



PART 1 – KINGS FOREST STAGE 1 MANAGEMENT PLAN

KINGS FOREST STAGE 1 – MP 08_0194 SUBDIVISION AND BULK EARTHWORKS

PREPARED FOR:

PROJECT 28 PTY LTD

COMPILED BY:

DARRYL ANDERSON CONSULTING PTY LTD

IN CONJUNCTION WITH:

Mortons Urban Solutions
Bushfire Safe (Aust) Pty Ltd
James Warren & Associates Pty Ltd
Gilbert & Sutherland Pty Ltd



**+ GILBERT
SUTHERLAND**

BUSHFireSafe (AUST) PTY LTD



OCTOBER 2012

Version 6.0

Suite 7, Corporate House
8 Corporation Circuit
Tweed Heads South NSW 2486

Ph: 07 55233611
Fax: 07 55233612

Email: admin@daconsulting.com.au

TABLE OF CONTENTS

1.0	INTRODUCTION AND BACKGROUND	1-1
2.0	DESCRIPTION OF AMENDED PROJECT APPLICATION	2-1
3.0	SUMMARY OF KEY VALUES AND CONSTRAINTS	3-1
	3.1 Summary of Significant Values	3-1
	3.1.1 Background	3-1
	3.1.2 Threatened Species	3-1
	3.1.3 Endangered Ecological Communities	3-2
	3.1.4 SEPP 14 Wetlands	3-2
	3.1.5 Cudgen Nature Reserve	3-2
	APPENDIX 1 – FIGURES	3-3
4.0	SUMMARY OF MANAGEMENT PLANS – GILBERT & SUTHERLAND PTY LTD, JULY 2012	4-1
	SUMMARY	4-3
	LIST OF FIGURES	4-5
	4.1 Summary of Management Plans	4-6
	4.1.1 Aims and objectives	4-6
	4.1.2 Scope of this document	4-6
	4.1.3 Implementation	4-7
	4.1.4 SOMP structure	4-7
	4.1.5 General commitments	4-8
	4.1.6 Definitions	4-8
	4.1.7 Contact details	4-9
	4.2 Baseline data collection phase	4-10
	4.2.1 Intent	4-10
	4.2.2 Background water quality monitoring	4-10
	4.3 Management of potential impacts	4-13
	4.3.1 Intent	4-13
	4.3.2 Implementation	4-13
	4.3.3 Aquatic flora & weed management and maintenance	4-13
	4.3.4 Threatened species - Wallum froglet	4-16
	4.3.5 Threatened species - Olongburra frog	4-18
	4.3.6 Threatened species - Bush stone-curlew	4-20
	4.3.7 Threatened species - Grass owl	4-22
	4.3.8 Threatened species - Koala	4-24
	4.3.9 Waste management	4-26
	4.3.10 Machinery, workshops, and dangerous goods handling & storage	4-29
	4.3.11 Erosion controls	4-32
	4.3.12 Sediment control	4-35
	4.3.13 Acid sulfate soil identification	4-38
	4.3.14 Acid sulfate soil assessment and treatment (dry and wet excavation)	4-40
	4.3.15 Acid sulfate soil leachate monitoring	4-43
	4.3.16 Maintenance of water treatment measures	4-45
	4.3.17 Stormwater management	4-47
	4.3.19 Site stabilisation	4-50
	4.3.20 Surface water quality	4-51
	4.3.22 Groundwater monitoring	4-55
	4.3.23 Groundwater seepage monitoring	4-58
	4.3.24 Vegetation clearing and soil disturbance	4-61
	4.3.25 Air quality and dust management	4-63
	4.3.26 Noise and vibration management	4-65
	4.3.27 Site management	4-67
	4.3.28 Contractor management	4-69
	4.3.29 Hazardous and dangerous goods handling & storage	4-71
	4.3.30 Incidents & complaints management	4-73

Darryl Anderson Consulting Pty Ltd

A.C.N. 093 157 165

Town Planning & Development Consultants

ii

TABLE OF CONTENTS

4.3.31	Light management	4-75
4.3.32	Personnel training	4-76
4.3.33	Pollution control	4-77
4.3.34	Refuelling of construction equipment & vehicles	4-78
4.3.35	Traffic management	4-80
4.3.36	Geotechnical investigation & analysis	4-82
4.3.37	Fauna & flora protection – general provisions	4-84
4.3.38	Freshwater ecology	4-86
4.3.39	Waterways & wetlands management	4-87
4.3.40	Open space management	4-90
4.3.41	Golf course water conservation	4-92
4.3.42	Water management (golf course irrigation)	4-94
4.3.43	Golf course nutrient management	4-97
4.3.44	Golf course herbicide management	4-101
4.3.45	Golf course pesticide management (control of arthropods)	4-103
4.3.46	Golf course fungicide management	4-105
4.4	Monitoring summary for golf course operations	4-107
4.5	Administration of the SOMP	4-111
4.5.1	Amendment of the SOMP	4-111
4.5.2	Incident management	4-111
4.6	Attachment 1 – Drawings	4-112
4.7	Attachment 2 – Reference drawings	4-113

This Management Plan has been compiled by Darryl Anderson Consulting Pty Ltd with input from:

- ♦ Mortons Urban Solutions
- ♦ Bushfire Safe (Aust) Pty Ltd
- ♦ James Warren & Associates Pty Ltd
- ♦ Gilbert & Sutherland Pty Ltd

Darryl Anderson Consulting Pty Ltd

A.C.N. 093 157 165
Town Planning & Development Consultants

iii

MANAGEMENT PLAN

KINGS FOREST STAGE 1 – MP 08_0194 SUBDIVISION AND BULK EARTHWORKS

1.0 INTRODUCTION AND BACKGROUND

On 19 August 2010, Concept Plan Approval No. 06_0138 was issued for Kings Forest for the carrying out of the following:

- ♦ Residential development for approximately 4500 dwellings;
- ♦ Town centre and neighbourhood centre for future retail and commercial uses;
- ♦ Community and education facilities;
- ♦ Employment land;
- ♦ Golf course;
- ♦ Open space;
- ♦ Wildlife corridors;
- ♦ Protection and rehabilitation of environmentally sensitive land;
- ♦ Utility services infrastructure;
- ♦ Water management areas and lake; and
- ♦ Roads and pedestrian and bicycle paths.

Subsequently, the Concept Plan was modified (Modification No. 1) on 22 December 2010. The Concept Plan Approval will be further modified in conjunction with determination of the Stage 1 Project Application. The Concept Plan provides the overarching structure and context for Kings Forest and is a key planning tool to inform Project Application, Development Applications and Management Plans. A copy of the amended Concept Plan is contained at **Section 2**.

On 23 December 2010 the Director General of the Department of Planning and Infrastructure issued amended Director General's Environmental Assessment Requirements (DGRs) in respect of Major Project Application No. 08_0194 being an application for:

- ♦ Subdivision to create new lots for future development;
- ♦ Construction of the entrance road to the site and associated intersection works on Tweed Coast Road;
- ♦ Alignment and construction of the proposed Kings Forest Parkway from Tweed Coast Road via Precincts 4/5 through to the western side of the site, as well as the alignment of the two proposed roads through State Environmental Planning Policy No. 14 areas to access the southern (Cudgen Paddock) area;
- ♦ Rural retail development to the east of Tweed Coast Road and access arrangements to this part of the site;
- ♦ Construction works for the first stage (Precinct 5) of urban development; and
- ♦ Bulk earthworks across the site.

The (DGRs) require the Environmental Assessment to be accompanied by a suite of Management Plans. The objective of these Management Plans is to mitigate, manage and monitor various elements of the development.

The Project Application and Environmental Assessment were lodged with the Department of Planning and Infrastructure in November 2011. That application proposed the following key elements:

Darryl Anderson Consulting Pty Ltd

A.C.N. 093 157 165

Town Planning & Development Consultants

- ♦ Subdivision to create new lots for future development;
- ♦ Bulk earthworks across the site;
- ♦ Road works comprising:
 - construction of the entrance road into the site and associated intersection works on Tweed Coast Road;
 - alignment and construction of the proposed Kings Forest Parkway from Tweed Coast Road via Precincts 4 and 5 through to the western precincts; and
 - alignment and part construction of two proposed roads through SEPP 14 areas to access the southern precincts;
- ♦ Development of 2,126m² of floor space for rural retail development and access arrangements within Precinct 1;
- ♦ Construction of subdivision and infrastructure works along the Kings Forest Parkway and within Precincts 1 and 5;
- ♦ Maintenance of the existing east-west agricultural drainage channel in the SEPP 14 wetlands within the central part of the site; and
- ♦ The Plan of Development for Precinct 5.

The Project Application also includes the dedication, in due course, of land to the NSW National Parks and Wildlife Service and Tweed Shire Council (see Section 3.9 of the Environmental Assessment Report, Volume 1), subject to entering into a Voluntary Planning Agreement.

Insofar as the subdivision component is concerned, the application proposes the creation of 8 master lots (Lots 1 to 8) and further subdivision of proposed Lot 2 into 410 lots which will yield approximately 442 dwellings, being Precinct 5.

The Environmental Assessment was supported by 18 separate Management Plans addressing the matters contained in the DGRs. The Management Plans are voluminous and detailed, as a result of which concerns have been raised by Tweed Shire Council and the Department of Planning and Infrastructure in relation to implementation, administration and co-ordination of actions and monitoring between the various plans.

To achieve a more “user friendly” document and address the concerns raised, a single Management Plan for Kings Forest Stage 1 has been prepared. The single Management Plan, titled, “**Kings Forest Stage 1 Management Plan**”, incorporates all relevant background materials and drawings with each “specific issue” Management Plan forming a separate section of the document.

An Integration Matrix (**Section 1**) has also been included in the Plan to assist in its efficient implementation and administration, particularly in relation to integration and monitoring timeframes and responsibilities.

Each issue specific section of the Management Plan has been revised to reflect the amended Project Application and address the issues raised in the State Agency and public submissions received during the exhibition period.

This Management Plan should be read in conjunction with the Kings Forest Concept Plan Approval No. 06_0138 (as modified) and the Kings Forest Stage 1 Project Approval No. 08_0194 (as modified from time to time).

Darryl Anderson Consulting Pty Ltd

A.C.N. 093 157 165
Town Planning & Development Consultants

2.0 DESCRIPTION OF AMENDED PROJECT APPLICATION

Following consideration of submissions received from State Agencies and members of the public and consultations with the Department of Planning and Infrastructure, Tweed Shire Council and other State Agencies, the Project Application has been amended. The amended project is described as follows:

- ♦ Subdivision to create new lots for future development;
- ♦ Bulk earthworks across the site;
- ♦ Road works comprising:
 - construction of the entrance road into the site and associated intersection works on Tweed Coast Road;
 - alignment and construction of the proposed Kings Forest Parkway from Tweed Coast Road via Precincts 4 and 5 through to the western precincts; and
 - alignment and part construction of two proposed roads through SEPP 14 areas to access the southern precincts;
- ♦ Development of 2,036m² of floor space for "rural supplies" development and access arrangements within Precinct 1;
- ♦ Construction of subdivision and infrastructure works along the Kings Forest Parkway and within Precincts 1 and 5;
- ♦ The Plan of Development for Precinct 5.

3.0 SUMMARY OF KEY VALUES AND CONSTRAINTS

3.1 Summary of Significant Values

3.1.1 Background

Kings Forest has been comprehensively studied (e.g. Warren 2000, Aspect North 2004 & 2005, Biolink 2004, Specht & Gosselin 2004, Callaghan et al. 2004 & 2005, Parker 2005, Carrick 2008, LandPartners 2008, Sainty 2008, JWA 2006 & 2009).

Surveys on the Kings Forest site have recorded:

- ♦ Five (5) Threatened flora species;
- ♦ Nineteen (19) Threatened fauna species; and
- ♦ Three (3) Endangered Ecological Communities.

A summary of the significant values relevant to the Proposed development is provided in the following sections.

3.1.2 Threatened Species

Flora

Five (5) Threatened flora species have been recorded at the Kings Forest site (**FIGURE 1, APPENDIX 1**):

- ♦ Green-leaved rose walnut (*Endiandra muelleri* subsp. *bracteata*);
- ♦ Southern swamp orchid (*Phaius australis*);
- ♦ Stinking cryptocarya (*Cryptocarya foetida*);
- ♦ White laceflower (*Archidendron hendersonii*); and
- ♦ White yiel yiel (*Grevillea hilliana*).

Fauna

Nineteen (19) Threatened fauna species have been recorded (**FIGURE 2, APPENDIX 1**), or are considered to be provided with potential habitat, within the Subject site. These species are as follows:

- ♦ Black bittern (*Ixobrychus flavicollis*);
- ♦ Black-necked stork (*Ephippiorhynchus asiaticus*);
- ♦ Bush stone-curlew (*Burhinus grallarius*);
- ♦ Bush hen (*Amaurornis moluccana*);
- ♦ Common blossom-bat (*Synconycteris australis*);
- ♦ Common planigale (*Planigale maculata*);
- ♦ Eastern false pipistrelle* (*Falsitrellus tasmaniensis*);
- ♦ Glossy Black Cockatoo (*Calyptorhynchus lathami*);
- ♦ Grass owl (*Tyto longimembris*);
- ♦ Grey-headed flying fox (*Pteropus poliocephalus*);
- ♦ Koala (*Phascolarctos cinereus*);
- ♦ Large-footed myotis* (*Pteropus poliocephalus*);
- ♦ Little bent-wing bat* (*Miniopterus australis*);
- ♦ Masked owl (*Tyto novaehollandiae*);
- ♦ Osprey (*Pandion haliaetus*);

Darryl Anderson Consulting Pty Ltd

A.C.N. 093 157 165

Town Planning & Development Consultants

- ♦ Rose-crowned fruit-dove* (*Ptilinopus regina*);
- ♦ Wallum froglet (*Crinia tinnula*);
- ♦ Wallum sedge frog (*Litoria olongburensis*); and
- ♦ Yellow-bellied sheath-tail bat (*Saccolaimus flaviventris*).

* These species were generally recorded foraging over the site and are not included in **FIGURE 2 (APPENDIX 1)**.

3.1.3 Endangered Ecological Communities

Three (3) Endangered Ecological Communities (EEC's)¹ occur within the Subject site (**FIGURE 3, APPENDIX 1**):

- ♦ Swamp sclerophyll forest on coastal floodplains of the NSW North Coast;
- ♦ Freshwater wetlands on coastal floodplains of the NSW North Coast; and
- ♦ Subtropical coastal floodplain forest of the NSW North Coast bioregion.

3.1.4 SEPP 14 Wetlands

SEPP 14 – Coastal Wetlands are mapped over large areas of the Kings Forest site (**FIGURE 4, APPENDIX 1**). These wetlands are protected by State Environmental Planning Policy No. 14 – Coastal Wetlands (SEPP 14).

3.1.5 Cudgen Nature Reserve

Cudgen Nature Reserve occurs immediately adjacent to the eastern and southern boundaries of the Kings Forest site (**FIGURE 5, APPENDIX 1**).

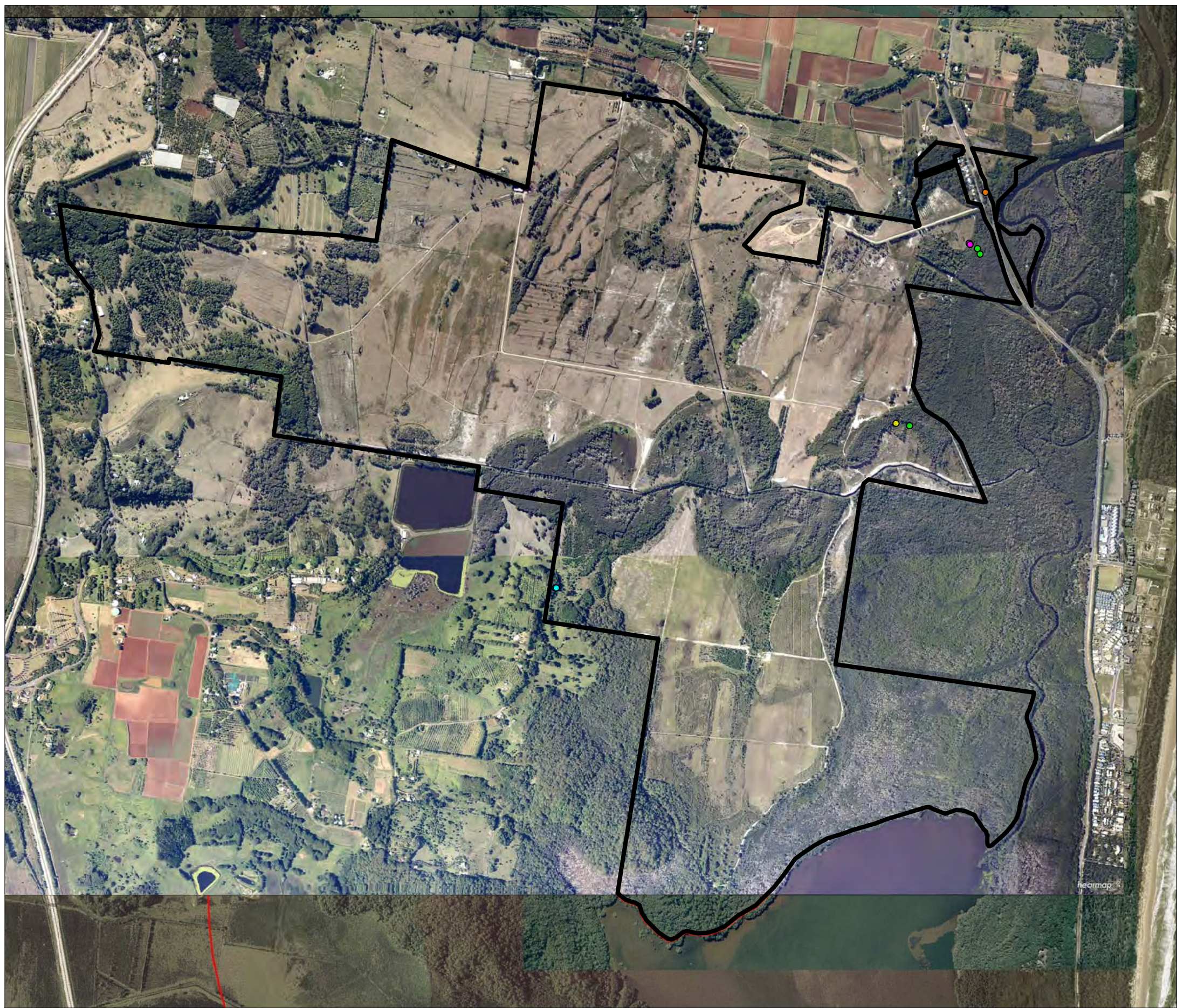
¹ As listed within schedules of the TSC Act (1995).

APPENDIX 1 – FIGURES

Darryl Anderson Consulting Pty Ltd

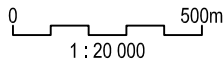
A.C.N. 093 157 165

Town Planning & Development Consultants



LEGEND

- Green leaved rose walnut
- Southern swamp orchid
- Stinking laurel
- White laceflower
- White yiel yiel
- Kings Forest Boundary



SOURCE: Landpartners - Threatened Flora & 2007 Aerial; Near Map June 2011 Aerial

SCALE: 1 : 20 000 @ A3

JAMES WARREN & ASSOCIATES PTY LIMITED
Environmental Consultants

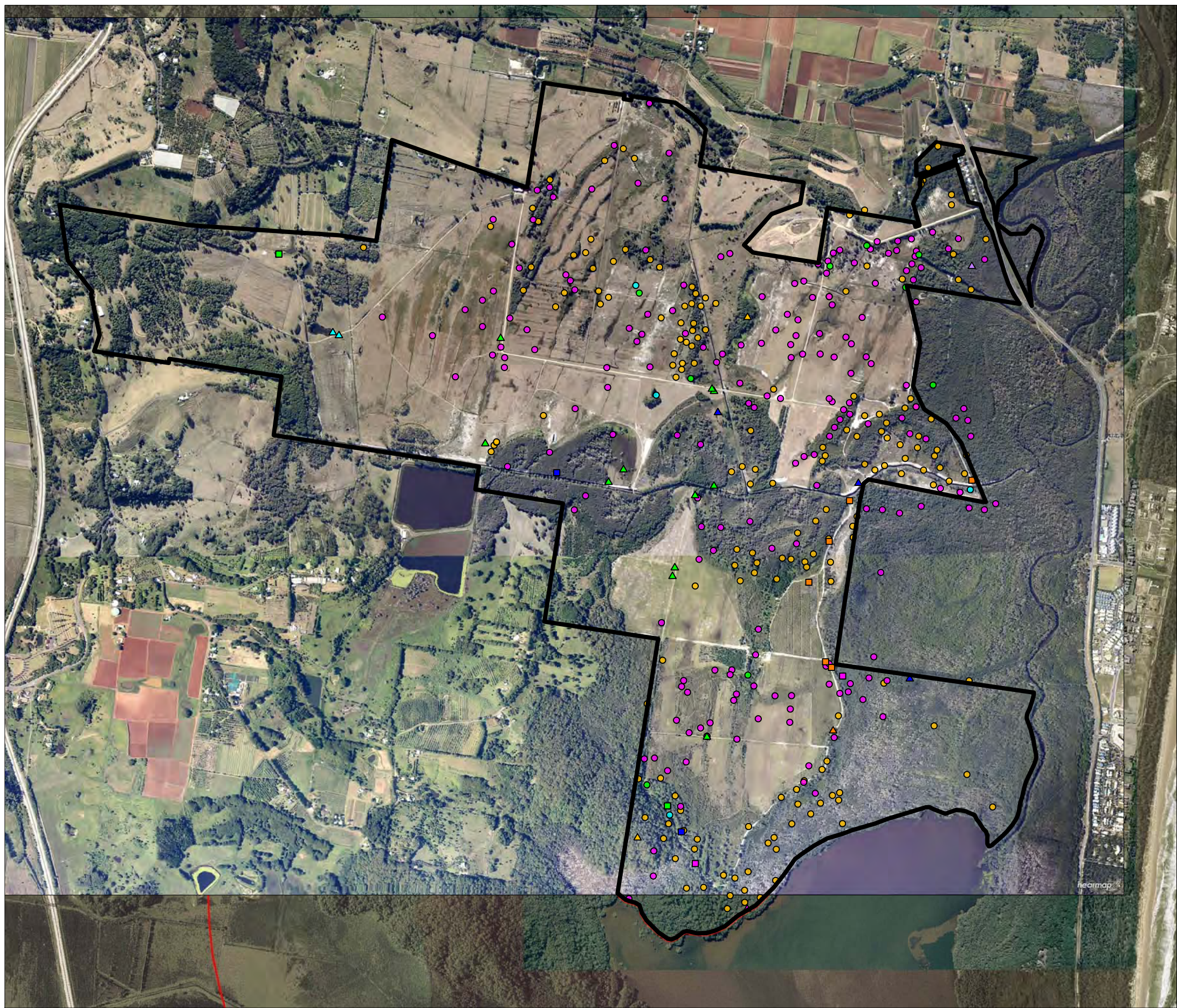
CLIENT
Project 28 Pty Ltd
PROJECT
Kings Forest Stage 1 Project Application
Summary of Significant Values
Melaleuca Drive, Duranbah, NSW
Shire of Tweed

FIGURE 1

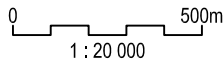
PREPARED: BW
DATE: 27 August 2012
FILE: N97017_SSV_Base.dwg

TITLE

THREATENED
FLORA



- LEGEND**
- ▲ Black bittern
 - ▲ Black-necked stork
 - ▲ Bush hen
 - ▲ Bush stone-curlew
 - ▲ Glossy black cockatoo
 - ▲ Grass owl
 - Masked owl
 - ▲ Osprey
 - Common blossom bat
 - Common planigale
 - Grey-headed flying-fox
 - Koala
 - Yellow-bellied sheathtail bat
 - Wallum sedge frog
 - Wallum froglet
 - Kings Forest Boundary



SOURCE: Landpartners - Threatened Fauna & 2007 Aerial; Near Map June 2011 Aerial

SCALE: 1 : 20 000 @ A3

JAMES WARREN & ASSOCIATES PTY LIMITED
Environmental Consultants

CLIENT
Project 28 Pty Ltd

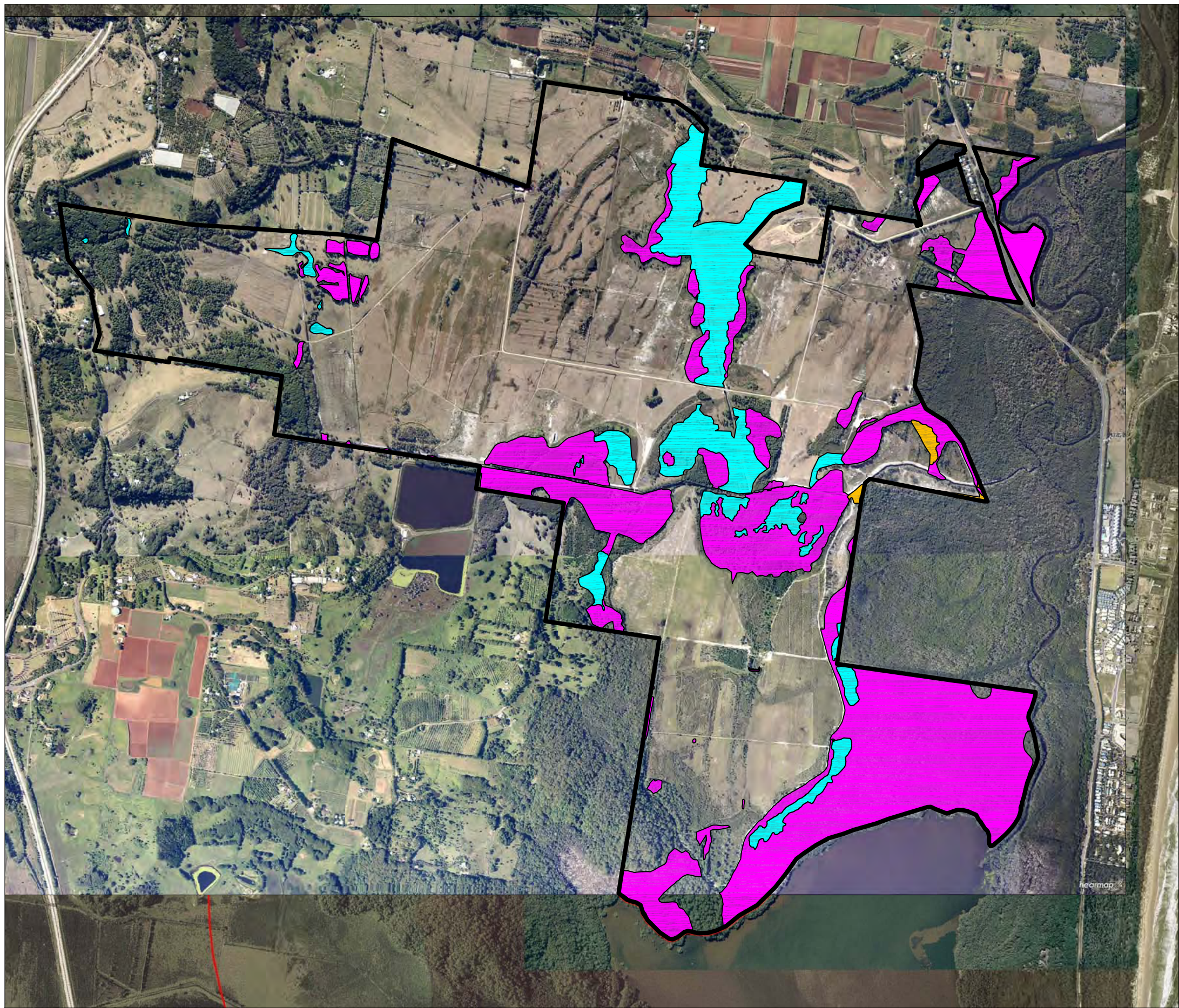
PROJECT
Kings Forest Stage 1 Project Application
Summary of Significant Values
Melaleuca Drive, Duranbah, NSW
Shire of Tweed

FIGURE 2

PREPARED: BW
DATE: 20 August 2012
FILE: N97017_SSV_Base.dwg

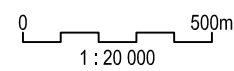
TITLE

**THREATENED
FAUNA SPECIES**



LEGEND

- Freshwater Wetlands
- Subtropical Floodplain Forest
- Swamp Sclerophyll Forest on Coastal Floodplain
- Kings Forest Boundary



