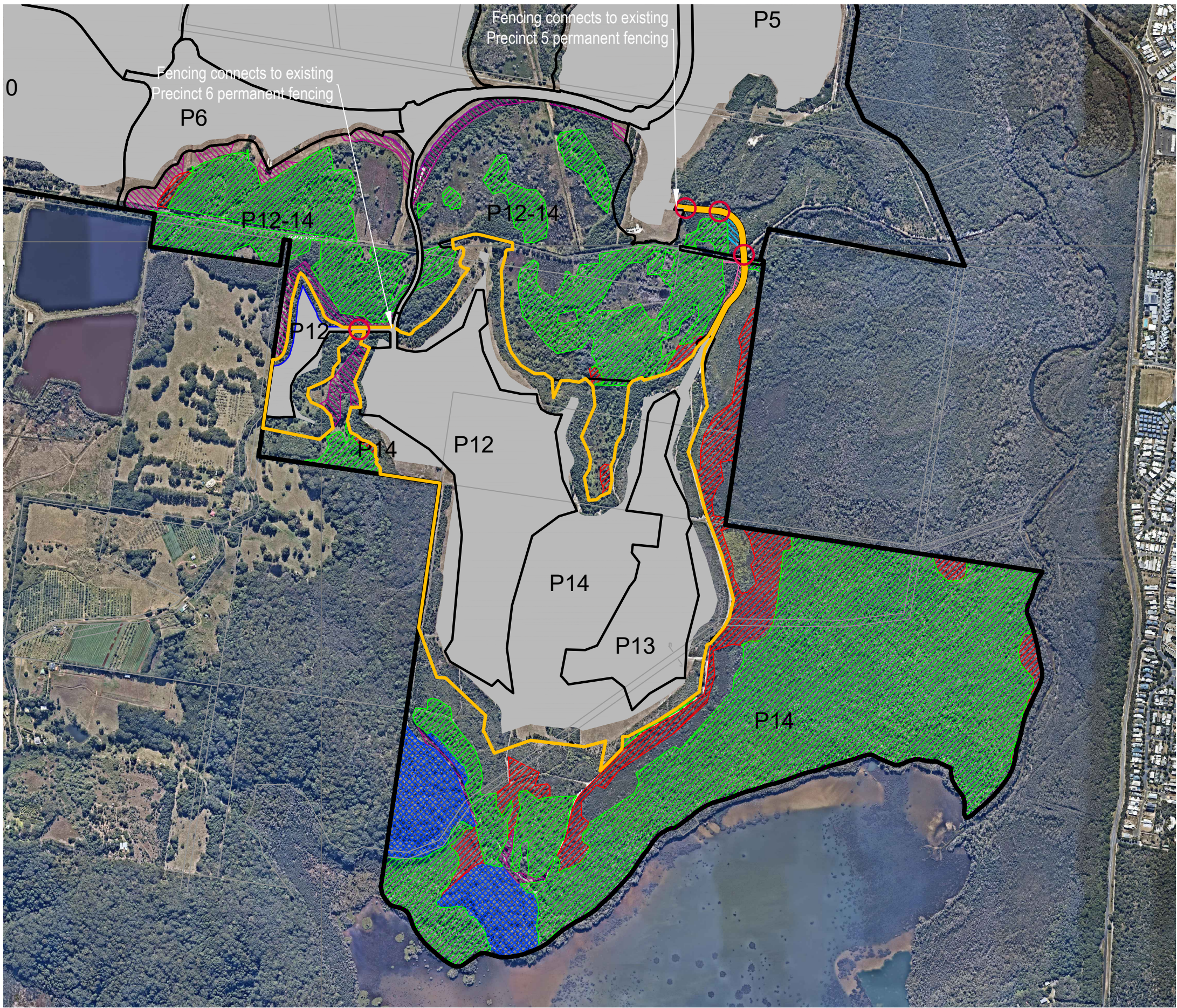




LEGEND

- 20m Outer Protection Zone Buffer to EPZ
- Development Footprint
- Precinct Boundary
- Kings Forest Boundary

PROPOSED FENCING PLAN

- Permanent Koala exclusion fencing
- Indicative underpass location

KOALA HABITAT THAT WILL REMAIN AS HABITAT AFTER DEVELOPMENT

- Primary Koala habitat to remain after development
- Secondary (A) Koala habitat to remain after development
- Secondary (B) Koala habitat to remain after development

KOALA COMPENSATORY HABITAT

- Dry primary Koala habitat
- Dry primary Koala habitat plus dry heath
- Wet primary Koala habitat
- Wet primary Koala habitat plus wet heath
- Wet secondary Koala habitat

PRECINCT 12-14 - RETAINED KOALA HABITAT & KOALA OFFSETS		
Koala Habitat to be Retained (Ha)	Primary Koala Habitat	17.08
	Secondary (A) Koala Habitat	127.24
	Secondary (B) Koala Habitat	12.21
Koala Offsets (Ha)	Dry Primary Koala Habitat	8.99
	Dry Primary Koala Habitat Plus Dry Heath	0.23
	Wet Primary Koala Habitat	14.64
	Wet Primary Koala Habitat Plus Wet Heath	0.23
	Wet Secondary Koala Habitat	1.61

0 500m
1 : 12 500

SOURCE: JWA KPOM (2018) & March to August 2018 Site Investigations; Near Map 08/08/18 Aerial

SCALE: 1 : 12 500 @ A3

JWA PTY LTD
Ecological Consultants

CLIENT
Project 28 Pty Ltd
PROJECT
Koala Plan of Management
Kings Forest
Melaleuca Drive, Duranbah, NSW
Shire of Tweed

FIGURE 40B

PREPARED: BW
DATE: 28 September 2018
FILE: N97017_KPOM Precincts.dwg

TITLE
POST-CONSTRUCTION
KOALA
MANAGEMENT ACTIONS
- PRECINCTS 12-14

of development only if such activities will have no adverse impact on Matters of National Environmental Significance only if the proponent has notified the Department in writing before an activity is undertaken.

TABLE 11 details the specific management actions that will be implemented during the pre-construction phase within each development precinct. Responsibilities and performance measures for each management action are also provided.

11.3 Construction Phase

The construction phase of the development refers to works completed after commencement of construction which is defined within the EPBC approval (2012/6328) as any preparatory works, excluding preliminary works (as defined in the EPBC approval 2012/6328), required to be undertaken including clearing vegetation, the erection of any onsite temporary structures and the use of heavy duty equipment for the purpose of breaking the ground for bulk earthworks, buildings or infrastructure for the proposed action.

TABLE 12 details the specific management actions that will be implemented during the construction phase within each development precinct. Responsibilities and performance measures for each management action are also provided.

11.4 Operational Phase

The operational phase of the development will commence post-construction and after registration of the plan/s of subdivision for each precinct.

TABLE 13 details the specific management actions that will be implemented during the operational phase within each development precinct. Responsibilities and performance measures for each management action are also provided.

TABLE 11
KOALA MANAGEMENT STRATEGIES - PRE-CONSTRUCTION PHASE

Relevant Development Precinct	Management Strategy	Management Action	Responsibility	Performance Measure	Precinct Specific Details
All Precincts	Base line surveys	Prior to the commencement of construction* a Baseline Koala Monitoring program will be completed across the entire site.	Qualified ecologist (SECTION 12.3)	Baseline Koala monitoring survey is completed.	
	Education of construction personnel	A construction personnel induction program shall be developed and implemented by the Proponent prior to commencement of construction* to highlight the potential presence of Koalas on the site.	Construction Manager	All construction personnel inducted and aware of Koala related issues and responsibilities.	
	Banning dogs	No domestic dogs are to be brought onto the site during pre-construction activities.	Construction manager	No dogs are brought on to the site during pre-construction activities.	
	Survey plans & permanent marking of dedication areas	Mark the boundaries of proposed/future dedication areas.	Construction Manager / Principal contractor / Registered Surveyor	Survey plans prepared and permanent markers installed showing proposed dedication areas. Survey plans lodged with the Department of Planning and Environment on a precinct-by-precinct basis.	
	Maintenance of retained Koala habitat	Koala habitat to be retained on the site will be maintained in accordance with the requirements of APPENDIX 6 and the following management plans: • Kings Forest Precincts 1 and 5 Vegetation Management Plan (JWA 2018a); • Kings Forest Precincts 2-4 and 6-11 Vegetation Management Plan (JWA 2018b); • Kings Forest Precincts 12-14 Vegetation Management Plan (JWA 2018c); • Kings Forest Precincts 1 and 5 Weed Management Plan (JWA 2018k);	Suitably qualified Bush Regeneration company	All retained Koala habitat remains free of construction impacts and is rehabilitated (where necessary) in accordance with the protocols and methods that apply to the compensatory habitat areas (refer APPENDIX 6).	

Relevant Development Precinct	Management Strategy	Management Action	Responsibility	Performance Measure	Precinct Specific Details
		• Kings Forest Precincts 2-4 and 6-11 Weed Management Plan (JWA 2018l); and • Kings Forest Precincts 12-14 Weed Management Plan (JWA 2018m).			
	Pre-clearing surveys for the Koala	Prior to the commencement of construction* associated with each precinct, pre-clearance surveys for Koala must be completed (SECTION 10.2).	Ecologist/ Spotter catcher	Pre-clearing surveys are completed prior to commencement of construction*.	
	Fire Management	The risk of high intensity fires should be reduced within Koala habitat areas through controlled low intensity burns, or mechanical means if and where appropriate, and accordance with an amended and approved Bushfire Risk Management Plan. High-intensity hazard reduction burns and wildfires that result in crown scorch or crown fires should be avoided.	Project 28 will be responsible for bushfire management in the conserved bushland and wetland areas, for an estimated period of five (5) years or until ownership is transferred.	Risk of high intensity fires is reduced through controlled low intensity burns, or mechanical means.	
		The control of Slash pine in retained Koala habitat and compensatory habitat areas will be a priority of the Weed Management Plans	Project 28 will be responsible for bushfire management in the conserved bushland and wetland areas, for an estimated period of five (5) years or until ownership is transferred.	Slash pine is controlled within retained Koala habitat and compensatory habitat areas	

Relevant Development Precinct	Management Strategy	Management Action	Responsibility	Performance Measure	Precinct Specific Details
Precincts 2-5 Precinct 7 Precinct 8 Precinct 10 Precinct 11 Precincts 12-14	Koala habitat creation and maintenance	Each retained Koala habitat area and rehabilitation (compensatory habitat) area will be allocated an individual identifying number. Flat (5 cm x 1 cm) pegs (painted in white at the top) with the allocated identifying area number written on the white paint will be placed at each truncation on the boundaries of each retained Koala habitat and rehabilitation area.	Suitably qualified Bush Regeneration company	Each retained Koala habitat area and rehabilitation area is allocated an individual identifying number and clearly marked/identified on the ground with pegs placed at each truncation.	
		Koala food and habitat tree planting to create additional Koala habitat.	Suitably qualified Bush Regeneration company	A total of 68.77 ha (including 6.26 ha comprising the east-west corridor) of Koala habitat to be created. The habitat is to reach sustainability prior to dedication on a precinct by precinct basis.	Precincts 2-5: A total of 9.27 ha of Koala habitat to be created within Precincts 2-5 as follows: - Precinct 2 = 1.05 ha - Precinct 3 = 0.96 ha - Precinct 5 = 7.26 ha Precinct 6: A total of 0.44 ha of Koala habitat to be created within the portion of the proposed east-west corridor that occurs in Precinct 6. Precinct 7: A total of 5.04 ha of Koala habitat to be created within Precinct 7. Precinct 8: A total of 6.69 ha of Koala habitat to be created within Precinct 8. Precinct 9: A total of 1.08 ha of Koala habitat to be created within Precinct 9. Precinct 10: A total of 5.82 ha of Koala habitat to be created within the portion of the proposed east-west corridor that occurs in Precinct 10. Precinct 11: A total of 14.73 ha of Koala habitat to be created within Precinct 11. Precinct 12-14: A total of 25.70 ha of Koala habitat to be created within Precincts 12-14.
		The created Koala habitat will either be:	Suitably qualified horticultural/	Created Koala habitat will be substantially established or a bond paid prior to the	

Relevant Development Precinct	Management Strategy	Management Action	Responsibility	Performance Measure	Precinct Specific Details
		i. Substantially established (see footnote 6) in any precinct prior to the commencement of construction* in any subsequent precinct; or ii. Planted for the relevant precinct and then a bond of 135% of the estimated maintenance and monitoring costs lodged with Tweed Shire Council (TSC) prior to the commencement of construction*. The bond to be forfeited if substantial establishment (see footnote 6) is not achieved.	environmental specialist	commencement of construction* in any subsequent precinct	
Notes: * In accordance with the EPBC approval (2012/6328) definitions, Commencement of construction means any preparatory works, excluding preliminary works[#], required to be undertaken including clearing vegetation, the erection of any onsite temporary structures and the use of heavy duty equipment for the purpose of breaking the ground for bulk earthworks, buildings or infrastructure for the proposed action. [#] In accordance with the EPBC approval (2012/6328) definitions, Preliminary works include: a) Minor physical disturbance necessary to undertake pre-clearance surveys, to establish monitoring programs, for geotechnical investigations or associated with mobilisation of plant, equipment, materials, machinery or personnel; b) Surveying or the construction of boreholes; c) Works associated with maintenance of the subject site including chopper rolling and weed management; d) Works necessary for rehabilitation including construction of frog ponds, installation of monitoring devices and necessary access tracks; and e) Other activities that are necessary for commencement that are associated with mobilisation of plant and equipment materials machinery and personnel prior to start of development only if such activities will have no adverse impact on Matters of National Environmental Significance only if the proponent has notified the Department in writing before an activity is undertaken.					

TABLE 12
KOALA MANAGEMENT STRATEGIES - CONSTRUCTION PHASE

Relevant Development Precinct	Management Strategy	Management Action	Responsibility	Performance Measure	Precinct Specific Details
All Precincts	Construction/ Installation of Infrastructure and Signage prior to commencement of bulk earthworks^	Permanent and temporary exclusion fencing and associated escape mechanisms installed prior to commencement of bulk earthworks^ as detailed in SECTION 10.9.	Construction Manager/ Principal contractor	All exclusion fences and escape mechanisms are in place prior to the commencement of bulk earthworks^ in each relevant Precinct.	Precinct 1: Permanent exclusion fencing will be integrated with the existing fencing at Tweed Coast Road and be situated at the outer edge of the 50m ecological buffer. Precincts 2-5: Permanent exclusion fencing to be constructed around the entirety of Precincts 2, 3, 4 and 5. This fencing will be integrated with existing fencing at Tweed Coast Road. Gates, similar in design to the Koala proof fencing, will be included at locations where future access for road construction will be required. Permanent exclusion fencing to be constructed on both sides of all roads in environmental protection zones. Permanent exclusion fencing to be constructed: - In the buffer zone (to SEPP 14 wetland) along the southern boundary of Precinct 6. - In the buffer zone (to SEPP 14 wetland) along the eastern boundary of Precinct 7. - In the buffer zone (to SEPP 14 wetland) along the eastern boundary of Precinct 8. - In the buffer zone (to SEPP 14 wetland) along the south-western boundary of Precinct 9. - In the buffer zone (to an environmental protection area) along the western boundary, and on the edge of the vegetated corridor along the southern boundary of Precinct 10. - In the buffer zone (to SEPP 14 wetland and an environmental protection area) along the eastern boundary of Precinct 11.

Relevant Development Precinct	Management Strategy	Management Action	Responsibility	Performance Measure	Precinct Specific Details
					- In the buffer zone (to SEPP 14 wetland and other environmental protection areas) along the northern, eastern and southern boundary of Precincts 12-14. Precinct 6 - 14: Temporary exclusion fencing will be erected in all other boundary locations (FIGURES 32 - 40). Gates, similar in design to the koala proof fencing, will be included at locations where future access for road construction will be required.
		Signage to be erected at 100m intervals along the margins of the EPZs and roadways stating "Environmental Protection Zone - No unauthorised entry." Provide and maintain educational, vandal proof signage (at intervals of no more than 100m) to ensure that residents are aware of the possibility of encountering koalas and other fauna on roads that traverse through environmental areas. Signage will include contact information for incident reporting. Signage will also be erected in strategic locations within any public open space area and at fauna underpasses advising residents that Koalas are active in the area and dogs should be kept on a leash at all times and encourage residents to keep dogs in enclosed yards between the hours of 6pm and 6am.	Site Manager/ Principal contractor until ownership of land is transferred.	Signage erected at no greater than 100m intervals prior to commencement of bulk earthworks^ in each relevant Precinct. Condition of signage regularly inspected and maintained. All instances of disrepair reported to the Site Manager.	

