The unconfined compressive strength for isotropic rocks (and anisotropic rocks which fall across the planar anisotropy) is typically 10 to 25 times the point load index $I_{p(50)}$. The ratio may vary for different rock types. Lower strength rocks often have lower ratios than higher strength rocks.

Rock Description Explanation Sheet (2 of 2)

COMMON DEFECTS IN ROCK MASSES		Diagram	Map Symbol	Graphic Log (Note 1)	DEFECT SHAPE	TERMS
Term	Definition				Planar	The defect does not vary in orientation
Parting	A surface or crack across which the rock has little or no tensile strength. Parallel or sub parallel to layering (eg bedding) or a planar anisotropy in the rock substance (eg, cleavage). May be open or closed.		20 Bedding 20 Cleavage	 (Note 2)	Curved	The defect has a gradual change in orientation
Joint	A surface or crack across which the rock has little or no tensile strength, but which is not parallel or sub parallel to layering or planar anisotropy in the rock substance. May be open or closed.		60	 (Note 2)	Undulating	The defect has a wavy surface
Sheared Zone (Note 3)	Zone of rock substance with roughly parallel near planar, curved or undulating boundaries cut by closely spaced joints, sheared surfaces or other defects. Some of the defects are usually curved and intersect to divide the mass into lenticular or wedge shaped blocks.		35		Stepped	The defect has one or more well defined steps
Sheared Surface (Note 3)	A near planar, curved or undulating surface which is usually smooth, polished or slickensided.		40		Irregular	The defect has many sharp changes of orientation
Crushed Seam (Note 3)	Seam with roughly parallel almost planar boundaries, composed of disoriented, usually angular fragments of the host rock substance which may be more weathered than the host rock. The seam has soil properties.		50		ROUGHNESS TERMS	
Infilled Seam	Seam of soil substance usually with distinct roughly parallel boundaries formed by the migration of soil into an open cavity or joint, infilled seams less than 1mm thick may be described as veneer or coating on joint surface.		65		Slickensided	Grooved or striated surface, usually polished
Extremely Weathered Seam	Seam of soil substance, often with gradational boundaries. Formad by weathering of the rock substance in place.		32		Polished	Shiny smooth surface
					Smooth	Smooth to touch. Few or no surface irregularities
					Rough	Many small surface irregularities (amplitude generally less than 1mm). Feels like fine to coarse sand paper.
					Very Rough	Many large surface irregularities (amplitude generally more than 1mm). Feels like, or coarser than very coarse sand paper.
					COATING TERMS	
					Clean	No visible coating
					Stained	No visible coating but surfaces are discoloured
					Veneer	A visible coating of soil or mineral, too thin to measure; may be patchy
					Coating	A visible coating up to 1mm thick. Thicker soil material is usually described using appropriate defect terms (eg, infilled seam). Thicker rock strength material is usually described as a vein.
					BLOCK SHAPE TERMS	
					Blocky	Approximately equidimensional
					Tabular	Thickness much less than length or width
					Columnar	Height much greater than cross section

Notes on Defects:

1. Usually borehole logs show the true dip of defects and face sketches and sections the apparent dip.
2. Partings and joints are not usually shown on the graphic log unless considered significant.
3. Sheared zones, sheared surfaces and crushed seams are faults in geological terms.

Engineering Log - Excavation

Client: **HDB TOWN PLANNING AND DESIGN**
Principal:
Project: **PROPOSED MIXED USE DEVELOPMENT**
Test pit location: **MEDOWIE**

Excavation No. **TP 1**
Sheet 1 of 1
Office Job No.: **ENVIWARA00340AB**
Date started: **21.5.2010**
Date completed: **21.5.2010**
Logged by: **GDT**
Checked by: 

equipment type and model: 4t Excavator Pit Orientation: Easting: m R.L. Surface: Not Measured
excavation dimensions: 3m long 0.5m wide Northing: m datum:

excavation information						material substance						structure and additional observations
method	penetration	support	water	notes samples, tests, etc	depth RL	graphic log	classification symbol	material	moisture condition	consistency/density index	pocket penetrometer	
E	1 2 3	N					CL	TOPSOIL: CLAY, low plasticity, dark brown with organics.	M	F		TOPSOIL
							CH	CLAY: high plasticity, brown with trace rootlets.			X	ALLUVIAL
					0.5							
					1.0						X	
					1.5						X	
					2.0		CL	CLAY: low plasticity, orange mottled red with trace fine to medium grained sand.	W		X	RESIDUAL
					2.5			Bottom of hole collapse of side walls.				

Sketch

Test pit TP 1 terminated at 2.4m

method N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	support S shoring N nil penetration 1 2 3 4 no resistance ranging to refusal water water level on date shown water inflow water outflow	notes, samples, tests U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	classification symbols and soil description based on unified classification system moisture D dry M moist W wet W _p plastic limit W _L liquid limit	consistency/density index VS very soft S soft F firm St stiff VS _t very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense
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Engineering Log - Excavation

Client: **HDB TOWN PLANNING AND DESIGN**

Principal:

Project: **PROPOSED MIXED USE DEVELOPMENT**

Test pit location: **MEDOWIE**

Excavation No. **TP 2**

Sheet 1 of 1

Office Job No.: **ENVIWARA00340AB**

Date started: **21.5.2010**

Date completed: **21.5.2010**

Logged by: **GDT**

Checked by: 

equipment type and model: 4t Excavator Pit Orientation: Easting: m R.L. Surface: Not Measured

excavation dimensions: 3m long 0.5m wide Northing: m datum:

excavation information					material substance										
method	penetration			support	water	notes samples, tests, etc	depth metres	graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro- meter kPa	structure and additional observations	
	1	2	3												
W				N		E			CL	FILL: CLAY, low plasticity, brown with some angular gravel.	M	F			FILL
									CH	CLAY: high plasticity, brown, some tree roots.	M	VSt			ALLUVIAL
						E	0.5						X		
									CH	CLAY: high plasticity, orange brown.			X		RESIDUAL
						E	1.0								
							1.5		CH	CLAY: high plasticity, grey mottled yellow with trace fine sand.		St	X		HIGHLY WEATHERED ROCK
							2.0								
													X		
							2.5			Bottom of hole. Test pit TP 2 terminated at 2.3m					

Sketch

method N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	support S shoring N nil penetration 1 2 3 4  no resistance ranging to refusal water  water level on date shown  water inflow  water outflow	notes, samples, tests U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	classification symbols and soil description based on unified classification system moisture D dry M moist W wet W _p plastic limit W _L liquid limit	consistency/density index VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense
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Engineering Log - Excavation

Excavation No. **TP 3**

Sheet 1 of 1

Office Job No.: **ENVIWARA00340AB**

Client: **HDB TOWN PLANNING AND DESIGN**

Date started: **21.5.2010**

Principal:

Date completed: **21.5.2010**

Project: **PROPOSED MIXED USE DEVELOPMENT**

Logged by: **GDT**

Test pit location: **MEDOWIE**

Checked by: 

equipment type and model: 4t Excavator Pit Orientation: Easting: m R.L. Surface: Not Measured
excavation dimensions: 3m long 0.5m wide Northing: m datum:

excavation information						material substance						
method	penetration	support	water	notes samples, tests, etc	depth metres	graphic log	classification symbol	material	moisture condition	consistency/ density index	pocket penetro- meter	structure and additional observations
W	1 2 3	N	Observed	E	0.5		CL	FILL: CLAY, low plasticity, brown with trace fine angular gravel.	M	F	100 200 300 400	FILL
			None Observed		1.0			Test pit TP 3 terminated at 0.2m				
					1.5							
					2.0							
					2.5							

Sketch

TESTPIT 00340AB.GPJ COFFEY.GDT 25.5.10

Form GEO 5.2 Issue 3 Rev.2

method N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	support S shoring N nil penetration 1 2 3 4  no resistance ranging to refusal water  water level on date shown  water inflow  water outflow	notes, samples, tests U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	classification symbols and soil description based on unified classification system moisture D dry M moist W wet W _p plastic limit W _L liquid limit	consistency/density index VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense
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Engineering Log - Excavation

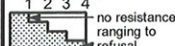
Client: **HDB TOWN PLANNING AND DESIGN**
Principal:
Project: **PROPOSED MIXED USE DEVELOPMENT**
Test pit location: **MEDOWIE**

Excavation No. **TP 4**
Sheet 1 of 1
Office Job No.: **ENVIWARA00340AB**
Date started: **21.5.2010**
Date completed: **21.5.2010**
Logged by: **GDT**
Checked by: 

equipment type and model: 4t Excavator Pit Orientation: Easting: m R.L. Surface: Not Measured
excavation dimensions: 3m long 0.5m wide Northing: m datum:

excavation information					material substance										
method	penetration			support	water	notes samples, tests, etc	depth metres	depth RL	graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro- meter kPa	structure and additional observations
E	1	2	3	N						CL	TOPSOIL: CLAY, low plasticity, dark brown with organics.	M	F	100	TOPSOIL
										CH	CLAY: high plasticity, orange mottled red.		St	200	RESIDUAL
						E	0.5							300	
														400	
						E	1.0								
										CH	CLAY: high plasticity, red mottled grey.		H		HIGHLY WEATHERED ROCK
							1.5								
							2.0							600	
											Practical refusal. Test pit TP 4 terminated at 2m				
							2.5								

Sketch

method N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	support S shoring N nil penetration 1 2 3 4  no resistance ranging to refusal water  water level on date shown  water inflow  water outflow	notes, samples, tests U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	classification symbols and soil description based on unified classification system moisture D dry M moist W wet W _p plastic limit W _L liquid limit	consistency/density index VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense
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Engineering Log - Excavation

Excavation No. **TP 5**

Sheet 1 of 1

Office Job No.: **ENVIWARA00340AB**

Client: **HDB TOWN PLANNING AND DESIGN**

Date started: **21.5.2010**

Principal:

Date completed: **21.5.2010**

Project: **PROPOSED MIXED USE DEVELOPMENT**

Logged by: **GDT**

Test pit location: **MEDOWIE**

Checked by: 

equipment type and model: 4t Excavator Pit Orientation: Easting: m R.L. Surface: Not Measured
excavation dimensions: 3m long 0.5m wide Northing: m datum:

excavation information					material substance							
method	penetration	support	water	notes samples, tests, etc	depth metres	graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro- meter kPa	structure and additional observations
W	1 2 3	N			0.5		SP	SAND: fine to medium grained, pale grey, trace of fines.	M	L	100 200 300 400	SHALLOW MARINE
			None Observed	E	1.0		SP	SAND: fine to medium grained, dark brown, highly indurated.		VD		INDURATED SAND
				E	1.5		SP	SAND: fine to medium grained, grey to black, some tree roots.		MD		SHALLOW MARINE
					2.0			Become very hard to dig due to coffee rock layer above. Test pit TP 5 terminated at 1.7m				
					2.5							

Sketch

method N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	support S shoring N nil penetration 1 2 3 4  no resistance ranging to refusal water  water level on date shown  water inflow  water outflow	notes, samples, tests U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	classification symbols and soil description based on unified classification system moisture D dry M moist W wet W _p plastic limit W _L liquid limit	consistency/density index VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense
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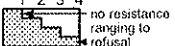
Engineering Log - Excavation

Client: **HDB TOWN PLANNING AND DESIGN**
 Principal:
 Project: **PROPOSED MIXED USE DEVELOPMENT**
 Test pit location: **MEDOWIE**

Excavation No. **TP 6**
 Sheet 1 of 1
 Office Job No.: **ENVIWARA00340AB**
 Date started: **21.5.2010**
 Date completed: **21.5.2010**
 Logged by: **GDT**
 Checked by: 

equipment type and model: 4t Excavator		Pit Orientation:		Easting: m	R.L. Surface: Not Measured
excavation dimensions: 3m long 0.5m wide		Northing: m		datum:	
excavation information			material substance		
method	penetration 1 2 3	support water	notes samples, tests, etc	depth metres	material substance
U		N			TOPSOIL: SAND, fine to medium grained, dark grey with some organics.
				0.5	SAND: fine to medium grained, pale grey, trace of fines.
		E			SAND: fine to medium grained, black to dark brown, highly indurated.
				1.0	SAND: fine to medium grained, black to brown, trace of fines strong odour.
		E			
				1.5	
		E			
				2.0	
				2.5	Hole collapse due to water. Test pit TP 6 terminated at 2.1m

Sketch

method N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	support S shoring N nil penetration 1 2 3 4  water  water level on date shown  water inflow  water outflow	notes, samples, tests U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	classification symbols and soil description based on unified classification system moisture D dry M moist W wet W _p plastic limit W _L liquid limit	consistency/density index VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense
---	---	---	--	---

Client: **HDB TOWN PLANNING AND DESIGN**

Date started: 21.5.2010

Principal:

Date completed: **21.5.2010**Project: **PROPOSED MIXED USE DEVELOPMENT**

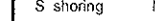
Logged by: **GDT**

Test pit location: **MEDOWIE**

Checked by:

Sketch

TESTPIT 00340AB.GPJ COFFEY,GDT 16.7 10

method N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	support S shoring N nil penetration  water  water level on date shown  water inflow  water outflow	notes, samples, tests U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	classification symbols and soil description based on unified classification system moisture D dry M moist W wet W _p plastic limit W _L liquid limit	consistency/density index VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense
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Appendix B

Results of Acid Sulfate Screening Test

acid sulfate soil screening test

client:	HDB TOWN PLANNING AND DESIGN				date:	4-6-2010						
principal:					test location:	Newcastle						
project:	PROPOSED MIXED USE REZONING				tested by:	GE						
location:	MEDOWIE ROAD, MEDOWIE				checked by:							
date samples recovered: 21-5-2010 pH meter used/serial no: HORIBA D-24 date of calibration: 4-6-2010												
hydrogen peroxide pH prior to use: 4.2 hydrogen peroxide temperature prior to use: 22.1												
Sample Number	Sample Location	Depth (m)	soil description	pH _F pH in 1:5 distilled water	pH _{FOX} (oxidation in 30% hydrogen peroxide)				pH Change (ie pH _F -pH _{FOX})	Additional comments		
					time (mins)	pH _{FOX}	temp (°C)	Effervescence (see note 1 below)			Odour (see note 2 below)	Colour change during reaction
1	TP1	0.9-1.0	Sand	5.26	20	4.04	22.3	A	1	None	1.22	
2	TP2	0.4-0.5	Sand	5.19	20	4.07	21.7	A	1	None	1.12	
3	TP5	0.4-0.5	Sand	6.09	20	4.23	21.3	A	1	None	1.86	
4	TP6	1.0-1.1	Sand	5.43	20	4.21	21.3	A	1	None	1.22	
5	TP6	1.4-1.5	Clay	5.47	20	4.29	21.2	A	1	None	1.18	
6	TP7	2.0-2.1	Clay	4.73	20	3.45	21.2	A	1	None	1.28	
NOTES: 1. Observed Effervescent Reaction: A. No visible effervescence B. Slight to moderate effervescence C. Vigorous effervescence D. No Reaction												
2. Observed Odour: 1. None 2. Moderate 3.Strong												

Bushfire Threat Assessment

For:
Lots 411 – 413 DP 1063902
Medowie Road, Medowie

Client:
Wendy Morris

JULY 2010

Prepared By:



Document History and Status

Issue	Revision	Issued To	Qty	Issue Date	Author	Reviewed
1	Draft	HDB	1	20/7/2010	SM	PS
1	Final	HDB	1			



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Printed: 8/5/10

File Location: G:\Jobs\2009\09167 - WENDY MORRIS - REZONING
MEDOWIE\Publication\Bushfire

Client: Wendy Morris

HDB Project Manager: Pene Scott

Reference: 09/167

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- Figure 3 – Current Zoning
- Figure 4 – Proposed Zoning
- Figure 5 – Concept Subdivision Design
- Figure 6 – Bushfire Prone Land Map
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- Figure 8 – 140m Buffer, Vegetation Types and APZ's, Northern Component
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- Table 1 – Recommended APZ's, Northern Component
- Table 2 – Recommended APZ's, Southern Component (Seniors Living)

1.0 INTRODUCTION

HDB Town Planning & Design has been engaged by *Wendy Morris* to undertake a Bushfire Threat Assessment in support of the rezoning of Lots 411, 412, 413 DP 1063902, Medowie Road, Medowie. The site is located to the south of the Village of Medowie in the Port Stephens Local Government Area (LGA). Part of the site is identified as being Bushfire Prone by Port Stephens Council's Bushfire Prone Land Map.

