PROJECT

SUMMARY OF MANAGEMENT PLANS STAGE 1, KINGS FOREST NEW SOUTH WALES

PREPARED FOR

PROJECT 28 PTY LTD

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SYNOPSIS This report constitutes the Summary of Management Plans (SOMP) for Stage 1 of the Kings Forest development. The SOMP brings together the discreet management provisions outlined in numerous separate environmental management plans for the Kings Forest development. This report constitutes an update of the SOMP contained in the Darryl Anderson Consulting Pty Ltd 'Preferred Project Report' dated October 2012 to ensure consistency with the latest version of each foundation report.

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SUMMARY

Project 28 Pty Ltd commissioned Gilbert & Sutherland Pty Ltd (G&S) to update the Kings Forest Stage 1 Summary of Management Plans (SOMP), to ensure its consistency with the latest version of each of its foundation reports and the requirements of Major Project Approval (MP08_0194) Condition 48 as repeated below;

> *The Summary of Management Plans (SOMP) shall be revised to ensure consistency with all relevant management plans to the satisfaction of the Secretary prior to the issue of a construction certificate for Stage 1 bulk earthworks.*

Drawing 12066_001 depicts the areas of the site that form the Phase 1 works. These areas are subject to imminent development. The SOMP is relevant to Stage 1 of the Kings Forest Development of which the Phase 1 scope is a subset.

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

The SOMP integrates the provisions of the following foundation management plans:

- Erosion and Sediment Control Management Plan (G&S July 2012) and the Kings Forest Development, Precinct 5, Sediment and Erosion Management Plan (Mortons Urban Solutions 2020).
- Acid Sulfate Soil Management Plan, (G&S September 2020) and any subsequent updates.
- Integrated Water Cycle Management Plan (G&S October 2020).
- Stormwater Management Plan (G&S October 2020).
- Groundwater Assessment and Management Plan (G&S 2012) and any subsequent updates.

- Baseline Water Quality Criteria Report, Kings Forest Stage 1, New South Wales, (G&S May 2020).
- Review of Environmental Management Plan (ePar 2009).
- Drain Maintenance Management Plan (G&S 2020).
- Overall Water Management Plan (G&S 2020).
- Construction Waste Management Plan (CWMP) (G&S, December 2019).
- Vegetation and Management Plan (VMP) (JWA 2020a-c).
- Buffer Management Plan (BMP) (JWA 2020d-e).
- Threatened Species Management Plan (TSMP) (JWA 2020f-h).
- Koala Plan of Management (KPoM) (JWA 2019).
- Wallum Sedge Frog Management Plan (WSFMP) (JWA 2020i).
- Feral Animal Management Plan (FAMP) (JWA 2020j).
- Remediation Action Plan, Precinct 5 and Kings Forest Parkway Stage 1, Kings Forest Development, New South Wales (G&S, November, 2020).
- Remediation Action Plan, Proposed Roadworks External Intersection, Kings Forest Parkway Stage 1 and Tweed Coast Road Water, Sewer and Cycleway, Kings Forest Development, New South Wales (G&S, November 2020).

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1 Introduction

Project 28 Pty Ltd commissioned Gilbert & Sutherland Pty Ltd (G&S) to update the Kings Forest Stage 1 Summary of Management Plans (SOMP) to ensure its consistency with the latest version of each of its foundation reports.

1.1 Scope of report

This report was prepared to meet the requirements of Major Project Approval (MP08_0194) Condition 48 as repeated below;

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The implementation table included at the end of this management plan details the actions, responsibilities and performance criteria upon which monitoring and auditing will be implemented. It is anticipated that implementation of the SOMP provisions will:

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

2 Proposed development

2.1 Stage 1 Project Application

In accordance with the Kings Forest Stage 1 Project Application No. MP 08_0194 the project contains the following key elements:

Kings Forest Residential Subdivision Stage 1 Bulk Earthworks, Roadworks and Subdivision of Precinct 5, including:

- *Subdivision of the site into ten development lots in 4 stages; Bulk earthworks across the site;*
- *Roadworks comprising:*
  - *construction of the entrance road and associated intersection works with Tweed Coast Road;*
  - *construction of the Kings Forest Parkway from Tweed Coast Road via Precincts 4 and 5 through to the western site precincts; and*
  - *construction of two roads providing access to the southern site precincts;*
- *Plan of Development for Precinct 5;*
- *Development of 998 sqm of floorspace for a service station and food and drink premises and access arrangements to Precinct 1;*
- *Construction of subdivision and infrastructure works along Kings Forest Parkway and within Precincts 1 and 5;*
- *Subdivision of Precinct 5 into 376 residential lots comprising:*
  - *one townhouse lot (7,860sqm)*
  - *37 terrace house lots (minimum lot size 150sqm)*
  - *25 duplexes (minimum lot size 450sqm)*
  - *192 zero lot dwellings (minimum lot size 240sqm)*
  - *121 traditional detached dwellings (minimum lot size 400sqm)*

Drawing 12066_001 depicts the areas of the site that form the Phase 1 works. These areas are subject to imminent development. The SOMP is relevant to Stage 1 of the Kings Forest Development, of which the Phase 1 scope is a subset.

3 Summary of Management Plans

3.1 Aims and Objectives

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

The SOMP aims to achieve the following:

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

The objectives of this SOMP are to ensure the following:

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

3.2 Scope of this document

This document constitutes an overarching SOMP for the activities involved with the development works to be undertaken for the Stage 1 Project Application for the Kings Forest development area. Drawing 12066_001 depicts the areas of the site that form the Phase 1 works. These areas are subject to imminent development. The SOMP is relevant to Stage 1 of the Kings Forest Development, of which the Phase 1 scope is a subset.

It is the intent of the document to address the environmental issues that may arise onsite with regard to the proposed activities involved in completing the bulk earthworks and civil works, on-maintenance and operations of the site. To achieve this, the SOMP integrates the provisions of the foundation management plans listed in Section 1.1.

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

3.3 Implementation

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

3.4 SOMP structure

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

The SOMP is based on a series of tables for the baseline data collection phase, bulk earthworks, landform stabilisation phase, civil construction, on-maintenance and operational phases of the development. The person responsible for the implementation of the measures detailed is written on the table itself. The tables then detail the issue, the performance criteria, the implementation strategy, monitoring, auditing, reporting, failure identification and the corrective action. The detachable pages within each section detail the provisions of the SOMP. The format is presented below for reference purposes.

#.# Title

Applies to	The relevant construction stages to which the issue detailed on this page applies.
Person responsible	This is the person or party who has accepted the responsibility of implementing the SWMP provisions detailed on this page.

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

Commitment #

What the management has committed the company to.

3.5 General commitments

Commitment 1

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

Commitment 2

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

Commitment 3

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

3.6 Definitions

In this SOMP these terms have the following meanings:

- SOMP means the approved Summary of Management Plans and includes any amendments that may be approved from time to time.
- Development means the development of the site in accordance with the Kings Forest Stage 1 Project Application.
- TSC means Tweed Shire Council.
- ASSMAC means the Acid Sulfate Soils Management Advisory Committee.
- Proponent means the person undertaking the construction of the proposed Kings Forest Stage 1 and includes the person nominated by the Proponent as having the responsibility for implementing the provisions of the SOMP.
- EPA means the NSW Environmental Protection Authority.
- DPIE means the Department of Planning, Industry and Environment.
- AASS means Actual Acid Sulfate Soils
- PASS means Potential Acid Sulfate Soils
- SDS means Safety Data Sheet
- GPT means Gross Pollutant Trap
- RAP means Remediation Action Plan
- CSMP means Construction Soils Management Plan
- SQP means Suitably Qualified Person (scientist or engineer) supervising the contaminated land management works

3.7 Contact details

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

Contractor's Site Manager

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

Consulting Engineer

Unless advised otherwise the Consulting Engineer is:

Company: TBA

Address:

Contact Details:

Phone:

Facsimile:

4 Baseline water quality data collection phase

4.1 Summary

This part of the SOMP the collection of baseline data which established appropriate discharge criteria for the construction phase. The performance criteria was established by background monitoring of pre-construction water quality conditions.

The baseline water quality monitoring was conducted at selected groundwater bores and surface water locations across the development site. Groundwater criteria is specific to the Phase 1 works area whilst surface water criteria can be applied to the entire site.

The following parameters were monitored over an eight round monitoring regime to capture the range of seasonal variation:

- pH (field measurement);
- electrical conductivity (EC) (field measurement);
- turbidity (field measurement);*
- dissolved oxygen (DO) (field measurement);*
- temperature (field measurement);
- redox potential (mV);
- suspended solids (SS) (mg L^{-1});*
- total nitrogen (TN), soluble nitrogen, nitrogen oxide (NO_x), total kjeldahl nitrogen (TKN), nitrite (NO_2) & nitrate (NO_3) (mg L^{-1});
- total phosphorus (TP) & soluble phosphorous (mg L^{-1});
- oil and grease (visual inspection);*
- calcium (Ca);
- magnesium (Mg);
- sodium (Na);
- potassium bicarbonate (K/HCO_3);
- bicarbonate (HCO_3);
- carbonate (CO_3);
- total & dissolved iron (Fe);
- total & dissolved aluminium (Al);
- dissolved manganese (Mn);
- chloride (Cl);
- sulfate (SO_4);
- ammonium (NH_4);
- colour;
- total acidity (titratable);
- total alkalinity;
- arsenic (As);
- cadmium (Cd);
- copper (Cu);
- lead (Pb);
- nickel (Ni);
- zinc (Zn);
- chlorophyll-a;*
- faecal coliforms;
- total algal cell count; and*
- blue green algae.*

*Surface water only

Following completion of the monitoring program the data was analysed and site specific water quality criteria were established in accordance with the recommendations of the ANZECC Guidelines. The water quality criteria as established in that report are provided in Table 4.1.1 and Table 4.1.2 below.

Table 4.1.1 Surface water quality criteria

Parameter	Saline (SW1, SW2, SW6, and SW9)	Brackish (SW5)	Fresh (SW3, SW4, SW7, SW8 and SW10)
pH	5.66-6.3	5.34-6.14	5.23-6.66
Electrical Conductivity	<38700 µs/cm	<4008.6 µs/cm	<230.4 µs/cm
Dissolved Oxygen	>7.10 mg/L	>4.87 mg/L	>2.91 mg/L
Turbidity	<3.1 mg/L	<23.76 mg/L	<32.54 mg/L
Total Nitrogen	<0.5 mg/L	<1 mg/L	<1.46 mg/L
Total Phosphorus	<0.03 mg/L	<0.04 mg/L	<0.14 mg/L
Iron (total)	<0.41 mg/L	<4.40 mg/L	<6.57 mg/L
Aluminium (total)	<0.22 mg/L	<0.36 mg/L	<0.68 mg/L
Chlorophyll-a	<6 µg/L	<6 µg/L	<6 µg/L
Litter and gross pollutants	No man made material <5mm in any dimension	No man made material <5mm in any dimension	No man made material <5mm in any dimension
Oil and/or grease	No visible film, no detectable odour	No visible film, no detectable odour	No visible film, no detectable odour

*Note: pH must be consistent with receiving water quality. Consideration must be given to the preferred water quality conditions of WSF communities when interpreting pH results against the site-specific water quality criteria. If receiving waters are estuarine, pH can range from 5.5 -7.5; if receiving waters are fresh, pH can range from 4.2 – 6.7 in accordance with the *Threatened Species Management Plans* (JWA, 20200f-h) for habitat requirements for Wallum Froglet (*Crinia signifera*) and the *Wallum Sedge Frog Management Plan* (JWA 2020i) for habitat requirements for the Wallum sedge Frog (*Litoria olongburensis*).

Table 4.1.2 Groundwater quality criteria

Parameter	*Precinct 1*	*Precinct 5*
pH	3.5-4.33	3.59-4.47
Electrical Conductivity	<339.4 µs/cm	<131 µs/cm
Total Nitrogen	<3 mg/L	<1.3 mg/L
Total Phosphorus	<0.34 mg/L	<0.05 mg/L
Iron (total)	<1.02 mg/L	<0.45 mg/L
Aluminium (total)	<1.89 mg/L	<0.52 mg/L

5 Management of potential impacts – all phases

5.1 Intent

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

5.2 Hours of work

The following Hours of Work as contained in Condition 74 of the Project Approval (MP08_0194) shall be followed at the site.

1) The hours of construction, including the delivery of materials to and from the site, shall be restricted as follows:
   a) between 7:00 am and 6:00 pm, Mondays to Fridays inclusive;
   b) between 8:00 am and 5:00 pm, Saturdays;
   c) no work on Sundays and public holidays.
2) Works may be undertaken outside these hours where:
   a) the delivery of materials is required outside these hours by the Police or other authorities;
   b) it is required in an emergency to avoid the loss of life, damage to property and/or to prevent environmental harm;
   c) variation is approved in advance in writing by the Secretary Director General or his nominee.
   d) Residents likely to be affected by the works are notified in writing of the timing and duration of these works at least 48 hours prior to the commencement of works (with the exception of emergency work).
3) The Proponent is responsible to instruct and control subcontractors regarding hours or work.

5.3 Complaints procedure

The following Complaints Procedure as contained in Condition 75 of the Project Approval (MP08_0194) shall be followed at the site.

At the commencement of construction the Proponent shall ensure that the following are available for community complaints during construction:

- A 24 hour telephone number on which complaints about construction activities at the site may be registered.
- A postal address to which written complaints may be sent.
- An email address to which electronic complaints may be transmitted.
- Name, address, contractor licence number and telephone number of the principal contractor, including a telephone number at which the person may be contacted outside working hours.

- Name, address and telephone number of the Project Manager and PCA
- The telephone number, the postal address, email address, the name of the site/project manager and the approved hours of work, shall be displayed on a sign near the entrance to the site, in a position that is clearly visible to the public.

The Proponent shall record details of all complaints received through the means listed above in an up-to-date Complaints Register.

The Proponent shall provide an initial response to any complaints made in relation to the project during construction within 48 hours of the complaint being made. The response and any subsequent action taken shall be recorded in the Complaints Register.

5.4 Incident reporting

Within 24 hours of detecting any incidents during construction that causes (or may cause) significant harm to the environment, the Proponent shall notify the Council and other relevant agencies of the incident and identify the following:

- Describe the date, time, and nature of the incident.
- Identify the cause (or likely case) of the incident.
- Describe what action has been taken to date.

Describe any proposed measures to address the incident.

5.5 Aquatic flora & weed management and maintenance

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

Issue	Aquatic flora and weed management and maintenance in constructed wetalnds and waterbodies.
Operational policy	To maintain healthy aquatic plant life and control weeds to promote the ecosystem health of constructed wetlands and waterbodies.
Performance criteria	Macrophyte establishment success rate >70%. The suppression of aquatic weeds and algae. Maintenance of hydraulic performance between waterbodies.
Implementation strategy	**Weed strategy - Landform stabilisation phase, Civil construction phase, On-maintenance phase, Operational phase** An expectation of avoidance or total removal of aquatic weeds within the waterway and wetland system is not realistic as weeds are present within the catchment and neighbouring sites. Management of macrophytes via removal of vegetation within flow paths to maintain hydraulic conductance. Particular attention should be given to weed management to prevent obstruction of hydraulic conductance. When removing weeds, care must be taken not to damage the growth of native aquatic plants or interrupt natural ecosystem function by adhering to the following methods: • Avoid overspray through use of correct equipment and not spraying in windy conditions. • Bag and removal of weeds offsite. • Manage access to wetlands to avoid damage via trampling. • Should mechanical harvesting of weed growth be required, access to waterbodies will be selected to achieve minimal impact and access points will be rehabilitated at the end of the harvesting period. **Weed strategy – Operational Period of Golf Course** Weed monitoring and maintenance is to be conducted in accordance with the DECC document *'Improving the environmental management of NSW Golf Courses'*. **Algae strategy** Quarterly monitoring of algal cell counts is required to monitor the potential for algal blooms. Proposed management methods specifically for algal blooms include: • Ability to isolate separate on-stream system pools to contain algal blooms.

	• Emergency aeration and/or mixing. • Safety signage during algal outbreaks. See Table 5.20 'Maintenance of water treatment measures' of the SOMP for further details. **Off-stream waterway and wetland system** • Containment of blooms within off-stream waterway and wetland system (no release of water if blue green algae levels exceed 50,000 cells/ml). • Emergency turnover. • Emergency vertical aeration and/or mixing. • Safety signage during algal outbreaks.
Monitoring	Routine quarterly monitoring for pH, EC, DO, turbidity, TN, TP, SS, Fe, Al, Chlorophyll-a and algal cell count during the landform stabilisation phase. To continue for two years following the completion of construction onsite. Routine quarterly visual inspection of treatment trains for vegetation establishment, damage, weed invasion and clogging.
Auditing	Reviews are to be carried out on a quarterly basis to assess the appropriateness of the implementation strategy. A checklist is to be completed which assesses the effectiveness of strategies detailed above.
Reporting	An Aquatic Flora Report shall be submitted to TSC annually. Maintenance and compilation of assessment sheets to be appropriately stored onsite for inspection by local and state government officers. **Incident reporting - Landform stabilisation phase, Civil construction phase, On-maintenance phase** Within 24 hours of detecting any incidents during construction that cause (or may cause) significant harm to the environment, the Proponent shall notify TSC and other relevant agencies of the incident in accordance with the protocol in Section 5.4. **Operational phase** Maintenance and compilation of assessment sheets to be appropriately stored onsite for inspection by local and state government officers if requested.
Identification of incident or failure	Non-compliance with agreed performance criteria will be identified by: • Vegetative losses >20%. • Weed growth that impacts upon ecosystem function and/or hydraulic conductance. • Algal blooms exceeding 500 cells/ml.
Corrective action	If vegetation fails, new vegetation should be planted and established. Vegetation may require supplementary replanting. Macrophyte density to be maintained at prescribed levels to achieve hydraulic conductance and pollutant removal.

	If algal blooms occur the following corrective actions should be investigated in consultation with the Environmental Consultant: • Containment of blooms within off-stream waterway and wetland system (no release of water if blue green algae levels exceed 50,000 cells/ml). • Emergency turnover. • Emergency vertical aeration and/or mixing. • Safety signage during algal outbreaks. The following specific actions may be undertaken in consultation with the Environmental Consultant. If blue green algae numbers exceed 500 cells/ml: • Increase turnover mixing until numbers are brought back to lower levels. • Fertiliser activity to be limited. • Maintain regular monitoring. If blue green algae numbers exceed 2,000 cells/ml: • Increase mixing: • Increase turnover through additional pumping of the recirculation system. • Vertical mixing through emergency compressed air or mechanical mixing devices. • Fertiliser activity and sprinkling to be limited where possible in the vicinity of the test sites of concern. • Harvest and land dispose of any dead fish. • Monitoring frequency to be increased at affected sites to once a month. If blue green algae numbers exceed 15,000 cells/ml: • All fertiliser activity and sprinkling to be stopped in the vicinity of the sites of concern. • Warning signs to be posted around the sites of concern. • All site personnel to be notified. • Monitoring frequency to increase at affected sites to once a week. • Contingency measures are to be considered including: • Increased mixing. • Harvesting and land disposal of algae and dead fish. • Allowing bloom to run its course. Upon receipt of a complaint follow the Complaints Procedure provided in Section 5.3.

Commitment 4

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

5.6 Vegetation and Weed Management

The information in this table was supplied by JWA (2020a-c) *Vegetation Management Plan (VMP).*

Applies to:	Pre-construction phase; Bulk earthworks phase, Land stabilisation phase, Civil construction phase, On-maintenance phase, Operational phase
Person responsible:	Contractor, Site manager, Proponent, Ecologist, Bush Regeneration Company, all personnel.

Issue	Vegetation management including retained vegetation maintenance, weed control, rehabilitation and revegetation works within EPZs and associated buffers.
Operational policy	Management of retained and compensatory native vegetation within EPZs and associated buffers in accordance with the VMPs (JWA 2020a-c)
Performance criteria	Detailed performance criteria are provided in the VMP (JWA 2020a-c). The following list provides a summary of the performance criteria: • Survival and continued growth of seedlings (i.e. planted stock). • Establishment of native ground cover within revegetation areas. • Establishment of native canopy cover (where applicable) within revegetation areas. • Natural recruitment of native species throughout the rehabilitation areas. • All identified weeds controlled to an acceptable level within retained habitat and rehabilitation areas. Infrastructure (e.g. protection fencing, signage, erosion and sediment control devices) functional and well-maintained.
Implementation strategy	Education of site personnel; Construction phase management measures; Exclusion fencing and other infrastructure; Re-use of topsoil; Management of retained vegetation; Weed management; Regeneration and revegetation; Transfer of land to public ownership; Fire management; and Adaptive management.
Monitoring	**Baseline Monitoring** Plot-based vegetation surveys and photo point monitoring to be completed prior to commencement of construction within retained habitat areas (Management

	Zones 2 and 3), koala and wallum sedge frog compensatory habitat areas (Management Zones 4 and 5) and within the Cudgen Nature Reserve (as baseline data for Management Zones 6 - 8). **Bush Regeneration Team Monitoring** The Bush Regeneration Team will be gather baseline data at each weed treatment site prior to commencement of weed control to assist in documenting vegetation recovery in the long term. The bush regeneration team will also keep detailed work sheets for all works completed within retained habitat areas (Management Zones 2 and 3), compensatory habitat areas (Management Zones 4 and 5) and other proposed revegetation/ regeneration areas (i.e. Management Zones 6 - 8). **Retained Vegetation Monitoring** Plot-based vegetation surveys and photo point monitoring within areas of retained vegetation (Management Zones 2 and 3) to be completed: • After 1st event of secondary weeding; • Six (6) monthly until the establishment period performance criteria are met; and • Then annually during the maintenance period. **Rehabilitation Monitoring** Plot-based vegetation surveys and photo point monitoring within revegetation/regeneration areas (Management Zones 6- 8) to be completed: • After 1st event of secondary weeding; • Six (6) monthly until the establishment period performance criteria are met; and • Then annually during the maintenance period. •
Reporting	Baseline Vegetation Monitoring Report Annual Vegetation Monitoring Report
Identification of incident of failure	Monitoring indicates that the performance criteria have not been met.
Corrective action	Additional/supplementary planting and/or irrigation if required; Extend monitoring until the targets are met; Weed control as necessary; Maintenance as necessary; Adaptive management.

Commitment 5

The contractor/land user will ensure that the health of the ecosystem is maintained through active vegetation management.

Commitment 6

The contractor/ land user will commit to monitoring weed species and ensure that the habitat area is appropriately protected and maintained, and weed species are proactively controlled.

5.7 Buffer Management

The information in this table was supplied by JWA (2020d-e) *Buffer Management Plan (BMP).*

Applies to:	Pre-construction phase; Bulk earthworks phase, Land stabilisation phase, Civil construction phase, On-maintenance phase, Operational phase
Person responsible:	Contractor, Site manager, Proponent, Ecologist, Bush Regeneration Company, all personnel.

Issue	Vegetation management including rehabilitation and revegetation works within buffers.
Operational policy	Management of buffers in accordance with the BMPs (JWA 2020d-e).
Performance criteria	Detailed performance criteria are provided in the VWMPs (JWA 2020a-c) and are summarized in the VWMP table above.
Implementation strategy	• Education of site personnel; • Construction phase management measures; • Exclusion fencing and other infrastructure; • Maintenance of retained vegetation; • Regeneration and revegetation; • Transfer of land to public ownership; • Fire management; • Adaptive management.
Monitoring	Detailed monitoring programs are provided in the VWMPs (JWA 2020a-c) and are summarized in the VWMP table above.
Reporting	Reporting requirements are provided in the VWMPs (JWA 2020a-c) and are summarized in the VWMP table above.
Identification of incident of failure	Monitoring indicates that the performance criteria have not been met.
Corrective action	• Additional/supplementary planting and/or irrigation if required; • Extend monitoring until the targets are met; • Weed control as necessary; • Maintenance as necessary; • Adaptive management.

Commitment 7

The contractor/land user will commit to maintaining the buffer zone and ensure that the habitat area is appropriately protected and meets the requirements of the vegetation management plan.

5.8 Threatened Fauna

The information in this table was supplied by JWA (2020f-h) Threatened Species Management Plan.

Applies to:	Pre-construction phase; Bulk earthworks phase, Land stabilisation phase, Civil construction phase, On-maintenance phase, Operational phase
Person responsible:	Contractor, Site manager, Proponent, Ecological Consultant, all personnel.

Issue	Protection and management of threatened fauna and their habitat. Species covered include: – Black bittern (*Ixobrychus flavicollis*); – Black-necked stork (*Ephippiorhynchus asiaticus*); – Bush stone-curlew (*Burhinus grallarius*); – Common blossom bat (*Syconycteris australis*); – Common planigale (*Planigale maculata*); – Eastern false pipistrelle (*Falsistrellus tasmaniensis*); – Eastern osprey (*Pandion cristatus*); – Glossy black-cockatoo (*Calyptorhynchus lathami*); – Grass Owl (*Tyto longimembris*); – Grey-headed flying fox (*Pteropus poliocephalus*); – Little bent-wing bat (*Miniopterus australis*); – Masked owl (*Tyto novaehollandiae*); – Pale-vented bush hen (*Amaurornis moluccana*); – Rose-crowned fruit-dove (*Ptilinopus regina*); – Southern myotis (*Myotis macropus*); – Wallum froglet (*Crinia tinnula*); and – Yellow-bellied sheathtail bat (*Saccolaimus flaviventris*).
Operational policy	Protection of Threatened fauna and their habitat in accordance with the TSMPs (JWA 2020f-h)
Performance criteria	– No sightings of threatened fauna species within exclusion fencing. – No significant decrease in numbers, range or abundance estimates from baseline data resulting from site activities. – No threatened species decline as a result of feral animal predation. – Threatened fauna habitat values are improved as a result of the rehabilitation of existing habitat.
Implementation strategy	Restoration and management of suitable habitat in accordance with the VWMPs (JWA 2020a-c). The FAMP (JWA 2020j) details feral animal management measures that will be implemented to ensure feral animals are controlled in areas of known habitat.

	The existence of threatened species must be considered in the development of any program using pesticides and herbicides for weed and/or mosquito and/or feral animal control. The existence of threatened species must be considered in the development of any Fire Management Plan (i.e. fire should be excluded from the areas of potential habitat). To minimise the spread of the disease chytridiomycosis to and between habitats, all contractors undertaking work in both wetland construction and vegetation rehabilitation must follow the protocol set out within the publication Hygiene protocol for the control of disease in frogs (DECCW and NPWS 2008) in accordance with the WSFMP (JWA 2020i). To ensure the development not impact upon threatened wetland species, erosion and sediment control devices shall be installed prior to commencement of bulk earthworks in accordance with the Erosion & Sediment Control Plan (G&S 2018a). A detailed water quality monitoring regime is included in the Overall Water Management Plan (G&S 2020) and will ensure that significant impacts on wetland habitat are avoided. Temporary and permanent exclusion fences will be installed at the edges of the EMAs in accordance with the KPoM (JWA 2019) to restrict domestic dogs as well as humans from entering habitat areas for the species. Core Wallum froglet habitat areas will be densely planted with sedges etc. to deter Cane toads from entering these areas. Any hollow-bearing trees within the development footprint should be retained where possible. If trees require removal, nest boxes should be installed within EPZs and associated buffers.