Relevant Development Precinct	Management Strategy	Management Action	Responsibility	Performance Measure	Precinct Specific Details
	Minimise construction impacts on Koalas and Koala habitat	Ensure the protection of retained vegetation/Koala habitat from all construction activities. Machinery and contractor access will be restricted. No clearing shall occur outside designated clearing zones.	Construction Manager/ Principal contractor	All retained vegetation/Koala habitat identified and protected and disturbance minimised.	
		All areas of vegetation to be cleared within each Precinct of the development will be clearly identified on construction plans and on site.	Construction Manager	All areas to be cleared within a specific precinct are identified and marked. No clearing outside of designated clearing areas.	
		All vegetation to be inspected by an ecologist/spotter catcher prior to clearing to check for the presence of Koalas.	Ecologist/ spotter catcher	Any experienced ecologist/spotter catcher to be on site at all times during clearing. All areas proposed for clearing inspected.	
		Clearing works are to be temporarily suspended (up to 72 hrs) within a 25m radius of any tree in which a Koala is located to ensure Koalas are not harmed. If the animal does not self-relocate out of the clearing area within 72 hrs of its initial observation, OEH will be consulted in relation to an appropriate protocol to encourage the animal to relocate.	Site Manager/ Ecologist/ spotter catcher	Clearing works temporarily suspended (up to 72 hrs) when within 25m of a Koala. Any Koalas that do not self-relocate out of the clearing area will be encouraged to utilising appropriate protocols as approved in consultation with OEH.	
		Any injured animals to be immediately taken to the nearest appropriately qualified veterinary clinic to provide treatment as soon as possible to injured animals.	Ecologist/ spotter catcher	Any injured animals receive treatment within one hour of capture.	
		Post-mortem examination completed for any Koalas found dead to determine the cause of death.	Suitably qualified person	Post-mortem completed for all Koalas found dead.	

Relevant Development Precinct	Management Strategy	Management Action	Responsibility	Performance Measure	Precinct Specific Details
		Vehicles shall be restricted to a maximum speed of 50 kph and shall operate only in daylight hours. Where roads traverse the environmental protection areas vehicles shall be restricted to a maximum speed of 40 kph to minimise the risk of vehicle strike.	All contractors and construction personnel on site	All operators of vehicles and machinery adhere to relevant speed limits and construction occurs only in daylight hours to minimise light and noise disturbance.	
		Koala exclusion fencing underpasses, signage etc. to be regularly checked (at not less than one (1) monthly intervals) and maintenance issues addressed as they arise, including vegetation in close proximity to the fencing. Any damage to exclusion fencing will be rectified within two (2) working days of the discovery of the damage.	Construction/Site Manager/ Principal contractor until ownership of land is transferred or independent contractor	Condition of fencing/gates, underpasses, signage etc. regularly inspected (at not less than one (1) monthly intervals) and maintained/repared. All instances of disrepair/ and/or breach etc. reported to the Site Manager.	
		Earthworks are to be temporarily suspended within 25m radius of any tree in which a Koala is located to ensure Koalas are not harmed. Where a Koala is located in the construction zone, the immediate threats to that animal are to be assessed by a suitably qualified person and intervention limited to instances where it is clear that there is an imminent and serious threat to that animal's welfare. Where threats are deemed to be low or manageable, the animal should be monitored until it moves to more suitable habitat.	Ecologist/Spotter catcher	Earthworks temporarily suspended at all times when within 25m of a Koala. Disturbance to any Koala located within the construction zone is minimised as far as possible and the animal has safely relocated of its own accord or the animal has been safely relocated by a qualified spotter/catcher.	
		No domestic dogs are to be brought onto the site during construction activities.	Construction manager	No dogs are brought on to the site during construction activities.	

Relevant Development Precinct	Management Strategy	Management Action	Responsibility	Performance Measure	Precinct Specific Details
		Any injured animals to be immediately taken to the nearest appropriately qualified veterinary clinic for treatment.	Ecologist/Spotter catcher	Any injured animals receive treatment within one hour of capture.	
		Street lighting to be capped and/or positioned to minimise light spill into retained Koala habitat and habitat rehabilitation areas.	Construction Manager/ Principal contractor	Light spill into Koala habitat areas is minimised as far as possible by appropriate design and positioning of lighting infrastructure.	
		Monitoring programs have been prepared to ensure that retained habitat remains free of construction damage, weeds, feral animals and adverse impacts on Koalas.	Construction Manager/ Ecologist	All retained Koala habitat remains free of construction impacts and in good condition.	
	Record Koala observations and incidents	Any Koala observation or incident should result in an observation/incident report. The report should contain as a minimum, the date and location (grid references) of the recorded. Where appropriate, cause of death (observed), sex of animal, age (teeth wear or other evidence) and any other information such as presence of ear tags, general condition (evidence of disease, weight, etc.) should be collected. This information should be available for viewing on request by OEH or TSC.	Construction Manager/ Ecologist	All Koala observations and incidents reported to TSC and OEH (on request).	
	Permanent fencing	Permanent fencing will replace temporary fencing at the end of the construction phase of the development of each applicable Precinct.	Construction Manager	All permanent fencing installed where applicable.	

Relevant Development Precinct	Management Strategy	Management Action	Responsibility	Performance Measure	Precinct Specific Details
	Fire Management	The risk of high intensity fires should be reduced within Koala habitat areas through controlled low intensity burns, or mechanical means if and where appropriate, and accordance with an amended and approved Bushfire Risk Management Plan. High-intensity hazard reduction burns and wildfires that result in crown scorch or crown fires should be avoided. Any locked gates may be opened in the event of bushfire to allow fauna to escape.	Project 28 will be responsible for bushfire management in the conserved bushland and wetland areas, for an estimated period of five (5) years or until ownership is transferred.	Risk of high intensity fires is reduced through controlled low intensity burns, or mechanical means.	
Precincts 2-5, Precinct 6	Construction/ Installation of Infrastructure during relevant road construction	The control of Slash pine in retained Koala habitat and compensatory habitat areas will be a priority of the Weed Management Plans	Project 28 will be responsible for bushfire management in the conserved bushland and wetland areas, for an estimated period of five (5) years or until ownership is transferred.	Slash pine is controlled within retained Koala habitat and compensatory habitat areas	Precincts 2-5: An underpass to be constructed underneath Kings Forest Parkway at the entrance to the estate. This underpass will be constructed as part of the upgrade of the Tweed Coast Road/Kings Forest Parkway intersection. Precinct 6: An underpass to be constructed underneath Kings Forest Parkway where it crosses between the two (2) SEPP 14 wetland areas.

Relevant Development Precinct	Management Strategy	Management Action	Responsibility	Performance Measure	Precinct Specific Details
		Grids will be provided where appropriate as detailed in SECTION 10.9.5.			Precincts 2-5: Koala fencing adjacent to Precinct 2 and 3 will include the construction of a specially designed Koala-grid where it crosses Secret Lane and a 2m wide self-locking gate to the north-east of the grid to allow pedestrian and horse access around the grid. Precinct 6: A temporary grid which shall be provided in the Kings Forest Parkway where it extends from Precinct 5 through to Precinct 6. Precincts 12-14: A temporary grid will be installed during road construction works at the southern end of Precinct 5 where a road is to be constructed linking precinct 5 with Precincts 12-14.
Precincts 2-5, Precinct 6	Koala habitat creation	Koala food tree planting around underpass openings to facilitate safe Koala dispersal across the site. To be completed as soon as practicable during construction phase at the completion of bulk earthworks.	Project 28 Pty Ltd - Site Manager / Bush Regeneration company	Fauna underpasses vegetated with Koala food trees within a 20m radius of openings.	
Notes: ^ In accordance with the EPBC approval (2012/6328) definitions, <u>bulk earthworks</u> include any importing, exporting, stockpiling, cutting or filling earthworks that alter site levels, but do not necessarily include clearing of vegetation.					

TABLE 13
KOALA MANAGEMENT STRATEGIES - OPERATIONAL PHASE

Relevant Development Precinct	Management Strategy	Management Action	Responsibility	Performance Measure
All Precincts	Self-sustaining koala population	Monitoring surveys to be completed on a biennial basis (SECTION 12).	Ecologist	Monitoring reports have been submitted to the Office of Environment and Heritage and compared with baseline data. The results of monitoring demonstrate that there is no reduction in Koala numbers.
	Exclude Koalas from roads and residential precincts	Koala exclusion fencing, underpasses, signage etc. to be regularly checked (at not less than three (3) monthly intervals) and maintenance issues addressed as they arise. Any damage to exclusion fencing will be rectified within two (2) working days of the discovery of the damage.	Site Manager/ Principal contractor until ownership of land is transferred or independent contractor	Condition of fencing/gates, underpasses, signage etc. regularly inspected (at not less than three (3) monthly intervals) and maintained. All instances of disrepair and/or breach reported to the Site Manager.
	Maintenance of infrastructure	Vegetation adjacent to exclusion fencing will be regularly checked (at not less than three (3) monthly intervals) and maintained to remove fallen branches and vines growing on the fence to maintain fence effectiveness, and trim trees where they may link to tree canopies on the other side of the fence.	Construction Manager/ Principal contractor	Vegetation adjacent to exclusion fencing is regularly checked (at not less than three (3) monthly intervals) and appropriately maintained.
	Help shape the attitude and	Provision of an information package for purchasers of land at Kings Forest.	Proponent	Information packages produced and distributed and feedback forms indicate that attitudes and awareness are being shaped.

Relevant Development Precinct	Management Strategy	Management Action	Responsibility	Performance Measure
	environmental awareness of members of the community.	Design and create a web page that contains information intended to raise and shape awareness of Koala issues at Kings Forest.	Proponent	Web page created and feedback forms indicate that attitudes and awareness are being shaped.
	Investigate sections of the community where public awareness of the environment is shaped.	The web site will be maintained for the duration of the construction phase of the project and for 12 months after completion of construction of the final precinct, or, until 31 December 2035, whichever occurs first.		
	Investigate ways in which awareness of local Koala issues can be shaped.	Advertise information relating to Koala management in local newspapers.	Proponent	Advertisements run and feedback forms indicate that attitudes and awareness are being shaped.
		Carry out community presentations/information days at local schools and/or public spaces.	Proponent	Presentations/information days carried out and feedback forms indicate that attitudes and awareness are being shaped.
		Provide feedback forms in order to confirm that awareness and education in the community is being built as a result of the environmental awareness and extension program.	Proponent	Feedback forms provided and indicating that attitudes and awareness are being shaped.
	Engaging with Local Government, NPWS and Community Koala Groups	Liaison of Proponent with Council, NPWS, OEH, Friends of the Koala, Tweed Valley Wildlife Carers and other relevant Community groups through meetings with the Koala Management Committee (KMC).	Proponent	Proponent is actively engaging with Local Government, NPWS and Community Koala Groups and attending meetings with the KMC.

Relevant Development Precinct	Management Strategy	Management Action	Responsibility	Performance Measure
	Residents' Representative	A Kings Forest Residents' Representative will be appointed by the Proponent. The Residents' Representative will attend all meetings of the Koala Management Committee (KMC). It is anticipated that the Residents Representative will also maintain a strong and regular connection with Tweed Shire Council, the NSW Environmental Protection Authority and the Office of Environment and Heritage.	Proponent	Residents' Representative is appointed and attending meetings with the KMC.
	Record Koala observations and incidents	Residents to report all instances of Koalas located within the urban area of Kings Forest and/or injured Koalas to Tweed Shire Council or Office of Environment and Heritage (OEH).	Residents	All Koala observations and incidents reported to TSC and OEH.
		Where a Koala is located in the urban area of Kings Forest, or reported by a resident, the protocol will be the same as during the construction phase. I.e. the immediate threats to that animal are to be assessed by a suitably qualified person and intervention limited to instances where it is clear that there is an imminent and serious threat to that animal's welfare. Where threats are deemed to be low or manageable, the animal should be monitored until it moves to more suitable habitat.	Residents/TSC Environmental Officer	Disturbance to any Koala located within the development zone is minimised as far as possible.

Relevant Development Precinct	Management Strategy	Management Action	Responsibility	Performance Measure
	Access management	At the completion of the monitoring program locks will be provided to all gates. Keys will be held by Tweed Shire Council and OEH (NPWS) where appropriate. Locked gates may be opened in the event of bushfire to allow fauna to escape.	Site Manager	Gates are locked and maintained.
Precincts 2-5, Precinct 6	Increase in connectivity	Use of underpasses will be monitored on a yearly basis for a period of five (5) years, or until revegetation on the Kings Forest site is self-sustaining (whichever is the earliest), following completion of exclusion fencing and underpass construction. Monitoring must be undertaken by a suitably qualified biologist/koala specialist. Monitoring may include use of sand beds at either end of underpasses or cameras in a number of randomly selected underpasses across the site.	Site Manager/Ecologist	Monitoring shows that Koalas are utilising these underpasses, with utilisation measured by number of through passes, increasing over time.

12 KOALA MONITORING AND REPORTING

12.1 Introduction

Monitoring will be undertaken to determine the effectiveness of mitigation measures implemented.

Monitoring will be required during the ‘establishment period¹¹’ and ‘maintenance period¹²’ of the project as defined within the Project approval (MP08_0194).

This section discusses the proposed monitoring program for Koalas at the Kings Forest site including the key monitoring objectives, methodologies to be implemented for baseline and biennial monitoring (including sand tray monitoring), data to be collected during monitoring events, reporting requirements and the specific requirement for Koala monitoring to be completed after bushfire events.

12.2 Key Monitoring Objectives

The key variable of interest for Koala monitoring purposes is the Koala habitat occupancy rate (Dr S. Phillips *pers. comm.* 11 October 2013). The key objectives of monitoring are to ensure:

- An increase in the amount of habitat being occupied by Koalas (notwithstanding stochastic events such as fire that are beyond the control of Koala management actions);
- An increase (over time) of habitat that is suitable for Koalas, and so an increase in the carrying capacity of the landscape outside of the proposed development area;
- Minimal or no encounters with Koalas within the development area (i.e. within Koala exclusion fencing);
- Minimal or no attacks on Koalas by domestic dogs;
- Koala responses to threatening processes are monitored;
- Mitigation measures are effective in minimising impacts to Koalas;
- Movement corridors for the local Koala population are maintained or improved;
- Koala exclusion fencing and associated underpasses, gates etc. are effective and Koalas are dispersing along existing and proposed fauna linkages; and
- Data is collected that will allow the detection of any significant impacts to the local Koala population.

¹¹ means the period commencing with the implementation of the relevant approved environmental management plan(s) and ending when the works specified in that plan meet the establishment period performance criteria (as defined by the relevant approved environmental management plan) to the satisfaction of the Secretary. The establishment period represents the time necessary to carry out initial environmental repair, restoration and monitoring prior to ongoing maintenance.

¹² means the period commencing immediately after the end of the establishment period during which environmental management and monitoring works specified in the relevant approved environmental management plan(s) are to be carried out in accordance with the maintenance period performance criteria (as defined by the relevant approved environmental management plan) to the satisfaction of the Secretary.

12.3 Baseline Monitoring

Baseline Koala monitoring will be completed across the entire site prior to the commencement of works on the site by suitably qualified and/or accredited persons¹³ in accordance with the methodology discussed in **APPENDIX 7**. Baseline 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 and the implementation of permanent photo monitoring points.

The survey data collected will be used to compile a Baseline Monitoring Report (**SECTION 12.8.1**).

12.4 Biennial Koala Monitoring

Koala monitoring shall be completed on a biennial basis (as a responsibility of the Proponent), from the date of commencement of works, and will continue for a period extending to five (5) years after completion of each precinct.

Biennial Koala monitoring will be completed over the Kings Forest site following the methodology described in **APPENDIX 7**. Biennial 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 and the continued monitoring of permanent photo monitoring points. In addition, sand tray monitoring will be completed, and/or camera traps installed to assess the usage of underpasses.

In the event that a suspected diseased koala is observed during monitoring, the time, date and location of the sighting must be recorded. These details should be passed on to an appropriate wildlife care organization as soon as practicable. If required, the observer should remain at the location until the wildlife rescuer attends.

Any records of diseased Koalas will be included in the results of the biennial koala monitoring report.

12.5 Koala Revegetation Monitoring

A direct offset strategy has been prepared (**SECTION 10.5** and **APPENDIX 6**) that identifies areas available for planting, suitable tree species, establishment methods and maintenance regimes.

Biennial monitoring will be completed to determine:

1. the success of the revegetation activities, including whether replanting is required in some areas; and
2. if the planted areas are being used by Koalas.

¹³ Means a qualified ecologist with appropriate training and at least five years of experience in undertaking surveys in relation to the relevant EPBC Act listed threatened species.

An outline of a suitable monitoring program adapted from the BAM (OEH 2017b) is provided in **APPENDIX 6** and includes specific performance targets to be achieved during the 'establishment period' and 'maintenance period' of the project as defined within the Project approval (MP08_0194).