The rezoning proposes to rezone the site from its current 1(c1) Rural Small Holdings, to a combination of:

- 1(c1) Rural Small Holdings;
- 2(a) Residential;
- 3(b) Business;
- 6(a) General Recreation, and
- 6(c) Special Recreation.

As detailed in Figures 3 and 4 of this report.

This Bushfire Threat Assessment will examine the ability of the proposed rezoning and concept development design to accommodate bushfire protection measures in accordance with *Planning for Bushfire Protection 2006* (henceforth known as PBP 2006) and the Section 117 Ministerial Directions in relation to bushfire mitigation.

2.0 SITE DETAILS

2.1 General Site Description

The subject site is identified as:

Local Government Area	Port Stephens Council
Lot & DP	Lots 411, 412, 413 DP 1063902
Address	Medowie Road, Medowie
Zoning	1(c1) Rural Small Holdings
Size	42.68ha
Ownership	Mrs Wendy Morris

The site is accessed from Medowie Road which forms the western boundary of the site. The site is approximately 2km south of Medowie. The relatively flat site has been heavily cleared due to past land uses including agricultural and a motorcycle track. The site supports gently undulating terrain ranging in altitude from 10 to 15 metres AHD. No permanent watercourses run through the site however the wetlands on the western part of the site may be subject to periodical inundation. The site generally drains across the surface to the wetland area.



Figure 1 – Location Plan.

2.2 Adjoining Land

The site is bounded by three distinct landuses. These are:

- A golf course (Pacific Dunes) to the east;
- Rural Residential to the north and residential to the northeast; and
- Natural vegetation to the west including SEPP 14 Wetlands.



Figure 2 – Aerial Photo.

2.3 Rezoning

The existing zoning of the site (1(c1) Rural Small Holdings) is shown in the following figure.

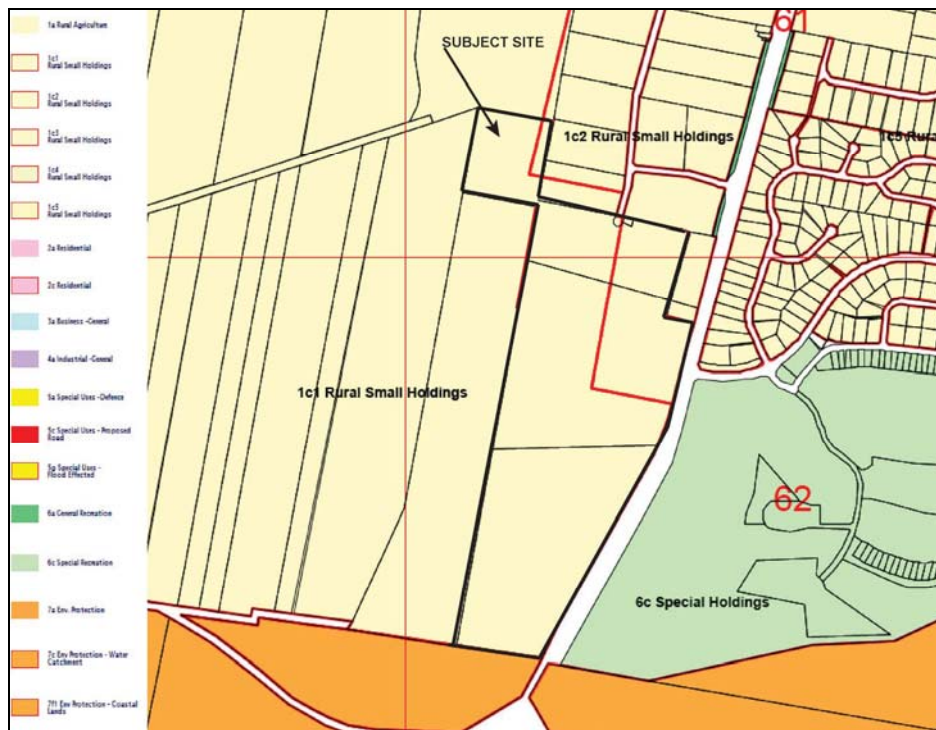


Figure 3 – Current Zoning.

The proposed zoning of the site, which this BTA will assess, is shown in the following figure.

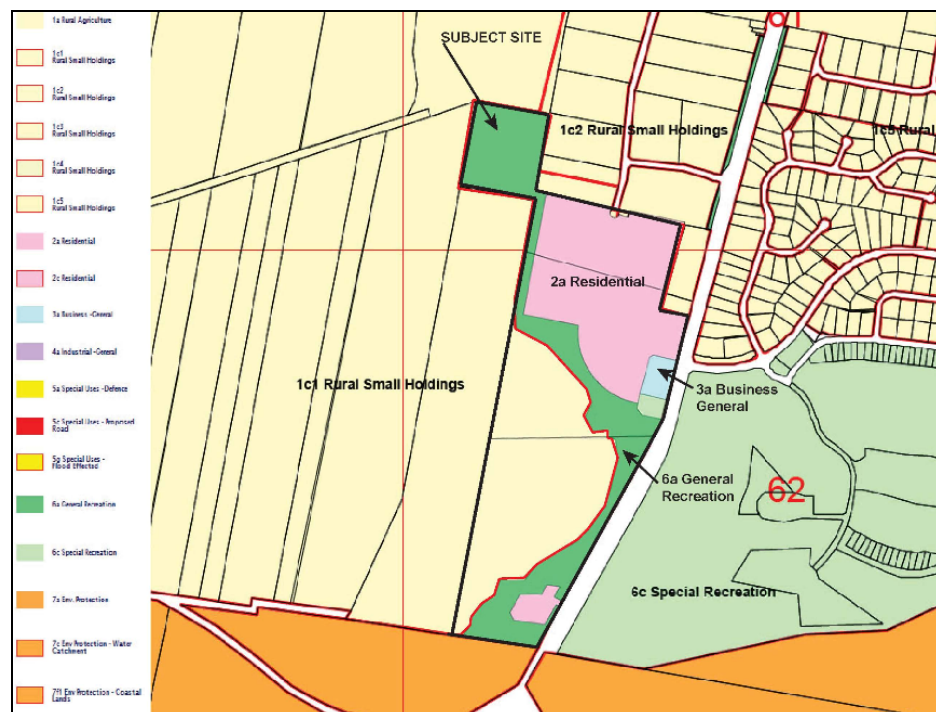


Figure 4 – Proposed Zoning.

2.4 Concept Rezoning & Masterplan

In order to demonstrate the feasibility of the proposed rezoning, a concept masterplan has been prepared. It contains Residential, Seniors Living, Commercial/Business and Open Spaces land uses which the rezoned site could accommodate. Reference is made to the following Figure.



Figure 5 – Concept Site Layout.

3.0 LEGISLATIVE REQUIREMENTS

This report addresses the subject site in terms of protection from the threat of bushfire under the Environmental Planning and Assessment Act, 1979, the Rural Fires Act, 1997 and the Rural Fires Regulations 2002.

In particular the proposed rezoning has been assessed with regard to the following legislation/documents:

- The requirements of s117 of the Environmental Planning and Assessment Act 1979, Ministerial Direction No. 19,
- Planning for Bushfire Protection 2006 and the criteria for assessing the bushfire threat to proposed landuses.

The section 117 direction provides that:

Section 117, Ministerial Direction 19

Objective

- *To protect life, property and the environment from bush fire hazards, by discouraging the establishment of incompatible land uses in bush fire prone areas.*
- *To encourage sound management of bush fire prone areas*

Where this direction applies

This direction applies to all councils that are required to prepare a bush fire prone land map under section 146 of the Act, or, until such a map has been certified by the Commissioner of the NSW Rural Fire Service, a map referred to in Schedule 6 of the Act.

When this direction applies

This direction applies when a council prepares a draft LEP that affects, or is in proximity to land mapped as bushfire prone land.

What a council must do if this direction applies

- 1) *In the preparation of a draft local environmental plan a Council shall consult with the Commissioner of the NSW Rural Fire Service under section 62 of the Act, and take into account any comments so made,*
- 2) *A draft LEP shall:*
 - a) *have regard to Planning for Bushfire Protection 2001,*
 - b) *introduce controls that avoid placing inappropriate developments in hazardous areas, and*
 - c) *ensure that bushfire hazard reduction is not prohibited within the APZ*
- 3) *A draft LEP shall, where development is proposed, comply with the following provisions, as appropriate:*
 - a) *provide an Asset Protection Zone (APZ) incorporating at a minimum:*

- i) *an Inner Protection Area bounded by a perimeter road or reserve which circumscribes the hazard side of the land intended for development and has a building line consistent with the incorporation of an APZ, within the property, and*
 - ii) *an Outer Protection Area managed for hazard reduction and located on the bushland side of the perimeter road,*
- b) *for infill development (that is development within an already subdivided area), where an appropriate APZ cannot be achieved, provide for an appropriate performance standard, in consultation with the NSW Rural Fire Service. If the provisions of the draft local environmental plan permit Special Fire Protection Purposes (as defined under section 100B of the Rural Fires Act 1997), the APZ provisions must be complied with,*
- c) *contain provisions for two-way access roads which links to perimeter roads and/or to fire trail networks,*
- d) *contain provisions for adequate water supply for firefighting purposes,*
- e) *minimise the perimeter of the area of land interfacing the hazard which may be developed,*
- f) *introduce controls on the placement of combustible materials in the Inner Protection Area, and*
- 4) *If the draft local plan does not comply with the provisions listed in paragraphs 2 and 3, the Council must obtain written advice from the Commissioner of the NSW Rural Fire Service, to the effect that, notwithstanding the non-compliance, the NSW Rural Fire Service does not object to the progression of the draft local environmental plan.*

Given that the site has been identified as being bushfire prone appropriate consideration of the bushfire threat is required in accordance with *Planning for Bushfire Protection 2006*.

Planning For Bushfire Protection 2006

In order to assess the bushfire risk to the site an assessment is required in accordance with the methodology detailed in *Planning for Bushfire Protection 2006*. As such this Bushfire Threat Assessment has been made pursuant to the requirements of *Planning for Bushfire Protection 2006*.

State Environmental Planning Policy No 14 – Coastal Wetlands

In addition to the above legislation in relation to bushfire mitigations consideration has also been given to SEPP 14. The wetlands to the west of the site are designated SEPP 14 wetlands. Bushfire mitigation measures should avoid impacts on this vegetation.



4.0 METHODOLOGY

The following aspects of the site have been investigated in relation to the legislation and *Planning for Bushfire Protection 2006*.

4.1 Vegetation Assemblages

Outlining the dominant vegetative features of the site provides the basis for an evaluation of the occurrence of combustible and hazardous flora species on and around site. *Planning for Bushfire Protection 2006* requires an assessment of all fire dominant vegetation types over a distance of at least 140m from the proposed building line on the development site to the bushfire prone land.

Planning for Bushfire Protection 2006 classifies vegetation into distinct groups based on the amount of fuel which can be found in each vegetation type, measured as fuel in tones/ hectare (t/ha). *Table A2.1 Classification of Vegetation Formations* from *Planning for Bushfire Protection 2006* illustrates the different classifications which apply to vegetation. This table will be used to assess vegetation across the subject site.

4.2 Topography

Planning for Bushfire Protection 2006 requires an assessment of the slope of the site, over a distance of at least 100m from the proposed building areas towards the various vegetation communities which are bushfire prone. Where there is more than one slope, the gradient, which has the most influence on fire behaviour, shall be adopted (usually the steepest slope). Downslope refers to the vegetation, or direction of bushfire attack, being downslope from a potential building site or subdivision boundary.

The dominant gradient should be determined in terms of the following classes:

- i. All upslope vegetation considered 0°;
- ii. >0 ° to 5° downslope;
- iii. >5° to 10 ° downslope;
- iv. >10° to 15 ° downslope;
- v. >15 to 18° downslope;

As Stage 1 will involve a number of land releases, the entire site and surrounds need to be assessed for slope types so APZ's can be calculated for residential development throughout the Stage 1 site. This will allow APZ's to be determined for future land releases as required.

4.3 Bushfire Protection Assessment

This assessment involves combining the dominant vegetation assemblage with the slope of the site to determine the appropriate Asset Protection Zone's required. The slope and vegetation information is used along with Table A2.4 of *Planning for Bushfire Protection 2006* to arrive at a suitable setback distance to provide a buffer between a potential bushfire and any dwelling/asset.

Asset Protection Zones

Planning for Bushfire Protection 2006 states that “where a bushfire hazard exists on or adjacent to the development site, an Asset Protection Zone is to be established on the hazard side of the development”. Thus, this necessitates appropriately sized firebreaks for any proposed residential development. These fire breaks are known as Asset Protection Zones, (APZ's) and have been determined according to the method set out by the NSW Rural Fire Service as discussed above.

The primary purpose of an APZ is to ensure that a progressive reduction of bushfire fuel occurs between the bushfire hazard and any habitable dwelling. It incorporates two recognised zones, these being the Outer Protection Area (OPA) and Inner Protection Area (IPA). The APZ, requires the regular maintenance and ongoing management of “fire fuels”. In almost all landscapes, mowing or slashing can control fuel to manageable levels.