SOURCE: Landpartners - EEC's & 2007 Aerial
Near Map June 2011 Aerial

SCALE: 1 : 20 000 @ A3

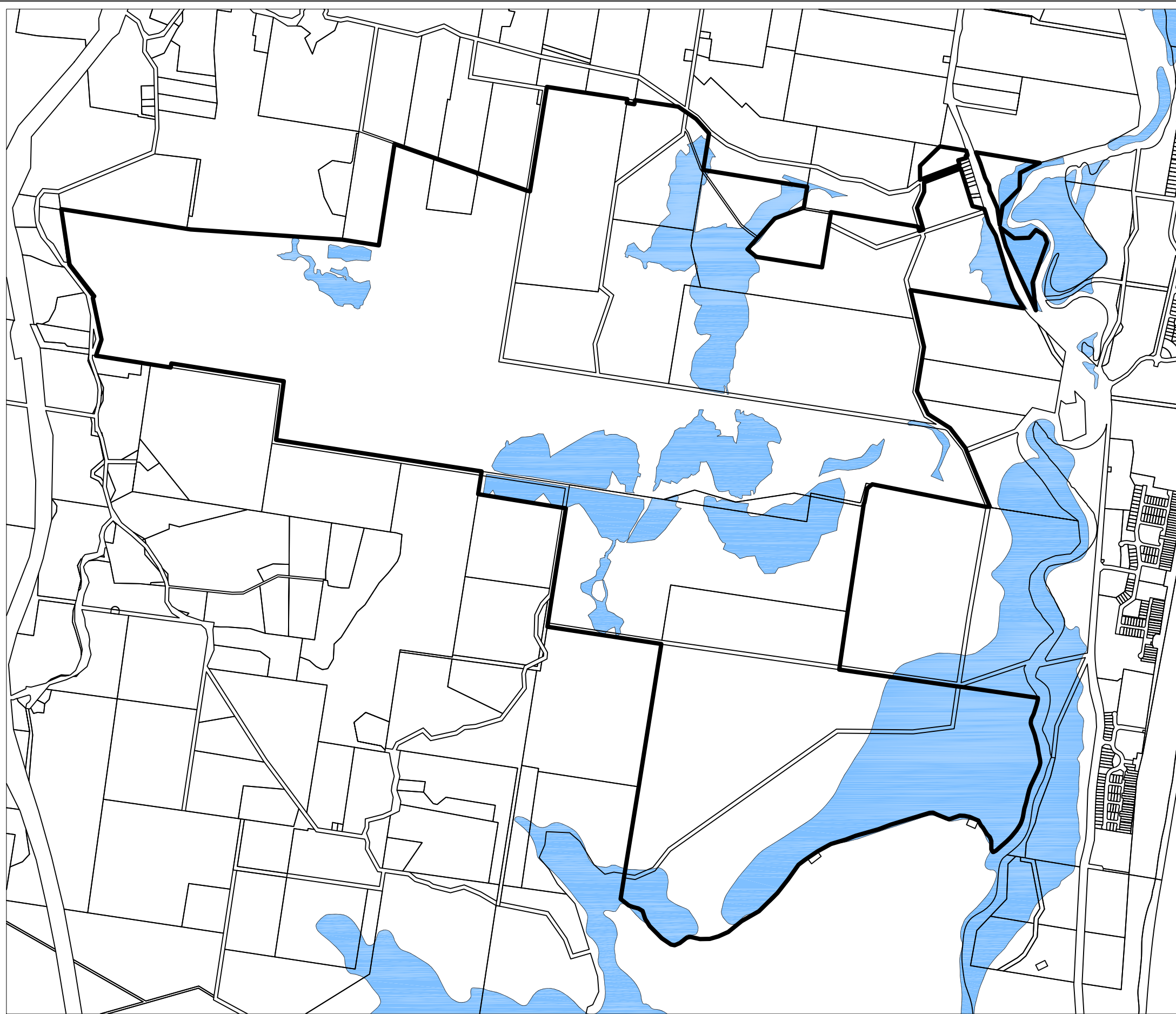
JAMES WARREN & ASSOCIATES PTY LIMITED
Environmental Consultants

CLIENT
Project 28 Pty Ltd
PROJECT
Kings Forest Stage 1 Project Application
Summary of Significant Values
Melaleuca Drive, Duranbah, NSW
Shire of Tweed

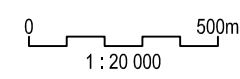
FIGURE 3

PREPARED: BW
DATE: 20 August 2012
FILE: N97017_SSV_Base.dwg

TITLE
ENDANGERED
ECOLOGICAL
COMMUNITIES
(EEC's)



LEGEND
 SEPP 14 Wetlands
 Kings Forest Boundary

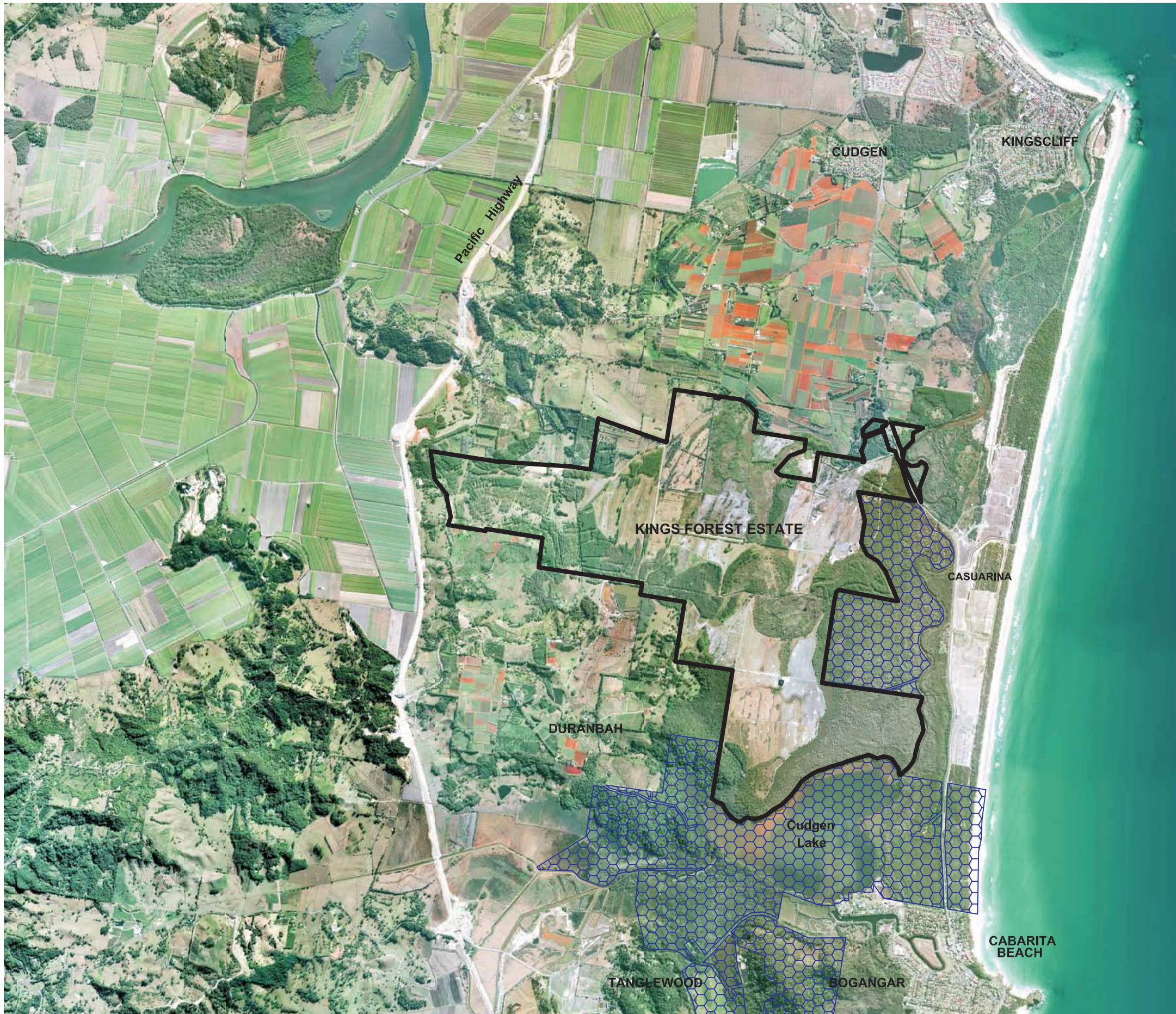


SOURCE: Landpartners - SEPP14 Wetlands (Amendment 15)
 SCALE: 1 : 20 000 @ A3
JAMES WARREN & ASSOCIATES PTY LIMITED
Environmental Consultants



CLIENT
 Project 28 Pty Ltd
 PROJECT
 Kings Forest Stage 1 Project Application
 Summary of Significant Values
 Melaleuca Drive, Duranbah, NSW
 Shire of Tweed

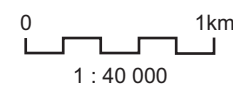
FIGURE 4
 PREPARED: BW
 DATE: 20 August 2012
 FILE: N97017_SSV_Base.dwg

TITLE
**SEPP No. 14
 COASTAL WETLANDS**



LEGEND

-  Cudgen Nature Reserve
-  Kings Forest Boundary



SOURCE: NPWS 05.06.06; Leda Developments
 (Ref: 6400_121.dwg Recd' 09.06.06)
 SCALE: 1 : 40 000 @ A3
JAMES WARREN & ASSOCIATES PTY LIMITED
 Environmental Consultants

CLIENT
 Project 28 Pty Ltd
 PROJECT
 Kings Forest Stage 1 Project Application
 Summary of Significant Values
 Melaleuca Drive, Duranbah, NSW
 Shire of Tweed

FIGURE 5

PREPARED: BW
 DATE: 20 August 2012
 FILE: N97017_SSV_Reserves.cdr

TITLE

**CUDGEN
 NATURE
 RESERVE**

4.0 SUMMARY OF MANAGEMENT PLANS

Darryl Anderson Consulting Pty Ltd

A.C.N. 093 157 165
Town Planning & Development Consultants

4-1

DOCUMENT CONTROL

DOCUMENT 10468_SOMP_RMF7F.docx

TITLE Summary of Management Plans, Incorporating Golf Course Management Plan, Kings Forest Stage 1 Project Application, Kings Forest, New South Wales

PROJECT MANAGER N. Sutherland

AUTHOR(S) P. Matthew & M. Foster

CLIENT Project 28 Pty Ltd

CLIENT CONTACT Reg van Rij

CLIENT REFERENCE –

SYNOPSIS This report constitutes a Summary of Management Plans (SOMP) for the entirety of the Kings Forest Stage 1 Project Application, including the golf course within precincts 12 and 13. This report addresses Environmental Assessment Requirements specified by the Director General of the NSW Department of Planning (DGRs) in relation to the proposed Kings Forest development. It has been prepared to plan a control strategy for any environmental impacts of development within and adjacent to the ecological buffers associated with the SEPP 14 wetlands and environmental protection zones that are adjacent to the site. The SOMP identifies the likely environmental impacts associated with the proposal and describes integrated strategies for the management of these constraints for the pre-bulk earthworks, bulk earthworks, landform stabilisation phase, civil construction, on maintenance and operational life of the project. The implementation of the SOMP provisions will help to ensure work is conducted in an environmentally responsible manner.

REVISION HISTORY

REVISION #	DATE	EDITION BY	APPROVED BY	FILE NAME
1	12/08	P. Matthew	N. Zurig /L. Varcoe	GJ0637_GCSOMP_RPM2F
2	2/11	M. Hancock	N. Zurig /L. Varcoe	10468_SOMP_RMH1F
3	4/11	M. Hancock	N. Zurig /L. Varcoe	10468_SOMP_RMH2F
4	4/11	M. Hancock	N. Zurig /L. Varcoe	10468_SOMP_RMH4F
5	6/11	M. Hancock	N. Zurig /L. Varcoe	10468_SOMP_RMH6F
6	7/12	M. Foster	N. Zurig /L. Varcoe	10927 SOMP RMF1F

DISTRIBUTION

	REVISION NUMBER									
Distribution	1	2	3	4	5	6	7	8	9	10
Project 28 Pty Ltd	3	1	1	1	1	1				
JBA Planning	-	1	1	1	1	-				
Darryl Anderson Consulting Pty Ltd	-	-	-	-	-	1				
G&S file	1	1	1	1	1	1				

Brisbane Sydney Melbourne and regions

Agriculture. Water. Environment.

5/232 Robina Town Centre Drive Robina QLD 4230 | PO BOX 4115 Robina QLD 4230
Phone 07 5578 9944 | Email robina@access.gs | www.access.gs

SUMMARY

Project 28 Pty Ltd commissioned Gilbert & Sutherland Pty Ltd (G&S) to prepare a Summary of Management Plans (SOMP) in support of the Kings Forest Stage 1 Project Application at Kings Forest, Cudgen, New South Wales.

This SOMP addresses the environmental issues relating to development of the site, including the golf course within precincts 12 and 13. Preparation of the SOMP involved a review of the amended Director General's Requirements (DGRs), Approved Concept Plan Conditions, the Preferred Project Report for the Concept Plan and a review of existing and revised environmental reports.

The Kings Forest Stage 1 Project Application No. MP 08_0194 was lodged in November 2011. The Application and Environmental Assessment Report was advertised from December 2011 to January 2012 following which 302 public submissions and 10 agency submissions were received.

As a result of the submissions, amendments to the project have been made. The amended project contains the following key elements (NB: these elements will be revised and updated as the amended project is finalised):

- Subdivision to create new lots for future development;
 - Bulk earthworks across the site;
 - Road works comprising:
 - construction of the entrance road into the site and associated intersection works on Tweed Coast Road;
 - alignment and construction of the proposed Kings Forest Parkway from Tweed Coast Road via Precincts 4 and 5 through to the western precincts; and
 - alignment and part construction of two proposed roads through SEPP 14 areas to access the southern precincts;
- Development of 2,036 m² of floor space for rural supplies development and access arrangements within Precinct 1;
- Construction of subdivision and infrastructure works along the Kings Forest Parkway and within Precincts 1 and 5;
- The Plan of Development for Precinct 5.

The SOMP identifies and describes strategies for the management of site constraints and their likely impacts during the pre-bulk earthworks, bulk earthworks, landform stabilisation phase, civil construction, on-maintenance and operational phases of the project. In addition, given that these constraints may potentially be conflicting, the SOMP also acts as a tool for the integration and implementation of the management strategies in accordance with the proposed construction sequencing.

It is anticipated that the implementation of the SOMP provisions will:

- ensure bulk earthworks and civil construction are managed in an environmentally responsible manner and will facilitate the detection of potential or emerging changes in site conditions to allow for construction methods to be adjusted accordingly;
- facilitate the ongoing management of the site to minimise its potential impacts to the ecological zones that surround it; and
- facilitate the ongoing management of the golf course within precincts 12 and 13 to minimise its potential impacts and ensure the golf course acts as an appropriate buffer between the urban development of the site and the ecological zones that surround it.

LIST OF FIGURES

DRAWING NO.	DESCRIPTION
Attachment 1 – drawings	
10927.1.1	Stage 1 Project Application Master Plan
10468.6.2	Stage 1 in relation to sensitive environmental receptors
Attachment 2 – reference drawings	
113691-PSP-4a(CONCEPT PLAN) Plan No. 01	Stage 1 Project Application Revised Concept Plan

GLOSSARY

TERM	MEANING
AGS	Above ground surface
ASSMAC	Acid Sulfate Soils Management Advisory Committee Manual 1998
DECCW	NSW Department of Climate Change and Water
DGR	Director General requirement
mAHD	Metres Australian Height Datum
NATA	National association of testing authorities
pH	The degree of acidity or alkalinity measured on a scale of 1 to 14, with 7 as neutral. From 1 to 7 is acidic; from 7 to 14 is alkaline.
SOMP	Summary of Management Plans
SEPP	State environmental planning policy

4.1 Summary of Management Plans

4.1.1 Aims and objectives

This Summary of Management Plans (SOMP) provides a framework to ensure that any impacts of the on-site activities are managed, treated, monitored, reported and, if necessary, mitigated.

The SOMP aims to achieve the following:

- Provide evidence of practical and achievable plans for the management of site activities.
- To ensure that legislative and environmental requirements are complied with by producing an integrated planning framework for comprehensive monitoring and control of operational impacts. Specific commitments on strategies and design standards to be employed are also given.
- A framework for regulatory authorities and the proponent to confirm compliance with policies and conditions.
- Evidence to the community that the operation is being managed in an environmentally acceptable manner.

The objectives of this SOMP are to ensure the following:

- All reasonable and practical measures are taken to prevent and/or minimise the likelihood of environmental harm being caused.
- On-site activities occur without adverse environmental impact or causing nuisance to nearby sensitive receptors.
- Operation of the golf course within precincts 12 and 13 will provide an effective buffer separating the urban development from SEPP 14 wetlands and environmental protection zones that are adjacent to the site.

4.1.2 Scope of this document

This document constitutes an overarching SOMP for the activities involved with the development works to be undertaken for the Stage 1 Project Application for the Kings Forest development area. As such, it is the intent of the document to address the environmental issues that may arise onsite with regard to the proposed activities involved in completing the bulk earthworks and civil works, on-maintenance and operations of the site.

Although addressing the issues, it is not within the scope of this document to detail the full extent of each issue, but rather to link and integrate the range of management issues governing each individual aspect. The reports specific to the development of the SOMP include:

- Kings Forest Stage 1 Project Application and associated documentation.
- Erosion and Sediment Control Management Plan (Gilbert & Sutherland 'G&S', July 2012).
- Acid Sulfate Soils Assessment and Management Plan (G&S, July 2012).
- Drainage Maintenance Impact Assessment and Management Plan (G&S, July 2012).
- Overall Water Management Plan (G&S, July 2012).
- Integrated Water Cycle Management Plan (G&S, July 2012).
- Groundwater Assessment and Management Plan (G&S, July 2012).
- Review of Environmental Management Plan (ePar 2009).

- Vegetation Management Plan (James Warren & Associates ‘JWA’, 2012,).
- Threatened Species Management Plan (JWA, 2012).
- Feral Animal Management Plan (JWA, 2012).
- Weed Management Plan (JWA, 2012).
- Koala Plan of Management (JWA, 2012).

4.1.3 Implementation

The SOMP requires the Proponent to mitigate the potential environmental impacts associated with the construction of the development works during the baseline data collection phase, bulk earthworks, landform stabilisation phase, civil construction, on-maintenance and operational phases.

4.1.4 SOMP structure

This SOMP acknowledges the environmental impacts associated with the construction and operations of the proposed development and details strategies to mitigate them. Each control strategy is based upon proven environmental management methods and is presented as a commitment.

The SOMP is based on a series of tables for the baseline data collection phase, bulk earthworks, landform stabilisation phase, civil construction, on-maintenance and operational phases of the 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 SOMP. The format is presented below for reference purposes.

Title

Applies to	The relevant construction stages to which the issue detailed on this page applies.
Person responsible	This is the person(s) who has accepted the responsibility of implementing the SOMP 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 the management has committed the company to.

An objective of the tabular format is to allow for change and allow the SOMP to be a working document. If items need altering, changes may be made to the individual tables after appropriate consultation with the statutory authorities.

4.1.5 General commitments

Commitment 1

The development shall proceed in accordance with the construction staging detailed in any approved engineering drawings. The Proponents undertake to comply with the environmental implementation strategy as contained within the approved final SOMP at all times throughout the baseline data collection phase, bulk earthworks, site stabilisation phase, civil construction, on-maintenance and operational phases.

Commitment 2

The Proponents undertake to fulfil all commitments made in the approved SOMP and to carry out their activities on the project site in accordance with relevant current statutory requirements and approved amendments.

Commitment 3

The principal golf course management operating the golf course within precincts 12 and 13 shall comply with the environmental implementation strategy as contained within the approved SOMP during the operational phase.

4.1.6 Definitions

In this SOMP these terms have the following meanings;

- SOMP means the approved Summary of Management Plans and includes any amendments that may be approved from time to time.

- Development means the development of the site in accordance with the Kings Forest Stage 1 Project Application.
- TSC means Tweed Shire Council.
- ASSMAC means the Acid Sulfate Soils Management Advisory Committee.
- Proponent means the person undertaking the construction of the proposed Kings Forest Stage 1 and includes the person nominated by the Proponent as having the responsibility for implementing the provisions of the SOMP.
- DECCW means the NSW Department of Environment, Climate Change and Water.

4.1.7 Contact details

The following persons are responsible for the implementation of the management measures described in the individual tables of the SOMP.

Contractor's Site Manager

The name and address of the Contractor and its representative will be notified to TSC by the Consulting Engineer prior to the commencement of each contract/stage of the project.

Consulting Engineer

Unless advised otherwise the Consulting Engineer is:

Company: TBA

Address:

Contact Details:

Phone:

Facsimile:

4.2 Baseline data collection phase

4.2.1 Intent

This part of the SOMP specifies those matters which must be complied with by the Proponent during the baseline data collection phase, being the period prior to bulk earthworks when baseline monitoring is being undertaken.

4.2.2 Background water quality monitoring

Applies to	Baseline data collection phase
Person responsible	Nominated Environmental Consultant

Issue	<p>Establishing appropriate discharge criteria for the construction phase.</p> <p>To determine the existing water quality conditions at the site (levels and quality) and examine any seasonal variations that may result from increased precipitation. This would serve as 'baseline' data and allow comparison with level and quality results recovered during the bulk earthworks and civil construction phase of works at the site.</p>
Operational policy	To determine existing water quality parameters for the proposed Kings Forest Stage 1 area, prior to construction.
Performance criteria	<p>The performance criteria shall be set by background monitoring of pre-construction water quality conditions. The following parameters shall be monitored for a minimum of 12 months to capture the range of seasonal variation:</p> <ul style="list-style-type: none"> • pH (field measurement); • electrical conductivity (EC) (field measurement); • turbidity (field measurement);* • dissolved oxygen (DO) (field measurement);* • temperature (field measurement); • redox potential (mV); • suspended solids (SS) (mg L⁻¹);* • total nitrogen (TN), soluble nitrogen, nitrogen oxide (NO_x), total kjeldahl nitrogen (TKN), nitrite (NO₂) & nitrate (NO₃) (mg L⁻¹); • total phosphorus (TP) & soluble phosphorous (mg L⁻¹); • oil and grease (visual inspection);* • calcium (Ca); • magnesium (Mg); • sodium (Na); • potassium bicarbonate (K/HCO₃); • bicarbonate (HCO₃); • carbonate (CO₃);

- total & dissolved iron (Fe);
- total & dissolved aluminium (Al);
- dissolved manganese (Mn);
- chloride (Cl);
- sulfate (SO₄);
- ammonium (NH₄);
- colour;
- total acidity (titratable);
- total alkalinity;
- arsenic (As);
- cadmium (Cd);
- copper (Cu);
- lead (Pb);
- nickel (Ni);
- zinc (Zn);
- chlorophyll-a;*
- faecal coliforms;
- total algal cell count; and*
- blue green algae.*

*Surface water only

Interim water quality criteria (based on data collected by TSC)

Parameter	Interim criteria
pH	5.5 - 7.5
Turbidity	<10NTU
Suspended solids	<10mg/L
Dissolved oxygen	>5mg/L
Chlorophyll-a	<6µg/L
Total Aluminium	<0.9mg/L
Total Iron	<1.7mg/L
Total Nitrogen	<1.0mg/L
Total Phosphorous	<0.06mg/L
Salinity	<12ppt
Litter and gross pollutants	No man made material >5mm in any dimension
Oil and/or grease	No visible film, no detectable odour

Implementation

Surface water quality and groundwater level and quality monitoring on a

strategy	<p>monthly basis from established monitoring locations prior to commencement of bulk earthworks.</p> <p>Following the completion of background monitoring, a water quality report, including results and interpretation would be prepared and submitted to TSC for review.</p>
Monitoring	Background monitoring shall be conducted by a qualified Environmental Scientist for the parameters listed above to allow the interpretation of data for statistical analysis and groundwater modelling purposes.
Auditing	The consultant will audit the results and submit a background groundwater quality report to TSC prior to the commencement of construction works.
Reporting	A background report to TSC including raw data, a results summary and a discussion comparing results with ANZECC guidelines.
Identification of incident or failure	Failure to collect adequate rounds of data prior to commencement of bulk earthworks.
Corrective action	<ul style="list-style-type: none"> • Cease works until data is available. • Increase frequency of monitoring until sufficient data is available.

Commitment

The Proponent will undertake background water quality monitoring to ascertain existing conditions at the site prior to bulk earthworks commencing.

4.3 Management of potential impacts

4.3.1 Intent

This part of the SOMP specifies those matters which must be complied with by the Proponent during the bulk earthworks phase (being the period during which cut and fill works are being undertaken), the landform stabilisation phase (being the period when each precinct is at final grade and stabilised), the civil construction phase and the twelve-month on-maintenance phase. It also details those matters which should be complied with by the Golf Course Manager during the operational phase (being the period after which each stage has been accepted off-maintenance by Council). The Proponent’s obligations end following cessation of the on-maintenance period.

4.3.2 Implementation

At the completion of the construction of the development’s civil works, the GPT’s (if any have been installed) should be cleaned out to become part of the permanent stormwater quality control treatment train.

4.3.3 Aquatic flora & weed management and maintenance

Applies to:	Landform stabilisation phase, Civil construction phase, On-maintenance phase, Operational phase
Person responsible:	Proponent, Site Manager, Environmental Consultant, Golf Course Manager

Issue	Aquatic flora and weed management and maintenance.
Operational policy	To maintain healthy aquatic plant life and control weeds to promote the ecosystem health of wetlands and waterbodies.
Performance criteria	<p>Macrophyte establishment success rate >70%.</p> <p>The suppression of aquatic weeds and algae.</p> <p>Maintenance of hydraulic performance between waterbodies.</p>
Implementation strategy	<p>Weed strategy</p> <p>An expectation of avoidance or total removal of aquatic weeds within the waterway and wetland system is not realistic as weeds are present within the catchment and neighbouring sites.</p> <p>Management of macrophytes via removal of vegetation within flow paths to maintain hydraulic conductance.</p> <p>Particular attention should be given to weed management to prevent obstruction of hydraulic conductance.</p> <p>When removing weeds, care must be taken not to damage the growth of native aquatic plants or interrupt natural ecosystem function by adhering to the following methods:</p> <ul style="list-style-type: none"> • Avoid overspray through use of correct equipment and not spraying in windy conditions. • Bag and removal of weeds offsite.

	<ul style="list-style-type: none"> • Manage access to wetlands to avoid damage via trampling. • Should mechanical harvesting of weed growth be required, access to waterbodies will be selected to achieve minimal impact and access points will be rehabilitated at the end of the harvesting period. <p>Algae strategy</p> <p>Regular monitoring, particularly in Spring and Summer, is required to reduce the potential for algal blooms. Proposed management methods include:</p> <ul style="list-style-type: none"> • Ability to isolate separate on-stream system pools to contain algal blooms. • Emergency aeration and/or mixing. • Safety signage during algal outbreaks. <p>See Table 4.6.16 'Maintenance of water treatment measures' of the SOMP for further details.</p> <p>Off-stream waterway and wetland system</p> <ul style="list-style-type: none"> • Containment of blooms within off-stream waterway and wetland system (no release of water if blue green algae levels exceed 50,000 cells/ml). • Emergency turnover. • Emergency vertical aeration and/or mixing. • Safety signage during algal outbreaks.
Monitoring	<p>Routine monthly monitoring for two years following the completion of construction onsite.</p> <p>Routine monthly visual inspection of treatment trains for vegetation establishment, damage, weed invasion and clogging.</p>
Auditing	<p>Reviews are to be carried out on a quarterly basis to assess the appropriateness of the implementation strategy. A checklist is to be completed which assesses the effectiveness of strategies detailed above.</p>
Reporting	<p>An Aquatic Flora Report shall be submitted to TSC annually.</p> <p>Maintenance and compilation of assessment sheets to be appropriately stored onsite for inspection by local and state government officers.</p> <p>Operational phase</p> <p>Maintenance and compilation of assessment sheets to be appropriately stored onsite for inspection by local and state government officers.</p>
Identification of incident or failure	<p>Non compliance with agreed performance criteria will be identified by:</p> <ul style="list-style-type: none"> • Vegetative losses >20%. • Weed growth that impacts upon ecosystem function and/or hydraulic conductance. • Algal blooms exceeding 500 cells/ml.