Monitoring	**Baseline Monitoring**
	
	Baseline fauna survey targeting Threatened species previously recorded or predicted to occur on the site to be completed prior to commencement of construction in order to determine species presence.
	
	At each survey site the following will be completed:
	
	• a 100 m transect line will be installed and permanently marked.
	• Five (5) trap stations will be installed approx. 20 m apart along each transect line for four (4) consecutive nights with each trap station containing:
	  ◦ an Elliott trap on the ground;
	  ◦ an arboreal Elliott trap on a permanently installed wooden platform attached to a suitable tree; and
	  ◦ a hair tube.
	
	The following additional survey techniques will also be employed at each survey transect line (where appropriate):

	• A pitfall trap line incorporating three (3) 20L buckets and four (4) funnel traps (installed only where ground/water table conditions are appropriate); • Installation of three (3) remote camera traps; • Active searching; • Bat echolocation call detection; and • Dawn and dusk bird surveys. In addition to the above transect surveys: • Spotlighting transects (both foot and vehicle-based) will be completed over a minimum of four (4) consecutive nights; • Call playback for target species will be undertaken over a minimum of four (4) consecutive nights; • Wetland census will be completed at dawn and dusk for a one-hour (1 hr); and • Targeted surveys for the Common blossom bat (Syconycteris australis) (i.e. mature flowering Banksias in readily accessible locations) will be completed over at dusk for one-hour (1 hr) a day over a minimum of four (4) consecutive nights. **Ongoing Fauna Monitoring** Threatened fauna will be monitored on an annual basis, , by the proponent and then by Council pending the proposed dedication of land under Concept Plan 06_0318 Condition B7.. The methodology used for the baseline monitoring described above will be utilised for the ongoing fauna monitoring.
Reporting	Baseline Threatened Species Monitoring Report Annual Threatened Species Monitoring Report
Identification of incident of failure	Monitoring indicates that the performance criteria have not been met.
Corrective action	• Review effectiveness of fencing and amend/maintain where necessary; • Habitat enhancement (e.g. rehabilitation works and nest boxes etc.); and • Review feral animal control in accordance with the FAMP (JWA 2020j).

Commitment 8

The contractor/ land user will commit to monitoring threatened fauna populations and ensure that the habitat area is appropriately protected and maintained.

5.9 Threatened flora

The information in this table was supplied by JWA (2020f-h) Threatened Species Management Plan.

Applies to:	Pre-construction phase; Bulk earthworks phase, Land stabilisation phase, Civil construction phase, On-maintenance phase, Operational phase
Person responsible:	Contractor, Site manager, Proponent, Ecological Consultant, all personnel.

Issue	Protection and management of threatened flora species and their habitat. Species covered include: - Green-leaved rose walnut (*Endiandra muelleri* subsp. *bracteata*); - Southern swamp orchid (*Phaius australis*); - Stinking cryptocarya (*Cryptocarya foetida*); - White laceflower (*Archidendron hendersonii*); - White yiel yiel (*Grevillea hilliana*).
Operational policy	Protection of Threatened flora and their habitat in accordance with the TSMPs (JWA 2020f-h)
Performance criteria	No disturbance to existing threatened plant species. No detrimental impacts to existing threatened plant species from spraying/ weeding No disturbance to existing threatened species from fire All identified weeds controlled to an acceptable level within retained vegetation areas in accordance with the VWMPs (JWA 2020a-c) Natural recruitment occurring (Species composition targets, based on accepted benchmarks for the specific vegetation communities are met) Regular (annual) searches of any threatened plant species occurring on the site indicates the continued presence of threatened plant species Successful propagation and establishment of cuttings/ seedlings of threatened flora
Implementation strategy	Prior to any rehabilitation works the threatened trees will be identified and clearly marked. Temporary high visibility fence (i.e. star pickets and high visibility mesh fencing) will be constructed around trees where appropriate to limit disturbance. A 10m buffer of suitable fast-growing rainforest species will be planted around known records of Stinking Cryptocarya and White laceflower. Seeds and/or cuttings of Stinking Cryptocarya and White laceflower will be collected and grown for use in rehabilitation plantings. Details of propagation and rehabilitation techniques are provided in the VWMPs (JWA 2020a-c). Weed control and protection of individual threatened flora species during weed control activities (e.g. limit spray drift within the vicinity). Restoration and management of suitable habitat in accordance with the VWMPs (JWA 2020a-c).

	The existence of known records of Stinking cryptocarya and White laceflower must be considered in the development of any Fire Management Plan (i.e. fire should be excluded from the areas immediately adjacent to known locations).
Monitoring	**Baseline Monitoring** Prior to commencement of works, previously located Threatened flora specimens will be identified in the field and clearly marked. The random meander technique will be used to complete targeted searches for Threatened flora specimens that cannot be found. Any additional Threatened species located during monitoring surveys will also be marked. All Threatened species specimens will have the following details recorded: • GPS location; • Height; • Diameter at breast height (DBH); • Flowering/fruiting status; • Condition; and • Potential threats (i.e. weeds). **Annual Monitoring** Monitoring to be completed annually during construction and then annually, by the proponent and then by Council pending the proposed dedication of land under Concept Plan 06_0318 Condition B7.. All identified threatened flora species will be monitored as follows: • Survival; • Height; • Flowering; • Fruiting; • Signs of natural recruitment; and • Potential threats (i.e. weeds). Any additional Threatened flora species located during monitoring surveys will be marked and monitored as part of an adaptive management strategy.
Reporting	Baseline Threatened Species Monitoring Report Annual Threatened Species Monitoring Report
Identification of incident of failure	Monitoring indicates that the performance criteria have not been met.
Corrective action	Fencing maintenance as necessary Weed control in accordance with the VWMPs (JWA 2020a-c) Fire management Habitat enhancement Supplementary planting

Commitment 9

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

5.10 Endangered Ecological Communities

The information in this table was supplied by JWA (2020f-h) Threatened Species Management Plan.

Applies to:	Pre-construction phase; Bulk earthworks phase, Land stabilisation phase, Civil construction phase, On-maintenance phase, Operational phase
Person responsible:	Contractor, Site manager, Proponent, Ecological Consultant, all personnel.

Issue	Protection and management of Endangered Ecological Communities: • Swamp sclerophyll forest on coastal floodplains of the NSW North Coast; and • Freshwater wetlands on coastal floodplains of the NSW North Coast.
Operational policy	Protection of EECs in accordance with the TSMPs (JWA 2020f-h)
Performance criteria	Detailed performance criteria provided in the TSMP (JWA 2020f-h). The following list provides a summary of the performance criteria: • Natural recruitment of native species throughout retained vegetation areas; • All identified weeds controlled to an acceptable level within retained vegetation areas in accordance with the VWMPs (JWA 2020a-c); and • Infrastructure (e.g. protection fencing, signage, erosion and sediment control devices) functional and well-maintained.
Implementation strategy	Exclusion fencing; Weed control; Regeneration/revegetation; Pest Management; and Transfer of land to public ownership.
Monitoring	Detailed vegetation (including EECs) monitoring programs are provided in the VWMPs (JWA 2020a-c) and are summarized in the VWMP table above.
Reporting	Reporting requirements are provided in the VWMPs (JWA 2020a-c) and are summarized in the VWMP table above.
Identification of incident of failure	Monitoring indicates that the performance criteria have not been met.
Corrective action	Additional/supplementary planting if required; Weed control as necessary; and Maintenance as necessary.

Commitment 10

The contractor/land user will commit to monitoring endangered ecological communities to ensure that identified habitat area is appropriately protected and maintained.

5.11 Koala Management

The information in this table was supplied by JWA (2019) *Koala Plan of Management (KPoM).*

Applies to:	Pre-construction phase; Bulk earthworks phase, Land stabilisation phase, Civil construction phase, On-maintenance phase, Operational phase
Person responsible:	Contractor, Site manager, Proponent, Ecological Consultant, all personnel.

Issue	Protection and management of Koala (*Phascolarctos cinereus*) and their habitat
Operational policy	Protection of Koalas and the management and creation of koala habitat in accordance with the KPoM (JWA, 2019)
Performance criteria	Detailed performance criteria provided in the KPoM (JWA 2019). The following lists provides a summary of the performance criteria: **Koala Monitoring** • the benchmark habitat occupancy rate to be achieved for Koala populations inhabiting the Kings Forest site will be equal to or greater than baseline levels; • extent of habitat being utilised by koalas across the Kings Forest site increases towards the benchmark (50% occupancy) or does not deviate significantly from the estimate of habitat occupancy rate established by baseline monitoring. **Compensatory Koala Habitat Monitoring** • Survival and continued growth of seedlings (i.e. planted stock); • Establishment of native canopy cover within revegetation areas; • All identified weeds controlled to an acceptable level within retained Koala habitat and rehabilitation areas in accordance with the approved VWMPs (JWA 2020a-c). • Shrub and groundcover recruitment. **Koala Infrastructure, Construction and Operational Management Monitoring** • Koalas are utilising underpasses (as evidenced by sand tray and camera trap monitoring), with utilisation measured by number of through passes, increasing over time; • Exclusion fences, fauna underpasses, grids and signage have been correctly installed, remain effective and well maintained; • No evidence of dog attacks on Koalas; • No reported vehicle strike mortalities; • High rates of diseased koalas are not detected; • No reported swimming pool drownings;

	• Bushfire related deaths or damage to habitat are minimised' • No dogs to be brought onto the site during construction; • Implementation of an induction/education program for construction personnel; • All contractors provided with protocols to be followed if a koala is killed or injured. Provided with Friends of the Koala (FOK) contact details; • Ensure gates are opened if a bushfire threatens the Kings forest site so as to allow fauna (including koalas) to escape; • Ensure FOK are informed of any koalas killed on site; • All koala observations and/or incidents on the site are recorded; • Engagement of the community with local koala issues and management. **Retained Koala Habitat Monitoring** Detailed performance criteria for retained koala habitat are provided in the VWMPs (JWA 2020a-c) and are summarized in the VWMP table above.
Implementation strategy	• Construction phase management measures; • Education of site personnel; • Pre-clearing koala surveys; • Erosion and sediment control measures; • Fauna incident reporting protocols; • Exclusion fencing, fauna underpasses, road crossings and other infrastructure; • Management of retained koala habitat; • Compensatory koala habitat; • Improving habitat connectivity and linkage corridors; • Providing appropriate care/management of diseased koalas; • Increasing carrying capacity; • Transfer of land to public ownership; • Fire management; • Engaging with the relevant Local Government, NPWS and community koala management groups; and • Raising community awareness.
Monitoring	**Baseline Koala Activity Monitoring** Baseline koala activity monitoring will be completed across the entire site prior to the commencement of works and will include: • diurnal searches of Kings Forest koala habitat; • a full measure of koala activity (i.e. application of Spot Assessment Technique (SAT) methodology (Phillips and Callaghan (2011); • an assessment of the condition of available koala habitat; and

	• implementation of permanent photo monitoring points. **Biennial Koala Activity Monitoring** Koala activity monitoring shall be completed over the entire Kings Forest site on a biennial basis (i.e. every two years) for a period extending to five (5) years after completion of the final precinct or until the all retained habitat is dedicated, whichever is sooner. Monitoring will include: • diurnal searches of Kings Forest koala habitat; • a full measure of koala activity (i.e. application of Spot Assessment Technique (SAT) methodology (Phillips and Callaghan (2011); • an assessment of the condition of available koala habitat; • continued monitoring of permanent photo monitoring points; and • sand tray monitoring will be completed, and/or camera traps installed to assess the usage of underpasses. **Koala Activity Monitoring After Fire** In the event of an uncontrolled bushfire occurring on the Kings Forest site, an additional koala activity monitoring event will be completed by a suitably qualified ecologist. **Retained Koala Habitat Monitoring** Detailed monitoring programs for retained vegetation are provided in the VWMPs (JWA 2020a-c) and are summarized in the VWMP table above. **Compensatory Koala Habitat Monitoring** Plot-based vegetation surveys and photo point monitoring within compensatory Koala habitat will be completed: • to set up monitoring transects and quadrats and collect baseline data after 1st event of secondary weeding; and • six monthly until the establishment period performance criteria are met; and • then annually during the maintenance period. **Koala Infrastructure, Construction and Operational Management Monitoring** The Environmental Officer will be responsible for the monitoring of relevant construction activities and koala infrastructure during and after construction. Visual inspections of koala infrastructure by the Environmental Officer will be completed on a monthly basis until the land occupied by the infrastructure is dedicated to either TSC or BCD.
Reporting	Baseline Koala Activity Monitoring Report Annual KPoM Monitoring Report
Identification of incident of failure	Monitoring indicates that the performance criteria have not been met.

Corrective action	• Investigate habitat usage and through consult with BCD and koala experts develop and implement strategy to improve/facilitate the usage; • Additional/supplementary planting and/or irrigation if required; • Extend monitoring and maintenance period until the targets are met; • Weed control as necessary; • Maintenance as necessary; • Review feral animal control in accordance with the FAMP (JWA 2020j). • Alternative fence design/location; • Repeated instances of vandalism to koala mitigation infrastructure will prompt the implementation of mobile security patrols by a commercial security specialist; • Re-education of appropriate site personnel/owners as necessary. • Appropriate community liaison/consultation completed as necessary.

Commitment 11

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

5.12 Wallum Sedge Frog Management

The information in this table was supplied by JWA (2020) *Wallum Sedge Frog Management Plan (WSFMP)*.

Applies to:	Pre-construction phase; Bulk earthworks phase, Land stabilisation phase, Civil construction phase, On-maintenance phase, Operational phase
Person responsible:	Contractor, Site manager, Proponent, Ecologist, Bush regeneration company, all personnel.

Issue	Protection and management of Wallum sedge frog (WSF, *Litoria olongburensis*) and their habitat
Operational policy	Protection of WSF and the management and creation of WSF Habitat in accordance with the WSFMP (JWA 2020i)
Performance criteria	Detailed performance criteria are provided in the WSFMP (JWA 2020i). The following lists provides a summary of the performance criteria: **WSF Monitoring** • Increased presence and abundance of WSFs in both created and retained habitat areas • Successful breeding observed within both created and retained habitat areas • Absence of mosquito fish and cane toads from all breeding habitat and environs **Water Quality Monitoring (created and retained habitat areas)** • stable pH between 4.0 and 5.5 • conductivity of <350uS.cm^{-1} • turbidity remains within baseline levels • suspended solids remain within baseline levels • nutrient levels remain within baseline levels • temperature remains within baseline range • dissolved oxygen levels remain within baseline range • no evidence of pollutants • average water depth in WSF breeding habitat between 0.5 m and 1.5 m • breeding habitat must retain water for a continuous period of at least 6-8 weeks. **Retained and Compensatory WSF Habitat Monitoring** • Survival and continued growth of seedlings (i.e. planted stock). • Establishment of native ground cover within revegetation areas (including at the entrances to underpasses). • Natural recruitment of native species throughout retained habitat and rehabilitation areas (including at the entrances to underpasses)

	• All identified weeds controlled to an acceptable level within retained habitat and rehabilitation areas. • Infrastructure (e.g. protection fencing, signage, erosion and sediment control devices) functional and well-maintained. • Fully structured vegetation communities (with reference to PCT benchmark descriptions accessed on the NSW Department of Planning, Industry and Environment (DPIE) database i.e. The BioNet Vegetation Classification System) are provided through assisted regeneration and revegetation plantings. • Width of macrophyte margin around WSF breeding habitat >200 mm thick • >25% native rigid rushes/ reeds/ sedges present • <25% open water • <25% combined litter, bare ground, ferns, forbs, shrubs, jointed rushes/ reeds/ sedges, limp rushes/ reeds/ sedges • <10% weed cover • Completely free of Pinus elliottii and all declared weeds e.g. Groundsel
Implementation strategy	• Education of site personnel; • Vegetation and stormwater management protocols; • Avoidance and management of acid sulphate soils; • Pre-clearing WSF surveys; • Management of retained WSF habitat; • Compensatory WSF habitat; • Transfer of land to public ownership; • Fire management; • Improving habitat connectivity and linkage corridors; • Wildlife exclusion fencing; • Fauna underpasses; • Providing appropriate care of sick/injured or diseased WSF; • Controlling pest species; • Reducing impacts of altered water quality and hydrological change on WSF habitat; • Increasing carrying capacity; • Community awareness programs and liaison; • Construction phase management measures.
Monitoring	**WSF surveys** WSF surveys will be completed annual during appropriate weather conditions and comprise three (3) sampling events undertaken per WSF breeding season (i.e. between late September and early March). All monitoring surveys will be

completed following rainfall events greater than 25 mm in 24 hours and approximately 30 minutes after dark.

Surveys will also be completed in two (2) previously identified high quality off-site WSF habitats. The data from the surveys in Areas A and B will provide benchmarks for site data.

Permanent 50 m transect will be installed at each area monitoring site. The observer walks this transect whilst listening for calling frogs or observing non-calling individuals. All species of frog calling of observed (including pest species) will be recorded. An abundance measure will be obtained by counting frogs within 1 m of this transect. Dip netting/tadpole searches and egg clutch surveys will be completed within any suitable areas (i.e. standing water) along the transects.

In areas where a 50 m transect can't be established a timed 30 min search including an inspection of emergent macrophyte cover, dip netting/tadpole searches and egg clutch surveys within potential breeding habitat will be used as a substitute.

If WSF are not heard calling and no non-calling individuals are observed at a survey site, call playback will be implemented in an attempt to elicit a response.

Water Quality Monitoring
Water quality/chemistry monitoring will be completed in all retained and created habitats in conjunction with the WSF monitoring (3 sampling events during September - March) and on an episodic basis i.e. during a very wet period and also during a very dry period. During water quality investigations, the depth of water within each open water habitats will be also recorded at five (5) random locations within each open water habitats.

WSF Monitoring After Fire
In the event of a bushfire occurring on the Kings Forest site, an additional WSF monitoring event will be completed by a suitably qualified ecologist.

Retained WSF Habitat
Plot-based vegetation surveys and photo point monitoring within retained WSF habitat will be completed:

- To set up monitoring transects and quadrats and collect baseline data prior to commencement of works;
- Quarterly for two (2) years during the construction phase (if clearing and construction activities extend further than 2 years then quarterly surveys will continue until completion of this phase); and
- Then annually.

Compensatory WSF Habitat
Plot-based vegetation surveys and photo point monitoring within compensatory WSF habitat will be completed:

	• To set up monitoring transects and quadrats and collect baseline data after 1st event of secondary weeding; • Six monthly for 1st year; and • Then annually.
Reporting	Baseline WSF Monitoring Report Annual WSF Monitoring Report
Identification of incident of failure	Monitoring indicates that the performance criteria have not been met.
Corrective action	• Additional/supplementary planting and/or irrigation if required; • Extend monitoring and maintenance until the targets are met; • Weed control as necessary; • Maintenance as necessary.

Commitment 12

The contractor/ land user will commit to monitoring wallum sedge frog populations to ensure that habitats are maintained.

5.13 Feral Animal Management

The information in this table was supplied by JWA (2020j) *Feral Animal Management (FAMP).*

Applies to:	Pre-construction phase; Bulk earthworks phase, Land stabilisation phase, Civil construction phase, On-maintenance phase, Operational phase
Person responsible:	Contractor, Site manager, Proponent, Ecologist, all personnel.

Issue	Feral animal and biting insect management within EPZs and ecological buffers
Operational policy	Management of feral animal species and biting insects in accordance with the FAMP (JWA 2020j)
Performance criteria	Reduction in feral animal numbers and control of biting insects as identified through subsequent monitoring
Implementation strategy	Liaison with NSW BCD and Tweed Shire Council; Liaison with Biosecurity Agencies; Education of site personnel and residents; Habitat management; Reduction of impacts of hydrological change; Monitoring and reporting; Implementation of targeted control measures (if necessary): • Foxes – Shooting and/or baiting and/or trapping program and/or den fumigation. • Cane toads – Light traps and/or cane toad muster and/or chemical tadpole traps and/or manual survey and removal of eggs and tadpoles. Establishment of dense vegetation around noted breeding or foraging areas. • Common mynas - Trapping program. • European rabbits – Shooting and/or poisoning and/or trapping and/or mechanical and/or biological control methods employed as appropriate. • Mosquito fish – Pools drained and dried where appropriate and necessary. Measures taken to prevent spread to other areas taken. • Feral cats - Shooting and/or poisoning and/or trapping program. • Feral dogs - Shooting and/or baiting and/or trapping program. • Biting insects - treatment using Bti. • Alert species - landholder shall notify NSW Department of Primary Industries (DPI) Invasive Plants and Animals Enquiry Line (ph: 1800 680 224 or email: invasive.species@dpi.nsw.gov.au) Adaptive management.

Monitoring	Feral animal monitoring to be completed in conjunction with other monitoring activities (i.e. vegetation and fauna monitoring) and will include the following (dependent on target species): • Motion-activated cameras; • Detection dog searches; • Spotlighting; • Inspection of aquatic areas for presence of mosquito fish and cane toads; • Biting insect sampling.
Reporting	An Annual Feral Animal Monitoring Report will be prepared by a suitably qualified ecologist
Identification of incident of failure	Monitoring indicates that the performance criteria have not been met.
Corrective action	Adaptive management

Commitment 13

The contractor/ land user will commit to monitoring feral animal populations and ensure that the habitat area is appropriately protected and maintained.

5.14 Contaminated land management – Precinct 5 and Kings Forest Parkway Stage 1

Must be implemented in accordance with the 'Remediation Action Plan, Precinct 5 and Kings Forest Parkway Stage 1, Kings Forest Development, New South Wales (G&S, November 2020)'.

Applies to:	Bulk earthworks phase, Civil construction phase.
Person responsible:	Proponent, Contractor's Site Manager, Suitably Qualified Person, all personnel

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Issue	Contaminated land management
Operational policy	Management of potentially contaminated land and unexpected finds shall be undertaken in accordance with the relevant Remedial Action Plan (RAP) and Construction Soil Management Plan (CSMP).
Performance criteria	Potentially contaminated land shall be managed in accordance with the relevant Remedial Action Plan (RAP) and Construction Soil Management Plan (CSMP). Unexpected finds of contamination shall be investigated and remediated in accordance with the relevant RAP and CSMP. Validation sampling and assessment of results shall be undertaken in accordance with the specifications of the relevant RAP/CSMP and NEPM 2013 criteria to demonstrate that the site is suitable for the intended use. The environmental and human health risks arising from the disturbance of unexpected contamination encountered during construction shall be avoided or otherwise minimised. The statutory requirements for managing contaminated land and the transport of contaminated goods, including the ASC NEPM (2013), draft Contaminated Land Guidelines NSW EPA (2019) and NSW EPA Waste Classification Guidelines (2014) shall be met. All materials designated for on-site re-use will conform with the NEPM Schedule B1 requirements or relevant resource recovery exemption for the designated use. All materials to be transported offsite for re-use or disposal will conform with the appropriate NSW EPA Resource Recovery Orders and Exemptions or NSW EPA Waste Classification Guidelines (2014). All contaminated material that does not meet the relevant resource recovery exemptions shall be disposed of to the appropriate landfill in accordance with the NSW EPA Online Waste Tracking System.
Implementation strategy	<u>Interim site management</u> Prior to the commencement of remediation works, the following interim site management measures shall be undertaken: • Installation of temporary exclusion fencing around the proposed remediation works footprint including any nominated stockpile areas (to be

defined in the separate Construction Soil Management Plan) to the satisfaction of TSC.

- Installation of warning signs as required.
- Installation of temporary erosion, sediment and water quality measures including stormwater diversion in accordance with the approved ESCP.

Inspection of cleared areas and identification of contaminated land

Prior to works in each precinct/area, all precincts/areas shall be subdivided into sublots to allow spatial tracking.

Following vegetation clearing and grubbing of each subarea, an inspection of the cleared areas shall be undertaken by the nominated Suitably Qualified Person (SQP) and the Site Auditor. Ongoing visual assessment of materials for possible contaminants shall also be undertaken by the earthworks contractor during cut and fill operations.

In the event that an area of likely contamination is identified (e.g. buried wastes, old drums or tanks, soil staining, discolouration, odour, evidence of gross contamination including asbestos (ACM), and possible heavy mineral sand residues (HMSR)), works will cease in that area and management measures undertaken as detailed in the relevant RAP/CSMP.

Assessment and delineation of contaminated finds

In the event that an area of likely contamination is identified, works will cease in that area/sub-precinct and the Contractors' Site Manager and the SQP will be notified. A preliminary assessment of the find will then be undertaken including:

- the need for immediate management controls (e.g. possible requirement for an exclusion/quarantine zone around the area using fencing and/or appropriate barriers and signage)
- What further assessment is to be undertaken and how such works are to be carried out

Any required sampling will be undertaken by the SQP in general accordance with the Sampling and Analysis Quality Plan (SAQP) and Data Quality Objectives (DQO) (to be included in the CSMP). All samples requiring laboratory assessment will be submitted to a NATA certified laboratory for analysis. A plan showing the location of the contamination and sampling points is to be produced for inclusion in a validation report.

No further works will be permitted until the results of the laboratory analysis are available at which time the SQP will allow the recommencement of works in the area, or will provide direction on what remedial work is required including further sampling to delineate the contamination and the dimensions of any excavations.

Any remediation work including excavation, backfilling, stockpiling and waste management (e.g. transport offsite) will be undertaken in accordance with the procedures detailed in the Remediation and Waste Management and tracking sections below.

Asbestos containing material

Any potential asbestos contamination shall be managed in accordance with the approved CSMP. The removal and disposal of asbestos, in line the with CSMP, shall be managed in accordance with the Work Health and Safety Act (2011) and Regulation (2011), the Safe Work Australia Code of Practice and the NSW EPA Waste Classification Guidelines.

Heavy mineral sands residues (HMSR)

Any potential HMSR contamination shall be managed in accordance with the approved CSMP. Any potential HMSR contamination is sampled, tested, validated and managed in accordance with the Queensland Government document *"Land contaminated by radioactive material – a guide to assessment, management and remediation,"* (2020).

No radioactive material to be transported offsite without appropriate classification and approval in accordance with NSW Waste Classification Guidelines *Part 3: Waste containing radioactive material.*

Radiation investigations, if required, are to be conducted by a suitably qualified and experienced practitioner.

As described in Queensland Health (2020), radiation equipment8 for radiation surveys should:

- have a suitable energy response to detect the suspected contaminants;
- have a minimum detectable level lower than that of natural background radiation; and
- be able to distinguish the presence of the radioactive contaminant from the naturally occurring background radioactive material.