12.6 Koala Monitoring Performance Criteria

- For monitoring purposes, 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;
- Notwithstanding the influence of events beyond the control of the Proponent, the KPoM can only be considered successful if the extent of habitat being utilised by Koalas across the Kings Forest site increases towards the benchmark or does not deviate significantly from the estimate of habitat occupancy rate established by baseline monitoring;
- Generally, conclusions relating to changes in the occupancy rate across the Kings Forest site should only be made at every second monitoring event (i.e. every four (4) years) by examining both the occupancy trend over the intervening four (4) year period and by a direct comparison to the occupancy estimate of four (4) years previous;
- Any statistically significant reduction in the habitat occupancy rate when compared to that estimated by the previous monitoring period will warrant further investigation as to the cause of the reduction and so trigger a review of the Plan;
- Koalas are not (or very rarely) encountered within the development area;
- No evidence of dog attacks on Koalas;
- Koalas are moving along existing and proposed fauna linkages/corridors as evidenced by monitoring results;
- Koalas are utilising underpasses (as evidenced by sand tray and camera trap monitoring), with utilisation measured by number of through passes, increasing over time;
- Inspections, monitoring and maintenance of Koala mitigation measures will occur at not less than one (1) monthly intervals from the commencement of construction within each Precinct;
- Any damage to exclusion fencing is reported and rectified within two (2) working days of the discovery of the damage; and
- All reporting is completed as scheduled and provided to OEH and TSC.

12.7 Koala Monitoring After Fire

Koala monitoring will also be completed after any bush fire on the Kings Forest site by a suitably qualified ecologist. This will be completed in accordance with the methodology provided in **APPENDIX 7** to monitor the impacts of fire on the local Koala population.

12.8 Reporting

12.8.1 Baseline Report

Subsequent to the completion of baseline monitoring, a report will be prepared outlining the results. The report will be provided to the Commonwealth Department of the Environment, NSW Department of Planning and Environment (DoPE), NSW Office of Environment and Heritage (OEH) and Tweed Shire Council and form the baseline for future monitoring. The baseline monitoring report will be available on the JWA website for 12 months (www.jwaec.com.au/).

12.8.2 Biennial Koala Monitoring Report

A Biennial Koala Monitoring Report (BKMR) will be prepared which discusses the results of the monitoring against the Monitoring Performance Criteria identified in **SECTION 12.6**, and the successful implementation of management actions (with reference to the Criteria for Success, Thresholds and Corrective Actions detailed in **SECTION 13.2**). The information provided in the BKMR should include, but not necessarily be limited to:

1. An aim will be to provide a scientifically based (repeatable) comparison of the following parameters with the baseline data:
Koala occupancy rates, Koala distribution and levels of activity, longer term movement patterns, reproductive output, dispersal patterns of juveniles, Koala population demographics, health profile and disease status.
2. A presentation of the results of the Koala survey for each particular monitoring event;
3. A detailed discussion of the results of each particular monitoring event;
4. A detailed comparison with the baseline parameters and with previous biennial survey data, as appropriate;
5. An analysis of the occupancy rate and any statistical changes to this rate over time;
6. A statement of compliance with the Monitoring Performance Criteria identified in **SECTION 12.6**;
7. Successful implementation of management actions (with reference to the Criteria for Success, Thresholds and Corrective Actions detailed in **SECTION 13.2**);
8. Koala usage within Environmental Protection Zones, ecological buffers and the golf course;
9. Adaptive management procedures to ensure that the separate management plans remain relevant and effective;
10. Documentation of any reported injuries to Koalas or mortalities;
11. An evaluation of the effectiveness of Koala grids, underpasses (e.g. sand tray and camera trap monitoring), fencing, improvements in habitat quality (fixed photo points), success of replanting efforts, community education, bushfire management, domestic dog control, feral dog control etc.; and
12. Comparison of results with the Baseline Monitoring Report and any other previous year's results.

Each BKMR will be provided to the Commonwealth Department of Environment, NSW Department of Planning and Environment (DoPE), NSW Office of Environment and Heritage (OEH) and Tweed Shire Council and will be available on the JWA website for a period of 12 months (www.jwaec.com.au/).

13 CONTINGENCY AND OFFSET STRATEGY

13.1 Introduction

Within one year of commencement of works within each relevant Precinct, the Proponent will prepare and submit a detailed Koala Contingency and Offset Strategy that will be implemented if the created compensatory habitat relevant to each precinct does not meet the defined success criteria outlined in **SECTION 13.2** as determined under the monitoring regimes detailed in **SECTION 12.4**.

Contingency and Offset Strategies will be in accordance with the applicable offset policy in place at the time of writing and will, as a minimum, address the following:

- The relevant offset policy context and requirements;
- The success criteria identified for compensatory habitat creation;
- The potential threats and risks to successful compensatory Koala habitat creation;
- A reiteration of the conservation outcome sought;
- The scenarios to be considered where offset may be required;
- The methodology for calculating offset, particularly if only part of the compensatory habitat created is not successful;
- The potential options for direct offsets including their location and the mechanisms for how tenure and conservation in perpetuity will be secured;
- The nature of the governance arrangements for the offset;
- The role of other compensatory measures; and
- How the offset will be monitored for success and reported on for compliance purposes.

13.2 Criteria for Success and Corrective Actions

13.2.1 Background

To assess the effectiveness of the KPoM the following specific criteria for success have been developed. Assessment against these criteria will be included in the BKMR. Thresholds and corrective actions in relation to specific management objectives are also discussed.

13.2.2 Criteria for Success

TABLE 14 details the specific objectives of the KPoM, the relevant recommendations proposed to achieve these objectives, and outlines the criteria for judging success.

TABLE 14
OBJECTIVES OF THE MANAGEMENT PLAN AND CRITERIA FOR JUDGING SUCCESS

Objectives	Recommendations	Criteria for Judging Success	Suggested Likelihood of Success (and Residual Risk)
To ensure that the proposed development does not remove significant areas of habitat known, or likely to be important for the local Koala population	1. Removal of Koala habitat will be restricted to approved areas (i.e. 8.00 ha in total as shown in FIGURE 19). 2. A large area which includes identified areas of "Primary Koala habitat" contiguous with Cudgen Nature Reserve (CNR) will be transferred to public ownership.	• All Koala habitat outside of approved clearing areas is retained (FIGURE 19). • The designated 150 ha (minimum) of habitat known to be important to Koalas and which is contiguous with Cudgen Nature Reserve (CNR) is transferred to public ownership (i.e. the Tweed Shire Council or the Office of Environment and Heritage (OEH)).	• High likelihood of success (low risk of clearing additional areas) • High likelihood of success (low risk that land is not transferred)
To ensure that movement corridors for the local Koala population are maintained or improved	3. Fauna underpasses will be constructed to facilitate connectivity of habitat and fauna movement. Underpasses will be at least 1.8m high x 2.4m wide and no longer than 40 m. Where the underpass crosses beneath a dual carriageway or a road with a centre island, skylights will be incorporated. Use of underpasses will be monitored on a yearly basis for a period of five (5) years, or until revegetation on the Kings Forest site is self-sustaining (whichever is the earliest), following completion of exclusion fencing and underpass construction. Monitoring must be undertaken by a suitably qualified biologist/koala specialist. Monitoring may include use of sand beds at either end of underpasses and/or camera traps in a number of randomly selected underpasses across the site.	• Monitoring shows that Koalas are utilising these underpasses, with utilisation measured by number of through passes, increasing over time. • Monitoring shows that Koalas are moving along existing and proposed fauna linkages.	• Moderate likelihood of success (a moderate risk that underpasses are not utilised) • Moderate likelihood of success (existing linkages likely to continue to be utilised, a moderate risk that new linkages will not be utilised)

Objectives	Recommendations	Criteria for Judging Success	Suggested Likelihood of Success (and Residual Risk)
	4. Free movement of Koalas through the Kings Forest site will be preserved and enhanced by revegetation of existing fauna linkages and the provision of additional linkages.		
To protect individual Koalas from injury or other adverse impacts during the development phase	5. Temporary fencing (comprised of 1.5 m high wire mesh held upright by star pickets) will be installed in the pre-construction phase. In some areas temporary fencing will not be required as permanent fencing will be installed prior to commencement of construction activities on site (refer SECTION 11). 6. An experienced fauna handler/ecologist will be on site to supervise all clearing activities regardless of whether the area is considered as Koala habitat. 7. An education program will be developed and presented to all workers on the site. The program will provide information on the potential presence of Koalas and the procedures to be followed if a Koala is encountered (i.e. tree clearing operations and or bulk earthworks will be temporarily suspended within a range of 25 m from any tree which is concurrently occupied by a koala and must not resume until the koala has moved out of the area of its own volition). 8. Appropriate temporary signage will be placed around the site and on the margins of the Environmental Protection Zones stating that Koalas occur on the site and providing an	• All fencing has been installed prior to commencement of construction. • An experienced fauna handler/ecologist is present to supervise all clearing activities. • All workers on the site are made aware of the potential presence of Koalas and the procedures to be followed if a Koala is encountered. • Appropriate temporary signage is installed. • Any damage to mitigation infrastructure is reported and rectified within two (2) working days of the discovery of the damage.	• High likelihood of success (low risk that fences are not installed) • High likelihood of success (low risk that fauna handler/ecologist is not present to supervise clearing activities) • High likelihood of success (low risk that site works are not properly inducted) • High likelihood of success (low risk that signage is not installed) • High likelihood of success (low risk that damage is not reported and rectified).

Objectives	Recommendations	Criteria for Judging Success	Suggested Likelihood of Success (and Residual Risk)
	appropriate contact for the reporting of Koala sightings. 9. Prompt notification to relevant agency of any damage to environmental mitigation measures (e.g. exclusion fencing).		
To embellish the habitat values of the site, including the creation of Koala habitat as part of a comprehensive offset strategy.	10. Koala food trees will be planted in areas identified in FIGURES 32 to 40. 11. Tree planting to occur prior to the commencement of construction on a precinct-by-precinct basis. 12. Koala food tree planting in accordance with the species list in APPENDIX 6 (TABLE 1). 13. Within 12 months of the commencement of construction associated with each precinct, the approval holder must submit a detailed Koala Contingency and Offset Strategy for the Minister's written approval that will be implemented should the created habitat not meet the defined success criteria detailed in this KPoM.	- Plantings are completed in designated areas and maintained until established. - Average growth rate, foliage projective cover and species composition targets, based on Plant Community Type (PCT) benchmark descriptions accessed on the NSW Office of Environment & Heritage (OEH) database i.e. The BioNet Vegetation Classification System, for the specific vegetation communities on the Kings Forest site are met. - Koala food trees have been planted along both sides of underpasses and within a radius of 20 m of underpass openings. - Koala food trees are planted from the list specified in the Vegetation Management Plan. - Biennial monitoring of Koalas demonstrates the stability of the local population and an increase in Koala numbers on the Kings Forest site after the completion of the development.	- High likelihood of success (low risk that plantings are not completed) - Moderate likelihood of success (moderate risk that plantings do not meet accepted benchmarks) - High likelihood of success (low risk that plantings are not completed) - High likelihood of success (low risk that specific species are not planted) - Moderate likelihood of success (moderate risk that population numbers do not increase)

Objectives	Recommendations	Criteria for Judging Success	Suggested Likelihood of Success (and Residual Risk)
To protect, restore and provide for ongoing maintenance of existing koala habitat	14. All existing Koala habitat outside of the proposed clearing areas must be protected and retained. 15. A management strategy is to be implemented to monitor retained Koala habitat e.g. exclusion of construction activities, Koala distribution, health of vegetation, weed occurrence etc. 16. Existing Koala habitat to be retained on the site will be embellished through assisted regeneration and weed control works in accordance with the requirements of the following management plans: • Kings Forest Precincts 1 and 5 Vegetation Management Plan (JWA 2018a); • Kings Forest Precincts 2-4 and 6-11 Vegetation Management Plan (JWA 2018b); • Kings Forest Precincts 12-14 Vegetation Management Plan (JWA 2018c); • Kings Forest Precincts 1 and 5 Weed Management Plan (JWA 2018k); • Kings Forest Precincts 2-4 and 6-11 Weed Management Plan (JWA 2018l); and • Kings Forest Precincts 12-14 Weed Management Plan (JWA 2018m).	• All existing Koala habitat outside of the proposed clearing areas is protected and retained. • Monitoring of retained Koala habitat demonstrates that the habitat remains suitable for Koala use. • Existing Koala habitat is embellished through assisted regeneration and weed control works in accordance with the relevant Management Plans.	• High likelihood of success (low risk that Koala habitat outside of designated clearing areas is removed/damaged) • High likelihood of success (low risk that retained Koala habitat becomes unsuitable for Koalas to utilise) • High likelihood of success (low risk that assisted regeneration and weed control works are not successfully completed in accordance with relevant Management Plans)
To ensure that activities generated because of the proposed development (e.g. additional traffic,	17. Exclusion fences will be constructed to keep Koalas out of residential areas in accordance with SECTION 10.9.3 . Koala incursions into built up areas during the operational phase of the development to be reported to TSC and dealt with by TSC and followed up by inspection of fencing issues. Inspection and maintenance to be completed on a regular basis. Where incidents	• Exclusion fences have been constructed. Inspection and maintenance regularly completed (i.e. vegetation in close proximity to fencing and damage caused by machinery, vandalism, fire and deterioration is amended as required). No Koalas have been recorded in residential areas.	• High likelihood of success (low risk that fences are not installed/maintained)

Objectives	Recommendations	Criteria for Judging Success	Suggested Likelihood of Success (and Residual Risk)
introduction of dogs) do not significantly impact on the local Koala population	involving impacts on Koala are directly attributable to failings of fencing and/or grid design, this shall necessitate the modification of their design. 18. Temporary grids will be installed in the pre-construction phase to exclude dogs from Environmental Protection Zones on a precinct-by-precinct basis (refer SECTION 11). 19. Regular checking and prompt maintenance of infrastructure (fencing etc.) 20. Educational signage will be placed at frequent intervals on the permanent Koala exclusion fencing. Signage will inform residents of the possible occurrence of Koalas within the Environmental Protection Zones, the purpose of the exclusion fencing around the residential area and imperative directive that dogs are prohibited within the EPZs. Signage will also detail procedures to be followed when encountering Koalas within the exclusion zone, including the appropriate persons to contact. 21. Prompt notification to relevant agency of breaches to environmental mitigation measures. 22. Project 28 engage with OEH, Council and the Rural Fire Service to amend the Bushfire Risk Management Plan so as to ensure that a co-operative effort to minimise the potential for	- Grids have been installed and no dogs have been recorded in Environmental Protection Zones. - Signage has been installed. - Any damage to mitigation infrastructure is reported and rectified within two (2) working days of the discovery of the damage. - A suitably qualified ecological professional inspects the fencing, grids and underpasses and certifies that the infrastructure has been constructed in accordance with the KPoM. - The Bushfire Risk Management Plan is updated and implemented.	- High likelihood of success (low risk that grids are not installed/maintained) - High likelihood of success (low risk that signs are not installed/maintained) - High likelihood of success (low risk that breaches are not reported and rectified). - High likelihood of success (low risk that infrastructure is not certified). - High likelihood of success (low risk that BRMP is not updated).

Objectives	Recommendations	Criteria for Judging Success	Suggested Likelihood of Success (and Residual Risk)
	wildfires and fire frequencies that impact on Koalas occurs.		
To ensure that Koalas continue to utilise habitat at Kings Forest	23. Any observations of Koalas (including any mortality if it was to occur on the Kings Forest site during or after development) will be reported in accordance with recommendations of the Office of Environment and Heritage.	- Monitoring reports have been submitted to the Office of Environment and Heritage and compared with baseline data. - The results of monitoring demonstrate that there is no reduction in Koala numbers after the completion of the development.	- High likelihood of success (low risk that reports not submitted). - Moderate likelihood of success (moderate risk that population numbers do not increase)
To ensure monitoring and management is being carried out and maintained	24. Biennial Koala monitoring and reporting will be provided to and approved by the Department of Planning, OEH and Tweed Shire Council.	Biennial Koala monitoring and report have been provided to the Department of Planning, OEH and Tweed Shire Council.	High likelihood of success (low risk that reports not submitted).
To raise awareness and promote community ownership of environmental management (including the conservation of the local Koala population)	25. Provision of an information package for purchasers of land at Kings Forest. Help shape the attitude and awareness of the community and investigate where and how efforts to shape public awareness are best applied. 26. Design and create a web page that contains information intended to raise and shape awareness of Koala issues at Kings Forest 27. Advertise information relating to Koala management in local newspapers.	- Information packages produced and distributed and feedback forms indicate that attitudes and awareness are being shaped. - Web page created and feedback forms indicate that attitudes and awareness are being shaped. - Advertisements run and feedback forms indicate that attitudes and awareness are being shaped.	High likelihood of success (low risk that information package, web page, advertisements, presentations/information days and feedback forms are not provided. Low risk that awareness of environmental management is not raised).