The Inner Protection Area is an area directly surrounding a building in which there is minimum fine fuel at ground level. Scattered trees can remain within the IPA, provided none of the trees have canopies that touch or that are immediately adjacent. Trees are not to overhang dwelling structures. The IPA can include lawns, gardens, swimming pools and driveways, as well as access roads such as Perimeter Fire Trails.

The Outer Protection Area is an area outside the IPA where the fine fuels (understorey material) have been reduced such that the IPA is effectively isolated from the majority of the flames and heat and protected from airborne sparks, ash and incendiaries. These areas can be cleared by mechanical means or by controlled slow burning. OPZ's are usually associated with forest vegetation assemblages where larger buffers are required.

Given the large size of the subject site the range of APZ's applicable through the site will be extensive. Using the attached Slope analysis and vegetation map, a site can be located, its slope and vegetation category identified, and its required APZ derived from Table 1 of this

report. Additionally an APZ for the entire Stage will be determined as a Stage level protective measure.

4.4 Roads & Access

As assessment of the road and access provisions to the site are required. This assessment is to be made in line with the requirements of the RFS as described in Planning for Bushfire Protection 2006.

4.5 Water Supply

Water supply for firefighting purposes must be evaluated. The supply of water for fire fighting to the standard required by the RFS will be assessed for the subject site. Furthermore it must be shown that these requirements can be met as described in Planning for Bushfire Protection 2006.

4.6 Level of Construction

Based on the calculated fire behaviour, it is important to safe guard habitual dwellings with the appropriate level of construction standards. Habitual structures are to be constructed in accordance with Section 3 of AS3959 – 1999. *Planning for Bushfire Protection 2006* describes appropriate levels of construction which should be taken into consideration when building in bushfire prone areas. As this report does not seek to address specific dwelling requirements levels of construction will not be addressed. However it should be noted that individual dwellings will be subject to further analysis upon application to develop. An appropriate construction level will be identified at such a time.

4.7 Special Considerations

Any additional information relating to the site which may or may-not effect the capacity of the RFS to assess the bushfire safety authority must be disclosed. In relation to the subject site to following areas will require additional considerations:

- Ecological issues. Flora and Fauna (SEPP 14),
 - Aboriginal heritage,
 - Site water courses,
 - Servicing.
-

5.0 RESULTS

5.1 Vegetation Assemblages

An analysis of the vegetation communities present on the site was undertaken by ecological consultants *Wildthing P/L* as part of their ecological site assessment prepared in support of the rezoning. The following figure details vegetation types/communities present on the subject site.



Figure 7 – Vegetation Types. Source: Wildthing, 2010.

Based on this information, and a separate analysis based on the methodology contained within PBP 2006, the vegetation that influences bushfire behavior within 140m of the proposed zones was undertaken. This assessment found three distinct vegetation classifications as listed below:

Grasslands: The dominant vegetation assemblage across the proposed developable area of the site, as can be seen on the aerial photo, Figure 2. Although some trees exist within the grassland areas they are mainly in isolation with no understory and do not warrant woodland classification.

Wetlands: large areas to the west of the site are (SEPP 14) wetlands associated with the large drainage depression in this area.

Forest: A small area to the west north-west of the site (to the north of the wetland area) is forest vegetation.

In relation to other surrounding land uses it is noted that PBP 2006 Appendix 2 (page 52) states that:

For the purposes of assessment, the following are not considered a hazard or as a predominant vegetation class/formation and can be included within an asset protection zone:

- a) *non-vegetated areas including roads, footpaths, cycleways, waterways, buildings, rocky outcrops and the like; and*
- b) *reduced vegetation including maintained lawns, golf course fairways, playgrounds or sports fields, vineyards, orchards, cultivated ornamental gardens and commercial nurseries.*

As such the golf course to the east of the site, and the maintained yards to the north, will be considered managed/maintained lands (i.e. not a bushfire hazard) for the purposes of this assessment.

Reference is made to the following figures 8 and 9 detailing the location of the above vegetation types.

5.2 Topography

The site supports gently sloping terrain with a high point in the northeastern corner of the site of 15m AHD, to 10m AHD along the western boundary in the wetland area. Slope ranges from flat to 4°. Generally speaking, two effective slope classes have been identified as effecting bushfire behavior. These are:

All upslope/flat terrain considered 0°

The majority of the site is across slope / flat for the purposes of this assessment.

>0 ° to 5° downslope

The majority of this site facing the wetland vegetation can be described as 0° to 5° degrees upslope from the vegetation to the site.

5.3 Bushfire Protection Assessment

Combining the vegetation and slope information from Sections 5.1 and 5.2 above, the following APZ's have been calculated for the Concept Masterplan / rezoning.

Table 1 – APZ's for Northern Component.

Direction from proposed building line	Vegetation:	Effective Slope:	Required setback	OPZ
Environmental Living				
North	Managed Land	Flat	NA	NA
South	Wetlands	>0 ° to 5°	10	NA
East	Managed Land	Upslope	NA	NA
West	Forest	>0 ° to 5°	25	
Residential / Villa / Townhouses / Commercial / Club				
Northeast	Residential	Upslope	NA	NA
Southeast	Residential	Flat	NA	NA
Southwest	Wetland	>0 ° to 5°	10	NA
Northwest	Residential	Flat	NA	NA



Figure 8 – 140m Buffer, Vegetation Types and APZ's, Northern Component.

Table 2 – APZ's for Southern Component. Seniors Living (SFPP).

Direction from Building Envelope	Vegetation:	Effective Slope:	Required setback	OPZ
SEPP Seniors Living				
North	Managed Land	Upslope	NA	NA
South	Forest	Flat	60	10
East	Managed Land	Flat	NA	NA
West	Wetlands	>0 ° to 5°	35	NA



Figure 9 – 140m Buffer, Vegetation Types and APZ's for Seniors Living Special Fire Protection Purpose

5.4 Roads & Access

As the proposal is currently as a rezoning stage no specific design exists for the road network, however comments can be made on the concept plan provided.

It is noted that the majority of lots proposed are contained within perimeter roads the exception being some environmental lots and 2 Seniors Living Lots. The Environmental Living lots are generally large and deep enough to contain the larger APZ they will require to meet the performance criteria of PBP 2006. The Seniors Living Lots will generally be surrounded by managed open space land presenting minimal fire hazard. The nearest bushfire prone land is separated from these lots by a mandatory 50m buffer as required by SEPP 14. This buffer, in combination to the reduced hazard presented by wetlands (as opposed to forest or woodlands)

minimises the bushfire threat to these two lots. In addition it has been shown that adequate room exists for the required APZ therefore a perimeter road is not essential in these locations.

Despite this it is noted that the majority of the masterplan includes a perimeter road which will be a two-way road that will need to be built to a level suitable to large rigid vehicles such as RFS vehicles and garbage trucks.

The proposed through road connection to Kingfisher Close provides an addition access/egress for fire crews and residents entering and leaving the site.

5.5 Water Supply

It is noted that it is proposed to service all lots with town water as part of any future subdivision, ensuring there is an adequate supply for firefighting purposes. A hydrant system should be located within proposed road reserves to ensure there is adequate supply for fire fighting in accordance with PBP 2006.

Given the depth of some of the Environmental Living lots the distance from the rear of the lot to the nearest hydrant point may be greater than 70m. In such a case static water supplies may be required in accordance with PBP 2006. Generally this means:

- Minimum water supply 10,000 litres per dwelling will provide sufficient water to protect a house using a hose
- A suitable connection for RFS purposes must be available. In general 65mm Stortz outlet with a gate or ball valve should be provided.
- Underground tanks with an access hole of 200mm will allow tankers to refill direct from the tank.
- Raised tanks should have their stands protected, and ember shielded .
- Water should be gravity fed by a diesel or petrol powered pumps that are not dependant on the main electrical supply. It is generally considered that 3kW pumps are adequate for the protection of a single dwelling using one or two hose lines.
- All above ground water pipes external to the building are metal including and up to any taps. Pumps are shielded.

It is considered that such requirements would be addressed at Development Application Stage for the development of these lots.

In relation to Rural Fire Service assets the nearest RFS station is located approximately 2km to the north of the site along Medowie Road. This would provide an excellent response time in the event of fire. Additional stations are located at Salt Ash (5km to the east) and Raymond Terrace (12km to the west).

5.6 Level of Construction

This BTA has been prepared in support of a rezoning application as described in Section 2.4 of this report. In this regard no building footprints or construction methods/materials are known at this point in time.

It is anticipated that following gazettal of the rezoning (which may result in the zonings proposed in this document and the associated Planning Proposal having been amended by the Department of Planning) a subdivision development application will be prepared. A subdivision application and subsequent built-form applications will be required to confirm that all building is undertaken in accordance with PBP 2006 and AS 3959-2009 as applicable.

With this in mind it should be noted that with the minimum APZ's recommended by this BTA in place, all building envelopes can be located such that they will permit the location of buildings such that they will not receive radiant heat level in excess of 29kW/m² being the upper threshold for Level 3 Construction pursuant to AS 3959-2009.

In addition the majority of the site, and future dwellings will be further than 100m from the fire threat. Such dwelling will not require any Level of Construction.

5.7 Special Considerations

Ecological constraints: Flora and Fauna

The majority of the site has been heavily cleared and disturbed in the past. For these reasons flora and fauna values are considered minimal. Given the importance of native vegetation within the Port Stephens LGA to local koala populations a north-south vegetation link is proposed to aid koala movement through the site.

As the masterplan locates developable areas within the already cleared portions of the site, the potential of negative ecological impacts is considered negligible.

Aboriginal Heritage

As part of the initial site studies undertaken for the master planning of the site, an Aboriginal Archaeological study was undertaken. (Myall Coast Archaeological, 2010). This report did not identify any items or places of Aboriginal Archaeological importance which need to be taken into consideration when planning bushfire mitigation measures.

Watercourses

The site generally drains across its surface to the wetlands located to the west of the site. No water courses of significance traverse the site. The SEPP 14 wetland will be unaffected by the required APZ's identified in this document. Future development applications will be required to demonstrate a negligible impact on the wetlands in terms of runoff quantity and quality.

Services

The site will be services with electricity, telecommunication, town water and sewage services. Utility infrastructure should be buried where possible to avoid service disruption during a bushfire event.

6.0 RECOMMENDATIONS

The following recommendations are made based on the results of this report. These recommendations would be required for future developments of dwellings within the Stage 1. In respect to the following areas a number of recommendations have been made:

Asset Protection Zones

- The APZ's shown in Tables 1 and 2 are to be implemented for the proposed zone boundaries for the corresponding slope and vegetation.
- All zonings which share boundaries with vegetation will require the corresponding APZ on any boundary which is exposed to a possible fire threat.

Road and Access

- Future road widths and turning radiuses conform to the requirements of the RFS, in particular Table 4.1 and Figure 4.4. It is considered that as the site will have to be accessed by large rigid vehicles (garbage trucks) roads will be suitable for emergency vehicles.
- Although not identified on the masterplan, a fire trail running parallel to the SEPP 14 wetland and forest (running north south) should be proposed as part of any future development application to ensure the RFS has adequate access to a defensible space between the bushfire prone vegetation to the west of the proposed developable areas.

Vegetation Maintenance

- Maintenance of the property with particular attention to the APZ's is required. Management of existing vegetation involves selective fuel reduction. Measures that could be taken include (where applicable):
 - Removal of ground litter and undergrowth.
 - Thinning of trees to break any continuous canopy.
 - Removal or pruning of trees and brush adjacent to building sites.
 - Removal of trees overhanging any buildings.
 - Pruning of lower limbs of trees to increase the distance between the canopy and the ground fuel.
 - Where asset protection zones are incorporated, in general they are to be maintained by the owner of the land. It is intended that APZ are to be maintained as such:
 - Low cut lawn area.
-

- Area around fences, fence posts, gates and trees are to be kept clear of fuel.
- No foliage within 3m of dwellings.
- Gutter and roof gully clearance.
- Maintenance and location of woodpiles.
- Appropriate types of plants to be stocked (contact local nursery).
- Type of fencing (preferable non flammable).

7.0 CONCLUSION

As outlined above, the site is identified as being subjected to potential bushfire attack. There is minimal variation in vegetation and the slope within the site. Asset Protection Zones will be necessary around residential development and the identified Special Fire Protection Purpose (Seniors Living).

This assessment demonstrates that the proposed development complies with the requirements of s117 of the Environmental Planning and Assessment Act 1979, Ministerial Direction No. 19, Planning for Bushfire Protection 2006 and the criteria identified in clause 46 of the Rural Fires Regulation.

It is therefore considered that having regard to bushfire threat assessment and based on the this report and the proposed rezoning plan that the subject properties are suitable for rezoning, and the rezoning should be supported by the Rural Fire Service, subject to their advice.

Aboriginal Heritage Due Diligence Assessment

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1. Introduction

1.1 Background

This report has been prepared at the request of Hunter development Brokerage, Maitland, NSW, to assess the possible impact a proposed mixed use development may have on Aboriginal Cultural Heritage at **Lots 411,412,413 DP 1063902 Medowie Road, Medowie, NSW** in order to demonstrate due diligence by :

1. Identifying whether or not Aboriginal objects are, or are likely to be, present in an area;
2. Determining whether or not their activities are likely to harm Aboriginal objects (if present); and
3. Determining whether an Aboriginal heritage Impact Permit (AHIP) application is required.

Due diligence amounts to taking reasonable and practicable steps to protect Aboriginal objects. The Department of Environment Climate Change and Water (DECCW) has developed a draft generic code that provides one process for satisfying the due diligence requirements under the *National Parks and Wildlife Act 1974* (as amended). It is not mandatory to follow this code. An individual or corporation can take other measures, provided that such measures are objectively reasonable and practicable and meet the ordinary meaning of exercising due diligence. However, according to DECCW there are three essential issues to consider when undertaking a due diligence process:

1. Nature of the proposed activity
2. Land condition and prior land uses
3. Knowledge and available information.

DECCW will not approve or certify a person's compliance with their due diligence requirements carried out under this or any other code. It is the responsibility of the individual or proponent to ensure that they have undertaken due diligence.

1.2 Legislative Context

The *National Parks and Wildlife Act 1974*, administered by DECCW, is the primary legislation for the protection of some aspects of Aboriginal cultural heritage in NSW. Section 86 of that act has been amended and comes into force on 1/10/2010 and deals with harming and desecrating Aboriginal Objects.

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

Under section 86 of the NPW Act, it is an offence to 'harm' an Aboriginal object. 'Harm' means any act or omission that:

- destroys, defaces, damages or desecrates the object
- moves the object from the land on which it had been situated, or
- causes or permits the object to be harmed.

There are now two types of offences for harming an Aboriginal object:

1. An offence of harming an object which a person knows is an Aboriginal object (a 'knowing offence')

2. An offence of harming an object whether or not a person knows it is an Aboriginal object (a 'strict liability offence').