Radiation monitoring instruments should, within the previous 12 months, have been calibrated against a recognised national or international standard. In addition, the instrument should have been subject to regular consistency checks.

<u>General remediation measures (excavation and backfilling)</u>

Depending on the nature of potential contamination, a Risk Assessment shall be undertaken prior to excavation works to determine the risk of the remediation works and any measures required to limit those risks during the works.

All workers involved in the remediation process shall be briefed on the remediation objectives and provided with any additional personal protective equipment (PPE) deemed necessary prior to the works.

Erosion and sediment control devices shall be installed prior to commencement of work to minimise the potential for movement of contaminated material. All stormwater/runoff shall be directed away from the excavation.

The extent and depth of excavation should be clearly marked before excavation and removal begins.

Excavation should be undertaken by an excavator equipped with a toothless bucket to minimise any disturbance and mixing with uncontaminated material.

As far as practicable, excavation practices should minimise dust generation. This may require wetting down of materials during earthworks.

All excavated material will be either transported to the designated stockpile area for further assessment and potential remediation.

Should additional contamination be evident during the removal process by visual inspection, further excavation shall be undertaken as considered necessary by the SQP.

Following removal of contaminated materials, validation sampling shall be undertaken in accordance with the Validation sampling procedures below and as detailed in the RAP.

Stockpiled contaminated soil should be stored in a manner to prevent soil being eroded and to reduce dust generation

All backfill materials to be validated as 'clean' prior to use by testing at the rate of 1 sample per 50m^3 or 10 samples (whichever is greater) for heavy metals, TRH and BTEX.

No backfill material to be sourced from offsite.

Backfilling of remediated areas shall not occur until validation is completed.

Works to cease if wind speeds exceed 20 knots (35 km/hour).

A workplace health and safety plan will be required to be prepared by the Contractor and adhered to during the remediation works.

Validation sampling

A Validation Plan and SAQP will be provided prior to works following consultation with the earthworks/civil contractor. Validation sampling of areas subject to removal of potentially contaminated materials will generally be undertaken as follows:

- Any excavations will be validated by the recovery of discrete soil samples from the floor and side walls. Samples would be collected from a 10m grid from the floor of the excavation. A minimum of one sample would be collected from each of the four walls, or from one every 10 linear metres for larger excavations.
- These samples will be analysed by a NATA-accredited laboratory for the contaminants which triggered the need for remediation
- The results will be assessed against the validation criteria above and the acceptance criteria of the potential disposal locations (e.g. landfill).

Results of validation sampling will be compared to the relevant remediation criteria (NEPM 2013) as detailed in the RAP.

All validation sampling will be undertaken with adherence to the NEPC National Environmental (Assessment of Site Contamination) Protection Measure (NEPM) 2013 Schedule B2 'Guideline *on Site Characterisation*, EPA 2020 *Contaminated Land Guidelines, Consultants Reporting on Contaminated Land',* and with reference to (AS) 4482.1-2205 '*Guide to the investigation of potentially contaminated soil Part 1: non-volatile and semi volatile compounds'* and in accordance with the appropriate QA/QC procedures as detailed in the RAP.

Re-use of materials

Validation of results for on site re-use

Following receipt of laboratory results, all materials designated for on-site re-use shall be assessed by the SQP for compliance with the criteria stated in the relevant RAP for the designated use.

Materials complying with the NEPM criteria will be able to be re-used on the site and elsewhere in the Kings Forest Stage 1 development footprint as engineered fill or for use in earthworks:

Materials not meeting the requirements of the above criteria will only be suitable for offsite disposal to landfill in accordance with the NSW EPA Waste Classification Guidelines (2014).

Validation of results for offsite re-use

Following receipt of laboratory results, all materials designated for offsite re-use shall be assessed by the SQP for compliance with the chemical and other material requirements of the Excavated Natural Material Exemption.

Materials complying with the Excavated Natural Materials Exemption will be able to be re-used offsite as engineered fill or for use in earthworks subject to compliance with Sections 4.90, 4.10 and 4.11 of the Excavated Natural Materials Order.

Any materials not complying with the requirements of the above Exemptions will only be suitable for offsite disposal to landfill in accordance with the NSW EPA Waste Classification Guidelines (2014).

Waste management and tracking (transport to landfill)

- All contaminated materials that exceed the relevant exemption criteria will be subject to waste classification in accordance with the NSW EPA Waste Classification Guidelines (2014).
- Based on the waste classification, appropriately licensed landfills will be identified and contacted regarding their ability to receive waste.
- An appropriately licensed transporter shall be used to transport the material
- All waste must be transported in a manner that avoids the waste spilling, leaking or otherwise escaping in accordance with Clause 70 of the Protection of the Environment Operations (Waste) Regulation 2014.
- All waste to be tracked using the NSW EPA Online Tracking System.
- If the online waste tracking system is not available when the waste is picked up, the pick-up details can be recorded by hand on the Transport Certificate and the receiving facility can enter the details online when the waste arrives.

Occupational health and safety

- The Contractor shall prepare a Workplace Health and Safety & Environmental (WHS&E) Plan prior to the commencement of works

	• Contractor responsible for ensuring all personnel working on site have a 'General Induction Card' and attend a site specific Safety Induction Course prior to entering the work area • Contractor will ensure that all employees and subcontractors have been given the necessary training prior to the start of work • A Site Safety Officer shall be responsible for the overall health and safety of all individuals with access to the work area • All staff shall be provided with the appropriate personal protective equipment (PPE), which meets Australian Standards and shall be trained in the need for and wearing of PPE, prior to commencement of work.
Monitoring	Weekly site inspections are to be carried out by the site manager or Proponent's representative to ensure the provisions of the RAP are being adequately implemented. Contractor's site manager to ensure all areas subject to bulk earthworks are subject to inspection following vegetation clearing and grubbing and during the bulk earthworks program. The SQP and site manager are to ensure that all works are conducted in accordance with the RAP. The SQP is to be present at all times during the remediation works and all validation samples are to be recovered by the SQP. Contractors' Site Manager and SQP to ensure re-use of materials is undertaken in accordance with the relevant Conditions of Exemption. Contractors' Site Manager and SQP to ensure all waste removal is undertaken in accordance with the RAP. Occupational health and safety monitoring shall be undertaken during the remediation works to ensure that no persons are exposed to factors, which may compromise their personal health and safety.
Auditing	Auditing will be undertaken by the site foreman/manager and/or the proponent's nominated representative. Alternatively, auditing may be carried out by an independent consultant. The audit should include an inspection of site activities, complaints, corrective actions and reporting to assess compliance with the provisions outlined within the RAPs and CSMPs.
Reporting	The environmental consultant shall photograph and document any unexpected findings for inclusion within a Validation Report. All laboratory results and plan showing location of delineated contamination and sampling locations kept for inclusion within a Validation Report. The extent of excavation and volume removed and stockpiled shall be recorded with the details included within the Validation Report. The SQP to compile and discuss the results of the validation testing within a validation report to be submitted to the Site Auditor.

	The validation results will be assessed and compared against the remediation criteria. The data will be statistically analysed to ensure that there is less than a 5% chance of a false negative (deciding that the site is not contaminated when it is), and less than a 20% chance of a false positive (deciding the site is contaminated when it is not). Prior to transport of any Excavated Natural Material offsite for re-use, the Proponent (i.e. Generator) must provide the following to each person (Consumer) to be supplied the Excavated Natural Material for re-use: • A written statement of compliance verifying that all requirements set out in this order have been met. • A copy of the excavated natural material exemption, or a link to the relevant NSW EPA website. • A copy of the excavated natural material order, or a link to the relevant NSW EPA website. The Proponent (generator) must also keep a written record of the following for a period of six years: • This Remediation Action Plan detailing the sampling plan required under clause 4.1.1 of the excavated natural materials order. • All laboratory testing results in relation to the excavated natural material supplied. • The volume and location of any detected hotspot material. • The quantity of any supplied excavated natural material. • The name and address of any person (consumer) supplied excavated natural material. Additionally, where materials are to be re-used onsite the Proponent (consumer) will be required to keep a written record of the quantity and location of any Excavated Natural Material used on the site for a period of six years. Proof of waste tracking including landfill acceptance shall be retained by the Contractors' Site Manager and SQP. **Incident reporting - Bulk earthworks phase, Civil construction phase, On-maintenance phase** Within 24 hours of detecting any incidents during construction that causes (or may cause) significant harm to the environment, the Proponent shall notify the Council and other relevant agencies of the incident and identify the following: • Describe the date, time, and nature of the incident. • Identify the cause (or likely case) of the incident. • Describe what action has been taken to date. • Describe any proposed measures to address the incident.
Identification of incident or failure	Failure of management measures resulting in environmental or physical harm or unnecessary disturbance to neighbouring land users.

	Failure to visually inspect any area of land following vegetation clearing and grubbing and during further earthworks. Failure to report any unexpected findings. Failure to properly delineate and sample potentially contaminated material allowing movement of potentially contaminated materials across or offsite. Continuation of earthworks in an area prior to receipt of laboratory results and subsequent advice from the environmental consultant for that area. Displacement of potentially contaminated material due to failure of erosion and sediment control (ESC) measures. Failure to delineate excavation areas prior to commencement of remediation works. Failure to keep a record of excavated and stockpiled materials. Analytical results indicate the remediation target levels have not been achieved. Insufficient testing or QA/QC has been undertaken. Re-use or disposal of excavated materials without meeting the conditions of the relevant orders and exemptions. Failure to comply with the notification and reporting requirements of the relevant orders and exemptions. Failure to undertake appropriate waste classification and disposal of contaminated materials to landfill. Failure to undertake appropriate waste tracking. Spillage of contaminated materials in-transit.
Corrective action	Upon receipt of a complaint follow the Complaints Procedure provided in Section 5.3. Rectify any failed measures as soon as possible Undertake additional visual assessment as required. SQP and site manager to ensure all unexpected finds of potentially contaminated materials are delineated and sampled Site manager to ensure no further works in the delineated area until receipt of laboratory results and advice form the SQP Any materials removed from areas of potential contamination without approval must be traced, sampled and analysed. In the event that disturbed materials cannot be adequately tracked and there is an unacceptable risk that contamination has been spread, further investigation shall be undertaken to establish the risk If the results of the risk assessment indicates an unacceptable risk, a detailed assessment shall be undertaken of the affected area to properly delineate and quantify any contamination Identify the source of any displaced material and take the necessary steps required to prevent a recurrence. This may include: • maintenance of existing controls

	• the installation of additional ESC measures Re-establish procedures to ensure all contaminated area are properly delineated prior to remediation works. Any materials removed from areas of potential contamination without approval must be traced, sampled and analysed. In the event that disturbed materials cannot be adequately tracked and there is an unacceptable risk that contamination has been spread, further investigation shall be undertaken to establish the risk If the results of the risk assessment indicates an unacceptable risk, a detailed assessment shall be undertaken of the affected area to properly delineate and quantify any contamination If possible undertake further excavation or scraping of soils until the analytical results indicate that the remediation criteria have been met. If further sampling is not possible, review results of nearest in-situ or stockpile sampling to determine possible magnitude of remnant contamination and risk. Take corrective actions to ensure all material re-used onsite or transported offsite for re-use complies with the relevant orders and exemptions Take corrective actions to ensure all contaminated material is subject to waste classification and disposal to appropriate landfill facility Take corrective actions to ensure the waste tracking is undertaken as required Any spillage of materials in transit shall be cleaned up immediately and, if significant, shall be reported to NSW EPA.

Commitment 14

The nominated responsible parties shall ensure that the provisions of the relevant RAP and CSMP are complied with at all times during bulk and civil earthworks.

5.15 Contaminated land management – Proposed roadworks

Must be implemented with reference to the 'Remediation Action Plan, Proposed Roadworks External Intersection, Kings Forest Parkway Stage 1 and Tweed Coast Road Water, Sewer and Cycleway, Kings Forest Development, New South Wales (G&S, November 2020)'.

Applies to:	Bulk earthworks phase, Civil construction phase.
Person responsible:	Proponent, Contractor's Site Manager, Suitably Qualified Person, all personnel

Issue	Contaminated land management – Proposed roadworks
Operational policy	Management of potentially contaminated land and unexpected finds shall be undertaken in accordance with the relevant Remedial Action Plan (RAP) and Construction Soil Management Plan (CSMP).
Performance criteria	Potentially contaminated land shall be managed in accordance with the relevant Remedial Action Plan (RAP) and Construction Soil Management Plan (CSMP). All areas subject to earthworks sampled and characterised with regard to NSW Waste Regulation requirements prior to or during earthworks. All validated areas to comply with Table 7 Schedule B1 NEPM No asbestos containing material to be transported offsite without compliance with Part 7 of the POEO (Waste) Regulation 2014 All validated areas to comply with the QLD Govt. document *"Land contaminated by radioactive material – a guide to assessment, management and remediation,"* (2020). No radioactive material to be transported offsite without appropriate classification and approval in accordance with NSW Waste Classification Guidelines *Part 3: Waste containing radioactive material* Validation sampling and assessment of results shall be undertaken in accordance with the specifications of the relevant RAP/CSMP and NEPM 2013 criteria to demonstrate that the site is suitable for the intended use. All materials designated for on-site re-use will conform with the NEPM Schedule B1 requirements or relevant resource recovery exemption for the designated use. All contaminated material that does not meet the relevant resource recovery exemptions shall be disposed of to the appropriate landfill in accordance with the NSW EPA Online Waste Tracking System. All materials to be transported offsite for re-use or disposal will conform with the appropriate NSW EPA Resource Recovery Orders and Exemptions or NSW EPA Waste Classification Guidelines (2014). Unexpected finds of contamination shall be investigated and remediated in accordance with the relevant RAP and CSMP.

	The environmental and human health risks arising from the disturbance of unexpected contamination encountered during construction shall be avoided or otherwise minimised. The statutory requirements for managing contaminated land and the transport of contaminated goods, including the ASC NEPM (2013), draft Contaminated Land Guidelines NSW EPA (2019) and NSW EPA Waste Classification Guidelines (2014) shall be met.
Implementation strategy	<u>Interim site management</u> Prior to the commencement of remediation works, the following interim site management measures shall be undertaken: • Installation of temporary exclusion fencing around the proposed remediation works footprint including any nominated stockpile areas (to be defined in the separate Construction Soil Management Plan) to the satisfaction of TSC. • Installation of warning signs as required. • Installation of temporary erosion, sediment and water quality measures including stormwater diversion in accordance with the approved ESCP. <u>Sampling and testing of excavated materials</u> *In-situ sampling – existing paved areas and vegetated areas* Where possible, vegetated areas shall be sampled prior to works with samples recovered at the rate detailed in relevant RAP from surface and at every 1m to the proposed maximum depth of excavation. Where prior sampling is not possible, the following methodology shall be undertaken: • Following stripping of asphalt and clearing of vegetated layers, all stripped surfaces shall be inspected by the SQP for possible contamination (e.g. buried wastes, soil staining/discoloration/odour, presence of gross contaminants including asbestos fragments, old fuel drums or tanks, presence of heavy mineral sand residues (HMSR), etc.) • Any potential contamination shall be recorded, with representative samples recovered by the SQP for laboratory analysis. • The potentially contaminated materials shall then be removed/excavated under supervision of the SQP ensuring the complete removal of the material, with the excavated materials transported to the designated stockpile areas. • Following removal of the contaminated materials, validation sampling of 'clean' surfaces will be undertaken in general accordance with the methodology detailed in the relevant RAP and in accordance with the validation plan and SAQP included in the CSMP. • The remaining materials shall then be sampled to the proposed maximum depth of excavation/disturbance at the rate detailed in the relevant RAP.

- No materials shall be moved from the stockpile area for re-use or disposal until the characterisation test results indicate compliance with either the relevant re-use or disposal criteria discussed in the RAP.

Stockpile sampling

In the event that in-situ sampling is unable to be undertaken, the following procedures shall be adhered to:

- Following stripping of asphalt/clearing of vegetated areas, all surfaces shall be inspected by the SQP with any potential contamination sampled, removed and validated as detailed for in-situ sampling.
- All remaining materials shall be stripped/excavated and stockpiled in the approved and designated stockpile areas and separated according to materials composition (e.g. asphalt, subgrade, topsoil, subsoil).
- All stockpiled materials will be sampled in accordance with the details included in the relevant RAP.
- No materials shall be moved from the stockpile area for re-use or disposal until the characterisation test results indicate compliance with either the relevant re-use or disposal criteria discussed in the RAP.

Hold points

Hold point 1: No excavation to occur until stripped and cleared areas inspected for contamination.

Release point 1: SQP to notify Contractor's Site Manager upon compliance

Hold point 2: If contamination is identified, excavation to cease in vicinity until contaminated area sampled for laboratory testing, materials excavated and validation testing undertaken.

Release point 2: SQP to notify Contractor's Site Manager upon compliance

Hold point 3: No material to be removed from designated stockpile areas for re-use on site until designated or disposal until compliance with relevant resource recovery orders and exemptions (re-use) or waste classification guideline (disposal).

Release point 3: Review of results and approval by SQP.

<u>Potential asbestos contamination</u>

Remediation and validation of areas subject to potential asbestos contamination will generally be undertaken as follows. The detailed sampling and testing methodology for potential asbestos contamination will be included in the CSMP.

- Where non-friable asbestos (i.e. fibro sheets or fragments) is identified on the soil surface and the materials equate to less than or equal to 10 square metres in total, the material shall be removed and stockpiled in Precinct 1 in accordance with Clause 42 of the Protection of Environment Operations (Waste) Regulation 2005. The SQP shall ensure the complete removal of the material from in situ and undertake a visual validation of the soil surface

- Where non-friable asbestos greater than 10 square metres in total is identified on the soil surface and/or non-friable asbestos is identified below 10cm of the soil surface and/or friable asbestos is identified on the surface or at depth, works in the vicinity of the contamination would need to cease and advice sought from an appropriately licenced asbestos removalist regarding removal and clearance.
- If friable asbestos is identified in or on soil, the following actions are recommended:
    - isolate and secure the area by installing warning signs and a temporary barricade (e.g. marker tape) around the affected area to prevent anyone from accidentally disturbing the materials and generating airborne asbestos fibres
    - to minimise the release of fibres into the air keep soil damp (but not flooded); and,
    - if it is safe to do so, cover the area with plastic sheeting
- In the case of non-friable or friable asbestos in soil, an assessment should be made on site as to whether the material should remain within the soil and the site managed accordingly. If this is not possible, the materials should be removed and stockpiled in the designated stockpile area/s under the supervision of the Class A asbestos removalist, with the excavation validated in accordance with the approved Validation Plan and SAQP forming part of the CSMP.
- The stockpile should be managed in accordance with the requirements of the CSMP and subsequently removed to a licensed landfill in accordance with Clause 42 of the Protection of Environment Operations (Waste) Regulation 2005.

<u>Heavy mineral sand residue (HMSR) contamination</u>

Remediation and validation of areas subject to potential HMSR contamination will generally be undertaken as follows. The detailed sampling and testing methodology for potential HMSR contamination will be included in the CSMP.

- In the event that HMSR is identified, all works in the vicinity of the potential contamination should cease immediately and the surface of the materials screened for ionising (gamma) radiation using a 2m grid pattern in accordance with the Qld Govt. guidelines *"Land contaminated by radioactive material – a guide to assessment, management and remediation*
- If the results indicate a hotspot (i.e. gamma radiation is measured exceeding the nominated screening reference level (0.15 µGy/h) and significantly higher that the natural background level), testing of the materials for gamma radiation shall be undertaken throughout the profile at regular intervals to the proposed design depth.
- Additionally, samples shall be recovered at the same depths for laboratory analysis of radionuclides and their leachability (i.e. TCLP).
- The materials shall then be excavated/removed until all visual contamination and radiation screening indicates levels below the

nominated screening reference level, with the materials stockpiled in the designated stockpile area.

- Following removal of the potentially contaminated materials, validation sampling shall be undertaken in accordance with the RAP, the approved Validation Plan and SAQP forming part of the CSMP.
- All radiation investigations should be conducted by a suitably qualified and experienced practitioner.
- As described in Queensland Health (2020), radiation equipment4 for radiation surveys should:
    - have a suitable energy response to detect the suspected contaminants;
    - have a minimum detectable level lower than that of natural background radiation; and
    - be able to distinguish the presence of the radioactive contaminant from the naturally occurring background radioactive material.
- Radiation monitoring instruments should, within the previous 12 months, have been calibrated against a recognised national or international standard. In addition, the instrument should have been subject to regular consistency checks.
- All stockpiled materials shall be classified in accordance with the NSW Waste Classification Guidelines *Part 3: Waste containing radioactive material*
- Materials subsequently classified as hazardous waste or restricted solid waste will require a licence to dispose offsite in accordance with the Radiation Control Act (1990) or POEO Act (1997)
- Materials with very low levels of activity (total activity ratio ≤ 1) is below regulatory concern and does not require approval for removal or re-use.

<u>Validation sampling</u>

A Validation Plan and SAQP will be provided prior to works following consultation with the earthworks/civil contractor. Validation sampling of areas subject to removal/excavation of potentially contaminated materials and following removal of soil stockpiles at the cessation or works will generally be undertaken as follows:

- Any excavations will be validated by the recovery of discrete soil samples from the floor and side walls. Samples would be collected from a 10m grid from the floor of the excavation. A minimum of one sample would be collected from each of the four walls, or one from every 10 linear metres for larger excavations.
- Former stockpile areas will be sampled at the rate of 1 sample per 25 square metres
- All samples will be analysed by a NATA-accredited laboratory for the contaminants which triggered the need for remediation
- The results will be assessed against the validation criteria above and the acceptance criteria of the potential disposal locations (e.g. landfill).

All validation sampling will be undertaken with adherence to the NEPC National Environmental (Assessment of Site Contamination) Protection Measure (NEPM) 2013 Schedule B2 '*Guideline on Site Characterisation*, EPA 2020 *Contaminated Land Guidelines, Consultants Reporting on Contaminated Land',* and with reference to (AS) 4482.1-2205 '*Guide to the investigation of potentially contaminated soil Part 1: non-volatile and semi volatile compounds'* and following appropriate QA/QC procedures as detailed in the RAP.

Validation sampling

A Validation Plan and SAQP will be provided prior to works following consultation with the earthworks/civil contractor. Validation sampling of areas subject to removal of potentially contaminated materials will generally be undertaken as follows:

- Any excavations will be validated by the recovery of discrete soil samples from the floor and side walls. Samples would be collected from a 10m grid from the floor of the excavation. A minimum of one sample would be collected from each of the four walls, or from one every 10 linear metres for larger excavations.
- These samples will be analysed by a NATA-accredited laboratory for the contaminants which triggered the need for remediation
- The results will be assessed against the validation criteria above and the acceptance criteria of the potential disposal locations (e.g. landfill).

Results of validation sampling will be compared to the relevant remediation criteria (NEPM 2013) as detailed in the RAP.

All validation sampling will be undertaken with adherence to the NEPC National Environmental (Assessment of Site Contamination) Protection Measure (NEPM) 2013 Schedule B2 'Guideline *on Site Characterisation*, EPA 2020 *Contaminated Land Guidelines, Consultants Reporting on Contaminated Land',* and with reference to (AS) 4482.1-2205 '*Guide to the investigation of potentially contaminated soil Part 1: non-volatile and semi volatile compounds'* and in accordance with the appropriate QA/QC procedures as detailed in the RAP.

Re-use of materials

Validation of results for on site re-use

Following receipt of laboratory results, all materials designated for on-site re-use shall be assessed by the SQP for compliance with the criteria stated in the relevant RAP for the designated use.

Materials complying with the NEPM criteria will be able to be re-used on the site and elsewhere in the Kings Forest Stage 1 development footprint as engineered fill or for use in earthworks.

Materials not complying with the NEPM criteria but complying with either the Excavated Public Road Materials Exemption requirements or Reclaimed Asphalt Pavement Exemption requirements may be re-used on-site within the road corridor as public road materials.

Materials not meeting the requirements of the above criteria will only be suitable for offsite disposal to landfill in accordance with the NSW EPA Waste Classification Guidelines (2014).

Validation of results for offsite re-use

Following receipt of laboratory results, all materials designated for offsite re-use shall be assessed by the SQP for compliance with the chemical and other material requirements for the following:

• Excavated Natural Material Exemption requirements
• Excavated Public Road Materials Exemption requirements • Reclaimed Asphalt Pavement Exemption requirements

Materials complying with the Excavated Natural Materials Exemption will be able to be re-used offsite as engineered fill or for use in earthworks subject to compliance with Sections 4.90, 4.10 and 4.11 of the Excavated Natural Materials Order.

Materials not complying with the Excavated Natural Materials Exemption, but complying with the Excavated Public Road Material Exemption, may be used offsite for public road related activities.

Reclaimed asphalt complying with the Reclaimed Asphalt Pavement Exemption may be used for road maintenance activities as road base and sub base, as a surface layer on road shoulders and unsealed roads and use as an engineered fill offsite.

Any materials not complying with the requirements of the above Exemptions will only be suitable for offsite disposal to landfill in accordance with the NSW EPA Waste Classification Guidelines (2014).

<u>Waste management and tracking (transport to landfill)</u>

- All contaminated materials that exceed the relevant exemption criteria will be subject to waste classification in accordance with the NSW EPA Waste Classification Guidelines (2014).
- Based on the waste classification, appropriately licensed landfills will be identified and contacted regarding their ability to receive waste.
- An appropriately licensed transporter shall be used to transport the material
- All waste must be transported in a manner that avoids the waste spilling, leaking or otherwise escaping in accordance with Clause 70 of the Protection of the Environment Operations (Waste) Regulation 2014.
- All waste to be tracked using the NSW EPA Online Tracking System.
- If the online waste tracking system is not available when the waste is picked up, the pick-up details can be recorded by hand on the Transport Certificate and the receiving facility can enter the details online when the waste arrives.

<u>Occupational health and safety</u>

- The Contractor shall prepare a Workplace Health and Safety & Environmental (WHS&E) Plan prior to the commencement of works

	• Contractor responsible for ensuring all personnel working on site have a 'General Induction Card' and attend a site specific Safety Induction Course prior to entering the work area • Contractor will ensure that all employees and subcontractors have been given the necessary training prior to the start of work • A Site Safety Officer shall be responsible for the overall health and safety of all individuals with access to the work area • All staff shall be provided with the appropriate personal protective equipment (PPE), which meets Australian Standards and shall be trained in the need for and wearing of PPE, prior to commencement of work.
Monitoring	Weekly site inspections are to be carried out by the site manager or Proponent's representative to ensure the provisions of the RAP are being adequately implemented. Contractor's site manager and SQP to ensure all areas subject to bulk earthworks within the site are subject to inspection, sampling and subsequent laboratory analysis in accordance with the Implementation Strategy following removal of paved and vegetation layers. Contractor's site manager and SQP to ensure all materials excavated and stockpiled are spatially tracked. SQP and/or Contractor's Site Manager to ensure sampling, testing, remediation and validation of potential asbestos contamination is undertaken as required. SQP and/or Contractor's Site Manager to ensure sampling, testing, remediation and validation of potential HMSR contamination is undertaken as required. All validation samples to be recovered by the SQP. Contractors' Site Manager and SQP to ensure re-use of materials is undertaken in accordance with the relevant Conditions of Exemption. Contractors' Site Manager and SQP to ensure all waste removal is undertaken in accordance with the RAP. Occupational health and safety monitoring shall be undertaken during the remediation works to ensure that no persons are exposed to factors, which may compromise their personal health and safety.
Auditing	Auditing will be undertaken by the site foreman/manager and/or the proponent's nominated representative. Alternatively, auditing may be carried out by an independent consultant. The audit should include an inspection of site activities, complaints, corrective actions and reporting to assess compliance with the provisions outlined within the RAP and CSMP.