Corrective action	<p>If vegetation fails, new vegetation should be planted and established. Vegetation may require supplementary replanting.</p> <p>Macrophyte density to be maintained at prescribed levels to achieve hydraulic conductance and pollutant removal.</p> <p>If blue green algae numbers exceed 500 cells/ml:</p> <ul style="list-style-type: none"> • Increase turnover mixing until numbers are brought back to lower levels. • Fertiliser activity to be limited. • Maintain regular monitoring. <p>If blue green algae numbers exceed 2,000 cells/ml:</p> <ul style="list-style-type: none"> • Increase mixing: <ul style="list-style-type: none"> • Increase turnover through additional pumping of the recirculation system. • Vertical mixing through emergency compressed air or mechanical mixing devices. • Fertiliser activity and sprinkling to be limited where possible in the vicinity of the test sites of concern. • Harvest and land dispose of any dead fish. • Monitoring frequency to be increased at affected sites to once a month. <p>If blue green algae numbers exceed 15,000 cells/ml:</p> <ul style="list-style-type: none"> • All fertiliser activity and sprinkling to be stopped in the vicinity of the sites of concern. • Warning signs to be posted around the sites of concern. • All site personnel to be notified. • Monitoring frequency to increase at affected sites to once a week. • Contingency measures are to be considered including: <ul style="list-style-type: none"> • Increased mixing. • Harvesting and land disposal of algae and dead fish. • Allowing bloom to run its course.
--------------------------	---

Commitment

The Proponent/ golf course management will ensure the health of the wetland and water body ecosystems is maintained through active weed and algae monitoring and management.

4.3.4 Threatened species - Wallum froglet

The information in this table was supplied by James Warren & Associates (2012) *Threatened Species Management Plan*.

Applies to:	Species: Wallum Froglet (<i>Crinia signifera</i>) Bulk earthworks phase, Landform stabilisation phase, Civil construction phase, On-maintenance phase - disturbed mixed grassland and regenerating heathland.
Person responsible:	Contractor's site manager, Proponent, Ecological Consultant, all personnel.

Issue	Protection of habitat. Provision of habitat from construction of artificial wetland areas (Constructed habitat areas providing suitable acidic conditions (pH 4.2 – 6.7), aquatic vegetation and a variety of microhabitats). Maintenance of constructed habitat areas to limit changes in hydrology, nutrient loading etc.
Operational policy	Protection of Wallum Froglet habitat in accordance with the <i>Threatened Species Management Plan</i> (JWA, 2012).
Performance criteria	<ul style="list-style-type: none"> Minimise impacts on Wallum Froglet habitat. Colonisation of constructed wetlands by Wallum Froglet. Maintenance of water quality (pH, nutrient levels) within constructed and naturally occurring habitat. pH should be 4.2 – 6.7 in accordance with the '<i>Threatened Species Management Plan</i>' (JWA, 2012) for habitat requirements for Wallum Froglet (<i>Crinia signifera</i>) and Olongburra Frog (<i>Litoria olongburensis</i>). This pH range of 4.2 to 6.7 is also identified in '<i>Habitat and Movements of the Wallum Froglet Crinia tinnula at the Southern Part of its Range</i>'.¹ A similar pH range of 4.2 to 7.2 is identified in '<i>Threatened frogs of New South Wales: Habitats, Status and Conservation</i>'.² Minimise any open water areas on the site as this will create optimum conditions for Cane Toads (predator of Wallum Froglet). All ponds should be planted with a dense edge of reeds/sedges, and drainage swales should be well vegetated with reeds/sedges.
Implementation strategy	<ul style="list-style-type: none"> Design of constructed wetlands (liaison with relevant personnel). Construction of wetlands. Landscaping /revegetation works. Maintenance of natural constructed wetlands (liaison with relevant personnel) and landscaping /revegetation works.

¹ White, A. W. & Pyke, G. H., 2006, '*Habitat and Movements of the Wallum Froglet Crinia tinnula at the Southern Part of its Range*'. Unpublished paper submitted to Journal of Herpetology.

² Ehmann, H. 1997 (ed), '*Threatened frogs of New South Wales: Habitats, Status and Conservation*'. Published by Frog and Tadpole Study Group of NSW Inc., Sydney.

Monitoring	<ul style="list-style-type: none"> • Reevaluation of monitoring and actions annually.
	<p>Regular inspections to:</p> <ul style="list-style-type: none"> • monitor water quality; and • monitor Wallum Froglet activity.
Auditing	<p>Regular monitoring inspections to be completed at stated intervals:</p> <p>Bulk earthworks phase, Landform stabilisation phase</p> <ul style="list-style-type: none"> • water quality monitoring on a weekly basis; and • frog monitoring on a monthly basis with an emphasis on monitoring in breeding season (June – August). <p>Civil construction phase, On-maintenance phase</p> <ul style="list-style-type: none"> • water quality monitoring on a Quarterly basis; and • frog monitoring on an annual basis with an emphasis on monitoring in breeding season (June – August).
	<p>Standard pro-formas for monitoring to be filled in accordingly including results of any water quality testing. Results of monitoring to be collated and presented as report to client, Council and any other relevant statutory authorities.</p>
Reporting	
Identification of incident or failure	<ul style="list-style-type: none"> • Physical failure of constructed wetlands (e.g. breach). • Inappropriate pH levels. • Records of high nutrient input. • Absence or decline of Wallum Froglet.
Corrective action	<p>Apply remedial measures to correct issues of water quality as determined by monitoring.</p>

Commitment

The contractor/ land user will commit to monitoring Wallum Froglet populations to ensure that habitats are maintained.

4.3.5 Threatened species - Olongburra frog

The information in this table was supplied by James Warren & Associates (2012) Threatened Species Management Plan.

Applies to:	Species: Olongburra Frog (<i>Litoria olongburensis</i>) Bulk earthworks phase, Landform stabilisation phase, Civil construction phase, On-maintenance phase - disturbed mixed grassland and regenerating heathland.
Person responsible:	Contractor site manager, Proponent, Ecological Consultant, all personnel.

Issue	<p>Protection and restoration of habitat - disturbed mixed grassland and regenerating heathland, two constructed dams which currently occur, one of which requires repair.</p> <p>Provision of habitat from construction of artificial wetland areas (Constructed habitat areas providing suitable acidic conditions (pH 4.2 – 6.7), aquatic vegetation and a variety of microhabitats).</p> <p>Maintenance of constructed habitat areas to limit changes in hydrology, nutrient loading etc.</p>
Operational policy	Protection of Olongburra Frog habitat in accordance with the <i>Threatened Species Management Plan</i> (JWA, 2012).
Performance criteria	<ul style="list-style-type: none"> Minimise impacts on Olongburra Frog habitat. Colonisation of constructed wetlands by Olongburra Frog. Maintenance of water quality (pH, nutrient levels). Maintenance of aquatic vegetation and dense reedland. Minimise any open water areas on the site as this will create optimum conditions for Cane Toads (predator of Olongburra Frog). All ponds should be planted with a dense edge of reeds/sedges, and drainage swales should be well vegetated with reeds/sedges.
Implementation strategy	<ul style="list-style-type: none"> Design of constructed wetlands (liaison with relevant personnel). Construction of habitat areas. Landscaping /revegetation works. Maintenance of natural and constructed wetlands (liaison with relevant personnel) as well as landscaping /revegetation works. Re-evaluation of monitoring and actions annually.
Monitoring	<p>Regular inspections to:</p> <ul style="list-style-type: none"> monitor water quality; and monitor Olongburra Frog activity.
Auditing	<p>Regular monitoring inspections to be completed at stated intervals:</p> <p>Bulk earthworks phase, Landform stabilisation phase</p> <ul style="list-style-type: none"> water quality monitoring on a weekly basis; and

Reporting	<ul style="list-style-type: none"> • frog monitoring on a monthly basis with an emphasis on monitoring in breeding season (June – August). <p>Civil construction phase, On-maintenance phase</p> <ul style="list-style-type: none"> • water quality monitoring on a quarterly basis; and • frog monitoring on an annually basis with an emphasis on monitoring in breeding season (spring & summer).
	<p>Standard pro-formas for monitoring to be filled in accordingly including results of any testing. Results of monitoring to be collated and presented as report to client, ecologist, Council and any other relevant statutory authorities.</p>
Identification of incident or failure	<ul style="list-style-type: none"> • Physical failure of constructed wetlands (e.g. breach). • Inappropriate pH levels. • Records of high nutrient input. • Absence or decline of Olongburra Frogs.
Corrective action	<p>Apply remedial measures to correct issues of water quality as determined by monitoring outcomes.</p>

Commitment

The contractor/ land user will commit to monitoring Olongburra Frog populations to ensure that wetlands are appropriately maintained.

4.3.6 Threatened species - Bush stone-curlew

The information in this table was supplied by James Warren & Associates (2012) Threatened Species Management Plan.

Applies to:	Species: Bush Stone-curlew (<i>Burhinus grallarius</i>) Bulk earthworks phase, Landform stabilisation phase, Civil construction phase, On-maintenance phase - disturbed mixed grassland and regenerating heathland.
Person responsible:	Contractor’s site manager, Proponent, Ecological Consultant, all personnel.

Issue	Protection and restoration of habitat - tall rank grassland and heathland, Scribbly Gum woodland and regrowth heath in the south eastern margins of precincts 12 and 13. Predation by foxes & feral dogs. Disturbance from human visitation & motor vehicles. Disturbance from use of herbicides/pesticides/fertilisers as part of vegetation and golf course management.
Operational policy	Protection and improvement of Bush Stone-curlew habitat in accordance with the <i>Threatened Species Management Plan</i> (JWA, 2012).
Performance criteria	Minimise impacts on Bush Stone-curlew habitat. Survival of planted trees to ensure additional habitat creation.
Implementation strategy	<ul style="list-style-type: none"> identifying and maintaining area to be set aside for habitat protection. surveying & fencing area to exclude vehicle access. signage installed stating ‘Habitat Area – Keep Out’. weed control & planting of additional Scribbly Gum to increase suitability of habitat. placement of woody debris to augment habitat requirements retain existing vegetation where possible. re-evaluation of monitoring and actions annually.
Monitoring	Periodic inspections to: <ul style="list-style-type: none"> ensure no works take place within habitat area; ensure fencing and signage are maintained; assess growth of planted trees & monitor weed invasion; and survey for presence of Bush Stone-curlew.
Auditing	Periodic monitoring inspections of planted trees to be completed at stated intervals (e.g. every 3 months) in addition to weed assessment & control (if required). Bush Stone-curlew surveying on a periodic basis (e.g. every 3 months).
Reporting	Standard pro-formas for monitoring planted trees and weed control works to be filled in by landscape maintenance staff/bush regenerators Survey

Identification of incident or failure	pro-formas to be completed by ecologist and presented as report to client, ecologist, Council and any other relevant statutory authorities.
	<ul style="list-style-type: none"> • Disturbance within identified habitat area. • Accidental removal of trees. • Poor survival of planted trees. • Removal of fencing or signage. • Weed invasion. • Absence or decline of Bush Stone-curlew population.
Corrective action	<p>Bulk earthworks phase, Landform stabilisation phase</p> <ul style="list-style-type: none"> • Educate contractors so that works (e.g. vegetation clearing) are not undertaken in habitat areas. • Replacement of any dead trees with new stock as soon as detected. • Responsibility for corrective actions rests with construction management, contractors and landscape staff or bush regenerators.
	<p>Civil construction phase, on-maintenance phase</p> <ul style="list-style-type: none"> • Minimise disturbance of habitat areas. • Replacement of any dead trees with new stock as soon as detected.

Commitment

The contractor/ land user will commit to monitoring Bush Stone-curlew populations and ensuring that the habitat area is appropriately protected and maintained.

4.3.7 Threatened species - Grass owl

The information in this table was supplied by James Warren & Associates (2012) Threatened Species Management Plan.

Applies to:	Species: Grass Owl (<i>Tyto capensis</i>) Bulk earthworks phase, Landform stabilisation phase, Civil construction phase, On-maintenance phase - disturbed mixed grassland and regenerating heathland.
Person responsible:	Contractor’s site manager, Proponent, Ecological Consultant, all personnel.

Issue	Protection and restoration of habitat – tall rank grassland and heathland. Predation by foxes & feral dogs. Disturbance from human visitation & motor vehicles. Disturbance from use of herbicides/pesticides/fertilisers as part of golf course management.
Operational policy	Protection of Grass Owl habitat in accordance with the <i>Threatened Species Management Plan</i> (JWA, 2012).
Performance criteria	<ul style="list-style-type: none"> Minimise impacts on Grass Owl habitat. Maintenance of rank grasslands and heathland vegetation.
Implementation strategy	<ul style="list-style-type: none"> Identifying and maintaining area to be set aside for habitat protection. Surveying & fencing area to exclude vehicle access. signage installed stating ‘Habitat Area – Keep Out’. weed control (if required). Retain existing vegetation where possible. re-evaluation of monitoring and actions annually.
Monitoring	Periodic inspections to: <ul style="list-style-type: none"> ensure no disturbance takes place within habitat area; ensure fencing and signage are maintained monitor (& control) weed invasion; and survey for presence of Grass Owl.
Auditing	<ul style="list-style-type: none"> Periodic weed assessment & control (if required) at 3 month intervals. Grass Owl surveying on a periodic basis (e.g. every 3 months).
Reporting	Standard pro-formas for monitoring weed control works to be filled in by landscape maintenance staff/bush regenerators. Survey pro-formas to be completed by ecologist and presented as report to client, Council and any other relevant statutory authorities.
Identification of	<ul style="list-style-type: none"> Contractors working within identified habitat area.

incident or failure	<ul style="list-style-type: none"> • Weed invasion. • Absence or decline of Grass Owl population.
Corrective action	<p>Bulk earthworks phase, Landform stabilisation phase</p> <ul style="list-style-type: none"> • Educate contractors so that works (e.g. vegetation clearing) are not undertaken in habitat areas. • Replacement of any dead trees with new stock as soon as detected. • Responsibility for corrective actions rests with construction management, contractors and landscape staff or bush regenerators. <p>Civil construction phase, on-maintenance phase</p> <ul style="list-style-type: none"> • Minimise disturbance of habitat areas. • Replacement of any dead trees with new stock as soon as detected.

Commitment

The contractor/ land user will commit to monitoring Grass Owl populations and ensuring that the identified habitat area is appropriately protected and maintained.

4.3.8 Threatened species - Koala

The information in this table was supplied by James Warren & Associates (2012) *Koala Plan of Management*.

Applies to:	Species: Koala (<i>Phascolarctos cinereus</i>) Bulk earthworks phase, Landform stabilisation phase, Civil construction phase, On-maintenance phase - disturbed mixed grassland and regenerating heathland.
Person responsible:	Contractor’s site manager, Proponent, Ecological Consultant, all personnel.

Issue	<p>Protection and restoration of habitat.</p> <p>Predation by feral dogs.</p> <p>Injury/death from vegetation clearing.</p> <p>Injury/death from vehicle strike.</p>
Operational policy	Protection and creation of Koala habitat in accordance with the <i>Koala Plan of Management</i> ('KPoM', JWA, 2012).
Performance criteria	<ul style="list-style-type: none"> Minimise loss of Koala feed trees as identified in the KPoM. Planting of additional feed trees in accordance with rehabilitation and maintenance targets prescribed in the KPoM (JWA, 2012). Creation of habitat corridors for movement & foraging.
Implementation strategy	<ul style="list-style-type: none"> Identify all areas of Core Koala habitat to be retained and surround with barrier fencing prior to any works commencing. Inform all contractors that these areas are to be retained. Contractors are prohibited to bring dogs on to site. Establish Koala sighting logbook for contractors to fill out while on site. All sightings, including mortalities, to be reported in accordance with KPoM. Identify potential areas for tree/corridor plantings. Survey and fence corridor planting areas and erect signage 'Restoration Area – Keep Out'. Vehicles restricted to a maximum speed of 50kph, only operating in daylight hours. Planting of preferred Koala food tree species within planting areas identified in the KPoM (JWA, 2012). <p>Re-evaluation of monitoring and actions annually.</p>
Monitoring	<p>Regular inspections to:</p> <ul style="list-style-type: none"> monitor fenced areas have not been breached; monitor health of plantings; and survey for Koala presence & use of habitat areas.

<p>Auditing</p>	<ul style="list-style-type: none"> • Periodic assessment of plantings & weed assessment & control (if required) within habitat areas at 3 month intervals. <p>Bulk earthworks phase, Landform stabilisation phase</p> <p>Koala surveys to be completed on a periodic basis (e.g. every 6 months).</p> <p>Civil construction phase, on-maintenance phase</p> <p>Koala surveys to be completed on a periodic basis (e.g. every 12 months).</p>
<p>Reporting</p>	<p>Standard pro-formas for monitoring weed control works to be filled in by landscape maintenance staff/bush regenerators Survey pro-formas to be completed by ecologist and presented as report to client and Council and any other relevant statutory authorities.</p> <p>A Koala Monitoring Report is to be prepared by a suitably qualified person on an annual basis, from the date of commencement of bulk earthworks, for 5 years or as otherwise determined by the Director-General. Reports to be submitted to DoP, DECCW, TSC and DPI Fisheries.</p>
<p>Identification of incident or failure</p>	<ul style="list-style-type: none"> • Contractors working within identified habitat area. • Removal of any marked Koala feed trees. • Weed invasion & decline in planting health. • Death of planted trees. • Absence or decline of Koala population.
<p>Corrective action</p>	<ul style="list-style-type: none"> • Educate staff that no clearing of Koala feed trees occurs, and that works do not occur within fenced Koala habitat areas. • Replacement of any dead trees with new stock as soon as detected, and weed control undertaken in restoration areas. • Responsibility for corrective actions rests with construction management, contractors and landscape staff or bush regenerators.

Commitment

The contractor/ land user will commit to monitoring Koala populations and liaising with construction management to ensure that identified habitat area is appropriately protected and maintained.

4.3.9 Waste management

Applies to:	Bulk earthworks phase, Civil construction phase, On-maintenance phase, Operational phase
Person responsible:	Proponent, Contractor’s Site Manager, Golf course manager, all personnel

Issue	Waste management.
Operational policy	<p>To minimise the amount of solid and liquid waste produced as a result of construction activities and general operations.</p> <p>To ensure all waste generated is stored, removed and recycled or disposed of in an appropriate manner.</p> <p>To minimise potential environmental and social impacts from waste and waste handling.</p> <p>The site is kept in a neat and tidy state.</p> <p>To ensure that all waste generated at the site is disposed of in accordance with the applicable legislation.</p>
Performance criteria	<p>Compliance with relevant legislation.</p> <p>No evidence of excessive waste or litter accumulating onsite, outside of designated containment areas.</p>
Implementation strategy	<p>General strategies:</p> <p>Waste management methods that employ reduction, reuse or recycling practices shall be used where practicable.</p> <p>The site shall be kept in a clean and tidy state, free from loose waste or litter.</p> <p>Waste material, including vegetation, litter, human waste, used oils and other wastes, shall not be disposed of by burning or burying onsite or in adjacent areas.</p> <p>All wastes shall be stored onsite in confined areas and managed to prevent environmental harm or nuisance from occurring.</p> <p>An appropriate number of covered waste receptacles shall be located onsite, with the provision of areas or additional receptacles for the storage of reusable and recyclable materials.</p> <p>Waste containers shall be emptied on a regular basis (or as required) by a licensed contractor.</p> <p>Areas for the storage of oils and other hazardous liquids used during construction shall be bunded and located away from waterways and drainage lines in accordance with Table 4.3.20 ‘Surface water quality’. Any spillage will be collected and disposed of offsite at an approved facility.</p> <p>All wastes transported from the site shall be covered or otherwise handled to prevent spillage or nuisance to the community and environment.</p> <p>Any waste material that is unable to be reused, reprocessed or recycled</p>

	<p>shall be disposed of at a landfill licensed by the DECCW to receive that type of waste.</p> <p>Bulk earthworks phase</p> <p>Areas used to store oils and other hazardous liquids during construction shall be bunded and located away from waterways and drainage lines in accordance with Table 4.3.20 'Surface water quality'. Any spillage will be collected and disposed of offsite at an approved facility.</p> <p>Civil construction phase, On-maintenance phase, Operational phase</p> <p>Organic waste:</p> <p>Tree prunings, grass clippings and other organic materials from the golf course area are to be collected and composted in a small, purpose built composting facility.</p> <p>Only category 1 organic materials will be composted in the facility.</p> <p>The composting facility will be located in any infrastructure zones.</p> <p>The compost facility will be constructed and operated in accordance with the NSW guidelines for composting facilities (even though it is not of sufficient size to warrant licensing).</p> <p>Composted organic materials will be used on landscaping projects in other areas of the urban foot print and landscaping.</p> <p>Golf course effluents:</p> <p>Effluents from the golf course will be either contained by impermeable membranes (such as the case with the tees and greens) or directed towards the bio-retention and filter basins for renovation and storage.</p> <p>The effluents will be reused on the fairways and factored in the nutrient and water balance determinations of the site.</p>
<p>Monitoring</p>	<p>The site manager/ golf course manager shall conduct weekly inspections of all work areas (specifically the waste containment areas and the property boundary) to ensure there is no accumulation of waste material.</p> <p>Inspection notes shall be recorded in the Site Diary and all waste management issues promptly addressed in accordance with the control measures detailed in the SOMP.</p> <p>All waste-related complaints shall be recorded in the Incidents/ Complaints Register in accordance with Table 4.3.30 'Incidents & complaints management'. This register shall be reviewed by management weekly.</p>
<p>Auditing</p>	<p>Monthly environmental audits (Bulk earthworks phase, Civil construction phase) of site activities, complaints, corrective actions and reporting by an independent consultant during the construction phase of the development to assess compliance with the SOMP.</p> <p>On-maintenance phase</p> <p>Annual environmental audits of site activities, complaints and corrective</p>

	actions.
Reporting	<p>Records of waste removal invoices shall be maintained and kept onsite.</p> <p>Site inspection notes, including the amount and type of waste observed onsite and any corrective actions, shall be recorded in the Site Diary.</p> <p>An Incidents/Complaints Register shall be maintained on-site and will be available for inspection by TSC (or other relevant authorities) upon request.</p> <p>When there is potential or actual environmental harm as a result of waste management, the site manager shall notify the appropriate authority and corrective actions implemented as directed.</p> <p>Annual waste management reports shall be prepared and provided to statutory authorities upon request.</p>
Identification of incident or failure	<p>Ongoing and repetitive waste-related observations or complaints.</p> <p>Contamination resulting from poor waste management practices.</p>
Corrective action	<p>The site manager/ golf course manager shall direct clean-up operations as required on the basis of site inspections.</p> <p>Additional corrective actions may be:</p> <ul style="list-style-type: none"> • Identifying the source of waste and the implementation of the following measures (if applicable): • The establishment of additional waste management areas including the provision of additional waste containers; and • Increasing the awareness among staff of the acceptable methods for storage and disposal of waste onsite.

Commitment

The contractor/ land user/ golf course manager will ensure waste is managed to ensure proper controls, removal and disposal systems are in place at all times.

4.3.10 Machinery, workshops, and dangerous goods handling & storage

Applies to:	Bulk earthworks phase, Civil construction phase, On-maintenance phase
Person responsible:	Contractor’s site manager, all personnel

Issue	Materials handling and storage management, and hazardous substance management.
Operational policy	To ensure that fuel, grease and other hazardous substances present onsite are managed in a safe and environmentally responsible manner.
Performance criteria	<p>Appropriate facilities will be available for the storage of hazardous materials in accord with the relevant acts and best management practices.</p> <p>No fuel, grease, oil or other hazardous substances shall escape containment bunds and contaminate the site soils, surface water or leave the site.</p> <p>No fuel, grease and/or oil contamination of the environment shall result due to operational activities.</p> <p>Bulk earthworks phase</p> <p>No fuel, grease and/or oil contamination of the environment shall result due to construction activities in accordance with Table 4.3.33 ‘Pollution control’ and Table 4.3.34 ‘Refuelling of construction equipment & vehicles’.</p>
Implementation strategy	<p>All materials shall be stored within the boundaries of an area designated as a storage and containment zone for materials on site. The zone is to be located away from the surrounding SEPP 14 wetlands and environmental protection areas in the central golf course infrastructure development area (outside of buffer zones).</p> <p>Storage facilities shall be constructed prior to hazardous material being brought to the site.</p> <p>Stockpile and storage areas shall be identified and any contained products shall be clearly marked.</p> <p>Minimum practical quantities of fuels, grease and other hazardous substances shall be located onsite. These materials shall be stored in sheltered, impervious and bunded areas (or as required by the applicable regulations).</p> <p>Containment bund capacity shall be 110% of the volume of the tank stored within it. Where multiple tanks are stored within the one bund, the capacity will be 110% of the largest tank.</p> <p>Material Safety Data Sheets (MSDS) will be available onsite for all hazardous materials used or stored onsite for the duration of the construction works.</p> <p>An emergency response plan shall be developed for the site to control risk to the environment from hazardous materials. This shall include spill</p>

	<p>prevention and pollution control programs and an operating procedure for containing and cleaning up spills in accordance with Table 4.3.27 'Site management'.</p> <p>Suitable quantities of absorbent materials shall be stored onsite to accommodate minor spills.</p> <p>Relevant staff shall be trained in chemical and fuel handling, spill containment and clean up procedures in accordance with Table 4.3.32 'Personnel training'.</p> <p>Personnel protection equipment shall be made available onsite as required for the use of hazardous substances.</p> <p>All suppliers shall be informed of procedures and restrictions required, and deliveries supervised during off-loading by appropriately trained personnel.</p> <p>Materials shall be adequately secured and loads covered where there is risk of spillage or loss of load.</p> <p>Imported materials shall be free of weeds, litter and contaminants.</p> <p>All regulated waste shall be removed and disposed of by an appropriately licensed waste contractor at an appropriately licensed waste disposal facility.</p>
Monitoring	<p>Weekly inspections will be carried out by the site manager to verify the integrity of material storage facilities and bunding. Visual inspections for spills and land contamination shall also be conducted.</p>
Auditing	<p>Bulk earthworks phase</p> <p>Monthly environmental audits of site activities, complaints, corrective actions and reporting by an independent consultant during the construction phase of the development to assess compliance with the SOMP.</p> <p>Civil construction phase, On-maintenance phase</p> <p>Annual environmental audits of site activities, complaints, corrective actions and reporting by an independent consultant during the construction phase of the development to assess compliance with the SOMP.</p>
Reporting	<p>Site inspection notes (a checklist of visual inspections) shall be recorded in a Site Diary.</p> <p>An incidents/complaints register shall be maintained onsite and will be available for inspection by TSC (or other relevant authorities) upon request.</p> <p>In the event of potential or actual environmental harm or nuisance, the site manager shall notify the NSW DECCW and corrective actions implemented as directed.</p> <p>Reports detailing any incidents and/or complaints and associated corrective actions shall be provided to statutory authorities upon request.</p>

Identification of incident or failure	Land or water contamination.
Corrective action	<p>The immediate containment of spillages with booms, containment bunds or other appropriate measures.</p> <p>Remediation of site contamination in consultation with environmental consultant and DECCW.</p> <p>Corrective actions (to be implemented in the event of land contamination) include:</p> <ul style="list-style-type: none"> • Identifying the source of contamination and reporting the incident to the appropriate authorities immediately. • Arranging for the source of the contamination to be rectified and for the contaminated area to be remediated. <p>Action for fuel/oil spillage:</p> <ul style="list-style-type: none"> • All ignition sources to be removed from vicinity of spill. • All equipment in vicinity of storage to be turned off. • Identification of source of spillage and take action to ensure similar incidents are avoided in future.

Commitment

The Proponent/ manager/ land user will ensure the handling and storage of machines and materials onsite is managed in a safe and environmentally responsible manner.