Objectives	Recommendations	Criteria for Judging Success	Suggested Likelihood of Success (and Residual Risk)
	28. Carry out community presentations/information days at local schools and/or public spaces. 29. Provide feedback forms in order to confirm that awareness and education in the community is being built as a result of the environmental awareness and extension program.	• Presentations/information days carried out and feedback forms indicate that attitudes and awareness are being shaped. • Feedback forms provided and indicating that attitudes and awareness are being shaped.	
Compliance with relevant conditions	30. Within three (3) months of every twelve (12) month anniversary of the commencement of the approved action, Project 28 must publish a report on their website addressing compliance with each of the conditions of approval relating to Koalas. 31. Project 28 must inform the Department of any non-compliance with conditions relating to Koalas within two (2) business days of becoming aware of the non-compliance. 32. Project 28 must maintain accurate records. These records may be subject to audit by the Department. 33. Project 28 must publish this KPoM on the JWA website (www.jwaec.com.au/) within 1 month of its approval. 34. If, at any time 5 years from the date of this approval, Project 28 has not substantially	• Publish report on Project 28 website addressing compliance. The report will be available on the website for 12 months. • The KPoM is published on the Project 28 website within one (1) month of its approval. The KPoM will be available on the website for 12 months. • Project 28 will not commence the action after 21 May 2020 without written agreement of the Minister.	• High likelihood of success (low risk that reports not published). • High likelihood of success (low risk that reports not published). • High likelihood of success (low risk of project commencement after 21 May 2020 without written agreement of the Minister).

Objectives	Recommendations	Criteria for Judging Success	Suggested Likelihood of Success (and Residual Risk)
	commenced ¹⁴ the action, then Project 28 must not substantially commence the action without the written agreement of the Minister.		
Revision of the KPoM as appropriate	35. Project 28 will submit, to the Department, a revised version of the KPoM if they wish to carry out any activity which is not in accordance with the approved KPoM. 36. If the Minister believes that it is necessary or convenient for the better protection of the Koala, the Minister may request that Project 28 revise the KPoM. Project 28 must revise the KPoM as directed by the Minister.	KPoM revised when necessary or as directed by the Minister.	High likelihood of success (low risk that KPoM not revised if necessary).

¹⁴ means the physical commencement of bulk earthworks or construction of housing and other infrastructure, in one or more precincts on the project area.

13.2.3 Thresholds and Corrective Actions

The following actions will be the responsibility of the Proponent and implemented if required:

- Any statistically significant reduction in occupancy rate (**SECTION 12.6**) will trigger investigations into the Threatening Processes known to be acting against Koala populations generally:
 - o Habitat Degradation, Loss or Fragmentation - Investigate habitat usage on the Kings Forest site. Determine which areas of potential habitat are not being utilised by the population. Consult with OEH and Koala experts to develop a strategy to improve/facilitate the usage of the potential Koala habitat. Implement the strategy.
 - o Road Kills - If there is an instance of one (1) Koala killed or injured on Kings Forest internal roads then an investigation of causes will be triggered. All Koala exclusion fences will be inspected and re-instated or mended as appropriate. All vegetation adjacent to or covering fences will be lopped or treated as appropriate so as to ensure Koalas cannot use vegetation to travel over the fences. Inspection protocols will be amended where appropriate to ensure that fence damage and/or vegetation growth does not provide escape opportunities for Koalas in the future.
 - o Dog Attacks - If there is an instance of one (1) attack by a dog on a Koala then an investigation of causes will be triggered. Exclusion fencing will be assessed as described above. Dog management within the Kings Forest estate will be investigated. If the lack of dog management is considered to be ineffective or dog ownership then Council and OEH will be consulted and a more prescriptive dog ownership/management strategy will be prepared and implemented.
 - o Bushfire - If a bushfire occurs within land owned by Project 28 (Leda) an investigation will be triggered to assess damage to Koalas and their habitat on the Kings Forest lands. The investigation will include a survey of the Koala population occurring on the Kings forest site (see **APPENDIX 7** for the Methodology). Consultation will occur with RFS, Council and OEH to determine the cause of the fire. A report will be prepared after the consultation. The report will address, causes, impacts and proposed changes, if considered necessary, to Bushfire management plans.
 - o Disease - Disease condition assessments will be carried out during the baseline monitoring assessment and in every biennial assessment thereafter. Five (5) years after commencement of construction consultation will occur with relevant OEH scientists and other Koala experts as necessary or convenient. A report will be completed. If expert opinion considers that disease occurrence is over and above that which would be expected in a wild population of Koalas or they consider that there has been a significant increase in diseased animals since the Baseline assessment, then advice will be obtained from appropriate OEH scientists and/or other Koala experts as considered necessary or appropriate. The advice will be implemented.
 - o Swimming Pools - If there is an instance of a Koala drowning in a residential pool then an investigation will be triggered. Koala exclusion fences will be assessed

and strategies provided as discussed above. Pool ownership strategies eg. checking to ensure all pool owners have pool fences which are Koala proof. Other strategies could include the provision of ropes in pools. A report will be prepared in consultation with OEH, Council and/or Koala experts as necessary or appropriate. The recommendations contained in the report will be implemented.

- Any damage to fences will be reported to the Site Manager and prompt immediate repair, within two (2) working days of the discovery of the damage, will be completed by site personnel or independent contractors as determined by the Site Manager.
- If dogs are shown to have breached the intact fences and entered the Environmental Protection Zones a review of the fence design will occur within 1 month of the breach being detected. Evidence may include: reported sightings by the public, Leda staff or contractor personnel; dog tracks found during koala underpass sand tray monitoring events; photographs of dogs taken by camera traps; dead or injured koalas. The review will be completed by an acknowledged authority in Koala biology/ecology. All recommendations from the review will be implemented;
- Repeated instances of vandalism to Koala mitigation infrastructure will prompt the implementation of mobile security patrols by a commercial security specialist;
- Any instances of diseased/injured Koalas will be investigated and further monitored;
- Any instances of Koala mortality as a result of poor public awareness (i.e. domestic dog attack, vehicle strike) will prompt the installation of additional educational signage;
- If it is evident that public awareness of Koala issues is low, as indicated by non-compliance with Koala management strategies (e.g. domestic dogs allowed to roam, vandalism to Koala mitigation infrastructure), investigations into improved public awareness strategies will be completed. This may involve consulting a specialist;
- The use of underpasses by Koalas will be investigated. SKM (2014) have indicated that evidence of usage of designated underpasses by koalas should be based on a frequency which confirms ongoing connectivity is being maintained. The baseline survey (**APPENDIX 7**) will provide underpass usage data upon which all subsequent usage data will be measured. The significance (or otherwise) of deviations from the baseline usage data will be determined by an acknowledged authority in Koala biology/ecology when each Biennial Koala Monitoring Report is prepared;
- Replanting of Koala trees in close proximity to underpass openings if required (refer **APPENDIX 6** for trigger values);
- Assess the adequacy of vegetation surrounding underpass openings, restrictions or disturbances to movement through underpasses etc.
- If pest animals are found to be impacting on native recruitment within rehabilitation areas, installation of protective tree guards, fencing and/or feral animal control will be considered;
- Excessive use of underpasses by feral animals (i.e. if only being used by feral animals - identified through sand tray inspections and/or camera traps) will prompt the implementation of appropriate feral animal control programs; and

- All survey data collected for the project will be prepared so as to conform to EPBC Act survey guidelines and/or policy statements. This data must be made available to the Department within thirty (30) days of a request by the Department for this data.
- If monitoring results indicate that there has been a statistically significant reduction in Koala occupancy rates on the Kings Forest site over two (2) successive monitoring periods an investigation of threatening processes will be completed. The test of significance will utilise the Paired Student t-test to test the hypothesis that pre-development koala activity (via SAT survey data) is higher than the post-development koala activity. As sample sizes are relatively small, however, the value of p (typically 0.05 or 0.01 in order for significance to be determined) should be raised to something that better reflects the limitations of the sample size. A p of 0.25 as the statistical benchmark of significant change should be considered, further qualified by a requirement that a major review should be initiated only after consideration of the monitoring data from 2 successive monitoring events. Prior to the collection of any data it is proposed to complete a Power analysis. The main purpose underlying this power analysis will be to assist the ecologist to determine the smallest sample size that is suitable to detect the effect of a given test at the desired level of significance. This would allow a response to a (negative) trend within a single koala generation (Dr S. Phillips *pers comm* 3 October 2018).
- This investigation will be completed by an independent Koala specialist jointly appointed by NSW DoPE and Commonwealth Department of Environment and funded by Leda. The independent Koala specialist will prepare a report. The report should consider the following factors:
 - o A thorough review of potential Koala threatening processes on the Kings Forest site and the success of the management strategies aimed at mitigating the impact of these processes on the Kings Forest site should be completed;
 - o Survey data indicating Koala occupancy rates for the Tweed Coast population (including Kings Forest) have been collected by Tweed Shire Council on a triennial basis since 2015. Data was also collected by Biolink in 2011. A thorough analysis of this data will be required;
 - o Phillips *et al.* (2011) have stated that the Tweed Coast Koala Population is in serious decline and may be extinct within 20-30 years (from 2011). The local Kings Forest Koala population is a seamless part of the wider Tweed Coast population. As this prediction was made well prior to commencement of development at Kings Forest in 2018, it is very highly unlikely (and probably impossible) that the proposed Kings Forest development, regardless of commencement in coming years, would have any impact on the decline of the Tweed Coast Koala Population. Indeed, if Leda are considered compliant with all of their conditions, including implementation of the management strategies, it would be impossible for them to be held responsible for the extinction of the Tweed Coast population;
 - o Consultation with all stakeholders i.e. DoPE, OEH, Tweed Shire Council, relevant community Koala groups and landowners/developers; and
 - o Recommendations to halt (and reverse) the decline in Koala occupancy rate will be provided in the report.

This report will be assessed by Leda, the Commonwealth Department of Environment, NSW DoPE and NSW OEH. NSW DoPE will provide Leda with recommendations relating to the current status of the Kings Forest Koala population and proposals to increase the occupancy rates on the Kings Forest site.

- Leda will retain their right to appeal to the NSW Land & Environment Court if they contest any of the recommendations from NSW DoPE.

13.2.4 Performance Targets and Corrective Actions for Proposed Offset Strategy

The performance indicators and targets for the proposed rehabilitation strategy to be achieved during the ‘establishment period’ and ‘maintenance period’ of the project (as defined within the Project approval MP08_0194) are contained in **APPENDIX 6**. Corrective actions are also provided that are to be implemented if performance targets are not met.

14 SUMMARY TABLE AND IMPLEMENTATION SCHEDULE OF MANAGEMENT PLAN

Task (Relevant Section/s)	Responsibility	Pre- construction	Construction	Operational Phase (Year/Month)									
				Year 1		Year 2		Year 3		Year 4		Year 5	
				Annually	Monthly	Annually/ Biennially	Monthly	Annually	Monthly	Annually/ Biennially	Monthly	Annually	Monthly
Baseline surveys (SECTION 12.3)	Ecologist	X											
Pre-clearing Koala surveys (SECTION 10.2)	Ecologist/ Spotter catcher	X											
Education of site personnel (SECTION 10.3)	Construction manager	X											
Maintenance of retained Koala habitat (SECTION 10.4)	Suitably qualified bush regeneration company	X	X	X		X		X		X		X	
Revegetation/offsetting of koala habitat (SECTION 10.5)	Site manager/ Suitably qualified bush regeneration company	X	X	X		X		X		X		X	
Fire Management including controlled burns and/or mechanical methods and control of Slash pine (SECTION 10.7)	Proponent until ownership of land is transferred		X	X		X		X		X		X	
Install wildlife exclusion fencing (permanent and/or temporary) and associated escape mechanisms (SECTION 10.9 & 10.10)	Construction manager/ Principal contractor	X	X										

Task (Relevant Section/s)	Responsibility	Pre- construction	Construction	Operational Phase (Year/Month)									
				Year 1		Year 2		Year 3		Year 4		Year 5	
				Annually	Monthly	Annually/ Biennially	Monthly	Annually	Monthly	Annually/ Biennially	Monthly	Annually	Monthly
Construction/Installation of fauna road crossing infrastructure (SECTION 10.9 & 10.10)	Construction manager/ Principal contractor		X										
Signage erected in strategic locations within public open space areas and underpasses - advising koala presence and dogs on leash (SECTION 10.10)	Construction manager/ Principal contractor		X										
Survey plans and permanent marking of dedication areas (SECTION 11.2)	Construction manager/ Principal contractor/ Registered surveyor	X											
Clearing works - all existing koala habitat outside of the proposed clearing areas protected and retained and areas to be cleared clearly identified (SECTION 11.2)	Construction manager/ Principal contractor		X										
Preventing Koala contact with dogs and appropriate dog control (SECTION 10.10)	Construction manager/ Tweed Shire Council	X	X	X	X	X	X	X	X	X	X	X	X
Providing appropriate care/management of diseased or injured Koalas and post-mortem examination of dead koalas (SECTION 10.11)	Construction manager /Contractors/ Monitoring teams/ Ecologist	X	X	X	X	X	X	X	X	X	X	X	X

Task (Relevant Section/s)	Responsibility	Pre- construction	Construction	Operational Phase (Year/Month)									
				Year 1		Year 2		Year 3		Year 4		Year 5	
				Annually	Monthly	Annually/ Biennially	Monthly	Annually	Monthly	Annually/ Biennially	Monthly	Annually	Monthly
Record Koala observations and incidents (SECTION 11.3 and 11.4)	Construction Manager/ Ecologist/ Residents		X	X	X	X	X	X	X	X	X	X	X
Self-sustaining Koala population and increase Koala carrying capacity - biennial monitoring (SECTION 10.13, 11.4 and 12.4)	Ecologist		X			X				X			
Use of underpasses will be monitored on a biennial basis for five years (SECTION 10.9 and 12.4)	Site manager/ Ecologist					X				X			
Engaging with the relevant Local Government, NPWS and community Koala management groups (SECTION 10.14)	Proponent	X	X	X	X	X	X	X	X	X	X	X	X
Raising community awareness and education (SECTION 10.15)	Proponent/ Site manager/ Principal contractor until ownership of land is transferred		X	X	X	X	X	X	X	X	X	X	X
Additional construction phase management measures (SECTION 10.16)	Contractors		X										
Implementation of fauna underpasses (SECTION 10.9)	Construction manager/ Principal contractor		X										

Task (Relevant Section/s)	Responsibility	Pre- construction	Construction	Operational Phase (Year/Month)									
				Year 1		Year 2		Year 3		Year 4		Year 5	
				Annually	Monthly	Annually/ Biennially	Monthly	Annually	Monthly	Annually/ Biennially	Monthly	Annually	Monthly
Signage shall be provided and maintained along the boundary of the EPZ - 1 monthly intervals during construction and then 3 monthly (SECTION 10.9.3)	Site manager		X	X		X		X		X		X	
Exclusion fencing to regularly checked and maintained - 1 monthly intervals during construction and then 3 monthly. Gates are locked and maintained (SECTION 10.9.3 and 12)	Construction/site manager/ Principal contractor until ownership of land is transferred or independent contractor		X	X		X		X		X		X	
Minimise light spill into Koala habitat areas (SECTION 10.9.6 and 11.4)	Construction manager/ Principal contractor		X										
Koala revegetation monitoring (SECTION 12.5)	Ecologist		X			X				X			
Koala monitoring after fire (as necessary) (SECTION 12.7)	Ecologist		X	X		X		X		X		X	

15 COSTING

TABLE 15 contains an indicative costing for the implementation of mitigation measures within each precinct of the development.