Reporting	All testing results, material descriptions (borelogs) and associated spatial tracking information to be kept for a period of six years and made available to the Site Auditor, NSW EPA and Tweed Shire Council upon request. The SQP to compile and discuss the results of all sampling and validation testing within a remediation and validation report to be submitted to the Site Auditor. The validation results will be assessed and compared against the remediation criteria. The data will be statistically analysed to ensure that there is less than a 5% chance of a false negative (deciding that the site is not contaminated when it is), and less than a 20% chance of a false positive (deciding the site is contaminated when it is not). Prior to transport of any material for off-site re-use, the Proponent (i.e. Generator) must provide the following to each person (Consumer) to be supplied the material for re-use: • A written statement of compliance verifying that all requirements set out in the appropriate order have been met • A copy of the relevant exemption, or a link to the relevant NSW EPA website • A copy of the relevant order, or a link to the relevant NSW EPA website The Proponent (generator) must also keep a written record of the following for a period of six years: • This Remediation Action Plan detailing the sampling plan required under clause 4.1.1 of the excavated natural materials order • All laboratory testing results in relation to the excavated natural material supplied • The volume and location of any detected hotspot material • The quantity of any supplied excavated natural material • The name and address of any person (consumer) supplied excavated natural material The SQP to compile and discuss the results of the validation testing within a validation report to be submitted to the Site Auditor. Proof of waste tracking including landfill acceptance shall be retained by the Contractors' Site Manager and SQP **Incident reporting - Bulk earthworks phase, Civil construction phase, On-maintenance phase** Within 24 hours of detecting any incidents during construction that causes (or may cause) significant harm to the environment, the Proponent shall notify the Council and other relevant agencies of the incident and identify the following: • Describe the date, time, and nature of the incident. • Identify the cause (or likely case) of the incident. • Describe what action has been taken to date. • Describe any proposed measures to address the incident.

Identification of incident or failure	Failure to visually inspect any area of land following stripping of asphalt or vegetation. Failure to sample and test in-situ or stockpiled materials in accordance with the Excavated Natural Material Order requirements. Re-use or disposal of excavated materials without sampling and testing in accordance with the Order requirements Analytical results indicate the remediation target levels have not been achieved. Insufficient testing or QA/QC has been undertaken. Off-site re-use or disposal of excavated materials without meeting the conditions of the relevant orders and exemptions Failure to comply with the notification and reporting requirements of the relevant orders and exemptions Failure to undertake appropriate waste classification and disposal of contaminated materials to landfill Failure to undertake appropriate waste tracking Spillage of contaminated materials in-transit Any incident relating to WHS practice as outlined in the implementation strategy above Failure to wear protective PPE
Corrective action	Upon receipt of a complaint follow the Complaints Procedure provided in Section 5.3. Rectify any failed measures as soon as possible Stop work. Contractor's site manager and SQP to be notified. Undertake sampling and testing of stockpiled material if possible. Notify Site Auditor of non- compliance. If possible undertake further excavation or scraping of soils until the analytical results indicate that the remediation criteria have been met or manage the contamination in situ under an appropriate Management Plan If possible undertake further excavation or scraping of soils until the analytical results indicate that the remediation criteria have been met. If further sampling is not possible, review results of nearest in-situ or stockpile sampling to determine possible magnitude of remnant contamination and risk. Take corrective actions to ensure all material re-used onsite or transported offsite for re-use complies with the relevant orders and exemptions Take corrective actions to ensure all contaminated material is subject to waste classification and disposal to appropriate landfill facility Take corrective actions to ensure the waste tracking is undertaken as required

	Any spillage of materials in transit shall be cleaned up immediately and, if significant, shall be reported to NSW EPA.

Commitment 15

The nominated responsible parties shall ensure that the provisions of the relevant RAP and CSMP are complied with at all times during bulk and civil earthworks.

5.16 Waste management

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

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Issue	Waste management.
Operational policy	To ensure all waste generated onsite is stored, re-used, recycled removed and disposed of in an appropriate manner. To adhere to the waste management hierarchy. To minimise potential environmental and social impacts from waste and waste handling. To minimise the amount of waste produced as a result of operations on site. To keep site neat and tidy.
Performance criteria	As far as practicable, cut and fill volumes should be balanced to avoid generating excess fill requiring offsite disposal and/or stockpiling for future use. No green waste material removed from site. Adherence to the waste management hierarchy with waste removed from site only for disposal to landfill or a recycling facility when it cannot be re-used or recycled on site. Ensure facilities are available onsite for the segregation of wastes into streams to allow for recycling. Storage facilities to be clearly labelled, covered and regularly maintained. Storage of waste shall occur within the boundaries of the site, by way of a screened area of silt stop fabric, shade cloth or waste disposal bins; provided to council specifications. All waste is to be collected and transported by an appropriately licensed contractor and disposed of to an appropriately licensed facility. All waste is handled in compliance with this CWMP, relevant legislation and to the satisfaction of the PCA.
Implementation strategy	**General strategies:** Reduction, reuse or recycling practices should be used wherever practicable. The following actions will apply in order to achieve this outcome: • All waste is to be stored within site boundaries in covered receptacles that meet TSC specifications and consistent with the Erosion and Sediment Control Management Plan. • No waste generated outside of the site is to be received at the site for storage or disposal. • An appropriate number of covered waste receptacles will be located on site with the provision of dedicated areas or additional receptacles for the storage of re-usable and recyclable materials.

- Waste containers will be emptied once a week or as required (based on volumes generated) by an appropriately licensed contractor.
- All waste is to be removed from site only by an appropriately licensed contractor and taken to a facility with the correct permits for handling and processing the waste form.
- The site should be left clean and tidy at the end of each work day with no waste left loose or exposed.
- Any spillage is to be collected immediately and disposed of at an appropriately licensed facility.

Specific strategies:

In respect of **excavated materials**, the following action will apply:

- As far as practicable, cut and fill volumes should be balanced to eliminate the need for offsite disposal of materials or onsite stockpiling.
- Where cut and fill volumes cannot be balanced and excess materials result, materials shall either be stockpiled for re-use in future stages of the Kings Forest development or removed offsite and disposed of to a suitably licensed facility.

For **green waste**, the following actions will apply:

- Clearing of onsite vegetation shall be limited to only what is required as shown on the relevant plans.
- Green waste produced onsite (including wooden fencing) will be mulched and re-spread across the site following the completion of earthworks, or stockpiled and used to facilitate landscaping works.

Specific **putrescible waste** management measures are:

- There will be clearly labelled bins on site for putrescible waste that will be emptied at least once a week by a licensed contractor or as required based on the volumes generated.
- All putrescible waste will be removed by an appropriately licensed contractor and taken to a facility for composting or disposal.

For **non-putrescible waste**, the following actions will apply:

- Clearly labelled bins will be available onsite to segregate waste into recyclable or non-recyclable material.
- Reuse any material onsite where possible (e.g. construction materials).
- Minimise volume of waste going to landfill.
- Bins will be regularly collected by a suitably licenced contractor to avoid stockpiling or overflow.

For **on-site wastewater**, the following actions will apply:

- Installation and appropriate servicing of relocatable toilet facilities by a licensed contractor.
- Waste will be removed by an appropriately licensed contractor and taken to a facility licensed to handle and process the waste.

	• No effluent will be disposed of on site. **Special waste** will be managed according to the following: • Onsite generation of special waste shall be avoided wherever possible. • Servicing of plant or equipment shall be undertaken offsite. • If onsite repairs to plant or equipment are unavoidable, any generated special wastes will be appropriately stored until collection by an appropriately licensed contractor **Hazardous waste** will be managed in accordance with the following: • Where possible, machinery is to be re-fuelled and serviced offsite. • Any storage of oils or hazardous liquid/materials shall be in containers that meet Australian standard and stored away from hazard areas and sensitive receiving environments such as waterways. • Compliance with relevant legislation regarding removal, containment and emission control of hazardous waste will be achieved, including the submission of records to PCA prior to removal. • Any spills are to be cleaned up immediately with wastes disposed of to an appropriately licensed facility.
Monitoring	In order to ensure that the provisions of this CWMP are being correctly implemented, the following monitoring will be applied: • A designated onsite representative shall conduct daily visual inspections of the site's waste storage facilities and record inspection notes in a site diary. • Daily inspection of waste bins and skips shall assess whether sufficient capacity remains for continued use as well as ensuring waste is being segregated correctly and being put into the correct bin. • All waste related complaints are to be recorded in an incidents/complaints register which will be reviewed weekly by management.
Auditing	Auditing will be undertaken by the site foreman/manager and/or the proponent's nominated representative. Alternatively, auditing may be carried out by an independent consultant. The audit should include an inspection of site activities, complaints, corrective actions and reporting to assess compliance with the provisions outlined within the CWMP.
Reporting	• Records of waste removal invoices and plant and equipment servicing shall be kept up to date at all times and shall be made available to the nominated auditor and/or the relevant statutory authorities upon request. • An incidents and complaints register shall be kept onsite and made available to the nominated auditor and/or the relevant statutory authorities upon request. • Any incidents involving waste handling onsite or spills shall be reported to the foreman and/or the site manager immediately.

	• When there is potential or actual environmental harm as a result of waste management, the foreman and/or site manager is to notify appropriate authorities and corrective actions implemented as directed. • When there is potential or actual environmental harm as a result of waste management, TSC is to be contacted immediately on Council's Environmental Health Services line (02) 6670 2400 or the TSC after hours emergency contact number 1800 818 326. • Any staff training or inductions on waste management recorded. **Incident reporting - Bulk earthworks phase, Civil construction phase, On-maintenance phase** Within 24 hours of detecting any incidents during construction that causes (or may cause) significant harm to the environment, the Proponent shall notify the Council and other relevant agencies of the incident and identify the following: • Describe the date, time, and nature of the incident. • Identify the cause (or likely case) of the incident. • Describe what action has been taken to date. • Describe any proposed measures to address the incident.
Identification of incident or failure	**General incident or failure:** General site incidents or failure can be identified as below**:** • Workers, contractors onsite not made aware of CWMP. • Monitoring indicates ongoing, repetitive, incorrect waste management or complaints. • Large quantities of waste going to landfill when it has the potential to be re-used or recycled. • Insufficient waste storage capacity or frequency of waste removal from site. • Waste generated outside of site being received at the site for storage or disposal without the correct permit. **Identification of incident or failure in respect to a specific waste stream:** In respect to identification of incident or failure relating to **excavation material**: • Excess fill to be placed (too many cuts made). • Removal of any fill from site without first exhausting all opportunities for onsite reuse. • Inappropriate stockpiling of excess fill. Failure or incident in handling of **green waste:** • Removal of green waste from site. • Failure to take opportunities to reuse green waste onsite. Identification of failure or incident in handling **putrescible waste**: • Putrescible waste being found outside of the appropriate receptacles – i.e. being found on site not in bins.

	• Putrescible waste collected infrequently leading to rotting in bins, attracting wildlife and/or causing foul odour. Identification of failure or incident in handling **non-putrescible waste**: • Non-putrescible waste being found outside of the appropriate bins – i.e. being found on site not in bins or not being segregated onsite. • Insufficient capacity of receptacles causing overflow of waste. • Inappropriate offsite disposal of waste. Evidence of failure or incident of **onsite wastewater effluent:** • Waste found outside of toilet facility and/or the onsite disposal of wastewater. • Inappropriate offsite disposal of wastewater. Identification of **special waste** related incident or failure: • Any form of special waste found onsite – not having been immediately removed after servicing. Failure or incident relating to **hazardous waste**: • Hazardous waste not being correctly or safely stored as per this CWMP and relevant Australian Standard. • Hazardous waste spills not being removed, treated and reported appropriately. • Hazardous waste being removed in a manner un-satisfactory of the PCA.
Corrective action	**General Corrective Actions:** The process for any general waste related incident will be: • Investigate cause and undertake any required reporting. • Undertake remediation. • Implement re-training where necessary The site manager or designated representative will direct clean-up operations as required. Directions will be based on the processes as follows: • Source of waste is to be identified. • Appropriate clean-up actions to be undertaken. • Waste to be disposed of by licenced contractor. • To avoid a reoccurrence, increase onsite waste storage capacity where necessary, increasing the frequency of waste collection and re-train staff. Upon receipt of a complaint follow the Complaints Procedure provided in Section 5.3. **Action related to a specific waste stream:** Corrective actions for **excavation material:** • Fill any unnecessary cuts made. • Store excess materials onsite for use in the next stage of development.

	• Ensure stockpiling of material is undertaken appropriately with adequate stabilization, erosion and sediment controls. Corrective actions relating to **green waste** are as follows: • Identify onsite opportunities for reuse of green waste. • Where practical, stockpile material for reuse rather than dispose of offsite. Corrective actions for **putrescible waste**: • Organise immediate removal of any overflowing bins or bins with strong odour by licensed contractor. • Arrange for bins to be emptied more frequently. • Train staff in correct waste disposal including the use of the correct bin. Corrective actions for **non-putrescible waste**: • Undertake staff and contractor training on importance of correct waste disposal including the use of the correct bin and not littering on site. • If bins overflow repetitively, arrange for removal of bins to become more frequent or increase volume of storage facility. • If a contractor is not disposing of waste as per their license or in an inappropriate manner offsite, alert relevant authorities including TSC. Corrective actions for **onsite wastewater effluent**; • Immediate removal of any sewage related waste by an appropriately licensed contractor to an appropriately licensed facility. • Staff training on importance of correct effluent disposal including education on related health risks. • If a contractor is not disposing waste water as per their license or in an inappropriate manner offsite, alert relevant authorities including TSC. Corrective actions for **special waste** are as follows; • Immediate removal of any special waste found onsite and taken to an appropriately licensed facility by an appropriately licensed contractor. Corrective actions for **hazardous wastes** are as follows; • Immediate removal by suitable contractor to appropriately licensed facility. • Contact and inform the appropriate authorities. • If required, conduct testing around area for contamination. • Undertake staff and contractor training regarding the safe handling of hazardous waste as well as necessary actions in the case of incidents such as spills or contamination. • Train staff to be familiar with the removal of hazardous waste to the satisfaction of the PCA.

Commitment 16

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

5.17 Erosion and sediment control

Applies to	Bulk earthworks and civil construction phases
Person responsible	Contractor's site manager, Consulting Engineer

Issue	Sediment and Erosion Controls
Operational policy	To prevent the displacement of sediment and soil across and offsite in accordance with the approved ESCP. Where any inconsistency exists between this plan and the approved ESCP, the approved ESCP shall prevail.
Performance criteria	No visual indication of erosion on stages under construction, including evidence of rilling (an indicator of sheet erosion).
Implementation strategy	• Erosion and sediment control devices shall be installed prior to commencement of work in accordance with the approved ESCP. • Where possible, the construction program shall be scheduled to minimise the potential for soil loss to occur. Where construction activities cannot be altered, additional controls shall be implemented in the areas of high erosion potential. • Runoff and erosion controls shall be installed prior to clearing and include: • Diversion of upslope runoff around cleared and/or disturbed areas in a way that minimises erosion, minimises the upslope catchment and diverts waters to a legal point of discharge. • Sediment control fences and/or other measures shall be installed at the downslope perimeter of cleared and/or disturbed areas. • Maintenance of all erosion control measures at operational capacity until land is effectively rehabilitated. • Temporary erosion measures (e.g. straw bales, straw fences) are to be employed onsite during construction where reasonably deemed necessary by TSC from an assessment of slope and soil type. Such measures shall be maintained at, or above their design capacity. Such measures will be in accordance with the recommendations in Council's '*Code of Practice for Soil and Water Management on Construction Works – Annexure A of Development Design Specification D7 – Stormwater Quality'* and "*Managing Urban Stormwater: Soils and Construction*" March 2004 by Landcom, Australia. • In areas where more than 1,000m^2 are to be disturbed, runoff controls are also to include measures such as, but not limited to: • Sediment basins • The use of barrier fencing, • The utilisation of exclusions zones, and • Minimising slope lengths of disturbed, uncontrolled areas. • Stripped topsoil shall be separated from subsoil materials and shall only be stripped from the areas designated on the appropriate plans.

	• Stockpiled soil will be stored taking into account the following considerations: • They are not to be located on public footpaths, nature strips, roads, road shoulders or any other public land. • They are to be located at least 2 m away from any hazard areas. • They are to be protected from upslope surface flows, and • They are to be provided with sediment filters downslope. Fill batters shall be located to avoid established trees. Unless otherwise specified, trenches must be backfilled and compacted to 95% standard compaction and capped with topsoil. Excess spoil can be retained onsite provided the stockpile area is prepared by stripping topsoil from beneath the fill site for further use in revegetation. Outside the construction area of Stage 1, existing surface water conditions will be maintained wherever possible. All stockpiles, including preload, will be seeded within a fortnight of final forming with an appropriate mix. Sediment basins and clean-water diversion channels shall be constructed prior to earthworks in accordance with the drawings detailed in the ESCP. Sediment shall be cleaned out of sediment basins when accumulated sediment volume reaches 70%. Removed materials must be disposed of in a manner that does not cause pollution. Sediment basins shall be dosed with gypsum at a rate of 32kg/100m^3 of water when required to ensure that discharge water quality meets required limits. Level markers shall be installed within all sediment ponds to monitor sediment accumulation. All weather access tracks shall be constructed to all internal water bodies, trash racks and gross pollutant traps. Where increased stormwater runoff is likely to accelerate erosion of any downstream watercourse, the necessary remedial work shall be undertaken. All immediate downstream drainage inlets shall have appropriate controls installed. Outside the construction area of Stage 1 existing surface water conditions will be maintained wherever possible.
Monitoring	• Carry out visual inspections weekly and after rainfall events to ensure that erosion measures are in place and operational to suit the activities taking place at the time. • Surface water quality to be monitored (refer herein to ‘Surface Water Monitoring’ which details monitoring of surface water and stormwater quality).
Auditing	Regular self-audits shall be carried out in accordance with the above monitoring requirements. *Additional visual inspections to be carried out monthly and after rainfall events to verify that control measures are in place and properly maintained.*

Reporting	Signed, completed self-audits, original test results, rainfall-event and other result sheets shall be kept on site and made available on request to TSC officers and other relevant statutory authorities. Within 24 hours of detecting any incidents during construction that causes (or may cause) significant harm to the environment, the Proponent shall notify the Council and other relevant agencies of the incident and identify the following: • Describe the date, time, and nature of the incident. • Identify the cause (or likely case) of the incident. • Describe what action has been taken to date. • Describe any proposed measures to address the incident. A record of Complaints received shall be maintained in a Complaints Register and kept onsite for inspection by statutory authorities upon request.
Identification of incident or failure	• Signs of erosion on site. • Damaged or failed erosion and sediment control devices. • Falling stormwater quality as identified by Environmental Consultant. • Build-up of sediment in receiving environment.
Corrective action	Apply remedial measures to improve sediment and erosion measures, for example: silt fences, shake down areas. Upon receipt of a complaint follow the Complaints Procedure provided in Section 5.3.

Commitment 17

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

5.18 Acid sulfate soil sampling and identification (dry and wet excavation)

Applies to	Bulk earthworks and civil construction phases
Person responsible	Contractor's Site Manager, Environmental Consultant

Issue	Acid sulfate soil identification.
Operational policy	To identify any AASS, PASS or acidic soils during earthworks at the site and determine their treatment requirements.
Performance criteria	All AASS, PASS and acidic soil material is appropriately identified prior to treatment.
Implementation strategy	All soils excavated across the site (below RL5.0) will be sampled according to the following sampling protocols undertaken concurrently with the earthworks (or ahead of the excavation face). Sampling of dry and wet excavated materials will be undertaken according to the following protocol prior to placement within the designated bunded treatment area/zone. **Frequency:** Chromium Suite analysis will be conducted at a frequency of 1 test/500m^3 of excavated in situ materials. **Sample size:** Soil samples should be approximately 0.3 kg in size with a brief soil texture description accompanying each sample. **Sampling:** Soil samples to be tested onsite or collected in sealed containers that exclude air for temporary storage prior to testing onsite. **Handling and storage**: Samples destined for storage shall be frozen or dried within 24 hours of collection.
Monitoring	Laboratory analysis will employ the Chromium Suite method (Method 22B). Material (spatial) tracking of dry and wet excavated material will be undertaken by the environmental consultant and site supervisor. Records shall be kept of volumes excavated, location of excavated material and acid sulfate soil testing frequency.
Reporting	ASS analytical results including interpretation and liming rates shall be reported to the site supervisor and kept onsite. Records shall be made available to statutory authorities upon request.
Identification of incident or failure	Insufficient sampling or failure to sample as identified by material tracking records and/or test results and/or procedures.
Corrective action	Undertake additional sampling as required to completely characterise the nature of the material to be disturbed. Consultation with an Environmental Consultant to determine appropriate rates for additional sampling.

Commitment 18

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

5.19 Acid sulfate soil treatment (dry and wet excavation)

Applies to	Bulk earthworks and civil construction phases
Person responsible	Contractor's Site Manager, Environmental Consultant

Issue	Treatment of AASS and PASS identified onsite.
Operational policy	No actual acid sulfate soils (AASS) or potential acid sulfate soils (PASS) are to be disturbed or excavated without appropriate testing and/or treatment by neutralisation of the Net Acidity.
Performance criteria	All AASS and PASS material has been appropriately identified and will be neutralised and subject to verification testing prior to final placement.
Implementation strategy	**Treatment thresholds** Lime treatment will be required where the following thresholds are exceeded: • Potential soil acidity: S_{CR}% >0.03, • Actual soil acidity: S_{CR}% of >0.01 and TAA >18 mol H^+/t, **Note:** Naturally acidic soils (originating from complex organic acids) are present at the site and do not require lime treatment. A sulfidic material contains detectable inorganic sulfides greater than or equal to 0.01% sulfidic S[1]. Soils returning S_{CR} values of less than or equal to 0.01% sulfidic S do not require lime treatment regardless of the TAA value. **Lime treatment (when required)** In calculating the amount of lime or neutralising agent to be added, a mixing factor of safety (or Fineness Factor) of 1.5 will be used. Material will be placed in spatially tracked lots within bunded areas. The bunded areas shall have a leachate collection system. Placed material will be spread to a depth of approx. 300 mm, limed at the determined rate and mixed with a rotary hoe or disc plough to a minimum depth of 300 mm. Materials used to construct the bunds will be free from ASS. The bunded area will be prepared with surface lime at the minimum rate of 5 kg/m²/metre depth of material, or 10 kg/m²/metre depth of material where the potential acidity is more than 1.0% S-equivalent. A layer of lime slurry shall be applied to exposed cut faces immediately following the excavation to the maximum depth to neutralise the soils exposed to oxidation. Any dewatering of the excavation or treatment of leachate or groundwater within the excavation shall be undertaken as detailed in Section 2.9. **Earthworks planning**

[1] Water Quality Australia (June 2018). National Acid Sulfate Soils Guidance: National acid sulfate soils identification and laboratory methods manual.

In areas identified as likely to contain ASS or PASS soils the volume of material being excavated shall be timed to ensure sufficient space is available to accommodate the number of treatment or liming pads for the drying and neutralisation of the ASS.

The timing of the excavation works shall also take into consideration the expected laboratory turnaround time to ensure the laboratory results are obtained prior to the excavation and treatment of the next layer.

Should issues arise which disrupt the anticipated timing of the excavation, changes shall be made to the earthworks strategy.

Excavation works and timing of stockpiling/treatment

All excavation works and stockpiling of untreated acid sulfate materials shall be carried out in such a manner that:

- the surface area of materials exposed to oxidation is minimised,
- the length of time the untreated materials are exposed to air is minimised,
- provides for a system of suitable diversion drains or embankments to divert surface waters away from the stockpiles and the excavation area,
- ensures that any unforeseen groundwater seepage and/or leachate and/or stormwater runoff within the excavation area is collected and not released from the site, untreated to any stormwater drain or waters (including groundwater),
- ensures that any leachate and/or stormwater runoff which has been in contact with acid sulfate materials or contaminants is collected and not released from the site, untreated to any stormwater drain or waters (including groundwater).

Temporary short-term stockpiling of untreated ASS shall only be undertaken for a maximum period of 5 days in accordance with the *Acid Sulfate Soils Manual 1998* (ASSMAC). The total volume of stockpiled material should not exceed 20% of a day's total extraction.

In the event that operational delay times (for instance inclement weather) require the stockpiling of untreated ASS exceeding 5 days, medium-term stockpiles may be established for a maximum duration of 28 days. Should this be required, the relevant administrating authority shall be notified and justification provided.

Stockpiled untreated ASS soils will be stored taking into account the following considerations:

- Stockpiles will be located away from hazard areas, including but not limited to watercourses, drainage lines and native vegetation, taking into account slope, soil type and surface area.
- For all medium-term stockpiles, a guard layer will be in place. The amount of neutralising agent used will be 0.3 times the average potential and existing acidity of the stockpile/m^2 per vertical metre of soil that is to be temporarily placed in the stockpile.
- All stockpiles will be appropriately bunded and protected from surface flows by the installation of diversion banks upslope of the stockpile.

	• Any leachate generated as result of the stockpile material will be contained and tested prior to release in accordance with Table 2.8. **Validation testing** Following lime treatment, validation testing shall be performed at the rate of one sample per 1,000 m^3 of treated material, with laboratory analysis undertaken using the Chromium suite. Subsequent treatment layers (<300 mm) will not be placed within the treatment pad until validation testing results are obtained, indicating the complete neutralisation of the treated material. **Supply of neutralising agent** A supply of neutralising agent or agricultural lime shall be kept onsite at all times for treatment of ASS. The supply shall be stored in a covered and bunded area to prevent accidental release to the environment. A supply of hydrated lime shall be kept onsite at all times for treatment of acidic waters (if encountered). Storage requirements for hydrated lime shall be as specified for a neutralising agent or agricultural lime and in accordance with the manufacturer's MSDS.
Monitoring	Soil that has been treated by neutralisation shall meet the following performance criteria: • The neutralising capacity of the treated soil must exceed the existing plus potential acidity of the soil by at least a safety factor of 1.5; • Post-neutralisation, the soil pH (pH_{KCl})is to be greater than 6.5; and • Excess neutralising agent shall remain within the soil until all acid generation reactions are complete and the soil has no further capacity to generate acidity. Collect lime delivery dockets and compare with calculated amounts required. All validated materials shall be stored separately to non-validated materials.
Auditing	Auditing will be undertaken by the site manager and/or the proponent's nominated representative. Alternatively, auditing may be carried out by an independent consultant. The audit should include an inspection of site activities, complaints, corrective actions and reporting to assess compliance with the provisions outlined within the ASSMP.
Reporting	Records including testing results and lime delivery dockets are to be kept on site during the construction phase and should be available for inspection at all times. Records shall be made available to statutory authorities upon request. Within 24 hours of detecting any incidents during construction that cause (or may cause) significant harm to the environment, the Proponent shall notify TSC and other relevant agencies of the incident in accordance with the protocol in Section 2.4.

