



Aura - Precinct 3, 4, 5 and Part Precinct 6 **Construction Environmental Management Plan**

Prepared by Calibre Consulting
Prepared for Stockland Development Pty Ltd

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GLOSSARY OF TERMS

AER	Annual Environment Report
AHD	Australian Height Datum
ASS	Acid Sulfate Soils
CEMP	Construction Environmental Management Plan
DEHP	Department of Environment and Heritage Protection
E&SC	Erosion and Sediment Control
EDQ	Economic Development Queensland
EPBC	Environmental Protection and Biodiversity Conservation Act 1999
EPZ	Environmental Protection Zone
HMU	Habitat Management Unit
MNES	Matters of National Environmental Significance
PDA	Priority Development Area
PER	Public Environment Report
Proponent	Stockland Development Pty Ltd
RL	Reduced Level
SCRC	Sunshine Coast Regional Council
SDS	Safety Data Sheet
The Project	The Development of Precincts 3, 4, 5 and Part Precinct 6 and associated works including borrow areas in the Western Borrow Area and Precinct 14
TSS	Total Suspended Solids
Works	All matters associated with the construction of the development
WSF	Wallum Sedge Frog
WSFMP	Wallum Sedge Frog Management Plan (Aug 2016)

1 INTRODUCTION

1.1 BACKGROUND

Calibre Consulting (Qld) Pty Ltd has been commissioned by Stockland Development Pty Ltd to prepare a Construction Environmental Management Plan (CEMP) for Precinct 3, 4, 5 and part Precinct 6, of the Aura Master Planned Community. This CEMP will set the framework for the management of environmental impacts and risks associated with the construction of Precinct 3, 4, 5 and part Precinct 6 and the associated fill material sourced from the Western Borrow Area and future Precinct 11.

This CEMP has been prepared as required by Condition 3 of the Environmental Protection and Biodiversity Conservation Act 1999 (EPBC) approval (EPBC Ref: 2011/5987) for the Aura Master Planned Community. Details of Condition 3 are provided in **Section 1.2**.

Calibre Consulting has also prepared the Preliminary Environmental Management Plan (Construction) (N12058CEMP01, January 2013) to support the Development Application for Precincts 3, 4, 5 and Part Precinct 6. This CEMP incorporates the management methodology from the Preliminary Environmental Management Plan (Construction) report and expands on the outcomes where necessary to satisfy the CEMP objectives.

1.2 STATUTORY COMPLIANCE AND CONDITIONS

Condition 3 of the of the Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Approval) details the following information requirements for each precinct.

Prior to the commencement of the action within each precinct, the person undertaking the action must submit to the Minister for approval a detailed precinct-specific Construction Environmental Management Plan. Each precinct Construction Environmental Management Plan must be submitted to Minister at least three (3) months prior to the commencement of the action within each precinct. Each precinct Construction Environmental Management Plan must be a standalone document that incorporates specific management actions required for each precinct. Each precinct Construction Environmental Management Plan must include:

Error! Reference source not found. below shows each requirement of Condition 3 and the reference to the relevant section in the CEMP).

Table 1-1: EPBC Condition 3 Requirements

Item	CEMP Report Section
<i>a) details on the timing of construction works including (consistent with the requirements under Condition 7) any compensatory habitat works</i>	Section 2 Civil Construction Methodology (Page 8) Section 5 Mitigation Strategies (Page 21) Appendix B
<i>b) current and detail map of the locations of:</i>	Appendix A: Engineering Drawings Appendix B: Wallum Sedge Frog Management Figures

Item	CEMP Report Section
<p>i) <i>Environmental Protection Zones, no-go areas/protected areas where only habitat creation, weed management or rehabilitation will occur;</i></p> <p>ii) <i>sediment and erosion treatment and prevention devices;</i></p> <p>iii) <i>prescribed Buffer Zones;</i></p> <p>iv) <i>development and construction zones;</i></p> <p>v) <i>essential services and easements;</i></p> <p>vi) <i>roads; and</i></p> <p>vii) <i>fauna protection devices and road crossings/underpasses.</i></p>	Appendix C: Vegetation Management Figures
c) <i>potential impacts to matters of national environmental significance;</i>	Section 3 Matters of Environmental Significance (Page 14)
d) <i>management and mitigation actions required for acid sulfate soils, surface and ground water quality, sediment and erosion controls, vegetation management, and pest and weed management to protect matters of national environmental significance;</i>	<p>Section 5 Mitigation Strategies</p> <p>Section 5.1.3 Erosion and Sediment Control Management Measures</p> <p>Section 5.2.3 Groundwater Management Measures</p> <p>Section 5.3.3 Geotechnical (Acid Sulfate Soils) Management Measures</p> <p>Section 5.4.3 Wallum Sedge Frog Management Measures</p> <p>Section 5.5.3 Vegetation Management Measures</p> <p>Section 5.6.3 Pest Management Measures</p> <p>Section 5.7.3 Weed Management Measures</p>
e) <i>the objectives, methods, parameters and monitoring strategies to be used;</i>	<p>Section 5 Mitigation Strategies</p> <p>Section 5.1.4 Erosion and Sediment Control Monitoring Program</p> <p>Section 5.2.4 Groundwater Monitoring Program</p> <p>Section 5.3.4 Geotechnical (Acid Sulfate Soils) Monitoring Program</p> <p>Section 5.4.4 Wall Sedge Frog Management Monitoring Program</p> <p>Section 5.5.4 Vegetation Management Monitoring Program</p> <p>Section 5.6.4 Pest Management Monitoring Program</p> <p>Section 5.7.4 Weed Management Monitoring Program</p>
f) <i>performance criteria for each set of parameters at which point corrective actions are required to be implemented;</i>	<p>Section 5 Mitigation Strategies</p> <p>Section 5.1.2 Erosion and Sediment Control Performance Criteria</p> <p>Section 5.2.2 Groundwater Performance Criteria</p>

Item	CEMP Report Section
	Section 5.3.2 Geotechnical (Acid Sulfate Soils) Performance Criteria Section 5.4.2 Wall Sedge Frog Management Performance Criteria Section 5.5.2 Vegetation Management Performance Criteria Section 5.6.2 Pest Management Performance Criteria Section 5.7.2 Weed Management Performance Criteria
<i>g) corrective actions, and/or mechanisms for developing corrective actions, and the parties responsible for implementing corrective actions.</i>	Section 5 Mitigation Strategies Section 5.1.5 Erosion and Sediment Control Corrective Actions Section 5.2.5 Groundwater Corrective Actions Section 5.3.5 Geotechnical (Acid Sulfate Soils) Corrective Actions Section 5.4.5 Wall Sedge Frog Management Corrective Actions Section 5.5.5 Vegetation Management Corrective Actions Section 5.6.5 Pest Management Corrective Actions Section 5.7.5 Weed Management Corrective Actions

We refer you to the approved Engineering Report EPBC Condition Variation N14002CER01B, February 2014 detailing the requirement to include other precincts within a given standalone precinct CEMP. This report details the requirements for cut and fill operations to facilitate the overall master planned development earthworks and infrastructure sequencing external to Precinct 3, 4, 5 and Part Precinct 6, being the Western Borrow Area and Part Precinct 11 (noted as “the works covered by this CEMP” from herein).

In addition to the EPBC Act the following legislative documents are applicable to the works covered by this CEMP. The project proponent is responsible for ensuring the requirements of these documents are satisfied.

- Environmental Protection Act 1994.
- Nature Conservation Act 1992.
- Vegetation Management Act 1999.
- Land Protection (Pest and Stock Route Management) Act 2002.
- Water Act 2000.
- Coastal Protection and Management Act 1995.

1.3 PRECINCT DESCRIPTION AND CONTEXT

Aura is a major master planned community situated to the southwest of existing residential areas at Caloundra and Little Mountain. Precincts 3, 4, 5 and Part Precinct 6 will consist of up to 230 business, industry, showroom allotments, open space, rehabilitation areas and also include major arterial roads to connect to the future city centre. **Figure 1-1** depicts the location of Precincts 3, 4, 5 and Part Precinct 6 relative to the Aura Priority Development Area.

Currently a haul road exists for the Precincts 1 and 2 developments through Precincts 3, 4, 5 and Part Precinct 6 for the transport of materials. If an external fill source is available it is expected that this haul road will be used, as per the current state, for transfer of imported material. Refer **Appendix A** drawing N12058-CEMP003 for details.

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1.4 CEMP OBJECTIVES AND REFERENCE

This CEMP will provide the framework for the management of environmental impacts relating to Precincts 3, 4, 5 and Part Precinct 6, and the associated Western Borrow Area and Precinct 11 borrow site of Aura. This CEMP will ensure that the Proponents obligations under the EPBC Act 1999 (EPBC ref 2011/5987) are achieved.

The objectives of this CEMP and references to the relevant sections for further details are outlined within.

Table 1-2: CEMP Objectives

: Objective	Reference Section
<ul style="list-style-type: none"> Identify impacts on Matters of National Environmental Significance; 	Section 3 Matters of National Environmental Significance (Page 14)
<ul style="list-style-type: none"> Detail the management and mitigation action for: <ul style="list-style-type: none"> Sediment and Erosion Control. Prescribed buffer zones. Development of construction zones. Essential services and easements. Geotechnical requirements for Acid Sulfate Soils. Groundwater. Fauna and Flora. Pests and Weeds. 	Section 5 Mitigation Strategies <ul style="list-style-type: none"> Sediment and Erosion Control (Section 5.1); Prescribed buffer zones (Section 5.1 and Section 5.4); Development of construction zones (Section 5.1 and Table 5-1); Essential services and easements (Section 2.4); Geotechnical requirements for Acid Sulfate Soils (Section 5.3); Groundwater (Section 5.2); Fauna and Flora (Section 5.4 where it relates to Wallum Sedge Frog Management. Section 5.5 where it relates to Vegetation management) Pests and Weeds (Section 5.7 where it relates to Weed Management)
<ul style="list-style-type: none"> Promote and manage “best construction practice” by the principal contractor and subcontractors 	Section 4 Environmental Management (Page 17-20)
<ul style="list-style-type: none"> Ensure construction activities occur without adverse environmental impacts within the site and adjacent properties; 	Section 5 Mitigation Strategies (Page 21 - 49)

1.5 ENVIRONMENTAL POLICY

Stockland is committed to the protection and enhancement of the environment. Stockland's environmental commitment is outlined below.

We recognise that a successful future for our business depends on sustainability of the environments, communities and economies in which we operate.

- *Systematically plan our operations to incorporate responsible environmental management principles and practices into property acquisition, design, construction, operation and maintenance.*
- *Work collaboratively with regulators and councils and comply with environmental laws, regulations and consent conditions.*
- *Embed community building strategies throughout our operations. Continually engage with people in our communities and respond to their reasonable concerns.*
- *Take a leadership role with our business partners to foster industry-wide best practice environmental outcomes.*
- *Work with our suppliers to see that they understand, commit to and meet our standards for environmental management.*
- *Implement strategies to prevent pollution, use resources efficiently and minimise waste and ecological impact.*
- *Support selection of materials that are safe, recycled or reused, have low embodied energy and have a reduced impact on resource depletion.*
- *Plan for and implement strategies to minimise energy consumption at our properties and projects.*
- *Support the use of more efficient transport modes and networks.*
- *Provide our employees with the information, training and support they require to meet the objectives of our environment program and foster their personal commitment and involvement.*
- *Measure and report on our performance and utilise the data as an input into our continual improvement program.*

2 CIVIL CONSTRUCTION METHODOLOGY

2.1 OVERVIEW

The following sections describe the scheduling and general construction sequencing for the development of the works covered by this CEMP.

2.1.1 WORKS COVERED BY THIS CEMP

This CEMP is intended to cover specific works items being undertaken within the Aura site relating to civil construction to satisfy condition 3 of the EPBC conditions of approval (EPBC ref 2011/5987). Works items include:

- Bulk Earthworks incl. temporary works such as haul roads;
- Roadworks – trunk and internal roads;
- Drainage – piped or overland swales;
- Sewer – trunk and reticulation;
- Water – trunk and reticulation;
- Stormwater Quality Improvement Devices; and
- Electrical.

2.1.2 CONSTRUCTION PHASE OVERVIEW

Construction will be divided into various sub stages for construction sequencing. The sub staging locations and sizes are to be defined as the project progresses further into the detailed design process. The construction of these stages will allow for the creation of business, industry and showroom lots, road networks, open space, drainage reserves as well as services such as electrical/telecommunications, water and wastewater. The general configuration of the development layout plan is illustrated in **Appendix A**.

To facilitate construction of the Works, fill is required to be imported from the borrow area within the Western Borrow Area and part of Precinct 11. If an external fill material source is readily available and feasible at the time of construction, this material may be used in place of the Western Borrow Area and Precinct 11 sources. Nevertheless, the importation of fill from the Western Borrow Area and Precinct 11 has been considered as a part of the CEMP for Precincts 3, 4, 5 and Part Precinct 6. A brief overview of the construction phases for the Works is provided within **Table 2-1** below.

Table 2-1: Overview of Construction Phases

Phase	Construction Activity	Description
1	Preconstruction Activities	<ul style="list-style-type: none"> • Preliminary work including set out to establish the site boundary, EPZ and environmental buffers; • Site construction office will be established; • Erosion and sediment control measures will be established; • Testing of soils for Acid Sulfate Soils (ASS) and associated groundwater testing to be completed (if required); • Construction of WSF habitat areas (if required); • Site assessment to confirm the extent of the WSF habitat or other fauna/flora; and • Site Specific Inductions including addressing CEMP requirements.

Phase	Construction Activity	Description
2	Construction Activities	<ul style="list-style-type: none"> Existing vegetation and topsoil within earthworks areas will be stripped in accordance with current vegetation management plan (if required). No stockpiles, haul roads or track will be established in areas other than shown on the plans or approved by the Superintendent; Works are to be planned to ensure that the minimum area of the site is disturbed at any one time; Earthworks will commence, including the cut operations in the borrow area within the Western Borrow Area and Precinct 11 (if required) to facilitate the filling of Precincts 3, 4, 5 and Part Precinct 6; Material will be transported from the Western Borrow Area and Precinct 11 (if required) to Precincts 3, 4, 5 and Part Precinct 6 via haul roads established to facilitate the material import; Formalised overland flow channels will be stabilised to prevent erosion and scour; Earthworks will be undertaken in a timely manner, then topsoiled, seeded/grassed and mulched immediately on completion. Site stabilisation will be carried out progressively as works are completed; Silt fences will be provided downstream of stockpiles; Following the construction of stormwater drainage, inlet protection will be provided to all inlets; and Services will be progressively established as the earthworks progress.
3	Post Construction	<ul style="list-style-type: none"> On the completion of the lots the sediment fencing will remain installed and removal of the fencing will only be permitted once seed strike and grass coverage is achieved and approved by the Superintendent; and Once road sealing and landscaping of verge areas have been undertaken, general inlet protection works will be removed where approved by the Superintendent.

2.1.3 CONSTRUCTION SCHEDULING

The construction scheduling of the project is anticipated for commencement in June 2017, with the completion expected within 10-15 years.

A comprehensive construction program will be developed by the Principal Civil Contractor upon award of the contract. This program will be reviewed by the Superintendent and Proponent in order to comply with time frame constraints within the CEMP (if applicable), to enable construction activities to proceed without adverse effect on site constraint items.

The construction program will be broken down into specific tasks relating to each activity within the project, and nominate key processes such as critical links, milestones, percentage completions and task summaries.

In general construction works associated with the project will be undertaken between the hours outlined within **Table 2-2** below. Works outside of these hours will require prior approval from the Superintendent.

Table 2-2: Nominated Working Hours

Working Days	Nominated Work Construction Hours
Weekdays (Monday to Friday)	7:00am to 6:00pm
Saturdays	7:00am to 4:00pm
Sundays and Public Holidays	No Work

Note: Access to the site outside of these hours is permitted for deliveries, equipment maintenance, security and emergency response to ensure environmental compliance; as permitted by the relevant government approvals. It is acknowledged that safety of workers on site is paramount and that personal safety is to take priority when responding to investigations and/or corrective actions, when responding to turbidity trigger alarms or inclement weather related incidents/notifications.

Additional to the above, **Table 2-3** details the indicative construction sequencing with reference to **Appendix A** for the precinct staging plans.

Table 2-3: Indicative Construction Sequencing

Aura Precincts 3, 4, 5 and Part Precinct 6 Indicative Construction Sequencing		
Works Package	Commencement	Completion
Estate Major Works		
Frog Ponds within the relevant Precincts covered by this CEMP.	Prior to any works occurring within the relevant Precinct.	Prior to any works occurring within the relevant Precinct.
PT Sub-Arterial Road	January 2018	December 2018
Connection to Racecourse Road	July 2030	December 2030
Bells Creek Arterial Phase 2 & 3	January 2018	December 2018
Trunk Sewer Gravity Main	January 2018	December 2018
Trunk Water Main	January 2018	December 2018
Bulk Earthworks Works Packages		
Bulk Earthworks Phases including sediment basin construction, erosion and sediment controls, clearing and grubbing, topsoil strip, bulk earthworks, topsoil re-spread and site stabilisation	June 2017	August 2022
Subdivision Works & Rehabilitation		
Stage works including WSUD (wetlands, rain gardens, bio retention) erosion and sediment control, services, roadworks, landscaping and rehabilitation	June 2017	December 2030

2.2 EROSION AND SEDIMENT CONTROL

The installation and maintenance of adequate erosion and sediment control measures are important in order to protect downstream waterways. The concept erosion and sediment control drawings detailed in **Appendix A** indicate the minimum standard of erosion and sediment control measures that are to be implemented during construction and phasing of the works. Detailed design will confirm the actual erosion and sediment control measures ensuring downstream and adjacent environmental values are protected from construction activities.

During the construction, an erosion and sediment control management plan will be submitted to the Construction Superintendent for acceptance. The attached drawings will be updated with further details of erosion and sediment control processes for works covered by this CEMP. The Principal Civil Contractor shall review the erosion and sediment control management plan regularly and make onsite amendments as required, including the installation of additional measures where site conditions dictate.

Erosion and Sediment control measures shall comply with the *Preliminary Environmental Management Plan (Construction)* (Brown Consulting 2013) and shall include, but not be limited to, the following:

- Control and/or diversion of upstream surface runoff through or around works areas without mixing with sediment laden site flows;
- The construction of mulch/earth bunds to control/divert surface runoff following clearing of vegetation;
- The construction of diversion drains and detention devices prior to and during earthworks operations;
- Taking care not to concentrate surface runoff unnecessarily so that it becomes a nuisance or cause damage to the works and/or the environment;
- Construction of sediment/silt fences, sediment basins, rock check dams, sand bag checks dams, cattle (vibration) grids at site entry/exit points, etc.;
- All in stream works are to be promptly completed by the Contractor while taking care not to cause adverse effects to the environment;
- The protection of batters from erosion and scour by diverting surface runoff away from the batters until vegetation is established;
- Any measures/construction to meet the requirements of the EDQ approvals;
- Any amendments required to the installed erosion and sediment control measures following review and written instruction from the Superintendent to do so;
- Diversion of all surface and stormwater flows resulting from construction works, away from mapped (retained) or constructed WSF breeding habitat, so as to ensure no connection of runoff flows to WSF breeding habitat, see **Appendix B**; and
- Regular inspection and maintenance of all erosion and sediment control measures throughout the construction period.