The NPW Act provides several defences to prosecution for both types of offence. Where a person either knows or does not know they are harming an Aboriginal object, a person has a defence where:

1. the harm was authorised by an Aboriginal heritage impact permit (AHIP), and all the permit's conditions are complied with
2. the harm occurred during the exercise of a power or function under the *State Emergency and Rescue Management Act 1989* (for emergencies as defined under that Act)
3. the harm was specifically required or permitted under the terms of a conservation agreement entered into under the NPW Act (only where the agreement was entered into or modified after the commencement of the *National Parks and Wildlife Amendment Act 2008*).

Where a person does not know they are harming an Aboriginal object, they have an additional defence to prosecution if:

'... [They] exercised due diligence to determine whether the act...would harm an Aboriginal object and determined that no Aboriginal object would be harmed' (a 'due diligence defence').

The NPW Act provides exemptions to harming Aboriginal objects in the following circumstances:

- Aboriginal people and their dependants are exempt from being prosecuted for harming an Aboriginal object if, in carrying out any traditional cultural activities, they would otherwise harm an Aboriginal object within the meaning of the Act.
- Emergency fire fighting activities authorised under the *Rural Fires Act 1997*.

There is an additional strict liability offence related to harming an Aboriginal Place. An Aboriginal Place, declared under section 84 of the NPW Act, is 'a place that, in the opinion of the Minister, is or was of special significance with respect to Aboriginal culture'.

2. The Due Diligence Process

The following information is taken from the DECCW Website:

(<http://www.environment.nsw.gov.au/legislation/DueDiligence.htm#responsibility>).

The purpose of due diligence is to identify whether Aboriginal objects are present in an area, and to determine whether a proposed activity will have impacts on Aboriginal objects. Therefore it is essential to identify and understand all the expected impacts of the proposed activity. There are two categories of activity used for assessing impacts:

1. *activities involving no additional surface disturbance*
2. *activities causing additional surface disturbance. For activities causing additional surface disturbance, it is necessary to determine whether an activity is proposed for:*
 - a) *a developed area or a previously disturbed area, or*
 - b) *an undisturbed area.*

For activities in previously developed or disturbed areas, it is then necessary to determine whether the new activity will create significant additional surface disturbance. If it will, then the process for undisturbed areas will apply.

Disturbed land has been defined in the DECCW draft due diligence process as Land that has been previously subjected to any activity that has resulted in clear and observable changes to the land's surface. Examples include: soil that has been ploughed; urban development that has occurred; existing rural infrastructure such as dams and fences; existing roads, trails and walking tracks; and other existing infrastructure such as pipelines, transmission lines and stormwater drainage.

The following flowchart also from the DECCW webpage illustrates the process.

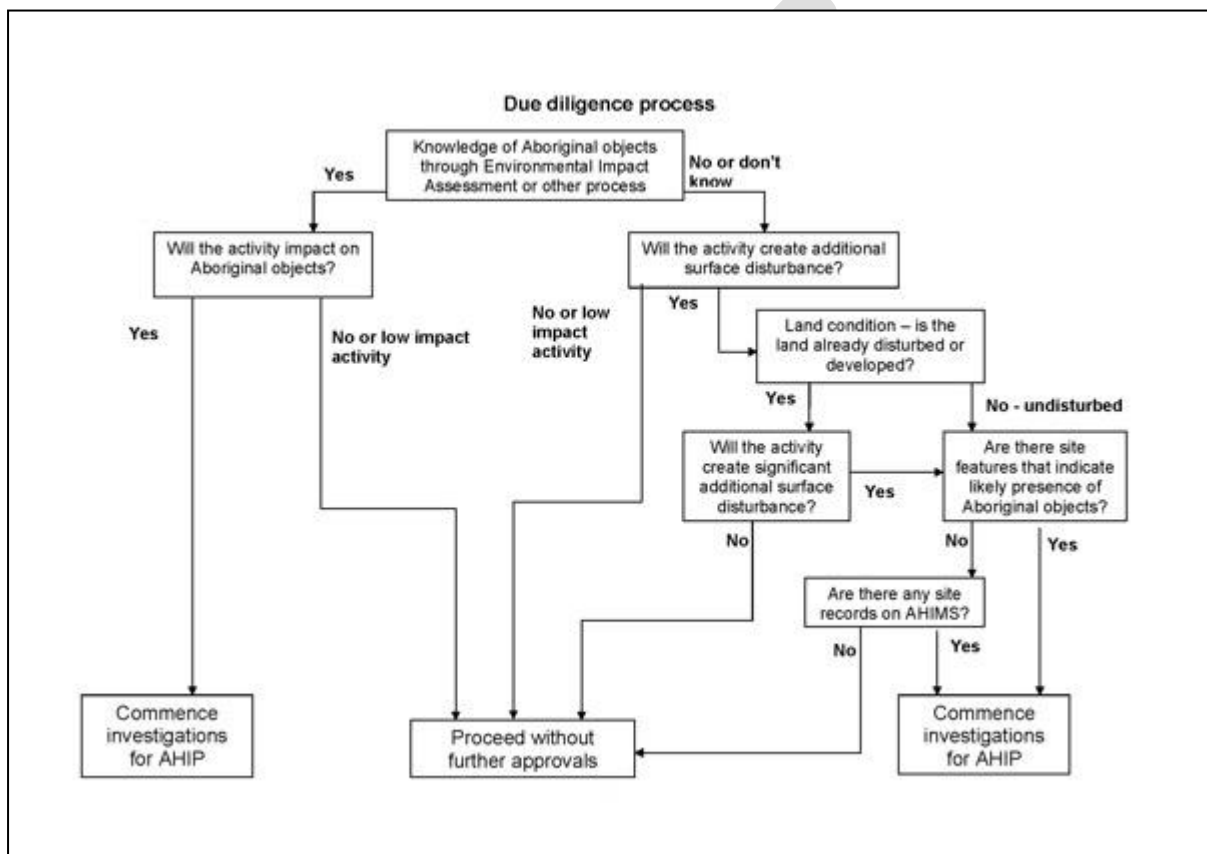


Figure 1 Due Diligence Process according to DECCW website

This Due Diligence Assessment follows the draft due diligence guidelines as per the DECCW website. (<http://www.environment.nsw.gov.au/legislation/DueDiligence.htm#purpose>)

2.1 Assessment Personnel

The research and report was compiled by Len Roberts, (BA [Arch.], Grad. Dip. Comp., Dip Sp. Ed.,) consulting archaeologist who holds a certificate in Archaeological fieldwork, from Tel Aviv University, Israel. Len has worked on archaeological projects in Australia and overseas.

The field survey was carried out by this archaeologist in conjunction with site officers for; the Local Aboriginal Land Council (Jamie Merrick), Nur-run-gee (Len Anderson) and Mur-Roo-Ma (Anthony Anderson), who have extensive experience in archaeological fieldwork and a recognised right to speak on country. The fieldwork was carried out on 24/5/2010

3.0 The Assessment

3.1 Description of Land and Activity

It is proposed to develop Lots 411,412,413 DP 1063902 Medowie Road, Medowie for mixed use purposes.

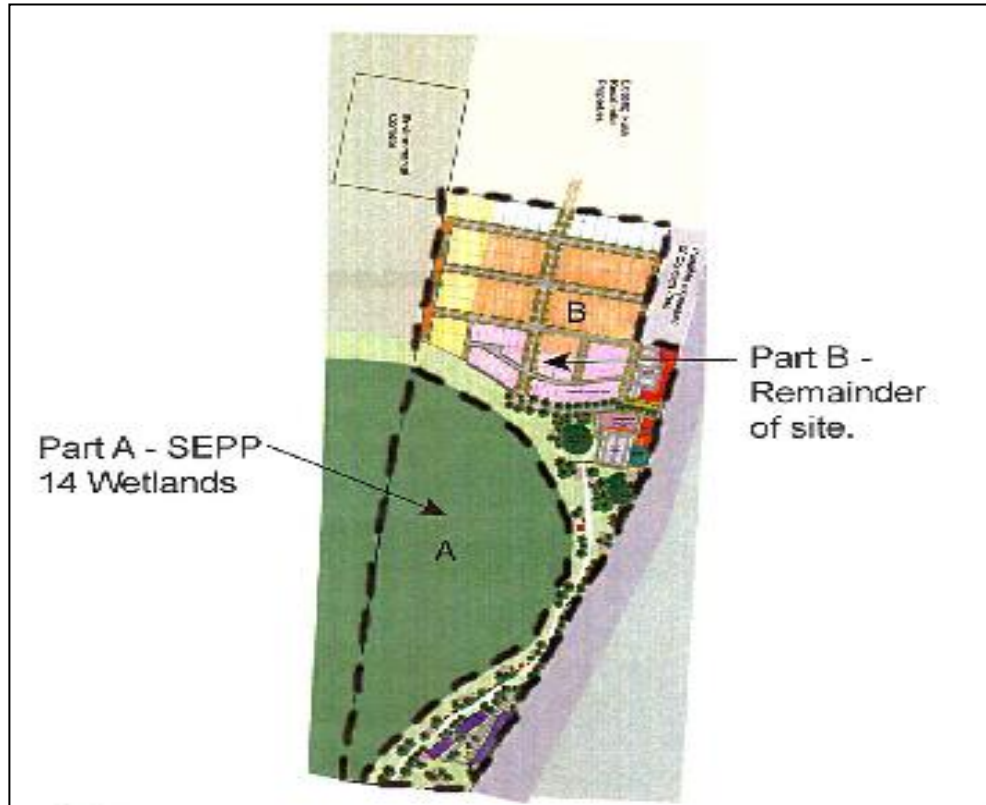


Figure 2 Land and activity concept

The land is bounded by Medowie Road on the East, Richardson Road to the South, Large Lot Rural residential to the north and rural land to the west

3.2 Is the Land defined as “Disturbed Land” or an exempt or complying development?

The activity is not exempt or complying, but it is disturbed land as there are “clear and observable changes to the land’s surface”.

The land has been filled and affected by Medowie Road development. The property contains 2 houses and associated rural infrastructure such as sheds and access roads and tracks. It also contains a large area competitive asphalt go kart track. The land is generally level and looks like a “golf course” in appearance. The vegetation consists of imported grass that has developed into a manicured lawn. The landscape has been affected by long term modification, cultivation and mowing.

3.3 Is the activity exempt?

No

3.4 Will the activity involve harm that is trivial or negligible?

No

3.5 Is the activity in an Aboriginal Place or are you already aware of Aboriginal objects on the land?

No. It is not an Aboriginal Place and according to AHIMS there are no known Objects on the land.

3.6 Is the activity a low impact activity for which there is a defence in the regulation?

No

3.7 Will the activity disturb the ground surface?

Yes, but the land is already disturbed and filled.

3.8 Does the Aboriginal Heritage Information Management System suggest potential?

Yes. The AHIMS indicates occupation nearby in similar undisturbed landscapes.

3.9 Is there archaeological potential because the proposal is:

- **within 200m of waters;**
Yes, the land contains wetlands however the activity will not occur near or within that wetland
- **located within a sand dune;**
No
- **located on a ridge top, ridge line, or headland;**
No
- **located within 200m below or above a cliff face;**
No
- **within 20m of or in a cave, rock shelter, or a cave mouth;**
No

3.10 Can harm be avoided to the object or disturbance of the landscape feature?

Yes. The wetland will not be impacted by the activity and there are no known objects on the land which is heavily modified and disturbed

3.11 Is Desktop assessment and visual inspection required?

Yes. Given that the activity is adjacent to a wetland (irrespective of whether it is natural or not) it would be prudent to inspect the land. In addition there is the possibility that Objects could have been imported with the fill or transported on site from adjacent areas through natural or anthropogenic processes. The desktop assessment is contained in section 4 and the field assessment in section 5 of this report

3.12 Are Further investigations and impact assessment required?

No. The land is disturbed land, the activity will be undertaken away from the margins of the wetland and the desktop and field assessment did not reveal any objects or potential for objects to be discovered.

4.0 Desktop Assessment

4.1 Methodology

The analysis and assessment of the study area's archaeological potential and the impact of the proposal required the completion of the following;

- *Research*

This involved a review of primary and secondary sources including written material, maps, plans, AHIMS database and other reports.

- *Predictive modeling;*

This involved an analysis of the research to produce a model of possible archaeological deposits within the study area. In order to conduct the analysis of the research material in an effective and consistent manner the following aspects were examined:

1. Aboriginal heritage values
2. Archaeological record
3. Previous Studies
4. Landscape
5. Soils
6. Geological Features
7. Past land use

- *Site Inspection*

This involved evaluation of the above research with the study area's potential to reveal/conceal archaeological evidence.

4.2 Aboriginal Heritage Values

SOCIAL

The survival of prehistoric people stranded on islands has been studied by Jones who has come to the conclusion that "in hunter-gatherer conditions, the limiting viable population may be somewhere in the range of four hundred to six hundred depending on local circumstances and the vagaries of chance."

This estimated minimum viable population of about five hundred was also the average size of a so-called tribe in Australia. The term tribe, which was adopted from 19th century Europe, has often been used to describe the organisation of Aboriginal society in Australia. Several anthropologists feel that 'tribe' does not accurately reflect the interaction and make-up of Aboriginal Australia, preferring the term 'band' to be the most appropriate term to describe the basic social and economic unit of Aboriginal society. It is described as a small-scale population, comprising between 2 to 6 extended family units, who together occupied and exploited a specific area.

The band was by no means a social or cultural isolate but, rather, interacted with other bands in a variety of ways. Typically these interactions involved visits, marriage, ceremonies and trade. As a result of these interactions, clusters of bands were formed; wherein there was a sense of collective identity, often expressed in terms of common and distinctive language.

LOCATION

In recent times the territories of Aboriginal tribes generally encompassed the drainage basin of one river and stretched from the shoreline up to the top of an escarpment, another River or prominent

landform feature. There is no way of knowing how far back in time this territorial organisation goes, but it may well be quite ancient.

The evidence suggests a comparatively small early population, spread thinly around the Continent and concentrated in the places where food was most abundant: the coast and large inland lakes and rivers. Thousands of Aboriginal middens have been found on the south-eastern coast of Australia. The least inhabited parts of mainland Australia were the snowy mountains and the desert centre of the Continent. According to Flood (p.219), "We now know that people were camping at least occasionally on the fringes of the snowy mountains, in treeless country at 730 metres above sea level and in the region North of Uluru, at Purnitjarra, around 30 thousand years ago."

The bands developed into regional groupings or cultural areas of interacting Aboriginal societies possessing broadly similar languages, social organisation and customs, material culture and art styles, ways of life and environment. According to the work by Peterson (1986), there is a general correlation between culture areas and major drainage basins, which has been explained on the grounds that a drainage basin is unified by its river system and bounded by its catchment. Water supply determines plant cover and therefore the availability of food and consequently, Aboriginal population density.