4.3.11 Erosion controls

Applies to:	Bulk earthworks phase, Civil construction phase
Person responsible:	Contractor’s Site Manager; Consulting Engineer

Issue	Erosion controls.
Operational policy	<p>To prevent the displacement of sediment and soil across and offsite during storm events.</p> <p>To manage erosion controls in accordance with the <i>Erosion and Sediment Control Plan</i> (G&S, July 2012) – Section 13 of the <i>Kings Forest Stage 1 Management Plan</i> (DAC, 2012).</p>
Performance criteria	No visual indication of erosion on stages under construction, including evidence of rilling (an indicator of sheet erosion).
Implementation strategy	<p>Erosion and sediment control devices shall be installed prior to the commencement of work in each stage in accordance with the site’s ESCP.</p> <p>No site disturbance shall commence until the appropriate approvals have been obtained.</p> <p>Where possible, the construction program shall be scheduled to minimise the potential for soil loss to occur. Where construction activities cannot be altered, additional controls shall be implemented in the areas of high erosion potential.</p> <p>Runoff and erosion controls shall be installed prior to clearing and include:</p> <ul style="list-style-type: none"> • Diversion of upslope runoff around cleared and/or disturbed areas in a way that minimises erosion, minimises the upslope catchment and diverts waters to a legal point of discharge. • Sediment control fences or other measures at the downslope perimeter of cleared and/or disturbed areas. • Regular maintenance of all erosion control measures at operational capacity until land is effectively rehabilitated. <p>Temporary erosion measures are to be employed onsite during construction in accordance with the site’s ESCP or where reasonably deemed necessary by TSC from an assessment of slope and soil type. Such measures shall be maintained at, or above, their design capacity. Such measures should be in accordance with the recommendations in Council’s ‘<i>Code of Practice for Soil and Water Management on Construction Works – Annexure A of Development Design Specification D7 – Stormwater Quality</i>,’ and ‘<i>Managing Urban Stormwater: Soils and Construction</i>’ March 2004 by Landcom, Australia.</p> <p>On stages where more than 1,000m² are to be disturbed, runoff controls are also to include:</p> <ul style="list-style-type: none"> • the use of barrier fencing; • the use of exclusion zones; and

	<ul style="list-style-type: none"> • minimising slope lengths of disturbed, uncontrolled areas. <p>Stripped topsoil shall be separated from subsoil materials and shall only be stripped from the areas designated on the appropriate plans.</p> <p>Stockpiled soil should be stored taking into account the following considerations:</p> <ul style="list-style-type: none"> • Stockpiles are not to be located on public footpaths, nature strips, roads, road shoulders or any other public land. • They will be located at least 2m away from any hazard areas. • They will be protected from upslope surface flows. • Downslope sediment filters will be provided. • Fill batters shall be located to avoid established trees. • Unless otherwise specified, trenches must be backfilled and compacted to 95% standard compaction and capped with topsoil. <p>Excess spoil may be retained onsite provided the stockpile area is prepared by stripping topsoil from beneath the fill site for further use in revegetation.</p> <p>Outside the construction area of Stage 1, existing surface water conditions should be maintained wherever possible.</p> <p>All stockpiles, including preload, should be seeded within a fortnight of final forming with an appropriate mix.</p>
Monitoring	<p>Regular site inspections shall be undertaken to monitor the effectiveness of sediment and erosion controls. A site inspection and monitoring program shall include:</p> <ul style="list-style-type: none"> • weekly site inspections; • inspections immediately following rainfall events that cause runoff; and • inspections immediately before site closure. <p>Surface water to be monitored at discharge points during rainfall events for suspended solids/turbidity in accordance with Section 4.3.20.</p>
Auditing	<p>Regular site inspections shall be carried out in accordance with the above monitoring requirements.</p> <p>Additional visual inspections to be carried out weekly and after rainfall events to verify that control measures are in place and properly maintained.</p>
Reporting	<p>Signed site inspection records, original test results, weekly and other result sheets shall be kept on site and made available on request to TSC officers and other relevant statutory authorities.</p>
Identification of incident or failure	<ul style="list-style-type: none"> • Signs of erosion on site.

Corrective action	<ul style="list-style-type: none">• Damaged or failed erosion control devices.• Decline in water quality as identified by environmental consultant.
	<p>Apply remedial measures to improve sediment and erosion control including the incorporation of additional measures, including but not limited to hay bales, silt fences and flocculation of water quality control ponds.</p> <p>Should additional measures prove unsuccessful, consultation with an environmental consultant and/or construction site erosion and sedimentation control specialist.</p>

Commitment

The Contractor will ensure best management practices are implemented during civil construction phase to minimise erosion.

4.3.12 Sediment control

Applies to:	Bulk earthworks phase, Civil construction phase
Person responsible:	Contractor’s Site Manager; Consulting Engineer

Issue	Sediment control.												
Operational policy	<p>To prevent the displacement of sediment and soil across and offsite during storm events.</p> <p>To manage sediment controls in accordance with the <i>Erosion and Sediment Control Plan</i> (G&S, July 2012) – Section 13 of the <i>Kings Forest Stage 1 Management Plan</i> (DAC, 2012).</p>												
Performance criteria	<p>Offsite discharges to comply with water quality criteria set by pre-construction background monitoring of the perimeters listed in Table 4.2.2. Interim performance criteria have been based on existing TSC water quality monitoring data.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr style="background-color: #1a2b3c; color: white;"> <th style="text-align: left;">Water Quality Parameter</th> <th style="text-align: left;">Release Criteria</th> <th style="text-align: left;">Criteria Type</th> </tr> </thead> <tbody> <tr> <td>Suspended solids</td> <td>10mg L⁻¹</td> <td>Maximum</td> </tr> <tr> <td>Turbidity</td> <td>10NTU</td> <td>Maximum</td> </tr> <tr> <td>Litter and gross pollutants</td> <td>No man made material >5mm in any dimension</td> <td>--</td> </tr> </tbody> </table>	Water Quality Parameter	Release Criteria	Criteria Type	Suspended solids	10mg L ⁻¹	Maximum	Turbidity	10NTU	Maximum	Litter and gross pollutants	No man made material >5mm in any dimension	--
Water Quality Parameter	Release Criteria	Criteria Type											
Suspended solids	10mg L ⁻¹	Maximum											
Turbidity	10NTU	Maximum											
Litter and gross pollutants	No man made material >5mm in any dimension	--											
Implementation strategy	<p>All sediment control measures and facilities must be installed and stabilised prior to the commencement of construction activities.</p> <p>No site disturbance shall commence until the appropriate approvals have been obtained.</p> <p>Temporary erosion measures (e.g. silt fences) are to be employed onsite during construction where reasonably deemed necessary by TSC from an assessment of slope and soil type. Such measures should be in accordance with the recommendations in Council’s <i>‘Code of Practice for Soil and Water Management on Construction Works – Annexure A of Development Design Specification D7 – Stormwater Quality,’</i> and <i>‘Managing Urban Stormwater: Soils and Construction’</i> March 2004 by Landcom, Australia.</p> <p>Silt fence geotextiles are to be replaced when damaged or permanently blocked.</p> <p>Level markers shall be installed within all sediment ponds.</p> <p>Internal waterbodies or waterways shall be dosed with flocculating agents when required to ensure that discharge water quality meets required limits specified in the above performance criteria.</p> <p>Sediment shall be cleaned out of sediment ponds when accumulated sediment volume reaches 70%. Removed materials must be disposed of</p>												

	<p>in a manner that does not cause pollution.</p> <p>All weather access tracks shall be constructed to all internal water bodies, trash racks and gross pollutant traps.</p> <p>Where practical, surface waters from undisturbed lands shall be diverted away from construction areas.</p> <p>Sediment detention basins and clean-water diversion channels shall be constructed prior to earthworks in accordance with the ESCP.</p> <p>When sediment controls are required outside the construction site, the following shall be adhered to:</p> <ul style="list-style-type: none"> • Where increased stormwater runoff is likely to accelerate erosion of any downstream watercourse, the necessary remedial work shall be undertaken; • All immediate downstream drainage inlets shall have appropriate controls installed in accordance with the approved engineering drawings; • All disturbed areas on other property are to be reinstated to the original condition. <p>Outside the construction area of each stage, existing surface water conditions to be maintained wherever possible.</p>
<p>Monitoring</p>	<p>Regular site inspections shall be undertaken to monitor the effectiveness of sediment and erosion controls. A site inspection and monitoring program shall include:</p> <ul style="list-style-type: none"> • weekly site inspections; • inspections immediately following rainfall events that cause runoff; and • inspections immediately before site closure. <p>Surface water quality to be monitored monthly and during rainfall events in accordance with the parameters listed in Table 4.2.2.</p>
<p>Auditing</p>	<p>Regular site inspections shall be carried out in accordance with the above monitoring requirements.</p> <p>Additional visual inspections to be carried out monthly and after rainfall events to verify that control measures are in place and properly maintained.</p>
<p>Reporting</p>	<p>Signed, site inspection records, original test results, weekly and other result sheets shall be kept on site and made available on request to TSC officers and other relevant statutory authorities.</p>
<p>Identification of incident or failure</p>	<ul style="list-style-type: none"> • Falling water quality as identified by environmental consultant. • Build-up of sediment.
<p>Corrective action</p>	<p>Apply remedial measures to improve sediment and erosion control including the incorporation of additional measures, including but not limited</p>

to, silt fences and flocculation of water quality control ponds.

Should additional measures prove unsuccessful, consultation with an environmental consultant and/or construction site erosion and sedimentation control specialist.

Commitment

The contractor will ensure best management practices are implemented into work practices throughout the civil construction phase to minimise sediment transport off site.

4.3.13 Acid sulfate soil identification

Applies to:	Bulk earthworks phase
Person responsible:	Contractor’s Site Manager; Environmental Consultant

Issue	Acid sulfate soil identification
Operational policy	Excavated material will be managed in accordance with the site’s <i>Acid Sulfate Soils Management Plan</i> (G&S, July 2012) – Section 27 of the <i>Kings Forest Stage 1 Management Plan</i> (DAC, 2012).
Performance criteria	All ASS & PASS are appropriately identified prior to treatment.
Implementation strategy	<p>All soils excavated across the site (below RL5.0) will be sampled according to the following phase 2 sampling protocols undertaken concurrently with the bulk earthworks (or ahead of the excavation face).</p> <p>Frequency: Take a minimum of 1 soil sample collected at each colour or texture change with a minimum of 1 sample every 500m³ of all excavated soils analysed by the SPOCAS method (or Chromium suite), either from investigative boreholes or the excavated profile face.</p> <p>Sample size: Soil samples approximately 0.3kg each with a brief soil texture description accompanying each sample.</p> <p>Sampling: Soil samples to be tested onsite or collected in sealed containers that exclude air for temporary storage prior to testing onsite.</p> <p>Handling and storage: Samples destined for storage shall be frozen or dried within 24 hours of collection.</p> <p>The volume of material being excavated shall be timed to ensure sufficient space is available to accommodate the number of treatment or liming pads for the drying and neutralisation of the ASS in accordance with Table 4.3.14 ‘Acid sulphate soil assessment and treatment’ of the SOMP.</p> <p>The timing of the excavation works shall also take into consideration the expected laboratory turnaround time to ensure the phase 2 (identification) and phase 3 (verification) results are obtained prior to the excavation and treatment of the next layer.</p> <p>Should issues arise which disrupt the anticipated timing of the excavation, changes shall be made to the earthworks strategy.</p> <p>Temporary short-term stockpiling of untreated ASS shall only be undertaken for a maximum period of 5 days in accordance with the <i>Acid Sulfate Soils Manual 1998</i> (ASSMAC). The total volume of stockpiled material should not exceed 20% of a day’s total extraction.</p> <p>In the event that operational delay times (for instance inclement weather) require the stockpiling of untreated ASS exceeding 5 days, medium-term stockpiles may be established for a maximum duration of 28 days. Should this be required, the relevant administrating authority shall be notified and justification provided.</p> <p>Stockpiled untreated ASS soils will be stored taking into account the following considerations:</p>

	<ul style="list-style-type: none"> • Stockpiles will be located away from hazard areas, including but not limited to watercourses, drainage lines and native vegetation, taking into account slope, soil type and surface area. • For all medium-term stockpiles, a guard layer will be in place. The amount of neutralising agent used will be 0.3 times the average potential and existing acidity of the stockpile/m² per vertical metre of soil that is to be temporarily placed in the stockpile. • All stockpiles will be appropriately bunded and protected from surface flows by the installation of diversion banks upslope of the stockpile. • Any leachate generated as result of the stockpile material will be contained and tested prior to release in accordance with Table 4.3.15 'Acid sulphate soil leachate monitoring'. • Downslope erosion and sediment controls will be installed in accordance with Table 4.3.11 'Erosion controls' and Table 4.3.12 'Sediment control' and dust mitigation measures adopted (if required) as per Table 4.3.25 'Air quality and dust management' for stockpiled ASS material. <p>Groundwater and surface water monitoring shall be undertaken to facilitate the detection of potential or emerging changes as a result of the exposure of ASS.</p> <p>Geotechnical investigations shall be undertaken in accordance with Table 4.3.36 'Geotechnical investigation & analysis' of the SOMP to allow for the identification of potential disturbances to in situ ASS as a result of filling activities, including pre-loading.</p>
Monitoring	<p>Laboratory analysis will employ the SPOCAS Method (Method 23) or Chromium Suite (Method 22B). Laboratory analysis will be undertaken in the Gilbert & Sutherland on-site ASS laboratory.</p> <p>Material (spatial) tracking of dry and wet excavated material will be undertaken by the environmental consultant and site supervisor. Records shall be kept of volumes excavated, location of excavated material and acid sulfate soil testing frequency.</p>
Auditing	<p>Regular inspections to be undertaken to ensure compliance with the above implementation strategies.</p>
Reporting	<p>ASS analytical results including interpretation and liming rates shall be reported to the site supervisor and kept onsite.</p>
Identification of incident or failure	<p>Insufficient sampling or failure to sample as identified by material tracking records and/or test results and/or procedures.</p>
Corrective action	<p>Undertake additional sampling as required to completely characterise the nature of the material to be disturbed. Consultation with an Environmental Consultant to determine appropriate rates for additional sampling.</p>

Commitment

The contractor will undertake all necessary investigations to identify the occurrence and severity of PASS, AASS and acidic soils during the bulk earthworks phase.

4.3.14 Acid sulfate soil assessment and treatment (dry and wet excavation)

Applies to:	Bulk earthworks phase
Person responsible:	Contractor’s Site Manager; Environmental Consultant

Issue	Acid sulfate soil assessment & treatment.
Operational policy	<p>No acid sulfate soils are to be disturbed or excavated without appropriate testing and/or treatment by neutralisation of the acid generation potential (AGP) of the material.</p> <p>Excavated material will be managed in accordance with the site’s <i>Acid Sulfate Soils Management Plan</i> (G&S, July 2012) – Section 27 of the <i>Kings Forest Stage 1 Management Plan</i> (DAC, 2012).</p>
Performance criteria	No material will be covered until phase 3 validation tests indicate compliance with acceptance criteria based on the action levels of oxidisable sulfur or TPA, as outlined in the <i>Acid Sulfate Soils Manual 1998</i> (ASSMAC).
Implementation strategy	<p>All material identified as AASS or PASS in accordance with the protocol detailed in Table 4.3.13 ‘Acid sulfate soil identification’ of the SOMP, shall be treated as follows:</p> <p>Lime Treatment</p> <p>All excavated soils will be treated with lime or neutralising agent to neutralise their equivalent net acid generating potential (TPA or equivalent oxidisable sulphur concentrations). Lime treatment will be required where the following thresholds are exceeded:</p> <p>Potential soil acidity (S_{POS} or S_{CR}): >0.3%, Actual soil acidity (TAA): >18 mol H⁺/t, If pHKCl <4.5 and/or if jarosite is present, retained soil acidity analysis (SNAS or SRAS) will also be required.</p> <p>A mixing factor of safety of 1.5 shall be implemented.</p> <p>Material will be placed in spatially tracked lots within bunded areas. The bunded areas shall have a leachate collection system. Water collected within these bunded areas shall be tested and treated in accordance with Table 4.3.15 ‘Acid sulfate soil leachate monitoring’ of the SOMP. Materials used to construct the bunds will be free from acid sulfate soils.</p> <p>The bunded area will be prepared with surface lime at the rate of 0.2 x average net acid generating potential (NAGP) per metre depth of material to be placed or at the minimum rate of 5kg/m²/metre depth of material.</p> <p>Material will be placed to a depth of <300mm, limed at the rate determined by Phase 2 testing outlined in Section 4.3.13 and mixed with a rotary hoe or disc plough to a minimum depth of 300mm.</p> <p>Excavation faces and exposed sides of open drains/pits will be surface limed with lime slurry immediately after excavation at a rate of 5kg/m². All</p>

	<p>areas will be regularly monitored and lime reapplied as required.</p> <p>Validation testing</p> <p>Following lime treatment, validation (Phase 3) testing will be performed by SPOCAS (or similar method agreed with DECCW) plus ANC sampled at the rate of one sample per 1,000m³ of treated material.</p> <p>Subsequent treatment layers (<300mm) will not be placed within the treatment pad until Validation (Phase 3) testing results are obtained, indicating the complete neutralisation of the treated material.</p> <p>Excavation works and timing of stockpiling/treatment</p> <p>All excavation works and stockpiling of untreated acid sulfate materials shall be carried out in such a manner that:</p> <ul style="list-style-type: none"> • The surface area of materials exposed to oxidation is minimised. • The length of time the untreated materials are exposed to air is minimised. • It provides for a system of suitable diversion drains or embankments to divert surface waters away from the stockpiles and the excavation area. • It ensures that any unforeseen groundwater seepage and/or leachate and/or stormwater runoff within the excavation area is collected and not released from the site, untreated to any stormwater drain or waters (including groundwater). • It ensures that any leachate and/or stormwater runoff which has been in contact with acid sulfate materials or contaminants is collected and not released from the site, untreated to any stormwater drain or waters (including groundwater). <p>Supply of neutralising agent</p> <p>A supply of neutralising agent or agricultural lime shall be kept onsite at all times for treatment of acid sulfate soils. The supply shall be stored in a covered and bunded area to prevent accidental release to the environment.</p> <p>A supply of hydrated lime shall be kept onsite at all times for treatment of acidic waters (if encountered). Storage requirements for hydrated lime shall be as specified for a neutralising agent or agricultural lime and in accordance with the manufacturer's MSDS.</p>
<p>Monitoring</p>	<p>Soil that has been treated by neutralisation shall meet the following performance criteria:</p> <ol style="list-style-type: none"> 1. Acid base accounting shall be used to demonstrate that there is an excess amount of acid neutralising capacity of at least 0.5 times the potential plus existing acidity of the soil (i.e. the 1.5 safety factor). If the excess acid neutralising capacity (ANC) is less than 0.2 times the potential plus existing acidity, the soil shall be re-treated. ANC shall also be moderated by the use of a fineness factor of at least 1.5. 2. Post-neutralisation, the soil pH is to be greater than 6.5; and

	<p>3. Excess neutralising agent shall remain within the soil until all acid generation reactions are complete and the soil has no further capacity to generate acidity.</p> <p>Collect lime delivery dockets and compare with calculated amounts required.</p> <p>All validated materials shall be stored separately to non-validated materials.</p>
Auditing	<p>Monthly auditing of testing and treatment procedures including review of lime treatment dockets and spatial tracking to be undertaken.</p>
Reporting	<p>Records including testing results and lime delivery dockets are to be kept on site during the construction phase and should be available for inspection at all times.</p> <p>Records shall be made available to DECCW and TSC upon request.</p>
Identification of incident or failure	<p>Further investigation would only be required if:</p> <ul style="list-style-type: none"> • Verification (Phase 3) sampling tests fail, indicating the insufficient application of lime. • The formation of jarosite in exposed or excavated soils was observed. • Areas of green-blue water or extremely clear water occurred. • Rust-coloured deposits on plants and on the banks of drains or water bodies were noted. • A sulfurous odour was detected. • The pH of related water bodies dropped substantially below background levels.
Corrective action	<p>Retesting of materials in vicinity of excavation using ASSMAC approved method.</p> <p>Any need for additional lime in specific lots would be assessed and applied with thorough mixing.</p>

Commitment

The contractor will appropriately treat any PASS and ASS excavated in the course of construction, in accordance with the recommended liming rates determined by Phase 2 testing.

4.3.15 Acid sulfate soil leachate monitoring

Applies to:	Bulk earthworks phase
Person responsible:	Contractor’s Site Manager; Environmental Consultant

Issue	Water quality monitoring.
Operational policy	Waters ponded within the bunded treatment pads or associated with acid sulfate soil stockpiles will be managed in accordance with the site’s <i>Acid Sulfate Soils Management Plan</i> (G&S, July 2012) – Section 27 of the <i>Kings Forest Stage 1 Management Plan</i> (DAC, 2012).
Performance criteria	All waters ponded within the bunded treatment pads or associated with acid sulfate soil stockpiles and discharged from the site or to on-site drains or watercourses will comply with the parameters listed in Table 4.2.2.
Implementation strategy	<p>Surface water monitoring will be undertaken prior to discharge of waters ponding in ASS treated areas. Existing surface water conditions shall be maintained outside the construction area.</p> <p>Runoff will be directed around the bunded PASS treatment areas to minimise the potential for leaching and the possibility of the bund breaching prior to the testing and treatment of the contained water.</p> <p>All ponded surface and/or groundwater within excavations in estuarine soils below 5m AHD shall be tested within the excavation and treated if necessary prior to discharge in accordance with Table 4.3.23 ‘Groundwater seepage monitoring.’</p> <p>Low pH waters (i.e. pH<5.5) that need to be amended to be consistent with receiving environment waters of pH >5.5 may be ameliorated in situ by the use of hydrated lime or crushed ag-lime to achieve a pH>5.5 and <9.0 prior to release. In using hydrated lime, all care shall be undertaken to ensure pH is not above 9.0.</p> <p>Low pH waters consistent with receiving environment waters of pH 4.2-6.7 and that contain dissolved iron above 0.3mg L⁻¹ will require treatment to reduce dissolved iron to acceptable levels prior to discharge.</p> <p>A supply of hydrated lime shall be kept on site at all times for treatment of acidic waters (if encountered). Storage requirements for hydrated lime shall be in accordance with the manufacturer’s MSDSs.</p>
Monitoring	<p>The contractor or site manager shall inspect site works weekly and following rainfall events for any evidence of ponded acidic waters.</p> <p>Pre-discharge monitoring will be undertaken as outlined above to ensure compliance with the release criteria and results will be documented.</p> <p>All monitoring will be undertaken using equipment regularly calibrated, with samples sent to a NATA registered laboratory where appropriate.</p> <p>Daily rainfall to be recorded by the civil contractor.</p>
Auditing	Environmental consultant to audit water quality results to ensure all discharges comply with the performance criteria.

<p>Reporting</p>	<p>Result sheets to be compiled for monitoring results relating to water quality of ponded water. These results to be kept onsite for inspection by local and state government officers upon request.</p> <p>These results to be included in monthly reports to the supervising engineer until completion of works.</p>
<p>Identification of incident or failure</p>	<p>Discharge of waters ponded within PASS treatment areas that are outside the specified limits for the site.</p>
<p>Corrective action</p>	<p>If ponded water is detected outside the criteria range, all such waters will be contained until such time as the water quality is adjusted to within the range specified by the outcome of background monitoring or other criteria stated above. Correction of water quality will be undertaken in consultation with the environmental consultant.</p>

Commitment

The contractor will ensure water that is trapped within bunded areas established for the treatment of PASS is monitored and treated to ensure that acidic water is not discharged from the site.

4.3.16 Maintenance of water treatment measures

Applies to:	Landform stabilisation phase, On-maintenance phase, Operational period of golf course
Person responsible:	Proponent, Site Manager, Golf Course Manager

Issue	Maintenance of stormwater quality treatment devices.
Operational policy	To ensure that the stormwater quality treatment devices are maintained at an appropriate operational standard.
Performance criteria	No significant change in the physical characteristics of treatment devices. No significant change in the physicochemical and/or biological characteristics of the treatment devices.
Implementation strategy	Routine visual inspections and monitoring and maintenance.
Monitoring	Routine monthly (landform stabilisation phase)/ quarterly (operational phase) visual inspection of treatment trains and vegetated open space for: <ul style="list-style-type: none"> • Litter. • Erosion. • Excessive sediment deposition. • Clogging (bio-retention). • Vegetation damage (e.g. die off, weed growth). • Damaged or failed treatment devices. • Change in physical characteristics: <ul style="list-style-type: none"> • water level; and • area, depth or bed profile of any bio-retention basin, waterway or wetland system.
Auditing	Audit inspections are to be carried out on a quarterly (Landform stabilisation phase, on-maintenance phase)/ annual (Operational phase) basis to verify that the stormwater quality control structures are properly maintained by the contractor.
Reporting	A checklist is to be completed which assesses the strategies listed above and includes the following: A record of inspection details and; A record of details of all maintenance activities (including volume of silt removed fro each GPT or other control structure). Results to made available to TSC at all times. A summary of the inspection checklist findings shall be included in the annual water quality monitoring report.
Identification of	Non compliance with the criteria will be identified by:

incident or failure	<ul style="list-style-type: none"> • Blockage of stormwater system. • Build up of sediment & litter or re-entrainment of trapped sediments. • Excessive erosion. • Vegetation damage. • Poorly maintained, damaged or failed control devices. • A change in the physical characteristics. • A change in the physicochemical and/or biological characteristics. • Impeded drainage of bio-retention and filter basins. • Deterioration of water quality downstream of the control structure/s.
Corrective action	<p>Bio-retention and filter basin maintenance</p> <p>Regular harvesting to ensure vegetation is maintained at acceptable levels.</p> <p>Removal of a portion of vegetation to maintain nutrient and biomass balance</p> <p>Removed vegetation to be composted and reused on landscaping in other parts of development site</p> <p>Soil renovation (as required) to maintain permeability</p> <p>Removal of litter.</p> <p>Gross pollutant traps</p> <p>Removal of trapped material in accordance with manufacturer’s specifications.</p> <p>Vegetated rough</p> <p>Regular mowing and maintenance of rough filter characteristic by mulching organic matter back into rough soil profile.</p> <p>Ensure vegetation is maintained at acceptable levels (minimum 85% foliage protective cover).</p> <p>Removal of litter within the swale.</p> <p>Waterway and wetland system</p> <p>As per weed management program</p> <p>Sediment/sludge removal</p> <p>Sludge and sediments are expected to settle in the inlet zones of the wetlands and other water bodies. In the operational state this is expected to be minor and de-silting will only be required on an infrequent basis (maybe every 50 years). Prior to works the recommended best practice method of sediment/sludge removal of the time will be used.</p>

Commitment

The Proponent/ Site Manager, Golf Course Manager will ensure management measures are implemented (if required) to ensure the stormwater quality treatment devices are maintained at operational standard.

4.3.17 Stormwater management

Applies to:	Landform stabilisation phase
Person responsible:	Proponent; Environmental Consultant

Issue	Stormwater quality management.
Operational policy	To ensure water discharged from the completed Stage 1 area during the landform stabilisation phase meets specified water quality objectives.
Performance criteria	Water discharged from the completed Stage 1 area during the landform stabilisation phase shall meet the water quality targets listed in Table 4.2.2.
Implementation strategy	Local site catchment stormwater quality control is achieved through treatment trains consisting of: <ul style="list-style-type: none"> • At source bio retention system. • Gross Pollutant Trap (GPT). • Vegetated swales.
Monitoring	Routine monthly visual inspection of treatment trains and vegetated open space for: <ul style="list-style-type: none"> • litter; • erosion; • excessive sediment deposition; • clogging (bio-retention); • vegetation damage (e.g. die off, weed growth); and • damaged or failed treatment devices. Sample recovery and in situ analysis will be performed by staff on site on a quarterly basis and samples will be forwarded to a NATA accredited laboratory.
Auditing	Reviews are to be carried out on a monthly basis during establishment to assess the implementation strategy. A checklist is to be completed which assesses the strategies listed above.
Reporting	A Water Quality Report for all water quality monitoring results and assessments shall be submitted to TSC annually.
Identification of incident or failure	Non compliance with agreed performance criteria will be identified by: <ul style="list-style-type: none"> • Visual inspections identifying build up of sediment & litter, excessive erosion and vegetation damage. • Poorly maintained, damaged or failed control devices. • Deteriorated water quality identified by the environmental consultant as being attributable to the construction activities.

Corrective action

If build up of sediment and litter occurs, remove material, identify cause, inspect all treatment techniques, revise design or review different alternatives and install if necessary.

If erosion occurs, fill, vegetate and/or install velocity dissipation in accordance with *'Managing Urban Stormwater: Soils and Construction'* March 2004 by Landcom, Australia.

If vegetation fails, new vegetation should be planted and established. Vegetation may require supplementary watering and replanting.

If water quality objectives are not met, inspect all treatment techniques, revise designs or review different alternatives and install if necessary. If silt fences fail, replace and monitor more frequently.

If release of silt and other material off the site occurs, clean up, inspect all treatment techniques, revise designs and review different alternatives and install; otherwise reduce the rate of excavation.

All development activities taking place at the time of incident/failure shall be reviewed to verify compliance with the SOMP provisions and, if necessary, construction methods and procedures shall be adjusted. Specific strategies to be implemented are as follows:

Suspended solids and turbidity

If total suspended solids exceed the site specific target the waters will be contained onsite for a period sufficient to allow suspended solids to settle out prior to release, or treated with a flocculent. After gypsum has been applied, the stored waters will be retested immediately prior to discharge.

Erosion control devices will be immediately inspected and cleaned if necessary. Additional devices will be installed if a need is detected to prevent future breaches of the suspended solids criteria. The placement of stockpiles and management of disturbed areas will be reviewed with regard to the sediment and silt control provisions.

Dissolved oxygen

In the event that dissolved oxygen levels drop below the site specific target, the waters will not be released until visual inspections for algae has been carried out. If algae is present, further laboratory tests will be carried out to determine the type of algae in the waters.

A general investigation will be carried out of the flow conditions of the affected waters, to assess the flow rates and volume of water passing through the monitoring locations.

Litter and gross pollutants

In the event that litter and gross pollutants with a dimension greater than 5mm are observed, this material will be clean up and appropriately disposed of as soon as practicable. The contractor shall inform staff of the appropriate waste disposal procedures.

Oil and grease

In the event that oil and grease are visible and/or an odour is detected within a waterbody, management strategies will be implemented (Hazardous and dangerous goods handling and storage). Specifically, the waters shall be contained and the oil and grease isolated through the use of booms, containments bunds or other appropriate measures. Remediation works shall be implemented in consultation with the environmental consultant and DECCW.