2.3 SITE CLEARING AND BULK EARTHWORKS

Prior to clearing, delineation of the buffer zones, vegetation retention and habitat retention zones are to be defined onsite. Following on from the delineation activities the construction zones are established, and clearing and bulk earthworks activities can proceed:

- Establishment of erosion and sediment controls, refer **Section 2.2**;
- Re-establishment of the existing haul road (if required);
- Establishment of new haul roads including any creek crossings (as required);
- Clearing and grubbing of areas covered by this CEMP;
- Stripping of topsoil operations for areas covered by this CEMP;
- Excavation for cut operations for areas covered by this CEMP, including diversion drains and sedimentation ponds;
- Haulage of fill material along existing and newly created haul roads, if sourced externally to Precincts 3, 4, 5 and Part Precinct 6:
- Expected 380,000m³ fill required;
- Fill transportation of approximately 5,000 to 8,000m³/day;
- Fill import will occur intermittently as the development progresses;
- Fill placement and compaction operations for Precincts 3, 4, 5 and Part Precinct 6;
- Haul road maintenance/erosion and sediment control monitoring;
- Grass seeding (including drill seeding, hydro mulching or other methods approved by the Superintendent to achieve stabilisation) of completed lots following topsoil respread¹; and

- Decommissioning of erosion and sediment controls on successful completion of site stabilisation works.

The removal of material from the Western Borrow Area and Precinct 11 shall ensure that all surface and ground water from disturbed areas will discharge into sediment basin(s) located throughout the earthworks operations. Exposed areas are to be progressively stabilised as works are complete, to minimise the extent of areas of disturbance at any given time.

2.4 ESSENTIAL SERVICES (INFRASTRUCTURE SEQUENCING)

Serviceability for precincts require certain infrastructure located outside of the precinct boundaries itself. These essential services are required for the given Precinct to achieve occupancy. In relation to management and mitigation measures, essential services and easements must consider the requirements of the EPBC Approval and associated approved management plans. Examples of these essential services and management/mitigation measures are as follows:

Table 2-4: Essential Infrastructure

Essential Infrastructure	Management/Mitigation Measure
Trunk roads to access the precinct	In accordance with the masterplan, locate roads in areas where clearing of vegetation is minimized. Implement fauna and or frog crossings to improve fauna connectivity.
Drainage infrastructure including wetlands, bioretention, drainage channels and stormwater pipes	Ensure location and maintenance access meet the requirements of the Wallum Sedge Frog Management Plan.
Sewer and water reticulation mains	Consolidate where possible into road reserves.
Electrical and communication reticulation	Consolidate where possible into road reserves.
Footpaths and maintenance access through open space and conservation areas	Minimise footpaths in close proximity to protected buffer zones. Use educational signage to promote the environmental values of conservation areas.

¹ Completed lots from a bulk earthworks perspective means lots progressively stabilised for later civil construction. It is noted that other areas undergo additional stabilisation by various methods.

3 MATTERS OF ENVIRONMENTAL SIGNIFICANCE

The following section outlines Matter the National Environmental Significance (MNES) identified in the Public Environmental Report for Aura (Stockland 2013) and if they are relevant to the development of Precincts 3, 4, 5 and Part Precinct 6. Reference should be made to the Public Environment Report (PER) for further details regarding each MNES.

The MNES that have been considered on the Aura site are as follows:

- Wetlands of international importance – the Moreton Bay Ramsar Wetland which was listed under the Convention on Wetlands of International Importance in 1993;
- Listed Threatened species and communities - Wallum Sedge Frog (*Litoria olongburensis*), Water Mouse (*Xeromys myoides*), Attenuate Wattle (*Acacia attenuata*), Swamp Stringybark (*Eucalyptus conglomerata*), Lesser Swamp Orchid (*Phaius Australis*), Wallum Leek (*Prasophyllum wallum*), Emu Mountain Sheoak (*Allocasuarina emuina*), Hairy-joint Grass (*Arthraxon hispidus*) and Three-leaved Bosistoa (*Bosistoa transversa*); and
- Listed Migratory Species - *Actitis hypoleucos*, *Arenaria interpres*, *Calidris acuminata*, *Calidris alba*, *Calidris canutus*, *Calidris ferruginea*, *Calidris melanotos*, *Calidris ruficollis*, *Calidris tenuirostris*, *Gallinago hardwickii*, *Heteroscelus brevipes*, *Heteroscelus incanus*, *Limicola falcinellus*, *Limnodromus semipalmatus*, *Limosa lapponica*, *Limosa*, *Numenius madagascariensis*, *Numenius minutus*, *Numenius phaeopus*, *Tringa glareola*, *Tringa nebularia*, *Tringa stagnatilis*, *Xenus cinereus*, *Calidris subminuta*, *Phalaropus lobatus*, *Philomachus pugnax*, *Charadrius bicinctus*, *Charadrius leschenaultia*, *Charadrius mongolus*, *Charadrius veredus*, *Pluvialis fulva*, *Pluvialis squatarola*, *Glareola maldivarum*, *Sterna albifrons*, *Sterna caspia*, *Ardea modesta*, *Ardea Ibis*, *Merops ornatus*, *Rhipidura rufifrons*.

The following table describes for each MNES whether they have been identified within Precincts 3, 4, 5 and Part Precinct 6 and therefore could be directly impacted by this part of the development or if there is the potential for indirect effects on these MNES if not located within the Precinct.

Reference should be made to the following documents for further details regarding each MNES.

- Wallum Sedge frog Management Plan (WSFMP) – August 2016 (or latest approved);
- Environmental Management Plan – November 2013 (or latest approved);
- Environmental Protection Plan – July 2015 (or latest approved); and
- Vegetation Management Rehabilitation Plans – November 2013 (or latest approved); and, Water Quality Management Plan – May 2016 (or latest approved).

Section 5 of this CEMP describes in detail the mitigation and management strategies proposed in relation and appropriate to each MNES described below in **Table 3 1**.

For further information on the latest resources available for the project, reference should be made to the projects website at: <https://www.stockland.com.au/residential/gld/aura/resources>.

Table 3-1: Works covered by the CEMP – Summary of Potential Impacts and Mitigation for Matter of National Environmental Significance

MNES		Summary of Potential Direct Impacts on MNES & Mitigation	Summary of Potential Indirect Impacts on MNES & Mitigation
Listed Threatened Species	Wallum Sedge Frog	<ul style="list-style-type: none"> A preconstruction survey was undertaken in September 2016 in accordance with Condition 8g of the approval and consistent with the method outlined in the updated WSFMP (August 2016). Based on the results from the survey, 4.54ha of WSF habitat is assessed as being lost within Precincts 4 and 5 of the development (polygons 24, 30, 31 and 42). Impacted WSF habitat within Precinct 3 has been previously accounted for in the CEMP from Precinct 2 and Part Precincts 3/4. In accordance with the approved WSFMP and Condition 7 of the Approval, 12.53ha of WSF habitat is being created, conserved and embellished along the Bells Creek North (northern bank) frog conservation corridor (Frog Zone and Frog Buffer). This will reduce somewhat with the introduction of storm water drainage corridors and WSUD placement within the Frog Buffers. A total area of 0.175ha of potential existing WSF habitat (identified in the preconstruction survey) will be retained and conserved within the Bells Creek North (northern bank) frog conservation corridor. There is a maximum net gain of 8.03ha of WSF habitat (12.53-4.54=8.03). 	<ul style="list-style-type: none"> Adjacent earthworks (i.e. filling works, clearing of vegetation etc.) to be undertaken so as to avoid impact on retained habitat. Stormwater runoff from the development in areas of construction covered by this CEMP to be diverted away from retained or created Wallum Sedge Frog habitat (ponds) to avoid potential impacts.
	Water Mouse	<ul style="list-style-type: none"> Water mouse habitat as identified in the PER (Stockland, 2013) will not be directly impacted by the works covered by this CEMP. 	<ul style="list-style-type: none"> No Water Mouse habitat exists within or adjoining any areas covered by this CEMP. Indirect impacts would not be anticipated as surface water and ground water, if discharged, will be directed into Lamerough Creek and Bells Creek North.
Habitat with potential to contain EPBC list species		<ul style="list-style-type: none"> No EPBC Act listed threatened flora species were located on the Aura site during the targeted surveys and as such no direct impacts on these MNES are predicted (PER, 2013). 	<ul style="list-style-type: none"> The Aura site has been assessed as containing habitat with the potential to contain EPBC Act listed flora species to occur based on the quality of extant habitats and the proximity of nearby

MNES		Summary of Potential Direct Impacts on MNES & Mitigation	Summary of Potential Indirect Impacts on MNES & Mitigation
			populations. Stockland has committed to appropriate rehabilitation within conservation and rehabilitation areas across the site. An area bounding the northern and eastern boundaries of Precincts 3, 4, 5 and Part Precinct 6 has been defined as the Environmental Protection Zone (EPZ) which will be conserved and rehabilitated to improve habitat value. The nature of habitat rehabilitation across the site is identified in the Vegetation Rehabilitation and Management Plan, 2014, through the designation of habitat management units or HMU's.
Listed Migratory species		<ul style="list-style-type: none"> The development of works covered by this CEMP are expected to not directly impact migratory birds that use the site. 	
Wetland of International importance (RAMSAR)		<ul style="list-style-type: none"> As a result of the works covered by this CEMP, there is expected to be no direct impacts on the RAMSAR site. 	<ul style="list-style-type: none"> There would be no indirect impacts on Ramsar as downstream water quality and quantity would be maintained to protect environmental values.

4 ENVIRONMENTAL MANAGEMENT

4.1 MANAGEMENT STRUCTURE AND RESPONSABILITY

Figure 4-1 below illustrates the general management and reporting structure that will be implemented for the project.

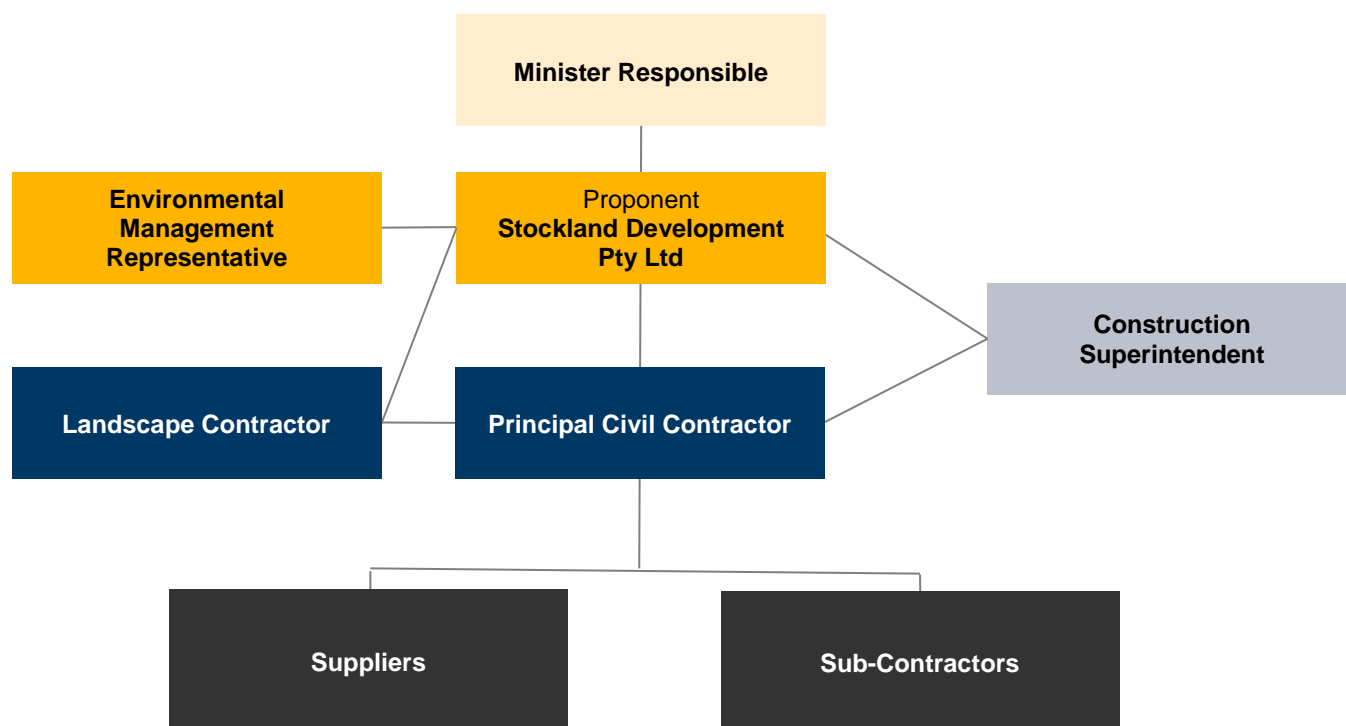


Figure 4-1: CEMP Reporting Structure

4.1.1 STOCKLAND DEVELOPMENT PTY LTD (PROPONENT)

Stockland as the project proponent will be responsible for the implementation and monitoring of the CEMP. The responsibilities of the proponent are:

- Appoint a Development Manager and or Project Manager to manage and monitor compliance with the CEMP;
- Appoint a Construction Superintendent to manage and monitor the performance of the Principal Civil Contractor;
- Co-ordinate between the Proponent and Construction Superintendent;
- Appoint a Principal Civil Contractor;
- Appoint an Environmental Management Representative that is responsible for compliance reporting to the department, consistent with condition 14 of the Approval;
- Appoint a Landscape Contractor; and
- Appoint all other development driven personnel.

4.1.2 CONSTRUCTION SUPERINTENDENT

The Construction Superintendent will be responsible for managing and monitoring the performance of the Principal Civil Contractor. The Superintendent will also be responsible for:

- Be the point of contact for the Local Authorities;
- Co-ordinate between the Proponent/Environmental Management Representative and the Principal Civil Contractor;
- Informing the Principal Civil Contractor of complaints or enquiries from neighbouring properties; and
- Report non-compliances as soon as possible to the Project Manager or Development Manager and Environmental Management Representative, in order to comply with proponent notification requirements, consistent with condition 14 of Approval.

4.1.3 PRINCIPAL CIVIL CONTRACTOR

The Principal Civil Contractor will be responsible for the construction of the civil aspects of the development and the overall day to day implementation and monitoring of the CEMP. The responsibilities of the Principal Civil Contractor are:

- Manage and monitor the performance of the civil works contractors and sub-contractors;
- Co-ordinate testing and maintenance activities when required;
- Co-ordinate other disciplines and ensure compliance with the CEMP documentation;
- Implantation, monitoring and maintenance of the erosion and sediment control device;
- Working within the documentation of the CEMP; and
- Notify the Construction Superintendent of non-compliances as soon as possible in order to comply with Proponent notification requirements consistent with condition 14 of the Approval.

4.1.4 ENVIRONMENTAL MANAGEMENT REPRESENTATIVE

The Environmental Management Representative will be appointed by the Proponent and will be responsible for compliance reporting in accordance with the CEMP. The responsibilities of the Environmental Management Representative are:

- Monitor the performance of the Principal Civil Contractor in conjunction with the appointed Project Manager and or Development Manager;
- Conduct necessary investigations required under this plan relating to feral pest management;
- Provide input into CEMP element rectification if required;
- Report any non-compliances to the department within 2 business days of being made aware of the non-compliance, consistent with condition 14 of the EPBC Approval; and,
- Prepare and submit annual compliance reporting to the department.

4.2 ENVIRONMENTAL TRAINING

All personnel associated with the construction of this project (where their activities are relevant to this CEMP relating to the protection of MNES), will undertake general environmental awareness and induction training, this training will outline the roles, responsibilities and management measures required by this CEMP. This training will be undertaken as part of the site induction process and will be delivered by an appropriate qualified person.

This training will encompass (but not be limited to):

- A general site induction to familiarise personnel with the site and its surrounds;
- Awareness and induction training outlining the CEMP requirements;
- Environmental emergency response training in the event of flood, bushfire and chemical spills;
- Site specific training with regard to environmental controls;
- Environmental responsibilities such as general environmental duties and the duty to report and notify;
- Acceptable and unacceptable practices for the site;
- Identification of the appropriate person to report to in the event of an environmental issue;
- Procedures for unexpected finds such as Aboriginal heritage sites and European heritage sites;
- Specific task training, such as dust mitigation measures for operators, and designated fuelling stations for plant and machinery;
- Procedures for threatened flora and fauna identification such as the Wallum Sedge Frog;
- Stop work and notification procedures in the event of unexpected finds and/or the identification of threatened species;
- Significant tree locations and the controls to be implemented to preserve these areas; and
- Following review of an incident, noncompliance or public complaint the corrective and preventive action will identify the need to assess and retrain the personnel involved.

The corrective and preventative action should also identify changes to the training content and/or structure to ensure continued improvement principals are implemented.

A register of site induction and environmental training including the names of personnel trained, date of training, details of the trainer and the timeframe for review and retrain will be maintained onsite.

4.3 EMERGENCY CONTACTS AND RESPONSE

The Principal Civil Contractors Project Manager and Site Engineer will be responsible for the reporting of environmental incidents or emergencies to the appropriate authorities and action recommendations made by the given authorities to rectify the situation.

The Principal Civil Contractor must nominate an employee that will be contactable for environmental emergencies 24 hours a day, 7 days a week. This employee must have the authority to stop or direct works to ensure the mitigation of risk in the event of an emergency situation. This employee must have clear documented responsibilities and procedures to follow in the event of an emergency situation onsite.

This employees contact details and responsibilities will be issued to adjoining residents, DEHP, the Construction Superintendent, Proponent and local authorities **Table 4-1** shows the relevant emergency contact numbers.

Table 4-1: Emergency Contact Numbers From DEHP (2014)

Issue	Person/Authority	Contact Details
Bushfire, medical and other emergencies	Emergency Services (Police, Fire, Ambulance)	000
General Environmental Emergency	DEHP Emergency Services	13 74 68 000
General Environmental Issues	DEHP	13 74 68
Wildlife Incidents Pollution Reporting	DEHP	1300 130 372
Sick or Injured Wildlife	RSPCA QLD	1300 264 625
Onsite Emergency – Internal Contact	Principal Contractors Site Engineer Principal Contractors Project Manager Superintendent	TBA TBA TBA

All personnel entering the site will be required to sign into an attendance register, and subsequently sign out upon leaving site. In the event of an emergency situation all onsite personnel will need to be accounted for.

An assembly point will be nominated for the site, and in the event of an emergency situation all personnel onsite will assemble at this point. The Principal Civil Contractor's Project Manager or appropriately delegated employee will confirm personnel numbers in preparation for the arrival of emergency services.

The Principal Civil Contractor must develop and implement a procedure where all personnel onsite will receive notification regarding emergency situation and the need for assembly.

The Principal Civil Contractors must address the requirement for onsite emergency procedures in the event of the following occurrences:

- Localised onsite fire - including requirements for onsite fire protection devices such as; Fire extinguishers, fire trails and areas allocated for smoking;
- Bushfire on adjoining land - including the control mechanism to prevent or minimise combustible material onsite;
- Flooding onsite, adjoining land and roadways; and
- Chemical Spills, including designated refuelling points away from flow catchment areas with appropriate controls in place.

A Hazardous Substance Register will be established for the Project and this register will be kept within the site office compound.

The Hazardous Substance Register must record details such as the product name, risk rating, storage instructions, volume kept onsite, location kept onsite and a person responsible for the maintenance of this register.

Safety Data Sheets (SDS) for all chemicals stored or used on the site will be included with the Hazardous Substance Register and made available to interested parties. SDS's must be dated and approved for use within a five (5) year period. Any SDS outside of the five year period will be deemed non-compliant.

Personnel working with, transporting or using chemicals and/or hazardous substances must be appropriately trained, and this qualification recorded during Site Induction Training.

A copy of all current SDS's must also be stored at the first aid facilities, and trained first aid personnel will have access to all SDS's for the Project.

In the event of an emergency situation, the Hazardous Substance Register is to be issued to emergency services upon their arrival to site.

All personnel involved with the construction of the Project will be trained in these procedures at the time of Site Induction.