Identification of incident or failure	Further investigation would only be required if: • verification (Phase 3) sampling tests fail, indicating the insufficient application of lime • the formation of jarosite in exposed or excavated soils was observed • areas of green-blue water or extremely clear water occurred • rust-coloured deposits on plants and on the banks of drains or water bodies were noted • a sulfurous odour was detected • the pH of related water bodies dropped substantially below background levels.
Corrective action	Re-treatment and re-testing of materials until the performance criteria are met. Upon receipt of a complaint follow the Complaints Procedure provided in Section 5.3.

Commitment 19

The Developer will appropriately treat acid sulfate soil excavated in the course of construction, in accordance with the calculated liming rates.

5.20 Acid sulfate soil leachate monitoring

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

Issue	Water quality monitoring.
Operational policy	Waters ponded within the bunded treatment pads or associated with acid sulfate soil stockpiles will be managed in accordance with the site's *Acid Sulfate Soils Management Plan* (G&S September 2020) and any subsequent revisions of that plan. Ponded water to be discharged from the site or to on-site drains or watercourses will meet the relevant site specific water quality criteria prior to release.
Performance criteria	The following site-specific water quality criteria would be adopted for all waters ponded within the bunded treatment pads or associated with acid sulfate soil stockpiles that is to be discharged from the site or to on-site drains or watercourses.

Surface water quality criteria

Parameter	Saline (SW1, SW2, SW6, and SW9)	Brackish (SW5)	Fresh (SW3, SW4, SW7, SW8 and SW10)
pH	5.66-6.3	5.34-6.14	5.23-6.66
Electrical Conductivity	<38700 µs/cm	<4008.6 µs/cm	<230.4 µs/cm
Dissolved Oxygen	>7.10 mg/L	>4.87 mg/L	>2.91 mg/L
Turbidity	<3.1 mg/L	<23.76 mg/L	<32.54 mg/L
Total Nitrogen	<0.5 mg/L	<1 mg/L	<1.46 mg/L
Total Phosphorus	<0.03 mg/L	<0.04 mg/L	<0.14 mg/L
Iron (total)	<0.41 mg/L	<4.40 mg/L	<6.57 mg/L
Aluminium (total)	<0.22 mg/L	<0.36 mg/L	<0.68 mg/L
Chlorophyll-a	<6 µg/L	<6 µg/L	<6 µg/L
Litter and gross pollutants	No man made material <5mm in any dimension	No man made material <5mm in any dimension	No man made material <5mm in any dimension
Oil and/or grease	No visible film, no detectable odour	No visible film, no detectable odour	No visible film, no detectable odour

*Note: pH must be consistent with receiving water quality. Consideration must be given to the preferred water quality conditions of WSF communities when interpreting pH results against the site-specific water quality criteria. If receiving waters are estuarine, pH can range from 5.5 -7.5; if receiving waters are fresh, pH can range from 4.2 – 6.7 in accordance with the *Threatened Species Management Plans* (JWA, 2020f-h) for habitat requirements for Wallum Froglet (*Crinia*

	signifera) and the *Wallum Sedge Frog Management Plan* (JWA 2020i) for habitat requirements for the Wallum sedge Frog (*Litoria olongburensis*).
Implementation strategy	Surface water monitoring will be undertaken prior to discharge of waters ponding in ASS treated areas. Existing surface water conditions shall be maintained outside the construction area. Runoff will be directed around the bunded PASS treatment areas to minimise the potential for leaching and the possibility of the bund breaching prior to the testing and treatment of the contained water. All ponded surface and/or groundwater within excavations shall be tested within the excavation and treated if necessary prior to discharge in accordance with Table 5.25 'Groundwater seepage monitoring.' A supply of hydrated lime shall be kept on site at all times for treatment of acidic waters (if encountered) to achieve baseline levels. Storage requirements for hydrated lime shall be in accordance with the manufacturer's SDSs.
Monitoring	The contractor or site manager shall inspect site works weekly and following rainfall events for any evidence of ponded waters. Pre-discharge monitoring will be undertaken as outlined above to ensure compliance with the release criteria and results will be documented. All monitoring will be undertaken using equipment regularly calibrated, with samples sent to a NATA-accredited laboratory where appropriate. Daily rainfall to be recorded by the civil contractor.
Auditing	Environmental consultant to audit water quality results to ensure all discharges comply with the performance criteria.
Reporting	Result sheets to be compiled for monitoring results relating to water quality of ponded water. These results are to be kept onsite for inspection by local and state government officers upon request and are to be included in monthly reports to the supervising engineer until completion of works. Within 24 hours of detecting any incidents during construction that cause (or may cause) significant harm to the environment, the Proponent shall notify TSC and other relevant agencies of the incident in accordance with the protocol in Section 5.3.
Identification of incident or failure	Discharge of waters ponded within PASS treatment areas that are outside the specified limits for the site.
Corrective action	If ponded water is detected outside the criteria range, all such waters will be contained until the water quality is adjusted to within the required range. Correction of water quality will be undertaken in consultation with the environmental consultant. Upon receipt of a complaint follow the Complaints Procedure provided in Section 5.3.

Commitment 20
The Contractor's Site Manager will ensure water that is trapped within bunded areas established for the treatment of PASS is monitored and treated to ensure that acidic water is not discharged from the site.

5.21 Maintenance of water treatment measures

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

Issue	Maintenance of stormwater quality treatment devices.
Operational policy	To ensure that the stormwater quality treatment devices are maintained at an appropriate operational standard.
Performance criteria	No significant change in the physical characteristics of treatment devices. No significant change in the physicochemical and/or biological characteristics of the treatment devices.
Implementation strategy	Routine visual inspections and monitoring and maintenance.
Monitoring	Routine visual inspections of treatment trains and vegetated open space at the following frequencies; • monthly during landform stabilisation and on-maintenance phase, • quarterly during operational phase. Inspections shall be undertaken for: • Litter. • Erosion. • Excessive sediment deposition. • Clogging (bio-retention). • Vegetation damage (e.g. die off, weed growth). • Damaged or failed treatment devices. • Change in physical characteristics: ° water level; and ° area, depth or bed profile of any bio-retention basin, waterway or wetland system.
Auditing	Audit inspections are to be carried out on a quarterly (Landform stabilisation phase, on-maintenance phase)/ annual (Operational phase) basis to verify that the stormwater quality control structures are properly maintained by the contractor.
Reporting	A checklist is to be completed which assesses the strategies listed above and includes the following: • A record of inspection details and; • A record of details of all maintenance activities (including volume of silt removed from each GPT or other control structure). Results to made available to TSC at all times.

	A summary of the inspection checklist findings shall be included in the annual water quality monitoring report. Within 24 hours of detecting any incidents during construction that cause (or may cause) significant harm to the environment, the Proponent shall notify TSC and other relevant agencies of the incident in accordance with the protocol in Section 5.4.
Identification of incident or failure	Non-compliance with the criteria will be identified by: • Blockage of stormwater system. • Build-up of sediment and litter or re-entrainment of trapped sediments. • Excessive erosion. • Vegetation damage. • Poorly maintained, damaged or failed control devices. • A change in the physical characteristics. • A change in the physicochemical and/or biological characteristics. • Impeded drainage of bio-retention and filter basins. • Deterioration of water quality downstream of the control structure/s.
Corrective action	**Bio-retention and filter basin maintenance** Regular harvesting to ensure vegetation is maintained at acceptable levels. Removal of a portion of vegetation to maintain nutrient and biomass balance Removed vegetation to be composted and reused on landscaping in other parts of development site Soil renovation (as required) to maintain permeability Removal of litter. **Gross pollutant traps** Removal of trapped material in accordance with manufacturer's specifications. **Vegetated rough** Regular mowing and maintenance of rough filter characteristic by mulching organic matter back into rough soil profile. Ensure vegetation is maintained at acceptable levels (minimum 85% foliage protective cover). Removal of litter within the swale. **Waterway and wetland system** As per weed management program **Sediment/sludge removal** Sludge and sediments are expected to settle in the inlet zones of the wetlands and other water bodies. In the operational state this is expected to be minor and de-silting will only be required on an infrequent basis

	(maybe every 50 years). Prior to works the recommended best practice method of sediment/sludge removal of the time will be used. Upon receipt of a complaint follow the Complaints Procedure provided in Section 5.3.

Commitment 21

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

5.22 Site stabilisation

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

Issue	Landform stabilisation at the completion of the bulk earthworks phase Stage 1 works.
Operational policy	Landscaping, stabilisation and revegetation of completed areas to aid the treatment of surface water and minimise sediment transport.
Performance criteria	No sediment transport from completed areas.
Implementation strategy	• Progressive stabilisation and revegetation of completed areas. • The landscaping and rehabilitation program shall be programmed to ensure that minimal time delay occurs between final land shaping and permanent rehabilitation in accordance with the approved ESCP. • All temporary erosion and sediment control works are to be removed once works are complete and revegetation is successfully established in formerly disturbed areas in accordance with the approved ESCP.
Monitoring	Contractor's site manager to conduct inspections weekly and following rainfall events (>25 mm in 24 hours) until the stage is stabilised.
Auditing	Auditing to be conducted on a quarterly basis.
Reporting	Completed checklists of site inspections to be kept onsite for inspection by TSC upon request. Within 24 hours of detecting any incidents during construction that cause (or may cause) significant harm to the environment, the Proponent shall notify TSC and other relevant agencies of the incident in accordance with the protocol in Section 5.4.
Identification of incident or failure	• Failure of vegetated areas • Signs of erosion onsite. • Damaged or failed erosion control devices. • Decline in water quality as identified by environmental consultant.
Corrective action	• Test topsoil if revegetation works have been unsuccessful to determine the possible problem. • Review procedures in consultation with landscape architect and/or horticulturalist. Apply remedial measures to improve sediment and erosion control (e.g. the incorporation of additional measures, including but not limited to hay bales, silt fences and flocculation of water quality control ponds). Upon receipt of a complaint follow the Complaints Procedure provided in Section 5.3.

Commitment 22

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

5.23 Surface water quality monitoring

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

Issue	Surface water quality monitoring.
Operational policy	To maintain the water quality conditions of the receiving environment throughout each phase of the development.
Performance criteria	Surface water monitoring will be conducted monthly and following the first monthly rainfall event (defined as >25mm in 24 hours) at the locations shown on Drawing No. 12017_001 for the parameters listed in Section 4.1. Results shall be compared with the surface water quality criteria (indicator parameters only) detailed below;

Surface water quality criteria

Parameter	*Saline (SW1, SW2, SW6, and SW9)*	*Brackish (SW5)*	*Fresh (SW3, SW4, SW7, SW8 and SW10)*
pH	5.66-6.3	5.34-6.14	5.23-6.66
Electrical Conductivity	<38700 µs/cm	<4008.6 µs/cm	<230.4 µs/cm
Dissolved Oxygen	>7.10 mg/L	>4.87 mg/L	>2.91 mg/L
Turbidity	<3.1 mg/L	<23.76 mg/L	<32.54 mg/L
Total Nitrogen	<0.5 mg/L	<1 mg/L	<1.46 mg/L
Total Phosphorus	<0.03 mg/L	<0.04 mg/L	<0.14 mg/L
Iron (total)	<0.41 mg/L	<4.40 mg/L	<6.57 mg/L
Aluminium (total)	<0.22 mg/L	<0.36 mg/L	<0.68 mg/L
Chlorophyll-a	<6 µg/L	<6 µg/L	<6 µg/L
Litter and gross pollutants	No man made material <5mm in any dimension	No man made material <5mm in any dimension	No man made material <5mm in any dimension
Oil and/or grease	No visible film, no detectable odour	No visible film, no detectable odour	No visible film, no detectable odour

*Note: pH must be consistent with receiving water quality. Consideration must be given to the preferred water quality conditions of WSF communities when interpreting pH results against the site-specific water quality criteria. If receiving waters are estuarine, pH can range from 5.5 -7.5; if receiving waters are fresh, pH can range from 4.2 – 6.7 in accordance with the *Threatened Species Management Plans* (JWA, 2020f-h) for habitat requirements for Wallum Froglet (*Crinia signifera*) and the *Wallum Sedge Frog Management Plan* (JWA 2020i) for habitat requirements for the Wallum sedge Frog (*Litoria olongburensis*).

Monitoring results will also be compared to the following Tweed Catchment Water Quality Objectives[2] (in accordance with the Project Approval Condition 21[5]):

Parameter	Unit	Objective
pH	pH units	Freshwater 6.5 - 8.5 Estuary 7 - 8.5
Dissolved oxygen	mg/L	80 - 100% saturation
Turbidity	NTU	0.5 - 10 NTU
Total phosphorous	mg/L	0.03 mg/L
Total nitrogen	mg/L	0.3mg/L
Chlorophyll a	ug/L	<4
Note: These objectives are included for comparison only and do not constitute compliance criteria for the site. In many instances, baseline site water quality does not meet these objectives.		

Implementation strategy

Construction of temporary sediment detention basins, clean-water diversion channels, swales and vegetated filter strips will be constructed prior to the commencement of earthworks in accordance with the approved Erosion and Sediment Control Plan (ESCP).

Stormwater control will be achieved by directing as much runoff from disturbed areas as practicable to the sediment detention basins.

Clean water diversion channels will be used to divert clean water from construction areas.

Monitoring of the sediment detention basins prior to controlled release shall occur in accordance with the approved ESCP. Monitoring shall be undertaken for pH, turbidity and suspended solids to ensure compliance with background conditions (as relevant to the discharge location).

Water may be discharged from the site that exhibits a suspended solids concentration greater than 50mg L^{-1}, providing the concentration in the discharge is 10% less than the concentration exhibited in the receiving water.

Where water quality fails to meet the established criteria, corrective measures will be undertaken (e.g. if sediment problems are identified, settling in the sediment detention ponds shall be aided by dosing with flocculation agents) to achieve compliance with the water quality release criteria. Treated water is to be re-tested prior to release to establish the effectiveness of treatment measures.

Landscaping activities and revegetation will occur as soon as possible during/after the construction phase of development.

Only appropriate herbicides and fertilisers are to be used in accordance with TSC specifications.

Monitoring

Bulk earthworks phase and Civil construction phase

Surface water monitoring will be conducted monthly and following the first monthly rainfall event (defined as >25mm in 24 hours) at the locations shown on Drawing No. 12017_001 for the parameters listed in Section 4.1.

[2] https://www.environment.nsw.gov.au/ieo/Tweed/report-02.htm

	Surface water and groundwater quality monitoring are to be conducted simultaneously to allow temporal comparisons between the systems. Sample recovery and in situ analysis will be performed by trained staff and, when required, samples will be forwarded to a NATA-accredited laboratory. Sediment and erosion control measures will be inspected regularly in accordance with the approved ESCP. **Landform stabilisation phase, On-maintenance phase** Routine quarterly monthly and rainfall event (>25mm/24hrs) monitoring for one year following the completion of bulk earthworks. Routine quarterly monitoring of temperature, dissolved oxygen, pH, EC and turbidity at 0.5m depths of all off-stream deep water bodies. **Operational phase** Routine biannual monitoring for two years following the completion of the on-maintenance period, with biannual rainfall event (>25mm/24hrs) monitoring campaigns. Parameters shall be those listed in Section 4.1 (Background water quality monitoring) in addition to: hydrocarbon (TPH); benzene, toluene, ethylbenzene and xylenes (BTEX); and enterococci. Routine biannual monitoring of temperature, dissolved oxygen, pH, conductivity, salinity and turbidity at 0.5m depths of all off-stream deep water bodies.
Auditing	**Bulk earthworks phase and Civil construction phase** Monthly: Environmental consultant to audit monthly and rainfall event water quality results against the site specific water quality criteria. **Landform stabilisation phase, On-maintenance phase** Quarterly: Environmental consultant to audit quarterly and rainfall event water quality results against the site specific water quality criteria. **Operational phase** Biannual: Environmental consultant to audit biannual and rainfall event water quality results against the site specific water quality criteria.
Reporting	Within 24 hours of detecting any incidents during construction that cause (or may cause) significant harm to the environment, the Proponent shall notify TSC and other relevant agencies of the incident in accordance with the protocol in Section 5.4. **Bulk earthworks phase and Civil construction phase** Monthly reports will be submitted to TSC within 30 working days upon receipt of the laboratory results. **Landform stabilisation phase and On-maintenance phase** Quarterly reports to be submitted to TSC until completion of works. These reports will be submitted to TSC within 30 working days upon receipt of the laboratory results. **Operational phase** Annual reports to be submitted to TSC.

	All phases Result sheets to be compiled for monitoring results relating to water quality of water bodies. These results to be kept onsite for inspection by local and state government officers. Reports to be submitted to TSC until completion of works. Reports will be submitted to TSC within 30 working days upon receipt of the laboratory results. The water quality reports will be prepared by a suitably qualified and experienced Environmental Consultant. These reports will detail: • The results for each of the environmental indicators monitored. • An assessment of the monitoring results against the criteria. • Consideration must be given to the preferred water quality conditions of WSF communities when interpreting pH results against the site-specific water quality criteria. • When interpreting compliance with the adopted water quality criteria, it is essential to acknowledge that the values of water quality indicators vary naturally and that not all of this variation is ecologically important[3]. • An evaluation, if applicable, of the environmental conditions if monitoring results fall outside the limits of the release criteria. • Recommendations that are relevant to ensuring a high level of water quality is maintained. • Each report will include previous water quality results in tabular format for comparative purposes and trend graphs will be provided. Laboratory certificates will be provided.
Identification of incident or failure	• The values of water quality indicators will vary naturally and not all of this variation is ecologically important.[4]. • The site-specific criteria are based on the 80th percentile of the baseline data set and thus the probability of a single observation exceeding the 80th percentile is 20%. The probability of a Type 1 error (or the risk of triggering a false alarm) is 20%. The recording of a single result that exceeds the criteria will be used to trigger additional investigations including an increase to fortnightly monitoring of the parameter(s) in question. Results will be used to ascertain whether an adverse trend may be emerging and if so, allow early detection of the cause of the trend. The findings of such site investigations should be used to determine whether a non-compliance has occurred.
Corrective action	All development activities occurring at the time of incident/failure shall be reviewed to verify compliance with the OWMP provisions. Construction methods and procedures shall be adjusted if necessary. Specific strategies are to be implemented in consultation with the Environmental Consultant but may include: **pH** In the event that the pH of waters falls outside of the critical limits, such waters will be contained and the pH adjusted to within the target range prior to release.

[3] Australian and New Zealand Guidelines for Fresh and Marine Water Quality, Volume 1, 2000, Section 3.1, Page 21.

[4] Australian and New Zealand Guidelines for Fresh and Marine Water Quality, Volume 1, 2000, Section 3.1, Page 21.

Electrical conductivity
If electrical conductivity exceeds the relevant background criteria, the waters will be contained onsite until adequate EC levels are reached. Further monitoring of upstream waters will be conducted to assess the impact of the development on the absolute change to water quality.

Rainfall data will also be assessed at such times to determine the impact that rainfall has had on the water quality of the site and discharging waters.

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

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

Dissolved oxygen
In the event that dissolved oxygen levels drop below the relevant background criteria, the waters will not be released until visual inspections for algae have been carried out. If algae are present, further laboratory tests will be carried out to determine the type of algae in the waters.

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

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

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

Upon receipt of a complaint follow the Complaints Procedure provided in Section 5.3.

Commitment 23

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

5.24 Groundwater monitoring

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

Issue

Groundwater monitoring.

Operational policy

To establish and maintain stable groundwater conditions and verify by monitoring that development management is appropriate.

Groundwater monitoring is to be undertaken in accordance with the site's *Overall Water Management Plan* and any subsequent revisions of that plan.

Performance criteria

Site specific groundwater quality criteria (indicator parameters only) are:

Groundwater quality criteria		
Parameter	*Precinct 1*	*Precinct 5*
pH	3.5-4.33	3.59-4.47
Electrical Conductivity	<339.4 µs/cm	<131 µs/cm
Total Nitrogen	<3 mg/L	<1.3 mg/L
Total Phosphorus	<0.34 mg/L	<0.05 mg/L
Iron (total)	<1.02 mg/L	<0.45 mg/L
Aluminium (total)	<1.89 mg/L	<0.52 mg/L

For the Landform stabilisation, civil construction, on-maintenance and operational phases there shall be no variation in groundwater levels beyond normal seasonal fluctuations.

Implementation strategy

Groundwater monitoring will be at the locations identified on Drawing 12017_01. The progression of earthworks will necessitate the gradual removal of bores within the footprint of development. Bores will be retained for as long as possible.

Bulk earthworks and civil construction phases
Monitoring of groundwater levels should be undertaken fortnightly during the bulk earthworks phase to determine any effect excavation and dewatering activities may have on groundwater levels.

Groundwater samples are to be collected monthly for the parameters listed in Section 4.1. Results to be compared against the performance criteria above.

Landform stabilisation phase and on-maintenance phase
Quarterly groundwater monitoring during the Landform stabilisation phase will be undertaken for the parameters in Section 4.1. Results to be compared against the performance criteria above.

	Operational phase Monitoring of groundwater levels should be undertaken bi-annually during. Groundwater samples are to be collected quarterly and analysed for the parameters in Section 4.1 with additional monitoring for hydrocarbon (TPH); benzene, toluene, ethylbenzene and xylenes (BTEX); and enterococci. Results to be compared against the performance criteria above.
Monitoring	Groundwater monitoring will be at the locations identified on Drawing 12017_01. The progression of earthworks will necessitate the gradual removal of bores within the footprint of development. Bores will be retained for as long as possible. **Bulk earthworks and civil construction phases** Monitoring of groundwater levels should be undertaken fortnightly during the bulk earthworks phase to determine any effect excavation and dewatering activities may have on groundwater levels. Groundwater samples are to be collected monthly for the parameters listed in Section 4.1. Results to be compared against the performance criteria above. **Landform stabilisation phase and on-maintenance phase** Quarterly groundwater monitoring during the Landform stabilisation phase will be undertaken for the parameters in Section 4.1. Results to be compared against the performance criteria above. **Operational phase** Monitoring of groundwater levels should be undertaken bi-annually during. Groundwater samples are to be collected quarterly and analysed for the parameters in Section 4.1 with additional monitoring for hydrocarbon (TPH); benzene, toluene, ethylbenzene and xylenes (BTEX); and enterococci. Results to be compared against the performance criteria above.
Auditing	**Bulk earthworks and civil construction phases** Monthly: The environmental consultant is to audit water quality to ensure that no deleterious effects are resulting from any excavation, filling and dewatering operations at the site. The data from the water level measurement shall be collated and evaluated against the background monitoring data. **Landform stabilisation phase and On-maintenance phase** Quarterly: The environmental consultant is to audit water quality quarterly to ensure that no deleterious effects are resulting from any excavation, filling and dewatering operations at the site. **Operational phase** Biannual: The environmental consultant is to audit water quality biannually to ensure that no deleterious effects are resulting from site activities.
Reporting	Within 24 hours of detecting any incidents during construction that cause (or may cause) significant harm to the environment, the Proponent shall

	notify TSC and other relevant agencies of the incident in accordance with the protocol in Section 5.4. **Bulk earthworks phase and Civil construction phase** Monthly reports will be submitted to TSC within 30 working days upon receipt of the laboratory results. **Landform stabilisation phase and On-maintenance phase** Quarterly reports to be submitted to TSC until completion of works. These reports will be submitted to TSC within 30 working days upon receipt of the laboratory results. **Operational phase** Annual reports to be submitted to TSC. **All phases** Result sheets to be compiled for monitoring results relating to water quality of water bodies. These results to be kept onsite for inspection by local and state government officers. Reports to be submitted to TSC until completion of works. Reports will be submitted to TSC within 30 working days upon receipt of laboratory results. The water quality reports will be prepared by a suitably qualified and experienced Environmental Consultant. These reports will detail: • The results for each of the environmental indicators monitored. • An assessment of the monitoring results against the criteria. • Consideration must be given to the preferred water quality conditions of WSF communities when interpreting pH results against the site-specific water quality criteria. • When interpreting compliance with the adopted water quality criteria, it is essential to acknowledge that the values of water quality indicators vary naturally and that not all of this variation is ecologically important[5]. • An evaluation, if applicable, of the environmental conditions if monitoring results fall outside the limits of the release criteria. • Recommendations that are relevant to ensuring a high level of water quality is maintained. • Each report will include previous water quality results in tabular format for comparative purposes and trend graphs will be provided. Laboratory certificates will be provided.
Identification of incident or failure	• The values of water quality indicators and groundwater levels will vary naturally and not all of this variation is ecologically important.[6]. • The site-specific criteria are based on the 80th percentile of the baseline data set and thus the probability of a single observation exceeding the 80th percentile is 20%. The probability of a Type 1 error (or the risk of triggering a false alarm) is 20%. • The recording of a single result that exceeds the criteria will be used to trigger additional investigations including an increase to fortnightly

[5] Australian and New Zealand Guidelines for Fresh and Marine Water Quality, Volume 1, 2000, Section 3.1, Page 21.
[6] Australian and New Zealand Guidelines for Fresh and Marine Water Quality, Volume 1, 2000, Section 3.1, Page 21.

<table>
<tr><td rowspan="2">Corrective action</td><td>monitoring of the parameter(s) in question. Results will be used to ascertain whether an adverse trend may be emerging and if so, allow early detection of the cause of the trend. The findings of such site investigations should be used to determine whether a non-compliance has occurred.</td></tr>
<tr><td>If a trend of declining groundwater quality is detected, the likely source(s) of contamination will be identified.

Should the investigation indicate that site activities are triggering the incident/failure, the following will be implemented:
• Locate the source of the contamination/level variation and take appropriate actions to contain and control the contaminant/level variation. Investigate the cause of the contamination/level variation and take action to prevent a recurrence.
• All development activities taking place at the time of incident/failure shall be reviewed to verify compliance with the SOMP provisions and, if necessary, construction methods and procedures shall be adjusted.
The quality of the dewatered groundwater being discharged to recharge trenches shall be reviewed to confirm compliance with the performance criteria detailed below.