On the coast, according to Flood (p.219), "The most favoured campsite was a foredune close to a rock platform on the north side of a headland. Such a site, offered easy access to shellfish, a landing place for canoes, proximity to drinking water, shelter from prevailing winds, and soft sand for a bed." Inland, the camps would have been near reliable watercourses and protected from prevailing winds. If hills were nearby, they may have had winter camps in rockshelters or caves. JW Fawcett (1898, p.152), stated of the Wonnaruah "in choosing their site [camp] proximity to freshwater was one essential, some food supply a second, whilst a vantage ground in case of attack from an enemy was a third. Pearson (1981), made similar observations of the Wiradjuri (Western Plains, NSW) for suitable camp site location: accessibility to water; Level ground with good drainage; Elevation above cold air currents and lingering frost prone valley systems often with good views of the river flats and water courses; Sheltered from cold winter winds and with adequate summer cooling breezes; and, Adequate fuel supplies.

Aboriginal people were able to exploit, and to survive in, a wide range of environments where European agriculture failed. They tended to congregate in bands of about 500 consisting of family groupings, generally limiting themselves to a river, lake or bay drainage basin, living off the abundant food supply that was easily available. Each family grouping would be about 8 miles (12-15km) apart (Bennett, 1926). They were not nomadic in the clinical sense, however they did move from campsite to campsite on a rotational basis, mainly for reasons of hygiene (Bennett, 1926). Extensive use was made of fire as a hunting tool, modifying the Australian vegetation. There was regular contact with other bands for social and economic purposes. Many of the paths followed would be along watercourses or from one water source to another.

According to Horton (1994), the Band that would be of interest to this survey, would be the family groupings of the Wonnaruah, The first reported sightings of Aboriginal people in the Port Stephens area was by the crew of the Endeavour, Captained by James Cook, on May 11th, 1770, who wrote;

"... as we sailed along the shore we saw many smokes and signs of the inhabitants"
(Historical Records of Australia, Vol.1 p216)

The Aborigines around Port Stephens were numerous and healthy, as they had abundant food supply. The earliest inhabitants were hunters and gatherers living off the abundant wildlife.

"The Aboriginal population was controlled by the food resources available, which in turn was related to water resources." (Flood 1995, p265)

The varied environment - terrestrial, rivers and estuaries, sand dunes and mountains provided a diet of oysters, fish, turtles, kangaroos, wallabies, possums, pigeons, bats, wild fruits and roots. This would mean that Port Stephens could sustain a large and healthy population. The early historical records even dating back to Captain James Cook, notes the vitality and healthy appearance of the natives. However by the 1820's, records indicate that a large number of Aboriginals died from introduced diseases from which they had no immunity.

From the recollections of William Scott who was born at Carrington, his father being employed by The A.A. Company, it is obvious that the Aboriginal population was quite large, but declined rapidly in the years since white settlement. By 1836 a smallpox epidemic and other introduced diseases had decimated the Aboriginal population. It seems by 1890 the local tribes had been virtually wiped out.

Most of the written sources refer to the Aborigines around Port Stephens and although the bands around Raymond Terrace were similar if not related, their lifestyle was different as one group were coastal dwellers, the other river. A picture of Aboriginal life around the Terrace and along the Williams River is well documented. Wetlands were a substantial source of food. Forays from nearby camping areas close to the river, into the wetlands, would have been a common day occurrence.

They tended to live close to the River approximately 8 miles apart, frequently on the move within a specified area; "carrying few personal possessions and relying on caves or quickly built bark gunyahs. They were skilled canoe makers, sailors, hunters and gatherers. They used fire for cooking; pasture management, for warmth and light at night, for the manufacture of weapons and in ceremonies" (Hunter p2)

Regular burning would have occurred as a method of 'firestick- farming'. It would appear that the land was lightly forested and cleared of scrub undergrowth.

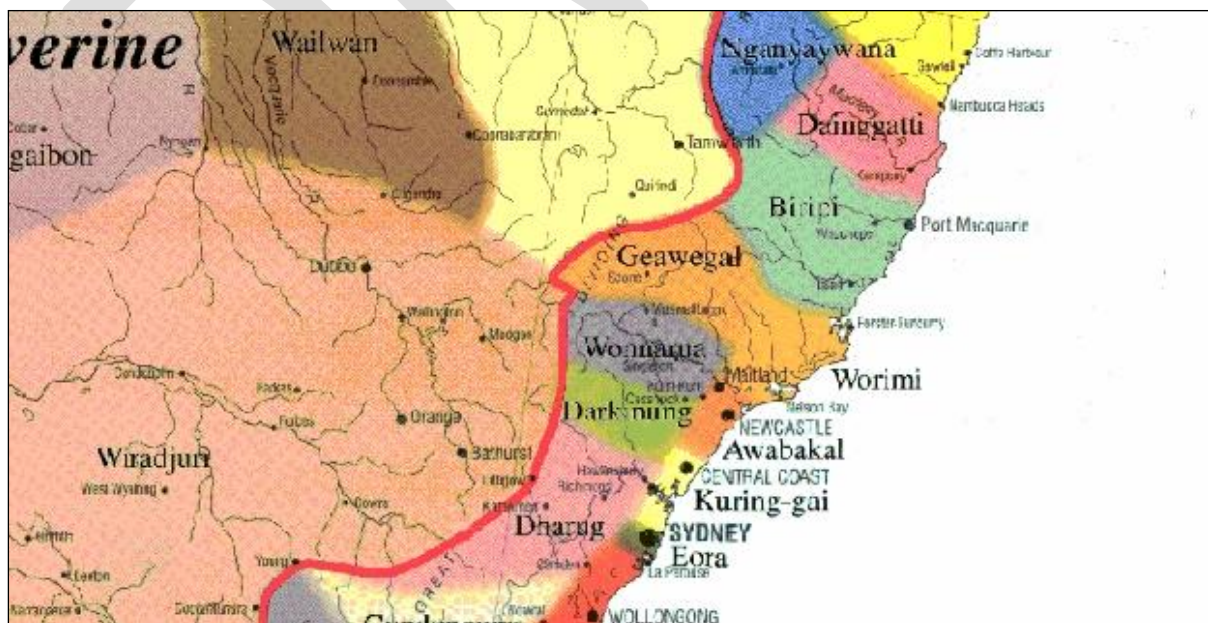


Figure 3 Horton's Map of Aboriginal Territorial Organisation

ENVIRONMENTAL IMPACT

Several researchers have shown that the Australian Aboriginal has had a huge impact on the vegetation through use of fire. There were many reasons for the extensive burning. It was used for signalling and also to make travel easier by clearing undergrowth along the corridor. Aboriginal tracks were open by regular firing in the early timbered ranges. Throughout the Continent, burning was used as an aid to hunting, animals could be speared as they broke to escape the flames.

Other uses of fire were for longer term hunting strategies. After firing, the Bush would regenerate; new grass would spring up and attract kangaroos and other animals, on which the hunters could prey. Likewise, fire encouraged the regrowth of eucalyptus trees and of edible plant roots. The ashes acted like manure, and sweet, new green shoots would spring up after the first hard rain following the burn.

The term 'fire-stick farming' has been applied to this aspect of hunting.

There is an assumption that prior to European settlement the land was heavily forested. However, according to early settlers accounts and the Aboriginal oral history, this was not so. Walsh, (p26), cites extracts from the accounts of early explorers,

"The extracts from letters, diaries and journals of early European settlers, explorers and government officials describe a parklike landscape of grasslands and grassed open forest lands with very few areas of thick forest. The cessation of regular burning following European settlement allowed a growth of thick forest of young trees that, together with an increasing understorey, choked out the grasses."

These grasslands provided perfect pastures for sheep, but when Aborigines were no longer present to maintain them with a regular fire regime, sour grass and scrub took over, gradually obliterating the open land, with considerable loss to the non- fire stick farmers.

Such regular, light burning was the pattern all over Australia at the time of first European contact. The fires were of low intensity, which meant that they consumed the litter of leaves and branches on the forest floors but did not burn down the trees.

Aborigines never put out their fires. Campfires were left burning, as were signal fires, including those lit in a sequence to indicate the direction of travel of humans or game.

Gould (p.82), "never encountered an occasion when a fire actually invaded an area that was already producing wild food crops". It seems that, as well as increasing their future food supply; the Aborigines also protected their present food resources. As Flood (p.252) put it, "Fire is the most versatile and important tool of hunter-gatherers. It is used for warmth, light, cooking, hunting, signalling, track making, and, whether intentionally or not, had the effect of improving the food supplies of prehistoric Australia."

RESOURCES

The food resources available controlled the Aboriginal population, which in turn were related to water resources: the areas with the highest rainfall were generally richest in food. The number of mouths that could be fed was regulated by the food available at the leanest time of year.

When food was difficult to obtain, the food quest simply required more time and effort rather than new strategies. Thus when times were hard, the people could simply move more often and further afield.

The typical Australian Bands economy is flexible with a wide variety of foods being sought and advantages being taken of seasonal abundance or chance events, such as the stranding of a whale. Aboriginal Australia was not vulnerable to famine through the failure of one crop.

The simplicity and self-sufficiency of Aboriginal society was observed by Captain Cook in 1770, and cited in Beaglehole, 1955 (p.399).

"From what I have said of the natives of New Holland they may appear to some to be the most wretched people on earth, but in reality they are far more happier than we Europeans. They live in a tranquillity which is not disturbed by the inequality of condition: the air and sea of their own accord furnishes them with all things necessary for life, they covet not magnificent houses, household stuff etc., they lie in a warm and fine climate and enjoy a very wholesome air, so that they have very little need of clothing and this may seem to be fully sensible of, for many to whom we gave cloth etc. to, left it carelessly upon the sea beach and in the Woods as a thing they had no matter of use for. In short they seemed to set no value upon any thing we gave them, nor would they ever part with anything of their own for any one article we could offer them; this in my opinion argues that they think themselves provided with all the necessary's of life and that they have no superfluities."

4.3 Archaeological Record

There are 28 Objects listed on the AHIMS database within a 5km radius of the study area. The majority of which are artefacts (27). One is a potential artefact deposit.

An examination of the location of the above relics not only places the study area in an overall archaeological context but also indicates the possible archaeological evidence to be found in the study area, if the study area was in an undisturbed state. This is important as it indicates the lifestyle of the Aboriginal people in a landscape context.

The information shows that the overall area was used by Aboriginal People with particular reliance on wetlands.

Comment:

The AHIMS indicates that the study area in an undisturbed state could contain evidence of Aboriginal Occupation.

4.4 Previous Studies

Locally, many studies have been undertaken for residential, tourist and infrastructure development. Each study generally reinforced known occupation patterns with the work of Baker (1996) highlighting the correlation of wetlands and Aboriginal Occupation. Moffats Swamp is only a couple of kilometres from the study area.

On a state wide basis, several studies have been undertaken which have proven to be definitive works for understanding the correlation of landscape and archaeological potential.

- **Importance of wetlands**

Archaeological investigations by Kuskie (1994), Ruig (1995) and Effenberger and Baker (1996) on margins of various wetlands indicate that artefacts could be found on all types of landscapes abutting wetlands with density in direct correlation to distance from the margin.

- **Relationship of landform type and ceremonial areas**

Work by Klaver and Heffernan (1991) which was an assessment of sites in the Greater Taree Council area, identified landscape attributes for ceremonial sites. Citing an earlier work by Fitzpatrick (1986),

they stated, "Ceremonial grounds were said to comprise two rings, one on top of a low ridge and the other in a level place below. The latter was..."established in a roomy place, so that all the gins could camp there close to the ring." This aligns with this author's findings at North Arm Cove and Kings Hill, Raymond Terrace.

- **Relationship between Object type and landscape**

Brayshaw, in 1986 conducted a Study of Colonial Records of the Aborigines of the Hunter Valley and was able to present an account of the environment and way of life of the Aborigines at the time of colonial settlement. Her study also indicated areas and landforms of Aboriginal use and occupation. Dean-Jones and Mitchell (1993) conducted a similar assessment of archaeological sites in the Hunter Valley.

The above studies indicated:

- Open campsites would be near water holes
- Grinding grooves are more likely to be found in rocky outcrops exposed by erosion or in creek beds.
- Scarred trees may be present in any type of landscape, but this would depend on the age and type of tree.
- Artefacts are more likely to be found along creek and drainage lines
- Stone arrangements and ceremonial artefacts are more likely to be found in significant landscape aspects such as caves and hills.
- Artefacts can be found in any landscape in proximity to an abundant food/water source.
- Archaeological evidence is more likely to occur in undisturbed areas.

- **Relationship of Objects and Distance from Water /Song trails**

A report for the Brigalow country undertaken by the Resource and Assessment Council titled Aboriginal cultural heritage assessment NSW western regional assessments final report September 2002 – Brigalow Belt South Stage 2. This large scale landmark study analysed the finding of separate independent studies and was able to establish an information base that highlighted Aboriginal association with forests, travelling stock routes (early roads), rural properties and towns.

The study showed that of the sites recorded, 50% were within 200 metres of water and Aboriginal occupation may have occurred for prolonged periods under the right conditions, made possible by a different array of water features (chains of ponds) that existed prior to European usage of the forests.

Burials

With respect to burials, work by Donlon 1990, where she analysed skeletons uncovered on beaches on the Central Coast of NSW, ethnographic reports by Bennett 1929, along with other research cited by Mulvaney and Kamminga 1999, has tended to indicate that whilst burials could be found almost anywhere and diverse in practice, intentional or formal burials, generally in Eastern NSW, consisted of isolated burials being placed in sandy type soil, near the high water mark, and sufficient soil depth to bury the person vertically in a sitting position and with various belongings. In the Central west of NSW according to Garnsey (1942: 23ff), the body was placed in a squatting position; with the elbows placed on the knees and the head between the hands. In this position, the body was placed at the foot of a Coolabah tree facing east. In the burial of an important individual, a strip of bark about five foot long and two foot wide was stripped from the eastern side of the tree and placed in a slanting position over the corpse. The blaze on the tree was also carved in tribal markings to show the man's status. These carved trees were apparently only associated with the graves of the spiritual leaders. For the period of mourning, the body remained out of the ground.

The only recorded cemeteries are within the Murray River corridor or at Broadbeach in Queensland. Most burials are discovered by accident.

- **Relationship between Stream Order and occupation pattern**

A survey by Jo McDonald 1988 was an east west survey from Dubbo to Tamworth. The report found stream order influenced occupation pattern. Her analysis concluded that;

“the size (density and complexity) of archaeological features will vary according to the permanence of water (i.e. stream order), landscape unit and proximity to lithic resources in that density and complexity are greater in 4th order (major creeklines and rivers.”

- **Occupation Pattern**

A general pattern is emerging that more concentrated remains of Aboriginal occupation are associated with wetland or swamp resources along the principal rivers of the region and/or where resources suitable for the manufacture of tools are present.