5 MITIGATION STRATEGIES

The following sections outline the mitigation measures for the management of potential environmental impacts as a result of the Precincts 3, 4, 5 and Part Precinct 6 construction activities. The mitigation measures detailed below are in accordance with the *Preliminary Environmental Management Plan (Construction)* (Brown Consulting 2013).

The mitigation strategies outlined below will be continually reviewed and updated to reflect current best management practice. The mitigation strategies will be updated to reflect the changes in works undertaken throughout the project.

5.1 EROSION AND SEDIMENT CONTROL

5.1.1 OVERVIEW

During the construction of works covered by this CEMP, the management of sediment laden runoff is critical to ensure no adverse impact to receiving waterways. Best practice erosion and sediment control measures will be provided throughout the construction area in accordance with the Best Practice Erosion and Sediment Control Guidelines (IECA, 2008) with guidance from the Manual for Erosion and Sediment Control Version 1.2 (Sunshine Coast Regional Council 2008). It is proposed to use sedimentation ponds and/or high efficiency sediment basins throughout the areas covered by this CEMP and associated works.

5.1.2 PERFORMANCE CRITERIA

The performance criteria shall apply to dewatering of sediment basins for any rainfall event up to and including the design rainfall event defined in **Table 5.1**. The performance criteria have been set to provide the required discharge criteria to ensure the site based water quality discharge parameters (i.e. creek water quality in accordance with the approved Water Quality Management Plan) are not exceeded. The performance requirements for water quality are as follows:

- pH 6.5 to 8.5, if groundwater is passed through the sediment basins, then the pH of the discharged water can be less than 6.5, providing it is within the range reported within the WSFMP (2015) – a pH range of between 4 and 5;
- Dissolved Oxygen (DO) > 80% saturation;
- Total Suspended Solids (TSS) less than 50 mg/L, or the equivalent turbidity;
- Nutrients (nitrogen and phosphorus) to be managed through normal erosion and sediment control practices;
- Capture first 15mm/day of runoff; and
- Discharge turbidity offsite to be less than 10% above background values of water quality entering the site via Bells Creek North and South at the Bruce Highway culverts for any events up to and including the design rainfall event.

If during a rain event, the above discharge criteria have not been achieved, and downstream water quality is within the required criteria, then no further corrective action is required.

If performance criteria have not been achieved, as a result of works covered by this CEMP, then corrective actions are to be implemented refer **Section 5.1.5**.

All testing is to be in accordance with the Water Quality Management Plan approved on the January 2016, or latest approved version.

5.1.3 MANAGEMENT MEASURES

A detailed Erosion and Sediment Control Plan (ESCP) will be developed for areas covered by this CEMP and any other associated essential services work. This ESCP will detail the proposed control (structural and non-structural) measures that will be implemented on site. The ESCP will be in accordance with IECA (2008) with guidance from *Council's Manual for Erosion and Sediment Control Version 1.2* (SCRC 2008) and EPBC Approval. Water quality discharge from sediment

basins in not to enter any retained or created Wallum Sedge Frog breeding habitat (ponds). Indirect discharge into retained or created habitat (foraging) is permitted providing discharge criteria in **Section 5.1.2 and 5.4.2** have been met. This is to ensure that environmental flows are maintained to conservation areas.

Temporary erosion and sediment control measures will remain in place until stabilisation of the contributing sub catchment within each bulk earthworks or construction package is achieved through greater than 70% groundcover (grass seeding strike post bulk earthworks), establishment of permanent landscape treatment, stabilisation through paving or similar surface treatments. Stabilisation should ensure that the natural runoff from the catchment is within the discharge limits specified in **Section 5.1.2** or, will not adversely impact the water quality in the receiving environment as confirmed by the relevant parties. **Table 5-1** details the erosion and sediment control management methodology.

Receiving water quality monitoring is also being undertaken in accordance with the approved "Water Quality Management Plan" (latest approved version), which includes a range of monitoring activities (e.g. event-based, estuarine EHMP, real-time turbidity, load-based monitoring). Monitoring for nutrients will be undertaken as part of the freshwater ambient, event-based and estuarine EHMP monitoring. Appropriate water quality 'trigger levels' for 'investigations' and 'corrective actions' for Bells Creek and Pumicestone Passage (for a range of water quality indicators) are shown in Figures 7-2 to 7-10 of the aforementioned Water Quality Management Plan (including for nutrient concentrations). These 'trigger levels' will be applied to appropriately mitigate any potential water quality impacts throughout the project.

Table 5-1: Erosion and Sediment Control Management

Measure	Description
Dedicated Construction Areas and Clearly Identified Protection Zones	<p>Conservation areas for protection will be clearly identified and protected from construction activity through signage, barriers or other appropriate measures.</p> <p>All construction activities will occur within dedicated construction areas as advised by the Superintendent.</p>
Minimise disturbed areas/Progress Stabilisation	<p>Areas of soil disturbance will be minimised wherever possible. Construction activities will be staged in order to reduce the area of soil exposed at any period in time.</p>
Progressive Stabilisation	<p>It is proposed that all areas within the site are to be stabilised within 5 days of earthworks completion. Stabilisation will consist of both short term and long term stabilisation.</p> <p>Short term stabilisation will consist of covering disturbed areas with a suitable product such as hydro mulch, mulch, enviromulch, geofabric etc. Long term stabilisation will be achieved through drill seeding, hydro mulch, enviromulch, etc. Due to the importance of stabilisation, it is proposed that short term measures will be reinstated as required until long term stabilisation is achieved, to ensure stabilisation is maintained.</p> <p>Sterile and native grass species will be used to prevent spread of weeds and future impact on native vegetation.</p>
Diversion of clean flows	<p>Where possible clean water will be diverted around the areas of disturbance. These diversions will be undertaken so as not to increase the concentration of TSS or other pollutants and without causing erosion or scouring.</p>

Measure	Description
	<p>All cut-off drains will be designed to both convey and be structurally stable for the 10 year ARI event.</p> <p>The water quality of any stormwater discharge resulting from the construction works is to be tested to confirm parameters have been met, before discharging into the receiving environment.</p>
Diversion of dirty flows	<p>Installation of dirty water diversion drains to collect all surface run off from disturbed areas. All dirty water diversions to be discharged in to the closest sediment pond for treatment prior to discharge.</p> <p>No flows to enter WSF breeding habitat.</p>
Stockpiles	<p>Any stockpiles will be located within the area of disturbance, and away from any waterways or drainage channels. Appropriate erosion and sediment control measures will be installed and maintained to prevent any stockpile run-off.</p> <p>Stockpile batter will be maintained at a slope of no greater than 1:1 and the height should be no greater than 2m.</p>
Sediment Fences	<p>Sediment fences will be installed to provide further protection and retention of runoff from disturbed areas. These will be strategically placed along contours and will include overflow weirs to prevent both scour and failure of the devices. Earthen bunds/drains may be used as an alternative subject to an assessment of their suitability in relation to location and catchment characteristics.</p>
Sediment Basins (High Efficiency & Traditional)	<p>Sediment management devised may include the use of High Efficiency and/ or traditional sediment basins installed on site to capture all runoff from disturbed areas throughout construction. Captured runoff will then be treated and discharged into downstream, stabilised areas.</p> <p>The use of high efficiency basins versus traditional sediment basins will be based on the proximity to sensitive receiving environments, erosion risk and an assessment of the best practice, practicality and appropriateness of each application.</p> <p>Due to the sensitive nature of the site, and also with a view to exceed current 'best practice' outcomes specific design criteria will apply for each management scenario.</p> <p>Where traditional sediment basins are used, requirements are to be in accordance with the manual for Erosion and Sediment control (SCRC 2008). The design rainfall depth of 77mm over a 5 day period is to be adopted. It is noted that this is somewhat higher than the 5-day 85th percentile rainfall depth for Caloundra</p>

Measure	Description
	<p>which is the recommended design rainfall for sensitive receiving environments.</p> <p>For High Efficiency sediment basins, rainfall intensity and inflow duration govern the time available for suspended sediment to settle in the basin. Design storm events for these basins are to be:</p> <p>0.5 times the peak 1 year ARI discharge</p> <p>All captured runoff shall be treated (flocculated) and discharged within 5 days of the cessation of the rain event, where practical or as soon as practical noting cumulative / successive rainfall impacts the ability to de-water in some circumstances. Captured runoff is to be treated to achieve the performance criteria outlined above.</p> <p>No discharge of sediment basin water to enter WSF breeding habitat</p> <p>Refer to Appendix A for the conceptual Sediment Basin locations.</p>

5.1.4 MONITORING PROGRAM

Regular monitoring of all erosion and sediment control measures will be undertaken by Principal Contractor and Superintendent, comprising:

- Daily inspections of all erosion and sediment control measures;
- Daily inspection of the road network for evidence of sediment being deposited external to the site;
- Inspection of all control measures after major rain events (greater than 25mm in 24 hours);
- Daily measurement of turbidity, pH, Electrical Conductivity (EC) and Dissolved Oxygen (DO) within sediment basins;
- Water Quality testing of any indirect stormwater runoff entering the foraging areas of the WSF habitat;
- Rainfall will be recorded at 9am each working day;
- Turbidity monitoring at sediment basin outlets. The following monitoring will be undertaken;
 - For traditional capture and treat systems monitoring shall be undertaken prior to discharge; and
 - For flow through systems monitoring shall be real time continuous monitoring;
- Temporary sediment control measures incl. sediment basins can be decommissioned provided the following performance criteria below are met for the relevant sub-catchment:
 - Greater than 70% groundcover is achieved;
 - Establishment of permanent landscape treatments;
 - Stabilisation through paving or similar surface treatments.

At the cessation of use of temporary sediment control measures, natural runoff from the stabilised catchment is to be within the discharge limits specified in **Section 5.1.2** or, will not adversely impact the water quality in the receiving environment as confirmed by the relevant parties.

5.1.5 CORRECTIVE ACTIONS

If the performance criteria is not achieved, then the following corrective action is required:

- The Principal Civil Contractor shall inspect all temporary erosion and sedimentation controls. Any defects revealed by such inspections shall be rectified immediately and these works shall be cleaned, repaired and augmented as required, to ensure effective erosion and sedimentation control thereafter.
- The Principal Civil Contractor shall review the erosion and sediment control strategy, identify opportunities for improvement and develop a strategy for ongoing development of the strategy.

Periodically during the course of construction of the project, the Construction Superintendent or representative may make an observation or issue a direction/advice in relation to the erosion and sediment control strategy being implemented by the Principal Civil Contractor. Notwithstanding any direction/advice issued by the Construction Superintendent, the Principal Civil Contractor shall ensure that at all times during the construction phase, best practice erosion and control measures are implemented on site.

5.1.6 RESPONSIBILITIES

The Principal Civil Contractor shall be entirely responsible for planning, design, certification and carrying the whole of the Work to minimise and avoid erosion and sedimentation of the site, surrounding country, watercourses, water bodies and wetlands.

The Principal Civil Contractor should note that any Conceptual Erosion and Sediment Control drawings included in the CEMP or approved under the approval process with EDQ are conceptual only and represent a possible erosion and sediment control strategy for the site. The Principal Civil Contractor shall be responsible for advancing the conceptual design plans to suit their construction methodology.

5.1.7 REPORTING

Onsite documentation must be held whereby a record of daily inspection documentation is kept, including but not limited to:

- Monthly environmental compliance reports (ECR) to address erosion and sediment control measures and events resulting from significant rainfall (see above);
- A log of the effectiveness of the erosion and sediment control measures will be maintained;
- Daily inspections of all erosion and sediment control measures;
- Rectification of defect items;
- Onsite water quality testing results;
- Turbidity monitoring documentation The following monitoring documentation will be recorded;
 - For traditional capture and treat systems monitoring documentation shall be undertaken prior to discharge; and
 - For flow through systems documentation shall be real time continuous monitoring; and
- Notify the Construction Superintendent of non-compliances as soon as possible in order to comply with reporting obligations of the proponent, consistent with condition 14 of the EPBC Approval and **Section 4.1.4** of this document.
- An Annual Compliance Report (ACR) will be prepared in accordance with condition 14 of the EPBC Approval and will report on compliance within this CEMP.

5.2 GROUNDWATER

5.2.1 OVERVIEW

Much of the current development site is underlain by relatively shallow groundwater. At the site establishment stage, there will be a need to manage local groundwater levels to allow construction activities to commence (e.g. provide a working platform) without causing adverse environmental impacts.

Due to the presence of shallow groundwater across the site, earthworks have the potential to impact groundwater where excavation activities intersect the water table and dewatering is necessary

Where dewatering is necessary, a network of closely spaced drainage trenches intersecting the water table is likely to be constructed to reduce groundwater levels. Groundwater discharge is to be kept separate to the surface water discharge.

Dewatering activities will not drain areas of retained or created WSF habitat, with natural fluctuations to groundwater levels (e.g. filling and evaporative cycles of the perched, shallow aquifer) maintained in areas identified for long term WSF habitat. Monitoring is proposed in these areas.

5.2.2 PERFORMANCE CRITERIA

Performance requirements for groundwater management are as follows:

- Discharges of surface water from the site (that could be groundwater affected) are managed and released in accordance with surface water quality discharge standards, inclusion of combined surface water and groundwater sediment basins to be sized accordingly taking into account dewatering rates;
- Sediment basins to be dewatered within 5 days;
- Acidity and/or dissolved metals are not to be conveyed off the site through groundwater as a result of the development above what is considered to be natural variability;
- Spills or other contaminant releases that could affect groundwater quality are avoided or otherwise treated immediately; and,
- No drainage of retained or created WSF breeding habitat.

The data collected as part of the groundwater monitoring program will be used to develop an adaptive monitoring approach that utilises monitoring data to inform management approaches. The groundwater monitoring program is related to the construction phases of the development.

Prior to commencement of construction/ earthworks, trigger values will need to be established for each bore in the monitoring network. Recommended trigger values for monitoring groundwater levels during construction periods are outlined in the WQMP (BMT WBM January 2016).

Indicative recommend trigger values are shown in **Table 5-2**. The recommended trigger values and management responses are:

- Exceedance of the 80th percentile of baseline data (or 20th percentile for parameters with a lower limit) at sentinel bores triggers an initial investigation into impacts to Protected Matters.
- Indications that there are impacts to Protected Matters triggers corrective actions.

Table 5-2: Indicative Groundwater Level Trigger Values

Statistic	GW10 (mbGL)	GW10 shallow (mbGL)	GW8 (mbGL)	GW8 shallow (mbGL)	GW9 deep (mbGL)	GW9 vs (mbGL)	S1 deep (mbGL)	S1 vs (mbGL)	S2 shallow (mbGL)	
Average	10.81	10.94	6.61	4.04	11.69	11.64	6.79	6.95	6.56	
Minimum	10.56	10.87	5.61	3.74	10.15	11.62	5.39	6.95	6.18	
Maximum	11.15	11.01	7.50	4.33	12.15	11.66	7.78	6.95	6.95	
90 th %ile	11.1						7.2			
80 th %ile	11.0						7.1			
20 th %ile	10.6						6.48			
10 th %ile	10.5	10.88	6.01	3.81	10.57	11.62	6.26	6.95	6.26	
Statistic	BHH6 (mbGL)	Bh3 vs (mbGL)	Bh3 deep (mbGL)	Bh3 shallow (mbGL)	BHH6 shallow (mbGL)	BV3 vs (mbGL)	GW5 (mbGL)	GW5 shallow (mbGL)	GWH5 (mbGL)	GWH5 shallow (mbGL)
Average	0.74	2.04	1.28	1.31	1.88	5.82	3.99	4.23	19.59	21.96
Minimum	0.23	1/78	0.47	0.36	1.78	5.60	2.76	4.07	16.15	21.96
Maximum	1.24	2.30	2.34	2.23	1.96	6.04	4.69	4.38	22.78	21.96
90 th %ile	1.12						4.6		21.8	
80 th %ile	1.0						4.5		21.3	
20 th %ile	0.4						3.8		17.6	
10 th %ile	0.33	1.83	0.68	0.64	1.80	5.64	3.37	4.10	16.94	21.96

5.2.3 MANAGEMENT MEASURES

Based on the current bulk earthworks source from Precincts 3, 4, 5 and Part Precinct 6, the below calculations in: **Figure 5-1** detail the outflow from the groundwater equilibrium process. The aquifer is approximately 10m thick, with a water table depth of approximately 2 metre below ground surface, which is the base of the excavation. The water table should be depressed 1 metre below the floor of the excavation.

Using hydraulic parameters developed during previous modelling, the total discharge of water from the pit is estimated to be 67 KL/day.

ESTIMATE OF WATER TO BE PUMPED TO MAINTAIN DRAWDOWN
 $Q = K(H^2 - h^2) / 0.733 \log(R/r)$ from Groundwater & Wells, Driscoll 1982 - Chapter 22 - dewatering equations
 where Q = Discharge (kL/d)
 K = Hydraulic Conductivity (m/d)
 H = Saturated thickness of aquifer before pumping (m)
 h = depth of water in the well while pumping (m bgs) - required depth to water for dry excavation
 R = radius of the cone of depression (m)
 r = well radius (m)

Assumptions: excavation pit is represented by large diameter well
 bottom of aquifer is interface with underlying sandstone (12 m bgs)
 sat thickness is 10m
 depth to water is approx 2 m bgs
 water table should be 1 m below bottom of excavation
 assume cone of depression limited by planned drainage channels

K (m) =	0.25
H (m) =	10
h (m) =	9
R (m) =	125
r (m) =	100
Q (kL/d) =	66.9

Depth of the water table at any distance from the well
 $h = \sqrt{H^2 - (0.733 Q \log R/r) / K}$
 h = depth of water table at obs well (any point from pumping well)
 r = distance from well

r (m bgs) =	125
h (m) =	10.0

Volume of water to be removed
 $V_{wd} = S_y \cdot V_t$
 V_{wd} - volume of water drained (KL)
 S_y - specific yield - 0.19 for silt/clay
 V_t - Volume of saturated soil in excavation pit (calculated as cylinder)

S_y =	0.19
V_t (m3) =	63000
V_{wd} (KL) =	11970

Time to dewater V_{wd}
 T (d) = 179.0

Figure 5-1: Groundwater Equilibrium Process

To minimise potential negative impacts to groundwater quality, a management structure as shown in Figure 5-2 will be implemented. This structure identifies avoidance as the preferred management option as opposed to disposal as the least preferred.