<table><tr><th rowspan="2">Water Quality Parameter</th><th colspan="2">Release Criteria</th></tr><tr><th>Precinct 1</th><th>Precinct 5</th></tr><tr><td>pH</td><td>3.5-4.33</td><td>3.59-4.47</td></tr><tr><td>Oil and grease</td><td>No visible film, no detectable odour</td><td>No visible film, no detectable odour</td></tr></table>
Upon receipt of a complaint follow the Complaints Procedure provided in Section 5.3.</td></tr>
</table>

Commitment 24

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

5.25 Groundwater seepage monitoring

Applies to:	Bulk earthworks phase and Civil Construction phases
Person responsible:	Contractor's Site Manager; Environmental Consultant

Issue	Groundwater seepage monitoring. Management of groundwater seepage quality.
Operational policy	All groundwater seepage encountered in excavations will be monitored and managed to minimize offsite impacts.
Performance criteria	Daily pH monitoring of any seepage within the excavation areas is to be undertaken prior to the disposal of these waters via dewatering.

Discharge to recharge trenches/zones

All waters discharged from the excavation areas to recharge trenches or recharge zones during the construction phase should comply with the following criteria:

Water Quality Parameter	Release Criteria	
	Precinct 1	Precinct 5
pH	3.5-4.33	3.59-4.47
Oil and grease	No visible film, no detectable odour	No visible film, no detectable odour

Discharge to surface water bodies

Where the discharge of dewatered groundwater to on-site drains and waterways is intended, water quality will satisfy the relevant surface water quality criteria:

Surface water quality criteria Parameter	Saline (SW1, SW2, SW6, and SW9)	Brackish (SW5)	Fresh (SW3, SW4, SW7, SW8 and SW10)
pH	5.66-6.3	5.34-6.14	5.23-6.66
Electrical Conductivity	<38700 µs/cm	<4008.6 µs/cm	<230.4 µs/cm
Dissolved Oxygen	>7.10 mg/L	>4.87 mg/L	>2.91 mg/L
Turbidity	<3.1 mg/L	<23.76 mg/L	<32.54 mg/L
Total Nitrogen	<0.5 mg/L	<1 mg/L	<1.46 mg/L
Total Phosphorus	<0.03 mg/L	<0.04 mg/L	<0.14 mg/L
Iron (total)	<0.41 mg/L	<4.40 mg/L	<6.57 mg/L
Aluminium (total)	<0.22 mg/L	<0.36 mg/L	<0.68 mg/L
Chlorophyll-a	<6 µg/L	<6 µg/L	<6 µg/L
Litter and gross pollutants	No man made material <5mm in any dimension	No man made material <5mm in any dimension	No man made material <5mm in any dimension

	Oil and/or grease	No visible film, no detectable odour	No visible film, no detectable odour	No visible film, no detectable odour
	*Note: pH must be consistent with receiving water quality. Consideration must be given to the preferred water quality conditions of WSF communities when interpreting pH results against the site-specific water quality criteria. If receiving waters are estuarine, pH can range from 5.5 -7.5; if receiving waters are fresh, pH can range from 4.2 – 6.7 in accordance with the *Threatened Species Management Plans* (JWA, 2020f-h) for habitat requirements for Wallum Froglet (*Crinia signifera*) and the *Wallum Sedge Frog Management Plan* (JWA 2020i) for habitat requirements for the Wallum sedge Frog (*Litoria olongburensis*).			

Implementation strategy

The site contractor shall be equipped with reliable pH monitoring equipment that will be calibrated on a weekly basis (at least).

Daily pH monitoring of any seepage within the excavation areas is to be undertaken prior to the disposal of these waters via dewatering.

Dewatered groundwater will undergo appropriate treatment to ensure compliance with the pH criteria prior to release into recharge trenches, zones or surface water bodies.

Where disposal to surface water bodies (drains, waterways etc) is intended additional monitoring (for the surface water quality parameters outlined above) will be undertaken at the controlled discharge points by the environmental consultant monthly and during rainfall events (defined as >25 mm in any 24 hour period) for the duration of the associated dewatering activities.

The following principles will be followed for all dewatering and recharge activities;

- Discharge of dewatered groundwater will occur within the site boundary.
- Discharge of dewatered groundwater will occur within close proximity to the extraction location as far as is operationally achievable
- Sediment basins, and the excavations for swales and/or bioretention basins may act as recharge locations if practical and proximal to the dewatering location.

Records of the measured pH, time of monitoring, calibration records and treatment measures employed are to be kept on site for inspection by the environmental consultant and TSC if requested.

Outside the construction area of each stage existing surface water conditions shall be maintained in accordance with Table 5.23 of this management plan ‘Surface water quality’.

If acidic seepage waters are encountered, the batter slopes of the excavation face should be subject to blanket liming as required at a predetermined rate in accordance with the *Acid Sulfate Soil Management Plan* (G&S, September 2020 and any subsequent revisions of that plan.

The addition of hydrated lime or crushed ag-lime to acidic seepage waters may also be required. The environmental consultant should be consulted to determine the need for this treatment and the required addition rate in accordance with *Acid Sulfate Soil Management Plan* (G&S, September 2020) and any subsequent revisions of that plan.

Before undertaking any earthworks in drains or watercourses, the drain or watercourse will be bunded and contained in a staged manner, with water

	tested and treated prior to discharge. Particular attention will be given to watercourses containing high levels of organic matter that may also have the potential to form monosulfidic black oozes (MBOs). Existing MBOs will be managed, with organic material within the drain kept to a minimum and dissolved oxygen concentrations within water-bodies monitored and increased if necessary (in accordance with the recommendations outlined in Tulau (2007). Titratable Actual Acidity contents and water pH levels of water-bodies will also be monitored and adjusted as necessary.
Monitoring	Carry out daily pH monitoring of seepage waters entering excavations during the construction phase prior to disposal via dewatering. Where disposal to surface water bodies (drains, waterways etc) is intended additional monitoring (for the surface water quality parameters outlined above) will be undertaken at the controlled discharge points by the environmental consultant monthly and during rainfall events (defined as >25mm in any 24 hour period) for the duration of the associated dewatering activities. Samples will be forwarded to a NATA-accredited laboratory for analysis when required.
Auditing	A review of the contractor's monitoring and treatment records shall be undertaken to verify sufficient monitoring and treatment is being undertaken. Site management to audit water quality results weekly to verify that discharges comply with the performance criteria.
Reporting	All monitoring results and treatment procedures are to be accurately recorded and maintained onsite for inspection by TSC upon request. Within 24 hours of detecting any incidents during construction that cause (or may cause) significant harm to the environment, the Proponent shall notify TSC and other relevant agencies of the incident in accordance with the protocol in Section 5.4.
Identification of incident or failure	Failure to undertake monitoring at the required frequencies. Discharge of ground waters to recharge trenches or surface water bodies that do not satisfy the nominated pH range for this site. A decline in water quality downstream of the dewatering or discharge activities.
Corrective action	Increase monitoring frequency to required levels. Take necessary steps to address the problem and apply remedial measures to prevent the generation of excessive acid seepage waters (i.e. blanket liming of excavated faces and recharge trenches) in consultation with the Environmental Consultant. Upon receipt of a complaint follow the Complaints Procedure provided in Section 5.3.

Commitment 25

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

5.26 Vegetation clearing

The information in this table was supplied by JWA (*Vegetation and Weed Management Plan* (VWMP) (JWA 2020a-c).

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

Issue	Vegetation clearing. Minimisation of the removal or disturbance of trees, shrubs and ground covers.
Operational policy	To maintain existing vegetation where possible during construction works. Vegetation to be retained is detailed in the *Vegetation and Weed Management Plan* (VWMP) (JWA 2020a-c).
Performance criteria	No vegetation is to be removed prior to TSC approval.
Implementation strategy	Koala survey to be undertaken by appropriately qualified person prior to any clearing in areas of potential Koala habitat. An ecologist should be present during vegetation clearing. Trees to be conserved are to be flagged with surveyors marking tape. Trees to be cleared will be inspected immediately prior to clearing. Orphaned fauna encountered shall be managed in accordance with Table 5.36 'Fauna & flora protection – general provisions'. Compaction of ground in the drip line of trees to be retained will be avoided or otherwise minimised. The area of disturbance shall be clearly delineated to keep vehicles, building materials and refuse away from areas to be conserved. Vegetation buffer zones shall be maintained where possible. Where practicable vegetative debris shall be salvaged as logs or woodchip. Research into appropriate timbers and uses will be carried out prior to selection of salvaged logs. Vegetative debris set out to be salvaged for logs will be clearly marked and stockpiled onsite until required. Timber for woodchips will be chipped onsite and stockpiled within control measures until required.
Monitoring	Regular inspections shall be carried out to ensure that construction work areas are kept within stage boundaries.
Auditing	• A weekly safety audit shall be conducted of the retained vegetation. • Management to examine the boundary of the works weekly.

Reporting	No reporting is necessary unless areas are inadvertently cleared outside approved stage boundaries.
Identification of incident or failure	• Clearing of designated retained vegetation. • Clearing outside of stage boundaries.
Corrective action	Reinstate and revegetate overcleared areas where necessary, unless the area is to be used for future staging.

Commitment 26

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

5.27 Air quality and dust management

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

Issue	Air quality & dust management. Minimisation of movement of dust offsite.
Operational policy	To achieve acceptable air quality standards through the control of the movement of dust offsite from construction works.
Performance criteria	The target level for complaints by nearby residents is no more than one in any seven-day period. Ambient air quality should not deteriorate by more than 30% over a period of seven consecutive days. Dust deposition at any nearby residence should not exceed 100mg m^{-2} d^{-1}.
Implementation strategy	• Construction works shall be staged to limit the areas exposed at any one time. • Remove topsoil and rehabilitate disturbed areas as soon as practicable after the completion of earthworks. • Erosion and sediment control measures shall be installed in accordance with Table 5.16 ''Erosion and Sediment Control' and the site's ESCP. • All permanent bunds and reshaped areas will be revegetated within a fortnight after completion of earthworks (including excavation and backfilling of services trenches). • Stockpiling onsite will be minimised where possible. Long term stockpiles, not used for over six months, will be sown with cover crops. • Ground surfaces and haulage routes will be kept damp (not wet). • Surfaces (excluding haulage routes) shall be left in a rough cloddy condition to increase roughness and slow surface wind speed. • An on-site water cart will be available at all times. • All work to cease if wind speed exceeds 10m/sec. • Contractors staff to be trained to implement dust minimisation measures. • Protective ground covers shall be provided where appropriate, including mulches, vegetation, organic binders or dust retardants. • Traffic movements on any disturbed areas shall be minimised in accordance with Table 5.3 'Site management' and Table 5.34 'Traffic management' of the SOMP.

Monitoring	Daily inspections will be carried out to verify that dust mitigation measures are being implemented. Dust monitoring will be conducted upon receipt of repeated complaints.
	
	If dust monitoring is to take place, the following will occur:
	• Temporary dust deposition gauges will monitor the movement of dust offsite at;
	  ◦ the residence/s from which the complaint has been received,
	  ◦ at the boundary of the construction site, in line with the residence/s (ideally in the predominant wind directions); and
	  ◦ at a suitable 'regional background' location which should not be affected by construction dust, to provide background context for analysis and interpretation.
	• Monitoring will be undertaken in accordance with AS 3580.10.1 (2016) or subsequent updates.

Auditing	• Management to examine the complaints register monthly and review corrective action taken.
Reporting	The contractor to notify the DPIE of a possible environmental nuisance on receipt of three (3) or more dust-related complaints in any 24-hour period. Reports will be provided to TSC upon request. Upon receipt of a complaint follow the Complaints Procedure provided in Section 5.3.
Identification of incident or failure	Any dust-related complaints by residents that are confirmed to originate from the site will indicate a failure of the dust control measures.
Corrective action	Locate the source of the dust and implement the following measures: • Apply water sprays to vegetation; • Cover or water exposed areas of soil. • Monitor and log the wind direction and speed • If dust persists, cease the dust creating activities. • All dust complaints are to be addressed in consultation with the environmental consultant. • Reports will be provided to TSC upon request.

Commitment 27

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

5.28 Noise and vibration management

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

Issue	Noise & vibration management.
Operational policy	To minimise noise and vibration impacts to the surrounding environment and nearby noise receptors.
Performance criteria	Compliance with the local area Noise policy of DPIE and TSC. No vibration impacts on nearby dwellings or structures.
Implementation strategy	Hours of work shall be as per Section 5.2. Prior to construction works being undertaken, the: • Surrounding noise sensitive receivers should be contacted and informed of the anticipated duration of works as prescribed in section 7.4 of the approved Noise and Vibration Mangement Plan (CRG, 2020). • Noise emissions of all plant to be used onsite, along with all sensitive noise receptors, are to be reviewed as prescribed in Section 7.2 of the approved Noise and Vibration Management Plan (CRG, 2020). Commence earthworks in the mornings as far from the residential premises as is possible. • Optimise the placement of haul roads and fixed plant and equipment to ensure they are as far as practicable from noise sensitive receivers. • Unloading building materials should be conducted as far away from noise sensitive premises as possible. • The provision of sound walls and acoustical screening, including the use of earth embankments. • Incorporate buffer zones and setback distances between the noise source and receiver. All workers are to adhere to the hours of operation prescribed in Section 7.1 of the Noise and Vibration Management Plan (CRG, 2020), so as to minimise noise generating activities occurring early and late in the day. Staff training shall be conducted and include adequate information on typical noise exposures and methods for noise management in accordance with this policy. Plant and equipment shall be maintained and operated in accordance with manufacturer's specifications and Sections 7.2 and 7.3 of the approved Noise and Vibration Management Plan.

	Plant and equipment shall be fitted with exhaust and radiator silencers where appropriate. The use of horns, sirens and reverse signals shall be restricted to where required for the satisfaction of workplace health and safety. Blasting (if required) shall be coordinated to reduce the level of ground vibration by altering drilling patterns, incorporating delays, controlling spacing and orientation and establishing blast timing to suit local conditions.
Monitoring	Daily inspections will be carried out by the Site Manager of all noise and vibration generating plant. Inspection notes to be recorded in Site Diary. All noise and vibration related complaints shall be recorded in the Incidents/ Complaints Register. Incidents and complaints shall be handled in accordance with Sections 5.3 and 5.4.
Auditing	Monthly environmental audits of site activities, complaints, corrective actions and reporting by an independent consultant during the construction phase of the development to assess compliance with the SOMP.
Reporting	Site inspection notes, including any control measures implemented, shall be recorded in the Site Diary. An Incidents/Complaints Register shall be maintained on-site and will be available for inspection by TSC (or other relevant authorities) upon request. Upon the receipt of three or more noise-related complaints within a 24-hour period, TSC and the DPIE shall be notified. Reports detailing any incidents and/or complaints and corrective actions shall be provided to statutory authorities upon request.
Identification of incident or failure	The receipt of three or more noise-related complaints within a 24hr period. Ongoing, repetitive complaints.
Corrective action	Non-compliance and complaints will be addressed according to the management methodology prescribed in Section 7.5 of the approved Noise and Vibration Management Plan (CRG, 2020). Corrective actions will be implemented upon receipt of complaints (which have been investigated and determined to be legitimate). This shall involve identifying the source of the offending noise, and the implementation of the following measures (if applicable): • Driver training and erection of additional signage • Compliance with the approved hours of operations for the construction works. • The removal of noise producing works (where possible) from areas in close proximity to residential properties. • Improving the noise rating of offending equipment. • Providing acoustic enclosures/shielding for offending equipment. • Improving acoustic buffering at the site boundary. • If excessive noise levels persist, cease the noise creating activities and review site activities and procedures.

	If, for the purpose of complaint resolution, noise auditing/monitoring is requested by TSC or the DPIE, the following will occur: • monitoring of noise levels (including background levels) at the site by an independent noise consultant; and • measuring the contributing noise from the development at the nearest sensitive receptor (residence).

Commitment 28

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

5.29 Site management

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

Issue	Site management.
Operational policy	To ensure that the site works are undertaken in such a manner as to provide a safe and efficient workplace, whilst minimising any potential disturbances to the surrounding community and preventing environmental harm.
Performance criteria	Effective control of site access and fencing. Site-specific induction training to ensure all personnel are aware of his/her responsibilities under the SOMP. All persons entering/visiting the site are appropriately informed of site requirements.
Implementation strategy	Hours of work shall be as per Section 5.2. All construction activities, materials, equipment and personnel shall be restricted to within the boundaries of the site. Fencing around the perimeter of the work area shall be maintained for the duration of the construction activities. Gates at the site access points shall be maintained and secured after hours. All persons working on the project, including sub-contractors, shall undertake site induction training on the provisions of the SOMP prior to commencing activities onsite in accordance with the provisions of Table 5.32 'Personnel training'.
Monitoring	Weekly inspections shall be carried out by the Site Manager to verify: • construction activities are being conducted within the approved hours of operation and within the staged boundaries; and • the integrity of the perimeter fencing, gates and locks. The Site Manager shall ensure that contractors/sub-contractors are conforming to site requirements.
Auditing	NA
Reporting	Site inspection notes shall be recorded in the Site Diary. A record of all staff working onsite shall be maintained and available for inspection upon request. A training attendance register shall be established, recording the name of the trainee and trainer, date trained and the elements of training delivered. A logbook shall be kept onsite to record all visitors to the construction area.

	An Incidents/Complaints Register shall be onsite and will be available for inspection by TSC (or other relevant authorities) upon request. Trespassing incidents are to be investigated.
Identification of incident or failure	Unauthorised access to the construction site. Inadequate staff training with respect to implementation of the SOMP. Failure to adhere to site operating hours. Complaints regarding site operations.
Corrective action	Site management procedures are to be reviewed. Environmental induction training to be conducted regularly for new staff and repeated for staff responsible for any non-conformances. Provisions of the SOMP to be implemented.

Commitment 29

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

5.30 Contractor management

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

Issue	Contractor management.
Operational policy	To ensure the Proponent's duty of care is met by ensuring the contractor is aware of his/her responsibilities under the terms of the SOMP.
Performance criteria	Each contractor is fully aware of its responsibilities under the terms of the SOMP and its obligation to respond to environmental issues arising from construction activities.
Implementation strategy	The SOMP (and approved variations) will be included in the contract documentation and become a contractual obligation for all contractors performing any civil or earthworks. The contractor will integrate the SOMP (and approved variations) with the construction approach and staging. The development will comply with the SOMP at all times throughout the construction and operational phases. When assessing site conditions, the contractor shall and implement the relevant SOMP provisions in conjunction with the approved plans, drawings and documents. Monitoring and verifying that the SOMP is adhered to at all times and taking action if the specifications are not followed. Ensuring the contractor is aware of the SOMP arrangements and clarifying the expectations (with regards to specific environmental requirements) as they relate to each contractor. The proper and adequate coordination of contractors to ensure the integration of interrelated issues identified in the SOMP. The provision of advice, information and training to contractors and staff with regards to the implementation of the SOMP provisions in accordance with Table 5.32 'Personnel training' of the SOMP. Review of the SOMP and the construction phase contracts at the end of each stage of works. Feedback shall be sought to the satisfaction of works being completed. If required, the Proponent shall manage the transition to new contractors. Remedies for breach of contract shall be enforced.
Monitoring	Weekly site inspections to be carried out by the Proponent's representative to ensure the provisions of the SOMP are being adequately implemented. Monitoring the contractor's continuing performance against contract obligations.

	Continuous monitoring of contractor work to ensure high productivity and reasonable progress towards performance outcomes of the SOMP. Liaison with internal managers, users and suppliers to identify and resolve any issues that arise.
Auditing	Monthly environmental audits of site activities, complaints, corrective actions and reporting by an independent consultant during the construction phase of the development to assess compliance with the SOMP.
Reporting	Not applicable.
Identification of incident or failure	Not applicable.
Corrective action	The Proponent has the right to call a halt to any activity being undertaken which is deemed in conflict with the provisions of the SOMP. The SOMP shall be regularly reviewed and updated in consultation with TSC to reflect changes to the construction project.

Commitment 30

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

5.31 Light management

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

Issue	Light management.
Operational policy	To prevent artificial light affecting premises, roadways and wildlife.
Performance criteria	Compliance with Australian Standard AS4282 – 1997 'Control of Obtrusive Effects of Outdoor Lighting'. Compliance with relevant nuisance legislation. Compliance with TSC conditions with respect to hours of operation.
Implementation strategy	All temporary lighting infrastructure shall be designed to prevent or minimise adverse effects on adjoining premises, roadways and wildlife. Professional advice on the design, operation and maintenance of all external lighting proposed for the site shall be sought prior to installation. The erection of lighting shielding walls, the provision of appropriate earth or vegetation barriers or other similar strategies shall be utilised to minimise light nuisance to neighbouring sensitive receptors. **Precinct 1** The visible light reflectivity from building materials used on the facades of the buildings in Precinct 1 must not exceed 20% and must be designed so as not to result in glare that causes any nuisance or interference to any person or place. A report demonstrating compliance with these requirements must be submitted to the satisfaction of the Certifying Authority prior to the issue of a Construction Certificate for the construction of any building in Precinct 1. All outdoor lighting must comply with AS/NZ1158.3: 1999 Pedestrian Area Category P) Lighting and AS4282: 1997 Control of the Obtrusive Effects of Outdoor Lighting. Details demonstrating compliance with these requirements must be submitted to the satisfaction of the Certifying Authority prior to the issue of a Construction Certificate for the construction of any building in Precinct 1.
Monitoring	All outdoor lighting erected in association with the construction works shall be assessed to ensure compliance with the performance criteria and MP08_0194. All light related complaints shall be recorded in the Incidents/ Complaints Register in accordance with Section 5.3. This register shall be reviewed by management weekly.

Auditing	Monthly environmental audits of site activities, complaints, corrective actions and reporting by an independent consultant during construction phase of the development to assess compliance with the SOMP. **Precinct 1 (prior to issue of an occupation certificate)** The Proponent must submit to the Certifying Authority evidence from an independent qualified practitioner demonstrating compliance that: • All externally mounted artificial lighting, including security lighting, must be shielded where necessary or required so as to prevent the spill of light or glare creating a nuisance to neighbouring or adjacent premises. • Illuminated signage and lights must be switched off between the hours of 10:30 pm to 6 am each evening.
Reporting	Site inspection notes, including any control measures implemented, shall be recorded in the Site Diary. An Incidents/Complaints Register shall be maintained on-site and will be available for inspection by TSC (or other relevant authorities) upon request. Reports detailing any incidents and/or complaints and corrective actions shall be provided to statutory authorities upon request.
Identification of incident or failure	The receipt of three or more light-related complaints within a 24hr period. Ongoing, repetitive complaints.
Corrective action	Upon receipt of a complaint follow the Complaints Procedure provided in Section 5.3.

Commitment 31

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

5.32 Personnel training

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

Issue	Personnel training.
Operational policy	To ensure that all personnel understand the environmental issues involved with construction operations.
Performance criteria	All personnel appropriately and adequately trained. All incidents are managed efficiently and corrective actions promptly implemented in accordance with the provisions of Table 5.29 'Site management'.
Implementation strategy	• All personnel involved in the construction of the project shall undergo induction training on the provisions of the SOMP prior to commencing activities onsite. • Training handouts will be made available to all personnel. • Additional training shall be provided for employees involved in specialised construction activities (if applicable) so that the appropriate skills and competencies to participate in these activities are attained.
Monitoring	• Management to examine the training attendance records and ensure appropriate training procedures are in place. • Regular liaison with the contractors to keep onsite staff informed of any issues that arise with regards to the requirements of the SOMP.
Auditing	Monthly environmental audits of site activities, complaints, corrective actions and reporting by an independent consultant during the construction phase of the development to assess compliance with the SOMP.
Reporting	An attendance register shall be established and all attendees recorded following the completion of the training.
Identification of incident or failure	Not applicable.
Corrective action	Additional training or refresher courses shall be provided for new staff members or for those requiring additional training and performance review.

Commitment 32

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

5.33 Refuelling of construction equipment and vehicles

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

Issue	Refuelling of construction equipment & vehicles.
Operational policy	To ensure that fuel, grease and other hazardous substances present onsite are managed in a safe and environmentally responsible manner.
Performance criteria	No fuel, grease and/or oil contamination of the environment shall result due to construction activities.
Implementation strategy	Where reasonably practical, plant shall be refuelled offsite. Maintenance of machinery onsite is to be minimised and completed offsite wherever possible. The storage, preparation, use and disposal of fuels and oils shall take place under the supervision of the earthmoving contractor who will be responsible for any decontamination. Only appropriately trained personnel (as detailed in Table 5.32 'Personnel training') shall conduct refuelling. An operating procedure for containing and cleaning up oil spills will be in place and all staff will be trained in these procedures. Suitable quantities of products designed to contain and absorb oil spills will be available onsite. Contaminated materials used in the clean-up of a fuel/oil spill will be disposed of by a commercial waste contractor offsite at an appropriately licensed waste disposal facility in accordance with Table 5.14 ''Waste management'.
Monitoring	Weekly inspections will be carried out by the Site Manager of: • the integrity of any temporary sumps or fuels storage areas; and • the quantity and condition of products designed to contain and absorb oil spills.
Auditing	Monthly environmental audits of site activities, complaints, corrective actions and reporting by an independent consultant during the construction phase of the development to assess compliance with the SOMP.
Reporting	Site inspection notes shall be recorded in the Site Diary. Incidents/Complaints Register to be maintained on-site and be available for inspection by TSC (or other relevant authorities) upon request. Incident reporting shall be undertaken in accordance with Section 5.4.

	In the event of potential or actual environmental harm arising from a spill, the site manager shall notify the DPIE and corrective actions implemented as directed. Reports detailing any incidents and/or complaints and corrective actions shall be provided to statutory authorities upon request.
Identification of incident or failure	Land or water contamination associated with the practice of onsite vehicle maintenance or refuelling.
Corrective action	The immediate containment of spillages with booms, containment bunds or other appropriate measures. Remediation of site contamination in consultation with environmental consultant and DPIE. Corrective actions (to be implemented in the event of land contamination) include: • Identifying the source of contamination and reporting the incident to the appropriate authorities in accordance with the Incident Reporting provisions in Section 5.4. • Arranging for the source of the contamination to be rectified and for the contaminated area to be remediated. Action for fuel/oil spillage: • All ignition sources to be removed from vicinity of spill. • All equipment in vicinity of storage to be turned off. • Identification of source of spillage and immediately contain with booms, bunds or similar. • Remediate spill in consultation with the Environmental Consultant. • Report the Incident in accordance with Section 5.4. • Take action to ensure similar incidents are avoided in future.