Commitment

The Proponent will ensure the quality of the discharge from the site meets the water quality objectives to ensure no detrimental impacts on the downstream environment, including the waterway and wetland system.

4.3.19 Site stabilisation

Applies to:	Landform stabilisation phase
Person responsible:	Contractor’s Site Manager

Issue	Landform stabilisation at the completion of the bulk earthworks phase Stage 1 works.
Operational policy	Landscaping, stabilisation and revegetation of completed areas to aid the treatment of surface water and minimise sediment transport.
Performance criteria	No sediment transport from completed areas.
Implementation strategy	<ul style="list-style-type: none"> Progressive stabilisation and revegetation of completed areas. The landscaping and rehabilitation program shall be programmed to ensure that minimal time delay occurs between final land shaping and permanent rehabilitation (a period of 20 days is to be provided). <p>All temporary erosion and sediment control works are to be removed once works are complete and revegetation is successfully established in formerly disturbed areas.</p>
Monitoring	Routine weekly inspections undertaken by the contractor’s site manager until the stage is stabilised.
Auditing	A checklist is to be completed which assesses the strategies listed above.
Reporting	Completed checklists to be kept onsite for inspection by TSC upon request.
Identification of incident or failure	<ul style="list-style-type: none"> Failure of vegetated areas Signs of erosion onsite. Damaged or failed erosion control devices. Decline in water quality as identified by environmental consultant.
Corrective action	<ul style="list-style-type: none"> Test topsoil if revegetation works have been unsuccessful to determine the possible problem. Review procedures in consultation with landscape architect and/or horticulturalist. <p>Apply remedial measures to improve sediment and erosion control including the incorporation of additional measures, including but not limited to hay bales, silt fences and flocculation of water quality control ponds.</p>

Commitment

The Proponent will ensure each stage or precinct is stabilised once final grade is achieved.

4.3.20 Surface water quality

Applies to:	Bulk earthworks phase, Landform stabilisation phase, Civil construction phase, On-maintenance phase, Operational period of golf course
Person responsible:	Contractor’s Site Manager, Proponent, Environmental Consultant, Golf Course Manager

Issue	Surface water quality.
Operational policy	<p>To ensure:</p> <ul style="list-style-type: none"> • That any waters discharged from the site meet the specified water quality objectives. • That the water quality in the waterway and wetland system remains at an acceptable level.
Performance criteria	All water discharged from the controlled discharge points will comply with the water quality criteria listed in Table 4.2.2 ‘Background water quality monitoring’.
Implementation strategy	<p>Monitoring of the sediment detention basins for compliance with background conditions will take place prior to any discharge of stormwater (controlled or uncontrolled) from the site.</p> <p>Samples are to be collected monthly and during rainfall events (defined as >25mm in any 24 hour period) at the upstream and downstream sampling locations and water quality control pond discharge point and analysed for the above parameters.</p> <p>Where water quality fails to meet the established criteria, corrective measures will be undertaken (e.g. if sediment problems are identified, settling in the sediment detention ponds shall be aided by dosing with flocculation agents) to achieve compliance with the water quality release criteria. Treated water is to be re-tested prior to release to establish the effectiveness of treatment measures.</p> <p>Landscaping activities and revegetation will occur as soon as possible during/after the construction phase of development.</p> <p>Only appropriate herbicides and fertilisers are to be used in accordance with TSC specifications.</p> <p>Silt fences will be placed along the downstream extents of all construction.</p> <p>Clean-up of GPT’s on a quarterly basis or after significant rainfall events.</p> <p>Bulk earthworks phase</p> <p>Construction of internal bio-retention and filter basins used as temporary sediment detention basins, other temporary sediment detention basins, clean-water diversion channels, swales and vegetated filter strips will be constructed prior to the commencement of earthworks.</p> <p>Stormwater control will be achieved by directing as much runoff from</p>

	<p>disturbed areas as practicable to the sediment detention basins.</p> <p>Clean water diversion channels will be used to divert clean water from construction areas.</p> <p>Civil construction phase, On-maintenance phase</p> <p>Completion and maintenance of internal bio-retention and filter basins, waterbodies, swales and vegetated filter strips as specified at detailed design and approved by TSC.</p>
<p>Monitoring</p>	<p>Sample recovery and in situ analysis will be performed by trained onsite staff and, when required, samples will be forwarded to a NATA-accredited laboratory. Sediment and erosion control measures will be inspected daily by the site manager during periods of rainfall.</p> <p>Bulk earthworks phase, Civil construction phase and On-maintenance phase</p> <p>Monthly and rainfall event-based (greater than 25mm in a 24 hour period) monitoring. Analysis for total algae numbers, chlorophyll-a and faecal coliforms will also be conducted monthly and during rainfall events once any waterbody(ies) specified by the erosion and sediment control plan have made operational.</p> <p>Monitoring for aluminium and total and dissolved iron will occur at water holding locations monthly and during rainfall events and prior to discharge off site. If iron floc, sediments or iron staining are observed at the discharge points, samples should also be taken for laboratory analysis and discharge halted until water has been treated to adequate levels. Iron indicator strips will be used if practicable.</p> <p>Landform stabilisation phase, Operational phase</p> <p>Routine quarterly monitoring including biannual rainfall event (>25mm/24hrs) monitoring. Monitoring to continue for one year following the completion of the On-maintenance period.</p> <p>Vertical Profiling:</p> <p>Routine quarterly (Landform stabilisation phase) / biannual (Operational phase) monitoring of temperature, DO, pH, EC and turbidity at 0.5m depths of all off-stream deep water bodies.</p>
<p>Auditing</p>	<p>Reviews are to be carried out on a monthly basis during establishment and biannually during the Operational phase to assess the implementation strategy. A checklist is to be completed which assesses the strategies listed above.</p>
<p>Reporting</p>	<p>Result sheets to be compiled for monitoring results relating to water quality of water bodies. These results to be kept onsite for inspection by local and state government officers.</p> <p>Monthly (Bulk earthworks phase, Civil construction phase) / biannual (On-maintenance phase) / annual (Landform stabilisation phase, Operational phase) reports to be submitted to TSC until completion of works. These</p>

	<p>reports will be submitted to TSC within 30 working days upon receipt of the laboratory results.</p> <p>The water quality reports will be prepared by a suitably qualified and experienced Environmental Consultant. These reports will detail:</p> <p>The results for each of the environmental indicators monitored:</p> <ul style="list-style-type: none"> • An assessment of the monitoring results against the release criteria. • An evaluation, if applicable, of the environmental conditions if monitoring results fall outside the limits of the release criteria. • Recommendations that are relevant to ensuring a high level of water quality is maintained. <p>Each report will include previous water quality results in tabular format for comparative purposes and trend graphs will be provided. Laboratory certificates will be provided.</p>
<p>Identification of incident or failure</p>	<p>The results of the water quality monitoring indicating concentrations exceeding the release limits specified in the “performance criteria” for a single water quality parameter.</p>
<p>Corrective action</p>	<p>All development activities taking place at the time of incident/failure shall be reviewed to verify compliance with the SOMP provisions and, if necessary, construction methods and procedures shall be adjusted.</p> <p>Specific strategies to be implemented are as follows:</p> <p>pH</p> <p>In the event that the pH of waters falls outside of the critical limits, such waters will be contained and the pH adjusted to within the target range prior to release. Monitoring of the pH level shall be carried out immediately prior to release.</p> <p>Low pH waters (i.e. pH<5.5) that need to be amended to be consistent with receiving environment waters of pH >5.5 may be ameliorated in situ by the use of hydrated lime or crushed ag-lime to achieve a pH>5.5 and <9.0 prior to release. If using hydrated lime, all care shall be undertaken to ensure pH is not above 9.0.</p> <p>Low pH waters consistent with receiving environment waters of pH 4.2-6.7 and that contain dissolved iron above 0.3mg L⁻¹ will require treatment to reduce dissolved iron to acceptable levels prior to discharge.</p> <p>Electrical conductivity</p> <p>If electrical conductivity exceeds 1.5 dS m⁻¹, the waters will be contained onsite until adequate EC levels are reached. Further monitoring of upstream waters will be conducted to assess the impact of the development on the absolute change to water quality.</p> <p>Rainfall data will also be assessed at such times to determine the impact that rainfall has had on the water quality of the site and discharging waters.</p>

Suspended solids and turbidity

If total suspended solids exceed 30mg L^{-1} the waters will be contained onsite for a period sufficient to allow suspended solids to settle out prior to release, or treated with a flocculent. After gypsum has been applied, the stored waters will be retested immediately prior to discharge.

Erosion control devices will be immediately inspected and cleaned if necessary. Additional devices will be installed if a need is detected to prevent future breaches of the suspended solids criteria. The placement of stockpiles and management of disturbed areas will be reviewed with regard to the SOMP Table 4.3.11 'Erosion controls' and Table 4.3.12 'Sediment control'.

Dissolved oxygen

In the event that dissolved oxygen levels drop below 6.5mg L^{-1} , the waters will not be released until visual inspections for algae has been carried out. If algae are present, further laboratory tests will be carried out to determine the type of algae in the waters.

A general investigation will be carried out of the flow conditions of the affected waters, to assess the flow rates and volume of water passing through the monitoring locations.

Litter and gross pollutants

In the event that litter and gross pollutants with a dimension greater than 5mm are observed, this material will be clean up and appropriately disposed of as soon as practicable. The contractor shall inform staff of the appropriate waste disposal procedures and reiterate the importance and sensitivity of the surrounding ecosystems.

Oil and grease

In the event that oil and grease are visible and/or an odour is detected within a waterbody, management strategies will be implemented. Specifically, the waters shall be contained and the oil and grease isolated through the use of booms, containments bunds or other appropriate measures. Remediation works shall be implemented in consultation with the environmental consultant and DECCW.

Commitment

The Contractor/ Proponent/ Site Manager/ Golf Course Manager will ensure routine monitoring is carried out to ensure the quality of the discharge from the site meets the water quality objectives.

4.3.22 Groundwater monitoring

Applies to:	Bulk earthworks phase, Land stabilisation phase, Civil construction phase, On-maintenance phase, Operational phase
Person responsible:	Contractor’s Site Manager; Environmental Consultant, Golf Course Manager

Issue	Groundwater monitoring.
Operational policy	<p>To establish and maintain stable groundwater conditions and verify by monitoring that development management is appropriate.</p> <p>Groundwater monitoring is to be undertaken in accordance with the site’s <i>Groundwater Assessment and Management Plan</i> (G&S, July 2012) – Section 9 of the <i>Kings Forest Stage 1 Management Plan</i> (DAC, 2012).</p>
Performance criteria	Groundwater monitoring shall be undertaken for the parameters listed in Table 4.2.2 ‘Background water quality monitoring’.
Implementation strategy	<p>Bulk earthworks phase</p> <p>Monitoring of groundwater levels should be undertaken fortnightly during the construction phase to determine any effect excavation and dewatering activities may have on groundwater levels.</p> <p>Groundwater samples are to be collected monthly and analysed for the parameters specified above.</p> <p>Landform stabilisation phase, Operational phase</p> <p>Monitoring of groundwater levels should be undertaken quarterly during the landform stabilisation phase.</p> <p>Groundwater samples are to be collected quarterly and analysed for the parameters specified above.</p> <p>Civil construction phase, On-maintenance phase</p> <p>Monitoring of groundwater levels should be undertaken monthly during the civil construction phase and On-maintenance phase.</p> <p>Groundwater samples are to be collected monthly and analysed for the parameters specified above.</p>
Monitoring	<p>Sample recovery and in situ analysis will be performed by onsite staff and, when required, samples will be forwarded to a NATA-accredited laboratory.</p> <p>Bulk earthworks phase</p> <p>Carry out fortnightly groundwater level monitoring and monthly groundwater quality monitoring at locations to be specified.</p> <p>Landform stabilisation phase, Operational phase</p> <p>Carry out quarterly groundwater level and quality monitoring at locations to</p>

Auditing	<p>be specified.</p> <p>Civil construction phase, On-maintenance phase</p> <p>Carry out monthly groundwater level and quality monitoring at locations to be specified.</p>
	<p>Bulk earthworks phase</p> <p>The environmental consultant is to audit water quality to ensure that no deleterious effects are resulting from any excavation, filling and dewatering operations at the site.</p> <p>The data from the water level measurement shall be collated quarterly and evaluated against the background monitoring data. It will also be used to verify the predictive model for groundwater behaviour.</p> <p>Landform stabilisation phase, Civil construction phase</p> <p>The environmental consultant is to audit water quality annually to ensure that no deleterious effects are resulting from any excavation, filling and dewatering operations at the site.</p> <p>On-maintenance phase, Operational phase</p> <p>The environmental consultant is to audit water quality biannually to ensure that no deleterious effects are resulting from site activities.</p>
	<p>Bulk earthworks phase</p> <p>Quarterly reports are to be submitted to TSC within one (1) month of the collection of water quality data.</p> <p>The quarterly reports to TSC shall include raw data, a results summary and a discussion comparing results with baseline values and ANZECC guidelines.</p> <p>Result sheets to be compiled for monitoring results. All results shall be made available for inspection by local and state government officers when requested.</p> <p>Landform stabilisation, Civil construction phase, On-maintenance phase, Operational phase</p> <ul style="list-style-type: none"> • Annual reports are to be submitted to TSC. • The annual reports to TSC shall 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 shall be made available for inspection by local and state government officers when requested.
Reporting	
Identification of incident or failure	<ul style="list-style-type: none"> • 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.
Corrective action	<p>If the test results for any parameter fails to meet the performance criteria (to be determined based on background monitoring), further investigations will be conducted. This will involve fortnightly groundwater quality</p>

monitoring (or more frequent if deemed necessary by the environmental consultant) of the subject parameter(s).

The results of the investigation should ascertain if the incident/failure is an anomaly or if a sustained decline in groundwater quality is present. If a trend exists for declining groundwater quality, the likely source(s) of contamination will be identified.

Should the investigation indicate that site activities are triggering the incident/failure, the following will be implemented:

- Locate the source of the contamination/level variation and take all possible actions to contain and control the contaminant/level variation. Investigate the cause of the contamination/level variation and take action to prevent a recurrence.
- All development activities taking place at the time of incident/failure shall be reviewed to verify compliance with the SOMP provisions and, if necessary, construction methods and procedures shall be adjusted.

The quality of the dewatered groundwater being discharged to recharge trenches shall be reviewed to confirm compliance with the performance criteria

Water Quality Parameter	Release Criteria	Criteria Type
pH	As developed from background monitoring	Range
Oil and grease	No visible film, no detectable odour	-

Commitment

The Contractor/ Site Manager/ Golf Course Manager will seek to establish stable groundwater conditions and verify by monitoring that development management is appropriate.

4.3.23 Groundwater seepage monitoring

Applies to:	Bulk earthworks phase, Civil construction phase
Person responsible:	Contractor's Site Manager; Environmental Consultant

Issue	Groundwater seepage monitoring.																																							
	Management of groundwater seepage quality entering excavation areas.																																							
	Operational policy																																							
Operational policy	<p>To minimise and manage the generation of acidic waters entering the onsite excavation areas through seepage. To provide for monitoring and treatment of these waters prior to disposal.</p> <p>Groundwater monitoring is to be undertaken in accordance with the site's <i>Groundwater Assessment and Management Plan</i> (G&S, July 2012) – Section 9 of the <i>Kings Forest Stage 1 Management Plan</i> (DAC, 2012).</p>																																							
Performance criteria	<p>Daily pH monitoring of any seepage within the excavation areas is to be undertaken prior to the disposal of these waters via dewatering. All waters discharged from the excavation areas to the recharge trenches during the construction phase should comply with the following criteria:</p> <table border="1"> <thead> <tr> <th>Water Quality Parameter</th> <th>Release Criteria</th> <th>Criteria Type</th> </tr> </thead> <tbody> <tr> <td>pH</td> <td>As developed from background monitoring</td> <td>Range</td> </tr> <tr> <td>Oil and grease</td> <td>No visible film or detectable odour</td> <td>--</td> </tr> </tbody> </table> <p>Where the discharge of dewatered groundwater to on-site or nearby drains and waterways is intended, water quality will satisfy the criteria set by pre-construction background monitoring. The following interim performance criteria prior to release at the controlled discharge locations:</p> <table border="1"> <thead> <tr> <th>Water Quality Parameter</th> <th>Release Criteria</th> <th>Criteria Type</th> </tr> </thead> <tbody> <tr> <td>pH</td> <td>5.5-7.5</td> <td>Range</td> </tr> <tr> <td>Salinity</td> <td>12ppt</td> <td>Maximum</td> </tr> <tr> <td>Suspended solids</td> <td>10mg L⁻¹</td> <td>Maximum</td> </tr> <tr> <td>Turbidity</td> <td>10NTU</td> <td>Maximum</td> </tr> <tr> <td>Dissolved oxygen</td> <td>5mg L⁻¹</td> <td>Minimum</td> </tr> <tr> <td>Total Iron</td> <td>1.7mg L⁻¹</td> <td>Maximum</td> </tr> <tr> <td>Total Aluminium</td> <td>9mg L⁻¹</td> <td>Maximum</td> </tr> <tr> <td>Litter and gross pollutants</td> <td>No man made material >5mm in any dimension</td> <td>--</td> </tr> <tr> <td>Oil and grease</td> <td>No visible film, no detectable odour</td> <td>-</td> </tr> </tbody> </table>	Water Quality Parameter	Release Criteria	Criteria Type	pH	As developed from background monitoring	Range	Oil and grease	No visible film or detectable odour	--	Water Quality Parameter	Release Criteria	Criteria Type	pH	5.5-7.5	Range	Salinity	12ppt	Maximum	Suspended solids	10mg L ⁻¹	Maximum	Turbidity	10NTU	Maximum	Dissolved oxygen	5mg L ⁻¹	Minimum	Total Iron	1.7mg L ⁻¹	Maximum	Total Aluminium	9mg L ⁻¹	Maximum	Litter and gross pollutants	No man made material >5mm in any dimension	--	Oil and grease	No visible film, no detectable odour	-
Water Quality Parameter	Release Criteria	Criteria Type																																						
pH	As developed from background monitoring	Range																																						
Oil and grease	No visible film or detectable odour	--																																						
Water Quality Parameter	Release Criteria	Criteria Type																																						
pH	5.5-7.5	Range																																						
Salinity	12ppt	Maximum																																						
Suspended solids	10mg L ⁻¹	Maximum																																						
Turbidity	10NTU	Maximum																																						
Dissolved oxygen	5mg L ⁻¹	Minimum																																						
Total Iron	1.7mg L ⁻¹	Maximum																																						
Total Aluminium	9mg L ⁻¹	Maximum																																						
Litter and gross pollutants	No man made material >5mm in any dimension	--																																						
Oil and grease	No visible film, no detectable odour	-																																						

	<p>*Note that pH will be consistent with receiving water quality. If receiving waters are estuarine, pH should be 6.5 – 7.5; if receiving waters are acidic, pH should be 4.2 – 6.7 in accordance with the Threatened Species Management Plan (JWA, 2012) for habitat requirements for Wallum Froglet (<i>Crinia signifera</i>) and Olongburra Frog (<i>Litoria olongburensis</i>). This pH range of 4.2 to 6.7 is also identified in 'Habitat and Movements of the Wallum Froglet <i>Crinia tinnula</i> at the Southern Part of its Range'.³ A similar pH range of 4.2 to 7.2 is identified in 'Threatened frogs of New South Wales: Habitats, Status and Conservation'.⁴</p>
<p>Implementation strategy</p>	<p>The site contractor shall be equipped with reliable pH monitoring equipment that will be calibrated on a weekly basis (at least).</p> <p>Dewatered groundwater will undergo appropriate treatment to ensure compliance with the above criteria prior to release into recharge trenches.</p> <p>Where disposal to surface water bodies is intended monitoring will be undertaken at the controlled discharge points by the environmental consultant monthly and during rainfall events (defined as >25mm in any 24 hour period).</p> <p>Records of the measured pH, time of monitoring, calibration records and treatment measures employed are to be kept on site for inspection by the environmental consultant and TSC.</p> <p>The total acid risk of seepage waters shall be determined from the total acidity (titratable) results measured during the background monitoring program. These results will be considered during the preparation of a treatment program for any dewatered acidic groundwater.</p> <p>Outside the construction area of each stage existing surface water conditions shall be maintained in accordance with Table 4.3.20 'Surface water quality'.</p> <p>If acidic seepage waters are encountered, the batter slopes of the excavation face should be subject to blanket liming as required at a predetermined rate in accordance with an acid sulfate management plan provisions.</p> <p>The addition of liquid lime to acidic seepage waters may also be required. The environmental consultant should be consulted to determine the need for this treatment and the required addition rate in accordance with Table 4.3.15 'Acid sulfate soil leachate monitoring' of the SOMP.</p> <p>Where recharge trenches are required, the base and sides of the trench should also be blanket limed at a predetermined rate prior to the disposal of dewatered groundwater in accordance with Table 4.3.14 'Acid sulfate soil assessment and treatment' of the SOMP.</p> <p>Before undertaking any earthworks in drains or watercourses, the drain or watercourse will be bunded and contained in a staged manner, with water</p>

³ White, A. W. & Pyke, G. H., 2006, 'Habitat and Movements of the Wallum Froglet *Crinia tinnula* at the Southern Part of its Range'. Unpublished paper submitted to Journal of Herpetology.

⁴ Ehmann, H. 1997 (ed), 'Threatened frogs of New South Wales: Habitats, Status and Conservation'. Published by Frog and Tadpole Study Group of NSW Inc., Sydney.

Monitoring	<p>tested and treated prior to discharge. Particular attention will be given to watercourses containing high levels of organic matter that may also have the potential to form monosulfidic black oozes (MBOs). Existing MBOs will be managed, with organic material within the drain kept to a minimum and dissolved oxygen concentrations within water-bodies monitored and increased if necessary (in accordance with the recommendations outlined in Tulau (2007). Titratable Actual Acidity contents and water pH levels of water-bodies will also be monitored and adjusted as necessary.</p>
	<p>Carry out daily pH monitoring of seepage waters entering excavations during the construction phase prior to disposal into recharge trenches.</p> <p>Where disposal to surface water bodies is intended, all waters leaving the site at the controlled discharge points will be monitored for pH, electrical conductivity, suspended solids, dissolved oxygen, oil and grease monthly and during rainfall events. Analysis for total algae numbers will also be conducted monthly and during rainfall events once the waterbody(ies) have been brought online and are operational.</p> <p>Monitoring for aluminium and total and dissolved iron will occur on a monthly basis at water holding locations prior to discharge off site.</p> <p>Samples will be forwarded to a NATA registered laboratory for analysis when required.</p>
Auditing	<p>A visual inspection of the contractor’s monitoring and treatment records shall be undertaken to verify sufficient monitoring and treatment is being undertaken.</p> <p>Management to audit water quality results monthly to verify that discharges comply with the performance criteria.</p>
	<p>Recording of monitoring results and treatment procedures is required. Results are to be available onsite at all times.</p>
Reporting	<p>Recording of monitoring results and treatment procedures is required. Results are to be available onsite at all times.</p>
Identification of incident or failure	<p>Discharge of ground waters to recharge trenches that do not satisfy the nominated pH range for this site.</p>
Corrective action	<p>Take necessary steps to address the problem and apply remedial measures to prevent the generation of excessive acid seepage waters (i.e. blanket liming of excavated faces and recharge trenches).</p>

Commitment

The contractor will minimise and manage the generation of acidic waters entering the onsite excavation areas through seepage and to monitor and treat these waters prior to disposal.

4.3.24 Vegetation clearing and soil disturbance

Applies to:	Bulk earthworks phase, Civil construction phase
Person responsible:	Contractor’s Site Manager

Issue	<p>Vegetation clearing & soil disturbance.</p> <p>Minimisation of the removal or disturbance of trees, shrubs and ground covers.</p>
Operational policy	<p>To maintain existing vegetation where possible during construction works.</p> <p>Vegetation to be retained is detailed in the <i>Vegetation Management Plan</i> (JWA 2012).</p>
Performance criteria	<p>No vegetation is to be removed prior to TSC approval.</p>
Implementation strategy	<p>Koala survey to be undertaken by appropriately qualified person prior to any clearing in areas of potential Koala habitat.</p> <p>An ecologist should be present during vegetation clearing.</p> <p>Trees to be conserved are to be flagged with surveyors marking tape.</p> <p>Trees to be cleared will be inspected immediately prior to clearing.</p> <p>Orphaned fauna encountered shall be managed in accordance with Table 4.3.37 ‘Fauna & flora protection – general provisions’.</p> <p>Erosion and sediment control measures shall be installed in accordance with Table 4.3.11 ‘Erosion controls’ and Table 4.3.12 ‘Sediment control’ of the SOMP.</p> <p>Compaction of ground in the drip line of trees to be retained shall be minimised.</p> <p>The area of disturbance shall be clearly delineated to keep vehicles, building materials and refuse away from areas to be conserved.</p> <p>The number of access points onto the site shall be minimised in accordance with Table 4.3.35 ‘Traffic management’.</p> <p>Vegetation buffer zones shall be maintained where possible.</p> <p>Where practicable vegetative debris shall be salvaged as logs or woodchip. Research into appropriate timbers and uses will be carried out prior to selection of salvaged logs. Vegetative debris set out to be salvaged for logs will be clearly marked and stockpiled onsite until required. Timber for woodchips will be chipped onsite and stockpiled within control measures until required.</p> <p>Where possible, shakedown devices shall be utilised to minimise sediment transport onto public roads.</p>
Monitoring	<p>Regular inspections shall be carried out to ensure that construction work areas are kept within stage boundaries.</p>

Auditing	<ul style="list-style-type: none"> • A weekly safety audit shall be conducted of the retained vegetation. • Management to examine the boundary of the works weekly.
Reporting	No reporting is necessary unless areas are inadvertently cleared outside approved stage boundaries.
Identification of incident or failure	<ul style="list-style-type: none"> • Clearing of designated retained vegetation. • Clearing outside of stage boundaries.
Corrective action	Reinstate and revegetate overcleared areas where necessary, unless the area is to be used for future staging.

Commitment

The contractor will maintain existing vegetation where possible during construction works.

4.3.25 Air quality and dust management

Applies to:	Bulk earthworks phase, Civil construction phase
Person responsible:	Contractor’s Site Manager

Issue	<p>Air quality & dust management.</p> <p>Minimisation of movement of dust offsite.</p>
Operational policy	To achieve acceptable air quality standards through the control of the movement of dust offsite from construction works.
Performance criteria	The target level for complaints by nearby residents is no more than one in any seven-day period. Ambient air quality should not deteriorate by more than 30% over a period of seven consecutive days. Dust deposition at any nearby residence should not exceed 100mg m ⁻² d ⁻¹ .
Implementation strategy	<p>The minimisation of the movement of dust offsite will be achieved through the following onsite practices:</p> <ul style="list-style-type: none"> • Construction works shall be staged to limit the areas exposed at any one time. • Erosion and sediment control measures shall be installed in accordance with Table 4.3.11 ‘Erosion controls’ and Table 4.3.12 ‘Sediment control’. • All permanent bunds and reshaped areas will be revegetated within a fortnight after completion of earthworks (including excavation and backfilling of services trenches). • Stockpiling onsite will be minimised where possible. • Ground surfaces will be kept damp (not wet). • Surfaces shall be left in a rough cloddy condition to increase roughness and slow surface wind speed. • An on-site water cart will be available at all times. • All work to cease if wind speed exceeds 10m/sec. • Contractors staff to be trained to implement dust minimisation measures in accordance with Table 4.3.25 ‘Air quality and dust management’ of the SOMP. • Protective ground covers shall be provided where appropriate, including mulches, vegetation, organic binders or dust retardants. • Traffic movements on any disturbed areas shall be minimised in accordance with Table 4.3.27 ‘Site management’ and Table 4.3.35 ‘Traffic management’ of the SOMP.
Monitoring	Daily inspections will be carried out to verify that dust mitigation measures are being implemented. Dust monitoring will be conducted upon receipt of complaints by residents in accordance with Table 4.3.30 ‘Incidents & complaints management’ of the SOMP.

	<p>If dust monitoring is to take place, the following will occur:</p> <ul style="list-style-type: none"> • Temporary dust deposition gauges will monitor the movement of dust offsite at the nearest residences adjacent to the active construction stages and within the predominant wind directions. • Monitoring will be undertaken in accordance with AS3580.10.1 (2003).
Auditing	<p>Management to examine the complaints register weekly and review corrective action taken in accordance with Table 4.3.30 'Incidents & complaints management' of the SOMP.</p>
Reporting	<p>Management to examine the complaints register weekly and review corrective action taken in accordance with Table 4.3.30 'Incidents & complaints management' of the SOMP.</p> <p>The contractor to notify the DECCW of a possible environmental nuisance on receipt of three (3) or more dust-related complaints in any 24 hour period.</p> <p>Reports will be provided to TSC upon request.</p> <p>Complaints by residents are to be recorded in a Complaints Register in accordance with Table 4.3.30 'Incidents & complaints management' of the SOMP and TSC notified.</p>
Identification of incident or failure	<p>Any dust-related complaints by residents will indicate a failure of the dust control measures.</p>
Corrective action	<p>Locate the source of the dust and implement the following measures:</p> <ul style="list-style-type: none"> • apply water sprays to vegetation; • cover or water exposed areas; and • if dust persists, cease the dust creating activities and amend construction strategies. <p>All dust complaints are to be addressed in consultation with the environmental consultant. Council shall be advised of the remedial measures taken to address dust complaints</p>

Commitment

The contractor will maintain acceptable air quality standards through the control of the movement of dust offsite from construction works.