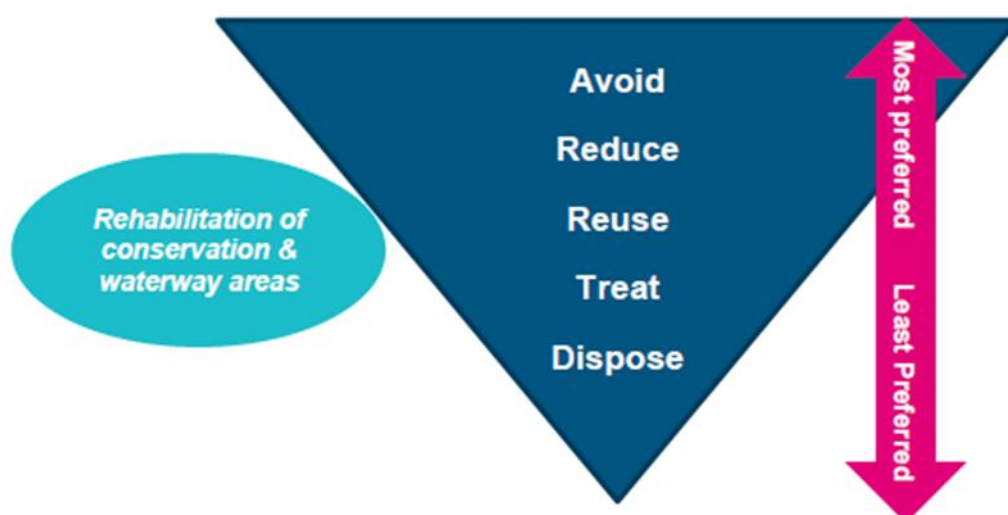


Figure 5-2: Groundwater Management Hierarchy

Table 5-3: Groundwater Management

Management Option	Description of Measures
Avoid	<p>The Aura development has been designed to rehabilitate and protect extensive areas of conservation areas and waterway corridors. These conservation and waterway corridor areas extend over an area of approximately 656 hectares within the site (over 27% of the site). It is anticipated that the protection and rehabilitation of these areas will significantly mitigate potential negative impacts to and improve the health of downstream waterway areas, through improved catchment hydrology and reduced pollutant loads.</p> <p>During the development of Precincts 3, 4, 5 and Part Precinct 6, the extraction of groundwater should only occur if required, and any unnecessary groundwater extraction should be avoided.</p>
Reduce	<p>If groundwater extraction is required, extraction should only be undertaken at an extent and/or rate deemed necessary to appropriately undertake required earthworks activities.</p>
Reuse	<p>Where practical and feasible, extracted groundwater is to be reused on site to (i) supplement on-site water demands and (ii) minimise discharges to downstream environments.</p> <p>As described in the report “<i>Aura Development: Groundwater Assessment</i>” (BMT WBM, 2013), the quality of shallow groundwater at the Aura site is good with generally low salinity (excepting a locally developed salt scald), although some slightly elevated nutrient and dissolved iron concentrations have been recorded for shallow groundwater.</p> <p>It is anticipated that extracted groundwater could be used for a variety of usages, including irrigation, and construction phase dust suppression. Whilst the water could be used as a resource to irrigate areas to be rehabilitated, it could also be irrigated on other areas within the Aura site as a form of ‘disposing’ the extracted groundwater (and minimising discharges to downstream waterways).</p> <p>The construction phase sediment basins will provide temporary storage for the extracted groundwater. It is, however, anticipated that additional storage will be required to provide extended storage for extracted groundwater (for subsequent reuse). This storage could be provided in areas proposed for wetlands, basins and/ or the lake for the operational phase of the site</p>
Treat	<p>Sediment loads within the extracted groundwater will primarily be treated via drainage channels and sediment basins (integrated as part of the best practice Erosion and Sediment Control Plan (ESCP) for the site).</p> <p>In the infrequent event of not being possible to transfer groundwater from the sediment basins to other on-site storages (for subsequent reuse), stormwater flows (discharging from the basins) will be further treated via vegetated ‘buffer’ areas – between the basins and waterways.</p> <p>Stormwater flows from the sediment basins (and/ or other storages) will be dissipated/ spread over the vegetated areas (located upslope of waterways, but downslope of WSF breeding habitat) to reduce pollutant loads (particularly sediment) entering the waterways.</p> <p>The treatment of sediment laden stormwater will by default also assist in the removal of a range of other potential pollutants.</p>
Dispose	<p>Disposal has been adopted as the least preferred method of groundwater management as dictated by the management hierarchy adopted for the site.</p> <p>The only groundwater proposed to be disposed of includes:</p>

Management Option	Description of Measures
	<ul style="list-style-type: none"> • Extracted groundwater which overtops the sediment basins and/ or other storages (for extracted groundwater) • Extracted groundwater which is treated in the sediment basin and control released in the event that the treated groundwater cannot be transferred to other storages (e.g. if they were already full). • Environmental flows in waterways which will not be impacted by the proposed disturbance footprint. <p>Where feasible and practical, it is preferred that any 'disposal' of flows should be undertaken within the Lamerough Creek catchment in preference to Bells Creek. This is because Bells Creek has Ramsar wetland status and is anticipated to be more sensitive to discharged flows (e.g. due to a smaller catchment size, relative to Lamerough Creek).</p> <p>It is noted that due to the "avoid", "reduce" and "reuse" strategies discussed in this table, environmental flows will still maintained to the downstream receiving waterways so that there is not an over-extraction of water resources.</p> <p>Where extracted groundwater is disposed (e.g. over-topping of sediment basins during major rainfall events), some sediments and associated pollutants within this water will also be disposed (and conveyed downstream).</p>
Rehabilitation of conservation and waterway area	<p>As described above, the Aura development has been designed to rehabilitate and protect extensive areas of conservation and waterway corridor areas. To augment the best practice approach to groundwater management, the rehabilitation of the conservation and waterway corridor areas should be undertaken as soon as practical. In particular, the rehabilitation of the conservation and waterway corridor areas adjacent to (and downstream of) construction areas will have two key benefits:</p> <ul style="list-style-type: none"> • <i>Lowering of groundwater levels.</i> As described in the report "Aura Development: Groundwater Assessment" (BMT WBM, 2013), there is a close linkage between tree coverage of the site and associated groundwater levels, and when the site was covered (historically) with vegetation (be that pine plantation or native forest), groundwater levels were lower than those currently observed on the site. The planting and growth of trees within adjacent areas proposed for conservation and waterway corridor areas will subsequently augment the lowering of groundwater levels, and reduce groundwater extraction requirements. • <i>Buffering/ Treatment of Stormwater Flows:</i> As described above, vegetated buffer areas downstream of sediment basins (and/ or other storages) will act to improve the quality of stormwater flows discharged to downstream waterways. The rehabilitation/ planting of these areas (if currently lacking vegetation growth) will act to augment the treatment performance of these areas.

5.2.4 MONITORING PROGRAM

There is a network of existing groundwater monitoring bores located across the site, as illustrated in **Figure 5-3**. A stratified program of monitoring is proposed, depending upon whether development works are occurring in catchments, as follows:

- Pre-construction Baseline monitoring for the site has been carried out, see below **Table 5-4**.
- All bores within catchments with active construction works will be sampled on a biannual basis, up to and for 12 months after active development works are completed in respective catchments.

- All Sentinel and Control bores within catchments where there are active construction activities occurring will be sampled on a monthly basis.
- Construction bores within catchments where construction activities are occurring and which are in close proximity (i.e. within 500m) to areas of active development works will be sampled on a monthly basis, refer **Figure 5-3** for details.

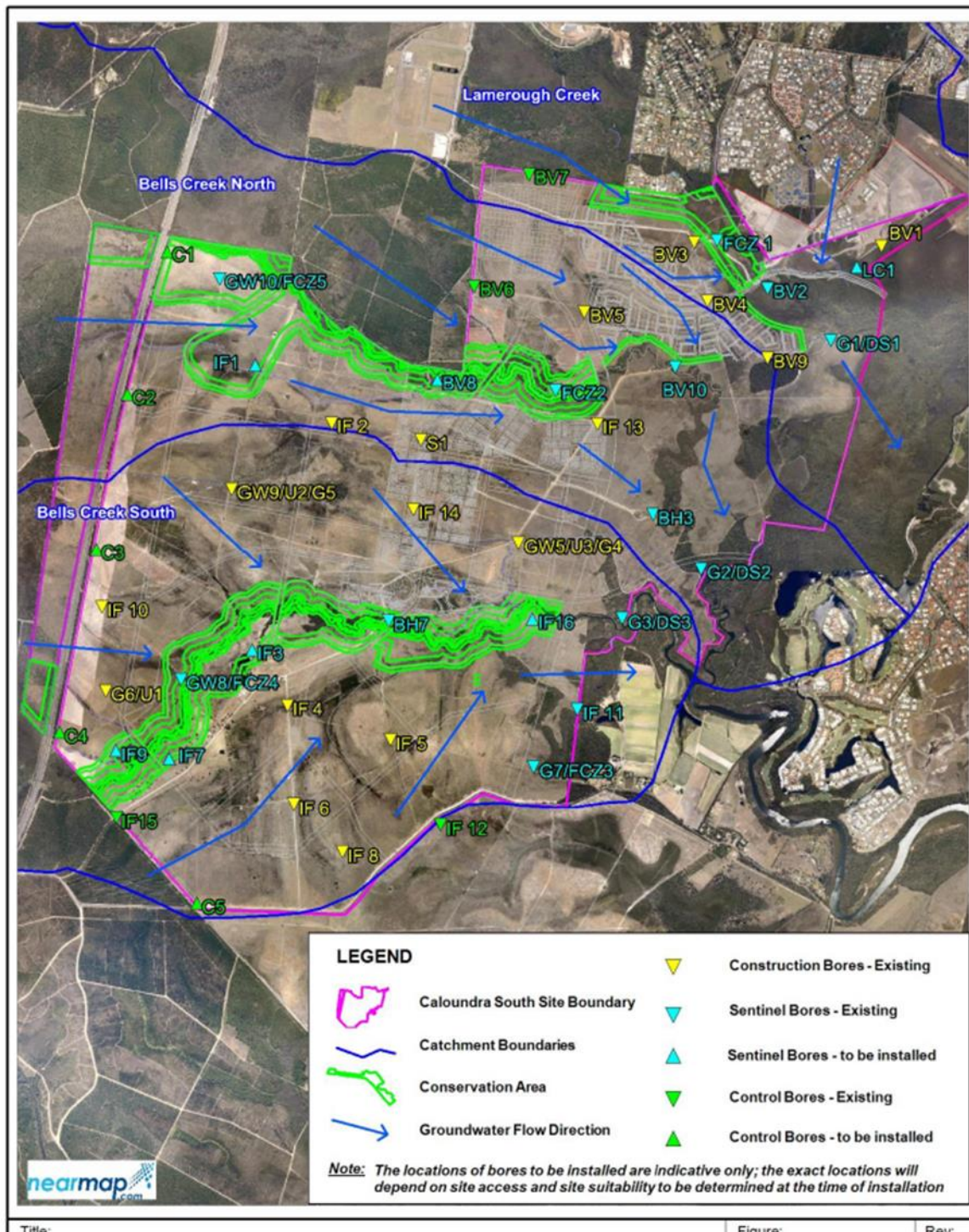


Figure 5-3: Groundwater Monitoring Locations (Source BMT WBM)

Table 5-4: Groundwater Quality Monitoring Summary

Monitoring Category	Nature of Works	Commencement	Cessation
Pre-construction Baseline	<ul style="list-style-type: none"> Periodic samples and analysis at groundwater locations on site shown in Figure 5-3. Within at least 12 months of commencing active construction works in a catchment, all bores within the catchment proposed for active construction works will be monitored on a monthly basis until a sufficient bore-specific data set is available (at least ten rounds of data collected over at least a 12 month period prior to construction). Field Parameters: <ul style="list-style-type: none"> Water level; pH; Electrical conductivity; Temperature; and Dissolved oxygen. Analytical Parameters: <ul style="list-style-type: none"> Major Anions (Alkalinity); Major Cations; Total nitrogen, Organic N, Ammonia N and NO_x; Total phosphorus and filterable reactive phosphorus; Soluble sulfate (Cl⁻:SO₄²⁻) ratio; Dissolved metals; and PAHs including BTEXN, TPH, TRH. 	<ul style="list-style-type: none"> At least 12 months prior to commencing construction in a catchment, where practicable. Should construction occur prior to the completion of pre-construction monitoring (e.g. new bores), site-specific baseline data (i.e. baseline data from across the entire site) will be assigned to the bore. 	Commencement of active construction works in a catchment

Monitoring Category	Nature of Works	Commencement	Cessation
Biannual Monitoring	<ul style="list-style-type: none"> Biannual monitoring (once every six months) will be undertaken at all bores within catchments with active construction works occurring. Field Parameters: <ul style="list-style-type: none"> Water level; pH; Electrical conductivity; Temperature; and Dissolved oxygen. Analytical Parameters: <ul style="list-style-type: none"> Major Anions (Alkalinity); Major Cations; Total nitrogen, Organic N, Ammonia N and NOx; Total phosphorus and filterable reactive phosphorus; Soluble sulfate (Cl:-:SO42-) ratio; Dissolved metals; and PAHs including BTEXN, TPH, TRH. 	<ul style="list-style-type: none"> Once active construction works commence in a catchment, all bores within the catchment will be sampled on a biannual basis. 	12 months after active construction works are completed in respective catchments
Construction Phase Monthly Monitoring	<ul style="list-style-type: none"> Monthly will be conducted at all 'Construction' bores within 500m of active construction works. Monthly monitoring will be conducted at all 'Sentinel' and 'Control' bores. Monitoring will be conducted for the following parameters: 	<ul style="list-style-type: none"> 'Construction' bores within catchments where there are construction activities occurring and which are in close proximity (i.e. within approximately 500m) to areas of active construction works will be sampled on a monthly basis. 	12 months after active construction works are completed in respective catchments

Monitoring Category	Nature of Works	Commencement	Cessation
	<ul style="list-style-type: none"> • Water level; • pH; • Electrical Conductivity; • Total nitrogen, Organic N, Ammonia N and NOx; • Total phosphorus and filterable reactive phosphorus; • Dissolved Iron; and • Dissolved Aluminium. 	<ul style="list-style-type: none"> • All 'Sentinel' and 'Control' bores within catchments where active construction works are occurring will be monitored on a monthly basis. 	

5.2.5 CORRECTIVE ACTIONS

If performance criteria have not been achieved as a result of works, then corrective actions are to be implemented and may include:

- Review of site construction management practices;
- Localised filling or excavation works to adjust land elevations;
- Review of current and planned filling and excavation works;
- Changes to proposed re-vegetation and ecological enhancement strategies;
- Review of site surface water management devices (WSUD) and stormwater harvesting practices;
- Detection and remediation of spills or other contaminant releases (if groundwater quality is detected as being affected); and
- Review and amendment of ASS management practices in the context of unusually low groundwater pH or the presence of dissolved metals at downstream monitoring locations.

5.2.6 RESPONSIBILITIES

As outlined above, Stockland is the proponent and overall project administrator of the development. To oversee construction phases, Stockland will appoint an external Construction Superintendent to oversee the implementation of the project, and will engage a Principal Civil Contractor as well as construction and/or building contractor(s) to undertake the works in accordance with relevant approvals, conditions and commitments (including those set out in this CEMP).

The Principal Civil Contractor will be responsible for ensuring best practice for the management of groundwater during the construction of the works covered by this CEMP. The Proponent will be responsible for the appointment of a suitably qualified Environmental Management Representative to undertake monitoring of groundwater. This consultant will be independent of the Principal Civil Contractor.

The Proponent and Principal Civil Contractor will be responsible for the implementation and refinements of any corrective actions to ensure appropriate environmental protection goals are achieved.

5.2.7 REPORTING

The following reporting requirements apply:

- An Annual Compliance Report (ACR) will be prepared in accordance with condition 14 of the EPBC Approval and will report on compliance with on this CEMP.
- Notify the Construction Superintendent of non-compliances as soon as possible in order to comply with reporting obligations of the proponent, consistent with condition 14 of the EPBC Approval and **Section 4.1.4** of this document.

5.3 GEOTECHNICAL (ACID SULFATE SOILS)

5.3.1 OVERVIEW

Preliminary Geotechnical investigations have been completed over the site. Bore hole results have indicated the presence of soils with generally low concentrations of natural acidity across the site and a very low potential for additional acidity arising from oxidation of the in-situ soils as a result of excavation or filling.

During construction of the works covered by this CEMP, the cut exercise varies and the fill material will be used to fill. While ASS are not expected to be encountered during the construction of the works associated with this CEMP, construction phase monitoring will be undertaken where excavations are below 5.0m AHD.

If hotspots of ASS or potential ASS are detected, an ASS management plan will be prepared by the Principal Civil Contractor. Typical management measures (i.e. bulk application of agricultural lime) will be minimised as far as practicable due to the presence of the Wallum Sedge frog and other acid frogs which prefer acidic conditions. A description of general ASS management measures is outlined in the table 5-5.

Management and testing of ASS will be undertaken in accordance with the Guidelines for Sampling and Analysis of Lowland Acid Sulfate Soils in Queensland (C.R. Ahern et. Al. 1998) or most recent version. Management approaches of Acid Sulfate Soils are to be assessed on a case specific basis on advice from specialist consultants. Management methodology is to be approved in writing by the Construction Superintendent.

5.3.2 PERFORMANCE CRITERIA

The following performance criteria shall apply to the management of ASS during construction of the works covered by this CEMP:

- Significant adverse impacts to the natural or built environment on or off the site as a result of the disturbance of ASS are avoided; and
- pH sensitive fauna habitats and species retained on the site in the EPZ and frog zone are not adversely affected by ASS treatment methods.

Implement corrective actions if performance criteria are not achieved as a result of works covered by this CEMP (refer **Section 5.3.5**).

5.3.3 MANAGEMENT MEASURES

Table 5-5: Acid Sulfate Soils Management

Management Option	Description of Measures
Avoid	Minimise areas of excavation under RL 5.0 m (AHD) where greater concentrations of acid sulfate soils could be present.
Testing	During construction, where acid sulfate soils are expected to be encountered, progressive testing of soils to determine if presents of acid sulfates are present in the soils. Testing to be completed by an appropriately qualified geotechnical engineer or environmental scientist/engineer. Remediation of acid sulfate soils to be determined by a qualified geotechnical engineer or environmental scientist/engineer and in accordance with the Guidelines for Sampling and Analysis of Lowland Acid Sulfate Soils in Queensland (C.R. Ahern et. Al. 1998) or the most recent version.
Treatment	When acid sulfate soils are encountered, ensure suitable buffer zones are allowed for between frog habitats and overland flow areas for lime dosing or other treatment measures, including on site storage. In accordance with Guidelines for Sampling and Analysis of Lowland Acid Sulfate Soils in Queensland (C.R. Ahern et. Al. 1998) or the most recent version.

5.3.4 MONITORING PROGRAM

Monitoring requirements for ASS are as follows:

- ASS testing will be completed on areas below 5m AHD and other areas expected to contain ASS;
- Management and testing of ASS will be undertaken in accordance with the Guidelines for Sampling and Analysis of Lowland Acid Sulfate Soils in Queensland (C.R. Ahern et. Al. 1998) (or most recent version), or an alternative methodology approved in writing by the Construction Superintendent; and
- Daily measurement of water pH within construction sediment ponds.

5.3.5 CORRECTIVE ACTIONS

If performance criteria have not been achieved, then corrective actions are to be implemented and may include the following:

- Review of ASS testing and management procedures;
- Isolate and separate affected stockpile material. Ensure protection against overland flows and containment of stockpile runoff is achieved; Treatment of fill or trench material to be determined by and appropriately qualified geotechnical engineer or environmental scientist/engineer; and
- Implement corrective actions for WSF habitat in accordance with **Section 5.4.5**.

5.3.6 RESPONSIBILITIES

The Proponent will be responsible for the below:

- Ensuring best practice design to reduce earthworks impact for levels under RL 5.0 m (AHD).
- Production of sampling regime prior to construction to determine process for future Precinct earthworks.

The Principal Contractor will be responsible for:

- Onsite testing of ASS by an appropriately qualified geotechnical engineer or environmental scientist/engineer;
- Preparation of an ASS management plan if ASS or potential ASS are detected; and
- Management and treatment of ASS material.

5.3.7 REPORTING

The following reporting requirements apply:

- ASS sampling and results;
- Notify the Construction Superintendent of non-compliances as soon as possible in order to comply with reporting obligations of the Proponent, consistent with condition 14 of the EPBC Approval and **Section 4.1.4** of this document; and
- An Annual Compliance Report (ACR) will be prepared in accordance with condition 14 of the EPBC Approval and will report compliance with this CEMP.

5.4 WALLUM SEDGEFROG MANAGEMENT

5.4.1 OVERVIEW

Based on the previous survey data and as discussed in **Table 3-1**, 0.175ha of WSF habitat is to be retained across Precincts 4 and 5, with an additional 12.53ha created as part of the overall WSF mitigation strategy. This includes large forage and buffer areas to both the retained and created WSF breeding ponds.