TABLE 15
INDICATIVE COSTINGS

Precinct	Infrastructure Items and Rehabilitation of Offset Areas	Cost (\$)*
Precinct 1	One-way Koala exclusion fencing (\$130/metre)	\$45,370
	Gates	Included in costs above
	Escape mechanisms	\$1,250/each
	Signage (speed and koala warning)	\$250/sign
	Roadway lighting	\$40,000/km
	Maintenance of infrastructure in the long term (accumulating per year until infrastructure dedicated or the end of the project)	\$7,500/year
	Monitoring & Reporting	\$120,000/year
Precincts 2-5	One-way Koala exclusion fencing (\$130/metre)	\$661,570
	Gates	Included in costs above
	Escape mechanisms	\$1,250/each
	Dedicated fauna underpass and furniture	\$75,000
	Landscape at entry to underpass	\$2,500
	Median strip treatment	\$2,000
	Roadway lighting	\$40,000/km
	Grids (3 x 3 m length @ \$1500 each plus installation)	\$4,500
	Signage (speed and koala warning)	\$250/sign
	Maintenance of infrastructure in the long term (accumulating per year until infrastructure dedicated or the end of the project)	\$7,500/year
	Rehabilitation of offset areas (1,112 plants/hectare @ \$15/plant (includes seedling, fertiliser, watering and weeding until sustainable) i.e. \$16,680/hectare)	\$154,624
	Environmental Awareness and Extension Program	\$15,000
	Monitoring	\$120,000/year
Precinct 6	One-way Koala exclusion fencing (\$130/metre)	\$612,040
	Gates	Included in costs above
	Escape mechanisms	\$1,250/each
	Dedicated fauna underpass and furniture	\$75,000
	Landscape at entry to underpass	\$2,500
	Signage (speed and koala warning)	\$250/sign
	Maintenance of infrastructure in the long term (accumulating per year until infrastructure dedicated or the end of the project)	\$7,500/year

Precinct	Infrastructure Items and Rehabilitation of Offset Areas	Cost (\$)*
	Rehabilitation of offset areas (1,112 plants/hectare @ \$15/plant (includes seedling, fertiliser, watering and weeding until sustainable) i.e. \$16,680/hectare)	\$7,340
	Monitoring	\$120,000/year
Precinct 7	One-way Koala exclusion fencing (\$130/metre)	\$381,420
	Gates	Included in costs above
	Escape mechanisms	\$1,250/each
	Signage (speed and koala warning)	\$250/sign
	Maintenance of infrastructure in the long term (accumulating per year until infrastructure dedicated or the end of the project)	\$7,500/year
	Rehabilitation of offset areas (1,112 plants/hectare @ \$15/plant (includes seedling, fertiliser, watering and weeding until sustainable) i.e. \$16,680/hectare)	\$84,068
	Monitoring	\$120,000/year
Precinct 8	One-way Koala exclusion fencing (\$130/metre)	\$418,730
	Gates	Included in costs above
	Escape mechanisms	\$1,250/each
	Signage (speed and koala warning)	\$250/sign
	Maintenance of infrastructure in the long term (accumulating per year until infrastructure dedicated or the end of the project)	\$7,500/year
	Rehabilitation of offset areas (1,112 plants/hectare @ \$15/plant (includes seedling, fertiliser, watering and weeding until sustainable) i.e. \$16,680/hectare)	\$111,590
	Monitoring	\$120,000/year
Precinct 9	One-way Koala exclusion fencing (\$130/metre)	\$501,540
	Gates	Included in costs above
	Escape mechanisms	\$1,250/each
	Signage (speed and koala warning)	\$250/sign
	Maintenance of infrastructure in the long term (accumulating per year until infrastructure dedicated or the end of the project)	\$7,500/year
	Rehabilitation of offset areas (1,112 plants/hectare @ \$15/plant (includes seedling, fertiliser, watering and weeding until sustainable) i.e. \$16,680/hectare)	\$18,015
	Monitoring	\$120,000/year
Precinct 10	One-way Koala exclusion fencing (\$130/metre)	\$332,020
	Gates	Included in costs above
	Escape mechanisms	\$1,250/each
	Signage (speed and koala warning)	\$250/sign
	Maintenance of infrastructure in the long term	\$7,500/year

Precinct	Infrastructure Items and Rehabilitation of Offset Areas	Cost (\$)*
	(accumulating per year until infrastructure dedicated or the end of the project)	
	Rehabilitation of offset areas (1,112 plants/hectare @ \$15/plant (includes seedling, fertiliser, watering and weeding until sustainable) i.e. \$16,680/hectare)	\$97,078
	Monitoring	\$120,000/year
Precinct 11	One-way Koala exclusion fencing (\$130/metre)	\$614,380
	Gates	Included in costs above
	Escape mechanisms	\$1,250/each
	Signage (speed and koala warning)	\$250/sign
	Maintenance of infrastructure in the long term (accumulating per year until infrastructure dedicated or the end of the project)	\$7,500/year
	Rehabilitation of offset areas (1,112 plants/hectare @ \$15/plant (includes seedling, fertiliser, watering and weeding until sustainable) i.e. \$16,680/hectare)	\$245,679
	Monitoring	\$120,000/year
Precincts 12-14	One-way Koala exclusion fencing (\$130/metre)	\$1,164,540
	Gates	Included in costs above
	Escape mechanisms	\$1,250/each
	Signage (speed and koala warning)	\$250/sign
	Maintenance of infrastructure in the long term (accumulating per year until infrastructure dedicated or the end of the project)	\$7,500/year
	Rehabilitation of offset areas (1,112 plants/hectare @ \$15/plant (includes seedling, fertiliser, watering and weeding until sustainable) i.e. \$16,680/hectare)	\$428,626
	Monitoring	\$120,000/year
*Note: Proposed to be funded from the proponents ongoing cash flow during the development.		

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APPENDIX 1 - JAMES WARREN - CV

JAMES WARREN
MANAGING DIRECTOR

Biography

With 28 years of industry experience, James has specialist expertise in:

- The completion of field surveys and assessments for flora and fauna communities across a broad spectrum of habitats including wetlands, coastal heaths, rainforests, sclerophyll forests and woodlands, heathlands and estuarine communities;
- The assessment of impacts on plant and animal communities and the mitigation of impacts on these communities;
- The completion of environmental management plans;
- The completion of mine rehabilitation plans;
- Acting as a liaison to local councils, state and federal departments as well as other consultants; and
- Project management.

James has extensive knowledge of environmental policy and legislation relevant to development and industry in New South Wales and Queensland and has a proven record of achieving favourable project outcomes.

James has also participated in mediation and Court ordered Joint Experts Reports and has appeared regularly as an expert witness in the NSW Land and Environment and Court in the Queensland Planning and Environment Court.

Major projects James has contributed to:

- **Kings Forest Estate, near Kingscliff (NSW)** - Master planned community and mixed use development of 900 ha and 4,500 lots. James has been involved with this project since 1997 and most recently completed Submissions to the Commonwealth.
- **Cobaki Estate, Cobaki (NSW)** - Master planned community and mixed use development of 550 ha and 5,500 lots. James has been involved with this project since 1997 and most recently completed Submissions to the Commonwealth.
- **Area E, Terranora (NSW)** - The Proposed development consists of residential Lots, open space, shops, community facilities and roads. Residential Lots will comprise the majority of the site with 401 dwellings. Retail shops, a Residents Club and a community building will cover approximately 2.5ha and the remainder will be roads, open spaces and vegetation rehabilitation. Plans completed include a Vegetation Assessment, Wetland Rehabilitation Plan and Habitat Rehabilitation Plan.



JAMES WARREN

MANAGING DIRECTOR

- **Hayman Island (QLD)** - James completed three surveys of the One & Only Hayman Island resort and surrounds to assess the Proserpine Rock Wallaby population size prior to the capture and translocation of 100 wallabies to the mainland.
- **Peregian Springs Estate, Peregian Springs (QLD)** - Proposed Master planned community and mixed use development. James completed a detailed ecological assessment of the site.
- **Cannon Hill Community Links, Minnippi Parklands (QLD)** - James completed a monitoring program for the Squirrel glider population.

Representative Court Expertise

- The Trustee for the Gerald and Catherine Barnard Family Trust T/A Australian Walkabout Wildlife Park Pty Ltd [ACN 662 583 787] v Minister for Planning and Infrastructure & Rocla Materials Pty Ltd, Land and Environment Court of NSW Proceedings No. 14/10024. Ecological Assessment - Calga Sand Quarry Southern Extension.
- Braudmont Pty Ltd ACN 067 531 131 & Gemstone Nominees Pty Ltd & Brian Neil Sings v Gold Coast City Council & Department of Environment & Resource Management, Planning and Environment Court Appeal No. 217 of 2010. Report of Evidence - The Impact of a Walkway Construction on the Ecology of the Frontal Dune Between Len Wort Park and Tomewin Street, Currumbin.
- Tyam Heong Chong & Chon-Jui Yang v Logan City Council Appeal No. 2822 of 2012. Joint Expert Witness Report.
- Roy Somerville Surveys Pty Ltd v Brisbane City Council Planning and Environment Court No's. 1058, 1059 & 1060 of 2010 - 252a Compton Road and 57 Acacia Road, Karawatha.
- Iny Pty Ltd v Brisbane City Council, Land Court of Queensland AQL116-12 - Lot 2 on RP 75292, 211 Underwood Road, Eight Mile Plains.

Education

1974 Bachelor of Science Degree (B.Sc.)
University of New England, Armidale

1989 Master of Applied Science Degree (Thesis) (M.AppSc)
University of Technology, Sydney

The Thesis studied the status and productivity of the Wetland and Riparian Ecosystems in the Parramatta River Basin.

JAMES WARREN
MANAGING DIRECTOR

Relevant Professional Experience

November 1997 - present	Managing Director and Principal Environmental Scientist JWA Pty Ltd, Ballina NSW
1995-1997	Principal Environmental Scientist Woodward-Clyde
1987-1995	Director and Principal Environmental Scientist James Warren Biological and Environmental Consultants
1993	Manager Environmental Division Australian Koala Foundation
1990 -1992	Senior Environmental Scientist Newcrest Mining (Aust. Eastern Division)
1987-1989	Environmental Biologist Planners North
1976-1987	Secondary School Teacher - Sydney, Lismore and Murwillumbah

Professional Memberships

Member of the Ecological Society of Australia (MESA)
Member of the Australian Institute of Biology (MAIB)
Member of the Coast and Wetlands Society (MCAWS)

APPENDIX 2 – SUMMARY OF RELEVANT STATUTORY DOCUMENTS AND PLANS

Introduction

This section outlines the statutory requirements in relation to the conservation of Koalas and the preparation of Koala Plans of Management. The statutory requirements are contained in Commonwealth and State legislation as follows:

Commonwealth Environment Protection and Biodiversity Conservation Act (1999)

The Koala (combined populations of QLD, NSW and ACT) was listed (May 2012) as ‘Vulnerable’ under the *Environment Protection and Biodiversity Conservation Act 1999* in recognition of the threat to their survival, particularly in coastal regions, from:

- Vegetation loss and fragmentation;
- Vehicle strike and predation by dogs as a result of urban expansion; and
- Increased susceptibility to the effects of drought, climate change and disease.

The proposed development was considered likely to have a significant impact on a Matter of National Environmental Significance (NES) i.e. the Koalas in the Kings Forest locality, and was therefore referred to the Minister of the Environment through the Australian Government Department of Sustainability, Environment, Water, Population and Communities (DSEWPC). The DSEWPC indicated that the proposed action would be assessed through Preliminary Documentation (PD).

A comprehensive review and public exhibition process was completed in 2013 and 2014 and a Revised Final Response Report was submitted in March 2015. The action was approved in May 2015. This Approval contained twenty-seven (27) conditions. The requirement for the preparation of a KPoM was included in the conditions.

EPBC Act Referral guidelines for the vulnerable Koala (Queensland, New South Wales and the Australian Capital Territory (2014)

These Koala referral guidelines (the guidelines) aim to address the complexity of making a decision as to what constitutes a significant impact on the Koala and provide guidance that can be applied consistently across the entire distribution of the listed koala. The guidelines break down the significant impact decision and guide proponents on important requirements, particularly on information expectations, survey planning, standards for mitigating impacts and guidance on significant impact. This is provided in the context of long term recovery planning for the Koala.

The following points summarise the guidelines:

- Impacts on ‘habitat critical to the survival of the species’ and impacts that ‘substantially interfere with the recovery of the species’ are the focus of assessing significance.

- Habitat protection and impact mitigation is focused on areas of habitat that are large and well-connected. This habitat is considered to be habitat critical to the survival of the species as it is the most likely to remain viable in the medium to long-term.
- Loss of habitat that is not habitat critical to the survival of the species is highly unlikely to have a significant impact on the koala for the purposes of the EPBC Act.
- Actions with indirect impacts on the koala may constitute a significant impact, particularly where they occur in habitat critical to the survival of the koala, are new impacts or exacerbate an existing impact. Mitigation measures are available to reduce the impact of such actions.
- Mitigation measures must be monitored and maintained for the duration of the impact (this often means in perpetuity). If this standard is not met, the proposed mitigation will not be considered effective for reducing impact.
- Urban areas are not likely to contain habitat critical to the survival of the koala, as the existing effects of habitat loss, fragmentation, vehicle strike, dog attack and other threats are likely to continue to degrade these areas over the medium to long-term. These existing threats are best addressed by local remedial action, rather than through regulation under the EPBC Act.

Examples of structures designed to mitigate dog and vehicle impacts on Koalas include:

Dog attack

- fencing that is both dog proof and Koala proof along boundaries, or dog proof fencing with Koala furniture to allow Koalas to escape yards.
- Fences are a minimum 3m high (dog proof) and have a minimum 50 cm wide scratch panelling installed along the length of the outer side of the fence (for Koala proof fencing).

Vehicle strike

- Koala proof fencing along entire extent of infrastructure and be a minimum of 1.8m high and be 3 metres from any retained trees or plantings and be clear of all overhanging branches.

Underpasses

- include above water, dry longitudinal benches;
- Ideally be no more than 40m in length;
- Be a minimum 2.4m in height and width;
- Have a low flow channel incorporated in the design;
- Fencing in place to guide Koalas to the underpasses (at least 100m on either side of the underpasses).

In most cases, avoiding impacts to habitat critical to the survival of the koala and implementing the mitigation measures outlined will help reduce the risk of a significant impact and therefore the need to refer the action for EPBC Act approval.

NSW Threatened Species Conservation Act (1995)

The *Threatened Species Conservation Act 1995* (TSC Act) is the key piece of legislation in NSW relating to the protection and management of biodiversity and threatened species. The TSC Act aims to protect and encourage the recovery of threatened species, populations and communities that are listed under the Act through threat abatement and species recovery programs. The TSC Act requires consideration of whether a development (Part 4) or an activity (Part 5) is likely to significantly impact threatened species, populations, communities or their habitat. The Koala is listed as Vulnerable under the TSC Act.

NSW Environmental Planning and Assessment Act (1979)

The NSW *Environmental Planning and Assessment Act (1979)* (EP&A Act) has, amongst others, the objectives to protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities and their habitats.

The Kings Forest Project Application was assessed under Part 3A of the EP&A Act as a State Significant Project. Part 3A required that:

- The Minister was the consent authority;
- The Director of Planning issue Director General's Environmental Assessment Requirements (DGEAR's); and
- The proponent complete a comprehensive Environmental Assessment Report (EAR).

Under Section 75F of the EP&A Act (1979) the Director General of the NSW Department of Planning issued "Director General's Environmental Assessment Requirements (DGEAR's) on 21 August 2007. A requirement to prepare a KPoM was contained in the DGEAR's. Amended DGEAR's were issued to Project 28 in December 2010 for the Stage 1 Project Application. The amended DGEAR's required the completion of an updated KPoM.

NSW Recovery Plan for the Koala (2008)

Within New South Wales, Koalas (*Phascolarctos cinereus*) are recognised as a Schedule 2 (Vulnerable) species under the TSC Act. The Final Determination for the listing of the Koala on the TSC Act by the Scientific Committee notes that the Koala has been included in Schedule 2 for the following reasons:

- Koala populations and their distribution have been severely reduced.
- Recovery potential is considered poor.
- Threatening processes are considered to be severe.

- Koalas are ecological specialists, feeding principally on the leaves of particular eucalypt species.
- Most of the state's remaining Koalas occur as a series of fragmented populations in the north coast region, from the Hunter River to the NSW/QLD border.
- Koalas appear largely dependent on areas of fertile soils and either high rainfall or adequate soil moisture. The majority of such lands have already been cleared for agriculture or settled at densities, which may eventually eliminate Koalas.
- Only 24% of Koala sightings obtained by the 1986-87 New South Wales Koala Survey were in National Parks, Nature Reserves or State Forests (Reed *et al.* 1990). The majority of sightings were on private lands in New South Wales, where Koala conservation is a community concern and the responsibility falls largely with the community and local government.

The TSC Act provides that the Director General of the Department of Environment and Climate Change (DECC) may prepare a recovery plan for all species, populations and ecological communities listed as critically endangered, endangered or vulnerable on the Schedules of the Act (other than species presumed extinct). Part 4 of the TSC Act specifies matters to be included in a recovery plan and the process for preparing recovery plans. In 2008 the DECC completed an Approved Recovery Plan for the Koala (*Phascolarctos cinereus*). In addition, the TSC Act provides that the Director General must prepare a Priorities Action Statement (PAS), which specifies the conservation strategies, and actions where known, to recover all threatened species in NSW. Actions contained within this recovery plan are summarised by the PAS and this information is available from the NSW threatened species website. Any KPoM prepared in NSW would be required to comply with the provisions of the Recovery Plan.

