ANNEX T

Supplementary Geotechnical Advice

coffey geotechnics
SPECIALISTS MANAGING THE EARTH

17 July 2008

Resource Design Management
PO Box J430
COFFS HARBOUR NSW 2450

Attention: Matt Cooper

Dear Mr Cooper

RE: Glades Development, Clarification regarding terms Stage and Precincts

I refer to your recent enquiry regarding the proposed Glades Development, Moonee, which requested that Coffey Geotechnics clarify references made in our previous reports which referred to Stages 1 to 4.

I confirm that all references to Stages 1 to 4 in Coffey Geotechnics reports for this development should be read as applying to Precincts 1 to 4 as they are the same.

If you have any further questions please contact me directly on (02) 6651 3213.

For and on behalf of Coffey Geotechnics Pty Ltd

Andrew Ballard
Associate Environmental Scientist
Environmental Team Leader – Coffs Harbour

coffey geotechnics
SPECIALISTS MANAGING THE EARTH

RESPONSE TO INFORMATION REQUEST FROM THE NSW DEPARTMENT OF PLANNING - THE GLADES DEVELOPMENT, MOONEE

Lot 1 DP725785 Pacific Highway, Moonee Beach NSW

Rothwell Boys Pty Ltd
c/o Resource Design & Management Pty Ltd
GEOTCOFH01173AC-AB
1 April 2008

Coffey Geotechnics Pty Ltd ABN 93 056 929 483
1/18 Hurley Drive Coffs Harbour NSW 2450 Australia

coffey geotechnics
SPECIALISTS MANAGING THE EARTH

1 April 2008

Resource Design & Management Pty Ltd
Suite 34 Jetty Village Shopping Centre
Coffs Harbour NSW 2450

Attention: Matt Cooper

Dear Sir

RE: Coffey Geotechnics advice for inclusion in a combined response to NSW Department of Planning information request for The Glades Development, Moonee

Coffey Geotechnics Pty Ltd (Coffey) is pleased to present our advice to include in a combined response to the information request from the NSW Department of Planning for The Glades Development, Moonee. As per our proposal GEOTCOFH01173AC-AA Coffey is pleased to provide advice for the following issues:

a. Acid Sulfate Soils,

b. Acidic Soils, and

c. Fill Suitability Assessment.

We draw your attention to the attached sheet entitled “Important Information About Your Coffey Report” which should be read in conjunction with this report.

We trust that this report meets with your requirements. If you require further information please contact the undersigned in our Coffs Harbour office.

For and on behalf of Coffey Geotechnics Pty Ltd

Andrew Ballard
Environmental Team Leader – Coffs Harbour

Distribution:	Original held by:	Coffey Geotechnics Pty Ltd
	1 Copy	Coffey (Coffs Harbour library)
	3 Copies	Resource Design & Management Pty Ltd

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1 INTRODUCTION

1.1 General

Coffey Geotechnics Pty Ltd (Coffey) was engaged by Dale Holt of Rothwell Boys Pty Ltd on 12 March 2008 to provide advice for inclusion in a combined response to the NSW Department of Planning's information request for the proposed The Glades Development. The proposed development is a residential subdivision to be located at Lot 1 DP725785 (Lot 1) Pacific Highway, Moonee Beach NSW. In preparing this correspondence Coffey has undertaken a review of our previously published reports for the proposed The Glades Development.

The purpose of this report is to provide advice which will assist in the preparation of a combined response to the NSW Department of Planning's information request. The requested information includes:

a. A summary of the findings from previous Acid Sulfate Soils (ASS) investigations provided by Coffey for Stage 1 and if required, provide recommendations and details of additional work.

b. A summary and review of our previous comments on acidic soils in Stage 1 and the appropriate management of acidic soils during any future construction acitivities.

c. A summary on the suitability of materials won from Stage 1 to be used as fill for low lying areas in subsequent stages of the development.

d. Provide copies of previous geotechnical reports prepared by Coffey as referred to in GEOTCOFH0173AB-AA *Acid Sulfate Soils Assessment for Residential Subdivision.*

Copies of previous Coffey reports as outlined in Point d above were provided separately to Resource Design & Management Pty Ltd (RDM) on 17 March 2008.

The proposed The Glades development comprises of a residential subdivision to be developed in stages on the whole of Lot 1. Previous reports identified two 'zones' with different subsurface conditions on Lot 1. Zone 1 comprised residual soils and weathered siltstone materials. Zone 2 comprised alluvial and fill soils overlying residual soils. A site layout showing the assumed boundary between the Zone 1 and Zone 2 materials is provided in Figure 1.

Coffey have previously carried out work on this site, which was reported in several letters, facsimiles and reports. Further information on the previous work is presented in Section 1.2 below.

1.2 Background Information

Coffey has previously carried out a geotechnical investigation, acid sulfate soils assessment, and collected water level data at the site, from which the following reports and letters were issued;

- CH1173/1-AC dated 8 March 2004 – this letter presented the results of a geotechnical assessment and preliminary recommendations for the proposed residential subdivision development. The letter provided general comments on road construction, footings and founding conditions, excavation conditions and acid sulfate soils.
- CH1173/1-AD dated 24 March 2004 – this facsimile provided comments on the suitability of the site for residential development with respect to geotechnical engineering aspects. A recommendation was also made that a more detailed geotechnical investigation should be

carried out prior to final design and construction of the proposed subdivision.

- CH1173/1-AF dated 7 April 2004 – this letter provided similar information as CH1173/1-AC and CH1173/1-AD which are discussed above.
- CH1173/1-AH dated 31 May 2004 – this facsimile advised the client that data loggers which had been installed at the above site to record water level data had been vandalised and irreversibly damaged.
- CH1173/1-AI dated 3 December 2004 – this report provided similar information as CH1173/1-AC and CH1173/1- AD which are discussed above.
- CH1173/1-AM dated 16 December 2005 - This report collated the information presented in the above letter and reports, and presented recommendations and information on:
    - Previous reports and letters provided, including surface and subsurface conditions, excavation conditions, and comments on suitability of the site for residential development;
    - General land capability with respect to site filling and drainage and the likely associated effects on groundwater quality;
    - Acid sulfate soils and a preliminary management plan.
    - Groundwater levels to date.
- CH1173/1-AN dated 26 June 2006 – This letter provided the results of groundwater monitoring on the site over a one year period.
- GEOTCOFH01173AB-AA dated 17 July 2007 – This report presents the results of an acid sulfate soil assessment within the Stage 1 area.

Copies of these correspondence and reports have been provided separately to RDM.

2 ACID SULFATE SOILS

The preliminary Acid Sulfate Soils (ASS) assessment (provided in report no. CH1173/1-AM) indicated that the Zone 2 alluvial materials may contain ASS. As outlined in Section 1.2 above, an ASS assessment was conducted along a 600m section of road within Stage 1 where the Zone 2 soils will be disturbed to approximately 0.6m depth and was presented in Coffey Report GEOTCOFH01173AB-AA.

The investigation undertaken for GEOTCOFH01173AB-AA included a field investigation and subsequent laboratory testing of eight soil samples to assess the presence or absence of ASS.

The results of the testing indicated that soils at the site are unlikely to contain pyritic sulfur, but may contain organic sulfur. This was supported by low reduced inorganic sulfur (% Scr) results and relatively high total actual acidity (TAA) and total potential acidity (TPA) results. These results suggest that the Zone 2 soils present in this part of Stage 1 of the development site are unlikely to be ASS. Coffey advised that based on these results that these soils are not ASS, but are acidic soils. Acidic soil issues are considered in further detail in section 3 below.

Coffey's most recent ASS investigation on this site focussed on an area along a proposed roadway in part of Stage 1. The roadway was located in part of the site which contained Zone 2 alluvial soils and fill soils overlying residual soils. The balance of Stage 1 is comprised of residual soils classed as within Zone 1. Zone 1 soils are considered to have a low probability of containing ASS.

As yet no detailed ASS investigation has been undertaken for other Stages 2, 3 and 4 of the proposed development. Parts of the land within Stages 2, 3 and 4 will not be suitable for residential development due to existing constraints. Within these two stages Lot 1 is bounded by Skinners Creek to the north and Moonee Creek to the east and southeast. Coffey understands that there are 50m to 100m buffer zones along these waterways, i.e. no development is to occur in these buffer zones. Excluding these buffer zones further ASS investigations are recommended within the remaining areas of Stages 2, 3 and 4, with particular attention paid to those lands within Zone 2 and identified for future residential development.

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

3 ACIDIC SOILS

The ASS investigation (GEOTCOFH01173AB-AA) found that the soils within the proposed roadway in Stage 1 may contain organic sulfur and classed these Zone 2 soils as acidic soils. The report advised that acidic soils are unlikely to cause significant harm to the environment, as the production of acid is slow and is unlikely to leach from the soils in significant quantities in their natural state. Should the soils be disturbed and be washed into waterways then acidification of the water can occur. Acidic soils can have a negative effect on vegetation growth, especially vegetation that is not native to Australia, and concrete footings can also be corroded by acidic soils.

Options for managing acidic soils include minimising the potential for environmental harm by the implementation of a sediment control plan to prevent acidic soils from entering waterways, or by removing the potential risk through treatment of the acidic soils with lime. The decision as to which of these two options to adopt depends on the need to implement a sediment control plan for the development, and/or the volumes of materials that may be excavated and treated with lime.

Treatment of acidic soils during construction activities with lime will increase the soil pH to within range of pH 6 - 7. A bulk density of 1.6t/m^3 has been assumed for the residual soils. Coffey's report advised that based on the Total Actual Acidity (TAA) results, the liming ratio requirements were assessed to be 7kg/m^3 of soil for acidic soils excavated.

Good quality fine agricultural lime should be used to treat the excavated soils. In calculating the liming ratios, a factor of safety of 1.5 has been allowed (as recommended in the ASSMAC guidelines) above the theoretical requirement to take into account the rate of lime reactivity and the possibility of inhomogeneous mixing.

Coffey's report concluded that without treatment with lime that the alluvial/colluvial and residual soils be considered as having a severe exposure classification in respect to aggressivity to buried structural elements. The recommendations indicated in AS2159-1995, with respect to concrete piles (Table 6.1 of that document) should be adopted for foundations at the site.