The pattern of Aboriginal occupation was underpinned by 2 tenets:

- Aboriginal camping areas were always situated in areas of good shelter and good resources
- Base campsites would be near reliable water.

The known archaeological evidence tends to suggest that base camps were located close to freshwater and food sources. The campsites were in favourable climactic conditions, safe, not only from intruders but also for young children. Campsites were therefore not near fast, flowing rivers, dangerous swampy areas or steep cliffs. Many Dreamtime stories were told of mythical creatures to keep children away from dangerous areas. Trails from campsites and to other clans were generally along creek lines or ridgelines.

Prior to European settlement the area was inhabited by Aboriginal people who roamed freely across the river flats and through the timbered hill country. They lived in harmony with the land, only taking what they required from the bounty of game available. They also adopted burning off practices as the new shoots which emerged after fire attracted kangaroos which they surrounded and killed with clubs and spears) barbed with sharp stones.

Comment:

The study area was probably used as a resource area with the possibility of transient and or seasonal camping. The ethnographic record identifies other areas as more favoured for intensive occupation and base camps.

4.5 Landscape

The differing landscape creates different land use. For instance swampy or poorly drained land would not be conducive to campsites or burial grounds. Whereas, caves and rock shelters would give rise to artwork, and practical purposes such as shelter or women's birthing areas.

Early roads, stock routes and river crossings during European settlement often followed Aboriginal Song Trails (walking trails) and natural features adjacent to such trails were of significance for various reasons. Over the years, the main highways and roads have been realigned and adjusted, but initially the roads between settlements which were generally established around Aboriginal camping grounds, followed the Aboriginal trails.

The landscape survey and classification followed in this report is that formulated by Speight and others in the Australian Soil and Land Survey, Field Handbook, Second Edition.

Landform is basically divided into 2 classifications, the classification covering a larger area is known as Landform Pattern, which can then be subdivided into smaller areas known as Landform Elements. About 40 types of landform pattern are defined and include, for example, floodplain, dunefield and hills. Whereas, about 70 of the smaller landform elements are defined, including cliff, footslopes and valley flat.

Relative elevation classes have been standardised and used throughout Australia. The standard text used is called the "Soil and Land Field Handbook" (McDonald *et al*, 1990, Ed 2, p36). The landscape is divided into the following classes:

Landform	Relative Elevation
Plains	0-9 m
Rises	9-30 m
Low hills	30-90 m
Hills	90-300 m
Mountains	>300 m

Landforms as well as having morphological characteristics (surface dimensions) have been formed by processes. The formation processes can interact to produce an array of landforms. For example, plains can be separated into depositional plains of various kinds or erosional surfaces (peneplain). The formation process contributes to the concealing/revealing and the preserving/destroying of archaeological evidence. The identification of landform is paramount in predicting areas that have the potential to contain archaeological evidence.

The study area landform is part of the landscape and terrain of the northern end of the Sydney basin on Permian sediments, near the junction of the Lower Hunter Plain and the Tomago Coastal Plain.

The subject site is on the eastern side of a broad and gentle ridge <50 which generally runs toward the south east, connecting to a ridge system running from the Williams River toward the east and the north. This ridge tends to divide the wetlands of the Williams River floodplain and the now inundated wetlands of the Grahamstown (Ferodale) Dam.

The original main drainage is an ephemeral creek originating at the north of the site flowing east to the wetlands and then south to Campvale swamp which then flows west via Campvale Drain into Grahamstown Dam.

Comment:

The landscape tends to suggest that the study area was conducive to attracting and sustaining a variety of food and water resources at least seasonally. The study area would have at least been used for hunting and gathering.

4.6 Soils

Where an archaeological survey is only a surface investigation, any information relating to subsurface information is important, in that it indicates:

- The possibility of archaeological evidence beneath the surface.
- The possibility of archaeological evidence destroyed through erosion or other natural phenomena.

- The possibility of archaeological evidence preserved through soil/sand deposition.

The main soil features of interest are the depth of deposits, stability of the soil composition and the depositional age of the soil groups. Detailed analysis of the effects of different soils on the burial process of archaeological remains can only be carried out during an excavation.

The susceptibility of land to sheet and rill erosion is governed largely by the topsoil texture, slope of the land, length of slope and the probability of intense summer rainfalls. The topsoil or A horizon is where most nutrients, organic matter, seed and macroporosity so desirable for a seedbed exists. If this is stripped away through soil loss the fertility of the soil is lost and productivity reduced. The first few centimetres of soil also generally contain artefacts.

The following map details the soil profile. It shows the soil in the study area classified as Cd2 which is a duplex soil with generally sandy loam with arrange from sand to loam.

Comment:

The implication for the study area is that there could be potential for subsurface archaeological deposits within the first 300mm provided the soil profile has not been disturbed.



Figure 4 Soil classification

4.7 Geological Features

The geological data allows for analysis of the landscape to determine any special features that may contribute to Aboriginal occupation in prehistory. There may be particular outcrops or features that would suggest significant Aboriginal use.

Comment:

There is no indication of a geological abnormality or feature that would suggest special significance to the landscape.

4.8 Past Land Use

Past Aboriginal activities are not well manifested by archaeological record because many activities did not leave material evidence or because the material evidence was not durable. Many of the implements were organic material, such as wood and bone and readily decayed when exposed to the elements. Even burials, are subject to the acidic condition of the soil.

Durable evidence, such as stone and rock implements, is affected by European land use. Easily recognisable implements such as stone axes, have found their way into many private collections, well before it became illegal to do so, with no record of the location of the find. Cultivation, with the associated stick raking and stone gathering also tended to destroy surface evidence. However cultivation and pastoral land use also helped preserve the archaeological record. In some cases cultivation would expose evidence in others, cover the evidence.

In general, the archaeological record is dependent on the exposure of sites through erosion, weathering, fire, drought and anthropogenic activities.

Comment:

The landform of the study area has been so extremely modified that any archaeological evidence that may have existed on site is not able to be revealed. There is not even potential for intact subsurface evidence.

5.0 Field Assessment

A field inspection as conducted by car and on foot over the study area with representatives of the Aboriginal community as outlined at 2.1 previously. The margin of the wetland was examined intensively but as the lawns ran right to the edge and the wetlands were inundated nothing was or was likely to be observed. The field inspection reinforced the desktop assessment that the landscape had been heavily modified and existence of evidence would be extremely unlikely.

6.0 Impact Assessment

6.1 Key principles in determining Occupation Pattern

Roberts, 2009 formulated 7 key principles to determine probable Aboriginal land use of a particular area.

Using those principles it is possible to place the study area into Aboriginal occupation context and use.

1. Proximity to water
There is water on site. It would probably have been generally reliable however it is not known what affect the creation of nearby Grahamstown dam had on what is there now.
2. Food resource
The study area does not appear to contain any unusual favourable, seasonal or special food resources but the wetlands would have supported abundance and variety.
3. Geological features
There are no unusual, unique or prominent geological attributes within or adjacent to the study area.
4. Ease of access
The study area is easily accessible on foot for all age groups however the swampy conditions of the wetland would not have been conducive to adjacent camping on safety and health grounds.
5. Connectivity
The study area does not appear to be linked to significant landscape features or unite other areas.

6. Safety

The study area in its natural state, would have been dangerous for small children and thus inhibit camping. Aboriginal people did not like camping near mosquitoes. Dreamtime stories were used to remind children to stay away from swamps. Ellalong Lagoon (Catch a boy swamp) near Cessnock is a good example of such a story. There does not appear to be natural protection from harsh and extreme weather. There is no particular view.

7. Archaeological evidence

Whilst there are many objects identified in the Medowie area there are no objects on site or adjacent. This is perhaps due to both the lack of surveys in the immediate area and an indication of less intensive use of the Area. Due to the disturbed nature of the land, the information from AHIMS cannot be relied upon to reach any definitive conclusion regarding archaeological potential of the study area.

The lack of significant and extensive artefacts is probably more indicative of the occupation of the total area landscape rather than just the immediate area itself. It is likely the study area was only used in a transitory and occasional way and suffers from more favourable areas at Black Hill and nearby Woodberry Swamp.

6.2 Landscape Significance Assessment

It is important to stress that the significance of a cultural landscape is not dependent on archaeological evidence being significant in itself but the interrelatedness of the individual objects to the cultural landscape as a whole. Through understanding the cultural landscape in an holistic manner one may be able to appreciate the associations that may exist between Aboriginal objects and other features within the landscape.

Using the criteria outlined earlier the significance of the study area in an Aboriginal cultural heritage context can be assessed as follows:

- *Social value*

Much of the oral tradition and knowledge has been lost to the Aboriginal communities today. However as research and surveys discover and reveal greater understanding of the past, communities are rediscovering and appreciating what has gone before. At the present time, there does not appear to be spiritual, traditional, historical or contemporary associations and attachments which the place or area has for the present-day Aboriginal community. Similarly there does not appear to be associations with tragic or warmly remembered experiences, periods or events. However that is not to say that discovery of evidence or knowledge of past spiritual connection to the place will not rekindle such association.

- *Historic value*

At this time, there does not appear to be an association of the study area with a person, event, phase or activity of importance to the history of an Aboriginal community.

- *Scientific value*

There is absolutely no scientific value to the study area

- *Aesthetic value*

The sensory, scenic, and creative milieu of the adjacent and surrounding landscape does not readily evoke feelings of a sense of place and its past use.

7.0 Recommendations

1. Further investigation is not warranted
2. Application for a permit to harm an Aboriginal object is not required
3. Whilst it is considered extremely unlikely that archaeological evidence will be uncovered through the activity due to the disturbed nature of the land and whilst the activity will be conducted away from the wetlands it may be prudent to consider the following:
 - During any excavation that a representative/s of the Aboriginal community be on site.*According to DECCW draft due diligence code, harm does not include something that is trivial or negligible. Examples of what might be a trivial or negligible act are picking up and replacing a small stone artefact.*
4. If Aboriginal objects are later found when carrying out the activity, work must cease, DECCW notified and application for an AHIP if objects are likely to be harmed.

8.0 Certification

This report was prepared in accordance with the brief given by xxxx to assess of the impact of the proposed development on Aboriginal heritage and was undertaken to demonstrate due diligence.

To the best of our knowledge the report accurately reflects the archaeological survey, findings and results, as well as the input and recommendations of the Local Aboriginal Land Council and/or the registered Native Title Holders. The attached correspondence from the Aboriginal community forms part of this certification and report.

Whilst every care has been taken in compiling this report to determine the impact the proposal may have on Aboriginal Heritage and to demonstrate a due diligence process, neither MCAS nor the Local Aboriginal Land Council can warrant or guarantee that due diligence has been met. It is the responsibility of the individual or proponent to ensure that they have undertaken due diligence.

Signed



(Archaeologist)

26/07/2010

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10.0 Glossary

Aboriginal Site

1. Occupation Sites

Evidence of human occupation, which includes food remains, stone tools, baked clay, fire-blackened and fire-cracked stones and charcoal, is found in a range of sites known collectively as occupation sites

- *Shell middens.* These sites are found on the coastline and along the edges of rivers and lakes, It is a deposit composed of the remains of edible shellfish and also usually contains fish and animal bones, stone tools and campfire charcoal.
- *Rock shelters with archaeological deposit.* In rock outcrops such as sandstone and granite, overhangs sometimes form creating useable shelters. Sediments from fires, roof fall. discarded stone tools and food remains form a deposit protected within the shelter and this deposit can be excavated by archaeologists to study patterns of Aboriginal life.
- *Open campsites.* These sites are mostly surface and associated subsurface scatters of stone artefacts, sometimes with fireplaces. They exist throughout the landscape and are the most common site type in rural areas, While found in all environmental locations larger and denser sites tend to be found on riverbanks and lower slopes racing watercourses, as well as ridgelines and other areas that offers movement routes. The study or open sites can assist in understanding patterns of Aboriginal land use.
- *Base camp* This is the name applied to the major or main area of habitation. They tended to be close to a permanent water source and food source. Generally well sheltered. These camps would be rotated for hygiene reasons. They are different to smaller open campsites, which were mainly camps on transport routes or overnight areas on hunting forays.

2. Aboriginal Reserves and Missions

These places are very important to Aboriginal people today. Although Aboriginal people were often moved to reserves by force and were restricted by harsh regulations, the reserves became home to many people, where they and their families were born, lived and died. Historic cemeteries at many reserves are still cared for by the local Aboriginal community.

3. Rock Paintings

Aboriginal paintings are found on the ceilings and walls of rockshelters, which occur wherever suitable rock surfaces and outcrops, exist. Figures include humans, kangaroos, emus, echidnas, grid patterns, animal tracks, boomerangs, axes, hand stencils and other motifs. Paintings are made with white, red, yellow and black pigments. The motifs may be drawn, painted or stencilled, and charcoal drawings are common as well.

4. Rock Engravings

These occur usually where there is a suitable exposure of fairly flat, soft rock or in rock overhangs. The outlines of motifs were made by hitting the rock surface with a sharp stone to make small holes or pits. Sometimes the pits were jointed to form a groove, by rubbing with a stone. People, animal shapes and tracks are common as well as non-figurative designs such as circles.

5. Grinding Grooves

Grooves are located on flat rock exposures close to a stream or rock hole. They vary in size but are generally long (about 30-40cm in length) and elliptical in shape. Stone axes were ground into the softer stone allowing a working edge to be created or sharpened- Deeper grooves may have been used to work spears or other thin implements.

6. Quarries

Quarry sites occur wherever there are outcrops of siliceous or igneous rock. Stone material was used in creating stone tools, which in turn were used to work wood and provide people with tools to assist in hunting and gathering activities. Siliceous rock is easily flaked and made useful cutting and scraping tools whereas igneous rock was preferred for edge-ground tools, particularly axes.

7. Ceremonial grounds

These sites were used for initiation ceremonies, marriages, tribal meetings and other important functions and are of great significance to Aboriginal people. Bora rings, which are one or more raised earth rings, were used for male initiations.

8. Stone arrangements

These range from simple stone mounds to complex circles and pathways. Arrangements are found throughout inland New South Wales as well as the coast, where fish traps were sometimes constructed.

9. Carved and scarred trees

Tree bark was used for constructing canoes, shelters, coolamons and shields. Distinctive scars are left from bark removal and can usually be differentiated from natural scars. Carved trees are more distinctive, exhibiting patterns etched into the wood of the tree. They can occur throughout the state although clearing and forestry practices have greatly reduced numbers.

A range of diagnostic criteria has been developed to assist in the identification of Aboriginal scarred trees. The following criteria are based on archaeological work conducted by Simmons (1977) and Beesley (1989). It should be noted that these criteria have never been quantitatively tested or quantified using non-relative criteria such as absolute dating or an analysis of pre-occluded scar morphologies. This is because radiocarbon dating or dendrochronology is mostly inconclusive, and the removal of regrowth exposes trees to further damage.