4.3.26 Noise and vibration management

Applies to:	Bulk earthworks phase, Civil construction phase
Person responsible:	Contractor’s Site Manager; All personnel

Issue	Noise & vibration management.
Operational policy	To minimise noise and vibration impacts to the surrounding environment and nearby noise receptors.
Performance criteria	Compliance with the local area Noise policy of DECCW and TSC. No vibration impacts on nearby dwellings or structures.
Implementation strategy	<p>Working hours onsite shall be restricted to between those specified by regulation and/or bylaws of TSC.</p> <p>Noise sensitive locations and potential noise hazards shall be identified prior to the commencement of construction works of each stage. Equipment and machinery usage shall be scheduled taking into consideration these locations. Other strategies to be considered include:</p> <ul style="list-style-type: none"> • Moving equipment away from noise sensitive receptors. • Optimising the placement of haul roads and fixed plant and equipment. • The provision of sound walls and acoustical screening, including the use of earth embankments. • Incorporating buffer zones and setback distances between the noise source and receiver. • Using existing vegetation and landscaping as a shield and dissipater. <p>Construction works shall be programmed so as to minimise noise generating activities occurring early and late in the day.</p> <p>Staff training shall be conducted and include adequate information on typical noise exposures and methods for noise management in accordance with this policy.</p> <p>Plant and equipment shall be maintained and operated in accordance with manufacturer’s specifications.</p> <p>Plant and equipment shall be fitted with exhaust and radiator silencers where appropriate.</p> <p>The use of horns, sirens and reverse signals shall be restricted to where required for the satisfaction of workplace health and safety.</p> <p>Blasting (if required) shall be coordinated to reduce the level of ground vibration by altering drilling patterns, incorporating delays, controlling spacing and orientation and establishing blast timing to suit local conditions.</p>

Monitoring	<p>Daily inspections will be carried out by the Site Manager of all noise and vibration generating plant. Inspection notes to be recorded in Site Diary.</p> <p>All noise and vibration related complaints shall be recorded in the Incidents/Complaints Register in accordance with Table 4.3.30 'Incidents & complaints management'. This register shall be reviewed by management weekly.</p>
Auditing	<p>Monthly environmental audits of site activities, complaints, corrective actions and reporting by an independent consultant during the construction phase of the development to assess compliance with the SOMP.</p>
Reporting	<p>Site inspection notes, including any control measures implemented, shall be recorded in the Site Diary.</p> <p>An Incidents/Complaints Register shall be maintained on-site and will be available for inspection by TSC (or other relevant authorities) upon request.</p> <p>Upon the receipt of three or more noise-related complaints within a 24-hour period, TSC and the DECCW shall be notified.</p> <p>Reports detailing any incidents and/or complaints and corrective actions shall be provided to statutory authorities upon request.</p>
Identification of incident or failure	<p>The receipt of three or more noise-related complaints within a 24hr period.</p> <p>Ongoing, repetitive complaints.</p>
Corrective action	<p>Corrective actions will be implemented upon receipt of complaints (which have been investigated and determined to be legitimate). This shall involve identifying the source of the offending noise, and the implementation of the following measures (if applicable):</p> <ul style="list-style-type: none"> • Compliance with the approved hours of operations for the construction works. • The removal of noise producing works (where possible) from areas in close proximity to residential properties. • Improving the noise rating of offending equipment. • Providing acoustic enclosures/shielding for offending equipment. • Improving acoustic buffering at the site boundary. • If excessive noise levels persist, cease the noise creating activities and review site activities and procedures. <p>If, for the purpose of complaint resolution, noise auditing/monitoring is requested by TSC or the DECCW, the following will occur:</p> <ul style="list-style-type: none"> • monitoring of noise levels (including background levels) at the site by an independent noise consultant; and • measuring the contributing noise from the development at the nearest sensitive receptor (residence).

Commitment

The contractor will minimise noise and vibration impacts to the surrounding environment and nearby noise receptors.

4.3.27 Site management

Applies to:	Bulk earthworks phase, Civil construction phase
Person responsible:	Contractor’s Site Manager

Issue	Site management.
Operational policy	To ensure that the site works are undertaken in such a manner as to provide a safe and efficient workplace, whilst minimising any potential disturbances to the surrounding community and preventing environmental harm.
Performance criteria	<p>Effective control of site access and fencing.</p> <p>Site-specific induction training to ensure all personnel are aware of his/her responsibilities under the SOMP.</p> <p>All persons entering/visiting the site are appropriately informed of site requirements.</p>
Implementation strategy	<p>All construction activities, materials, equipment and personnel shall be restricted to within the boundaries of the site.</p> <p>Fencing around the perimeter of the work area shall be maintained for the duration of the construction activities.</p> <p>Hours of operation will be consistent with the requirements of the NSW DECCW guidelines and TSC bylaws.</p> <p>Gates at the site access points shall be maintained and secured after hours.</p> <p>All persons working on the project, including sub-contractors, shall undertake site induction training on the provisions of the SOMP prior to commencing activities onsite in accordance with the provisions of Table 4.3.32 ‘Personnel training’.</p>
Monitoring	<p>Weekly inspections shall be carried out by the Site Manager to verify:</p> <ul style="list-style-type: none"> • construction activities are being conducted within the approved hours of operation and within the staged boundaries; and • the integrity of the perimeter fencing, gates and locks. <p>The Site Manager shall ensure that contractors/sub-contractors are conforming to site requirements.</p>
Auditing	Monthly environmental audits of site activities, complaints, corrective actions and reporting by an independent consultant during the construction phase of the development to assess compliance with the SOMP.
Reporting	<p>Site inspection notes shall be recorded in the Site Diary.</p> <p>A record of all staff working onsite shall be maintained and available for inspection upon request.</p> <p>A training attendance register shall be established, recording the name of</p>

<p>Identification of incident or failure</p>	<p>the trainee and trainer, date trained and the elements of training delivered.</p> <p>A logbook shall be kept onsite to record all visitors to the construction area.</p> <p>An Incidents/Complaints Register shall be maintained (Table 4.3.30 'Incidents & complaints management) onsite and will be available for inspection by TSC (or other relevant authorities) upon request.</p> <p>Trespassing incidents are to be investigated immediately.</p>
<p>Corrective action</p>	<p>Unauthorised access to the construction site.</p> <p>Site management procedures are to be reviewed.</p> <p>Environmental induction training to be conducted regularly for new staff and repeated for staff responsible for any non-conformances.</p>

Commitment

The contractor will ensure that the site works are undertaken in such a manner as to provide a safe and efficient workplace, whilst minimising any potential disturbances to the surrounding community and preventing environmental harm.

4.3.28 Contractor management

Applies to:	Bulk earthworks phase, Civil construction phase
Person responsible:	Proponent

Issue	Contractor management.
Operational policy	To ensure the Proponent’s duty of care is met by ensuring the contractor is aware of his/her responsibilities under the terms of the SOMP.
Performance criteria	Each contractor is fully aware of its responsibilities under the terms of the SOMP and its obligation to respond to environmental issues arising from construction activities.
Implementation strategy	<p>The SOMP (and approved variations) will be included in the contract documentation and become a contractual obligation for all contractors performing any civil or earthworks.</p> <p>The contractor will integrate the SOMP (and approved variations) with the construction approach and staging. The development will comply with the SOMP at all times throughout the construction and operational phases. When assessing site conditions, the contractor shall and implement the relevant SOMP provisions in conjunction with the approved plans, drawings and documents.</p> <p>Monitoring and verifying that the SOMP is adhered to at all times and taking action if the specifications are not followed.</p> <p>Ensuring the contractor is aware of the SOMP arrangements and clarifying the expectations (with regards to specific environmental requirements) as they relate to each contractor.</p> <p>The proper and adequate coordination of contractors to ensure the integration of interrelated issues identified in the SOMP.</p> <p>The provision of advice, information and training to contractors and staff with regards to the implementation of the SOMP provisions in accordance with Table 4.3.32 ‘Personnel training’ of the SOMP.</p> <p>Review of the SOMP and the construction phase contracts at the end of each stage of works. Feedback shall be sought to the satisfaction of works being completed. If required, the Proponent shall manage the transition to new contractors.</p> <p>Remedies for breach of contract shall be enforced.</p>
Monitoring	<p>Weekly site inspections to be carried out by the Proponent’s representative to ensure the provisions of the SOMP are being adequately implemented.</p> <p>Monitoring the contractor’s continuing performance against contract obligations.</p> <p>Continuous monitoring of contractor work to ensure high productivity and reasonable progress towards performance outcomes of the SOMP.</p>

Auditing	<p>Liaison with internal managers, users and suppliers to identify and resolve any issues that arise.</p> <p>The contractor shall provide TSC, its employees and agents access to the site, on the giving of 24 hours written notice to the owner, to all water quality control and treatment systems, for the purpose of inspection, testing, sampling and recording.</p>
	<p>Monthly environmental audits of site activities, complaints, corrective actions and reporting by an independent consultant during the construction phase of the development to assess compliance with the SOMP.</p>
Reporting	<p>Full details shall be available to the contractor together with suggested corrective actions (if required).</p>
Identification of incident or failure	<p>Not applicable.</p>
Corrective action	<p>The Proponent has the right to call a halt to any activity being undertaken which is deemed in conflict with the provisions of the SOMP.</p>
	<p>The SOMP shall be regularly reviewed and updated to reflect changes to the construction project.</p>

Commitment

The Proponent will ensure all contractors are managed to ensure compliance with the SOMP.

4.3.29 Hazardous and dangerous goods handling & storage

Applies to:	Bulk earthworks phase, Civil construction phase
Person responsible:	Contractor’s Site Manager; All personnel

Issue	Materials handling and storage management, and hazardous substance management.
Operational policy	To ensure that fuel, grease and other hazardous substances present onsite are managed in a safe and environmentally responsible manner.
Performance criteria	<p>No fuel, grease and/or oil contamination of the environment shall result due to construction activities in accordance with Table 4.3.33 ‘Pollution control’ and Table 4.3.34 ‘Refuelling of construction equipment & vehicles’.</p> <p>Appropriate facilities will be available for the storage of hazardous materials.</p> <p>No fuel, grease or oil shall escape containment bunds and contaminate the site soils, surface water or leave the site.</p>
Implementation strategy	<p>All materials shall be stored within the boundaries of the active construction area.</p> <p>Storage facilities shall be constructed prior to hazardous material being brought to the site.</p> <p>Stockpile and storage areas shall be identified and any contained products shall be clearly marked.</p> <p>Minimum practical quantities of fuels, grease and other hazardous substances shall be located onsite. These materials shall be stored in sheltered, impervious and bunded areas (or as required by the applicable regulations).</p> <p>Containment bund capacity shall be 110% of the volume of the tank stored within it. Where multiple tanks are stored within the one bund, the capacity will be 110% of the largest tank.</p> <p>Material Safety Data Sheets (MSDS) will be available onsite for all hazardous materials used or stored onsite for the duration of the construction works.</p> <p>An emergency response plan shall be developed for the site to control risk to the environment from hazardous materials. This shall include spill prevention and pollution control programs and an operating procedure for containing and cleaning up spills in accordance with Table 4.3.27 ‘Site management’.</p> <p>Suitable quantities of absorbent materials shall be stored onsite to accommodate minor spills.</p> <p>Relevant staff shall be trained in chemical and fuel handling, spill containment and clean up procedures in accordance with Table 4.3.32 ‘Personnel training’.</p> <p>Personnel protection equipment shall be made available onsite as</p>

	<p>required for the use of hazardous substances.</p> <p>All suppliers shall be informed of procedures and restrictions required, and deliveries supervised during off-loading by appropriately trained personnel.</p> <p>Materials shall be adequately secured and loads covered where there is risk of spillage or loss of load.</p> <p>Imported materials shall be free of weeds, litter and contaminants.</p> <p>All regulated waste shall be removed and disposed of by an appropriately licensed waste contractor at an appropriately licensed waste disposal facility.</p>
Monitoring	<p>Weekly inspections will be carried out by the site manager to verify the integrity of material storage facilities and bunding. Visual inspections for spills and land contamination shall also be conducted.</p>
Auditing	<p>Monthly environmental audits of site activities, complaints, corrective actions and reporting by an independent consultant during the construction phase of the development to assess compliance with the SOMP.</p>
Reporting	<p>Site inspection notes shall be recorded in the Site Diary.</p> <p>An incidents/complaints register shall be maintained onsite (Table 4.3.30 'Incidents & complaints management') and will be available for inspection by TSC (or other relevant authorities) upon request.</p> <p>In the event of potential or actual environmental harm or nuisance, the site manager shall notify the DECCW and corrective actions implemented as directed.</p> <p>Reports detailing any incidents and/or complaints and associated corrective actions shall be provided to statutory authorities upon request.</p>
Identification of incident or failure	<p>Land or water contamination.</p>
Corrective action	<p>The immediate containment of spillages with booms, containment bunds or other appropriate measures.</p> <p>Remediation of site contamination in consultation with environmental consultant and DECCW.</p>

Commitment

The Proponent will ensure the handling and storage of construction materials onsite is managed in a safe and environmentally responsible manner.

4.3.30 Incidents & complaints management

Applies to:	Bulk earthworks phase, Civil construction phase
Person responsible:	Contractor’s Site Manager

Issue	Incidents & complaints management.
Operational policy	An Incidents/Complaints Register shall be maintained for the duration of the construction works.
Performance criteria	All incidents and complaints from the local community and onsite staff shall be recorded and corrective actions implemented as required.
Implementation strategy	<p>An Incidents/Complaints Register shall be maintained onsite for the duration of the construction works.</p> <p>For each incident/complaint notified, the following information shall be recorded:</p> <ul style="list-style-type: none"> • Date and time of incident/complaint. • Nature of incident/complaint and associated information. • Location of incident or source of complaint. • Name of person or body reporting the incident/complaint. • Employee who received notice of the incident/complaint. • Contractors review and comment. • Recommend corrective action to resolve incident/complaint. • List of organisations to be contacted with regard to incident/complaint. • Outcome of corrective actions undertaken subsequent to incident/complaint being recorded. • Date of resolution of incident/complaint. <p>A complaints handling procedure for reporting complaints from the affected community and employees shall be developed for the site. This procedure shall be written in plain, non-technical language, identify simple steps to be followed, be widely available to all staff and include investigation and review processes.</p> <p>All staff shall be aware of the complaints handling procedure and understand his/her responsibilities within the handling system.</p> <p>Training on the procedure, the benefits of good complaints handling and interpersonal skills (listening, questioning and conflict management) shall be provided for appropriate staff in accordance with Table 4.3.32 ‘Personnel training’.</p> <p>The complaints management procedure shall be easily accessible and publicised both internal and external to the site through the use of posters and signage. The contact information of the site manager or designated</p>

	<p>complaints manager shall be advertised.</p> <p>Where practical, staff shall assist members of the public making a complaint by providing advice on the complaint system, formulating the complaint and reporting the complaint.</p>
Monitoring	<p>Management to monitor the progress of complaints by examining the complaints register on a weekly basis and reviewing corrective actions taken.</p>
Auditing	<p>Monthly environmental audits of site activities, complaints, corrective actions and reporting by an independent consultant during the construction phase of the development to assess compliance with the SOMP.</p>
Reporting	<p>An Incidents/Complaints Register shall be maintained onsite and will be available for inspection by TSC (or other relevant authorities) upon request.</p> <p>The local authorities and the DECCW are to be notified and directions sought regarding corrective actions for incidents that have the potential to cause environmental harm.</p>
Identification of incident or failure	<p>Ongoing, repetitive complaints from the general public or staff.</p> <p>Serious or material environmental harm.</p>
Corrective action	<p>All complaints shall be treated as legitimate and investigated without prejudice.</p> <p>A response to each complaint shall be provided promptly, courteously and in accordance with their urgency.</p> <p>Corrective actions shall be implemented in the event of continued and sustained complaints and the failure to respond adequately to complaints from the public or authorities. Construction activities and procedures shall be adjusted accordingly.</p> <p>Corrective actions shall be in accordance with the provisions of the SOMP Table 4.3.25 'Air quality and dust management' and Table 4.3.26 'Noise and vibration management' or alternative management plan. In the event that serious or material environmental harm is caused or threatened by an activity, corrective actions shall be implemented in consultation with DECCW.</p> <p>Undertake a review and evaluation of the complaints handling procedure and identify possible systematic weaknesses and opportunities for improvement.</p>

Commitment

The contractor will ensure all incidents and complaints resulting from construction activities are promptly addressed and corrective actions implemented.

4.3.31 Light management

Applies to:	Bulk earthworks phase, Civil construction phase
Person responsible:	Contractor’s Site Manager

Issue	Light management.
Operational policy	To prevent artificial light affecting premises, roadways and wildlife.
Performance criteria	<p>Compliance with Australian Standard AS4282 – 1997 ‘Control of Obtrusive Effects of Outdoor Lighting’.</p> <p>Compliance with relevant nuisance legislation.</p> <p>Compliance with TSC conditions with respect to hours of operation.</p>
Implementation strategy	<p>All temporary lighting infrastructure shall be designed to prevent or minimise adverse effects on adjoining premises, roadways and wildlife.</p> <p>Professional advice on the design, operation and maintenance of all external lighting proposed for the site shall be sought prior to installation.</p> <p>The erection of lighting shielding walls, the provision of appropriate earth or vegetation barriers or other similar strategies shall be utilised to minimise light nuisance to neighbouring sensitive receptors.</p>
Monitoring	<p>All outdoor lighting erected in association with the construction works shall be assessed to ensure compliance with the performance criteria.</p> <p>All light related complaints shall be recorded in the Incidents/ Complaints Register in accordance with Table 4.3.30 ‘Incidents & complaints management’. This register shall be reviewed by management weekly.</p>
Auditing	Monthly environmental audits of site activities, complaints, corrective actions and reporting by an independent consultant during construction phase of the development to assess compliance with the SOMP.
Reporting	<p>Site inspection notes, including any control measures implemented, shall be recorded in the Site Diary.</p> <p>An Incidents/Complaints Register shall be maintained on-site and will be available for inspection by TSC (or other relevant authorities) upon request.</p> <p>Reports detailing any incidents and/or complaints and corrective actions shall be provided to statutory authorities upon request.</p>
Identification of incident or failure	<p>The receipt of three or more light-related complaints within a 24hr period.</p> <p>Ongoing, repetitive complaints.</p>
Corrective action	Where light complaints occur, which have been investigated and determined to be legitimate, appropriate corrective action shall be taken.

Commitment

The contractor will ensure artificial light emitted from the construction operations will be minimised wherever possible.

4.3.32 Personnel training

Applies to:	Bulk earthworks phase, Civil construction phase
Person responsible:	Contractor’s Site Manager

Issue	Personnel training.
Operational policy	To ensure that all personnel understand the environmental issues involved with construction operations.
Performance criteria	All personnel appropriately and adequately trained. All incidents are managed efficiently and corrective actions promptly implemented in accordance with the provisions of Table 4.3.27 ‘Site management’.
Implementation strategy	<ul style="list-style-type: none"> All personnel involved in the construction of the project shall undergo induction training on the provisions of the SOMP prior to commencing activities onsite. Training handouts will be made available to all personnel. Additional training shall be provided for employees involved in specialised construction activities (if applicable) so that the appropriate skills and competencies to participate in these activities are attained.
Monitoring	<ul style="list-style-type: none"> Management to examine the training attendance records and ensure appropriate training procedures are in place. Regular liaison with the contractors to keep onsite staff informed of any issues that arise with regards to the requirements of the SOMP.
Auditing	Monthly environmental audits of site activities, complaints, corrective actions and reporting by an independent consultant during the construction phase of the development to assess compliance with the SOMP.
Reporting	An attendance register shall be established and all attendees recorded following the completion of the training.
Identification of incident or failure	Not applicable.
Corrective action	Additional training or refresher courses shall be provided for new staff members or for those requiring additional training and performance review.

Commitment

The contractor will ensure personnel have adequate training to be aware of the provisions of the SOMP as they relate to site operations.

4.3.33 Pollution control

Applies to:	Bulk earthworks phase, Civil construction phase
Person responsible:	Contractor’s Site Manager; Environmental Consultant

Issue	Pollution control.
Operational policy	To minimise the incidents of pollution through controlling risks and hazards onsite.
Performance criteria	No pollution incidents during the construction phase.
Implementation strategy	<p>Petroleum and other chemical products shall be prevented from containing surface water and soil.</p> <p>Any onsite fuel storage areas shall comply with Australian Standards.</p> <p>Adequate trade waste and litter bins shall be provided onsite and serviced regularly in accordance with the provisions in Table 4.3.9 ‘Waste management’.</p> <p>Concrete wastes and washouts shall not be deposited in any location where the wastes or washings can flow, or can be washed into, any areas of retained vegetation or receiving waters.</p>
Monitoring	Weekly inspections shall be carried out on containment structures and washout areas.
Auditing	Not applicable.
Reporting	Weekly checklists shall be completed detailing any containment structure failures.
Identification of incident or failure	Pollution incidents causing environmental harm.
Corrective action	<p>Chemical or fuel spillages shall be reported to the DECCW and the Superintendent.</p> <p>Immediately contain spillages with booms, containment bunds or other appropriate measures immediately.</p> <p>The cause of any leak shall be established and appropriate action shall be undertaken to prevent a reoccurrence.</p> <p>Remediate any resultant site contamination in consultation with environmental consultant.</p> <p>Ensure management of fuels, oils and hazardous materials is occurring in accordance with the provisions detailed in Table 4.3.29 ‘Hazardous and dangerous goods handling & storage’.</p>

Commitment

The contractor will ensure construction works are managed in such a manner that minimises the risk of pollution.

4.3.34 Refuelling of construction equipment & vehicles

Applies to:	Bulk earthworks phase, Civil construction phase
Person responsible:	Contractor’s Site Manager; All personnel

Issue	Refuelling of construction equipment & vehicles.
Operational policy	To ensure that fuel, grease and other hazardous substances present onsite are managed in a safe and environmentally responsible manner.
Performance criteria	No fuel, grease and/or oil contamination of the environment shall result due to construction activities.
Implementation strategy	<p>Where reasonably practical, plant shall be refuelled offsite.</p> <p>Maintenance of machinery onsite is to be minimised and completed offsite wherever possible.</p> <p>The storage, preparation, use and disposal of fuels and oils shall take place under the supervision of the earthmoving contractor who will be responsible for any decontamination.</p> <p>Only appropriately trained personnel (as detailed in Table 4.3.32 ‘Personnel training’) shall conduct refuelling.</p> <p>An operating procedure for containing and cleaning up oil spills will be in place and all staff will be trained in these procedures.</p> <p>Suitable quantities of products designed to contain and absorb oil spills will be available onsite.</p> <p>Contaminated materials used in the clean up of a fuel/oil spill will be disposed of by a commercial waste contractor offsite at an appropriately licensed waste disposal facility in accordance with Table 4.3.33 ‘Pollution control’.</p>
Monitoring	<p>Weekly inspections will be carried out by the Site Manager of:</p> <ul style="list-style-type: none"> • the integrity of any temporary sumps or fuels storage areas; and • the quantity and condition of products designed to contain and absorb oil spills.
Auditing	Monthly environmental audits of site activities, complaints, corrective actions and reporting by an independent consultant during the construction phase of the development to assess compliance with the SOMP.
Reporting	<p>Site inspection notes shall be recorded in the Site Diary.</p> <p>Incidents/Complaints Register to be maintained on-site (refer to Table 4.3.30 ‘Incidents & Complaints management’) and be available for inspection by TSC (or other relevant authorities) upon request.</p> <p>In the event of potential or actual environmental harm arising from a spill, the site manager shall notify the DECCW and corrective actions implemented as directed.</p>

Identification of incident or failure	Reports detailing any incidents and/or complaints and corrective actions shall be provided to statutory authorities upon request.
	Land or water contamination.
Corrective action	<p>The immediate containment of spillages with booms, containment bunds or other appropriate measures.</p> <p>Remediation of site contamination in consultation with environmental consultant and DECCW.</p> <p>Corrective actions (to be implemented in the event of land contamination) include:</p> <ul style="list-style-type: none"> • Identifying the source of contamination and reporting the incident to the appropriate authorities immediately. • Arranging for the source of the contamination to be rectified and for the contaminated area to be remediated. <p>Action for fuel/oil spillage:</p> <ul style="list-style-type: none"> • All ignition sources to be removed from vicinity of spill. • All equipment in vicinity of storage to be turned off. • Identification of source of spillage and take action to ensure similar incidents are avoided in future.

Commitment

The contractor will ensure all employees are trained in the clean-up procedures of spillages of oils and chemicals to prevent potential land contamination.

4.3.35 Traffic management

Applies to:	Bulk earthworks phase, Civil construction phase
Person responsible:	Contractor’s Site Manager; Civil Engineering Consultant

Issue	Traffic management.
Operational policy	To provide a safe and efficient working environment and to minimise potential disturbance to the community as a result of vehicular movement onsite.
Performance criteria	Effective control of construction traffic to ensure that where possible traffic is kept off public roads and away from existing developed properties.
Implementation strategy	<p>Haul roads shall be constructed across the subject site. The use of Haul roads in lieu of public roads, where possible, shall become a contractual obligation for the contractors.</p> <p>All access points to the construction site shall be clearly defined and appropriate signage erected.</p> <p>All access roads shall be adequately maintained, including the erection of signage and dust suppression to ensure safe travel is maintained at all times.</p> <p>Speed limits shall be enforced for all access roads. Limits shall be reduced during times of high winds to prevent the production of excessive dust.</p> <p>Sufficient parking areas and loading zones shall be provided for staff and suppliers.</p> <p>Workers, materials or trucks will not obstruct existing footpaths and roads.</p> <p>Fencing shall be constructed at the site access points to restrict pedestrian access from local streets for the duration of the construction works.</p>
Monitoring	<p>Continual vigilance shall be maintained by the Site Manager to ensure all contractual obligations are met.</p> <p>Weekly inspections shall be carried out by the site manager to verify:</p> <ul style="list-style-type: none"> • the condition of site access points and any haul roads; • the provision of sufficient parking and loading zones; and • the erection of adequate signage. <p>Inspection notes are to be recorded in the Site Diary.</p>
Auditing	<p>Monthly environmental audits of site activities, complaints, corrective actions and reporting by an independent consultant during the construction phase of the development to assess compliance with the SOMP.</p> <p>Management to examine the complaints register weekly and review corrective actions taken.</p>

Reporting	A copy of all Site Diary notes and any other correspondence relating to traffic shall be forwarded to the Contract Superintendent on a monthly basis.
	An incidents/complaints register shall be maintained onsite and will be available for inspection by TSC (or other relevant authorities) upon request.
	A record of any breach of contractual obligations and of any complaints from adjoining residents shall be kept in the Site Diary. Any complaints from adjoining residents shall immediately be conveyed to the Contract Superintendent.
Identification of incident or failure	Vehicles operating in breach of contractual conditions.
Corrective action	Review procedures to ensure compliance with the SOMP.
	Amend site access and parking regimes to reflect onsite constraints during the construction process.
	Issue written instructions to persons in breach of contractual obligations.

Commitment

The contractor will manage traffic generated by the development in compliance with the provisions of the SOMP.