It is feasible that a less severe aggressivity classification for buried steel and concrete structural elements may be achieved through an additional test pit investigation conducted in addition to the previous ASS investigation. Coffey recommends that a field investigation be undertaken in both the Zone 1 and Zone 2 materials in Stage 1 as it is likely that the results may vary between the two zones. It is recommended that the field investigation should entail at least 6 test pits within both the Zone 1 and

4 FILL SUITABILITY ASSESSMENT

Earthworks for the development are proposed to comprise of cut and fill operations using site won materials from Stage 1 as fill for the subsequent stages of the development to raise land levels in low lying areas.

4.1 Unsuitable Materials

With regard to this site some materials might be unsuitable for forming structural fill and should be removed to spoil or used in non-critical areas in accordance with Australian Standard AS 3798-1996 *'Guidelines for Earthworks for Commercial and Residential Developments'*. Unsuitable materials may include:

- Organic soils, including any material containing topsoil, wood, peat or severely root-affected subsoils.
- Materials having hazardous chemical or physical properties requiring special measures for its excavation, handling, storage, transportation, or disposal.
- Cohesive soils having a liquid limit in excess of 90% or a plasticity index in excess of 65%.
- Silt, or materials that have deleterious engineering properties of silt.
- Fill that contains wood, metal, plastic, boulders or other delirious material, in sufficient proportions to affect the required performance of the fill.
- Materials with fragments with a diameter greater than two thirds of the loose layer thickness.

No material that is to be cut from the Zone 2 alluvial material (as outlined in Figure 1) is to be reused as fill given its potential for sulphidic acidification.

4.2 Suitable Full

The predominantly clay (cohesive) soils comprising the Zone 1 residual soils as well as the underlying weathered siltstone materials will be suitable for reuse as engineered fill with the exceptions specified in Section 4.1 above.

4.3 Site Preparation

Earthworks are to be carried out in accordance with AS3798-1996. The following general comments and recommendations are provided for site preparation beneath structures and pavements:

- Following excavation to design level, the exposed subgrade materials should be observed by a suitably qualified geotechnical practitioner, and proof rolled to help identify any wet, excessively deflecting or deleterious material. Any such areas should be over-excavated ad backfilled with engineered fill. All topsoil and existing fill should be initially stripped.
- Approved fill beneath roads should be placed in layers not exceeding 300mm loose thickness and be compacted to a minimum dry density ratio of 95% Standard Compaction. Clay fill should be placed and maintained at 60% to 90% of Standard optimum moisture content (OMC).
- The top 300mm of natural subgrade or subgrade fill below pavements should be compacted to a minimum dry density ratio of 100% Standard Compaction.

- All pavement materials should be placed and maintained at 60% to 90% of Standard OMC.
- Approved fill beneath structures should be placed in layers not exceeding 300mm loose thickness and be compacted to a minimum dry density ratio of 98% Standard Compaction. Clay fill should be placed and maintained at 60% to 90% of Standard OMC. All filling beneath structures should be carried out under Level 1 construction monitoring and testing as defined in AS3798-1996.

5 LIMITATIONS

The findings in this report are the result of observations made at discrete locations over a large area and observations of the surface conditions. Subsurface conditions may vary between investigation locations. Should different subsurface conditions to those expected be encountered during construction, Coffey should be contacted immediately.

We draw your attention to the attached sheets entitled “Important Information about your Coffey Report” which should be read in conjunction with this report.

For and on behalf of Coffey Geotechnics Pty Ltd

Andrew Ballard

Environmental Team Leader – Coffs Harbour

Figures

N

LEGEND

Approximate boundary of Zone 1 & Zone 2

Vertical Datum A.H.D.
Established From: PM 75647 (RL 16.80m)

PROJECT- Bore Hole Survey **CLIENT-** Winten Property Group

BORE HOLE LOCATIONS

SOURCE- R.D.M.

DWG. No. 05025/2 **SCALE-** Approx. 1:5000 at A3

0 100 200m

DATE- 19th August 2005

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COFFS HARBOUR NSW 2450
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CONSULTANTS IN ENGINEERING
TOWN PLANNING,SURVEYING &
ENVIRONMENTAL MANAGEMENT
RESOURCE DESIGN & MANAGEMENT

revision	description	drawn	approved	date

0 5 10 20 30
Horizontal Scale (metres)

0 5 10 20 30
Vertical Scale (metres)

drawn	**SK**
approved	
date	**18 March 2008**
scale	**1:5500**
original size	**A3**

coffey geotechnics
SPECIALISTS MANAGING THE EARTH

client: **Resource Design & Management**

project: **Proposed Subdivision, Pacific Highway, North Moonee Beach**

title: **Site Plan Showing Approximate Zone 1 & Zone 2 Boundary**

project no: **COFH01173AC-AB** figure no: **FIGURE 1**

coffey geotechnics
SPECIALISTS MANAGING THE EARTH

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.

coffey geotechnics
SPECIALISTS MANAGING THE EARTH

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.

ANNEX U

Stage 1 - Preliminary Investigation for Contamination

RESOURCE DESIGN & MANAGEMENT PTY LTD
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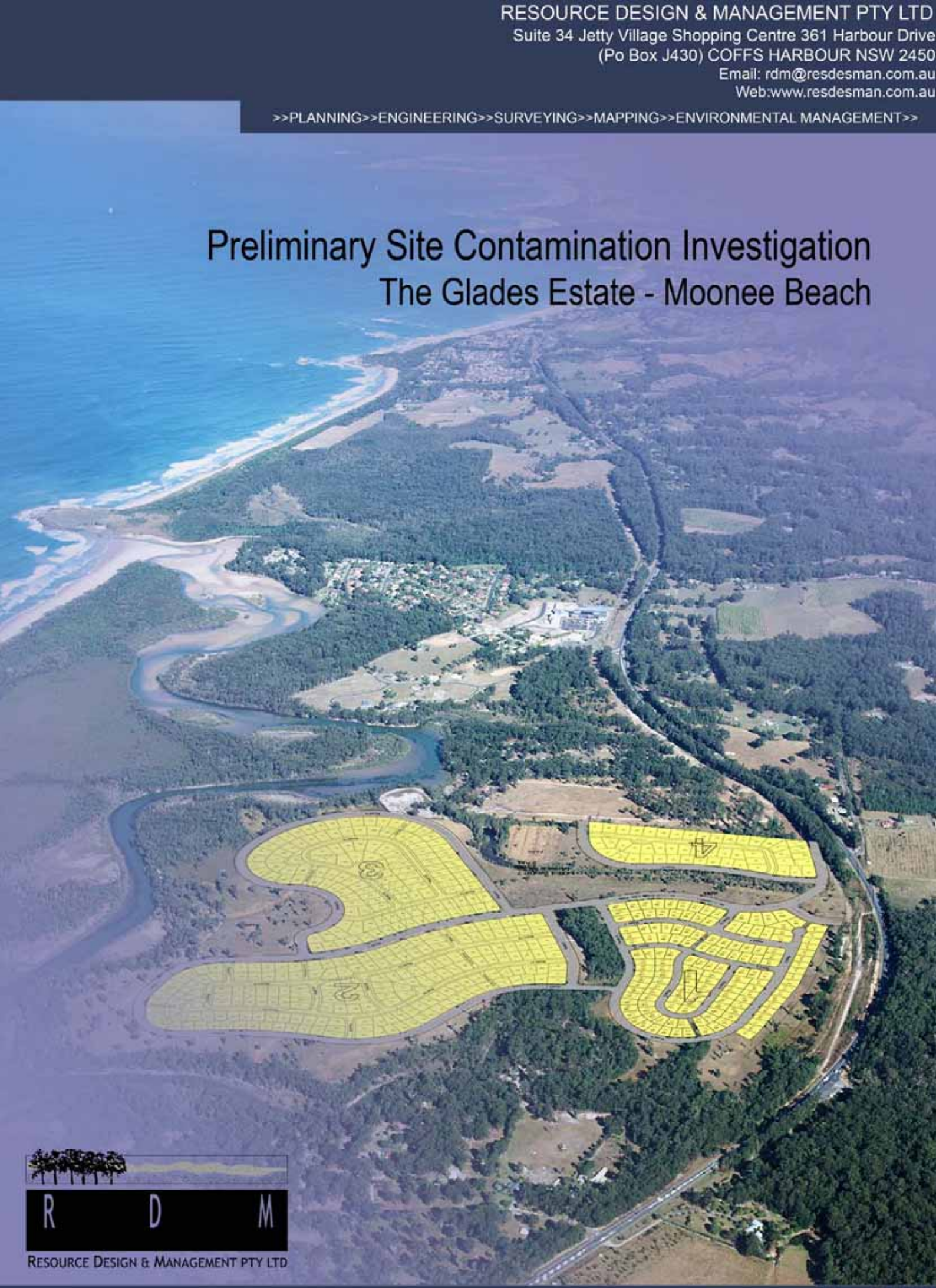
>>PLANNING>>ENGINEERING>>SURVEYING>>MAPPING>>ENVIRONMENTAL MANAGEMENT>>

Preliminary Site Contamination Investigation
The Glades Estate - Moonee Beach



R D M
RESOURCE DESIGN & MANAGEMENT PTY LTD

May 2008

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Report Appendices

1. Introduction

Resource Design and Management Pty Ltd (RDM) has been engaged by the Rothwell Boys Pty Ltd to prepare a Preliminary Site Contamination Investigation for the subject land identified as Lots 1 & 2 in DP 725785, otherwise described as *The Glades Estate*.

The following report completes an assessment of the subject land in accordance with the statutory requirements of State Environmental Planning Policy No 55 (Remediation of Land) and the document *Managing Land Contamination Planning Guidelines,* prepared by the Department of Urban Affairs and the Environment Protection Authority.

1.1 Site Details

Street Address:	Pacific Highway
Suburb:	Moonee
Real Property Description:	Lot 1& 2 in DP 725785
	Parish of Moonee, County of Fitzroy
Current Land Zoning:	Residential 2A Low Density;
	Environmental Protection 7A Habitat & Catchment;
	Environmental Protection 7B Scenic Buffer; and
	Open Space 6A Public Recreation.

1.2 Proposed Development

The subject land is intended to be developed into approximately 524 residential lots. The proposed development will be serviced by an internal public road network with direct access to the Pacific Highway. Pedestrian and cycle networks, residential allotments, and open space areas are key components of the proposed development.

A copy of Deposited Plan 725785 is attached as **Appendix A**, and a copy of the Project Plan is attached at **Appendix B**.

2. Statutory Considerations

2.1 State Environmental Planning Policy 55 – Remediation of Land

State Environmental Planning Policy No. 55 – Remediation of Land (SEPP 55) aims to promote the remediation of contaminated land for the purpose of reducing the risk of harm to human health and other aspects of the environment.