National Koala Conservation and Management Strategy (2009-2014)

The National Koala Conservation and Management Strategy (NKCMS) 2009-2014 takes into account the considerable amount of Koala research, planning and management activity since the 1998 National Koala Conservation Strategy. For instance, the 1998 strategy makes no reference to climate change.

Recent research has also shown that the relative importance of each threat differs from location to location. This requires local solutions, based on local studies and local plans, to manage individual koala populations across their extensive range. The task of this strategy is to give cohesion to all levels of activity and acknowledge that there is no one universal solution for managing koalas.

Since the 1998 strategy, national and state conservation efforts have increasingly focused on multi-species and landscape-scale protection and recovery. Protecting, restoring and managing koalas and their habitat will have significant benefits for a wide range of other species and ecological communities which also share the koala's habitat. The NKCMS aims to integrate with and complement, conservation efforts in all areas where the koala exists. Importantly, the koala was identified as a flagship with which to generate public support for these broader efforts.

The NKCMS was developed jointly by the Australian, state and territory governments through the Natural Resource Management Ministerial Council (NRMMC). Its aim was to provide a national framework for the conservation of koalas. The NKCMS was intended to be formally reviewed after five years, to facilitate an adaptive approach to Koala conservation management.

Species Profile and Threats Database (SPRAT Profile) for *Phascolarctos cinereus* (Combined Populations of Queensland, New South Wales and the Australian Capital Territory)

This is a comprehensive document provided in response to the decision to list the Koala as Vulnerable in the EPBC Act. Apart from the detailed discussions on the distribution, habitat requirements, reproductive biology and population estimates it discusses the threats facing the Koala and mitigation measures that should be implemented to halt and reverse the decline in population numbers. The document also contains a comprehensive list of references utilised in its compilation.

The document notes that a reduction in the risk of the impacts of vehicles on Koalas can be achieved by the control of speed limits, user awareness and design features such as exclusion fencing, escape mechanisms and light and noise reduction. These DoE mitigation features are discussed below:

Speed Limits

Where feasible, set 60km/h enforceable speed limits where a new major road/upgrade intersects with likely Koala habitat patches and landscape corridors. Differential speed limits could be set so that lower speeds are only enforceable during peak, daily, Koala-movement periods (e.g. 60km/h from 7pm to 5am during the local breeding season and 80km/h at all other times).

User Awareness

Road signage to alert drivers to the fact that Koalas may cross the roadway in the area (even though measures are in place to prevent this from occurring). Interpretative signage should educate:

- Construction personnel during the construction stage of the project;
- Road users and the general public (also could be done through letterbox drops or advertising campaigns); and
- Members of the public about the impact-prevention/mitigation measures constructed.

Design Features

Exclusion Fencing

Install Koala-proof fencing to prevent the access of Koalas to the roadway and in conjunction with all structural impact-mitigation measures to increase their effectiveness (for example funneling Koalas to overpasses or underpasses). Fences should:

- Be made of interlock mesh;
- Be a minimum 1.5 m in height;
- Be 5 m from any retained trees or plantings to minimise the potential for Koalas to climb over the fence and to minimise potential damage occurring to the fence from falling trees or tree limbs; and
- Have a minimum 50 cm wide scratch paneling or ‘floppy tops’ installed along the length of the fence to minimize the ability of Koalas to climb the fence.

Escape Mechanisms

Strategically place climbing poles (made of treated pine logs) at appropriate intervals along road corridor side of any Koala-proof fencing to allow Koalas to climb over the fence if they inadvertently enter the road corridor. Include refuge poles/furniture to allow Koalas to escape dogs easily.

Light and Noise Reduction

Incorporate walls (strategically placed to prevent the creation of barriers to Koala movement) and other techniques to prevent or reduce light emanating from the road (streetlights or vehicle headlights) entering adjacent Koala habitat and adversely affecting habitat quality. Use LED lights to reduce light emissions.

NSW Scientific Committee Final Determination - Koalas between the Tweed and Brunswick Rivers east of the Pacific Highway as an endangered population

The Scientific Committee, established by the Threatened Species Conservation Act 1995 (the Act), has made a Final Determination to list a population of the Koala *Phascolarctos cinereus* (Goldfuss, 1817) between the Tweed and Brunswick Rivers east of the Pacific Highway as an ENDANGERED POPULATION in Part 2 of Schedule 1 of the Act. Listing of Endangered populations is provided for by Part 2 of the Act.

In summary, the Scientific Committee found that:

1. In far north-eastern NSW, records of Koalas between the Tweed and Brunswick Rivers are concentrated in the coastal lowlands. Within the Tweed local government area over 44% of the original vegetation cover has been removed or heavily disturbed over the last 150 years.
2. The Koala population between the Tweed and Brunswick Rivers east of the Pacific Highway is considered to be disjunct because anthropogenic modification of the landscape has resulted in barriers to movement. The Pacific Highway, a four lane dual carriageway, represents the western boundary of the population. Major roads are considered a significant barrier to the movement of Koalas, functioning both as a substantial habitat gap that resident Koalas are reluctant to cross and as a significant source of mortality.
3. The Koala population between the Tweed and Brunswick Rivers east of the Pacific Highway is fragmented into four sub-populations. The Bogangar/Kings Forest/Forest Hill sub-population (inhabiting an area of 358 ha; 71% vegetated); the Tanglewood/Round

Mountain/Koala Beach subpopulation (inhabiting an area of 578 ha; 80% vegetated); the Pottsville Wetlands/Black Rock/Dunloe Park sub-population (inhabiting an area of 316 ha; 79% vegetated) and the Duranbah/Eviron subpopulation (inhabiting an area of 625 ha; 10% vegetated). The extent of connectivity within and amongst these sub-populations remains uncertain.

4. The geographic distribution of the Koala population between the Tweed and Brunswick Rivers east of the Pacific Highway is highly restricted. The extent of occurrence (EOO) is estimated to be 126- 189 km² . The EOO estimate is based on the method of assessment recommended by IUCN (2014). The area of occupancy (AOO) was estimated to be 132-228 km², based on 33-57 2 x 2 km grid cells, the scale recommended for assessing AOO by the IUCN (2014).
5. The estimated total number of mature individuals in the Koala population between the Tweed and Brunswick Rivers east of the Pacific Highway is considered to be low. Based on density estimates of 0.14 individuals per ha and the area of occupied sites, the total number of individuals in the four subpopulations is estimated to be 144 individuals (9-64 for each sub-population) with an upper 95% confidence interval at 267 individuals (16-120 for each sub-population) (Phillips *et al.* 2011). These estimates include an unknown proportion of juveniles and sub-adults so the number of mature individuals is likely to be less than these estimates.
6. The Koala population between the Tweed and Brunswick Rivers east of the Pacific Highway, like those throughout New South Wales, is subject to a number of ongoing threats including habitat loss and degradation, increased mortality due to wildfire, dog attacks and vehicle strike, as well as disease.
7. Inappropriate fire regimes, particularly high intensity or high frequency fires, represent an additional significant threat to the Koala population between the Tweed and Brunswick Rivers east of the Pacific Highway (Phillips *et al.* 2011; Hopkins and Phillips 2012). Fires impact Koalas directly through mortality of animals and habitat fragmentation reduces the ability of animals to subsequently recolonise burnt areas.
8. The largest area of natural vegetation, and potential Koala habitat, remaining in the Tweed coastal lowlands occurs around Cudgen Lake/Round Mountain (Phillips *et al.* 2011). Much of this area has been burnt multiple times in the last 15 years with time between fires being as short as three years. The 2004 and 2009 fires were of high-intensity and much of the area burnt by these fires is currently unoccupied by Koalas, despite containing areas mapped as high quality Koala habitat (Phillips *et al.* 2011).

NSW OEH Species Profile (Sept 2017) - Koalas between the Tweed and Brunswick Rivers east of the Pacific Highway as an endangered population

NSW OEH provide a profile for the Endangered Koala population known to occur between the Tweed and Brunswick River east of the Pacific Highway.

The profile contains information on:

- The distribution;
- The habitat and ecology;

- Threats;
- Recovery strategies; and
- Activities to assist this population.

Tweed Coast Comprehensive Koala Plan of Management (TCCKPOM) (2015)

It is noted that the preparation of the Kings Forest KPoM does not need to comply with the requirements of the TCCKPoM however the contents and proposed mitigation strategies have been reviewed and implemented in this KPoM where appropriate.

The Tweed Coast Koala Habitat Study (Biolink 2011) was the main supporting document to the TCCKPoM. The scope and content of the TCCKPoM, together with the supporting Tweed Coast Koala Habitat Study, has been prepared in accordance with SEPP 44 and the associated Departmental guidelines. Accordingly, this Plan covers a wide range of issues including development control, strategic planning, koala habitat restoration, managing threats from roads, dogs, fire and disease, community engagement, implementation, and ongoing monitoring, reporting and review. The plan also has relevance to a wide range of stakeholders.

Part 7 of the TCCKPoM commits Council to taking a lead role in Koala habitat restoration and identifies a range of non-regulatory opportunities and benefit for landholders wanting to preserve and/or enhance koala habitat on their land.

In relation to SEPP 44, the TCCKPoM itself has been prepared in accordance with Part 3 of SEPP 44 and addresses the aims and objectives of SEPP 44 (Part 1 of the SEPP) through both the regulatory and non-regulatory provisions. Part 5 of the TCCKPoM represents the regulatory component of the plan and satisfies the development control provisions of Part 2 of SEPP 44. Consistent with the provisions of Part 4 of SEPP 44, Part 6 of the TCCKPoM makes recommendations for the development control provisions (Part 5) to be incorporated in Council's Development Control Plan and also recommends environmental protection zoning and other protections for Core Koala Habitat under Council's LEP. Appendix B contains further detail on the manner in which the TCCKPoM addresses the SEPP 44 departmental guidelines.

Consistent with the SEPP 44 guidelines, the TCCKPoM represents an overarching environmental strategy which will be used to inform Council's response to all aspects of Koala conservation and management across all areas of its jurisdiction. As of October 2018, the TCCKPoM has not received approval under SEPP 44.

Appendix D of the TCCKPoM contains recommended Wildlife Infrastructure Design Guidelines such as:

- 1.8m high exclusion fencing;
- Climbable fencing to include an opaque sheeting of minimum 600mm height attached to the lower portion of the fence to form a visual barrier to fauna encountering the fence;
- Inclusion of grids where exclusion fencing is intersected by roads;

- Grids are to consist of 60mm diameter round pipe positioned at 200mm centres;
- Underpasses are to provide for all-weather dry access by Koalas;
- Underpass dimensions are to be no less than 1.8m high X 2.4m wide;
- Fauna crossings are to incorporate furniture, natural flooring and Koala food tree plantings at underpass entrances.

APPENDIX 3 – REVIEW OF RELEVANT KINGS FOREST KOALA MANAGEMENT DOCUMENTS

Introduction

Comprehensive desktop assessments were completed as an integral part of the preparation of this KPoM. Additional to the Statutory documents reviewed in **APPENDIX 2**, a number of other relevant (to Kings Forest) documents have been reviewed. This section provides details of some of these documents.

Summary of Documents Reviewed

Interim Report on Monitoring of Impacts on Koalas Associated with the Upgrading and Part Realignment of Old Bogangar Road. Prepared for Tweed Shire Council by John Callaghan and Steve Phillips. June 1998. The Australian Koala Foundation.

As part of this study, a total of eight (8) Koalas were captured and fitted with radio-tracking collars. The aim of the radio-tracking program was to establish baseline information and to facilitate monitoring of impacts on the local Koala population associated with the upgrading/realignment of Old Bogangar Road.

Two (2) animals whose ranging patterns clearly covered the Old Bogangar Road are known to have been killed since work commenced on the road upgrading. At least two (2) of the eight (8) radio-tracked Koalas, including the likely Alpha male, occupied home ranges that included areas on both sides of Old Bogangar Road. Both of these animals made road crossings (through a large culvert) over the course of the radio-tracking program. Exclusion fencing along the realigned Old Bogangar Road was recommended. This fencing has subsequently been installed.

Species Impact Statement for the Proposed Kings Forest Development. A Report to Narui Gold Coast. December 2000. James Warren and Associates Pty Ltd.

As part of this study, seven (7) Koalas were radio-collared and tracked for several months. Overall, Swamp Sclerophyll Forests were found to be the most important habitats for these animals. As expected, Koalas were closely associated with habitats containing the preferred feed tree Swamp mahogany (*Eucalyptus robusta*). Although no radio-tracking data was gathered for the Dry Sclerophyll Forests occurring on the Kings Forest site, this habitat is also likely to be important for Koalas.

Some Koalas were consistently recorded in Pine forests up to 150 m from preferred feed trees. Faecal pellet analysis revealed that Pine did not appear in the diet of these individuals, and it was concluded that the Pine was used for roost purposes only.

The Species Impact Statement (SIS) also provided details of a Koala Faecal Pellet Analysis. Faecal pellets were collected from six (6) of the radio-collared Koalas. The results establish the importance of Swamp mahogany (*Eucalyptus robusta*) as a feed tree for Koalas. They also highlighted the importance of species such as Scribbly gum (*Eucalyptus signata*), Broad-leaved paperbark (*Melaleuca quinquenervia*) Swamp turpentine (*Lophostemon suaveolens*), Blackbutt

(*Eucalyptus pilularis*) and Brushbox (*Lophostemon confertus*) that are typically regarded as secondary feed trees.

Eucalyptus robusta was the most significant component of the majority of pellets. Other species that comprised over 30% of an individual sample were *Eucalyptus pilularis* (>30% in 2 samples), *Lophostemon confertus* (>30% in 1 sample), *Lophostemon suaveolens* (>30% in 3 samples) and *Melaleuca quinquenervia* (>30% in 1 sample).

Kings Forest Draft Koala Plan of Management. Biolink Pty Ltd. October 2004.

This document constitutes the final stage of a project to develop a Koala Plan of Management for the Kings Forest area southwest of Kingscliff in the Tweed Local Government Area. The study area included the Kings Forest site, adjoining areas of the Cudgen Nature Reserve to the east and some neighbouring lands in the southwest.

Assessment was undertaken using analysis of data derived from a systematic sampling of the study area at 250m and 125m intervals using SAT methodology. A total of 136 SAT sites were inspected, 87 of which were formally assessed. Data analysis confirmed that the feeding preferences of koalas on lowland areas of the Kings Forest site is predominantly focused on Swamp mahogany, while other known koala food trees such as Forest red gum, Tallowwood and Grey gum also occur. However, koala activity was not widespread throughout the study area with only 23% of sampled sites returning koala activity levels consistent with the presence of *Core Koala Habitat*, the majority of which was located along the eastern periphery and southern portions of the study area in recent years, most notably in the vicinity of Depot Road and more centrally located wetland areas, the reasons for which are unknown.

SAT-based assessments further determined a population density estimate of 0.18 ± 0.04 koala/hectare, indicating that a population of approximately 76 koalas currently inhabit the study area, the greater proportion of which reside within mapped boundaries of *Core Koala Habitat*. Observations of free-ranging koalas and demographic data alludes to the presence of normal population parameters in the south and possibility of older cohorts in the north.

Kings Forest Koala Plan of Management. Prepared by Dr Frank N Carrick AM EcoIndig Resources Pty Ltd on behalf of Project 28 Pty Ltd. August 2009.

This 2009 KPoM was prepared in response to the NSW Department of Planning The Director General's Environmental Assessment Requirements (DGEARs), issued on the 21st August 2007. These requirements followed from State Environmental Planning Policy (Major Projects) 2005 (Amendment No 10) in NSW Government Gazette No 135 of the 10th November 2006, pursuant to a Concept Plan Application with respect to Kings Forest. In part, the SEPP amendment resulted in the rezoning of various parts of Kings Forest. This 2009 KPoM was prepared in response to the zoning amendments and also incorporated revisions arising from submissions on the Kings Forest KPoM dated March 2008 which were received from the public, conservation groups, local government and state government agencies.

This 2009 KPoM evaluated the likely impacts of the proposed development and made a series of management recommendations relating to carrying capacity, connectivity, vehicles, domestic dogs, swimming pools, disease status, and education and awareness issues.

Various performance indicators and benchmarks were recommended to assess the effectiveness of this 2009 KPoM and to provide for adaptive management modifications to the plan. A commitment to intensive and extended monitoring was provided to ensure compliance with the 2009 KPoM and to inform future planning decisions for development proposals in Koala Management Area 1 - North Coast (DECC 2008).

Tweed Coast Koala Habitat Study. Report to Tweed Shire Council. January 2011. Biolink Ecological Consultants Pty Ltd.