4.3.36 Geotechnical investigation & analysis

Applies to:	Bulk earthworks, Civil construction phase
Person responsible:	Contractor’s Site Manager; Geotechnical Consultant

Issue	Geotechnical investigation & analysis.
Operational policy	To manage the iterative process of investigation, design and construction monitoring to enable geotechnical design constraints to be formulated at the end of construction that are consistent with the proposed future use of the site.
Performance criteria	<p>Compliance with the recommendations of the Geotechnical Investigation for Proposed Residential Subdivision (Cardno Bowler October 2010) and any other future Geotechnical Engineering Management Plan (GEMP) prepared by qualified engineers and approved by TSC.</p> <p>Construction control testing and monitoring to assess progress of foundation treatment and determine when surcharge may be removed.</p> <p>Review of data and specification of geotechnical design constraints for infrastructure and buildings on development platforms.</p>
Implementation strategy	Development and use of a Geotechnical Engineering Management Plan.
Monitoring	<p>Placement and compaction of engineered fill shall be carried out under a Level 1 Overview as defined by AS3798-1996 “Guidelines on Earthworks for Commercial and Residential Development”. A construction control testing program shall be carried out in accordance with AS3798-1996.</p> <p>During the period of placement and compaction of engineered fill and surcharge, monitoring shall be carried out of settlement monitoring stations to measure the magnitudes of settlement caused by consolidation. Monitoring shall be carried out of piezometers to measure excess pore water pressure.</p>
Auditing	<p>The geotechnical consultant shall review the results of construction control materials testing, excess pore water pressure measurements and settlement monitoring to determine whether the data arising during the construction phase indicate suitable materials and procedures are adopted.</p> <p>During placement and compaction of engineered fill and the period of surcharge, excess pore water pressures around the perimeter of each fill area shall be reviewed and compared with target values required to achieve acceptable factors of safety against instability. Where the target values are exceeded, further placement of engineered fill and surcharge shall be delayed until advised by the geotechnical consultant.</p> <p>Surcharge shall not be removed until directed by the geotechnical consultant having regard to the monitoring data and any revised design assumptions.</p>

<p>Reporting</p>	<p>The results of all reviews shall be provided to TSC in a written format within 20 business days of completion of the reviews.</p> <p>If the Council makes a written request for information in relation to the submitted results, the geotechnical consultant shall provide the requested information in a written format within 10 business days of receipt of the written request.</p> <p>The likely future settlement that may occur on the development platforms is to be assessed and the geotechnical design constraints for infrastructure and buildings on the development platforms are to be specified.</p> <p>On completion of bulk earthworks, the geotechnical consultant shall prepare a comprehensive report on all additional site investigations/testing, construction monitoring of settlement and geotechnical construction overview of earthworks.</p>
<p>Identification of incident or failure</p>	<p>A significant difference between monitored data and design assumptions.</p> <p>Excess pore water pressures beneath the perimeter of a fill area exceeding target values.</p>
<p>Corrective action</p>	<p>Any significant difference between monitored data and design assumptions will require a review to be carried out of the design and construction program.</p> <p>Where excess pore water pressures beneath the perimeter of a fill area exceed target values, further placement of engineered fill and surcharge shall be delayed until advised by the geotechnical consultant.</p>

Commitment

The contractor will ensure the appropriate geotechnical investigations are conducted to ensure construction works being undertaken are consistent with the design assumptions and the proposed future use of the site.

4.3.37 Fauna & flora protection – general provisions

Applies to:	Bulk earthworks phase
Person responsible:	Contractor’s Site Manager; All personnel

Issue	Fauna & flora protection.
Operational policy	<p>To minimise the impact of construction activities on existing vegetation and fauna.</p> <p>Bulk earthworks will be controlled by the <i>Vegetation Management Plan</i> and <i>Threatened Species Management Plan</i> (JWA, 2012).</p>
Performance criteria	<p>No clearing or damage of vegetation beyond the limits of the construction site.</p> <p>Minimal disturbance to native fauna.</p>
Implementation strategy	<p>Flora management</p> <p>Existing vegetation shall be retained in accordance with the indicative golf course development plan.</p> <p>Temporary fencing shall be erected around all habitat or significant vegetation that is to be retained or avoided in the field.</p> <p>Buffer zones shall be maintained around protected areas to avoid encroachment by construction activities.</p> <p>The movement and parking of vehicles and stockpiling of materials shall be avoided within the drip line of trees to be retained.</p> <p>Vegetation shall only be cleared from within the designated clearing area. Vegetation to be cleared shall be clearly marked with flagging tape prior to any clearing activities.</p> <p>Where practicable, vegetation shall be salvaged for use in future rehabilitation/revegetation works. Topsoil, subsoil, root stock and cleared vegetation shall also be retained for use in rehabilitation.</p> <p>Where practicable, chipping or mulching of cleared vegetation shall be undertaken for use in stabilisation activities. If chipping or mulching is not possible, disposal shall be in accordance with local requirements.</p> <p>Where surface grades are modified, surface drainage shall be directed away from retained trees.</p> <p>Any underground services which are installed within the drip line of a tree that is part of a tree retention area are to be installed by means of tunnel boring or a similar technique.</p> <p>Within the tree retention area:</p> <ul style="list-style-type: none"> • Earthworks are not to be undertaken except for the installation of underground services. • If underground services are to be installed through the root zone of a tree, tunnel boring or a similar technique shall be used. • Trees shall not be removed unless TSC are reasonably satisfied

	<p>that the removal of the tree would not adversely impact on visual amenity or the tree represents a danger to the safety of persons or property.</p> <p>Fauna management</p> <p>Light, noise and vibration shall be managed in accordance with Table 4.3.31 'Light management' and Table 4.3.26 'Noise and vibration management' to avoid excessive disturbance to local fauna.</p> <p>All construction and maintenance staff shall be aware of the possibility of encountering fauna and shall inspect vegetation immediately before clearing.</p> <p>Orphaned or injured fauna shall be reported immediately to NSW PWS. Fauna shall only be captured or handled by qualified staff.</p>
Monitoring	<p>The site manager shall conduct weekly inspections of vegetation adjacent to areas of works to ensure no damage to the retained vegetation has occurred.</p>
Auditing	<p>Monthly environmental audits of site activities, complaints, corrective actions and reporting by an independent consultant during the construction phase of the development to assess compliance with the SOMP.</p> <p>Management to examine the complaints register weekly and review corrective action taken in accordance with Table 4.3.30 'Incidents & complaints management'.</p>
Reporting	<p>Site inspection notes shall be recorded in the Site Diary.</p> <p>An incidents/complaints register shall be maintained on-site and will be available for inspection by TSC (or other relevant authorities) upon request.</p> <p>Details shall be recorded of any fauna encountered and actively removed or treated during the project works, including action by NSW PWS.</p>
Identification of incident or failure	<p>Evidence of disturbance, introduction of noxious weeds or pest animals.</p>
Corrective action	<p>Any trees or vegetation inadvertently damaged or destroyed as a result of construction works shall be repaired or replaced.</p> <p>Dangerous limbs shall be removed by a suitably qualified arborist.</p> <p>Harmed or orphaned fauna shall be reported to NSW PWS and treated accordingly.</p>

Commitment

The contractor will ensure existing flora (identified for retention) and fauna is protected at all times during construction works.

4.3.38 Freshwater ecology

Applies to:	Bulk earthworks phase
Person responsible:	Contractor’s Site Manager; Environmental Consultant

Issue	Freshwater ecology.
Operational policy	To maintain and/or enhance the value of freshwater ecosystems within and downstream of the site.
Performance criteria	Water to comply with the criteria listed in Table 4.2.2 ‘Background water quality monitoring’. Water may be discharged from the site that exhibits a suspended solids concentration greater than 50mg L ⁻¹ , providing the concentration in the discharge is 10% less than the concentration exhibited in the receiving water. No decline in macroinvertebrate species richness.
Implementation strategy	Water levels maintained throughout construction phase. Sediment and erosion control measures to protect water from sedimentation and turbidity in accordance with Table 4.3.11 ‘Erosion controls’, Table 4.3.12 ‘Sediment control’ and Table 4.3.20 ‘Surface water quality’. Only locally endemic macrophyte species planted suited to site conditions. Monitoring strategies to be implemented incorporating water quality, weed removal and macroinvertebrate sampling.
Monitoring	Refer to Table 4.3.39 ‘Waterways & wetlands management’ of the SOMP for monitoring strategy. Monitoring of macroinvertebrates in freshwater wetlands as a biological indicator of ecosystem health. Standard sampling and interpretation methods to be followed, such as the Stream Pollution Index.
Auditing	Appropriately qualified environmental consultant to undertake monthly assessment of specified criteria.
Reporting	Maintenance and compilation of assessment sheets to be appropriately stored onsite for inspection by local and state government officers upon request.
Identification of incident or failure	Observation of element(s) outside nominated criteria. Degradation of water quality at the monitoring points to below the ‘Performance Criteria’ levels. Decreased ecosystem health as indicated by macroinvertebrate sampling.
Corrective action	Identification and source control. Review of construction and/or management methods.

Commitment

The contractor will ensure the integrity of the freshwater ecosystems is maintained for the duration of the construction works.

4.3.39 Waterways & wetlands management

Applies to:	Bulk earthworks phase
Person responsible:	Contractor’s Site Manager; Environmental Consultant

Issue	Wetlands & waterways management.
Operational policy	<p>To establish and maintain the health of wetlands and waterways during the bulk earthworks phase.</p> <p>To ensure strong plant growth and satisfactory water quality.</p>
Performance criteria	<p>Maintain surface water quality objectives identified for bulk earthworks in Table 4.2.2.</p> <p>Water may be discharged from the site that exhibits a suspended solids concentration greater than 50mg L⁻¹, providing the concentration in the discharge is 10% less than the concentration exhibited in the receiving water.</p> <p>Plant establishment success rate >80%.</p>
Implementation strategy	<p>The operational work shall be developed in stages to minimise the potential for soil erosion and water pollution. The site can then be progressively developed and rehabilitated.</p> <p>All waters from the active construction areas shall be treated (if required) prior to being discharged into completed areas. The wetlands will come progressively online as staged construction is completed.</p> <p>All runoff from disturbed areas is to be collected by means of surface drains and diverted to internal water bodies.</p> <p>Protection of waterways and wetlands from sediment</p> <p>All sediment and erosion control devices shall be installed prior to commencement of work in each stage in accordance with Table 4.3.11 ‘Erosion controls’ and Table 4.3.12 ‘Sediment control’ in the SOMP.</p> <p>These devices include (but are not limited to):</p> <ul style="list-style-type: none"> • Diversion of upslope runoff around cleared and/or disturbed areas in a way that minimises erosion, minimises the upslope catchment and diverts waters to a legal point of discharge. • Sediment control fences or other measures at the downslope perimeter of cleared and/or disturbed areas. • Maintenance of all erosion control measures at operational capacity until land is effectively rehabilitated. • Material accumulated behind sediment barriers shall be cleaned out as soon as practicable to minimise the potential for the transfer of sediment off the construction site. Sediment shall be removed to a secure stockpile location.

	<p>Maintenance of water quality</p> <p>Sediment is to be removed from each internal waterbody/sediment basin once 70% of the total available sediment storage component has been reached and weirs are to be regularly maintained and cleaned.</p> <p>Sediment basins/internal waterbodies shall be dosed with flocculating agents when required to ensure that water quality meets required limits.</p> <p>Bypass flows from sediment traps shall be directed to stable areas.</p> <p>The operational water bodies and associated wetland shall be de-silted, replanted as necessary and assessed for any acid sulphate oxidation effects prior to refilling with water at the end of the construction phase.</p> <p>To protect constructed wetlands and receiving environments, discharge of water not complying with nominated parameters must be avoided.</p> <p>Maintenance of plant health in shallow vegetated wetlands</p> <p>Wetlands planted with locally endemic species suited to site conditions. These species ensure minimisation of water usage. As wetlands are planted, water levels will be maintained via pumping of water that satisfies water quality objectives from sediment basins following rainfall events and stormwater flows.</p> <p>Particular attention should be given to weed management during the early stages of wetland vegetation development.</p>
<p>Monitoring</p>	<p>Sediment and erosion controls</p> <p>Regular site inspections shall be undertaken to monitor the effectiveness of sediment and erosion controls. A site inspection and monitoring program shall include:</p> <ul style="list-style-type: none"> • weekly site inspections; • inspections immediately following rainfall events that cause runoff; and • inspections immediately before site closure. <p>Surface water quality</p> <p>Surface water monitoring will be conducted at appropriate locations external and internal to the construction area as each wetland and waterway is constructed.</p> <p>Monitoring will be conducted monthly and during rainfall events for: pH, EC, suspended solids, dissolved oxygen, oil and grease.</p> <p>Sample recovery and in situ analysis will be performed by a NATA accredited sampler and, when required, samples will be forwarded to a NATA accredited laboratory.</p> <p>Visual inspection of wetland plant health, algae presence, weeds, pests including mosquitoes and cane toads.</p>
<p>Auditing</p>	<p>Environmental consultant to audit water quality and plant health results</p>

Reporting	<p>monthly to ensure compliance with the performance criteria.</p> <p>Additional visual inspections to be carried out monthly and after rainfall events to verify that control measures are in place and properly maintained.</p>
	<p>Results sheet and site inspection records to be compiled for monitoring results of water quality of water bodies and erosion and sediment control measures.</p> <p>To be kept onsite for inspection by local and state government officers.</p> <p>Recording of wetland health, establishment, weeds and pests.</p>
Identification of incident or failure	<ul style="list-style-type: none"> • Degradation of surface water quality at the monitoring points to below background level. • Excessive build-up of sediment. • Loss of wetland plants. • Algal blooms. • Emergence of pest species.
Corrective action	<p>Apply remedial measures to improve sediment and erosion control. Incorporate additional measures including, but not limited to, silt fences and flocculation of the water quality control ponds.</p> <p>If pH is outside the criteria range, then waters will be contained and the pH adjusted to within the range prior to release.</p> <p>If total suspended solids exceed the water quality criteria then water will be contained onsite for a period sufficient to allow suspended solids to settle out prior to release or treated with a flocculent.</p> <p>To increase dissolved oxygen, re-circulation and or aeration should be undertaken.</p> <p>Replanting of wetland species if losses exceed 20%. Review and choose alternative species if necessary.</p>

Commitment

The Contractor will ensure construction works are managed in a manner that will protect and enhance the integrity of the waterway and wetland system.

4.3.40 Open space management

Applies to:	Operational period of golf course
Person responsible:	Golf course golf course management

Issue	Open space management.
Operational policy	Ensure that the living landscape has been adequately established and is fully functional for its designed purpose.
Performance criteria	<p>The ongoing and safe use of the facilities provided within the Conservation Zone, Dedicated Public Open Space and ecological buffers and General Use Recreation areas.</p> <p>The ecological values and ecosystem functions of the open space areas are maintained.</p>
Implementation strategy	<p>Formal access to the zone shall be limited and regular, programmed maintenance undertaken.</p> <p>Firebreaks, incorporating radiation zones, shall be maintained on the outer margins of the Conservation Zones to the rear of lots, or incorporated within parts of the road network or trail system that run adjacent the Conservation Zones.</p> <p>Weed management strategies to be implemented in accordance with Table 4.3.3 'Aquatic flora & weed management and maintenance' of the SOMP.</p> <p>Signage shall be erected to direct visitors to litter bins located outside of the Conservation Zone.</p> <p>Residents shall be advised of the risks to wildlife presented by domestic cats and dogs, and Golf course management rules initiated to keep them indoors at night.</p> <p>Accidentally introduced feral species (cane toads, hares, foxes, dogs, cats) shall be managed through the implementation of survey, trap and removal of such species in order that a reasonable degree of control is achieved.</p> <p>Maintenance to the stormwater management infrastructure and works located within this zone shall be undertaken in accordance with Table 4.3.16 'Maintenance of water treatment measures' of the SOMP.</p> <p>Bollards and signage shall be used to delineate boundaries between the different types of open space.</p> <p>Maintenance practices will be implemented along the edges of zones including the clear delineation of radiation zones and the pathway network.</p> <p>Dedicated public open space zone</p> <ul style="list-style-type: none"> Litter receptacles shall be located at strategic points within the public open space zone.

	<p>General use recreation zone</p> <ul style="list-style-type: none"> • Routine maintenance shall be carried out on the public-access canoe trail system, picnic and barbecue facilities, seating, play equipment, informal kick and throw areas, and other facilities associated with local neighbourhood parks. • Litter receptacles shall be located at strategic points within the recreation zone.
Monitoring	Monitoring of the open space areas shall be undertaken in accordance with Table 4.3.39 'Waterways & wetlands management' of the SOMP.
Auditing	Not applicable.
Reporting	Not applicable.
Identification of incident or failure	Incidents or failures within the open space zones shall be identified with referenced to Table 4.3.30 'Incidents & complaints management' outlining procedures for incidents and failures of the SOMP.
Corrective action	Corrective actions shall be implemented in accordance with the Table 4.3.30 'Incidents & complaints management' of the SOMP.

Commitment

The golf course manager will ensure the open space zones are managed and maintained to ensure that these areas provide a safe environment for use by local residents.

4.3.41 Golf course water conservation

Applies to:	Civil construction phase, On maintenance phase and Operational phase of golf course, precincts 12 and 13
Person responsible:	Proponent, Golf Course Manager

Issue	All water flows must be controlled and managed to allow the effective use of the onsite water within a total water cycle. Essential to the ecological stability of the golf course and surrounding wetland and ecological protection zone is the maintenance of water quantities to both golf course and ecosystems.
Operational policy	To manage the rainfall on site to effectively distribute water supply to both the golf course and the surrounding Ecological zones (SEPP14 wetland and Ecological protection zones).
Performance criteria	<p>Ground water levels to be maintained within and adjacent to golf course with critical levels to be in accord with the seasonal variation in ground water height.</p> <p>Monitoring periods to be divided into Summer recharge period and Winter depletion period.</p>
Implementation strategy	<p>Harvesting</p> <ul style="list-style-type: none"> • All water directed to bio-retention basins. • Held to recharge groundwater. • Golf course graded towards the basins. <p>Volume</p> <ul style="list-style-type: none"> • Maintain constant volumes by maintaining course infiltration rate and fairways runoff directed to swales for detention and infiltration to ground water. <p>Storage</p> <ul style="list-style-type: none"> • Subsurface storage. • Central dam of surface run-off collection and ground water window. • Habitat storages within landscape plan. <p>Treatment</p> <ul style="list-style-type: none"> • Bio-detention and filter basins to remove nutrients. • Sediments removed by filtering through rough and percolation through Bio-detention and filter basin floor. <p>Distribution</p> <ul style="list-style-type: none"> • 30% annual average recharge to ecosystem. • 70 % to landscape in golf course. <p>Maintenance of treatment basins</p> <ul style="list-style-type: none"> • Basins maintained to ensure nutrient stripping and water infiltration.

Monitoring	Fortnightly (Civil construction phase) / monthly (on maintenance phase, operational phase) monitoring of groundwater height.
Auditing	Environmental consultant will audit the groundwater monitoring procedures and outcomes of the monitoring on a monthly (Civil construction phase) / annual (on maintenance phase, operational phase) basis.
Reporting	Results of monitoring will be reported quarterly (Civil construction phase) / biannually (on maintenance phase, operational phase) to TSC and NSW Department of Planning.
Identification of incident or failure	Ground water heights outside of critical limits to water level.
Corrective action	<p>Groundwater lower than the critical level – Irrigation extraction rate of golf course to be modified to redistribute the recharge potential to a new regime of 40% to ecosystem 60% to golf course.</p> <p>Continue to monitor.</p> <p>Ground water still outside limits – Irrigation extraction rate of golf course to be modified to redistribute the recharge potential to a new regime of 60% to ecosystem 40% to golf course.</p> <p>Continue to monitor.</p> <p>Ground water still outside limits – Irrigation extraction rate of golf course to be modified to redistribute the recharge potential to a new regime of 80% to ecosystem 20% to golf course. Seek alternate sources of water for golf course irrigation and undertake environmental management and plan for the import of water supply to site.</p> <p>Continue to monitor.</p> <p>Ground water still outside limits – implement alternate water supply.</p> <p>Groundwater higher than critical level – determine source of excess water.</p> <p>High rainfall events – do nothing incident is self correcting.</p> <p>Golf course groundwater mounding – alter irrigation regime to decrease irrigation input to site.</p>

Commitment

The land user / Golf Course Manager will ensure the water table heights in the vicinity of the golf course will be maintained within the critical limits identified in the SOMP.

4.3.42 Water management (golf course irrigation)

Applies to:	Civil construction, On maintenance phase and Operational phase of golf course, precincts 12 and 13
Person responsible:	Proponent, Golf Course Manager

Issue	All water flows must be controlled and managed to allow the effective use of the onsite water within a total water cycle. Essential to the ecological stability of the golf course and surrounding wetland and ecological protection zone is the maintenance of water quantities to both golf course and ecosystems.
Operational policy	To manage the irrigation applied to the golf course to minimise its impact on the surrounding Ecological zones (SEPP14 wetland and Ecological protection zones).
Performance criteria	Ground water levels to be maintained within and adjacent to golf course with critical levels to be in accord with the seasonal variation in ground water height. Monitoring periods to be divided into Summer recharge period and Winter depletion period.
Implementation strategy	<p>Irrigation is to be carried out in accordance with the DECC document <i>'Improving the Environmental Management of New South Wales Golf Courses'</i>.</p> <p>Source of water</p> <ul style="list-style-type: none"> Extraction at central point of development which is distant from ground water dependant ecosystems. <p>Distribution</p> <ul style="list-style-type: none"> Pipe mains and lateral distribution. Spray irrigation for distribution efficiency. Irrigation on tees greens and fairways only (allowing for minor over-spray on adjacent roughs). Pump stations and associated infrastructure, including sprinkler heads, to be sized and installed in accordance with recommendations in ePar (2009, pp10). <p>Irrigation scheduling</p> <ul style="list-style-type: none"> Install weather station and computerised control system to ensure efficient irrigation in accordance with recommendations in ePar (2009, pp9). Irrigation to occur at dawn or dusk (generally characterised by lower relative humidity, air temperature and wind speed). Soil water deficit based trigger for irrigation. Effective soil depth for schedule 0-200mm. Refill point to be set at 70% plant available soil moisture depletion. Irrigation applied to 98% of field capacity.

	<p>Water allocation model</p> <ul style="list-style-type: none"> • Sustainable yield applied to irrigation set at 70 % recharge potential. • Recycling. • Fairways constructed with gradient towards bio-detention basins. • Capture of irrigation runoff in detention basins for treatment and groundwater recharge. • Tees and greens captured separately and recycled to fairways. <p>Soil management</p> <ul style="list-style-type: none"> • Soil amendment to improve moisture holding (zeolite etc). • Maintenance of soil organic matter for soil structure maintenance. • Minimise compaction by machinery selection and operating procedures. • Control traffic. <p>Plant selection and management</p> <ul style="list-style-type: none"> • Native species and naturalised species endemic to local area. • Species selection dependant on landscape location eg Drought tolerant plants in elevated areas, waterlog tolerant plants in depressions.
	<p>Monitoring</p> <p>Fortnightly - Civil construction phase</p> <p>Monthly - On maintenance phase</p> <p>Biannual – Operational phase</p> <p>Height monitoring:</p> <ul style="list-style-type: none"> • Surface water – dams, basins, adjacent ecosystem water bodies. • Groundwater transect from detention basins to protection area (e.g. of groundwater monitoring bore transect through golf course and extending into adjacent SEPP 14 wetland). <p>Parameters:</p> <ul style="list-style-type: none"> • Height (AHD); pH (field measure); EC (field measure); Dissolved oxygen (field measure); Temperature (field measure). <p>Daily</p> <ul style="list-style-type: none"> • Soil water – Soil water monitoring for refill point – methods to be selected as appropriate to soil and turf management conditions, for instance: tensiometers (150 mm depth), or Penman’s estimation etc.
	<p>Auditing</p> <p>Environmental consultant will audit the monitoring procedures and outcomes of the monitoring on a quarterly (Civil construction phase) / biannual (on maintenance phase) / annual (Operational phase) basis.</p>
<p>Reporting</p> <p>Results of monitoring will be reported quarterly (Civil construction phase) / biannually (on maintenance phase) / annually (Operational phase) to TSC and other appropriate authorities.</p>	

Identification of incident or failure	Ground water heights outside of critical limits to water level.
Corrective action	<p>Groundwater lower than the critical level – Irrigation extraction rate of golf course to be modified to redistribute the recharge potential to a new regime of 40% to ecosystem 60% to golf course.</p> <p>Continue to monitor.</p> <p>Ground water still outside limits – Irrigation extraction rate of golf course to be modified to redistribute the recharge potential to a new regime of 60% to ecosystem 40% to golf course.</p> <p>Continue to monitor.</p> <p>Ground water still outside limits – Irrigation extraction rate of golf course to be modified to redistribute the recharge potential to a new regime of 80% to ecosystem 20% to golf course. Seek alternate sources of water for golf course irrigation and undertake environmental management and plan for the import of water supply to site.</p> <p>Continue to monitor.</p> <p>Ground water still outside limits – Implement alternate water supply.</p> <p>Groundwater higher than critical level – Determine source of excess water.</p> <p>High rainfall events – do nothing if incident is self-correcting.</p> <p>Golf course groundwater mounding – alter irrigation regime to decrease irrigation input to site.</p>

Commitment

The land user / Golf Course Manager will ensure the water table heights in the vicinity of the golf course will be maintained within the critical limits identified in the SOMP.

4.3.43 Golf course nutrient management

Applies to:	Civil construction, On maintenance phase and Operational phase of golf course, precincts 12 and 13
Person responsible:	Golf Course Manager

Issue	The nutrients applied to maintain the vigour of the golf course must not gain access to the surrounding environment. All nutrients must be controlled and managed to allow the effective use of the onsite water and to ensure to the ecological stability of the golf course and surrounding wetland and ecological protection zone.
Operational policy	To manage the nutrients applied to the golf course to minimise its impact on the surrounding Ecological zones (SEPP14 wetland and Ecological protection zones).
Performance criteria	<p>Ground and surface water nutrient levels to be maintained within and adjacent to golf course within critical levels in accord with the seasonal variation in ground water. Monitoring periods to be divided into Summer recharge period and Winter depletion period.</p> <p>Critical criteria set as per background monitoring.</p> <p><i>Parameters:</i></p> <ul style="list-style-type: none"> • pH (field measurement); • electrical conductivity (field measurement); • turbidity (field measurement); • dissolved oxygen (field measurement); • temperature (field measurement); • suspended solids (mg L⁻¹); • total nitrogen and nitrate, nitrite and ammonium (mg L⁻¹); • total and soluble phosphorus (mg L⁻¹); • total and soluble iron and filtered aluminium; and • oil and grease (visual inspection); • calcium; • magnesium; • potassium; • sodium; • dissolved manganese; • bicarbonate; • carbonate; • chloride; • sulfate; and • colour.
Implementation	Application of nutrients is to be carried out in accordance with the DECC

strategy

document *'Improving the Environmental Management of New South Wales Golf Courses'*.

Tees

- Impervious membrane under green set at 0.6m below NSL, leachate collected in containment well and reused on fairways.
- Soil conditioning to improve nutrient retention and moisture holding capacity (e.g. Zeolite incorporated top 100mm, development and maintenance of soil organic matter for soil structure and cation exchange capacity).
- Fertiliser selection – slow release and specialty fertilisers for tee maintenance.
- Fertiliser rate – minimal for turf stability as determined by soil testing consistent with standard best practice for turf management. Fertiliser rates to be determined in consultation with the recommendations in ePar (2009, pp8) or the site's Fertiliser Management Plan.
- Application method – split application at low rates, timed with other fairway operations that incorporate nutrients into turf (eg, turf renovation and top dressing, fertiliser incorporation irrigation events to prevent contamination of surface run-off).
- Clippings removed and composted for reuse on landscaping.

Greens

- Impervious membrane under green set at 0.6m below NSL, leachate collected in containment well and reused on fairways.
- Soil conditioning to improve nutrient retention and moisture holding capacity (e.g. Zeolite incorporated top 100mm, development and maintenance of soil organic matter for soil structure and cation exchange capacity).
- Fertiliser selection – slow release and specialty fertilisers for green maintenance.
- Fertiliser rate – minimal for turf stability as determined by soil testing consistent with standard best practice for turf management.
- Application method – split application at low rates, timed with other fairway operations that incorporate nutrients into turf (eg, turf renovation and top dressing, fertiliser incorporation irrigation events to prevent contamination of surface run-off).
- Clippings removed and composted for reuse on landscaping.

Fairways

- Soil conditioning to improve nutrient retention and moisture holding capacity (e.g. Zeolite incorporated top 100mm, development and maintenance of soil organic matter for soil structure and cation exchange capacity).
- Fertiliser selection – slow release and specialty fertilisers for tee maintenance.