The policy states that land must not be developed if it is unsuitable for a proposed use, because it is contaminated. If the land is considered unsuitable, remediation must take place before the land may be developed.

The policy makes remediation permissible across the State, it defines when consent is required and clarifies the level of investigation which is required if contamination is suspected. Further, the policy requires that Council's are to be notified of all remediation proposals.

To assist consent authorities and land developers, the Department, in conjunction with the Environment Protection Authority, has prepared *Managing Land Contamination Planning Guidelines (the Guideline)*. The purpose of the Guideline is to establish 'best practice' for managing land contamination through the planning and development control process. The principles of the guidelines are;

- *To ensure that changes of land use will not increase the risk to health or the environment,*
- *To avoid inappropriate restrictions on land use, and*
- *To provide information to support decision making and to inform the community.*

The Guideline provides a checklist for consent authorities to undertake initial evaluations of possible contaminated lands and to detail past uses or activities that may have caused site contamination. These preliminary investigations have been undertaken in accordance with this checklist.

2.2 Coffs Harbour City Council – Contaminated Land Information Sheet

Coffs Harbour City Council introduced the Contaminated Land Information Sheet in 2000. The information sheet embraces the provisions of SEPP 55 by providing basic information outlining the process for considering land contamination issues.

3. Initial Evaluation

3.1 Site History

The subject land has a history of forestry previous to the 1980's. Since then, the site has been used for cattle grazing. The land was substantially cleared of forest vegetation in the mid 1990's following the issue of Development Consent 257/93 which approved the clearing and grazing of the land. In 1994, development consent was granted by Coffs Harbour City Council for a twelve lot community title subdivision; RDM understands that this development has been substantially commenced.

Research into the history of the site has identified that a small portion of the land was used for turf farming in the late 1980's; its location can be seen in the aerial photo attached at **Appendix C**, marked by contoured banks adjacent to the farm dam at the southern boundary.

3.2 Checklist for Initial Evaluation

The following section addresses the checklist for initial evaluation as per Section 3.2.1 of the Guideline. Whilst is acknowledged the checklist is intended to be used by a consent authority (to determine whether land contamination is relevant to the subject land), RDM believe it is equally relevant for the purpose of this report.

Accordingly, the following response is provided to those items described under Section 3.2.1.

- ***Is the planning authority aware of any previous investigations about contamination on the land? What were the results, including any previous initial evaluations?***

  Council's Environmental Officer, Mr Paul Shepard was contacted by RDM. Mr Shepard advised that Council was not aware of any previous investigations concerning contamination on the subject land.

- ***Do existing records held by the planning authority show that an activity listed in Table 1 has ever been approved on the subject land? (Table 1 contains agricultural/horticultural activities and sheep & cattle dips).***

  Development Consent 257/93 was approved by Council for clearing of the site and its use for cattle grazing. RDM having completed a site inspection and walkover of the subject land did not observe any infrastructure such as cattle yards or dips.

  RDM's inquiries have identified that a small portion of the land was used for turf farming in the late 1980's (as shown in **Appendix C**). Whilst Council's records do not indicate that approval was issued for such verbal confirmation was received by Mr Phil Sisson in this regard. Mr Sisson has been maintaining the land (slashing) for approximately twenty years, contracted by various owners of the land. Mr Sisson confirmed that the turf farm was restricted to the areas adjacent to the farm dam and operated approximately twenty years ago.

- ***Was the subject land at any time zoned for industrial, agricultural or defence purpose?***

  The site was previously zoned Rural 1A and used for grazing and forestry. A small area of the subject land site was also used for turf farming.

- ***Is the subject land currently used for an activity listed in Table 1?***

  No, the site is currently zoned Residential 2A

- ***To the planning authority's knowledge was, or is, the subject land regulated through licensing or other mechanism in relation to any activity listed in Table 1?***

  Yes, a development consent 257/93 was approved to use the land for grazing in 1993. No contamination is believed to have occurred due to this use. As previously stated, RDM having completed a site inspection and walkover of the subject land did not observe any infrastructure such as cattle yards or dips.

- ***Are there any land use restrictions on the subject land relating to possible contamination, such as notices issued by the EPA or other regulatory authority?***

  A search has been undertaken in the Public Register of Contaminated Land with no results found for this site. A copy of these results is included at **Appendix D**.

- ***Does a site inspection conducted by the planning authority suggest that the site may have been associated with any activities listed in Table 1?***

  RDM acknowledges that cattle grazing is considered to be an activity which is listed in Table 1. However, as previously stated a visual inspection and walkover on the subject land did not observe any structure that would have been associated with a contaminating activity such as a cattle dip site.

  It is also acknowledged that a turf farm operated on part of the subject land. This may also be considered as an activity which is listed in Table 1. RDM's inquiries conclude that this use has been discontinued for some time and that the extents of such were restricted to a relatively small portion of the subject land.

  Having considered the abovementioned activities, it is considered that further assessment would not be warranted on the following basis:-

  - Grazing of cattle on the subject land has been intermittent. There is no evidence of a cattle dip or any other structures that are associated with an activity which would cause contamination.
  - The use of the land for turf farming has been discontinued for a significant period of time. It is unlikely that materials associated with this use (such as fertilisers) would cause further concern.

- ***Is the planning authority aware of information concerning contamination impacts on land immediately adjacent to the subject land which could affect he subject land?***

  The adjoining land, south of the subject site contains a residential dwelling. A visual site inspection of the land from the common property boundary did identify any evidence of a cattle dip.

  Enquiries with Coffs Harbour City Council and a search of the Pubic Contamination Land Register have not uncovered any information regarding contamination.

  A review of land north and east of the subject site has not been completed because of its separation by Moonee and Skinners Creeks. Similarly a review of the land to the west has not been completed because of its separation by the Pacific Highway.

4. Conclusion

This preliminary site contamination investigation has been completed in accordance with the Managing Land Contamination Planning Guidelines checklist for initial evaluation. On the basis of the type of activities occurring on the subject land, RDM considers that further investigation is not required.

Appendix A

Deposited Plan 725785

LT2/16

L.O. 88

PLAN OF THE RESIDUE OF PORTIONS 265 AND 292 AFTER ROAD ACTION

D. P. 725785

Registered: 12/11/1987

C.A.:

Title System: TORRENS

Purpose: DEPARTMENTAL

Ref. Map: Y09577-8

Last Plan:

~~Town~~/Shire/~~City~~: COFFS HARBOUR

Town or Locality:

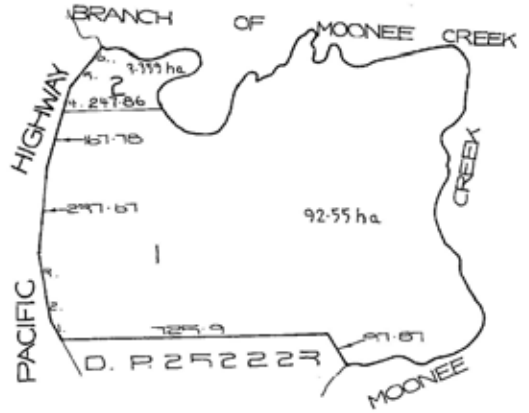
Parish: MOONEE

County: FITZROY

Reduction Ratio 1:100

Lengths are in metres

1002 DIB



REFERENCE

1.	63·87	4.	71·29
2.	70·95	5.	94·09
3.	119·99	6.	4·025

This negative is a photograph made as a permanent record of a document in the custody of the Registrar General this day. 13th November, 1987

10 20 30 40 50 60 70 Table of mm 110 120 130 140

Appendix B

Project Plan

Stage	No of Lots
1	62
2	40
3	47
4	47
5	51
6	61
7	48
8	48
9	50
10	42
11	28
TOTAL	**524**

Source: AUSPACIFIC Engineers Pty Ltd P1 04 - 1600 Amended May 2008

ERM

0 100m
Approximate Only

Annex C **Project Plan**

The Glades Estate, Coffs Harbour- Preferred Project Report

Appendix C

Aerial Photo

Source:AUSPACIFIC Engineers Pty Ltd 06-1811 July 2006

ERM

0 100m
Approximate Only

Figure 1.5 **Aerial Photograph**

The Glades Estate, Coffs Harbour

Appendix D

Search Results from Public Contamination Lands Register

Department of Environment and Climate Change

Management overview
Site auditor scheme
Guidelines under the CLM Act
Record of EPA notices
Engaging a consultant
Information on gasworks sites
Regulatory Impact Statement - Proposed Underground Petroleum Storage Systems Regulation
Frequently asked questions
More information about land

Search results

Your search for: LGA: Coffs Harbour City Council

Matched 9 notices relating to 4 sites.

SearchAgain RefineSearch

Suburb	Address	Site Name	Notices related to this site
Coffs Harbour	136 Pacific Highway	BP Service Station	1 current
Coffs Harbour	near General Aviation Drive	Mobil Fuel Depot (Airport)	1 former
Coffs Harbour	316 High Street	Mobil Service Station	2 current and 2 former
Coramba	5 Martin Street	5 Martin Street, Coramba	3 current

Page 1 of 1

Print-friendly version

7 March 2008

ANNEX V

Acid Sulphate Soil and Groundwater Management Plan

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agriculture · water · environment

Acid Sulfate Soil and Groundwater Management Plan, Moonee Glades Residential Development Moonee Beach, New South Wales

Prepared for
The Rothwell Boys Pty Ltd

August 2008

Document control

Document:	GJ0638-1.ASS&GWMP.RJT1.doc	Gilbert & Sutherland P/L ABN 56 077 310 840 Originating Office: Robina Eastside 5/232 Robina Town Centre Drive, Q4230 PO Box 4115, Robina Q4230 Telephone 07 5578 9944 Facsimile 07 5578 9945 gsrobina@groupgs.com Also at Kawana and Brisbane
Title:	Acid Sulfate Soil and Groundwater Management Plan, Moonee Glades Residential Development, Moonee Beach, New South Wales	
Project Manager:	Nathan Zurig	
Author:	Nathan Zurig	
Client:	The Rothwell Boys Pty Ltd	
Client Contact:	Dale Holt	
Client Reference:	Moonee Glades Acid Sulfate Soil & Groundwater Management Plan	
Synopsis:	This management plan establishes responsibilities and procedures for the management of acid sulfate soils and groundwater during the proposed development of the Moonee Glades residential estate.	