This report describes the results of a Koala habitat and population assessment for the coastal portion of the Tweed Local Government Area (TLGA), an area of approximately 21,200 ha comprising lands surrounding Terranora and Cobaki Broadwaters in the north before extending along the coast for approximately 35 km south of Tweed Heads generally between the coast and the Pacific Highway.

Analyses of 1,119 records of Koala sightings over the period 1949 to 2009 revealed that Koalas were once more widespread throughout the TLGA than they are today. Across the TLGA historical records infer a contraction of approximately 18% in the extent of occurrence over the last three (3) Koala generations, while area of occupancy rates appeared to be unchanged at approximately 44%, a trend also mirrored within the TCSA.

Detailed Koala population assessments in the TCSA involved application of a systematic sampling strategy primarily reliant on Spot Assessment Technique (SAT) methodology to gather data on koala presence and absence, food tree preferences, koala density and activity. Collectively, 134 field sites were sampled comprising 85 primary and 49 supplementary field sites, the latter focused around areas of significant koala activity. Evidence of habitat use by koalas was recorded in 17 of the 85 primary sites to provide a current estimated extent of occurrence of 12,631 ha, with a current area of occupancy of approximately 20%.

This study provides that, north of the Tweed River, Koala activity data indicates the persistence of small relic populations in the Terranora-Bilambil Heights and Tweed Heads South areas, however the short to medium-term viability of these populations is considered low in the absence of recruitment and is further reduced by the escalation of threatening processes arising from ongoing development. South of the Tweed River, three (3) disjunct sub-populations occupy discrete areas of habitat between Bogangar and Pottsville. The presence of an additional small population outlier in the vicinity of Duranbah and Eviron Road is also indicated, the viability of which is clearly contingent upon recruitment from the aforementioned sub-populations to the east.

Evidence of generational persistence is widespread throughout the TCSA, testifying to a long history of occupancy and successful reproduction by Koalas. Until now, the Tweed Coast's Koala population has persisted in an increasingly patchy habitat matrix that is compartmentalised by road barriers and cleared lands, where it is subjected to the full suite of threatening processes.

Comparison of historical record analysis and results of field survey suggests that occupancy by Koalas within the TCSA has halved in recent years, with density data inferring a population estimate of approximately 144 Koalas remaining in areas of currently occupied habitat. This population estimate infers that the population size of the TCSA Koalas may already be below the minimum viable population size required to sustain long-term population survival. Fire frequency and intensity within remaining habitat areas over the last decade has been identified as the major contributor to recent population attrition, with recovery potential now impeded in remaining habitat areas by ongoing incidental mortality rates due mostly to motor vehicle strike.

Data from 2,734 trees collected during the course of the study were augmented by that from other studies in order to better investigate issues associated with utilisation of preferred Koala food trees. Collectively, a total of 8,413 trees comprised the tree use data set. Consistent with previous work, four (4) species - Forest red gum (*Eucalyptus tereticornis*), Swamp mahogany (*E. robusta*), Tallowwood (*E. microcorys*) and Grey gum (*E. propinqua*) - were identified as the most preferred species within the TCSA. Forest red gum and Swamp mahogany were confirmed as primary food tree species, while size-class based variation in use of Tallowwood and Grey gum confirmed a role as secondary food trees when growing on low-nutrient soils. Knowledge of tree preferences and the influence of soil landscape facilitated development of a four-tiered, hierarchical Koala habitat classification decision-tree which resulted in approximately 3,815 ha of potential Koala habitat in habitat classes Primary, Secondary (Class A) and Secondary (Class B) being identified within the TCSA.

Hopkins, M. and Phillips, S. (2009) Koala Monitoring - Final Report. Skyline Road Upgrade, Lismore 2011. Biolink Pty Ltd, Uki, NSW

Hopkins and Phillips (2009) in their report on the Skyline Road Upgrade for Lismore City Council demonstrated the ability of wildlife exclusion fencing, coupled with strategically placed underpasses and the use of specially designed Koala grids at driveways and fence ends, to effectively exclude Koalas from designated areas. In this case Koalas were excluded from a 3 km section of road and associated impacts (such as vehicle strike) resulting from increased traffic volume and vehicle speeds. Included in the outcomes were:

- No change in the distribution and abundance of Koalas throughout the five (5) year monitoring program;
- An estimate of approximately 100 to 150 under-road traverses by Koalas each year; and
- No evidence of Koalas within the exclusion area and no associated road mortalities

Tweed Coast Koala Study 2015. Tweed Shire Council. December 2015.

The reassessment of the koala population on the Tweed Coast is one of the initial actions of the recently adopted Tweed Coast Comprehensive Koala Plan of Management. The aim of this study is to determine current occupancy rates and assess changes in the distribution and levels of koala activity in the five years since the Koala Habitat Study was prepared in 2011.

Surveys were carried out between June and September 2015 and involved resampling a large proportion of those sites surveyed during the Habitat Study, utilising identical methodology. Seventy-two sites on Council owned and managed land, private land and Nature Reserve were surveyed. Records of koala sightings were collated from various sources.

Koala activity remains widespread throughout the study area, however substantially less of the available habitat is currently occupied by resident koala populations than was reported in 2011. Koala activity levels have declined significantly overall, and indicate ongoing decline of the Tweed Coast koala population as a whole. Decline is most notable in the north of the study area, between Kings Forest and Koala Beach, while activity levels and the distribution of resident populations appear stable between Koala Beach and Black Rocks.

The stability of southern populations, ongoing breeding female observations and the use of new food tree plantings by koalas are encouraging. The Tweed Coast koala population however remains at high risk of extinction. As directed by the Tweed Coast KPoM, it is vital that Council and the broader community continue working to reduce threats, and plan for the future expansion of, the koala population to a more sustainable level.

Tweed Coast Koala Plan of Management Annual Report Year 1 (February 2015 - February 2016). Tweed Shire Council (2016).

Council adopted the Tweed Coast Comprehensive Koala Plan of Management as a strategy of Council in February 2015. The adopted plan includes a five year works program incorporating the 45 actions identified in the plan. Progress towards the implementation of the works program is reported to Council on a quarterly basis as a key performance indicator of the Natural Resource Management Unit. Further, this annual summary is prepared for general distribution and information and details key outcomes from the reporting period. The complete implementation of all plan actions, in particular meeting the targets for the creation of new koala habitat, remain subject to securing relevant external funding support.

A summary of findings of the 2016 Annual Report that relate to the local Koala population are as follows:

- Establishment of a Koala Management Committee has been intentionally delayed to align with the term of a new Council as per Council resolution of February 2016.
- Ongoing traffic monitoring and maintenance of Clothiers Creek 'koala road' measures. Monitoring to date indicates an improving trend with regard to the proportion of vehicles travelling at or below the speed limit;
- Tweed Coast Koala Fire Management Plan, Hazard Reduction Burn Guidelines for Koala Habitat on the Tweed Coast and Wildfire Response Procedure prepared. Final consultation with stakeholders underway and publication scheduled for April 2016.

The following relevant Year 2 priority actions were listed:

- Reassessment of the koala population in the Tweed Heads Koala Management Area;
- Preparation and implementation of a wild dog management strategy in the form of Pest Management Operational Plans for Council managed bushland;

- Complete analysis and mapping of high risk areas within the KPOM area for conflict between domestic dogs and koalas;
- Implementation of the Tweed Coast Koala Fire Management Plan and Hazard Reduction Burn Guidelines;
- Establish a Koala Management Committee to advise and oversee implementation of the plan.

Tweed Coast Koala Plan of Management Annual Report Year 3 (February 2017 - February 2018). Tweed Shire Council (2018).

A summary of findings of the 2018 Annual Report that relate to the local Koala population are as follows:

- Primary and follow-up bush regeneration works are continuing at Koala Beach, Pottsville Environment Park and Pottsville Wetland and on private land at Round Mountain, contributing towards the KPOM target of maintaining and improving existing preferred koala habitat;
- Ongoing traffic monitoring and maintenance of Clothiers Creek and Coronation Avenue 'koala roads'. Monitoring data indicates continuing value of koala zones at both locations as measured by the increased proportion of drivers travelling at or below the speed limit;
- Remote camera monitoring within the reporting period has shown that wild dog activity remains low and accordingly, control is not currently warranted. Two 1080 baiting control programs in the Round Mountain / Pottsville area were undertaken that focussed on control of foxes. This program was supplemented by site specific trapping programs in the Pottsville area, again targeting foxes.
- NSW NPWS continue to undertake 1080 baiting programs to control wild dog and fox biannually (Spring and Autumn) in Cudgen Nature Reserve and Mooball National Park.
- Monitoring has been completed to inform the NSW Saving our Species program funded project aimed at reducing the risk of dog attacks in bushland reserves. The monitoring has identified the key audiences for a subsequent community engagement campaign.
- Koalas, koala habitat and koala habitat plantings have been integrated to the Far North Coast Bushfire Risk Management Plan 2017. The recognition of these values as assets in the plan are significant and an essential element of improved outcomes for koalas with regard to fire suppression, hazard reduction and habitat maintenance.
- An online koala sightings database has been established as a project under the Atlas of Living Australia. This database enables direct input of sightings data, including through a smartphone application. More than 100 verified koala sightings from throughout the Tweed Shire have been submitted within the first six months of operation. These sightings will be incorporated into the Tweed Coast monitoring program and inform broader regional research projects.
- A wildfire occurred as a result of accidental ignition in January 2018 on private land at Kings Forest. The vast majority of the area burnt was paddocks and heath. Some areas

of potential koala habitat were burnt, mainly through the understorey but with some areas of crown scorching. Inspection on the first day after the fire was completed in an attempt to identify any immediate direct impacts to koalas. The inspection was limited to the edges of vegetated areas as there were some patches still alight and occasional branches dropping. Whilst it was determined in this instance that there was a low likelihood of koala occurrence in the areas burned, the capacity to respond to wildfire incidents remains problematic. Continuing liaison with the NSW RFS brigades including provision of direction on what to do if a koala is sighted during wildfire suppression remains the best available action at this time.

The following relevant Year 4 priority actions were listed:

- Reassessment of koala activity throughout the Tweed Coast will be completed in 2018. This is a three-yearly action of the KPOM and will also involve reporting on the results and provision of any recommendations for amendment of the KPOM. In addition to reassessment of sites from the previous two surveys, it is proposed to include some extra sites where new koala habitat has been established.

Tweed Coast Koala Fire Management Plan. Baker, A.G. (2016).

The Tweed Coast Koala Fire Management Plan identifies the major fire-management issues threatening the Tweed Coast koala as including:

- i. high intensity bush fires killing individual koalas;
- ii. peat fires that cause widespread collapse of koala habitat; and
- iii. fire exclusion resulting in progressive koala habitat decline and displacement.

Conversely, high frequency fires were found to be a relatively minor issue.

The Plan outlines four management strategies, including:

- i. Access and Strategic Fire Breaks;
- ii. Hazard Reduction;
- iii. Bush Fire Response Strategy; and
- iv. Education, Monitoring & Research.

The Access and Strategic Firebreaks strategy outlines actions required to identify and establish new additions of on ground fire infrastructure to better manage bush fire and hazard reduction burn operations in koala habitat.

The Hazard Reduction strategy outlines a hazard reduction program to maintain reduced fuel loads in order to reduce bush fire severity and assist fire suppression activities. Hazard reduction burning is the main strategy recommended for reducing bush fire hazard in koala habitat, while also playing a crucial role in maintaining healthy koala habitat. To guide implementation of this strategy, standalone detailed guidelines - Hazard Reduction Burn Guidelines for Koala Habitat on the Tweed Coast - have also been developed under this Plan.

The Bush Fire Response strategy establishes a set of procedures to minimise adverse impacts on koalas and their habitat during bush fire suppression activities. A key product of the strategy is the Koala Bush Fire Response Procedures, a separate document that outlines key operating procedures, key contacts and responsibilities and maps to assist with wildfire suppression priority.

The Education, Monitoring & Research strategy outlines actions to engage private landowners in bush fire planning, increase community awareness of the important role of hazard reduction burning in bush fire safety and koala conservation, and undertake research to ensure best practices for fire management in koala habitat.

Hazard Reduction Burn Guidelines for Koala Habitat on the Tweed Coast. Baker, A.G. (2016).

These Hazard Reduction Burn Guidelines for Koala Habitat on the Tweed Coast have been developed as part of the Tweed Coast Koala Fire Management Plan (Baker 2016), which outlines the rationale and underlying assessments informing their development. The guidelines collate and build upon existing guidelines and prescriptions developed for this and other regions, as well as consultation with leading fire and koala experts.

These guidelines adopt the recommended fire-intervals, and assumed hazard reduction burn intensities of the Planned Burn Guidelines: Southeast Queensland Bioregion of Queensland (QPWS 2013). These SEQ Guidelines have been used in preference to the NSW-wide guidelines of Kenny et al. (2004) given that they:

- relate directly to the Tweed Coast, which forms part of the 'South Eastern Queensland' Bioregion of the Interim Biogeographic Regionalisation for Australia (DSEWPaC 2012), based on common climate, geology, landform, and native vegetation communities; and
- reflect recent developments in the scientific understanding of the interplay between fire interval and biodiversity conservation, particularly that the absence of appropriate fire has been and is continuing to cause structural change towards more closed forests, resulting in altered fuel/fire hazard, open forest decline and a loss of biodiversity (QPWS 2013).

These guidelines also adopt many of the burn parameters of QPWS (2013) for specific fire management issues including:

- Peat-fire avoidance;
- Fire-sensitive vegetation protection;
- Cultural value protection; and
- Koala habitat maintenance.

Far North Coast Bushfire Risk Management Plan. Far North Coast Bush Fire Management Committee (2017)

This BFRMP has been prepared by the Far North Coast BFMC and covers both public and private land and is proposed to be reviewed and updated within each successive five-year period from the constitution of the BFMC. The Far North Coast BFMC area is located in the north eastern corner of New South Wales and includes the Local Government Areas of Ballina, Byron and Tweed.

The aim of the BFRMP is to minimise the risk of adverse impact of bush fires on life, property and the environment. The objectives of the BFRMP are listed as to:

- reduce the number of human-induced bush fire ignitions that cause damage to life, property and the environment;
- manage fuel to reduce the rate of spread and intensity of bush fires, while minimising environmental/ecological impacts;
- reduce the community's vulnerability to bush fires by improving its preparedness; and
- effectively contain fires with a potential to cause damage to life, property and the environment

APPENDIX 4 – APPROVALS PROCESS & STAKEHOLDER CONSULTATION

Background

A summary of the process for preparing this KPoM is detailed below.

- A Kings Forest KPoM (Carrick 2009) was approved as part of the Concept Plan approval in 2010;
- A Revised Kings Forest KPoM (JWA 2013) was approved as part of the Major Project approval in 2013.
- A modification to Project Approval 08_0194 (MOD 2) was approved in 2014. A Revised KPoM was prepared (JWA 2014) which removed proposed Koala compensatory habitat from the golf course.
- Commonwealth approval for the Kings Forest project was received in May 2015 which required the completion of a KPoM.
- A final draft of the KPoM in accordance with the EPBC Act approval conditions (2012/6328) was completed in May 2017. This draft KPoM was submitted to the NSW DoPE. The application (including the revised KPoM) was publicly exhibited between 29 June 2017 and 28 July 2017. During the exhibition period, a number of submissions were received by DoPE including submissions from:
 - o Tweed Shire Council;
 - o Office of Environment and Heritage;
 - o EcoLogical Australia on behalf of DoPE; and
 - o Members of the public (Total of approximately 2,009 submissions received during the extended exhibition period)
- On 19 December 2017 a Response to Submissions Report (DAC Planning Pty Ltd) was forwarded to the Department addressing issues raised in relation to a KPoM prepared by JWA Pty Ltd dated 19 May 2017 (Version 9). Attached to the RTS was a further revised KPoM (Version 11) - JWA Pty Ltd dated 19 December 2017.
- Following lodgement of the Response to Submissions Report a number of meetings were held between representatives of LEDA (including James Warren and Associates) and representatives from DoPE, OEH and TSC and a revised KPoM was provided on 23 March 2018.
- JWA Pty Ltd provided a further information and a cover letter detailing amendments on 26 March 2018, following which EcoLogical Australia (on behalf of DoPE) provided further comments on 28 March, 3 and 11 April 2018.
- In response to the EcoLogical Australia comments, JWA Pty Ltd have prepared a revised KPoM (May 2018) and a response to EcoLogical Australia comments.
- DoPE under their discretionary powers did not publicly exhibit the May 2018 KPoM but invited key stakeholders to provide comments. Submissions were received from Tweed Shire Council (dated 13 July 2018), NSW Office of Environment & Heritage (dated 23 July 2018), EcoLogical Australia (for Department of Planning and Environment) (dated 16th July 2018) and Team Koala (dated 11 July 2018).