Monitoring	<ul style="list-style-type: none"> • Fertiliser rate – minimal for turf stability as determined by soil testing consistent with standard best practice for turf management. In addition, a mass balance method will be used to identify fertiliser rates – inputs of water nutrients, fertiliser and effluent from tees and greens, output soil store, biomass and percolation. • Application method – split application at low rates, timed with other fairway operations that incorporate nutrients into turf (e.g., turf renovation and top dressing, fertiliser incorporation irrigation events to prevent contamination of surface run-off). • Irrigation maximum refill set to 98% field capacity to ensure first rainfall infiltrates and not runs off. <p>Rough</p> <ul style="list-style-type: none"> • No fertiliser used. • Rough to act as irrigation, sediment and nutrient buffer. • Biomass mulched back into rough. <p>Swales and detention basins</p> <ul style="list-style-type: none"> • No fertiliser used. • Maintenance removal of biomass to composting and reuse in landscaping.
	<p>Groundwater</p> <p><i>Monthly (Civil construction phase, on maintenance phase)</i></p> <p><i>Quarterly (Operational phase)</i></p> <ul style="list-style-type: none"> • Ground water quality samples (from all height monitoring bores). • Multiple group lysimeters set at 1m depth in four (4) locations in golf course fairways– leachate samples. • Parameters: pH (field measure); EC (field measure); Dissolved oxygen (field measure); Temperature (field measure); N – Total, NH₄, NO₃, P – Total, Ortho; Calcium; Magnesium; Sodium; Potassium; Total and dissolved iron; Dissolved manganese; Filtered aluminium; Bicarbonate; Carbonate; Chloride; Sulfate; and Colour. <p>Surface water</p> <p><i>Monthly (Civil construction phase, on maintenance phase)</i></p> <p><i>Quarterly (Operational phase)</i></p> <ul style="list-style-type: none"> • Central irrigation supply. • Surface habitat water bodies. • Parameters: pH (field measure); EC (field measure); Dissolved oxygen (field measure); Temperature (field measure); N – Total, NH₄, NO₃, P – Total, Ortho; Calcium; Magnesium; Sodium; Potassium; Total and dissolved iron; Dissolved manganese; Filtered aluminium; Bicarbonate; Carbonate; Chloride; Sulfate; and Colour.

	<p><i>Monthly (Civil construction phase, on maintenance phase)</i></p> <p><i>Quarterly (Operational phase)</i></p> <ul style="list-style-type: none"> • Central irrigation supply. • Parameters Irrigation water quality, N & P. <p>Soils</p> <p><i>6 monthly (Civil construction phase, on maintenance phase)</i></p> <p><i>Annually (Operational phase)</i></p> <ul style="list-style-type: none"> • Soil fertility sampling as per standard practice for turf (agricultural) management. <p>Biomass</p> <p><i>Quarterly (Civil construction phase, on maintenance phase)</i></p> <p><i>Annually (Operational phase)</i></p> <ul style="list-style-type: none"> • Fairway reference sites set at four locations within golf course. • The reference sites will have the biomass collected (weighed) and analysed for N & P. (Data to be used in estimating mass balance for monitoring purposes). <p><i>Biannually (Civil construction phase, on maintenance phase)</i></p> <p><i>Annually (Operational phase)</i></p> <ul style="list-style-type: none"> • SEPP 14 wetland and environmental protection zone to be monitored with two (2) reference transects to outline floristic structure and function.
	<p>Auditing</p> <p>Environmental consultant will audit the monitoring procedures and outcomes of the monitoring on an annual basis.</p>
	<p>Reporting</p> <p>Results of monitoring will be reported annually to TSC and NSW Department of Planning.</p>
	<p>Identification of incident or failure</p> <ul style="list-style-type: none"> • Groundwater analyses in excess of critical limits for two consecutive sample events. • Critical limit set considering background monitoring.
	<p>Corrective action</p> <p>Fertiliser regime re-assessed and fertiliser management plan altered by change of fertiliser form, rate or application technology.</p> <p>Continue to monitor.</p>

Commitment

The land user will ensure the water table and surface water areas associated with the golf course does not input excess nutrients into the surrounding SEPP14 wetlands and ecological protection zones.

4.3.44 Golf course herbicide management

Applies to:	Civil construction, On maintenance phase and Operational phase of golf course, precincts 12 and 13
Person responsible:	Golf Course Manager

Issue	Herbicides may be used within the golf course to manage turf weeds. The use of herbicides may have an impact on the flora adjacent to the golf course and strategies are needed to minimise these impacts.
Operational policy	To manage the herbicides applied to the golf course to minimise its impact on the surrounding Ecological zones (SEPP14 wetland and Ecological protection zones).
Performance criteria	No foliar damage to surrounding environment from herbicide applications.
Implementation strategy	<p>Turf weeds should be managed by adopting the pest control strategies outlined in the DECC document <i>'Improving the Environmental Management of New South Wales Golf Courses'</i>.</p> <p>The use of herbicides is an action of last resort. Primary control of weeds will be achieved by:</p> <ul style="list-style-type: none"> • Physical removal of weed species prior to turf area development and for selected weeds post development. • Soil management methods such as ameliorating compaction, improving drainage, shade management and nutrient management techniques such as avoiding N applications during weed active stages. • Turf management methods such as (but not restricted to) mowing height and frequency, thatch control, improving air movement, restricting traffic and insect control. • Spraying as a last resort as either spot spraying or contained spraying consistent with the requirements of best practice spraying and the obligations under the NSW Pesticides Act. <p>Specialist outcomes for each golf course zones as below:</p> <p>Tees</p> <ul style="list-style-type: none"> • Isolated from ground waters by membrane at depth. • Adopt best management principles for herbicide application. <p>Greens</p> <ul style="list-style-type: none"> • Isolated from ground waters by membrane at depth. • Adopt best management principles for herbicide application. <p>Fairways</p> <ul style="list-style-type: none"> • No herbicide use on extensive basis. • Spot and strip spraying as last resort.

	<p>Rough</p> <ul style="list-style-type: none"> • No herbicide use on extensive basis. • Spot spraying as last resort. <p>Swales</p> <ul style="list-style-type: none"> • No herbicide use on extensive basis. • Spot spraying as last resort.
	<p>Monitoring</p> <p>Annual monitoring of surface waters adjacent (within 100m) to areas subjected to Herbicide use. Visual inspection of adjacent areas for evidence of over-spray – e.g. Herbicide damage to leaves.</p> <p>Monitoring to be timed one to two weeks after spraying events.</p>
Auditing	<p>Environmental consultant will audit the monitoring procedures and outcomes of the monitoring on an annual basis.</p>
Reporting	<p>A chemical use register to be maintained for each fairway, tee, and green.</p> <p>Spot spraying of other areas to be recorded separately.</p> <p>Records to be maintained and produced upon request by relevant authority.</p>
Identification of incident or failure	<p>Foliage damage observed.</p>
Corrective action	<p>Damage foliage removed and mulched on site, plants to be monitored and dead plants replaced with suitable seedlings, or seed stocks.</p>

Commitment

The land user will ensure the minimisation of herbicide impacts on the surrounding SEPP14 wetlands and ecological protection zones.

4.3.45 Golf course pesticide management (control of arthropods)

Applies to:	Civil construction phase, On maintenance phase and Operational phase of golf course, precincts 12 and 13
Person responsible:	Golf Course Manager

Issue	Pesticides to control arthropods may be used within the golf course to manage turf pests. The use of these herbicides may have an impact on the flora adjacent to the golf course and strategies are needed to minimise these impacts.
Operational policy	To manage the pesticides applied to the golf course to minimise its impact on the surrounding Ecological zones (SEPP14 wetland and Ecological protection zones).
Performance criteria	No pesticide escape into the surrounding environment beyond AS/NZS standards of pesticide contamination of fresh waters.
Implementation strategy	<p>Pesticides should be managed by adopting the pesticide application practice outlined in the DECC document '<i>Improving the Environmental Management of New South Wales Golf Courses</i>'.</p> <p>Implement an integrated pest management program by monitoring, pest injury assessment, threshold of aesthetic and environmental damage determination, control method selection, timing and extent assessment, evaluate pest destruction outcome.</p> <p>The use of pesticides is an action of last resort. Primary control of arthropods will be achieved by:</p> <ul style="list-style-type: none"> • Site quarantine and hygiene by ensuring imported materials are free of pests. • Modifying pest habitat either soil or environmental conditions. • Selection of host resistant turf plants when available. • Biological control measures – natural parasites and predators. • Last resort chemical control – Spraying as a last resort with the requirements of best practice spraying and the obligations under the NSW Pesticides Act. <p>Chemical control preferences should be:</p> <ul style="list-style-type: none"> • Attractants (food and/or sex pheromone) and traps. • Inorganic materials (e.g. elemental sulfur and similar approaches). • Bioinsecticides (e.g. <i>Baccillus thuringiensis</i>). • Botanical extracts. • Synthetic organics (chemicals). <p>Specialist outcomes for each golf course zones as below:</p> <p>Tees</p> <ul style="list-style-type: none"> • Isolated from ground waters by membrane at depth.

	<ul style="list-style-type: none"> • Adopt best management principles for pesticide application. <p>Greens</p> <ul style="list-style-type: none"> • Isolated from ground waters by membrane at depth. • Adopt best management principles for pesticide application. <p>Fairways</p> <ul style="list-style-type: none"> • No pesticide use on extensive basis. • Spot and strip spraying as last resort. <p>Rough</p> <ul style="list-style-type: none"> • No pesticide use on extensive basis. <p>Swales</p> <ul style="list-style-type: none"> • No pesticide use on extensive basis. <p>Pesticide storage, containment, security, preparation and wash down areas to be located away from ecological and golf course area in designated infrastructure and facilities area of the development.</p> <p>A shrouded Controlled Droplet Applicator (CDA) should be used to reduce spray drift, chemical and water use. Pesticide application rate may be reduced by 1/3 where shrouded CDA's are used (ePar 2009, pp12).</p>
Monitoring	<p>Annual monitoring of surface waters adjacent (within 100m) to areas subjected to pesticide use.</p> <p>Parameters selected for monitoring to be consistent with the chemicals used on site.</p>
Auditing	<p>Environmental consultant will audit the monitoring procedures and outcomes of the monitoring on an annual basis.</p>
Reporting	<p>A chemical use register to be maintained for each fairway, tee, and green. Spraying of other areas to be recorded separately.</p> <p>Records to be maintained and produced upon request by relevant authority.</p>
Identification of incident or failure	<p>Pesticide contamination of water body beyond AS/NZS Standard for fresh waters.</p>
Corrective action	<p>Pesticide application to cease.</p> <p>Re-assess pesticide control methods – e.g. selection of methods, application technology.</p>

Commitment

The land user will ensure the minimisation of pesticide impacts on the surrounding SEPP14 wetlands and ecological protection zones.

4.3.46 Golf course fungicide management

Applies to:	Civil construction phase, On maintenance phase and Operational phase of golf course, precincts 12 and 13
Person responsible:	Golf Course Manager

Issue	<p>Fungicides may be used within the golf course to manage turf disease.</p> <p>The use of these Fungicides may have an impact on the flora adjacent to the golf course and strategies are needed to minimise these impacts.</p>
Operational policy	To manage the Fungicides applied to the golf course to minimise its impact on the surrounding Ecological zones (SEPP14 wetland and Ecological protection zones).
Performance criteria	Minimise Fungicide escape into the surrounding environment.
Implementation strategy	<p>Pesticides should be managed in accordance with the DECC document <i>'Improving the Environmental Management of New South Wales Golf Courses'</i>.</p> <p>Implement a turf disease management program by monitoring, disease injury assessment, threshold of aesthetic and environmental damage determination, control method selection, timing and extent assessment, evaluate disease control outcome.</p> <p>The use of fungicides is an action of last resort. Primary control of disease will be achieved by:</p> <ul style="list-style-type: none"> • Site quarantine and hygiene by ensuring imported materials are free of disease. • Modifying either soil or environmental conditions. • Selection of disease resistant turf plants when available. • Last resort chemical control - Spraying as a last resort with the requirements of best practice spraying and the obligations under the NSW Pesticides Act. <p>Specialist outcomes for each golf course zones as below:</p> <p>Tees</p> <ul style="list-style-type: none"> • Isolated from ground waters by membrane at depth • Adopt best management principles for pesticide application <p>Greens</p> <ul style="list-style-type: none"> • Isolated from ground waters by membrane at depth • Adopt best management principles for pesticide application <p>Fairways roughs and swales</p> <ul style="list-style-type: none"> • No fungicide use on extensive basis

Monitoring	Fungicide storage, containment, security, preparation and wash down areas to be located away from ecological and golf course area in designated infrastructure and facilities area of the development.
	Annual monitoring of surface waters adjacent (within 100m) to areas subjected to Fungicide use. Parameters selected for monitoring to be consistent with the chemicals used on site, frequency and distribution.
Auditing	Environmental consultant will audit the monitoring procedures and outcomes of the monitoring on an annual basis.
Reporting	A chemical use register to be maintained for each fairway, tee, and green. Spraying of other areas to be recorded separately. Records to be maintained and produced upon request by relevant authority.
Identification of incident or failure	Fungicide contamination of water body.
Corrective action	Fungicide application to cease. Re-assess fungicide control methods – e.g. selection of methods, application technology.

Commitment

The land user will ensure the minimisation of fungicide impacts on the surrounding SEPP14 wetlands and ecological protection zones.

4.4 Monitoring summary for golf course operations

For ease of reference, a monitoring schedule summary for the future Body Corporate of the golf course is provided in the table below

Monitoring schedule summary for operation phase of golf course management.

Item	Daily	Weekly	Monthly	Quarterly	Biannually	Annually
Groundwater			Height (AHD)	Height (AHD); pH; EC; temperature; TN; soluble N; NO _x ; TKN; NO ₂ ; NO ₃ ; TP; soluble P; Ca; Mg; Na; K/HCO ₃ ; HCO ₃ ; CO ₃ ; total & dissolved Fe; total & dissolved Al; dissolved manganese Mn; Cl; SO ₄ ; NH ₄ ; colour; total acidity (titratable); total alkalinity; As; Cd; Cu; Pb; Ni; Zn; TPH; BTEX; faecal coliforms; and enterococci.	Groundwater monitoring bore transect through golf course and extending into adjacent SEPP 14 wetland: Height (AHD); pH; EC; DO; temperature.	
Leachate				Multiple group lysimeters set at 1m depth in four (4) locations in golf course fairways: pH; EC; DO; temperature; TN, NH ₄ , NO ₃ , TP; Ortho-P; Ca; Mg; Na; K; total and dissolved Fe; dissolved Mn; filtered Al; HCO ₃ ; CO ₃ ; Cl; SO ₄ ; and Colour.		
Soils	Soil water monitoring for refill point					Soil fertility sampling as per standard practice for turf (agricultural) management.

Item	Daily	Weekly	Monthly	Quarterly	Biannually	Annually
Central irrigation supply, water bodies				pH; EC; DO; temperature; TN; NH ₄ ; NO ₃ ; TP; Ortho-P; Ca; Mg; Na; K; total and dissolved Fe; dissolved Mn; filtered Al; HCO ₃ ; CO ₃ ; Cl; SO ₄ ; and Colour.	Height (AHD); pH; EC; DO; temperature. Vertical profiling of all off-stream deep water bodies: temperature; DO; pH, EC; salinity and turbidity at 0.5m depths.	
Biomass						Four (4) locations within golf course: biomass weighed and analysed for N & P.
Wetland and waterbody ecosystems			Regular monitoring, particularly in Spring and Summer, is required to reduce the potential for algal blooms.	Visual inspection of wetlands and water bodies for vegetation establishment, damage, weed invasion and clogging		Two (2) reference transects within the SEPP14 wetland to outline floristic structure and function.
Stormwater quality treatment devices				Visual inspection of treatment trains and vegetated open space for: litter; erosion; excessive sediment deposition; clogging (bio-retention); vegetation damage (e.g. die off, weed growth); damaged or failed treatment devices (change in		

Item	Daily	Weekly	Monthly	Quarterly	Biannually	Annually
				physical characteristics such as water level); and area, depth or bed profile of any bio-retention basin, waterway and wetland system		
Surface water				For two years following the completion of the on-maintenance period: pH; EC; turbidity; DO; temperature; SS; TN; soluble N; NO _x ; TKN; NO ₂ ; NO ₃ ; TP; soluble P; oil & grease; Ca; Mg; Na; K/HCO ₃ ; HCO ₃ ; CO ₃ ; total & dissolved Fe; total & dissolved Al; dissolved manganese Mn; Cl; SO ₄ ; NH ₄ ; colour; total acidity (titratable); total alkalinity; As; Cd; Cu; Pb; Ni; Zn; TPH; BTEX; chlorophyll-a; faecal coliforms; enterococci; total algal cell count; and blue green algae.	<p>Rainfall event-based (>25mm in 24 hrs) for two years following the completion of the on-maintenance period: pH; EC; turbidity; DO; temperature; SS; TN; soluble N; NO_x; TKN; NO₂; NO₃; TP; soluble P; oil & grease; Ca; Mg; Na; K/HCO₃; HCO₃; CO₃; total & dissolved Fe; total & dissolved Al; dissolved manganese Mn; Cl; SO₄; NH₄; colour; total acidity (titratable); total alkalinity; As; Cd; Cu; Pb; Ni; Zn; TPH; BTEX; chlorophyll-a; faecal coliforms; enterococci; total algal cell count; and blue green algae.</p> <p>Height monitoring of surface water – dams, basins, adjacent ecosystem water bodies.</p> <p>Vertical profiling of all off-stream deep water bodies: temperature; DO; pH, EC; salinity and turbidity at 0.5m depths.</p>	Monitoring of surface waters adjacent (within 100m) to areas subjected to herbicide, pesticide or fungicide use. Monitoring to be timed one to two weeks after spraying events.

Item	Daily	Weekly	Monthly	Quarterly	Biannually	Annually
Waste management		Inspections of all work areas (specifically the waste containment areas and the property boundary) to ensure there is no accumulation of waste material				

4.5 Administration of the SOMP

4.5.1 Amendment of the SOMP

The Proponent may make an application to TSC to amend the provisions of this SOMP. The application shall:

- be in writing; and
- specify the provisions of the SOMP to which the application relates; and
- state how the proposed amendments achieve the objectives of the provisions to which the amendments relate.

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

4.5.2 Incident management



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

4.6 Attachment 1 – Drawings

250 500 750 1000 1250
SCALE metres

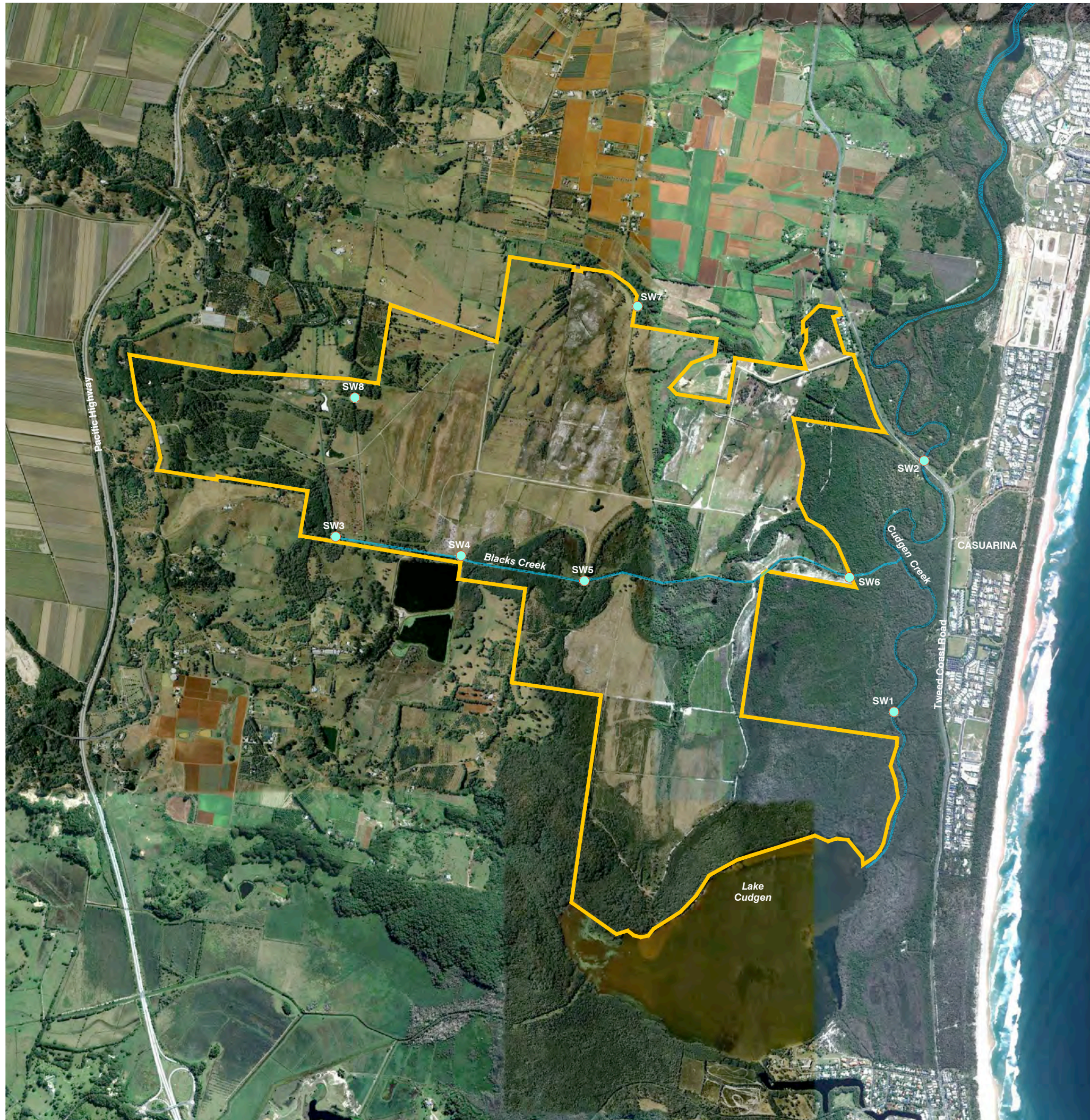
ORIENTATION
NORTH

LEGEND

-  Site boundaries
-  Surface water monitoring locations

SOURCES

Image base:
Google Earth Pro 2012, imagery date 13/05/2010



Brisbane Sydney Melbourne and regions

GILBERT SUTHERLAND
Agriculture. Water. Environment.

PROJECT
KINGS FOREST
STAGE 1
PROJECT APPLICATION

CLIENT
PROJECT 28
PTY LTD

DRAWING
SURFACE WATER
MONITORING
LOCATIONS




SCALE 1:25 000@A3	DRAWN SPD	CHECKED MLF
DATE 27/07/2012	PROJECT NO 10927	DRAWING NO 1.1

200 400 600 800 1000 metres

SCALE
1:20 000

ORIENTATION
NORTH

LEGEND

-  SEPP 14 Wetland Areas - Approximate Location
-  7(a) Environmental Protection Littoral Rainforest
-  7(l) Environmental Protection, Habitat

SOURCES

Base plan: MPS Architects December 2010 (MPS 2142 MP-01)

SEPP 14 Data: MPS Architects April 2011 (MPS 2142 DA-03a)



CAIRNS

KAWANA

ROBINA

5 / 232 Robina Town Centre Dr.
PO Box 4115
Robina Q4230
Phone 07 5578 9944
Fax 07 5578 9945
robina@access.gs

BRISBANE

Gilbert and Sultherland Pty Ltd
ABN 56 077 310 840

www.access.gs

AGRICULTURE WATER ENVIRONMENT

PROJECT

KINGS FOREST STAGE 1
PROJECT APPLICATION

CLIENT

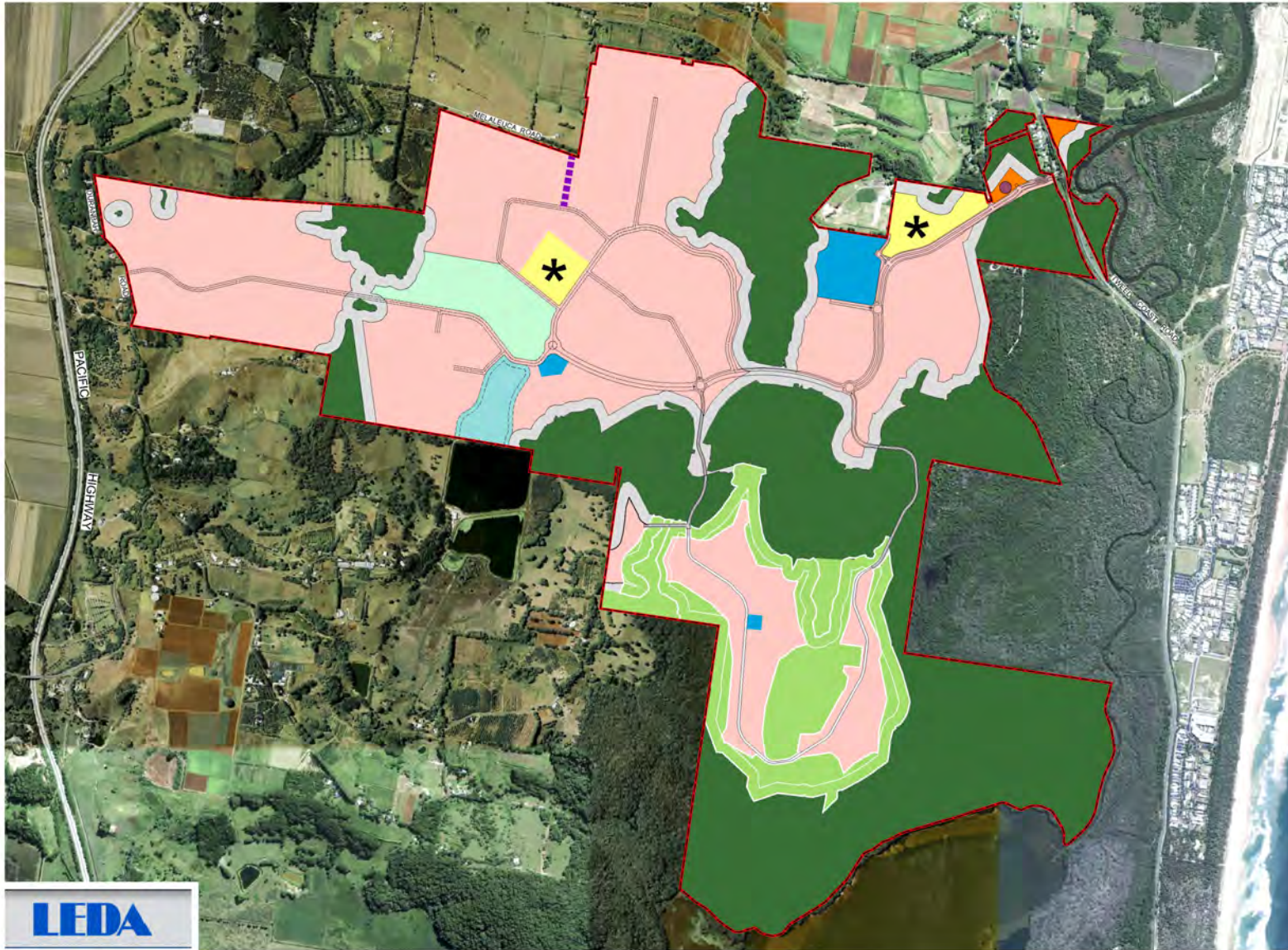
PROJECT 28 PTY LTD

DRAWING

SENSITIVE ENVIRONMENTAL
RECEPTORS

DATE 24/06/2011	DRAWN AJS	PROJECT NO 10468
SCALE 1:20 000	CHECKED ER	DRAWING NO 10468.6.2

4.7 Attachment 2 – Reference drawings



- TOWN CENTRE / NEIGHBOURHOOD CENTRE
- RESIDENTIAL
- COMMUNITY FACILITIES / EDUCATION
- EMPLOYMENT LAND
- STRUCTURED OPEN SPACE (ACTIVE)
(Passive open space to council standards, location subject to urban design).
- ENVIRONMENTAL PROTECTION AREA
TO BE DEDICATED TO COUNCIL OR NPWS
- 50m ECOLOGICAL BUFFER
(Includes APZs & Roads where approved)
- * STATE SCHOOL SITE
- PROPOSED ZONE SUBSTATION
(Subject to County Energy final approval)
- POTENTIAL ROAD CONNECTION TO MELALEUCA ROAD
- PRIVATE OPEN SPACE
GOLF COURSE AREA
(Encompassing ecological buffers where indicated)
- PRIVATE OPEN SPACE INCLUDING LAKE

IMPORTANT NOTE
 This plan was prepared as a preliminary concept plan for planning purposes only. As such all particulars, including lot design, areas and densities, are subject to detailed survey, site investigations and to the requirements of council and any other authority which may have requirements under any relevant legislation.
 This note is an integral part of this plan.



	CLIENT PROJECT 28 Pty Ltd	PLAN KINGS FOREST STAGE 1 PROJECT APPLICATION REVISED CONCEPT PLAN	REVISIONS		<p style="font-size: small;">RPS Australia East Pty Ltd ACN 140 292 762 ABN 44 140 292 762 Suite 4, Robina East Quay Corporate Park (North Building) 34-36 Glenferrie Drive, Robina PO Box 1048 Robina DC, Qld 4226 T +61 7 555 36900 F +61 7 555 36999 W rpsgroup.com.au</p>
	Date 21 AUGUST 2012		No.	DATE	
	Surveyed -		A	21.8.12	
	Drafted BJB		B		
	Parish CUDGEN		C		
County ROUS	SCALE: 1:20000 (A3)	D			
		E			
		F			
		G			
		I			

Local Authority **Tweed S.C.** DWG Ref **113691-PSP-4a(CONCEPT PLAN)** PLAN No. **01**