1. **The scar does not normally run to ground level:** (scars resulting from fire, fungal attack or lightning nearly always reach ground level). However, ground termination does not necessarily discount an Aboriginal Origin (some ethno-historic examples of canoe scars reach the ground);
1. (A). **If a scar extends to the ground, the sides of the original scar must be relatively parallel:** (natural scars tend to be triangular in shape);
2. **The scar is either approximately parallel sided or concave, and symmetrical:** (few natural scars are likely to have these properties except fire scars which may be symmetrical but are wider at the base than their apex. Surveyors marks are typically triangular and often adzed);
3. **The scar should be reasonably regular in outline and regrowth:** scars of natural origin tend to have irregular outlines and may have uneven regrowth;
4. **The ends of the scar should be shaped, either squared off, or pointed** (often as a result of regrowth): (a 'keyhole' profile with a 'tail' is suggestive of branch loss);
5. **A scar which contains adze or axe marks** on the original scar surface is likely to be the result of human scarring. Their morphology and distribution may lend support to an interpretation of an Aboriginal origin: (marks produced after the scarring event may need to be discounted);
6. **The tree must date to the time of Aboriginal bark exploitation within its region:** (an age of at least 100 years is prerequisite)
7. **The tree must be endemic to the region:** (and thus exclude historic plantings).

Field based identification of Aboriginal scars, is based on surface evidence only and will not necessarily provide a definitive classification. In many cases the possibility of a natural origin cannot be ruled out, despite the

presence or several diagnostic criteria or the balance or interpretation leaning toward an Aboriginal origin. For this reason interpretations of an Aboriginal origin are qualified by the recorder's degree of certainty. The following categories are used

Definite Aboriginal scar - This is a scar that conforms to all of the criteria and/or has in addition a feature or characteristic that provides definitive identification, such as diagnostic axe or adze marks or an historical identification. All conceivable natural causes of the scar can be reliably discounted.

Aboriginal origin is most likely - This is a scar that conforms to all of the criteria and where a natural origin is considered unlikely and improbable.

Probable Aboriginal scar - this is a scar that conforms to all of the criteria and where an Aboriginal origin is considered to be the most likely. Despite this, a natural origin cannot be ruled out.

Possible Aboriginal scar - This is a scar which conforms to all or most of the criteria and where an Aboriginal origin cannot be reliably considered as more likely than alternative natural causes. The characteristics of this scar will also be consistent with a natural cause.

10. Burials

Aborigines feel equally as respectful about prehistoric burials as modern cemeteries. As Aborigines have lived in Australia for over 30 000 years burials are seen as part of a continuing culture and tradition as well as offering valuable archaeological information. The dead were sometimes cremated, sometimes placed in trees or rock ledges and sometimes buried. Burials exist throughout New South Wales and can be accidentally uncovered in construction work or become exposed through erosion. It is important that if a skeleton is found it be reported to the police, to a representative of the National Parks and Wildlife Service and to the relevant Aboriginal community group.

II. Natural sacred sites

Many features of the landscape, such as mountains, rocks, waterholes etc., are regarded as sacred sites by Aborigines. They are places associated with Dreamtime ancestors and usually can only be identified by Aboriginal people. They retain a high significance to Aborigines.

Fire- stick Farming

The process of burning to aid in hunting. Animals could be speared or clubbed as they fled to escape the flames. Other uses of fire were for long term hunting strategies. After firing, the bush would regenerate attracting animals on which the hunters would prey. (Flood, p250)

Flake fragment of stone that was used as a tool for weapons, scrapers etc.

Geographical

AHD (Australian Height Datum) Australian standard measurement from the mean high sea level.

Swamp. An almost level, closed, or almost closed depression with a seasonal or permanent water table at or above the surface, commonly aggraded by overbank stream flow (Speight1990: 33).

Legal

Activity means a project, development, activity or work (ie this term is used in its ordinary way, and does not just refer to an activity as defined by Part 5 EP&A Act)

Disturbed land or land already disturbed by previous activity Land that has been previously subjected to any activity that has resulted in clear and observable changes to the land's surface. Examples include: soil that has been ploughed; urban development that has occurred; existing rural infrastructure such as dams and fences; existing roads, trails and walking tracks; and other existing infrastructure such as pipelines, transmission lines and stormwater drainage.

Due diligence Taking reasonable and practicable steps to avoid harm and protect Aboriginal objects.

harm an object or place includes any act or omission that:

- (a) destroys, defaces or damages the object or place, or
 - (b) in relation to an object—moves the object from the land on which it had been situated, or
 - (c) is specified by the regulations, or
 - (d) causes or permits the object or place to be harmed in a manner referred to in paragraph (a), (b) or (c),
- but does not include any act or omission that:
- (e) desecrates the object or place, or
 - (f) is trivial or negligible, or
 - (g) is excluded from this definition by the regulations.

Sand Dune Refers to sand ridges and sand hills formed by the wind, usually found in desert regions, near a lake or in coastal areas. In areas of Western NSW, windblown dunes can occur along the eastern edges of ephemeral lakes (called lunettes dunes). They can also occur along the banks of rivers.

Waters means the whole or any part of: any river, stream, lake, lagoon, swamp, wetlands, natural watercourse, tidal waters (including the sea). Note: the boundary or tidal waters is defined as the high water mark. ²

11.0 Appendix

- (A) AHIMS Search Results
- (B) Aboriginal Community Correspondence

DRAFT

Information Provided Through

Advance Legal Search Pty Ltd

Ph. 0297541590 Fax. 0297541364

Title Search**LEAP Legal**

An Approved LPI NSW

Information Broker

LAND AND PROPERTY INFORMATION NEW SOUTH WALES - TITLE SEARCH
-----**FOLIO: 411/1063902**

SEARCH DATE	TIME	EDITION NO	DATE
-----	----	-----	----
5/8/2010	11:25 AM	6	27/5/2009

LAND

LOT 411 IN DEPOSITED PLAN 1063902
AT MEDOWIE
LOCAL GOVERNMENT AREA PORT STEPHENS
PARISH OF STOWELL COUNTY OF GLOUCESTER
TITLE DIAGRAM DP1063902

FIRST SCHEDULE

NORMAN JAMES FRASER

SECOND SCHEDULE (4 NOTIFICATIONS)

- 1 RESERVATIONS AND CONDITIONS IN THE CROWN GRANT(S)
- 2 DP1097094 EASEMENT FOR OVERHEAD ELECTRICITY CABLES AND ACCESS
THERETO 15 METRES WIDE AFFECTING THE PART(S) SHOWN SO
BURDENED IN DP1097094
- 3 DP1097094 EASEMENT FOR ELECTRICITY SUBSTATION AND ACCESS THERETO
8.44 METRE(S) WIDE AFFECTING THE PART(S) SHOWN SO
BURDENED IN DP1097094
- 4 AE709245 MORTGAGE TO COMMONWEALTH BANK OF AUSTRALIA

NOTATIONS

UNREGISTERED DEALINGS: NIL

*** END OF SEARCH ***

Information Provided Through

Advance Legal Search Pty Ltd

Ph. 0297541590 Fax. 0297541364

Title Search

LEAP Legal

An Approved LPI NSW

Information Broker

LAND AND PROPERTY INFORMATION NEW SOUTH WALES - TITLE SEARCH
-----**FOLIO: 412/1063902**

SEARCH DATE	TIME	EDITION NO	DATE
-----	----	-----	----
5/8/2010	11:26 AM	4	16/4/2009

LAND

LOT 412 IN DEPOSITED PLAN 1063902
AT MEDOWIE
LOCAL GOVERNMENT AREA PORT STEPHENS
PARISH OF STOWELL COUNTY OF GLOUCESTER
TITLE DIAGRAM DP1063902

FIRST SCHEDULE

WENDY MAY MORRIS (T AE609568)

SECOND SCHEDULE (3 NOTIFICATIONS)

- 1 RESERVATIONS AND CONDITIONS IN THE CROWN GRANT(S)
- 2 DP1097094 EASEMENT FOR OVERHEAD ELECTRICITY CABLES AND ACCESS
THERE TO 15 METRES WIDE AFFECTING THE PART(S) SHOWN SO
BURDENED IN DP1097094
- 3 AE609569 MORTGAGE TO COMMONWEALTH BANK OF AUSTRALIA

NOTATIONS

UNREGISTERED DEALINGS: NIL

*** END OF SEARCH ***

Information Provided Through

Advance Legal Search Pty Ltd

Ph. 0297541590 Fax. 0297541364

Title Search

LEAP Legal

An Approved LPI NSW

Information Broker

LAND AND PROPERTY INFORMATION NEW SOUTH WALES - TITLE SEARCH
-----**FOLIO: 413/1063902**

SEARCH DATE	TIME	EDITION NO	DATE
-----	----	-----	----
5/8/2010	11:27 AM	5	15/6/2010

LAND

LOT 413 IN DEPOSITED PLAN 1063902
AT MEDOWIE
LOCAL GOVERNMENT AREA PORT STEPHENS
PARISH OF STOWELL COUNTY OF GLOUCESTER
TITLE DIAGRAM DP1063902

FIRST SCHEDULE

WENDY MAY MORRIS (T AF252489)

SECOND SCHEDULE (2 NOTIFICATIONS)

- 1 RESERVATIONS AND CONDITIONS IN THE CROWN GRANT(S)
- 2 AF555412 MORTGAGE TO COMMONWEALTH BANK OF AUSTRALIA

NOTATIONS

UNREGISTERED DEALINGS: NIL

*** END OF SEARCH ***

SIGNATURES AND SEALS ONLY

[Signature]

SURVEYORS (PRACTICE) REGULATION 2001 CLAUSE 32 (2)			
MARK	M.G.A. COORDINATES	NORTHING	ZONE
PM.27125	393 691 383	6 374 451 798	B U
PM.27126	393 375 963	6 373 689 500	B U
PM.73069	393 826 711	6 375 040 412	B U
SOURCE: M.G.A. COORDINATES ADOPTED FROM S.C.I.M.S. ON 7 MARCH 2003			
COMBINED SCALE FACTOR 0.999737			

Certified correct for the purposes of the Real Property Act 1900 by the MORTGAGEE of the Westpac Banking Corporation under power of attorney Book 4299 No. 332

(Signature) *[Signature]*
 The three-attorney by executing this instrument the attorney states that the attorney has received no notice of the revocation of the power of attorney.

I certify that the attorney for the MORTGAGEE with whom I am personally acquainted or as signed this instrument in my presence.

Signature of witness: *[Signature]*
 Name of witness: **Natalie Stinson**
 Address of witness: 1 King Street Concord West NSW

Crown Lands Office Approval

PLAN APPROVED: *[Signature]*
 Authorised Officer

Land District: *[Blank]*
 Paper No.: *[Blank]*
 Field Book: *[Blank]*

Subdivision Certificate

I certify that the provisions of s. 108 of the Environmental Planning and Assessment Act 1979 have been satisfied in relation to the proposed subdivision.

(Insert subdivision or new road)

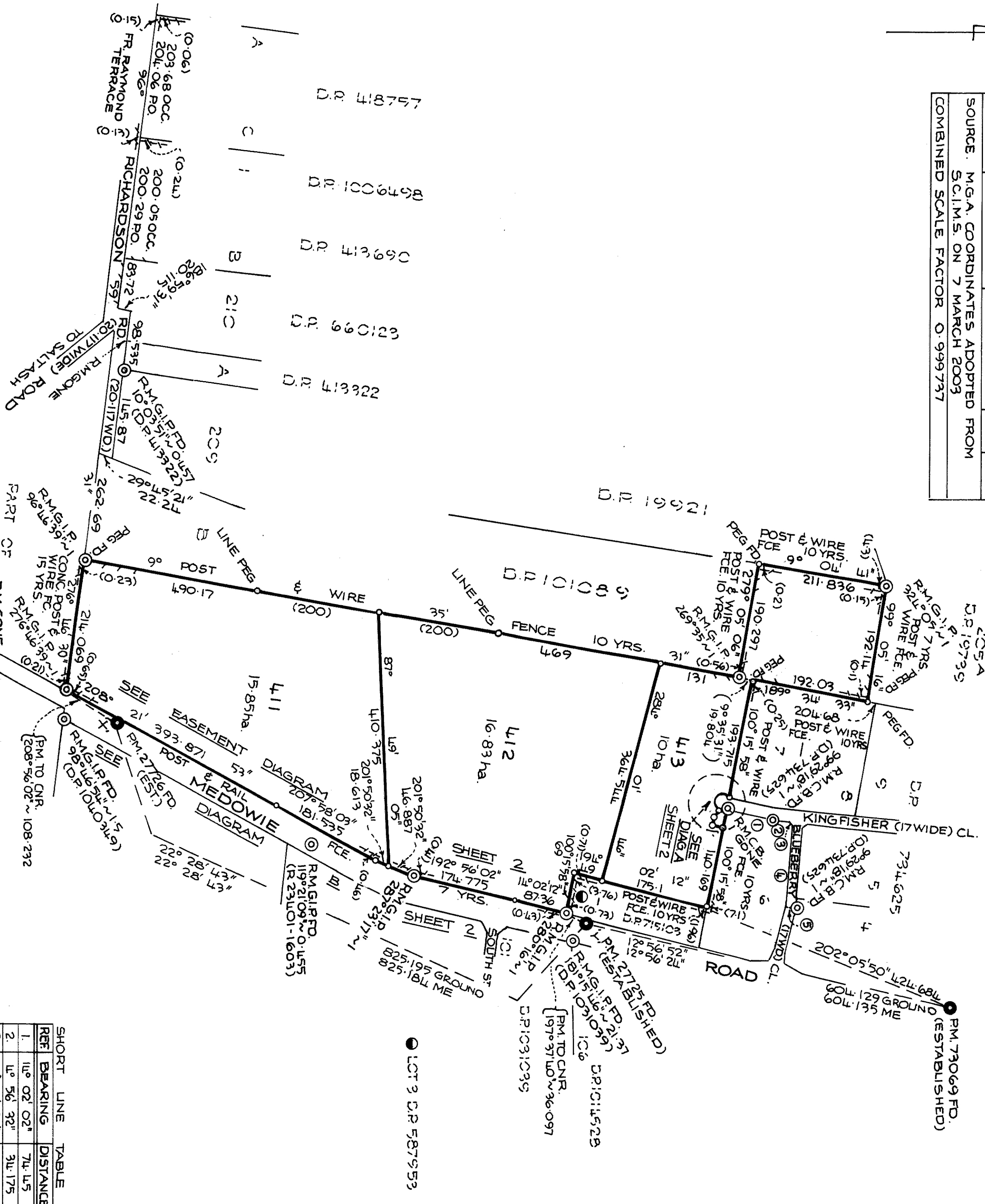
[Signature]

Consent Authority: Port Stephens Council
 Date of endorsement: 26 Sep. 2003

Accreditation No.: *[Blank]*
 Subdivision Certificate No.: 8003/137
 File No.: 15-2001-1430-1

When the plan is to be lodged electronically in the Land Titles Office, it should include a signature in an electronic or original form approved by the Registrar-General.