Commitment 33

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

5.34 Traffic management

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

Issue	Traffic management.
Operational policy	To provide a safe and efficient working environment and to minimise potential disturbance to the community as a result of vehicular movement onsite.
Performance criteria	Effective control of construction traffic to ensure that where possible traffic is kept off public roads and away from existing developed properties.
Implementation strategy	Traffic Control on Tweed Coast Road to be implemented in accordance with the Traffic Control Plan 19/1406. Haul roads shall be constructed across the subject site. The use of Haul roads in lieu of public roads, where possible, shall become a contractual obligation for the contractors. All access points to the construction site shall be clearly defined and appropriate signage erected. All access roads shall be adequately maintained, including the erection of signage and dust suppression to ensure safe travel is maintained at all times. Speed limits shall be enforced for all access roads. Limits shall be reduced during times of high winds to prevent the production of excessive dust. Sufficient parking areas and loading zones shall be provided for staff and suppliers. Workers, materials or trucks will not obstruct existing footpaths and roads. Fencing shall be constructed at the site access points to restrict pedestrian access from local streets for the duration of the construction works.
Monitoring	Continual vigilance shall be maintained by the Site Manager to ensure all contractual obligations are met. Weekly inspections shall be carried out by the site manager to verify: • the condition of site access points and any haul roads; • the provision of sufficient parking and loading zones; and • the erection of adequate signage. Inspection notes are to be recorded in the Site Diary.

Auditing	Monthly environmental audits of site activities, complaints, corrective actions and reporting by an independent consultant during the construction phase of the development to assess compliance with the SOMP. Management to examine the complaints register weekly and review corrective actions taken. A copy of all Site Diary notes and any other correspondence relating to traffic shall be forwarded to the Contract Superintendent on a monthly basis.
Reporting	An incidents/complaints register shall be maintained onsite and will be available for inspection by TSC (or other relevant authorities) upon request. Complaints will be managed in accordance with Section 5.3. A record of any breach of contractual obligations and of any complaints from adjoining residents shall be kept in the Site Diary. Any complaints from adjoining residents shall immediately be conveyed to the Contract Superintendent.
Identification of incident or failure	Vehicles operating in breach of contractual conditions.
Corrective action	Review procedures to ensure compliance with the SOMP. Amend site access and parking regimes to reflect onsite constraints during the construction process. Issue written instructions to persons in breach of contractual obligations.

Commitment 34

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

5.35 Geotechnical investigation & analysis

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

Issue	Geotechnical investigation & analysis.
Operational policy	To manage the iterative process of investigation, design and construction monitoring to enable geotechnical design constraints to be formulated at the end of construction that are consistent with the proposed future use of the site.
Performance criteria	Compliance with the recommendations of the Geotechnical Investigation for Proposed Residential Subdivision, Depot Road Kings Forest (Cardno Bowler April 2011) and any other future Geotechnical Engineering Management Plan (GEMP) prepared by qualified engineers and approved by TSC. Construction control testing and monitoring to assess progress of foundation treatment and determine when surcharge may be removed. Review of data and specification of geotechnical design constraints for infrastructure and buildings on development platforms.
Implementation strategy	Each stage shall be preceded by an endorsement of detailed earthworks design plans by a practising geotechnical engineer to certify compliance of the plans and implementation strategy with the conclusions and recommendations of the Geotechnical Report prepared by Cardno Bowler titled Geotechnical Investigation proposed subdivision Depot Road, Kings Forest dated 7 April 2011. Development and use of a Geotechnical Engineering Management Plan when required based on scope of works.
Monitoring	All earthworks are to be carried out in accordance with AS3798-2007 (Guidelines on earthworks for commercial and residential Developments) under Level 1 supervision and in accordance with the requirements of the findings of the detailed geotechnical investigation During the period of placement and compaction of engineered fill and surcharge, monitoring shall be carried out of settlement monitoring stations to measure the magnitudes of settlement caused by consolidation. Monitoring shall be carried out of piezometers to measure excess pore water pressure.
Auditing	The geotechnical consultant shall review the results of construction control materials testing, excess pore water pressure measurements and settlement monitoring to determine whether the data arising during the construction phase indicate suitable materials and procedures are adopted.

	During placement and compaction of engineered fill and the period of surcharge, excess pore water pressures around the perimeter of each fill area shall be reviewed and compared with target values required to achieve acceptable factors of safety against instability. Where the target values are exceeded, further placement of engineered fill and surcharge shall be delayed until advised by the geotechnical consultant. Surcharge shall not be removed until directed by the geotechnical consultant having regard to the monitoring data and any revised design assumptions.
Reporting	The results of all reviews shall be provided to TSC in a written format within 20 business days of completion of the reviews. If the Council makes a written request for information in relation to the submitted results, the geotechnical consultant shall provide the requested information in a written format within 10 business days of receipt of the written request. The likely future settlement that may occur on the development platforms is to be assessed and the geotechnical design constraints for infrastructure and buildings on the development platforms are to be specified. On completion of bulk earthworks, the geotechnical consultant shall prepare a comprehensive report on all additional site investigations/testing, construction monitoring of settlement and geotechnical construction overview of earthworks.
Identification of incident or failure	A significant difference between monitored data and design assumptions. Excess pore water pressures beneath the perimeter of a fill area exceeding target values.
Corrective action	Any significant difference between monitored data and design assumptions will require a review to be carried out of the design and construction program. Where excess pore water pressures beneath the perimeter of a fill area exceed target values, further placement of engineered fill and surcharge shall be delayed until advised by the geotechnical consultant.

Commitment 35

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

5.36 Fauna & flora protection – general provisions

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

Issue	Fauna & flora protection.
Operational policy	To minimise the impact of construction activities on existing vegetation and fauna. Bulk earthworks will be controlled by the *Vegetation and Weed Management Plan (VWMP_ (JWA, 2020a-c)* and *Threatened Species Management Plan (TSMP)* (JWA, 2020f-h).
Performance criteria	No clearing or damage of vegetation beyond the limits of the construction site. Minimal disturbance to native fauna.
Implementation strategy	**Flora management** Existing vegetation shall be retained in accordance with the indicative golf course development plan. Temporary fencing shall be erected around all habitat or significant vegetation that is to be retained or avoided in the field. Buffer zones shall be maintained around protected areas to avoid encroachment by construction activities. The movement and parking of vehicles and stockpiling of materials shall be avoided within the drip line of trees to be retained. Vegetation shall only be cleared from within the designated clearing area. Vegetation to be cleared shall be clearly marked with flagging tape prior to any clearing activities. Where practicable, vegetation shall be salvaged for use in future rehabilitation/revegetation works. Topsoil, subsoil, root stock and cleared vegetation shall also be retained for use in rehabilitation. Where practicable, chipping or mulching of cleared vegetation shall be undertaken for use in stabilisation activities. If chipping or mulching is not possible, disposal shall be in accordance with local requirements. Where surface grades are modified, surface drainage shall be directed away from retained trees. Any underground services which are installed within the drip line of a tree that is part of a tree retention area are to be installed by means of tunnel boring or a similar technique. Within the tree retention area: • Earthworks are not to be undertaken except for the installation of underground services.

	• If underground services are to be installed through the root zone of a tree, tunnel boring or a similar technique shall be used. • Trees shall not be removed unless TSC are reasonably satisfied that the removal of the tree would not adversely impact on visual amenity or the tree represents a danger to the safety of persons or property. **Fauna management** Light, noise and vibration shall be managed in accordance with Table 5.31 'Light management' and Table 5.28 'Noise and vibration management' to avoid excessive disturbance to local fauna. All construction and maintenance staff shall be aware of the possibility of encountering fauna and shall inspect vegetation immediately before clearing. Orphaned or injured fauna shall be reported immediately to NSW PWS. Fauna shall only be captured or handled by qualified staff.
Monitoring	The site manager shall conduct weekly inspections of vegetation adjacent to areas of works to ensure no damage to the retained vegetation has occurred.
Auditing	Monthly environmental audits of site activities, complaints, corrective actions and reporting by an independent consultant during the construction phase of the development to assess compliance with the SOMP. Management to examine the complaints register weekly and review corrective action taken in accordance with Table 5.3.
Reporting	Site inspection notes shall be recorded in the Site Diary. An incidents/complaints register shall be maintained on-site and will be available for inspection by TSC (or other relevant authorities) upon request. Details shall be recorded of any fauna encountered and actively removed or treated during the project works, including action by NSW PWS.
Identification of incident or failure	Evidence of disturbance, introduction of noxious weeds or pest animals.
Corrective action	Any trees or vegetation inadvertently damaged or destroyed as a result of construction works shall be repaired or replaced. Dangerous limbs shall be removed by a suitably qualified arborist. Harmed or orphaned fauna shall be reported to NSW PWS and treated accordingly.

Commitment 36

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

5.37 Freshwater ecology

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

Issue	Freshwater ecology.
Operational policy	To maintain and/or enhance the value of freshwater ecosystems within and downstream of the site.
Performance criteria	Surface water quality shall be maintained or enhanced and regularly assessed against the site specific water quality criteria detailed in Table 4.1.1. Water may be discharged from the site that exhibits a suspended solids concentration greater than 50 mg L^{-1}, providing the concentration in the discharge is 10% less than the concentration exhibited in the receiving water. In addition to the above WQOs no release from the off-stream waterway and wetland system shall occur if blue green algae levels exceed 5,000 cells/mL. No decline in macroinvertebrate species richness.
Implementation strategy	Water levels maintained throughout construction phase. Sediment and erosion control measures to protect water from sedimentation and turbidity in accordance with the approved ESCP. Only locally endemic macrophyte species planted suited to site conditions. Monitoring strategies to be implemented incorporating water quality, weed removal and macroinvertebrate sampling.
Monitoring	Refer to Table 5.38 'Waterways & wetlands management' of the OWMP for monitoring strategy. Monitoring of macroinvertebrates in freshwater wetlands as a biological indicator of ecosystem health. Standard sampling and interpretation methods to be followed, such as the Stream Pollution Index.
Auditing	Appropriately qualified environmental consultant to undertake monthly assessment of specified criteria.
Reporting	Maintenance and compilation of assessment sheets to be appropriately stored onsite for inspection by local and state government officers upon request. Within 24 hours of detecting any incidents during construction that cause (or may cause) significant harm to the environment, the Proponent shall

	notify TSC and other relevant agencies of the incident in accordance with the protocol in Section 5.4.
Identification of incident or failure	Observation of element(s) outside nominated criteria. Decreased ecosystem health as indicated by macroinvertebrate sampling.
Corrective action	Identification and source control. Review of construction and/or management methods. Upon receipt of a complaint follow the Complaints Procedure provided in Section 5.3.

Commitment 37

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

5.38 Waterways and wetlands management

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

Issue	Wetlands & waterways management.
Operational policy	To establish and maintain the health of wetlands and waterways during the bulk earthworks phase. To ensure strong plant growth and satisfactory water quality.
Performance criteria	Surface water quality shall be maintained or enhanced and regularly assessed against the site specific water quality criteria detailed in Table 4.1.1. In addition to the above WQOs no release from the off-stream waterway and wetland system shall occur if blue green algae levels exceed 5,000 cells/mL. Water may be discharged from the site that exhibits a suspended solids concentration greater than 50 mg L^{-1}, providing the concentration in the discharge is 10% less than the concentration exhibited in the receiving water. Plant establishment success rate >80%.
Implementation strategy	The operational work shall be developed in stages to minimise the potential for soil erosion and water pollution. The site can then be progressively developed and rehabilitated. All waters from the active construction areas shall be treated (if required) prior to being discharged into completed areas. The constructed wetlands will come progressively online as staged construction is completed. All runoff from disturbed areas is to be collected by means of surface drains and diverted to internal water bodies. **Protection of waterways and wetlands from sediment** All sediment and erosion control devices shall be installed and maintained in accordance with the approved ESCP. These devices include (but are not limited to): • Diversion of upslope runoff around cleared and/or disturbed areas in a way that minimises erosion, minimises the upslope catchment and diverts waters to a legal point of discharge. • Sediment control fences or other measures at the downslope perimeter of cleared and/or disturbed areas. • Maintenance of all erosion control measures at operational capacity until land is effectively rehabilitated.

	• Material accumulated behind sediment barriers shall be cleaned out as soon as practicable to minimise the potential for the transfer of sediment off the construction site. Sediment shall be removed to a secure stockpile location. **Maintenance of water quality** Sediment is to be removed from each internal waterbody/sediment basin once 70% of the total available sediment storage component has been reached and weirs are to be regularly maintained and cleaned. Sediment basins/internal waterbodies shall be dosed with flocculating agents when required to ensure that water quality meets required limits. Bypass flows from sediment traps shall be directed to stable areas. The operational water bodies and associated wetland shall be de-silted, replanted as necessary and assessed for any acid sulfate oxidation effects prior to refilling with water at the end of the construction phase. To protect constructed wetlands and receiving environments, discharge of water from active earthworks areas must comply with the specified release criteria in accordance with the '*Surface water quality monitoring'* table. **Maintenance of plant health in shallow vegetated wetlands** Wetlands planted with locally endemic species suited to site conditions. These species ensure minimisation of water usage. As wetlands are planted, water levels will be maintained via pumping of water that satisfies water quality objectives from sediment basins following rainfall events and stormwater flows. Particular attention should be given to weed management during the early stages of wetland vegetation development.
Monitoring	**Sediment and erosion controls** Regular site inspections shall be undertaken to monitor the effectiveness of sediment and erosion controls In accordance with the approved ESCP. **Surface water quality** Surface water monitoring will be conducted in accordance with the '*Surface water quality monitoring'* table and at appropriate locations external and internal to the construction area as each wetland and waterway is constructed. At the additional locations, monitoring will be conducted monthly and during rainfall events for: pH, EC, suspended solids, dissolved oxygen, oil and grease. Sample recovery and in situ analysis will be performed by a qualified Environmental Scientist sampler and, when required, samples will be forwarded to a-NATA-accredited laboratory. Visual inspection of wetland plant health, algae presence, weeds, pests including mosquitoes and cane toads.
Auditing	Environmental consultant to audit water quality and plant health results monthly against the performance criteria.

	Additional visual inspections to be carried out in accordance with the approved ESCP to verify that control measures are in place and properly maintained.
Reporting	Results sheet and site inspection records to be compiled for monitoring results of water quality of water bodies and erosion and sediment control measures. To be kept onsite for inspection by local and state government officers. Recording of wetland health, establishment, weeds and pests. Within 24 hours of detecting any incidents during construction that cause (or may cause) significant harm to the environment, the Proponent shall notify TSC and other relevant agencies of the incident in accordance with the protocol in Section 5.4.
Identification of incident or failure	• Degradation of surface water quality at the monitoring points. • Excessive build-up of sediment. • Loss of wetland plants. • Algal blooms. • Emergence of pest species.
Corrective action	Apply remedial measures to improve sediment and erosion control. Incorporate additional measures including, but not limited to, silt fences and flocculation of the water quality control ponds. If pH is outside the criteria range, then waters will be contained and the pH adjusted to within the range prior to release. If total suspended solids exceed the water quality criteria then water will be contained onsite for a period sufficient to allow suspended solids to settle out prior to release or treated with a flocculent. To increase dissolved oxygen, re-circulation and or aeration should be undertaken. Replanting of wetland species if losses exceed 20%. Review and choose alternative species if necessary. Upon receipt of a complaint follow the Complaints Procedure provided in Section 5.3.

Commitment 38

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

5.39 Open space management

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

Issue	Open space management.
Operational policy	Ensure that the living landscape has been adequately established and is fully functional for its designed purpose.
Performance criteria	The ongoing and safe use of the facilities provided within the Conservation Zone, Dedicated Public Open Space and ecological buffers and General Use Recreation areas. The ecological values and ecosystem functions of the open space areas are maintained.
Implementation strategy	Formal access to the zone shall be limited and regular, programmed maintenance undertaken. Firebreaks, incorporating radiation zones, shall be maintained on the outer margins of the Conservation Zones to the rear of lots, or incorporated within parts of the road network or trail system that run adjacent the Conservation Zones. Weed management strategies to be implemented in accordance with Table 5.5 'Aquatic flora & weed management and maintenance' of the SOMP. Signage shall be erected to direct visitors to litter bins located outside of the Conservation Zone. Residents shall be advised of the risks to wildlife presented by domestic cats and dogs, and Golf course management rules initiated to keep them indoors at night. Accidentally introduced feral species (cane toads, hares, foxes, dogs, cats) shall be managed through the implementation of survey, trap and removal of such species in order that a reasonable degree of control is achieved. Maintenance to the stormwater management infrastructure and works located within this zone shall be undertaken in accordance with Table 5.2.1 'Maintenance of water treatment measures' of the SOMP. Bollards and signage shall be used to delineate boundaries between the different types of open space. Maintenance practices will be implemented along the edges of zones including the clear delineation of radiation zones and the pathway network. **Dedicated public open space zone** • Litter receptacles shall be located at strategic points within the public open space zone.

	General use recreation zone • Routine maintenance shall be carried out on the public-access canoe trail system, picnic and barbecue facilities, seating, play equipment, informal kick and throw areas, and other facilities associated with local neighbourhood parks. • Litter receptacles shall be located at strategic points within the recreation zone.
Monitoring	Monitoring of the open space areas shall be undertaken in accordance with Table 5.38 'Waterways & wetlands management' of the SOMP.
Auditing	Not applicable.
Reporting	Not applicable.
Identification of incident or failure	Failure to comply with the provisions of the SOMP with respect to Open Space Management.
Corrective action	To be determined at the time of the failure with specialist input where required.

Commitment 39

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

5.40 Golf course water conservation

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

Issue	All water flows must be controlled and managed to allow the effective use of the onsite water within a total water cycle. Essential to the ecological stability of the golf course and surrounding wetland and ecological protection zone is the maintenance of water quantities to both golf course and ecosystems.
Operational policy	To manage the rainfall on site to effectively distribute water supply to both the golf course and the surrounding Ecological zones (SEPP 14 wetland and Ecological protection zones).
Performance criteria	Ground water levels to be maintained within and adjacent to golf course with critical levels to be in accord with the seasonal variation in ground water height. Monitoring periods to be divided into Summer recharge period and Winter depletion period.
Implementation strategy	Water flows are to be managed in accordance with the DECC document *'Improving the environmental management of NSW Golf Courses'*. **Harvesting** • All water directed to bio-retention basins. • Held to recharge groundwater. • Golf course graded towards the basins. **Volume** • Maintain constant volumes by maintaining course infiltration rate and fairways runoff directed to swales for detention and infiltration to ground water. **Storage** • Subsurface storage. • Central dam of surface run-off collection and ground water window. • Habitat storages within landscape plan. **Treatment** • Bio-detention and filter basins to remove nutrients. • Sediments removed by filtering through rough and percolation through Bio-detention and filter basin floor. **Distribution** • 30% annual average recharge to ecosystem. • 70 % to landscape in golf course. **Maintenance of treatment basins** • Basins maintained to ensure nutrient stripping and water infiltration.

Monitoring	Fortnightly (Civil construction phase) / quarterly (on maintenance phase, operational phase) monitoring of groundwater height.
Auditing	Environmental consultant will audit the groundwater monitoring procedures and outcomes of the monitoring on a monthly (Civil construction phase) / bi-annual (on maintenance phase, operational phase) basis.
Reporting	Results of monitoring will be reported quarterly (Civil construction phase) / biannually (on maintenance phase, operational phase) to TSC and NSW Department of Planning. Within 24 hours of detecting any incidents during construction that cause (or may cause) significant harm to the environment, the Proponent shall notify TSC and other relevant agencies of the incident in accordance with the protocol in Section 5.4.
Identification of incident or failure	Ground water heights outside of critical limits to water level.
Corrective action	Groundwater lower than the critical level – Irrigation extraction rate of golf course to be modified to redistribute the recharge potential to a new regime of 40% to ecosystem 60% to golf course. Continue to monitor. Ground water still outside limits – Irrigation extraction rate of golf course to be modified to redistribute the recharge potential to a new regime of 60% to ecosystem 40% to golf course. Continue to monitor. Ground water still outside limits – Irrigation extraction rate of golf course to be modified to redistribute the recharge potential to a new regime of 80% to ecosystem 20% to golf course. Seek alternate sources of water for golf course irrigation and undertake environmental management and plan for the import of water supply to site. Continue to monitor. Ground water still outside limits – implement alternate water supply. Groundwater higher than critical level – determine source of excess water. High rainfall events – do nothing incident is self-correcting. Golf course groundwater mounding – alter irrigation regime to decrease irrigation input to site. Upon receipt of a complaint follow the Complaints Procedure provided in Section 5.3.

Commitment 40

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

5.41 Water management (golf course irrigation)

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

Issue	All water flows must be controlled and managed to allow the effective use of the onsite water within a total water cycle. Essential to the ecological stability of the golf course and surrounding wetland and ecological protection zone is the maintenance of water quantities to both golf course and ecosystems.
Operational policy	To manage the irrigation applied to the golf course to minimise its impact on the surrounding Ecological zones (SEPP wetland and Ecological protection zones).
Performance criteria	Ground water levels to be maintained within and adjacent to golf course with critical levels to be in accord with the seasonal variation in ground water height. Monitoring periods to be divided into Summer recharge period and Winter depletion period.
Implementation strategy	Irrigation is to be carried out in accordance with the DECC document *'Improving the Environmental Management of New South Wales Golf Courses'*. **Source of water** • Extraction at central point of development which is distant from ground water dependant ecosystems. **Distribution** • Pipe mains and lateral distribution. • Spray irrigation for distribution efficiency. • Irrigation on tees greens and fairways only (allowing for minor over-spray on adjacent roughs). • Pump stations and associated infrastructure, including sprinkler heads, to be sized and installed in accordance with recommendations in ePar (2009, pp10). **Irrigation scheduling** • Install weather station and computerised control system to ensure efficient irrigation in accordance with recommendations in ePar (2009, pp9). • Irrigation to occur at dawn or dusk (generally characterised by lower relative humidity, air temperature and wind speed). • Soil water deficit based trigger for irrigation. • Effective soil depth for schedule 0-200 mm. • Refill point to be set at 70% plant available soil moisture depletion. • Irrigation applied to 98% of field capacity.

	Water allocation model • Sustainable yield applied to irrigation set at 70 % recharge potential. • Recycling. • Fairways constructed with gradient towards bio-detention basins. • Capture of irrigation runoff in detention basins for treatment and groundwater recharge. • Tees and greens captured separately and recycled to fairways. **Soil management** • Soil amendment to improve moisture holding (zeolite etc). • Maintenance of soil organic matter for soil structure maintenance. • Minimise compaction by machinery selection and operating procedures. • Control traffic. **Plant selection and management** • Native species and naturalised species endemic to local area. • Species selection dependant on landscape location e.g. Drought tolerant plants in elevated areas, waterlog tolerant plants in depressions.
Monitoring	**Fortnightly - Civil construction phase** **Monthly - On maintenance phase** **Biannual - Operational phase** Height monitoring: • Surface water – dams, basins, adjacent ecosystem water bodies. • Groundwater transect from detention basins to protection area (e.g. of groundwater monitoring bore transect through golf course and extending into adjacent SEPP wetland). Parameters: • Height (AHD); pH (field measure); EC (field measure); Dissolved oxygen (field measure); Temperature (field measure). **Daily** • Soil water – Soil water monitoring for refill point – methods to be selected as appropriate to soil and turf management conditions, for instance: tensiometers (150 mm depth), or Penman's estimation etc.
Auditing	Environmental consultant will audit the monitoring procedures and outcomes of the monitoring on a quarterly (Civil construction phase) / biannual (on maintenance phase) / annual (Operational phase) basis.
Reporting	Results of monitoring will be reported quarterly (Civil construction phase) / biannually (on maintenance phase) / annually (Operational phase) to TSC and other appropriate authorities.

	Within 24 hours of detecting any incidents during construction that cause (or may cause) significant harm to the environment, the Proponent shall notify TSC and other relevant agencies of the incident in accordance with the protocol in Section 5.4.
Identification of incident or failure	Ground water heights outside of critical limits to water level.
Corrective action	Groundwater lower than the critical level – Irrigation extraction rate of golf course to be modified to redistribute the recharge potential to a new regime of 40% to ecosystem 60% to golf course. Continue to monitor. Ground water still outside limits – Irrigation extraction rate of golf course to be modified to redistribute the recharge potential to a new regime of 60% to ecosystem 40% to golf course. Continue to monitor. Ground water still outside limits – Irrigation extraction rate of golf course to be modified to redistribute the recharge potential to a new regime of 80% to ecosystem 20% to golf course. Seek alternate sources of water for golf course irrigation and undertake environmental management and plan for the import of water supply to site. Continue to monitor. Ground water still outside limits – Implement alternate water supply. Groundwater higher than critical level – Determine source of excess water. High rainfall events – do nothing if incident is self-correcting. Golf course groundwater mounding – alter irrigation regime to decrease irrigation input to site.

Commitment 41

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

5.42 Golf course nutrient management

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

Issue	The nutrients applied to maintain the vigour of the golf course must not gain access to the surrounding environment. All nutrients must be controlled and managed to allow the effective use of the onsite water and to ensure to the ecological stability of the golf course and surrounding wetland and ecological protection zone.
Operational policy	To manage the nutrients applied to the golf course to minimise its impact on the surrounding Ecological zones (SEPP14 wetland and Ecological protection zones).
Performance criteria	Ground and surface water nutrient levels to be maintained within and adjacent to golf course within critical levels in accord with the seasonal variation in ground water. Monitoring periods to be divided into Summer recharge period and Winter depletion period. Critical criteria set as per background monitoring. *Parameters:* • pH (field measurement); • electrical conductivity (field measurement); • turbidity (field measurement); • dissolved oxygen (field measurement); • temperature (field measurement); • suspended solids (mg L^{-1}); • total nitrogen and nitrate, nitrite and ammonium (mg L^{-1}); • total and soluble phosphorus (mg L^{-1}); • total and soluble iron and filtered aluminium; and • oil and grease (visual inspection); • calcium; • magnesium; • potassium; • sodium; • dissolved manganese; • bicarbonate; • carbonate; • chloride; • sulfate; and • colour.