Revision History

Revision #	Date	Edition By		Approved By	
1	31.07.08	Nathan Zurig		Nathan Zurig	Lindsay Varcoe
2	6.08.08	Nathan Zurig		Nathan Zurig	Lindsay Varcoe
3	8.08.08	Nathan Zurig		Nathan Zurig	Lindsay Varcoe
4	26.08.08	Nathan Zurig		Nathan Zurig	Lindsay Varcoe
5	15.09.08	Nathan Zurig		Nathan Zurig	

Distribution

	Revision Number									
Distribution	1	2	3	4	5	6	7	8	9	10
The Rothwell Boys Pty Ltd	1	1	1	1	1					
Auspacific Engineers	1	1	1	1	1					
Gilbert & Sutherland library and file	1	1	2	2	2					

Summary

Gilbert & Sutherland (G&S) was commissioned by The Rothwell Boys Pty Ltd to undertake a review of existing acid sulfate soil assessments and groundwater monitoring for the proposed Moonee Glades Residential Development at Moonee Beach, New South Wales (NSW). On the basis of this review G&S has prepared this Acid Sulfate Soil and Groundwater Management Plan (ASS&GWMP).

The ASS&GWMP has been prepared to address the Director General's Environmental Assessment Requirements (DGRs) and issues raised by Coffs Harbour City Council and other statutory authorities in response to the public exhibition of the Environmental Assessment for the Project Application for the proposed development.

Acid sulfate soils (ASS) are identified as a low risk in ASS mapping covering the site and the areas most likely to be affected by ASS occur largely outside the development footprint. Previous investigations confirm this to be the case and only low level PASS has been identified.

Though not recommended at the project application stage, further investigation in the low lying areas will nonetheless be undertaken. Sufficient information is available to indicate that ASS are not a significant constraint to the proposed development and thus to support approval of the project application. ASS are manageable and this management plan describes appropriate measures for the management of material likely to be disturbed under the project application.

Provided any further investigations required are undertaken prior to the issue of a construction certificate, and if ASS is encountered it is managed in accordance with the attached management plan, it is unlikely that adverse environmental impacts would arise.

Preliminary investigations have been undertaken into the groundwater hydrology of the site and have determined that unconfined, permanent groundwater is present on the low lying alluvial plains of the site. Recommendations to identify and manage any impacts from the development are included herein.

This ASS & GWMP outlines the requirements for further investigation, monitoring and management and represents a basis for the management of ASS and groundwater prior to and during the development of the site.

It is considered that the constraints associated with the presence of ASS and groundwater do not constitute an impediment to development in accordance with the project application and can be effectively managed through the implementation of the ASS&GWMP.

Table of contents

1) Introduction

Gilbert & Sutherland (G&S) was commissioned by The Rothwell Boys Pty Ltd to undertake a desktop review of existing acid sulfate soil assessments and groundwater monitoring for the proposed Moonee Glades Residential development at Moonee Beach, New South Wales (NSW). The ASS&GWMP is based on the findings of G&S's desktop review of acid sulfate soil mapping, geotechnical and acid sulfate soils investigations and groundwater monitoring conducted by others.

This ASS&GWMP is prepared in support of a Project Application for a State Significant Development, currently being assessed by the NSW Department of Planning. The proposed plan of development for Moonee Glades is illustrated in the attached drawing (Auspacific Engineers Drawing No. 04-1600 P1-D).

The report addresses the issues relevant to the Director General of the Department of Planning's Environmental Assessment Requirements (DGRs), specifically in regard to the minimisation of impacts from the disturbance of acid sulfate soils and to the existing groundwater regime.

1.1 Scope of report

This report provides a summary of the available information pertaining to acid sulfate soils and groundwater at the site. An ASS&GWMP has been prepared detailing the requirements for further investigation, management and monitoring of these issues prior to and during the proposed development. This report addresses the following October 19, 2006 DGRs:

Part A:

'4.1 Address potential impacts on the water quality of surface and groundwater'

5.4 Identify the presence and extent of acid sulfate soils on the site and appropriate mitigation measures.

Part B :

7.1 Address impacts of earthworks and filling on the existing hydrology and water quality,...and the management of acid sulfate soils...

Following public display of the Environmental Assessment in November and December 2007, the Director General has requested a response to issues raised in submissions to the Department of Planning. These issues include:

- Justification is required for development in areas of high water table, which have been excluded from development under the Moonee Development Control Plan (DCP). The Moonee DCP excludes development in areas of high groundwater table if there are likely to be adverse impacts to groundwater quality.
- An acid sulfate soil management plan is required for the Project Application.
- Coffs Harbour City Council (CHCC) has indicated that further assessment of acid sulfate soils needs to be undertaken to address the construction of any services through the low lying areas of the site.
- The Department of Environment and Climate Change requires management of any acid sulfate soils encountered during the subdivision works, in accordance with the ASSMAC Manual and CHCC's Acid Sulfate Soils Management Plan. It is indicated that a groundwater management plan may be required if groundwater would be intersected during works.
- The Department of Water and Energy (DWE) is satisfied that there is no major groundwater resource under the site and is only concerned with the potential impacts of groundwater hydrology on acid sulfate soils. DWE recommends the monitoring of a network of piezometers so that any impacts to groundwater level can be detected.

DWE recommends that sampling and assessment for acid sulfate soils be incorporated into the Construction Environmental Management Plan, including management options for ASS if encountered.

This management plan seeks to address these further issues as required under the *Environmental Planning and Assessment Act 1979*.

Stage	No of Lots
1	62
2	40
3	47
4	47
5	51
6	61
7	48
8	48
9	50
10	42
11	28
TOTAL	**524**

amendment	date	
D	MAY 08	TOTAL SITE APPLICATION
C	APRIL 08	ENTRY AMENDED
B	OCT 07	DRAWING TITLE AMENDMENT
A	SEPT 07	CONCEPT PLAN & PRECINCT NOTED

DISCLAIMER: This is a preliminary concept plan prepared by Auspacific Engineers Pty Ltd ("the consultant").

PRELIMINARY LOT LAYOUT

AUSPACIFIC ENGINEERS

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scales: AS SHOWN
design: RKH
drawn: JM
date: NOV 2006

client: THE ROTHWELL BOYS PTY LTD

project: PROPOSED RESIDENTIAL SUBDIVISION
MOONEE BEACH COFFS HARBOUR

04-1600

drawing: P1
amendment: D

2) Background

2.1 Acid Sulfate Soils

2.1.1 ASS Mapping

The Dorrigo-Coffs Harbour 1:250,000 Geological Map indicates that the site is on the boundary of the Coramba Beds comprising mudstone, siltstone, chertz and quartz and Quaternary Alluvium comprising undifferentiated fine grained alluvial sands and swamp deposits.

The Department of Environment and Climate Change (DECC) Acid Sulfate Soil Risk Map covering the site indicates no known risk of acid sulfate soils on the residual soils overlying the Coramba geology on the ridges of the site. The ASS risk on the alluvial flats is mapped as 'low risk'. Occurrences are possible between 1 and 3m below surface with potential occurrence likely to be deeper, further from the creek. The ASS Risk Map is shown in Drawing No. GJ0793.1.

It is notable that the majority of the development footprint is over the area mapped as 'no known acid sulfate soil risk'. Almost all of Stages 1, 2, 3, 4, 7, 8, 10 and 11 are within no risk areas. Significant portions of stages 5, 6 and 9 are situated in areas mapped as low risk, with potential localised occurrences. However, these areas are to be filled with up to 3m of engineered fill. Therefore, even if there are localised occurrences, the likelihood of disturbance during the development of these areas is minor and would be limited to relatively small volumes associated with the provision of deep underground services.

2.1.2 Previous investigations

Previous investigations of the geotechnical properties of soils have been undertaken by Coffey Geotechnics, which included a preliminary assessment of the nature and distribution of Acid Sulfate Soils (ASS) at the site. The most complete and comprehensive of Coffey's reports was the December 16, 2005 –*Geotechnical Assessment*[1] which included a preliminary acid sulfate soils assessment and management plan. This report identified two broad geological zones including:

Zone 1 – Topsoil overlying residual soils and weathered rock.
Zone 2 – Topsoil overlying alluvial soils of variable depth, with residual soils underlying the alluvial soils.

These zones are illustrated in Drawing No.GJ0793.2.

The acid sulfate soil assessment was limited to screening tests and limited laboratory analysis of alluvial soils within Zone 2 as this area was the most likely to contain acid sulfate soils, according to the risk mapping.

Coffey's investigation identified low level acid sulfate soils in one of the test pits. It was recommended that further testing be undertaken within the Zone 2 soils which would be disturbed during the development of the site.

Coffey Geotechnic undertook a detailed investigation into the proposed alignment of the main access road in Stage 1 in June 2007.[2]

This assessment involved a more detailed investigation into the road alignment through Zone 2 soils. Five test pits were constructed for this investigation, with another test pit from a previous investigation also used for the assessment.

Oxidisable sulfur ($\%S_{Cr}$) was not identified in any of the test pits however the action criteria was triggered in two locations by the Titratable Peroxide Acidity (TPA). One of these results was triggered by existing acidity and the other showed a false positive result for TPA (based on the %S) which was considered to be due to the presence of organic material.

The assessment concluded that the soils along the road alignment were unlikely to be Acid Sulfate Soils and that the results reflected organic acidity.

[1] Coffey Geosciences. December 16, 2005. *Geotechnical Assessment - Proposed Subdivision at North Moonee Beach, Pacific Highway, Moonee Beach NSW* prepared for Resource Design and Management.

[2] Coffey Geotechnics. July 17, 2007. *Acid Sulfate Soils Assessment for Residential Subdivision – Lot 1 DP725785 Pacific Highway Moonee Beach NSW* prepared for Resource Design and Management.

2.1.3 Potential impacts

Based on the ASS Risk mapping, the development footprint and the results of preliminary acid sulfate soil assessments conducted by Coffey Geotechnics it is considered that if acid sulfate soils are disturbed, the scale of the disturbance relative to the proposed earthworks will be relatively minor.

Provided further investigations are undertaken in those areas considered to have some likelihood of the presence of ASS, as described in this ASS&GWMP, it is considered that potential impacts from the disturbance of ASS will be minimised.

Similarly, where ASS are identified and do need to be disturbed to facilitate the development of the site, provided they are managed in accordance with this ASS&GWMP, detrimental impacts to the surrounding environment will be minimised or avoided entirely.