A total area of 4.54ha of WSF habitat is expected to be lost to the development across Precincts 4 and 5, consisting of:

- Polygon 24 0.597ha
- Polygon 30 0.544ha
- Polygon 31 2.264ha
- Polygon 42 1.139ha

Polygons 24, 30, 31 and 42 were identified in the Wallum Sedge Frog Management Plan, 2015, as being lost to the development (impacted). Polygons 9 and 23 within Precinct 3 were previously addressed in the Precinct 2 and Part 3/4 CEMP.

Pre-construction survey data will confirm areas of habitat to be removed and this will be recorded in the Annual Compliance Report (ACR) which tracks compliance with condition 6 of the EPBC Approval (EPBC ref. 2011/5987).

The approved Wallum Sedge Frog Management Plan dated August 2016 is consistent with the details within this Construction Environmental Management Plan.

Retained and recreated Wallum Sedgefrog habitat traversed the riparian zones of Lamerough Creek and Bells Creek North and South. Retained and recreated Wallum Sedgefrog habitat has been incorporated into the Frog Zone and Frog Buffer, as per the WSFMP. As such, stormwater runoff during the construction and final developed stage of the project will need to traverse through all conservation zones for discharge to the receiving environments. It is important that conveyance of stormwater through the Frog Zone and Frog Buffer does not compromise attributes of either retained or recreated Wallum Sedgefrog habitat. There are numerous examples on site where WSF habitat can exist in close proximity to major drainage lines (Figure 5-4), thus the inclusion of drainage corridors through the dedicated Frog Zone should not be seen as a threat to meeting the mitigation plan presented in the WSFMP, nor meeting its Key Performance indicators.



Figure 5-4: Existing Site Conditions - Deep Drainage line (not WSF habitat) adjacent (<5m) to known WSF habitat

5.4.2 PERFORMANCE CRITERIA

The objective of this part of the CEMP is to conserve retained Wallum Sedgefrog (WSF) breeding habitat within the Environmental Protection Zone (EPZ). Key performance criteria are as follows:

- Avoid impacts of construction (both direct and indirect) on retained Wallum Sedgefrog habitat located in Precincts 3, 4, 5 and Part Precinct 6;
- Provision of a buffer between retained and re-created frog habitat within the EPZ and the development, to provide suitable separation;
- No direct construction related stormwater runoff if permitted to enter created or retained frog ponds;
- Indirect discharge of construction related stormwater runoff is able to enter retained or created habitat (foraging habitat – not ponds) provided that prescribed water quality parameters (pH range 4-5, salinity range 8-77 μ S/cm, refer to Section 4.3 of the WSFMP) are met, and
- Ensure that stormwater conveyance is not directed into retained WSF breeding habitat.

5.4.3 MANAGEMENT MEASURES

The following measures are required to manage the breeding habitats of the Wallum Sedgefrog in Precincts 3, 4, 5 and Part Precinct 6:

- Provision of WSF movement corridor along the northern bank of Bells Creek North, incorporating recreation of WSF breeding, foraging and movement habitat.
- Provision of a buffer between recreated and retained Wallum Sedgefrog breeding habitats (within polygon 124), earthworks and other development-related threats, located within the stormwater conveyance zone for up to 50m around retained breeding habitat;
- Where this buffer cannot be achieved, then physical separation from development associated stormwater discharge and WSF Breeding habitat must be demonstrated. This can be achieved via the creation of swale drains and bunds to ensure no interaction with discharge waters and WSF breeding habitat. Additionally, when this buffer cannot be achieved, the pH of waters within the swale drains must be less than 6, preferably within a range between 4-5.
- This buffer is to be planted with semi-erect semi-aquatic emergent vegetation consistent with species common in existing habitats on site. Table 5.3 of the approved Wallum Sedgefrog Management Plan provides a list of appropriate species to be used and Table 6.2b lists suitable vegetation for the frog and buffer zones;
- All stormwater runoff from the road and adjacent development within the conveyance zone see must not be allowed to enter any portion of the retained WSF breeding habitat within the EPZ, **Appendix B** for details. Culverts, open drains and overland flow pathways for all sized ARI events need to be directed around the retained WSF breeding habitat (to maintain pH, ensure habitat stability and limit introduction of competitor/predatory species);
- Maintaining natural groundwater hydro period and other water chemistry aspects (particularly pH and tannin levels) of retained habitat areas;
- Maintaining vegetation communities within retained habitat areas of the Frog Zone and Frog Buffer through weed management;
- Deter inappropriate recreational activities in retained frog habitat through signage, vegetation planting and physical barriers; and,
- Taking practical measures to reduce lighting in proximity to areas of retained Wallum Sedgefrog habitat where possible.

5.4.4 MONITORING PROGRAM

The following monitoring measures are required:

- Until the off-maintenance period, the following monitoring will be undertaken in accordance with Section 7 and Table 8.2a, b and d of the Wallum Sedgefrog Management Plan (2014);
- At six monthly intervals the quality of water will be measured in created and the retained WSF habitat. Depth of any ponds within the habitat polygon will also be recorded at five random locations. At this time visual observations of surface water flows will be undertaken for the possible indication of wet weather flow pathways through the habitat;
- A seasonal survey within retained WSF habitat will be undertaken for the presence of WSF and will follow the methodology identified in the Wallum Sedgefrog Management Plan, 2016 (Box 1, Section 5.4); and,
- Off-maintenance monitoring activities are to be carried out as per the requirements of Table 8.2e in the Wallum Sedgefrog Management Plan, 2016.

5.4.5 CORRECTIVE ACTIONS

If the performance criteria have not been achieved, the following corrective actions are to be implemented as required:

- If clearing occurs outside the delineated, approved areas, cease all work in the area affected and advise the Superintendent (and regulatory agencies if protected communities/ species);
- Instigate rehabilitation efforts immediately at any area accidentally cleared in accordance with directions from the Superintendent; and,
- Specific corrective actions associated with the retained WSF breeding habitat in Precincts 3, 4, 5 and Part Precinct 6 are to be implemented in accordance the requirements in the Wallum Sedgefrog Management Plan, 2015, Table 7.2 for:
 - water chemistry;
 - surface water runoff;
 - hydro period;
 - vegetation; and
 - Wallum Sedgefrog presence.

Table 5-6: Corrective Actions

Aspect Impacted	Issue Experienced	Possible Reason	Corrective Action Including Example of maintenance activity used to identify the risk	Responsible party
Water Chemistry	Elevated pH and conductivity combined with a reduce tannin concentration within created Wallum Sedgefrog habitat ponds.	An indication of surface water flows from the development entering the habitat ponds.	Locate the overland flow path and redirect it to the appropriate drainage infrastructure. Monitoring tasks A and B will identify the occurrence of this risk.	Proponent/ Principal Civil Contractor
Surface water runoff	Ineffective drainage from the development.	Blocked pipes and culverts.	Clearing of the blockage in the drainage infrastructure.	Proponent/ Principal

Aspect Impacted	Issue Experienced	Possible Reason	Corrective Action Including Example of maintenance activity used to identify the risk	Responsible party
			Monitoring task B will identify the occurrence of this risk.	Civil Contractor
Hydro period	A significant increase or decrease in ponding time when compared to that achieved within retained existing Wallum Sedgefrog habitat.	Possibly the result of the stormwater driven surface water inflows or a created Wallum Sedgefrog pond that is too shallow.	Identify the overland flow path and redirect it. Deepen the Wallum Sedgefrog pond by further excavation.	Proponent/ Principal Civil Contractor
Vegetation	Incorrect establishment of plant species and hence development of habitat not preferred by the Wallum Sedgefrog.	The incorrect hydro period and/or ineffective weed control will result in the establishment of an inappropriate plant community.	Develop correct hydro period, as stated above and implement a weed management regime. Monitoring tasks C will identify the occurrence of this risk.	Proponent

5.4.6 RESPONSIBILITIES

The Proponent will appoint a Construction Superintendent to oversee the implementation of the project, with a Principal Civil Contractor as well as construction and/or building contractor(s) and landscaping/environmental/ecological contractors for WSF management, vegetation management and rehabilitation to undertake the works in accordance with relevant approvals, conditions and commitments.

The Principal Civil Contractor will be responsible for ensuring best practice for the management of WSF during the construction of Precincts 3, 4, 5 and Part Precinct 6. The Proponent will be responsible for the appointment of a suitably qualified ecologist to provide advice as appropriate. This consultant will be independent of the Principal Civil Contractor.

The Proponent and Principal Civil Contractor will be responsible for the implementation and refinements of any corrective actions to ensure appropriate environmental protection goals are achieved.

5.4.7 REPORTING

The following reporting requirements apply:

- Six monthly reporting will be undertaken of all monitoring activities for WSF;
- Non-compliances must be reported to the Environmental Management Representative as soon as possible in order to ensure reporting can occur, consistent with condition 14 of the EPBC Approval; and
- An Annual Compliance Report (ACR) will be prepared in accordance with condition 14 of the EPBC Approval and will report on compliance with this CEMP.

5.5 VEGETATION MANAGEMENT

5.5.1 OVERVIEW

Within the development area of Precincts 3, 4, 5 and Part Precinct 6 no EPBC Act listed threatened flora species were located during targeted surveys (PER, 2013). In addition, no areas of native remnant vegetation were identified for retention.

An area to the south of and within Precincts 3, 4 and 5 designated as Part Precinct 6 (adjacent Bells Creek North) has been defined as the Environmental Protection Zone (EPZ) which will be conserved and rehabilitated to improve habitat value.

The nature of habitat rehabilitation across the site is identified in the Vegetation Rehabilitation and Management Plan, 2013, through the designation of habitat management units or HMU's. **Figure C1** in **Appendix C** defines the HMU's within and associated with Precincts 3, 4, 5 and Part Precinct 6 (Nos. 9a, 11, 16, 18a, 19, 23a and 29a). The following **Table 5-7** explains details of each of these HMU's in relation to area, target species, existing flora, target community and the proposed treatment.

Table 5-7: Habitat Management Unit Details

HMU	Approx. Area (ha)	Target Species ²	Current Flora	Target Community
9a	0.487	Aa, Ec, Pa, Pw	Bells Creek North Riparian Buffer. Remnant RE 12.3.4 and 12.3.5 and cleared areas that contain pasture grasses, some regrowth M. quinquenervia and native sedge	Melaleuca Forest, Sedgeland
11	2.861	Aa, Ec, Pa, Pw	Melaleuca regrowth with pasture grasses	Melaleuca Forest Biohub for Aa, Ec, Pa.
16	37.529	Aa, Ae, WSF, Pa, Pw	Low regrowth heath. Pasture grasses co-dominating with heath elements. Very high quality WSF habitat present throughout area.	Heath, Sedgeland Biohub areas for Ae
18a	2.356	Aa, Ec, Pa, Pw	Bells Creek North Riparian Buffer. Remnant RE 12.3.5 and large areas of cleared pasture	Melaleuca Forest, Sedgeland
19	2.014	Aa, Ec, Pa, Pw	Melaleuca regrowth with pasture grasses	Melaleuca Forest, Sedgeland Biohub for Aa, Ec, Pa, Pw
23a	11.708	Aa, WSF, Ec, Pa, Pw	Predominantly pasture with some juvenile pine and M. quinquenervia (due to proximity to remnant RE area). High and low quality WSF habitat present.	Melaleuca Forest, Sedgeland
29a	10.519	Aa, WSF, Ec, Pa, Pw	Remnant RE 12.3.5	12.3.5

A detailed Environmental Rehabilitation Plan will be prepared prior to the commencement of subdivision works.

5.5.2 PERFORMANCE CRITERIA

The objective of this part of the CEMP is to protect remnant vegetation to be retained on site and promote the successful rehabilitation of native vegetation within the EPZ.

The key performance criteria are:

- To avoid impacts on native remnant vegetation located within the EPZ in Precincts 3, 4 and 5; and
- Increase the quantity (ha) and quality (low, medium, high quality classes) of functioning native vegetation within the EPZ.
- Implement corrective actions if performance criteria are not achieved as a result of works covered by this CEMP (refer **Section 5.5.5**).

5.5.3 MANAGEMENT MEASURES

The following are management measures for retained and rehabilitated vegetation:

- Within Precincts 3, 4, 5 and Part Precinct 6, the area of EPZ to be conserved and rehabilitated must not be adversely affected by the works as identified on construction plans, marked and protected through the use of barrier fencing protection. This vegetation impact zones are detailed in **Appendix A**.
- Activities such as storage of materials, parking, liquid disposal, refuelling activities, construction site office or shed, combustion, stockpiling of soil, any filling or excavation activity (unless approved by the Construction Superintendent or Proponent) and use of unauthorised chemicals will be prohibited within the EPZ detailed in **Appendix A**.
- Retained trees shall not have their crown removed. The contractor is to take all reasonable care to ensure that no branches and trunks are damaged during the construction.
- All staff involved in construction are made aware of the defined significant and protected vegetation areas which are detailed in **Appendix A**, including all personnel engaged in preconstruction works.
- All tree roots that are damaged during excavations and related activities are to be saw cut to a clean surface and are to be treated with a fungicidal solution prior to backfilling or within 24 hours of the damage to the root occurring.
- All construction traffic will be confined to designated access roadways to prevent soil compaction. No heavy machinery is to be driven under canopies of significant vegetation nominated for retention, see **Appendix A** for haul road location details.
- Livestock and the general public will be excluded from HMUs undergoing ecological enhancement, unless temporary crash grazing is being used to control exotic pasture grasses. This will help to control weed and disease (e.g. chytrid fungus) spread.
- Rehabilitation within HMU's in the EPZ in Precinct will be implemented in accordance with an Environmental Rehabilitation Plan.

5.5.4 MONITORING PROGRAM

Monitoring is to be completed until handover (off-maintenance) requirements are satisfied (noting these may extend beyond the development construction period within Precincts 3, 4, 5 and Part Precinct 6).

Visual and photographic monitoring will be conducted to evaluate the effectiveness of the enhancement strategies within HMU's in the EPZ. A visual monitoring point will be established in each HMU and the location and characteristics monitored will be set out in the Precincts 3, 4, 5 and Part Precinct 6 Environment Rehabilitation Plan. Photo point records will be maintained every 6 months.

A permanent flora transect will be established to represent treatment types and target communities, undertaken annually and identified in the Precincts 3, 4, 5 and Part Precinct 6 Environmental Rehabilitation Plan.

5.5.5 CORRECTIVE ACTIONS

The following corrective actions are required if vegetation clearing occurs outside the delineated, approved areas:

- Cease all work in the area affected and advise the Superintendent (and regulatory agencies if protected vegetation).
- Instigate rehabilitation efforts immediately at any area accidentally cleared in accordance with directions from the Superintendent.
- In relation to the success of rehabilitation works, an adaptive management approach will be taken and outlined in the Precincts 3, 4, 5 and Part Precinct 6 Environmental Rehabilitation Plan.

Whilst not expected on the basis of previous surveys (as discussed in **Table 3-1**), if any Listed Threatened MNES vegetation species are identified during construction, the contractor will adopt the following corrective actions:

- Confirm the identity of the species found with the assistance of a qualified ecologist; and
- If confirmed as a Listed Threatened Species, undertake transplanting of the plant(s) into an appropriate location in the Environmental Protection Zone where it will be protected.

5.5.6 RESPONSIBILITIES

Stockland is the proponent and overall project administrator of the development. To oversee construction phases, Stockland will appoint either an external Superintendent to oversee the implementation of the project, and will engage a Principal Civil Contractor as well as construction and/or building contractor(s) and landscaping/environmental contractors for vegetation management and rehabilitation to undertake the works in accordance with relevant approvals, conditions and commitments.

The Principal Civil Contractor will be responsible for ensuring best practice for the management of vegetation during the construction of Precincts 3, 4, 5 and Part Precinct 6. The Proponent will be responsible for the appointment of a suitably qualified ecologist to provide advice as appropriate. This consultant will be independent of the Principal Civil Contractor.

The Proponent and Principal Civil Contractor will be responsible for the implementation and refinements of any corrective actions to ensure appropriate environmental protection goals are achieved.

5.5.7 REPORTING

Any vegetation compliance issues must be incorporated into the regular environmental reporting required by the contractor to the Superintendent.

A report will be produced annually for the duration of the ecological enhancement program (which may extend beyond the construction program for the rest of the development in Precincts 3, 4, 5 and Part Precinct 6.

Notify the Construction Superintendent of non-compliances as soon as possible in order to comply with reporting obligations of the Proponent, consistent with condition 14 of the EPBC Approval and **Section 4.1.4** of this document.

5.6 PEST MANAGEMENT

5.6.1 OVERVIEW

The development site currently supports the listed Wallum *Sedgefrog Litoria olongburensis* and other acid tolerant frog species. Areas downstream from the site (e.g. along Bells Creek) support feeding habitat for migratory water birds and contains areas of potential habitat for the threatened Water Mouse *Xeromys myoides* near the confluence of Bells Creek.

The development site potentially contains feral animals including: dingo, wild dog, wild cat, fox, pig, black rat, brown hare, spotted turtle-dove, cane toad and eastern gambusia. These pest animals pose direct threats to native fauna, and if

uncontrolled, could travel between the development site, unimproved areas and the EPZ and other conservation areas on site.

Identification of the presence of feral animals (particularly wild cats, wild dogs, foxes and pigs) is critical to ensure appropriate management responses are enforced to protect native animals in retained or created conservation areas.

The following sections outline the management measures that will be enacted to control pest species.

5.6.2 PERFORMANCE CRITERIA

The objective for pest management is to reduce or control impacts from pest animal species during the construction stage.

The performance criteria for pest management are as follows:

- No domestic animals are brought on the site by construction crews and workers.
- Signage to be installed to identify conservation areas.
- Putrescible waste are managed and transported off the site for disposal.
- Design and implementation of pest animal control measures to protect retained or rehabilitated habitat including habitat for Wallum Sedge frog.
- Implement corrective actions if performance criteria are not achieved as a result of works covered by this CEMP (refer to **Section 5.6.5**)

5.6.3 MANAGEMENT MEASURES

The following measures are required to manage pest species in Precincts 3, 4, 5 and Part Precinct 6:

- Permanent and semi-permanent structures established during construction should be designed to minimise harbourage and roosting opportunities for pest species including mosquitos and biting midges.
- Identification of measures using a combination of fencing, natural vegetative barriers and signage will be implemented to deter the bringing in or movement of domestic animals into the EPZ and other conservation areas.
- The construction crew and visitors to site will not be permitted to bring domestic animals to the construction works site or in conservation areas of the project site.
- Putrescible waste generated during construction will be stored in covered containers on site to limit access by scavenger animals, and will be transported off site for disposal.
- Management of predatory feral animals (cats, dogs, pigs and foxes) is carried out across the entire Aura site and includes a regular trapping and targeted baiting program implemented by Sunshine Coast Regional Council. Due to the potential for feral animals to be present within the area relevant to this CEMP, monitoring is required to detect any presence. This includes observing and recording the presence of any feral animals such as dogs, cats, pigs or foxes including animal tracks. Retained or newly constructed conservation areas are to be inspected for any ground disturbance caused by pigs.

5.6.4 MONITORING PROGRAM

Regular checking of the performance criteria will be undertaken by the contractor and the Superintendent. With respect to the retained WSF breeding habitat (ponds) in retained or newly created conservation areas, regular checking by the proponent (minimum 6 monthly) is required to identify if fish predators (in particular mosquito fish *Gambusia holbrooki*) are located within retained or created WSF ponds. Monitoring results will be reported in the annual compliance report.

The conservation areas and the retained WSF habitats are to be inspected weekly by the contractor to identify any ground disturbance possibly caused by Feral Pigs. If this is observed, this is to be reported directly to the proponent's

Environmental Management Representative to enable investigations to be conducted in consultation with the Sunshine Coast Regional Council.