Delete whichever is inapplicable



DP1063902

Registered: 4-2-2004

Title System: TORRENS

Purpose: SUBDIVISION

Ref Map: PARISH #

Last Plan: DP808163, (DP19921)

PLAN OF:
SUBDIVISION OF LOT 10
DP 808163

Lengths are in metres. Reduction Ratio 1:5000

L.G.A.: PORT STEPHENS

Locality: MEDOWIE

Parish: STOWELL

County: GLOUCESTER

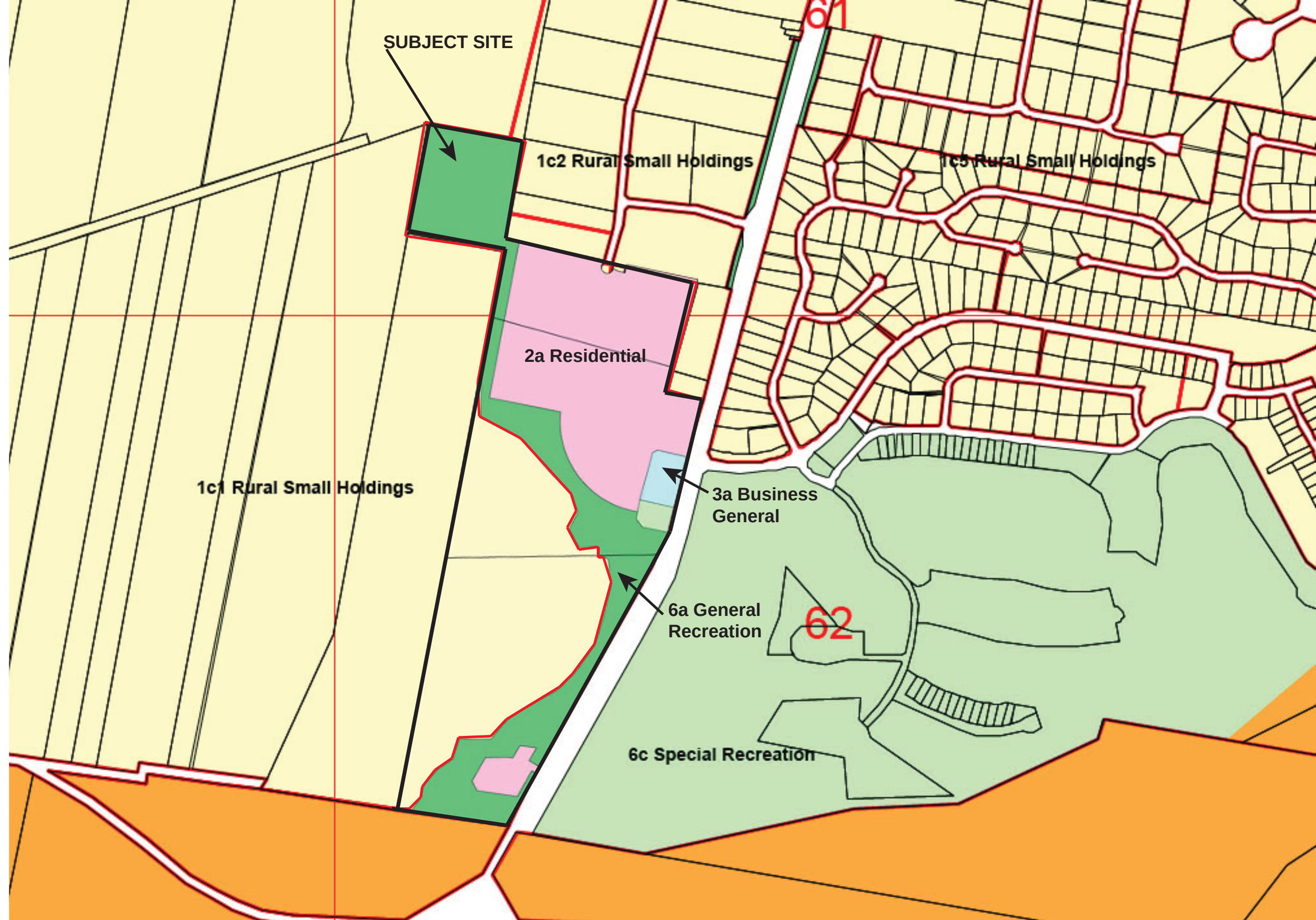
This is sheet 1 of 2 sheets.
(Delete if inapplicable)

Surveyors (Practice) Regulation 2001

I, DARCY CHARLES MC ELWEE, of MC ELWEE ASSOCIATES PTY. LTD., a company registered under the Corporations Act 1993, certify that the survey represented in this plan is accurate, has been made in accordance with the Surveyors Act 1929, and that the survey was completed on 21/09/2003.

The survey relates to: LOTS 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 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1014, 1015, 1016, 1017, 1018, 1019, 1020, 1021, 1022, 1023, 1024, 1025, 1026, 1027, 1028, 1029, 1030, 1031, 1032, 1033, 1034, 1035, 1036, 1037, 1038, 1039, 1040, 1041, 1042, 1043, 1044, 1045, 1046, 1047, 1048, 1049, 1050, 1051, 1052, 1053, 1054, 1055, 1056, 1057, 1058, 1059, 1060, 1061, 1062, 1063, 1064, 1065, 1066, 1067, 1068, 1069, 1070, 1071, 1072, 1073, 1074, 1075, 1076, 1077, 1078, 1079, 1080, 1081, 1082, 1083, 1084, 1085, 1086, 1087, 1088, 1089, 1090, 1091, 1092, 1093, 1094, 1095, 1096, 1097, 1098, 1099, 1100, 1101, 1102, 1103, 1104, 1105, 1106, 1107, 1108, 1109, 1110, 1111, 1112, 1113, 1114, 1115, 1116, 1117, 1118, 1119, 1120, 1121, 1122, 1123, 1124, 1125, 1126, 1127, 1128, 1129, 1130, 1131, 1132, 1133, 1134, 1135, 1136, 1137, 1138, 1139, 1140, 1141, 1142, 1143, 1144, 1145, 1146, 1147, 1148, 1149, 1150, 1151, 1152, 1153, 1154, 1155, 1156, 1157, 1158, 1159, 1160, 1161, 1162, 1163, 1164, 1165, 1166, 1167, 1168, 1169, 1170, 1171, 1172, 1173, 1174, 1175, 1176, 1177, 1178, 1179, 1180, 1181, 1182, 1183, 1184, 1185, 1186, 1187, 1188, 1189, 1190, 1191, 1192, 1193, 1194, 1195, 1196, 1197, 1198, 1199, 1200, 1201, 1202, 1203, 1204, 1205, 1206, 1207, 1208, 1209, 1210, 1211, 1212, 1213, 1214, 1215, 1216, 1217, 1218, 1219, 1220, 1221, 1222, 1223, 1224, 1225, 1226, 1227, 1228, 1229, 1230, 1231, 1232, 1233, 1234, 1235, 1236, 1237, 1238, 1239, 1240, 1241, 1242, 1243, 1244, 1245, 1246, 1247, 1248, 1249, 1250, 1251, 1252, 1253, 1254, 1255, 1256, 1257, 1258, 1259, 1260, 1261, 1262, 1263, 1264, 1265, 1266, 1267, 1268, 1269, 1270, 1271, 1272, 1273, 1274, 1275, 1276, 1277, 1278, 1279, 1280, 1281, 1282, 1283, 1284, 1285, 1286, 1287, 1288, 1289, 1290, 1291, 1292, 1293, 1294, 1295, 1296, 1297, 1298, 1299, 1300, 1301, 1302, 1303, 1304, 1305, 1306, 1307, 1308, 1309, 1310, 1311, 1312, 1313, 1314, 1315, 1316, 1317, 1318, 1319, 1320, 1321, 1322, 1323, 1324, 1325, 1326, 1327, 1328, 1329, 1330, 1331, 1332, 1333, 1334, 1335, 1336, 1337, 1338, 1339, 1340, 1341, 1342, 1343, 1344, 1345, 1346, 1347, 1348, 1349, 1350, 1351, 1352, 1353, 1354, 1355, 1356, 1357, 1358, 1359, 1360, 1361, 1362, 1363, 1364, 1365, 1366, 1367, 1368, 1369, 1370, 1371, 1372, 1373, 1374, 1375, 1376, 1377, 1378, 1379, 1380, 1381, 1382, 1383, 1384, 1385, 1386, 1387, 1388, 1389, 1390, 1391, 1392, 1393, 1394, 1395, 1396, 1397, 1398, 1399, 1400, 1401, 1402, 1403, 1404, 1405, 1406, 1407, 1408, 1409, 1410, 1411, 1412, 1413, 1414, 1415, 1416, 1417, 1418, 1419, 1420, 1421, 1422, 1423, 1424, 1425, 1426, 1427, 1428, 1429, 1430, 1431, 1432, 1433, 1434, 1435, 1436, 1437, 1438, 1439, 1440, 1441, 1442, 1443, 1444, 1445, 1446, 1447, 1448, 1449, 1450, 1451, 1452, 1453, 1454, 1455, 1456, 1457, 1458, 1459, 1460, 1461, 1462, 1463, 1464, 1465, 1466, 1467, 1468, 1469, 1470, 1471, 1472, 1473, 1474, 1475, 1476, 1477, 1478, 1479, 1480, 1481, 1482, 1483, 1484, 1485, 1486, 1487, 1488, 1489, 1490, 1491, 1492, 1493, 1494, 1495, 1496, 1497, 1498, 1499, 1500, 1501, 1502, 1503, 1504, 1505, 1506, 1507, 1508, 1509, 1510, 1511, 1512, 1513, 1514, 1515, 1516, 1517, 1518, 1519, 1520, 1521, 1522, 1523, 1524, 1525, 1526, 1527, 1528, 1529, 1530, 1531, 1532, 1533, 1534, 1535, 1536, 1537, 1538, 1539, 1540, 1541, 1542, 1543, 1544, 1545, 1546, 1547, 1548, 1549, 1550, 1551, 1552, 1553, 1554, 1555, 1556, 1557, 1558, 1559, 1560, 1561, 1562, 1563, 1564, 1565, 1566, 1567, 1568, 1569, 1570, 1571, 1572, 1573, 1574, 1575, 1576, 1577, 1578, 1579, 1580, 1581, 1582, 1583, 1584, 1585, 1586, 1587, 1588, 1589, 1590, 1591, 1592, 1593, 1594, 1595, 1596, 1597, 1598, 1599, 1600, 1601, 1602, 1603, 1604, 1605, 1606, 1607, 1608, 1609, 1610, 1611, 1612, 1613, 1614, 1615, 1616, 1617, 1618, 1619, 1620, 1621, 1622, 1623, 1624, 1625, 1626, 1627, 1628, 1629, 1630, 1631, 1632, 1633, 1634, 1635, 1636, 1637, 1638, 1639, 1640, 1641, 1642, 1643, 1644, 1645, 1646, 1647, 1648, 1649, 1650, 1651, 1652, 1653, 1654, 1655, 1656, 1657, 1658, 1659, 1660, 1661, 1662, 1663, 1664, 1665, 1666, 1667, 1668, 1669, 1670, 1671, 1672, 1673, 1674, 1675, 1676, 1677, 1678, 1679, 1680, 1681, 1682, 1683, 1684, 1685, 1686, 1687, 1688, 1689, 1690, 1691, 1692, 1693, 1694, 1695, 1696, 1697, 1698, 1699, 1700, 1701, 1702, 1703, 1704, 1705, 1706, 1707, 1708, 1709, 1710, 1711, 1712, 1713, 1714, 1715, 1716, 1717, 1718, 1719, 1720, 1721, 1722, 1723, 1724, 1725, 1726, 1727, 1728, 1729, 1730, 1731, 1732, 1733, 1734, 1735, 1736, 1737, 1738, 1739, 1740, 1741, 1742, 1743, 1744, 1745, 1746, 1747, 1748, 1749, 1750, 1751, 1752, 1753, 1754, 1755, 1756, 1757, 1758, 1759, 1760, 1761, 1762, 1763, 1764, 1765, 1766, 1767, 1768, 1769, 1770, 1771, 1772, 1773, 1774, 1775, 1776, 1777, 1778, 1779, 1780, 1781, 1782, 1783, 1784, 1785, 1786, 1787, 1788, 1789, 1790, 1791, 1792, 1793, 1794, 1795, 1796, 1797, 1798, 1799, 1800, 1801, 1802, 1803, 1804, 1805, 1806, 1807, 1808, 1809, 1810, 1811, 1812, 1813, 1814, 1815, 1816, 1817, 1818, 1819, 1820, 1821, 1822, 1823, 1824, 1825, 1826, 1827, 1828, 1829, 1830, 1831, 1832, 1833, 1834, 1835, 1836, 1837, 1838, 1839, 1840, 1841, 1842, 1843, 1844, 1845, 1846, 1847, 1848, 1849, 18

- 1a Rural Agriculture
- 1c1 Rural Small Holdings
- 1c2 Rural Small Holdings
- 1c3 Rural Small Holdings
- 1c4 Rural Small Holdings
- 1c5 Rural Small Holdings
- 2a Residential
- 2c Residential
- 3a Business -General
- 4a Industrial -General
- 5a Special Uses -Defence
- 5c Special Uses - Proposed Road
- 5g Special Uses - Flood Effect
- 6a General Recreation
- 6c Special Recreation
- 7a Env. Protection
- 7c Env Protection - Water Catchment
- 7f1 Env Protection - Coastal Lands



VEGETATION TO
REMAIN

ENVIRONMENTAL LIVING
14 LOTS

VEGETATION TO BE
PLANTED

AREAS OF FILL TO
ENVIRONMENTAL
LIVING LOTS

EMERGENCY ACCESS

KOALA HABITAT LINK
TO BE RETAINED
WITHIN LOTS

50m BUFFER TO
SEPP14 WETLANDS

SEPP 14 WETLANDS TO
BE RETAINED

VEGETATION TO BE
PLANTED ALONG SEPP
14 BOUNDARY

50m BUFFER TO SEPP
14 WETLANDS

EXISTING RURAL
RESIDENTIAL LOTS

RURAL RESIDENTIAL
8 LOTS

APPROX. FLOOD LINE
7.5m

RESIDENTIAL 50
LOTS

VILLA/ TOWNHOUSE
39 LOTS

ACCESS TO SITE.
INTERSECTION TO BE
UPGRADED
COMMERCIAL ZONE
2615sqm FLOOR
SPACE. 94 CAR PARK
SPACES

PROPOSED CLUB
1675sqm FLOOR
SPACE AND 2
BOWLING GREENS

SPORTS OVALS AND
CARPARK - 104
SPACES

SENIORS LIVING 11
LOTS