2.1.4 Further investigation

The soils within Zone 2 which are likely to be disturbed during the construction phase of Stages 1, 2 and 3 have been identified to a sufficient level of detail to allow the planning of management strategies to be applied during the disturbance of this material.

The recommended strategies to be applied during site disturbance are detailed in the management tables of this ASS&GWMP.

Further investigation of the Zone 2 soils mapped as having potential localised occurrences of ASS would be required prior to the commencement of earthworks in stages 4 - 11. Detailed investigation would be undertaken along the alignment of any excavation which would result in the disturbance of the existing alluvial soils.

These investigations and the future management of any acid sulfate soils would be undertaken in accordance with the ASSMAC Guidelines, and this ASS&GWMP.

2.2 Groundwater

2.2.1 Previous investigations

Groundwater was noted in test pits in Coffey's 2005 Geotechnical Assessment and was considered to occur as an ephemeral perched layer overlying the Zone 1 soils. It was considered that the groundwater in the Zone 2 alluvial soils was unconfined, but permanent in nature.

Coffey Geotechnics installed a series of six groundwater piezometers on April 5, 2004 within the Zone 2 alluvial soils.

Borehole locations are shown in the attached Drawing No. GJ0793.2.

Bimonthly monitoring was conducted for groundwater level over a 12-month period commencing in May 2005.

Coffey's noted that the groundwater levels varied by as much as 1.65m across the site, on a single monitoring occasion. Water levels varied at each site, but typically $\pm$0.5m over the 12 month monitoring period.

All bores respond significantly and rapidly to rainfall reflecting the unconfined nature of the aquifer.

2.2.2 Potential impacts

The increase in impermeable areas across the developed portion of the site will result in a net decrease in the infiltration of rainfall to the soil. Stormwater collected from hardstand areas will be directed to vegetated swales and bioinfiltration trenches for water quality treatment prior to infiltration into the ground or in larger events, runoff from the site.

There is expected to be a net decrease in the volume of infiltration to groundwater across the developed portion of the site. However the volume of groundwater recharge from this area, given the low permeability of these soils and the relatively small catchment size, is expected to be relatively minor in its natural state. Under the developed case a proportion of the collected stormwater will be infiltrated back into the Zone 2 soils, compensating for some of the losses from the developed area.

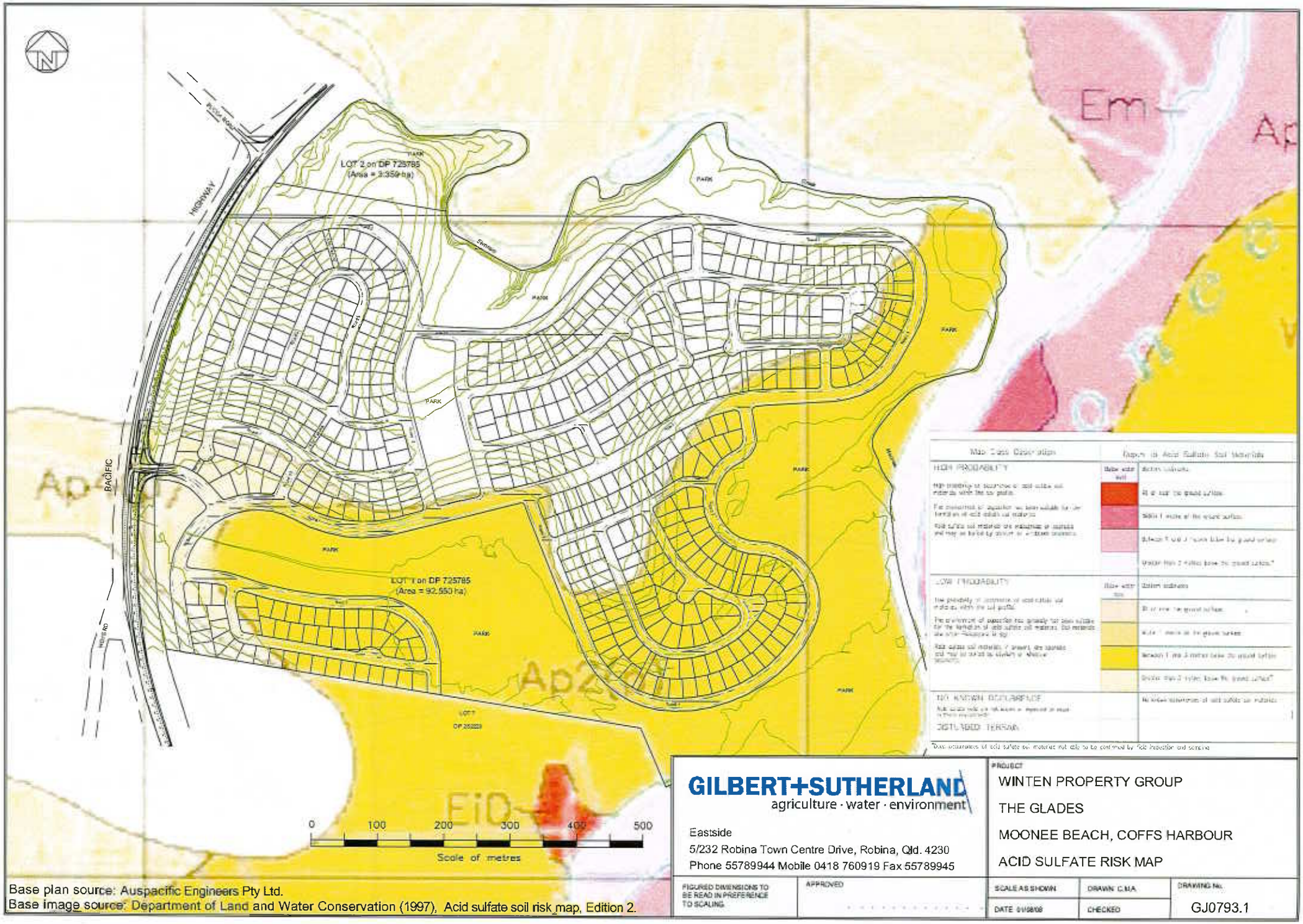
Monitoring will be undertaken to confirm there is no significant change to the groundwater hydrology, ensuring there is no drawdown exposing acid sulfate soils.

2.2.3 Further investigation

As CHCC's Moonee DCP precludes development of parts of the site, should adverse impacts to groundwater quality be likely, it is recommended that further monitoring be undertaken, including the collection of groundwater samples and analysis to determine the existing quality of groundwater in the area.

Similarly, the DWE is concerned that levels may impact on ASS or the existing groundwater dependent habitat in the low lying areas. As such, level monitoring would continue.

The commitments for background and construction phase groundwater monitoring are detailed in the management tables in Section 4 of this ASS&GWMP.



Base plan source: Auspacific Engineers Pty Ltd.
Base image source: Department of Land and Water Conservation (1997), Acid sulfate soil risk map, Edition 2.

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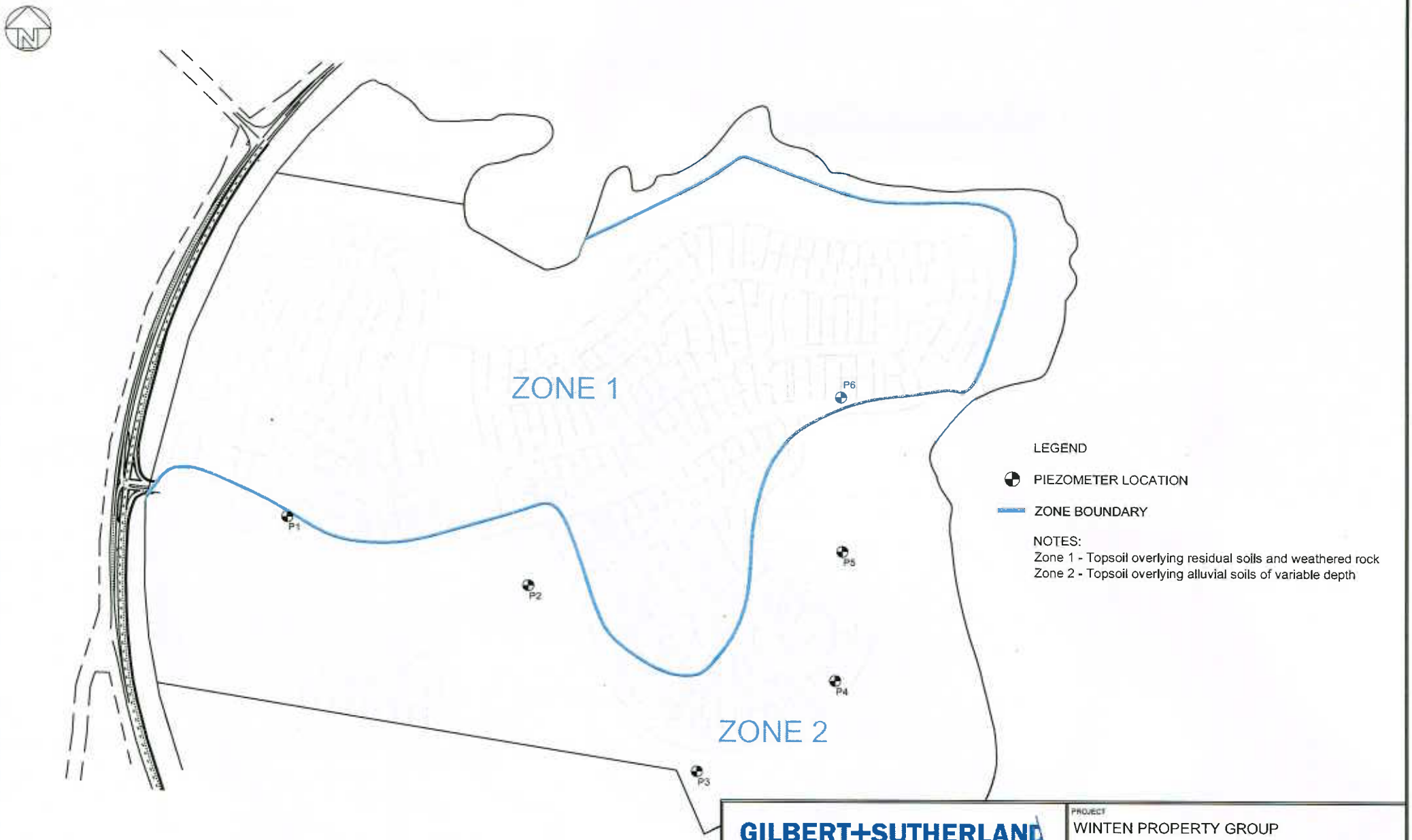
PROJECT
WINTEN PROPERTY GROUP
THE GLADES
MOONEE BEACH, COFFS HARBOUR
ACID SULFATE RISK MAP

FIGURED DIMENSIONS TO BE READ IN PREFERENCE TO SCALING	APPROVED	SCALE AS SHOWN	DRAWN C.M.A.	DRAWING No.
		DATE 01/08/08	CHECKED	GJ0793.1



Base plan source: Auspacific Engineers Pty Ltd.