Maintain a record of any siting (including animal tracks) of any predatory exotic fauna (cats, foxes, dogs, pigs) including the date, time and location of the siting. Records are to be maintained in the weekly inspection checklist and made available to Stockland and SCRC on request.

5.6.5 CORRECTIVE ACTIONS

The following corrective actions will be implemented where corrective action has been identified as being required:

- Review work practices regarding pest management and implement improvements as required; and
- If Eastern Gambusia are observed within an area of retained or created acid frog habitat, the water quality and chemistry parameters are to be sampled and assessed against the criteria in and corrective actions outlined in **Section 5.4.5** of this CEMP.

5.6.6 RESPONSIBILITIES

Stockland is the proponent and overall project administrator of the development. To oversee construction phases, Stockland will appoint either an internal or external Superintendent to oversee the implementation of the project, and will engage a Principal Civil Contractor as well as construction and/or building contractor(s) and landscaping/environmental contractors for weed and pest management, vegetation management and rehabilitation to undertake the works in accordance with relevant approvals, conditions and commitments.

The Principal Civil Contractor will be responsible for ensuring best practice for the management of pests during the construction of Precincts 3, 4, 5 and Part Precinct 6. The Proponent will be responsible for the appointment of a suitably qualified ecologist to provide advice as appropriate. This consultant will be independent of the Principal Civil Contractor.

The Proponent and Principal Civil Contractor will be responsible for the implementation and refinements of any corrective actions to ensure appropriate environmental protection goals are achieved.

5.6.7 REPORTING

Any pest control measures implemented must be incorporated into the regular weekly/monthly environmental report prepared by the Principal Civil Contractor to the Construction Superintendent; and

Notify the Construction Superintendent of any non-compliances as soon as possible in order to comply with reporting obligations of the Proponent, consistent with condition 14 of the EPBC Approval and **Section 4.1.4** of this document.

5.7 WEED MANAGEMENT

5.7.1 OVERVIEW

With respect to weeds, during construction, bulk earthworks operations will clear vegetation as required within Precincts 3, 4, 5 and Part Precinct 6 and part of the Western Borrow Area and Precinct 14 (if required for the borrow area). This action has the potential to introduce and spread weeds, fungi and other pathogens to and from the work area.

The introduction of weeds can pose a significant threat to biodiversity, and is recognised as one of the biggest issues affecting regeneration of native vegetation in Aura. Management measures have been developed to guide any necessary vegetation clearing during construction, as well as rehabilitation and weed control during construction and operation. As weed and pest control strategies are contingent on the protection and rehabilitation of retained native vegetation, management actions relating to native vegetation management are also provided.

Due to the history of the site, exotic pasture grasses dominate many areas requiring ecological enhancement. These include:

- *Setaria sphacelata*;
- Giant rat's tail grass (*Sporobolus pyramidalis* and *S. natalensi*), a Class 2 Declared Pest; and
- Grass species from the genera *Paspalum*, *Panicum*, and *Chloris*.
- There are also numerous other weed species on the site. Some of the more common weeds include:
 - *Lantana camara*, a Class 3 Declared Pest;
 - Groundsel Bush (*Baccharis halimifolia*) a Class 2 Declared Pest; and
 - Slash Pine (*Pinus elliottii*).

These weeds are a significant threat to achieving the objectives of ecological enhancement across the site; therefore, the site wide strategy focusses on integrative weed management as one of the primary tools to allow ecological enhancement rehabilitated areas.

Weed management in the rehabilitated areas of the EPZ and conservation areas will be further detailed in the Environmental Rehabilitation Plan for that area.

5.7.2 PERFORMANCE CRITERIA

The objective of this part of the CEMP is to implement effective weed management measures to minimise infestation on and off site during construction.

The key performance criteria are:

- Avoid or otherwise minimise the introduction of any new weed species, and control of existing weeds; and
- Avoid or otherwise minimise dieback from the introduction of pathogens.

5.7.3 MANAGEMENT MEASURES

The following measures are required to control weeds in Precincts 3, 4, 5 and Part Precinct 6:

- Implementation of the following weed management measures:
 - Treatment of existing weeds within the construction site.
 - Limiting machinery access near retained vegetation, frog zone, frog buffer and the EPZ.
 - Wash-down facilities are provided on site.
 - Certification of the origin of construction material is required to manage the importation of weed species onto site.
- Mechanical removal (by hand or machine) will be required for the removal of larger plants such as pine and lantana. In the area of Wallum Sedge frog habitat within the EPZ (polygon 125, see **Section 5.4**), chemical spot spraying will be unsuitable, and mechanical or hand removal of pasture grasses will be required.
- Edge planting is to be undertaken to prevent weed species from penetrating high conservation areas which in Precincts 3, 4, 5 and Part Precinct 6, is the EPZ and retained Wallum Sedgefrog habitat contained within. These areas of edge planting are to be at least 5 metres in width.
- Green waste handling, stockpiling and disposal procedures will be developed and implemented on the site.
- Plant material will be removed from site in a manner which reduces disturbance and is to be disposed of at an approved green waste disposal facility or mulched on-site for landscaping purposes.
- Machinery used for earth-moving and vegetation-clearing will be cleaned and inspected prior to the commencement of work to identify any attached material that needs to be removed to avoid the spread of weeds.

- Retained and buffer Wallum Sedgefrog habitat is 100% free of *Baccharis halimifolia* and *Pinus elliottii* and all Class 1 and 2 declared plants of Queensland. During rehabilitation within each HMU in the EPZ, measures will be required in place to prevent the spread of weed seeds and diseases such as *Phytophthora*, Myrtle Rust and Chytrid fungus. This may include shoe and tool disinfecting, exclusion areas and the use of clearly defined tracks.
- Any requirements for fire management within HMU's listed in **Section 5.5** will be outlined in detail in the Environmental Rehabilitation Plan for this area.

5.7.4 MONITORING

Regular monitoring of weeds at all disturbed areas and adjacent vehicle access points will be undertaken by the contractor, reporting to the Superintendent.

5.7.5 CORRECTIVE ACTION

Corrective action is to be undertaken where the performance criteria is not achieved.

If clearing occurs outside the delineated, approved areas, cease all work in the area affected and advise Superintendent and relevant regulatory agencies. Instigate rehabilitation efforts immediately at any area accidentally cleared in accordance with directions from the Superintendent.

For retained or rehabilitated habitat, undertake corrective actions as outlined in the Vegetation Management and Rehabilitation Plan.

5.7.6 RESPONSIBILITIES

Stockland is the proponent and overall project administrator of the development. To oversee construction phases, Stockland will appoint either an internal or external Superintendent to oversee the implementation of the project, and will engage a Principal Civil Contractor as well as construction and/or building contractor(s) and landscaping/environmental contractors for weed and pest management, vegetation management and rehabilitation to undertake the works in accordance with relevant approvals, conditions and commitments.

The Principal Civil Contractor will be responsible for ensuring best practice for the management of weeds during the construction of Precincts 3, 4, 5 and Part Precinct 6.

The Proponent will be responsible for the appointment of a suitably qualified ecologist to provide advice as appropriate. This consultant will be independent of the Principal Civil Contractor.

The Proponent and Principal Civil Contractor will be responsible for the implementation and refinements of any corrective actions to ensure appropriate environmental protection goals are achieved.

5.7.7 REPORTING

Any weed control measures implemented and non-compliance must be incorporated into the regular environmental reporting required by the contractor to the Superintendent.

Notify the Construction Superintendent of non-compliances as soon as possible in order to comply with reporting obligations of the proponent, consistent with condition 14 of the EPBC Approval and **Section 4.1.4** of this document.

6 AUDITING, REPORTING AND REVISIONS

6.1 AUDITING

This CEMP will describe the program and procedures for the internal and external Auditing requirements of the Project. The Audit Program detailed in **Table 6-1**, will be implemented onsite for the duration of the Project. The Principal Civil Contractors must be compliant with the Audit Program and the procedures to follow.

Table 6-1: Audit Program

Objective	Audit Tool	Scope	Frequency	Responsibility
Compliance with Site Activities and Controls	Site Inspection Checklist.	Assessment of onsite environmental activities and controls in accordance with this CEMP.	Weekly	Principal Civil Contractor
Compliance with Site Activities and Controls	Monthly Report.	Compilation of weekly monitoring activities to be submitted to Construction Superintendent.	Monthly	Principal Civil Contractor Construction Superintendent
System Compliance (internal audit)	Internal system audit	Systems Audit of CEMP & OEMP to review environmental issues onsite and the effectiveness of the systems in managing these. The audit will consist of a document review or desktop audit conducted in conjunction with a technical or operational audit.	Biannual	Principal Civil Contractor Construction Superintendent Proponent Environment Representative
Legal and System Compliance	Internal system audit	Systems Audit of CEMP to assess the current compliance status of the site against the EPBC Act Conditions of Approval and requirements of Approved plans and documents.	Annual	Proponent Environment Representative

Audits will to be entered into an audit schedule. The minimum content of the schedule is to be;

- Type of audit i.e: Sediment Control Audit.
- Date of audit, start and completion times.
- The personnel involved in the audit.
- Audit Scope – predetermined prior to audit date.
- Audit findings.
- Audit Recommendations.
- Corrective and Preventative Action.
- Audit Review.

Personnel conducting internal audits will have relevant knowledge of the construction site and appropriate experience such as audit techniques, procedural and environmental training.

Personnel conducting external audits will have relevant knowledge and experience such as auditor qualifications, process knowledge and previous experience in auditing.

The audit scope is to be developed in consultation with interested parties, and will be circulated prior to the audit for comment and approval from the Construction Superintendent and Proponent.

Audit findings must be recorded at the time of the audit, and formulate the basis for recommendations and comments.

Corrective and Preventative actions must allocate a responsibility and time frame for action. A follow up visit or inspection will often be required to ensure compliance measures are implemented post audit review.

The audit will be reviewed by the personnel involved, and distributed for further review by the Construction Superintendent and Proponent.

6.2 REVIEW

This CEMP will be reviewed as the need for review is identified.

The review will be scheduled by the Proponent's Environmental Management Representative, and be inclusive of the Principal Civil Contractor and Construction Superintendent.

All personnel involved with the Environmental Management of the Project are required to attend the review.

A review agenda will be set by the Proponent's Environmental Management Representative and circulated to all parties one week before the review date. This agenda will include but not be limited too;

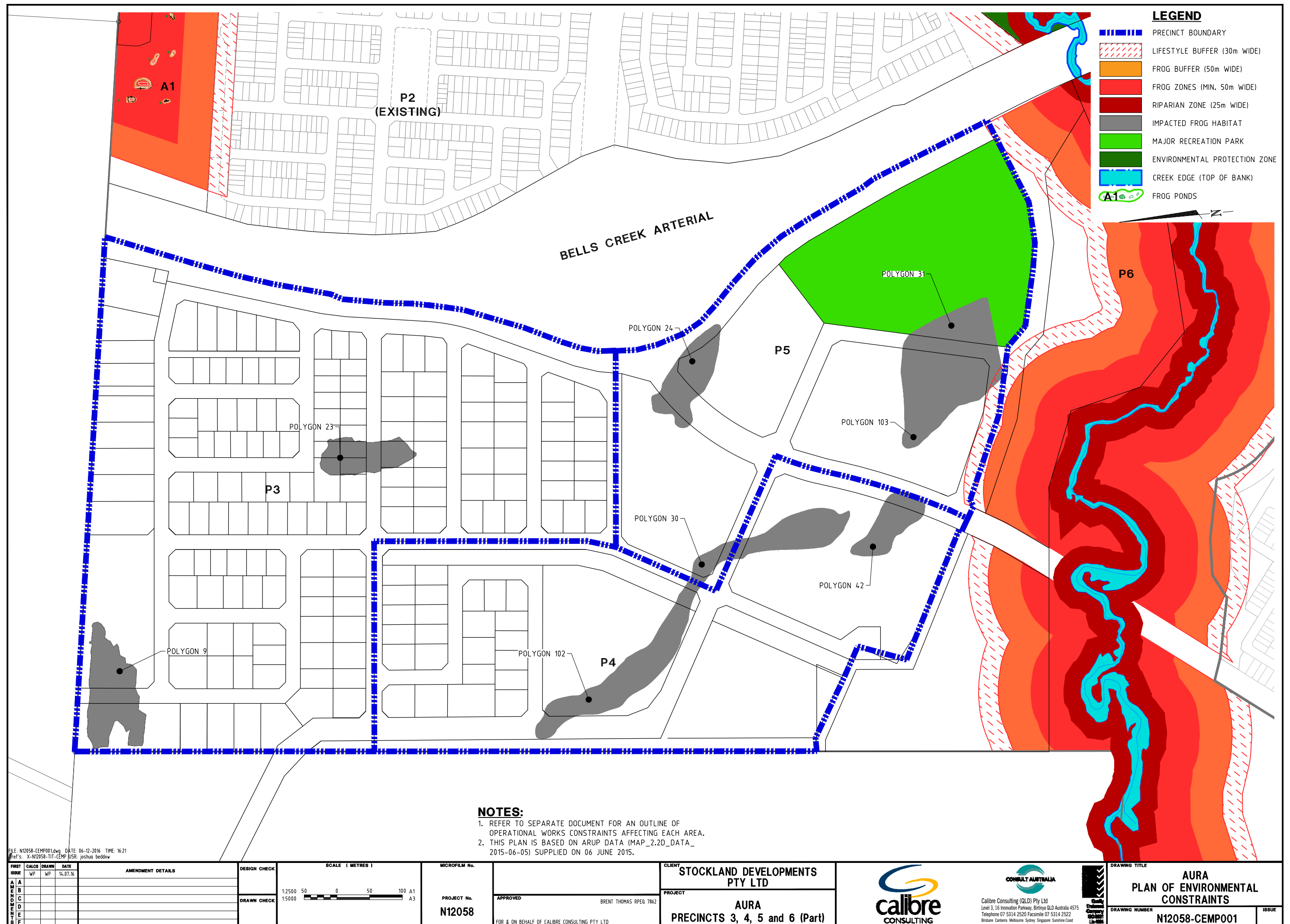
- Site Inspection Checklists
- Monthly Reports.
- Incident and investigation reports.
- Internal audit results, including corrective and preventative actions.
- External audit results and findings, including recommendations and actions.
- Completed registers such as; complaints, incidents and non-conformance.
- Training programs in place such as Site Induction training.
- Environmental Emergency Response.
- Review of legal requirements for the Project.

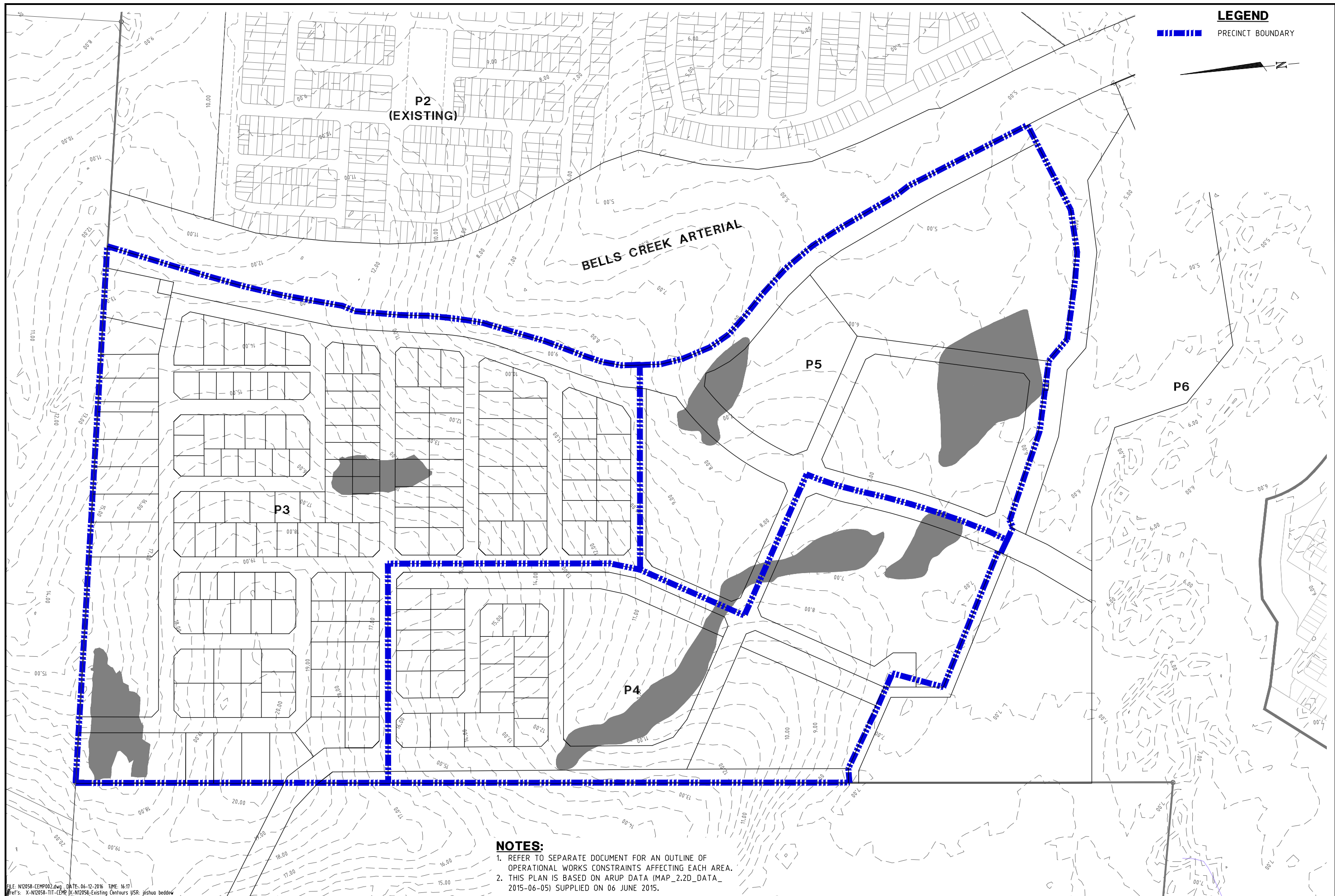
Overall effectiveness of the CEMP. The Construction Superintendent will be responsible for recording the items discussed, and circulating the agreed decisions resulting from the review.

The Proponent will assess the results of this review and make amendments to this CEMP as required and circulate for comment.