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

	• Fertiliser rate – minimal for turf stability as determined by soil testing consistent with standard best practice for turf management. In addition, a mass balance method will be used to identify fertiliser rates – inputs of water nutrients, fertiliser and effluent from tees and greens, output soil store, biomass and percolation. • Application method – split application at low rates, timed with other fairway operation s that incorporate nutrients into turf (e.g., turf renovation and top dressing, fertiliser incorporation irrigation events to prevent contamination of surface run-off). • Irrigation maximum refill set to 98% field capacity to ensure first rainfall infiltrates and not runs off. **Rough** • No fertiliser used. • Rough to act as irrigation, sediment and nutrient buffer. • Biomass mulched back into rough. **Swales and detention basins** • No fertiliser used. • Maintenance removal of biomass to composting and reuse in landscaping.
Monitoring	**Groundwater** *Monthly (Civil construction phase, on maintenance phase)* *Quarterly (Operational phase)* • Ground water quality samples (from all height monitoring bores). • Multiple group lysimeters set at 1m depth in four (4) locations in golf course fairways– leachate samples. • Parameters: pH (field measure); EC (field measure); Dissolved oxygen (field measure); Temperature (field measure); N – Total, NH_4, NO_3, P – Total, Ortho; Calcium; Magnesium; Sodium; Potassium; Total and dissolved iron; Dissolved manganese; Filtered aluminium; Bicarbonate; Carbonate; Chloride; Sulfate; and Colour. **Surface water** *Monthly (Civil construction phase, on maintenance phase)* *Quarterly (Operational phase)* • Central irrigation supply. • Surface habitat water bodies. • Parameters: pH (field measure); EC (field measure); Dissolved oxygen (field measure); Temperature (field measure); N – Total, NH_4, NO_3 P – Total, Ortho; Calcium; Magnesium; Sodium; Potassium; Total and dissolved iron; Dissolved manganese; Filtered aluminium; Bicarbonate; Carbonate; Chloride; Sulfate; and Colour. *Monthly (Civil construction phase, on maintenance phase)* *Quarterly (Operational phase)*

	• Central irrigation supply. • Parameters Irrigation water quality, N & P. **Soils** *6 monthly (Civil construction phase, on maintenance phase)* *Annually (Operational phase)* • Soil fertility sampling as per standard practice for turf (agricultural) management. **Biomass** *Quarterly (Civil construction phase, on maintenance phase)* *Annually (Operational phase)* • Fairway reference sites set at four locations within golf course. • The reference sites will have the biomass collected (weighed) and analysed for N & P. (Data to be used in estimating mass balance for monitoring purposes). *Biannually (Civil construction phase, on maintenance phase)* *Annually (Operational phase)* • SEPP wetland and environmental protection zone to be monitored with two (2) reference transects to outline floristic structure and function.
Auditing	Environmental consultant will audit the monitoring procedures and outcomes of the monitoring on an annual basis.
Reporting	Results of monitoring will be reported annually to TSC and NSW Department of Planning.
Identification of incident or failure	• Groundwater analyses in excess of critical limits for two consecutive sample events. • Critical limit set considering background monitoring.
Corrective action	Fertiliser regime re-assessed and fertiliser management plan altered by change of fertiliser form, rate or application technology. Continue to monitor. Upon receipt of a complaint follow the Complaints Procedure provided in Section 5.3.

Commitment 42

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

5.43 Golf course herbicide management

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

Issue	Herbicides may be used within the golf course to manage turf weeds. The use of herbicides may have an impact on the flora adjacent to the golf course and strategies are needed to minimise these impacts.
Operational policy	To manage the herbicides applied to the golf course to minimise its impact on the surrounding Ecological zones (SEPP wetland and Ecological protection zones).
Performance criteria	No foliar damage to surrounding environment from herbicide applications.
Implementation strategy	Turf weeds should be managed by adopting the pest control strategies outlined in the DECC document *'Improving the Environmental Management of New South Wales Golf Courses'*. The use of herbicides is an action of last resort. Primary control of weeds will be achieved by: • Physical removal of weed species prior to turf area development and for selected weeds post development. • Soil management methods such as ameliorating compaction, improving drainage, shade management and nutrient management techniques such as avoiding N applications during weed active stages. • Turf management methods such as (but not restricted to) mowing height and frequency, thatch control, improving air movement, restricting traffic and insect control. • Spraying as a last resort as either spot spraying or contained spraying consistent with the requirements of best practice spraying and the obligations under the NSW Pesticides Act. Specialist outcomes for each golf course zones as below: **Tees** • Isolated from ground waters by membrane at depth. • Adopt best management principles for herbicide application. **Greens** • Isolated from ground waters by membrane at depth. • Adopt best management principles for herbicide application. **Fairways** • No herbicide use on extensive basis. • Spot and strip spraying as last resort.

	Rough • No herbicide use on extensive basis. • Spot spraying as last resort. **Swales** • No herbicide use on extensive basis. • Spot spraying as last resort.
Monitoring	Annual monitoring of surface waters adjacent (within 100m) to areas subjected to Herbicide use. Visual inspection of adjacent areas for evidence of over-spray – e.g. Herbicide damage to leaves. Monitoring to be timed one to two weeks after spraying events.
Auditing	Environmental consultant will audit the monitoring procedures and outcomes of the monitoring on an annual basis.
Reporting	A chemical use register to be maintained for each fairway, tee, and green. Spot spraying of other areas to be recorded separately. Records to be maintained and produced upon request by relevant authority.
Identification of incident or failure	Foliage damage observed.
Corrective action	Damage foliage removed and mulched on site, plants to be monitored and dead plants replaced with suitable seedlings, or seed stocks.

Commitment 43

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

5.44 Golf course pesticide management (arthropods control)

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

Issue	Pesticides to control arthropods may be used within the golf course to manage turf pests. The use of these herbicides may have an impact on the flora adjacent to the golf course and strategies are needed to minimise these impacts.
Operational policy	To manage the pesticides applied to the golf course to minimise its impact on the surrounding Ecological zones (SEPP wetland and Ecological protection zones).
Performance criteria	No pesticide escape into the surrounding environment beyond AS/NZS standards of pesticide contamination of fresh waters.
Implementation strategy	Pesticides should be managed by adopting the pesticide application practice outlined in the DECC document '*Improving the Environmental Management of New South Wales Golf Courses'*. Implement an integrated pest management program by monitoring, pest injury assessment, threshold of aesthetic and environmental damage determination, control method selection, timing and extent assessment, evaluate pest destruction outcome. The use of pesticides is an action of last resort. Primary control of arthropods will be achieved by: • Site quarantine and hygiene by ensuring imported materials are free of pests. • Modifying pest habitat either soil or environmental conditions. • Selection of host resistant turf plants when available. • Biological control measures – natural parasites and predators. • Last resort chemical control – Spraying as a last resort with the requirements of best practice spraying and the obligations under the NSW Pesticides Act. Chemical control preferences should be: • Attractants (food and/or sex pheromone) and traps. • Inorganic materials (e.g. elemental sulfur and similar approaches). • Bioinsecticides (e.g. Baccillus thuringiensis). • Botanical extracts. • Synthetic organics (chemicals). Specialist outcomes for each golf course zones as below:

	Tees • Isolated from ground waters by membrane at depth. • Adopt best management principles for pesticide application. **Greens** • Isolated from ground waters by membrane at depth. • Adopt best management principles for pesticide application. **Fairways** • No pesticide use on extensive basis. • Spot and strip spraying as last resort. **Rough** • No pesticide use on extensive basis. **Swales** • No pesticide use on extensive basis. Pesticide storage, containment, security, preparation and wash down areas to be located away from ecological and golf course area in designated infrastructure and facilities area of the development. A shrouded Controlled Droplet Applicator (CDA) should be used to reduce spray drift, chemical and water use. Pesticide application rate may be reduced by 1/3 where shrouded CDA's are used (ePar 2009, pp12).
Monitoring	Annual monitoring of surface waters adjacent (within 100m) to areas subjected to pesticide use. Parameters selected for monitoring to be consistent with the chemicals used on site.
Auditing	Environmental consultant will audit the monitoring procedures and outcomes of the monitoring on an annual basis.
Reporting	A chemical use register to be maintained for each fairway, tee, and green. Spraying of other areas to be recorded separately. Records to be maintained and produced upon request by relevant authority.
Identification of incident or failure	Pesticide contamination of water body beyond AS/NZS Standard for fresh waters.
Corrective action	Pesticide application to cease. Re-assess pesticide control methods – e.g. selection of methods, application technology.

Commitment 44

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

5.45 Golf course fungicide management

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

Issue	Fungicides may be used within the golf course to manage turf disease. The use of these Fungicides may have an impact on the flora adjacent to the golf course and strategies are needed to minimise these impacts.
Operational policy	To manage the Fungicides applied to the golf course to minimise its impact on the surrounding Ecological zones (SEPP wetland and Ecological protection zones).
Performance criteria	Minimise Fungicide escape into the surrounding environment.
Implementation strategy	Pesticides should be managed in accordance with the DECC document '*Improving the Environmental Management of New South Wales Golf Courses'*. Implement a turf disease management program by monitoring, disease injury assessment, threshold of aesthetic and environmental damage determination, control method selection, timing and extent assessment, evaluate disease control outcome. The use of fungicides is an action of last resort. Primary control of disease will be achieved by: • Site quarantine and hygiene by ensuring imported materials are free of disease. • Modifying either soil or environmental conditions. • Selection of disease resistant turf plants when available. • Last resort chemical control - Spraying as a last resort with the requirements of best practice spraying and the obligations under the NSW Pesticides Act. Specialist outcomes for each golf course zones as below: **Tees** • Isolated from ground waters by membrane at depth • Adopt best management principles for pesticide application **Greens** • Isolated from ground waters by membrane at depth • Adopt best management principles for pesticide application Fairways roughs and swales • No fungicide use on extensive basis

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

Commitment 45

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

5.46 Blacks Creek drain maintenance

Person responsible	Contractor's Site Manager, Environmental Consultant

Issue	Drain maintenance (Blacks Creek)
Operational policy	Mitigation and management of the potential environmental impacts associated with the ongoing maintenance of Blacks Creek in accordance with the approved DMMP (G&S, 2020). **Mechanical maintenance** Minimise physical drain disturbance during the mechanical removal of sediment from Blacks Creek. **Acid sulfate soil treatment** No acid sulfate drain spoil is to be disturbed or excavated without appropriate treatment. **Sediment and erosion control** To prevent the displacement of sediment and soil from drains particularly during storm events. Compliance with the NSW POEO Act (1997). **Surface water quality management** To prevent adverse impacts to surface water quality in the downstream receiving environment as a result of drain maintenance activities. **Flora maintenance** Flora maintenance operations aim to minimise disturbance to native flora or fauna as well as disturbance to water quality during removal of invasive plant species.
Performance criteria	Minimise physical drain disturbance, ensure appropriate treatment of excavated materials, minimise erosion and turbidity of discharge waters, minimise adverse impacts to surface water quality in Cudgen Creek and nearby watercourses and minimise disturbance to native flora or fauna during maintenance activities.
Implementation strategy	• Ensure existing trails are used to access Blacks Creek for maintenance, consistent with DPIE's Guidelines for Controlled Activities. Mechanical maintenance must be carried out in accordance with Table 1.4.1 of the approved DMMP. • Lime treatment of drain spoil removed from drains situated below RL 5.0m AHD is to be undertaken according to Table 1.4.2 of the approved DMMP. • Ensure the required sediment and erosion control measures are implemented in accordance with the approved erosion and sediment control plans for each phase of development, and the correct erosion and sediment control measures are implemented prior to commencement of routine maintenance activities and in accordance with the approved DMMP.

	• Surface water quality monitoring will be undertaken at locations immediately upstream and downstream of the drain maintenance works area and compared with the site-specific water quality objectives, in accordance with the surface water management plan and Table 1.4.4 of the approved DMMP. • Vegetation clearing will be undertaken in accordance with the relevant guidelines and management plans, detailed in the DMMP. Care must be taken to avoid disturbance, damage or removal of any native vegetation. Maintenance is to be undertaken in stages manually to reduce cuttings entering water way and to prevent the use of water quality altering herbicides. This is to be undertaken by grubbing and/ or slashing. Removal of invasive flora in a controlled method to minimise spread of seed/ cuttings that cause rejuvenation.
Monitoring	Visual inspections of the following are to be undertaken in accordance with the approved DMMP: • bank stability and vegetation root stock • drain profile • yellow efflorescence on soil surface, and/or iron staining of soils or water • removed vegetation Inspections of accumulated silt and push tube tests are to be undertaken at the frequencies nominated in the approved DMMP. Daily in situ testing and weekly sample collection for laboratory analysis of surface waters will be conducted during drain maintenance works, for parameters detailed in the DMMP. Records of lime delivery and calculated liming rates to be kept on site during maintenance operations and available for inspection at all times. Verification testing in accordance with the Acid sulfate soils management plan, and Table 1.4.2 of the approved DMMP.
Auditing	Auditing will be undertaken by the site manager and/or the developer's nominated representative. Alternatively, auditing may be carried out by an independent consultant. The audit must include an inspection of site activities, monitoring, complaints, corrective actions and reporting to assess compliance with the provisions of the DMMP.
Reporting	The following records shall be maintained onsite for inspection by local and state authorities if requested: • Drain maintenance records. • Records of issues (if they arise) such as sedimentation, flooding, water quality and aquatic species mortality within drains. • Records of evidence of drain instability or bank erosion. • Any fish kills at the site must be recorded and reported to TSC. • Lime delivery dockets. • Treatment rates and verification results.

	Incident reporting Within 24 hours of detecting any incidents during construction that causes (or may cause) significant harm to the environment, the Proponent shall notify the Council and other relevant agencies of the incident and identify the following: • Describe the date, time, and nature of the incident. • Identify the cause (or likely case) of the incident. • Describe what action has been taken to date. • Describe any proposed measures to address the incident.
Identification of incident or failure	Monitoring indicates that the performance criteria set out in the approved DMMP have not been met.
Corrective action	Identify the reason for: • stability failure • acidic spoil or surface waters • erosion or excess build-up of sediment • deterioration of water quality or exceedance of water quality objectives • inappropriate removal of native vegetation and apply remedial measures in accordance with the Environmental Consultant and the approved DMMP. Amend the drain maintenance procedures and/or decrease/increase maintenance intensity as necessary.

Commitment 46

Drain maintenance activities shall be undertaken in accordance with the provisions of the approved Drain Maintenance Management Plan

6 Monitoring summary for golf course operations

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

Monitoring schedule summary for operation phase of golf course management.

Item	Daily	Weekly	Monthly	Quarterly	Biannually	Annually
Groundwater			Height (AHD)	Height (AHD); pH; EC; temperature; TN; soluble N; NO_x; TKN; NO_2; NO_3; TP; soluble P; Ca; Mg; Na; K/HCO_3; HCO_3; CO_3; total & dissolved Fe; total & dissolved Al; dissolved manganese Mn; Cl; SO_4; NH_4; colour; total acidity (titratable); total alkalinity; As; Cd; Cu; Pb; Ni; Zn; TPH; BTEX; faecal coliforms; and enterococci.	Groundwater monitoring bore transect through golf course and extending into adjacent SEPP wetland: Height (AHD); pH; EC; DO; temperature.	
Leachate				Multiple group lysimeters set at 1m depth in four locations in golf course fairways: pH; EC; DO; temperature; TN, NH_4, NO_3, TP; Ortho-P; Ca; Mg; Na; K; total and dissolved Fe; dissolved Mn; filtered Al; HCO_3; CO_3; Cl; SO_4; and Colour		
Soils	Soil water monitoring for refill point					Soil fertility sampling as per standard practice for turf (agricultural) management.
Central irrigation supply, water bodies				pH; EC; DO; temperature; TN; NH_4; NO_3; TP; Ortho-P; Ca; Mg; Na; K; total and dissolved Fe; dissolved Mn; filtered Al; HCO_3; CO_3; Cl; SO_4; and Colour.	Height (AHD); pH; EC; DO; temperature. Vertical profiling of all off-stream deep water bodies: temperature; DO; pH, EC; salinity and turbidity at 0.5m depths.	

Item	Daily	Weekly	Monthly	Quarterly	Biannually	Annually
Biomass						Four locations within golf course: biomass weighed and analysed for N & P.
Wetland and waterbody ecosystems			Monitoring, particularly in Spring and Summer, to reduce the potential for algal blooms	Visual inspection of wetlands and water bodies for vegetation establishment, damage, weed invasion and clogging		Two reference transects within the SEPP wetland to outline floristic structure and function.
Stormwater quality treatment devices				Visual inspection of treatment trains and vegetated open space for: litter; erosion; excessive sediment deposition; clogging (bio-retention); vegetation damage (e.g. die off, weed growth); damaged or failed treatment devices; change in physical characteristics (e.g. water level); and area, depth or bed profile of any bio-retention basin, waterway or wetland system		
Surface water				For two years following the completion of the on-maintenance period: pH; EC; turbidity; DO; temperature; SS; TN; soluble N; NO_x; TKN; NO_2; NO_3; TP; soluble P; oil & grease; Ca; Mg; Na; K/HCO_3; HCO_3; CO_3; total & dissolved Fe; total & dissolved Al; dissolved manganese Mn; Cl; SO_4; NH_4; colour; total acidity (titratable); total alkalinity; As; Cd; Cu; Pb; Ni; Zn; TPH; BTEX; chlorophyll-a; faecal coliforms; enterococci; total algal cell count; and blue green algae.	Rainfall event-based (>25 mm in 24 hrs) for two years following the completion of the on-maintenance period: pH; EC; turbidity; DO; SS; TN; temperature; soluble N; NO_x; TKN; NO_2; NO_3; TP; soluble P; Ca; Mg; oil & grease; Na; K/HCO_3; HCO_3; CO_3; total & dissolved Fe; total & dissolved Al; dissolved manganese Mn; Cl; As; Cd; Cu; Pb; Ni; Zn; TPH; BTEX; SO_4; NH_4; colour; total acidity (titratable); total alkalinity; chlorophyll-a; faecal coliforms; enterococci; total algal cell count; and blue-green algae.	Monitoring of surface waters adjacent (within 100m) to areas subjected to herbicide, pesticide or fungicide use. Monitoring to be timed one to two weeks after spraying events.

Item	Daily	Weekly	Monthly	Quarterly	Biannually	Annually
					Height monitoring of surface water – dams, basins, adjacent ecosystem water bodies. Vertical profiling of all off-stream deep waterbodies: temperature; DO; pH, EC; salinity and turbidity at 0.5m depths.	
Waste management		Inspections of all work areas (e.g. waste containment areas and property boundaries) to ensure no accumulation of waste material				

7 Administration of the SOMP

7.1 Amendment of the SOMP

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

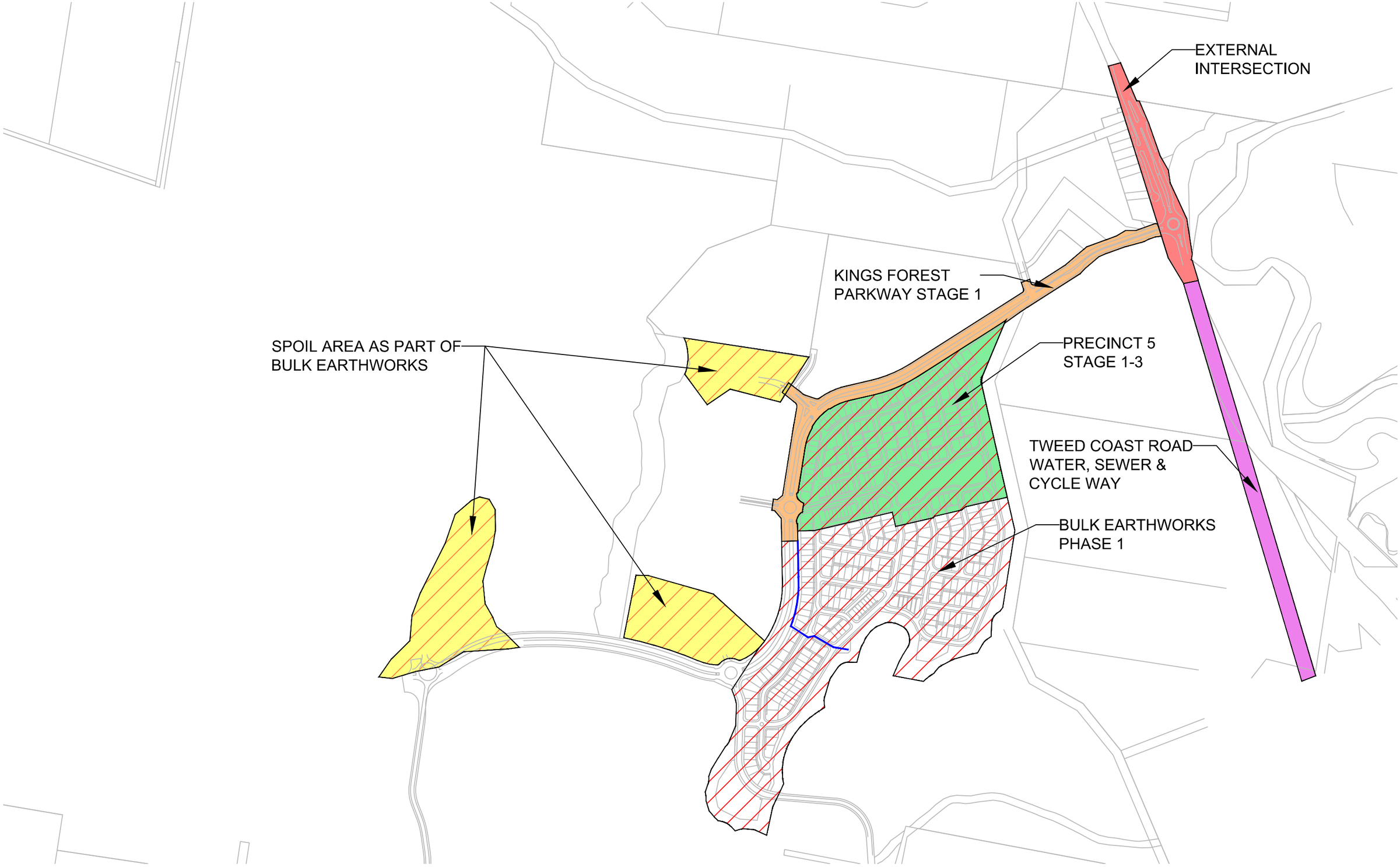
- be in writing;
- specify the provisions of the SOMP to which the application relates; and
- state how the proposed amendment(s) achieve the objectives of the provisions to which the amendment(s) relate.

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

7.2 Incident management

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

8 Attachment 1 – Drawings



ORIENTATION

SCALE 1:8,000

100 200 300 400 metres

ROBINA

PO Box 4115 Robina QLD4230 07 5578 9944
Email robina@access.gs **www.access.gs**

LEGEND

- Cadstre
- Precinct 5 Stage 1-3 Boundary
- Tweed Coast Road Boundary
- Stockpile Areas Phase 1 Boundary
- Parkway Stage 1 Boundary
- External Intersection Boundary
- Bulk Eathworks Phase 1 Boundary
- Rising Main & Pump Station Boundary

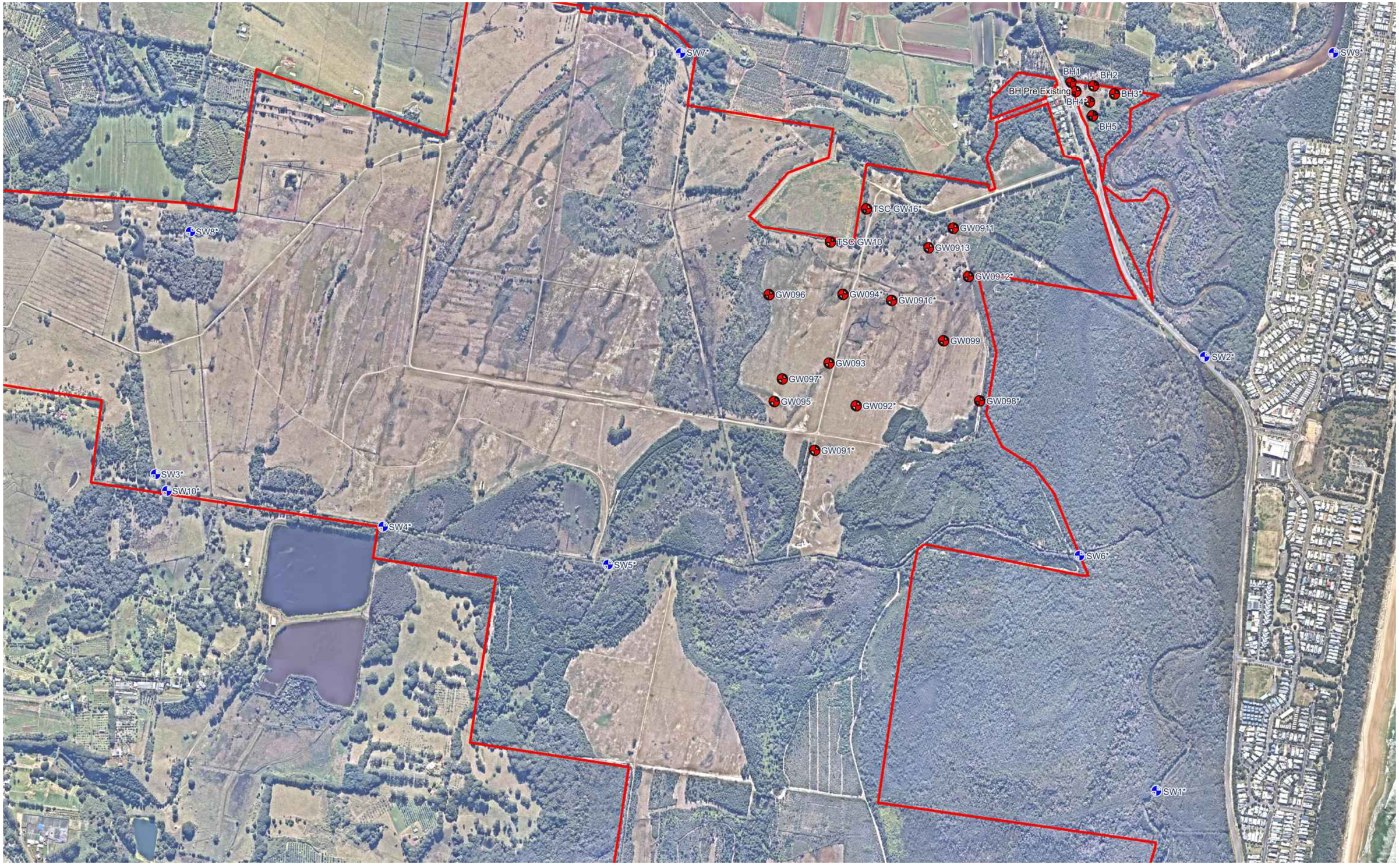
SOURCES

DEVELOPMENT LAYOUT: 12301-P5-1,2&3-100.dwg, *Mortons Urban Solutions, Received 03/12/2019.*

PROJECT	CLIENT	DRAWING
KINGS FOREST - PHASE 1 WORKS	PROJECT 28 PTY LTD	KINGS FOREST PHASE 1 WORKS

SCALE	DATE	DRAWN	CHECKED	PROJECT	DRAWING	REVISION
1:8,000@A3	13/12/2019	SWP	ELH	12066	001	-

GILBERT SUTHERLAND



ORIENTATION

SCALE

100 200 300 400 500
metres

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LEGEND

- Cadastral boundaries
- Site boundary
- Groundwater monitoring boreholes
- Surface water monitoring locations

SOURCES

Image: Nearmap image dated 15/07/2019.

NOTES

1. Field in-situ monitoring conducted at all locations.
2. Laboratory samples collected at monitoring locations with an asterix*.

PROJECT
KINGS FOREST

CLIENT
PROJECT 28 PTY LTD

DRAWING
BASELINE MONITORING LOCATIONS

SCALE	DATE	DRAWN	CHECKED	PROJECT	DRAWING	REVISION
1:12,500@A3	12/09/2019	AJF	NMS	12017	001	-

GILBERT SUTHERLAND