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PROJECT
WINTEN PROPERTY GROUP
THE GLADES
MOONEE BEACH, COFFS HARBOUR
SOIL ZONES & PIEZOMETER LOCATIONS - AFTER COFFEY

FIGURED DIMENSIONS TO BE READ IN PREFERENCE TO SCALING.	APPROVED	SCALE AS SHOWN	DRAWN C.M.A.	DRAWING No.
		DATE 01/08/08	CHECKED	GJ0793.2

3) Acid Sulfate Soil and Groundwater Management Plan

The acid sulfate soil risk mapping and investigations conducted by others have identified that Acid Sulfate Soil (ASS) materials potentially occur in the low lying portions of the site.

Recent detailed investigations conducted for the access road alignment in Stage 1 determined that material which exceed the action criteria for acid sulfate soils are present. Although, it was determined that this potential acidity was likely to be due to organic material, given the nature of this material it is prudent to provide a procedure for its management, if disturbed. This ASS&GWMP details the specific procedure for the treatment of soils from Stages 1, 2 and 3. Generic measures for the treatment of soils from Stages 4 – 11 are provided and these should be refined on the basis of more detailed investigation to be conducted prior to earthworks.

This acid sulfate soil and groundwater management plan is prepared to comply with the Acid Sulfate Soils Management Advisory Committee (ASSMAC) Guidelines.[3]

The provisions proposed within this ASS&GWMP for the further investigation, identification, treatment, monitoring and overall management of the site reflect best practice management of acid sulfate soils.

3.1 ASS&GWMP structure

This ASS&GWMP acknowledges the potential environmental impacts associated with the possible future disturbance of Acid Sulfate Soils (ASS) at Moonee Glades and details strategies to mitigate them. It contains provisions for further monitoring of groundwater to characterise baseline conditions against which the groundwater quality and hydraulic regime may be compared to ensure any impacts are identified and managed.

Each control strategy is based on proven environmental management methods and is presented as a commitment. The commitments made within this document will form the basis of future assessments, which will be made available to CHCC for review.

The ASS&GWMP is based on a series of tables for use prior to and during the earthworks and construction phase of the proposed development. The person responsible for the implementation of the measures detailed is written on the table itself. The tables then detail the issue, the performance criteria, the implementation strategy, monitoring, auditing, reporting, failure identification and the corrective action. The detachable pages within each section detail the provisions of the ASS&GWMP.

An objective of the tabular format is to allow for change and allow the ASS&GWMP to be a working document. If items need altering, changes may be made to the individual tables after appropriate consultation with the statutory authorities. The format is presented on the following page for reference purposes.

[3] Acid Sulfate Soils Management Advisory Committee (ASSMAC), 1998. *Acid Sulfate Soil Manual*. NSW Agriculture, Wollongbar NSW.

Title #

Person responsible	This is the person who has accepted the responsibility of implementing the ASS&GWMP provisions detailed on this page.

Issue	The issue with which the table deals.
Operational policy	The operational policy or management objective that applies to the element.
Performance criteria	Performance criteria (outcomes) for each element of the operation.
Implementation strategy	The strategies or tasks (to nominated operational design standards) that will be implemented to achieve the performance criteria.
Monitoring	The monitoring requirements which will measure actual performance (i.e. specified limits to pre-selected indicators of change).
Auditing	The auditing requirements, which will verify implementation of, agreed construction and operation phase environmental management strategies and compliance with agreed performance criteria.
Reporting	Content, timing and responsibility for reporting and auditing of monitoring results.
Identification of incident or failure	The circumstances under which the agreed performance criteria are unlikely to be met and environmental harm is likely to result.
Corrective action	The action to be implemented in case a performance requirement is not reached and the company(s) responsible for action.

Commitment #

What management has committed the company to.

3.2 General commitments

Commitment 1

The Proponent undertakes to comply with the environmental implementation strategy as contained within the approved Acid Sulfate and Groundwater Management Plan (ASS&GWMP).

Commitment 2

The Proponent undertakes to fulfil all commitments made in this ASS&GWMP and to carry out their activities on the project site in accordance with relevant current statutory requirements and approved amendments.

3.3 Definitions

In this ASS&GWMP the terms have the following meanings;

ASS&GWMP means the approved Acid Sulfate Soil and Groundwater Management Plan and includes any amendments that may be approved from time to time.

POEO Act means *Protection of* the *Environment Operations Act 1997.*

DoP means the NSW Department of Planning

Development means the development of the site for residential purposes generally as detailed by the plan of development.

DECC means the Department of Environment and Climate Change, NSW.

CHCC means Coffs Harbour City Council.

ASSMAC means the Acid Sulfate Soils Management Advisory Committee.

Proponent means the person undertaking the development of the land and includes the person nominated as having the responsibility for implementing the provisions of the ASS&GWMP.

4) Management of potential impacts

4.1 Acid sulfate soil identification

Person responsible	Site Manager / Environmental Consultant

Issue	Acid sulfate soil identification.
Operational policy	Identify actual and potential acid sulfate soils (AASS & PASS) and determine their acid producing potential and liming requirement prior to treatment.
Performance criteria	All ASS & PASS are appropriately identified prior to treatment.
Implementation strategy	**Stages 1, 2 & 3** The alignment of the main access road through Zone 2 soils has been investigated by Coffey Geotechnics and is described in their report of July 17, 2007. The nature of the soils has been described in this report. If following detailed design it becomes evident that excavation will be required into the natural soils and beyond the depth of Coffey's investigation, further investigation must be undertaken in accordance with the stages 4 - 11 requirements below. **Stages 4 - 11** All soils to be excavated from below the current surface level of the site for the provision of services (stormwater, sewerage, water, etc) will be investigated, prior to the issue of a construction certificate, according to the following protocol. **Frequency** - Boreholes will be drilled along the alignment of any proposed trenching at a maximum spacing of every 100m. Samples will be collected from every soil horizon, or at least every 0.5m to the depth of drilling, which shall extend to at least 0.5m below the maximum depth of excavation. All samples shall be screened for field pH and field oxidation pH. At least one sample from every 0.5m will be laboratory analysed for Chromium Reducible Sulfur (CRS) (or equivalent method) and Titratable Actual Acidity (TAA) in accordance with the ASSMAC guidelines. **Sample size** - Soil samples of approximately 0.3kg each are to be collected from each soil horizon with a soil profile description recorded. **Sampling** - Soil samples to be tested on site or collected in sealed containers or plastic geological sampling bags that exclude air. **Handling and storage** – Samples are to be sent to laboratory or dried within 24 hours.
Monitoring	Laboratory analysis will employ the CRS/TAA Methods (or equivalent) as per the ASSMAC Guidelines.
Reporting	Analytical results will be provided to the environmental consultant who shall provide an assessment of the results and prepare an Acid Sulfate Soil Management plan for each stage, nominating specific management procedures and liming rates for the various areas of disturbance.
Corrective action	Ensure sufficient sampling and analysis of all soils to be excavated. Adjust sampling rates as necessary with consent from CHCC.

Commitment 3

All soils excavated from below the current surface level will be tested for the presence of AASS and PASS prior to any works on site to determine appropriate liming rates.

4.2 Acid sulfate soil treatment

Person responsible	Site Manager

Issue	Acid sulfate soil assessment and treatment.
Operational policy	Excavated ASS will be treated to neutralise their acid generating potential (AGP).
Performance criteria	No material will be reburied without appropriate treatment to neutralise the AGP.

Implementation strategy	Treatment of all soil excavated from below natural surface within the Zone 2 alluvial soils is to be conducted in accordance with the provisions below.
	
	Stages 1, 2 & 3
	
	The alignment of the main access road through Zone 2 soils has been investigated by Coffey Geotechnics and is described in their report of July 17, 2007.
	
	The maximum liming rate determined by Coffey for the material to be disturbed, was 6.4kg/m^3.
	
	• Where natural surface is less than 5m AHD, any material excavated from below natural surface during the construction of trenches will be limed at a rate of 6.4kg/m^3, prior to backfilling.
	
	Stages 4 - 11
	
	Soils requiring treatment based on sample testing described in Table 4.1 above will be treated with lime or neutralising agent to neutralise their equivalent acid generating potential. Due to the organic nature of the soils and the likelihood of false positive results, acid generating potential shall be calculated on the basis of the sum of the Titratable Actual Acidity (TAA) and the acid equivalent oxidisable sulfur (a-S_{Cr}%) as determined by CRS analysis. In calculating the amount of lime or neutralising agent to be added, a mixing factor of safety of 1.5 will be used. If it can be demonstrated that this safety factor is not needed, this may be reduced with the written agreement of CHCC.
	
	• Any material excavated from below natural surface during the construction of trenches will be limed at the pre-determined liming rate prior to backfilling. The liming rate will be based on the highest Acid Generating Potential determined for each length of trench.
	
	Should acid sulfate soils requiring more than 40kg/m^3 lime treatment be encountered, these soils will transported to a dedicated treatment area and treated in accordance with the following requirements. If this is necessary and dewatering is being undertaken, backfilling of trenches should be undertaken using clean fill or treated and validated material, to minimise unnecessary and prolonged dewatering.
	
	• Excavated material will be placed within bunded fill areas. Bunded treatment areas should be situated taking into account the following considerations:
	  • treatment pads are not to be located on public land
	  • treatment pads are to be protected from upslope surface flows
	  • sediment filters should be provided downslope of treatment areas.
	
	• Material will be placed to a depth of <300mm and limed at the rate indicated by soil testing performed during excavation. Lime is to be mixed through the material to a minimum depth of 300mm with a rotary hoe or disc plough.
	
	• Subsequent fill layers (<300mm) will not be placed within the treatment pad (fill area) until validation results are obtained, indicating the complete neutralisation of the treated material.
	