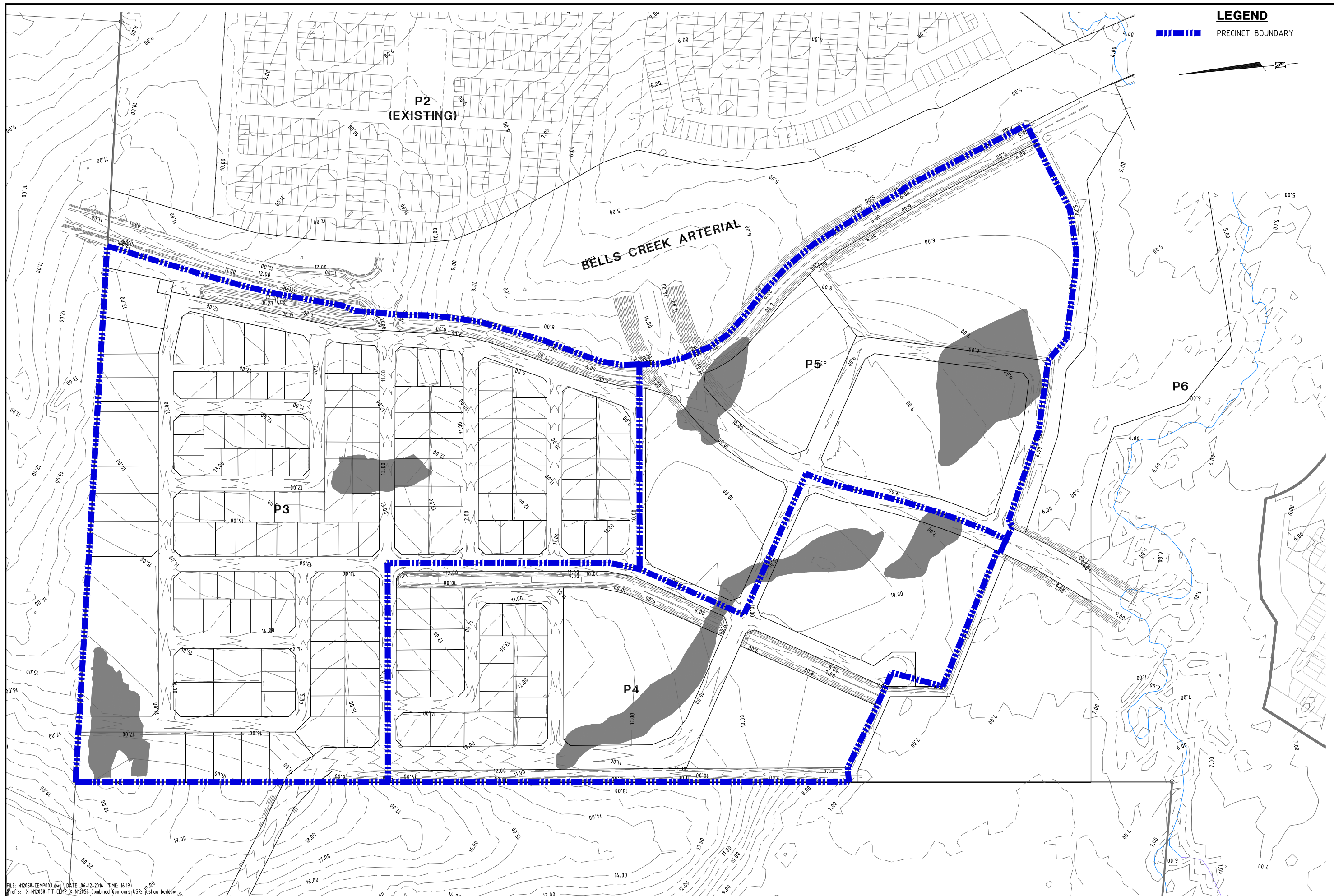
APPENDICES

APPENDIX A CONCEPT ENGINEERING DRAWINGS/PRECINCT STAGING





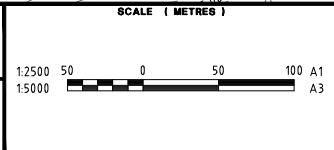
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B					1:5000			
C								
D								
E								
F								
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							AURA PRECINCTS 3, 4, 5 and 6 (Part)	ISSUE
							FOR & ON BEHALF OF CALIBRE CONSULTING PTY LTD	



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	WP	WP	14.07.16	
A				
B				
C				
D				
E				
F				

DESIGN CHECK
DRAWN CHECK



MICROFILM No.

PROJECT No.
N12058

APPROVED

BRENT THOMAS RP02 7862

FOR & ON BEHALF OF CALIBRE CONSULTING PTY LTD

CLIENT
**STOCKLAND DEVELOPMENTS
PTY LTD**

PROJECT
**AURA
PRECINCTS 3, 4, 5 and 6 (Part)**

**calibre
CONSULTING**

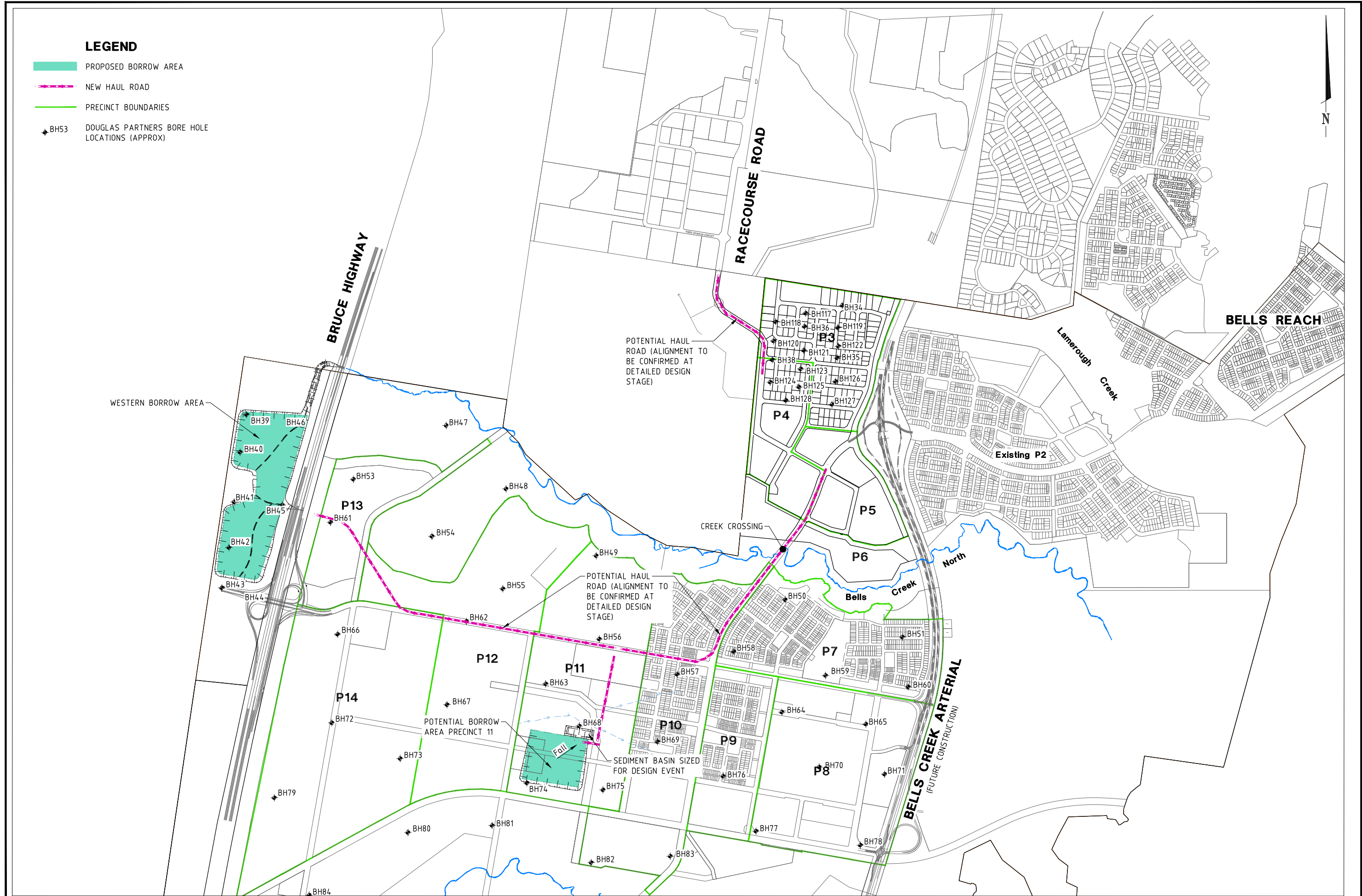
CONSULT AUSTRALIA

Calibre Consulting (QLD) Pty Ltd
Level 3, 16 Innovation Parkway, Brisbane QLD Australia 4575
Telephone 07 5314 2520 Facsimile 07 5314 2522
Brisbane Canberra Melbourne Sydney Singapore Sunshine Coast





DRAWING TITLE
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PLAN OF PROPOSED CONTOURS**

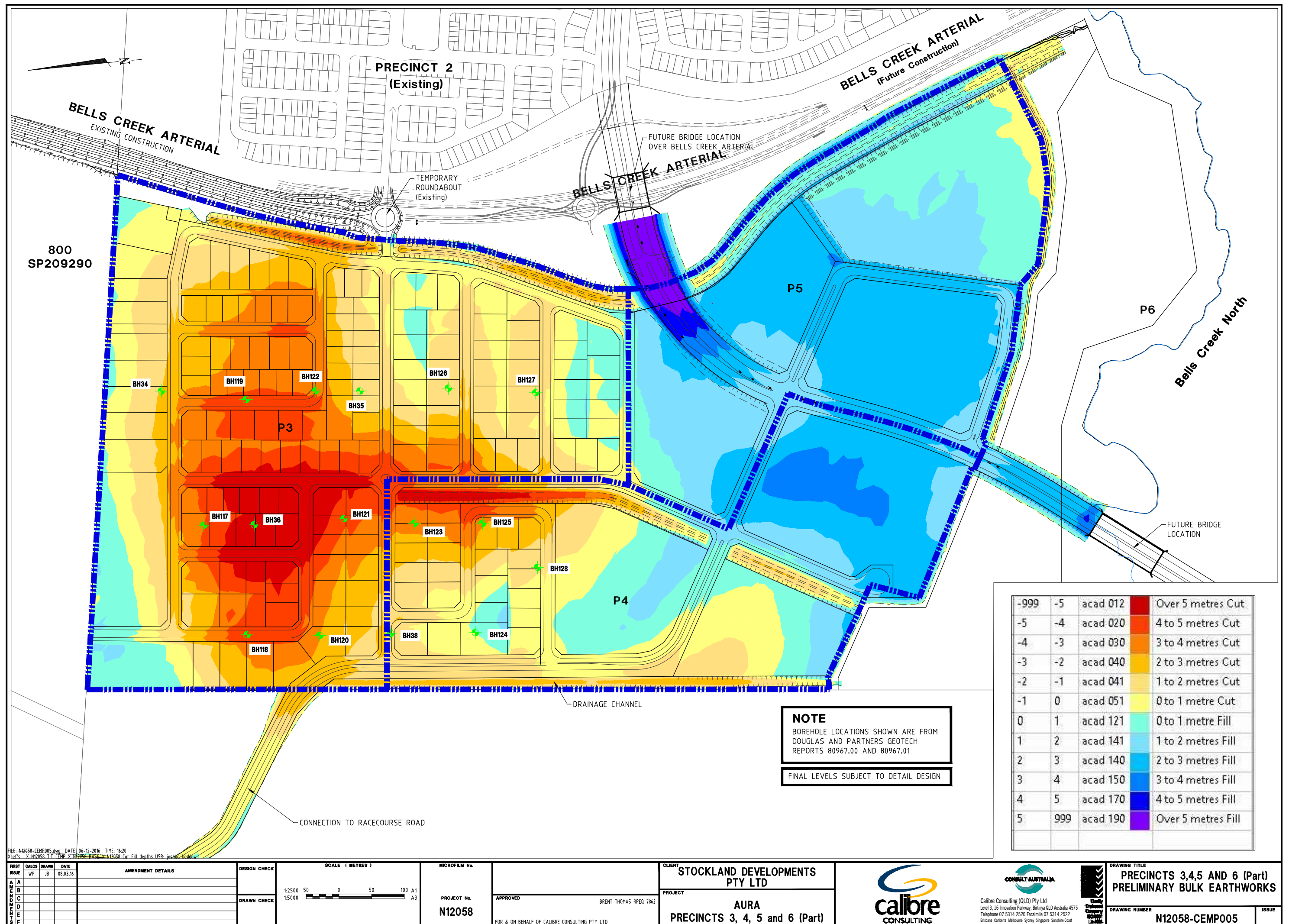
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ISSUE



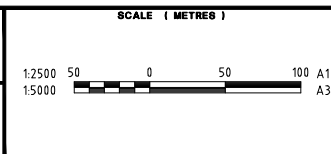
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							FOR & ON BEHALF OF CALIBRE CONSULTING PTY LTD						



FIRST ISSUE		CALCS	DRAWN	DATE	AMENDMENT DETAILS
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AMENDMENTS	A				
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	C				
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	E				
	F				

DESIGN CHECK
DRAWN CHECK



MICROFILM No.

PROJECT No.

N12058

APPROVED	BRENT THOMAS RPEQ 7862
FOR & ON BEHALF OF CALIBRE CONSULTING PTY LTD	

CLIENT	STOCKLAND DEVELOPMENTS PTY LTD
PROJECT	AURA PRECINCTS 3, 4, 5 and 6 (Part)



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 Brisbane Canberra Melbourne Sydney Singapore Sunshine Coast



DRAWING TITLE	
PRECINCTS 3,4,5 AND 6 (Part) PRELIMINARY BULK EARTHWORKS	
DRAWING NUMBER	ISSUE
N12058-CEMP005	



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APPENDIX B WALLUM SEDGEFROG MANAGEMENT FIGURES

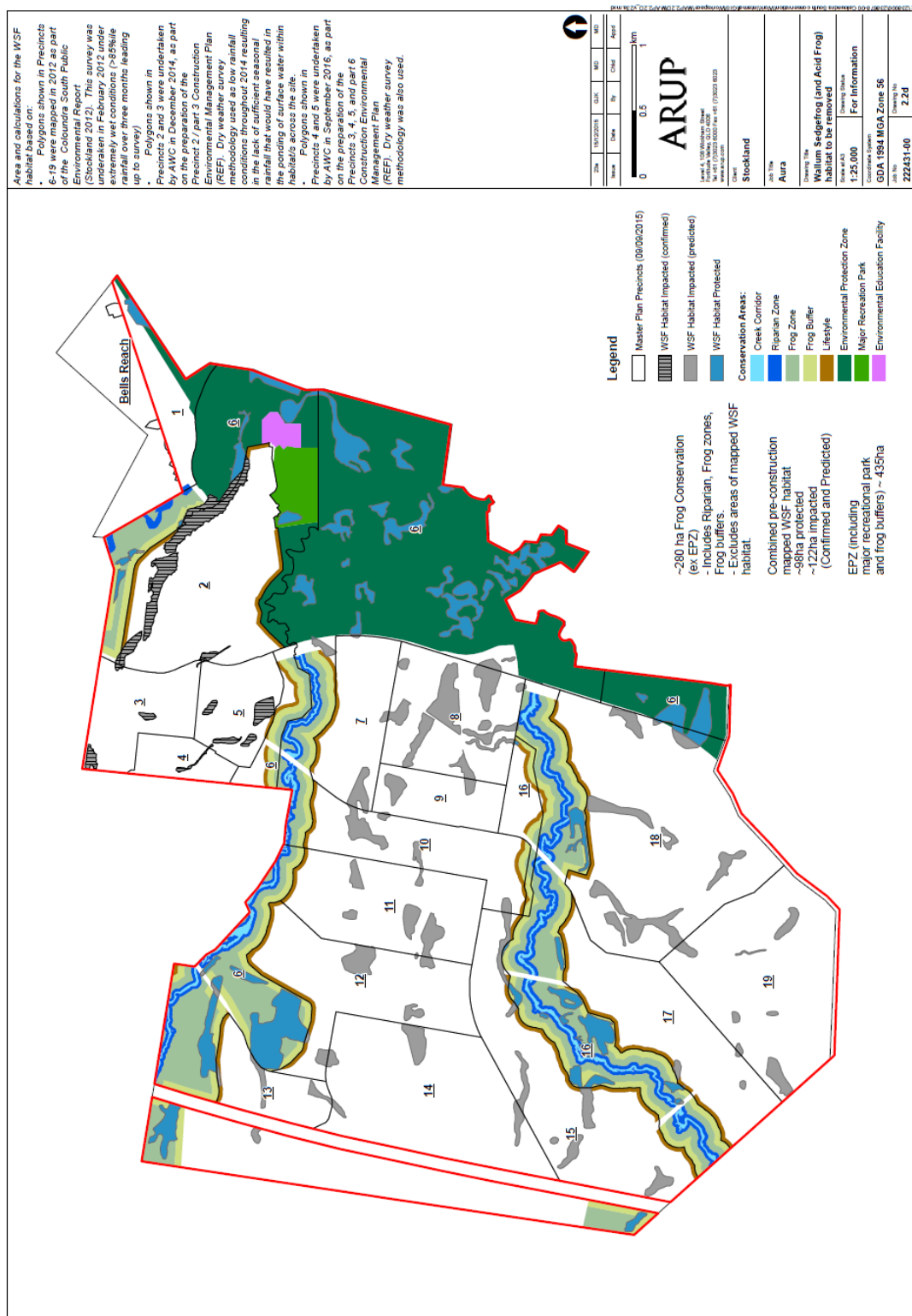


Figure B6-1: Identified Wallum Sedgefrog habitat (grey shading) to be removed (as per 2012 surveys) (WSFMP 2015)

APPENDIX C VEGETATION MANAGEMENT FIGURES

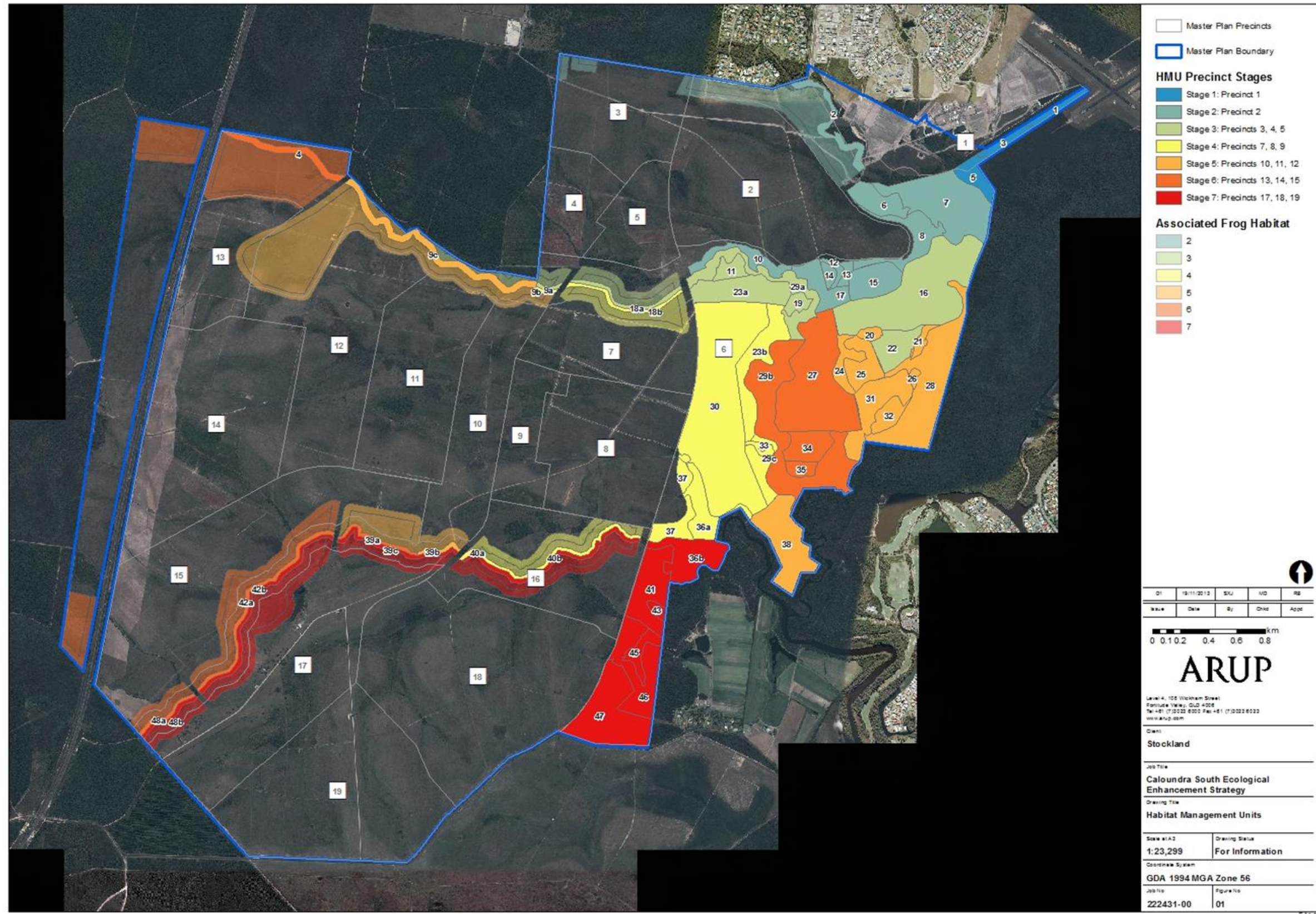


Figure C1: Habitat Management Units (EMP 2013)