	• Materials used to construct bunds will be free from acid sulfate soils with the bunded area prepared with surface lime at a rate of 5kg/m^2 of material to be placed.

Monitoring	Validation testing will be performed by assessing oxidisable sulfur (or equivalent method) sampled at the rate of one sample per 100m of trench or per 500m³ of treated material. Lime delivery dockets are to be retained and made available to the auditor. These dockets will be compared with required lime amounts (as per calculated liming rates) as an indication as to whether liming has occurred at the specified rates.
Auditing	Auditing will be undertaken by the site manager and/or the proponent's nominated representative. Alternatively, auditing may be carried out by an independent consultant. The audit should include an inspection of site activities, complaints, corrective actions and reporting to assess compliance with the provisions outlined within the ASS&GWMP.
Reporting of monitoring results	All validation testing results are to be reported to the site manager. Records are to be kept on site and should be available for inspection at all times. Records are to be sent to CHCC and/or DECC as required.
Identification of incident or failure	Failure of samples subjected to validation testing. Examination of works for evidence of: • yellow efflorescence on soil surface • iron staining of soils or water • sulphurous odour • low pH in water bodies.
Corrective action	• Retesting of materials using CRS/TAA method (or equivalent). • Any need for additional lime should be managed in accordance with the implementation strategies stated above. • If unforeseen environmental impacts occur due to excavation of acid sulfate soils (eg. fish kill) work should cease and CHCC should be contacted.

Commitment 4

All AASS and PASS material shall be managed in accordance with the above provisions and the ASSMAC guidelines.

4.3 Surface water quality management

Person responsible	Contractor's Site Manager

Issue

Surface water quality in the receiving environments surrounding the site including Moonee and Skinners Creeks will not be adversely impacted upon by site operations.

Operational policy

No adverse impact to the receiving environment shall result from runoff from the site.

Performance criteria

Surface water quality in the receiving waters will not be adversely impacted by the development of the site. Where practicable, surface water quality in the receiving environment will be evaluated against the ANZECC (2000) guideline limits for the protection of aquatic ecosystems and/or background levels established for that site.

Any surface water discharged from the site during the construction phase shall comply with the following release criteria:

Water quality parameter	Release criteria	Criteria type
pH	6.5 – 9.0	Range
Turbidity	<60NTU	Maximum
Electrical conductivity	1500µS/cm	Maximum

Where release from sedimentation ponds or ASS treatment areas is required, this will preferentially be achieved via irrigation to land following confirmation of the above water quality.

Implementation strategy

1. In situ surface water samples are to be collected during rainfall events from established monitoring points at site outlets.
2. When constructed, surface water quality monitoring shall be undertaken within sedimentation basins for pH, EC and turbidity prior to any intentional release.
3. Existing surface water conditions shall be maintained outside the construction area.
4. When constructed, surface water flows will be directed towards the nearest sedimentation basin. Sediment and erosion control measures will be installed as detailed in Table 4.6.
5. Stormwater control should be achieved by directing as much runoff as practicable from disturbed areas to the temporary control measures. "Clean" runoff from undisturbed areas should be diverted around the disturbed areas if possible.
6. Reliable *in situ* monitoring equipment will be used for all monitoring. This equipment will be calibrated prior to each round of monitoring.
7. Monitoring results should be reviewed after 6 months and sampling frequency revised in consultation with Council officers.

Monitoring

- Surface water monitoring during construction should be conducted at the monitoring points for the parameters shown above. Sampling frequency shall be during rainfall events (>25mm in 24 hours).
- Surface water quality monitoring within any sedimentation/detention basin for pH, EC and turbidity to be conducted prior to any intentional release of waters.
- Daily rainfall to be recorded by the civil contractor.

Auditing

Auditing will be undertaken by the site manager and/or the proponent's nominated representative.

Alternatively, auditing may be carried out by an independent consultant during the construction phase of the development. The audit should include an inspection of site activities, complaints, corrective actions and reporting to assess compliance with the ASS&GWMP.

Reporting of monitoring results

- Water quality monitoring reports to be submitted to CHCC on a monthly basis and include raw data, a results summary and a discussion comparing results with baseline values and the ANZECC guidelines
- Results sheets to be compiled for monitoring results.
- All results to be kept on site for inspection by local and state government officers at all times.

Identification of incident or failure

- Intentional discharge of waters from basins without appropriate testing to ensure the above water quality criteria are met.
- Deterioration in surface water quality downstream of the development resulting from site works.

Corrective action	• Take necessary steps to address the problem to prevent a recurrence. • Addition of agents such as sodium hydroxide (caustic soda), magnesium hydroxide (magnesia), sodium bicarbonate, calcium bicarbonate (limestone) or calcium hydroxide (lime water) to contained waters as required to maintain the pH within the recommended range. • Addition of gypsum to contained waters as required to reduce suspended solids concentrations. • Discharge from any contained waters will not be allowed until the water quality criteria are reached.

Commitment 5

Management will ensure that any surface water discharged off site is acceptable under the ANZECC (2000) water quality criteria and/or background levels established for that site prior to release from the site.

4.4 Background groundwater monitoring

Person Responsible	Environmental Consultant
Issue	To determine the existing groundwater conditions at the site (levels and quality) and examine any natural seasonal variations. This would serve as 'baseline' data and allow comparison with groundwater level and quality results recovered during the construction and operational phase of works at the site.
Operational policy	To manage construction activities so that any potential impacts on the current groundwater regime (including levels and quality) are minimised.
Performance criteria	• Groundwater level monitoring is to be undertaken on a monthly basis prior to construction works at the subject site. This should be conducted at the six monitoring locations established by Coffey Geotechnics, with further input to be obtained from the DWE.
Implementation strategy	Groundwater quality monitoring will be undertaken monthly in accordance with the *Murray-Darling Basin Groundwater Quality Sampling Guidelines* (1997) for the following parameters: • pH (field measured) • EC (field measurement) • Dissolved oxygen (field measurement) • Temperature (field measurement) • Total and dissolved nitrogen • Total and dissolved phosphorus If the field pH is below 6.5, laboratory analysis for the following parameters should also be performed: • Calcium • Magnesium • Total and dissolved iron • Dissolved manganese • Filtered aluminium • Bicarbonate • Carbonate • Chloride • Sulfate • Colour Laboratory analysis for total acidity (titratable) should also be undertaken on a monthly basis to determine the total potential acidity hazard that may be associated with groundwater at the site. Reliable in situ monitoring equipment will be used for all monitoring. This equipment will be calibrated prior to each round of monitoring.
Monitoring	• Twelve months of level monitoring has been collected by Coffey Geotechnics and is sufficient for determining the likely range of groundwater level. • Groundwater quality monitoring is to be undertaken on a monthly basis from the established monitoring locations prior to the commencement of construction, with analysis performed at a NATA accredited laboratory. A minimum of 8 rounds of data is necessary, however this could be collected more rapidly by monitoring more frequently. • Following the completion of background monitoring, a groundwater quality report, including results and interpretation would be prepared and submitted to Council for review.
Auditing	The consultant will audit the results and submit a background groundwater quality report to Council prior to the commencement of construction works.
Reporting of monitoring results	A background report to CHCC including raw data, a results summary and a discussion comparing results with ANZECC guidelines.

Commitment 6

Background groundwater quality monitoring shall be undertaken to establish the quality and hydrology of the existing groundwater aquifier. This information shall be used to establish monitoring criteria and management procedures for the construction phase of the development.

4.5 Groundwater management and monitoring

Person Responsible	Contractor's Site Manager / Environmental Consultant

Issue	Groundwater management and monitoring
Operational policy	To establish stable groundwater conditions and verify that development management is appropriate.
Performance criteria	• Water quality objectives for the construction phase of works would be devised from the background water quality data and ANZECC guidelines; these would incorporate seasonal variations in levels and quality. These proposed objectives would be submitted to CHCC for review and approval prior to implementation. • No discharge offsite of groundwater intercepted during any excavation without appropriate testing and treatment as required. • No variation in groundwater levels and/or flow direction beyond the effects of drought or flood.
Implementation strategy	Groundwater intercepted during excavation shall be retained onsite until the water quality criteria (determined from background monitoring) are reached. Monitoring of groundwater levels should be undertaken fortnightly during the construction phase to determine any impacts from construction activities on groundwater levels. Groundwater samples are to be collected monthly and analysed for the parameters specified in Table 4.4 at a NATA registered laboratory.
Monitoring	Carry out fortnightly groundwater level monitoring and monthly groundwater quality monitoring at the locations established by Coffey Geotechnic, and others as required. Any groundwater dewatered from excavations shall be monitored prior to release for the following parameters:

Water quality parameter	Release criteria	Criteria type
pH	6.5 – 9.0	Range
Dissolved oxygen	>6.0mg/L	Minimum
Turbidity	<50NTU	Maximum

Auditing	The Environmental consultant is to audit water quality to ensure that no deleterious effects are resulting from the excavation and dewatering operations at the site.
Reporting of monitoring results	• Monthly reports are to be submitted to CHCC within one (1) month of the collection of water quality data. • Monthly reports to CHCC will include raw data, a results summary and a discussion comparing results with baseline values and ANZECC guidelines. • Result sheets to be compiled for monitoring results. All results to be kept on site for inspection by local and state government officers at all times.
Identification of incident or failure	• Degradation of groundwater quality at the monitoring points to below the "Performance Criteria" levels (to be derived following baseline monitoring). • Variations in groundwater levels beyond typical seasonal fluctuations. • Discharge of waters offsite without appropriate testing to ensure the above water quality criteria are met. • Deterioration in surface water quality downstream of the development resulting from discharge of waters from the development site.
Corrective action	• Locate the source of the contaminant/level variations. • Take all possible actions to contain and control the contaminant/level variations. • Investigate the cause of the contamination/level variations and take action to prevent a recurrence. • If the test result for any parameter fails to meet the performance criteria, then fortnightly groundwater quality monitoring shall commence and continue until the recorded value/s meets the performance criteria. • Addition of hydrated lime to contained waters as required to maintain the pH within the recommended range. • Addition of gypsum to contained waters as required to reduce suspended solids concentrations.

[redacted]	• Discharge of any contained waters will not be permitted until the water quality criteria are reached.

Commitment 7

Management will ensure that on-site activities do not impact upon groundwater quality, levels or movement outside of conditions experienced during drought or flood.

4.6 Sediment and erosion controls

Person Responsible	Consulting Engineer, Contractor's Site Manager

Issue	Sediment and erosion control.
Operational policy	To prevent the displacement of sediment and acid sulfate soil material across the site, particularly during rainfall events.
Performance criteria	All excavated acid sulfate soil material shall be contained in such a manner so as to prevent the displacement of this material across the site. Erosion resulting from on-site activities shall be minimised. All waters shall be treated prior to release offsite to prevent the discharge of sediment laden waters into Moonee and Skinners Creeks or surrounding environments. The transport and accumulation of sediment offsite should be prevented.
Implementation strategy	Erosion and sediment control shall be undertaken in general accordance with Auspacific Engineers Erosion and Sediment Control Plan (Construction Phase), Drawing no. 04-1600-P10. Erosion and sediment control devices such as (but not limited to) silt fences, bunds and contour drains should be installed prior to commencement of site activities to the reasonable satisfaction of CHCC and should be maintained throughout the life of site operations. All exposed areas should have a negative grade toward the onsite excavations (water feature basins). Upslope runoff shall be diverted around any acid sulfate treatment areas or any cleared or disturbed regions of the site in a way that minimises erosion, the size of the upslope catchment and diverts waters to the onsite water feature basins. Runoff from acid sulfate soil treatment areas or stockpiled material shall be directed to the nearest water feature basin. Accumulated water shall undergo testing and treatment as per Table 4.3 prior to release from site. Sediment control fences should be constructed at the downslope perimeter of acid sulfate soil treatment areas and any cleared or disturbed regions of the site. Where possible, the excavation/construction program shall be scheduled to minimise the potential for soil loss to occur. Where excavation/construction activities cannot be altered, additional controls shall be implemented in the areas of high erosion potential. All erosion and sediment control measures should be maintained at operational capacity until disturbed land is effectively rehabilitated. Stripped topsoil shall be separated from subsoil materials and shall only be stripped from the areas designated on the appropriate plans. After undergoing any necessary acid sulfate soil treatment, soil should be stockpiled taking into account the following considerations: • stockpiles are not to be located on roads, road shoulders or any other public land • stockpiles to be protected from upslope surface flows • sediment filters should be provided downslope of stockpiles • all stockpiles should be seeded within a fortnight of final forming with an appropriate seed mix.
Monitoring	Carry out visual inspections daily and after rainfall events (>25mm in 24hours) to ensure adequate erosion and sedimentation control devices are installed and operational, particularly in acid sulfate soil treatment areas. Surface water monitoring to be undertaken in accordance with Table 4.3.
Auditing	Auditing will be undertaken by the site manager and/or the proponent's nominated representative. Alternatively, auditing may be carried out by an independent consultant during the construction phase of the development. The audit should include an inspection of site

	activities, complaints, corrective actions and reporting to assess compliance with the ASS&GWMP.
Reporting	Reporting is required if excessive sedimentation and/or erosion is identified. Full details to be available to the contractor together with suggested corrective actions if required.
Identification of incident or failure	• Displacement of acid sulfate soil material across the site. • Inadequate bunding of acid sulfate soil treatment areas. • Signs of erosion on site. • Damaged or failed erosion and sediment control devices. • Decline in receiving water quality as identified by the Environmental Consultant. • Sedimentation on or downstream of site.
Corrective action	Identify the source of the problem and take the necessary steps required to prevent a recurrence. This may include: • the installation of additional erosion and sediment control measures • maintenance of existing controls • a review of work practices to minimise exposed areas and the duration of exposure.

Commitment 8

The Proponent will ensure that appropriate and adequate erosion and sediment control measures are installed prior to the commencement of works and are maintained for the duration of the construction works.

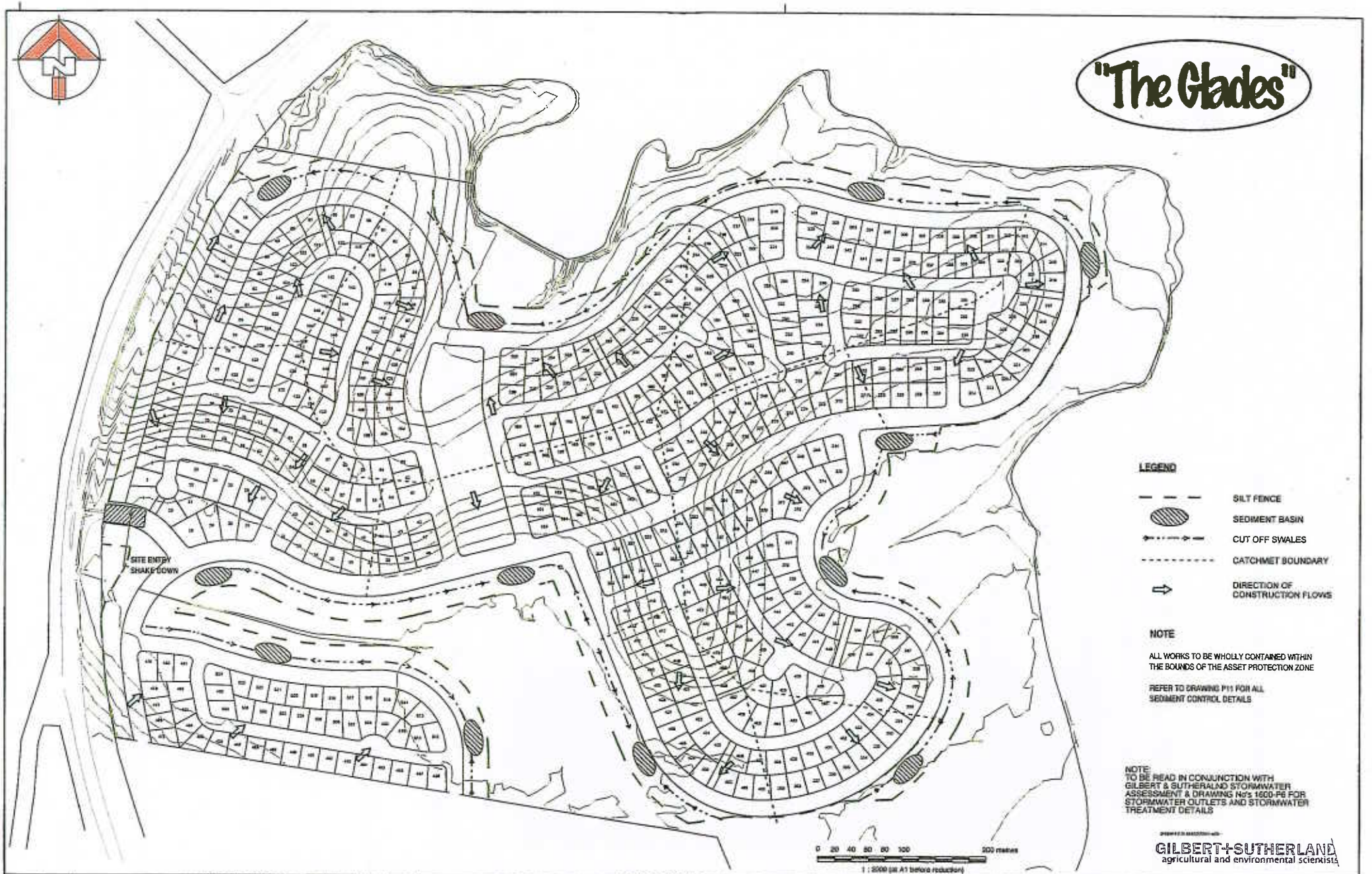
4.7 Contractor management

Person responsible:	Consulting Engineer

Issue	Contractor management.
Operational policy	To verify the Proponent's duty of care is met by ensuring the contractor is aware of his/her responsibilities under the terms of the ASS&GWMP.
Performance criteria	Each contractor is fully aware of his/her responsibilities under the terms of the ASS&GWMP and their obligation to respond to environmental issues arising from construction activities.
Implementation strategy	Monitoring and verifying that the ASS&GWMP is adhered to at all times and taking action if the specifications are not followed. The provision of advice, information and training to contractors and staff with regard to the implementation of the ASS&GWMP.
Monitoring	Weekly site inspections are to be carried out by the site manager or Proponent's representative to ensure the provisions of the ASS&GWMP are being adequately implemented.
Auditing	Auditing will be undertaken by the site manager and/or the proponent's nominated representative. Alternatively, auditing may be carried out by an independent consultant. The audit should include an inspection of site activities, complaints, corrective actions and reporting to assess compliance with the provisions outlined within the ASS&GWMP.
Reporting	Full details shall be available to the contractor together with suggested corrective actions (if required).
Identification of incident or failure	Failure to comply with the conditions set out in the ASS&GWMP resulting in environmental harm or unnecessary disturbance to neighbouring land users.
Corrective action	The Proponent has the right to call a halt to any activity being undertaken which is deemed in conflict with the ASS&GWMP.

Commitment 9

All contractors will be managed to ensure compliance with the ASS&GWMP for the duration of the site works.



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DISCLAIMER: This is a preliminary concept plan prepared by Auspacific Engineers Pty Ltd ("the consultant").
The concept plan has been prepared by the Consultant for the benefit of the entity to which it is addressed ("the Client") and is in response to certain instructions and requests given by the Client. The concept plan should not be used by or relied upon by the Client for any purpose for which it has been prepared and for no other purpose. The concept plan does not represent the Consultant's professional advice, but is merely an overview of potential development outcomes and as stated is "preliminary" in nature.
No third party is entitled to rely upon the information contained in the preliminary report and any decisions taken as to a budget, yields, etc., should be sought directly from the consultant.

EROSION AND SEDIMENT CONTROL PLAN (CONSTRUCTION PHASE)

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project: PROPOSED RESIDENTIAL SUBDIVISION MOONEE BEACH COFFS HARBOUR

dwg no.	amendment
P10	A

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5) Administration of the ASS&GWMP

5.1 Amendment of the ASS&GWMP

The Proponent may make an application to CHCC to amend the provisions of this ASS&GWMP. The application shall:

1. be in writing
2. specify the provisions of the ASS&GWMP to which the application relates
3. state how the proposed amendments achieve the objectives of the provisions to which the amendments relate.

CHCC shall approve the amendment where CHCC is satisfied acting reasonably that the proposed amendments achieve the objective of the provisions to which the amendment relates.

5.2 Incident management

The Proponent and any person appointed by the Proponent as having responsibility for a control strategy set out in this ASS&GWMP have clearly defined responsibilities under the *Protection of the Environment Operations Act 1997* to report any incidents likely to cause material or serious environmental harm.