APPENDIX D MONITORING PROGRAMME SUMMARY

Environmental Aspect	Commencement:	Cessation:	Requirements and Responsibilities	Reporting	Monitoring & Reporting Responsibility		
					Proponent	Construction Superintendent	Principal Civil Contractor
Erosion and Sediment Control <i>(Refer Section 5.1)</i> <i>(Refer Section 3.3.2 of EMP)</i>	Once possession of the site has been granted and the subdivision works have commenced.	Once the subdivision construction works have been completed and on maintenance achieved. Inspections of all erosion and sediment control devices will need to be inspected prior to and after each major rain event during the maintenance period.	<p>The Principal contractor shall be responsible for implementing best management practices at all times during the contract period. All planning, design, certification and construction works, are to minimize and avoid erosion and sedimentation of the site, surrounding country, watercourses, water bodies and wetlands. Regular monitoring will be required by the Principal contractor and the Superintendent:</p> <ul style="list-style-type: none"> Daily inspections of all erosion and sediment control measures; Daily inspection of the road network for evidence of sediment being deposited external to the site; Inspection of all control measures after major rain events (greater than 25mm in 24 hours); Rainfall to be recorded at 9AM each working day; Turbidity monitoring; and Water quality testing of any stormwater runoff resulting from the construction works that is proposed to enter the foraging areas of the WSF habitat. 	<p>Records of all daily inspections are to be kept onsite at all times. These include, but are not limited to:</p> <ul style="list-style-type: none"> Log book (including daily entries) of the effectiveness of all ESC measures; Weekly reports on water quality compliance and achievement. Following major rainfall events, reports are to be issued immediately afterwards; Monthly environmental compliance reports (ECR); Daily Inspection records of all ESC devices; Records of any rectification works; On-site water quality testing results; and Documentation of the turbidity monitoring <p>Report and Log Book to be issued by the contractor to the Superintendent. Superintendent to review and ensure all is satisfactory prior to issuing to the Project Certifier. Project Certifier to then issue to the Project Co-ordinator for submission to the Authority.</p>	<input type="checkbox"/> Preparation of an Annual Compliance Report (ACR).	<input type="checkbox"/> Monthly Environmental Compliance Report received and satisfactory. <input type="checkbox"/> Rectification works identified have been inspected and are complete. <input type="checkbox"/> Water Quality Testing received and satisfactory. <input type="checkbox"/> ESC measures inspected and satisfactory. <input type="checkbox"/> Documentation, including satisfactory Monthly Environmental Compliance Report issued to the Proponent.	<input type="checkbox"/> Daily inspections of all erosion and sediment control measures. <input type="checkbox"/> Daily inspection of the road network for evidence of sediment being deposited external to the site. <input type="checkbox"/> Inspection of all control measures after major rain events (greater than 25mm in 24 hours). <input type="checkbox"/> Daily measurement of turbidity, pH, Electrical Conductivity (EC) and Dissolved Oxygen (DO) within sediment basins. <input type="checkbox"/> Water quality testing of any stormwater runoff resulting from the construction works that is proposed to enter the foraging areas of the WSF habitat. <input type="checkbox"/> Rainfall will be recorded at 9am each working day. <input type="checkbox"/> Turbidity monitoring at sediment basin outlets. <input type="checkbox"/> ESC measures rectified where required. <input type="checkbox"/> Notify the Construction Superintendent of non-compliances as soon as possible. <input type="checkbox"/> Weekly reports on water quality compliance and achievement. Following major rainfall events, reports are to be issued immediately afterwards. <input type="checkbox"/> Monthly Environmental Compliance Report issued to the Construction Superintendent
Groundwater <i>(Refer Section 5.2)</i> <i>(Refer sections 4.2 and 5.2 in WQMP by BMT WBM)</i>	Six months prior to construction works commencing.	Minimum 12 months after the active construction works are complete.	<p>The Principal Contractor shall monitor all groundwater and minimize potential negative impacts to groundwater quality. The management structure of groundwater is in the order as follows:</p> <ol style="list-style-type: none"> Avoid any groundwater extraction through the protection and rehabilitation of the conservation and waterway corridor; 	<p>As per Figure 5-3, there is an existing network of groundwater monitoring bores located across the site. All boreholes will be sampled biannually, up to and for 12 months after the active development construction works are complete. Those bores which are within catchments where construction activities are occurring and are within 500m, are to be sampled monthly. Those bores where construction</p>	<input type="checkbox"/> Preparation of an Annual Compliance Report (ACR). <input type="checkbox"/> Coordination of pre-construction baseline monitoring for the site and confirmation it has been carried out. <input type="checkbox"/> Coordination of sampling of bores within active construction works areas on	<input type="checkbox"/> Monthly Environmental Compliance Report received and satisfactory <input type="checkbox"/> Rectification works identified have been inspected and are complete. <input type="checkbox"/> Groundwater management measures have been implemented and inspected and are all satisfactory.	<input type="checkbox"/> Rectification works completed. <input type="checkbox"/> Log Books completed monthly noting the works completed to avoid, reduce, reuse, treat and dispose of groundwater. <input type="checkbox"/> Notify the Construction Superintendent of non-compliances as soon as possible.

Environmental Aspect	Commencement:	Cessation:	Requirements and Responsibilities	Reporting	Monitoring & Reporting Responsibility		
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			<ol style="list-style-type: none"> Reduce the groundwater that is extracted during the required earthworks activities. Reuse groundwater where practical and feasible to supplement on-site water demands and minimize discharge downstream. Treat the suspended sediments in the groundwater via drainage channels, sediment basins and the use of vegetated 'buffer' areas between the basin and waterways. Disposal of the excess groundwater that overtops the sediment basins, or that has been treated shall be into the Lamerough Creek catchment. 	<p>is occurring but in close proximity to active works, are to be sampled on a 3 month basis.</p> <p>An annual report will be prepared including the results of the monitoring, test reports of the water quality and implementation of corrective actions. Report to be issued by the contractor to the Superintendent. Superintendent to review and ensure all is satisfactory prior to issuing to the Project Certifier. Project Certifier to then issue to the Project Co-ordinator for submission to the Authority.</p>	<p>a biannual basis, up to and for 12 months after active development works are completed in respective catchments.</p> <ul style="list-style-type: none"> Coordination of sampling of Sentinel and Control bores within catchments where there are active construction activities occurring will be sampled on a monthly basis. Coordination of sampling of Construction bores within catchments where construction activities are occurring and which are in close proximity (i.e. within 500m) to areas of active development works will be sampled on a monthly basis. 	<ul style="list-style-type: none"> Documentation, including satisfactory Monthly Environmental Compliance Report issued to the Proponent. 	<ul style="list-style-type: none"> Monthly Environmental Compliance Report issued to the Construction Superintendent.
<p>Geotechnical (Acid Sulfate Soils)</p> <p>(Refer Section 5.3)</p> <p>(Refer section 3.2 of EMP by BMT WMP)</p>	Prior to the commencement of the Bulk Earthworks operations.	At the completion of the construction works.	<p>Existing geotechnical investigations note that the risk of encountering acid sulfate soils (ASS) is low however hot spots of acidity may be detected. If these are present, they will need to be tested and managed through a basic acid sulfate soil management plan. Further detailed testing is proposed to be undertaken prior to bulk earthworks, particularly where the earthworks are proposed below 5m AHD.</p> <p>Management and testing of ASS are to be in accordance with the State Planning Policy Guidance on Acid Sulfate Soils December 2013 or the most recent version. The Principal Contractor will be responsible for the on-site testing, control and management, treatment of ASS soils and ensuring compliance with the pH conditions.</p>	<p>ASS Monitoring may include:</p> <ul style="list-style-type: none"> Acid Sulfate testing on any hot spot areas detected; Treatment and management of stockpiled material and treated soils during construction to ensure it is contained; and PH testing of site water and sediment pond water. <p>If ASS are found, an ASSMP is to be prepared and lodged. This should include:</p> <ul style="list-style-type: none"> Completion of the ASS management plan; Documentation of the on-site testing; and Corrective actions required as a result of the monitoring. <p>Report to be issued by the contractor to the Superintendent. Superintendent to review and ensure all is satisfactory prior to issuing to the Project Certifier. Project Certifier to then issue to the Project Co-ordinator for submission to the Authority.</p>	<ul style="list-style-type: none"> Preparation of an Annual Compliance Report (ACR) 	<ul style="list-style-type: none"> Acid Sulfate Testing received and satisfactory Monitoring, management, treatment and control measures implemented on-site, inspected and satisfactory Report and secondary retests received and satisfactory Documentation, including satisfactory Monthly Environmental Compliance Report issued to the Proponent. 	<ul style="list-style-type: none"> Acid Sulfate testing will be completed on areas below 5.0m AHD and any other areas expected to contain ASS with results available. Detailed testing in areas below 5m AHD prior to earthworks completed and satisfactory Management and testing of ASS will be undertaken in accordance with the Guidelines for Sampling and Analysis of Lowland Acid Sulfate Soils in Queensland (C.R. Ahern et. Al. 1998) (or most recent version) Daily measurement of water pH within construction sediment ponds. ASS management and control plan submitted to Superintendent (If ASS are found). Notify the Construction Superintendent of non-compliances as soon as possible.

Environmental Aspect	Commencement:	Cessation:	Requirements and Responsibilities	Reporting	Monitoring & Reporting Responsibility		
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							<input type="checkbox"/> Monthly Environmental Compliance Report issued to the Construction Superintendent.
Wallum Sedge Frog Management (Refer Section 5.4) (Refer WSFMP by Stockland. In particular Section 7)	Once possession of the site is granted and construction works commence.	Once Off Maintenance is achieved.	Further to the Wallum Sedgefrog surveys undertaken in 2012, 2013 and 2014, there are potential breeding habitats located in Precincts 3, 4, 5 and 6 (part). Please refer to Table 3-1 within the Construction Environmental Management Plan for Aura, Precinct 3, 4, 5 and 6 (part). The breeding habitats within the Environmental Protection Zone will need to be conserved. The following measures are required: <ul style="list-style-type: none"> Establishment of a planted buffer between the retained habitats and the earthworks and other development related threats; All stormwater run-off must be diverted from habitats; and Maintenance of silt fencing, bunding and detention basins for containing and treating stormwater run-off. The Principal contractor shall be responsible for the implementation and refinements of any corrective actions to ensure appropriate environmental protection goals are achieved.	Monitoring measures are required throughout the construction period and until the off-maintenance period as noted in the Wallum Sedgefrog Management Plan, 2014. The following will be required: <ul style="list-style-type: none"> Water quality testing every six months at the retained Wallum Sedgefrog's habit, in March and September; Recording the depths of the ponds at five random locations in the habitat; Seasonal survey within retained habitat; and Off maintenance monitoring. Six monthly reporting will be required for all monitoring activities. Report to be issued by the contractor to the Superintendent. Superintendent to review and ensure all is satisfactory prior to issuing to the Project Certifier. Project Certifier to then issue to the Project Co-ordinator for submission to the Authority.	<input type="checkbox"/> Preparation of an Annual Compliance Report (ACR) <input type="checkbox"/> Coordination of water Quality Testing to be completed every six months.	<input type="checkbox"/> ESC protection measures inspected and satisfactory. <input type="checkbox"/> Corrective actions inspected and satisfactory. <input type="checkbox"/> Documentation, including satisfactory Monthly Environmental Compliance Report issued to the Proponent.	<input type="checkbox"/> Construction water not to be directed to WSF breeding habitat. <input type="checkbox"/> Daily inspections of ESC measure to ensure retained WSF habitat is protected from works covered by this CEMP. <input type="checkbox"/> Rectification works completed. <input type="checkbox"/> Notify the Construction Superintendent of non-compliances as soon as possible. <input type="checkbox"/> Monthly Environmental Compliance Report issued to the Construction Superintendent.
Vegetation Management (Refer Section 5.5) (Refer VMRP by Stockland, particularly Sections 9 and Table 3)	Prior to the commencement of the works.	Once Off Maintenance is achieved and the environmental protection goals are achieved.	The area to the east of and within Precincts 3, 4, 5 and 6 (part), adjacent to the Caloundra Aerodrome, has been defined as the Environmental Protection zone (EPZ) and is required to be conserved and rehabilitated to improve habitat value. The habitat rehabilitation is identified in the Vegetation Rehabilitation and Management Plan, 2013. A detailed environmental rehabilitation plan will be prepared prior to the commencement of the subdivision works. The contractor is required to implement the management measurements and restrict all access to the area to ensure that rehabilitation is achieved.	Visual and Photographic monitoring will be conducted to evaluate the effectiveness of the strategies within the HMU's in the EPZ. A visual monitoring point will be established in each HMU and the location and characteristics monitored by Photo point records every 6 months. A report will be produced annually for the duration of the ecological enhancement programme. Report to be issued by the contractor to the Superintendent. Superintendent to review and ensure all is satisfactory prior to issuing to the Project Certifier. Project Certifier to then issue to the Project Co-ordinator for submission to the Authority.	<input type="checkbox"/> Preparation of an Annual Compliance Report (ACR). <input type="checkbox"/> Coordination of visual and Photographic monitoring to be logged and submitted every six months.	<input type="checkbox"/> Maintenance measures inspected and satisfactory. <input type="checkbox"/> Rectification works identified have been inspected and are complete. <input type="checkbox"/> Corrective actions inspected and satisfactory. <input type="checkbox"/> Documentation, including satisfactory Monthly Environmental Compliance Report issued to the Proponent.	<input type="checkbox"/> Rectification works completed. <input type="checkbox"/> Log Book of all implemented management measures, noting regular maintenance inspections <input type="checkbox"/> Notify the Construction Superintendent of non-compliances as soon as possible. <input type="checkbox"/> Monthly Environmental Compliance Report issued to the Construction Superintendent.

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Pest Management (Refer Section 5.6) (Refer Section 3.4.2 of EMP by BMT WBM)	Prior to the commencement of the works.	Once Off Maintenance is achieved and the environmental protection goals are achieved.	<p>The objective of the Pest Management is to reduce or control impacts from pest animal species during the construction stage.</p> <p>The following measures will be required as a minimum:</p> <ul style="list-style-type: none"> Permanent and semi-permanent structures to minimise harbourage and roosting opportunities for pest species; A combination of measures including fencing and signage to advise that no domestic animals are to be brought onto the site or the EPZ and conservation areas by crews and employees; Generated waste is to be stored in covered containers and be transported off site for disposal. <p>The principal contractor will be responsible for ensuring best practice for the management of pests during the construction works. Stockland will appoint an internal or external superintendent to oversee the implementation of these measures. And ensure environmental protection goals are achieved.</p> <p>If exotic fauna is observed on site, the proponent is to liaise with Sunshine Coast Regional Council to determine and implement an appropriate action plan.</p> <p>Weekly inspections are required of the retained conservation areas, including the WSF habitat, checking for any ground disturbance resulting from feral pigs. If this is recorded, the matter is to be reported to the proponents Environmental Management Representative for immediate investigation.</p>	<p>Regular inspections are required by the contractor and superintendent, noting all observed exotic fauna including pigs, dogs, cats and foxes. Pest control measures need to be included in the regular weekly/monthly environmental report.</p> <p>Report to be issued by the contractor to the Superintendent. Superintendent to review and ensure all is satisfactory prior to issuing to the Project Certifier. Project Certifier to then issue to the Project Co-ordinator for submission to the Authority. Submissions are to be made every six months.</p>	<input type="checkbox"/> Preparation of an Annual Compliance Report (ACR)	<input type="checkbox"/> Maintenance measures inspected and satisfactory. <input type="checkbox"/> Rectification works identified have been inspected and are complete. <input type="checkbox"/> Corrective actions inspected and satisfactory. <input type="checkbox"/> Documentation, including satisfactory Monthly Environmental Compliance Report issued to the Proponent.	<input type="checkbox"/> Rectification works completed. <input type="checkbox"/> Log book to be kept to record all management measures implemented on site <input type="checkbox"/> Weekly inspections logged and detailed records maintained. <input type="checkbox"/> Notify the Construction Superintendent of non-compliances as soon as possible. <input type="checkbox"/> Monthly Environmental Compliance Report issued to the Construction Superintendent.
Weed Management	Prior to the commencement of the works	Once Off Maintenance is achieved and the environmental	Effective weed management measures need to be implemented to minimise infestation on and off site during construction.	Monthly monitoring of weeds at all disturbed areas and vehicle access locations. Results, including the control measures implemented and any non-	<input type="checkbox"/> Preparation of an Annual Compliance Report (ACR)	<input type="checkbox"/> Report received and satisfactory.	<input type="checkbox"/> Weed management measures implemented

Environmental Aspect	Commencement:	Cessation:	Requirements and Responsibilities	Reporting	Monitoring & Reporting Responsibility		
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<p>(Refer Section 5.7)</p> <p>(Refer Section 3.4.3 of EMP by BMT WBM and Section 6 of VMRP by Stockland)</p>		protection goals are achieved.	The Principal Contractor and the proponent will be responsible for the implementation and refinement of all Weed Management measures, including wash down facilities, edge planting to high conservation areas. Please refer to Section 5.7 for further details.	<p>compliance, to be included in the reporting to the superintendent. Certification of the origin of earthworks material is also required.</p> <p>Documentation to be issued by the contractor to the Superintendent. Superintendent to review and ensure all is satisfactory prior to issuing to the Project Certifier. Project Certifier to then issue to the Project Co-ordinator for submission to the Authority. Submission to be made every six months.</p>	<input type="checkbox"/> Coordination of weed management within the rehabilitated areas of the EPZ and other conservation areas in accordance with the Environmental Rehabilitation Plan.	<input type="checkbox"/> Site management measures inspected and satisfactory. <input type="checkbox"/> Rectification works inspected and satisfactory <input type="checkbox"/> Certification of fill material received and satisfactory <input type="checkbox"/> Corrective actions inspected and satisfactory. <input type="checkbox"/> Documentation, including satisfactory Monthly Environmental Compliance Report issued to the Proponent.	<input type="checkbox"/> Limiting machinery access near retained vegetation, frog zone, frog buffer and the EPZ. <input type="checkbox"/> Wash-down facilities are provided on site. <input type="checkbox"/> Certification of the origin of construction material is required to manage the importation of weed species onto site. <input type="checkbox"/> Green waste handling, stockpiling and disposal procedures will be developed and implemented on the site. <input type="checkbox"/> Plant material will be removed from site in a manner which reduces disturbance and is to be disposed of at an approved green waste disposal facility or mulched on-site for landscaping purposes. <input type="checkbox"/> Machinery used for earth-moving and vegetation-clearing will be cleaned and inspected prior to the commencement of work to identify any attached material that needs to be removed to avoid the spread of weeds. <input type="checkbox"/> Log book to be kept to record all management measures implemented on site. <input type="checkbox"/> Regular monitoring noted in log book for all disturbed and access areas. <input type="checkbox"/> Notify the Construction Superintendent of non-compliances as soon as possible. <input type="checkbox"/> Monthly Environmental Compliance Report issued to the Construction Superintendent.

Table D1: Monitoring Programme