- On 20 August 2018, a meeting was held on site between representatives of LEDA (including James Warren and Associates) and representatives from DoPE, OEH and TSC. The meeting was convened at the request of DoPE to allow officers from their referral agencies to inspect several proposed compensatory habitat areas. Following this meeting, some further consolidated comments regarding the KPoM were received (7th September 2018).
- A Response to Submissions (RTS) was subsequently prepared by JWA Pty Ltd addressing the issues contained in the most recent submissions and final consolidated comments referred to above. This revised KPoM (October 2018) accompanied the RTS.

The following sections summarise the process Project 28 have undertaken thus far in the approval process in both State and Commonwealth jurisdictions.

Approvals Process

NSW

On the 19th January 2007, the NSW Minister for Planning authorised a Concept Plan (06_0318) for a proposed residential community at Kings Forest. The Director General's Environmental Assessment Requirements (DGEARs) were subsequently issued on the 21st August 2007. A Preferred Project Report (PPR) (and associated management plans including a KPoM) was prepared, after consultation with the NSW Department of Planning (DoP), addressing the DGEARs.

The Minister for Planning granted part 3A approval for the Concept plan for Kings Forest in August 2010. Modifications to the Concept Plan (and KPoM) were then subsequently approved in the period December 2010 to present.

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

The Project Application (containing the Stage 1 KPoM) was approved with conditions on the 11th August 2013. This KPoM was subsequently amended in 2012 and modified in 2014 (MOD 2).

Kings Forest Major Project Approval No. 08_0194 Modification 4 application to reconcile the inconsistencies between Commonwealth and State approvals were commenced by the Department of Planning and Environment in 2015.

The Department of Planning and Environment (DoPE) has agreed, in their letter of the 3rd November 2015 that a revised KPoM which addresses both Commonwealth and State approval conditions, should be prepared.

The DoPE provided a letter to Project 28, dated 2nd August 2016, in relation to the Department's workshop with Tweed Shire Council (TSC), the Office of Environment and Heritage (OEH) and the Commonwealth Department of Environment (DoE) to identify whether the State and Commonwealth approvals could be modified to provide a greater level of consistency. JWA Pty

Ltd provided a written response (dated 7th November 2016) which aimed to provide the requested information regarding habitat creation at Kings Forest.

Further correspondence ensued (i.e. meetings, letters, emails and telephone conversations) during the period between 7th November and 7th December 2016. In response to issues raised, JWA completed further detailed assessment of the proposed Compensatory habitat areas and made amendments to these areas where relevant. This resulted in the commitment to providing additional areas of Compensatory Koala habitat on the Kings Forest site. Additional responses (including amended Annexures) were provided to DoPE and other relevant parties (dated 18th & 29th November and 1st & 7th December 2016). Overall plant numbers to be installed in each of the proposed Compensatory habitat areas were also provided.

Further consultation occurred with the Department to resolve inconsistencies in the Concept Plan and Major Projects approvals. These matters related to:

- Additional Koala offset habitat;
- The need for a fully revegetated East-West corridor;
- The definition of “commencement” as it relates to commencement of work on the site;
- Spatial overlap of heath revegetation/regeneration areas with Koala food tree plantings and Wallum sedge frog created habitat;
- The requirement under the Project Approval for a 27 hectare Koala habitat offset in the nearby Cudgen Nature Reserve;
- The placement of Koala fencing adjacent to Environmental Protection Zones; and
- the timing for the completion of fauna underpass construction.

Major Project Approval No. 08-0194 MOD4 application to reconcile the inconsistencies between Commonwealth and State approvals are currently being assessed by the Department of Planning and Environment.

Commonwealth

On the 20th March 2012, the proposed action was referred to the Commonwealth under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). On the 12th November 2012, a delegate for the Minister for the then Department of Sustainability, Environment, Water, Population and Communities (DSEWPC) (now Department of the Environment (DoE)) determined that the proposed action required approval under the EPBC Act. The basis for the decision was that the proposed action had the potential to have a significant impact on matters protected under Part 3 of the EPBC Act: listed threatened species and ecological communities (Sections 18 and 18A) including the local Koala population.

The DSEWPC indicated that the proposed action would be assessed through Preliminary Documentation (PD). The PD was submitted in April 2013. It contained information already submitted as part of the referral as well as information acquired from experts and other relevant agencies. DSEWPC comments on the PD were received on the 12th June 2013 and further information was requested in an Analysis of Preliminary Documentation. A further

assessment was completed in order to address issues raised by the Department and the data was incorporated into the Final Preliminary Documentation, which was provided along with a Response to Submissions Report on the 24th December 2013.

Negotiations regarding approval conditions commenced in early 2014. A Supplementary Addendum report was provided to the Department on the 28th November 2014. On the 19th December 2014 the Department provided a written response to the Supplementary Addendum report. A Revised Final Response Report was prepared by JWA and submitted on 13th March 2015 to address comments and information requests from DSEWPC.

The Department considered the proposal in accordance with Part 9 of the EPBC Act and decided to grant approval to Leda on the 21st May 2015. The approval specifies a number of conditions in relation to protecting Koala populations. Condition No. 2 specifically requires the preparation of a Koala Plan of Management.

On 25th November 2015, DoE provided Project 28 a “Statement of Reasons for Approval under the Environment Protection and Biodiversity Conservation Act 1999”. The content of this document was considered in the preparation of this KPoM.

A meeting was held at DoE in Canberra on 9th November 2016. During this meeting the DoE raised issues in relation to the compatibility of the proposed Dry Secondary Koala habitat compensatory areas with regenerating heath communities. It was also raised that plant species lists for each compensatory habitat type should be provided. In response to these queries, and in liaison with DoPE and TSC, the proposed Compensatory Koala habitat was amended to minimise the spatial overlap of Dry Secondary Koala habitat and regenerating heath communities. Plant species lists were also provided for each of the proposed compensatory habitat types.

Consultation with DoE occurred in early 2017 with regard to the reconciliation of Commonwealth and State Approvals. In particular, the following matters were discussed:

- Timing for the completion of Koala infrastructure;
- Timing of construction commencement for each precinct as it relates to “substantial establishment” of created habitat; and
- Timing for the submission of the Contingency and Offsets Strategies for each precinct.

In May 2017 a “Variation to Conditions” was attached to the Approval. This document dealt with all of the above issues and provided a reconciliation with the State Approval.

Stakeholder Consultation

Introduction

In accordance with the Director General’s Environmental Assessment Requirements (DGEARs) for the Kings Forest Concept Plan proposal, consultation was required with relevant public authorities and the broader community. This section summarises the consultation completed by the proponent during preparation of the proposal and during the public exhibition of the Concept Plan and Preferred Project Report (PPR) prepared for the NSW Department of Planning

and Environment and Preliminary Documentation (PD) prepared for the Commonwealth Department of the Environment.

Previous Approvals and Consultations

In November 1987 Tweed Shire Council prepared the Kingscliff South Planning Report. In pursuance of this report, and following public and agency consultation, amendment No. 3 of Tweed LEP 1987 was gazetted on the 30th September 1989. The LEP amendment zoned part of the Kings Forest site to Part 1(b) Agricultural Protection, Part 2(c) Urban Expansion, Part 6(c) Recreation Special Purposes, Part 7(a) Environmental Protection and Part 2(e) Residential Tourist. Those zones applied under Tweed LEP 2000 up until the gazettal of the State Environmental Planning Policy (Major Projects) amendment for Kings Forest on the 10th November 2006.

In June 1989, Tweed Shire Council issued Development Consent No. GS488/182 for a 239 lot subdivision and 18 hole golf course. In 1992 Tweed Shire Council issued a further Development Consent No. S92/1 for a 260 lot subdivision and 18 hole golf course over Kings Forest. Whilst those developments did not proceed the consents were nevertheless granted pursuant to the statutory planning controls in force at those times.

The Proponent submitted a State Significant Site Study for Kings Forest to the Minister for Planning in 2006. The study and a draft zoning plan were publicly exhibited in April and May 2006. Wide ranging submissions were received and considered prior to gazettal of Amendment No. 10 to the Major Projects SEPP on the 10th November 2006.

The proposed Concept Plan, was prepared in accordance with the zonings established by the SEPP Amendment, except for proposed minor changes to the boundaries of Environmental Protection Zones. The development of a golf course was integral to the State Significant Site Study and the broad road pattern accords with exhibited TSC planning proposals. Moreover, the population which the Concept Plan anticipated was of the order that has been projected by TSC for many years. Accordingly, there is little in the current proposal that has not been subject to previous public scrutiny during public exhibitions arranged by both TSC and the Department of Planning. Nevertheless, further consultation with the community ensued as described below.

Council and Agency Consultation

The following public authorities were consulted by the proponent in relation to the Concept Plan:

- Tweed Shire Council - Administrators and officers;
- NSW Department of Environment and Climate Change (now NSW Office of Environment and Heritage (OEH)) - Northern Region;
- NSW Roads and Traffic Authority (now NSW Roads and Maritime Services); and
- NSW Department of Education and Training.

In accordance with Condition C3 of the Concept Plan (as amended) negotiations have commenced with regard to the transfer of a minimum of 150 ha of land as an addition to the Cudgen Nature Reserve.

A comprehensive suite of submissions was received from the following referral agencies during the exhibition period of the Preferred Project Report (PPR) completed for the Project Approval application in late 2011:

- NSW Department of Planning and Infrastructure;
- Tweed Shire Council;
- NSW National Parks and Wildlife Service;
- Eco Logical Australia Pty Ltd;
- NSW Environmental Protection Agency;
- NSW Department of Primary Industries;
- NSW Roads and Maritime Services;
- NSW Rural Fire Service;
- Essential Energy;
- NSW Finance and Services (Housing and Property Group);
- NSW Trade and Investment - Mineral Resources Branch; and
- NSW Office of Water.

During a telephone conversation between James Warren and Dr Mark Kingston (TSC) on 16th November 2016, Dr Kingston raised the following issues:

- There appeared to be areas within the 30m environmental buffer (particularly within the Cudgen Paddock) that were potentially suitable for the creation of Koala habitat but were not being utilised; and
- He would prefer the use of Forest red gum (*Eucalyptus tereticornis*) - a primary Koala food tree species - in lieu of Scribbly gum (*E. racemosa*) - a supplementary food tree species - where possible.

Dr Kingston met with JWA on 30th November 2016 to discuss the proposed Compensatory Koala habitat at the Kings Forest site. During this meeting, Dr Kingston proposed a significant area of additional created Koala habitat (i.e. 27.61 ha comprising 118 separate areas). JWA completed an inspection of these areas and confirmed that 11.27 ha was viable as additional compensatory habitat. Subsequently, the additional areas amounting to 11.27 ha were incorporated into the proposed Compensatory Koala habitat.

On 19 December 2017 a Response to Submissions Report (DAC Planning Pty Ltd) was forwarded to the Department addressing issues raised in relation to a KPOM prepared by JWA Pty Ltd dated 19 May 2017 (Version 9). Attached to the RTS was a further revised KPOM (Version 11) - JWA Pty Ltd dated 19 December 2017. Following lodgement of the Response to Submissions Report, the Department advised on 6 February 2018 that there were a number of recommendations in the Ecological Australia Report which required further consideration.

On 26 February 2018, the Project Ecologist Mr Adam McArthur of JWA Pty Ltd, emailed the Department including a letter identifying the most recent changes to the KPOM and a revised assessment of compensatory habitat.

Following a meeting between James Warren, Michael Geale, DoPE and EcoLogical Australia on 27 February 2018, James Warren forwarded an email to the Department and EcoLogical Australia on 7 March 2018 in relation to additional Koala compensatory habitat.

JWA Pty Ltd provided a detailed response and a revised KPoM on 23 March 2018 and a cover letter detailing amendments on 26 March 2018, following which EcoLogical Australia provided further comments on 28 March, 3 and 11 April 2018.

In response to the EcoLogical Australia comments, JWA Pty Ltd prepared a revised KPOM (May 2018) and a response to EcoLogical Australia comments.

DoPE under their discretionary powers did not publicly exhibit the May 2018 KPoM but invited key stakeholders to provide comments. Submissions were received from Tweed Shire Council (dated 13 July 2018), NSW Office of Environment & Heritage (dated 23 July 2018), EcoLogical Australia (for Department of Planning and Environment) (dated 16th July 2018) and Team Koala (dated 11 July 2018).

On 20 August 2018, a meeting was held on site between representatives of LEDA (including James Warren and Associates) and representatives from DoPE, OEH and TSC. The meeting was convened at the request of DoPE to allow officers from their referral agencies to inspect several proposed compensatory habitat areas. Following this meeting, some further consolidated comments regarding the KPoM were received (7th September 2018).

A Response to Submissions (RTS) was subsequently prepared by JWA Pty Ltd addressing the issues contained in the most recent submissions and consolidated comments referred to above. This revised KPoM (October 2018) accompanied the RTS.

Community Consultation

The Major Project Application and its PPR was publicly exhibited from the 22nd November 2011 until the 23rd December 2011 for a period of thirty-two (32) days. The Department of Planning and Infrastructure received 302 submissions during the exhibition period, including ten (10) submissions from public authorities and 292 submissions from the general public and special interest groups. All submissions were made as objections to the proposal.

Following referral of the proposed action to the Commonwealth Department of the Environment, the Amended PD was placed on public exhibition, in accordance with Section 95A of the EPBC Act, from the 11th November until the 6th December for a period of twenty (20) business days. A total of 3,105 public submissions were received during this time consisting of a large proportion (3,094) of form letters and a small number (10) of individual submissions, including one (1) in support of the proposed development. A submission from Tweed Shire Council was also received.

A KPoM in accordance with the EPBC Act approval conditions (2012/6328) was completed in May 2017. This draft KPoM was submitted to the NSW DoPE. The application (including the revised KPOM) was publicly exhibited between 29 June 2017 and 28 July 2017. During the exhibition period, a number of submissions were received by DoPE including 2,009 submissions received from members of the public during the extended exhibition period.

In response to submissions received JWA Pty Ltd prepared a revised KPOM (May 2018). DoPE under their discretionary powers did not publicly exhibit the May 2018 KPoM but invited key stakeholders, including Team Koala, to provide comments. Submissions were received from Team Koala dated 11 July 2018.

A Response to Submissions (RTS) was subsequently prepared by JWA Pty Ltd addressing the issues contained in the most recent submissions and consolidated comments including the Team Koala submission. This revised KPoM (October 2018) accompanied the RTS.

APPENDIX 5 - KOALA FOOD TREE SPECIES

*Taken from Appendix 2 of NSW Koala Recovery Plan (DECC 2008) (and listed as Primary, Secondary and Supplementary species)

#Taken from SEPP 44 - Koala Habitat Protection (no differentiation between Primary, Secondary and Supplementary species)

Primary Food Tree Species*

- Tallowwood (*Eucalyptus microcorys*)*,#
- Forest red gum (*E. tereticornis*)*,#
- Swamp mahogany (*E. robusta*)*,#
- Parramatta red gum (*E. parramattensis*)*
- Orange gum (*E. bancroftii*)*
- Cabbage gum (*E. amplifolia*)*

Secondary Food Tree Species*

- Narrow-leaved red gum (*E. seeana*)*
- Craven grey box (*E. largeana*)*
- Slaty red gum (*E. glaucina*)*
- Grey gum (*E. biturbinata*)*
- Small-fruited grey gum (*E. propinqua*)*
- Large-fruited grey gum (*E. canaliculata*)*
- Red mahogany (*E. resinifera*)*
- Steel box (*E. rummeryi*)*
- Mountain mahogany (*E. notabilis*)*
- Rudder's box (*E. rudderi*)*
- Grey box (*E. moluccana*)*
- White-topped box (*E. quadrangulata*)*
- Yellow box (*E. melliodora*)*

Stringybarks/Supplementary Species*

- Stringybark (*E. tindaliae*)*
- Blue-leaved stringybark (*E. agglomerata*)*
- Thin-leaved stringybark (*E. eugeniodes*)*
- Diehard stringybark (*E. cameronii*)*
- White stringybark (*E. globoidea*)*

Additional Species[#]

- Grey gum (*Eucalyptus punctata*)[#]
- Ribbon or manna gum (*Eucalyptus viminalis*)[#]
- River red gum (*Eucalyptus camaldulensis*)[#]
- Broad leaved scribbly gum (*Eucalyptus haemastoma*)[#]
- Scribbly gum (*Eucalyptus signata*)[#]
- White box (*Eucalyptus albens*)[#]
- Bimble box or poplar box (*Eucalyptus populnea*)[#]

APPENDIX 6 – REHABILITATION SPECIFICATIONS AND MONITORING

Rehabilitation Phases

Site rehabilitation works will be completed by a suitably qualified¹⁵ Bush Regeneration company and be undertaken in six (6) phases as follows:

- **Phase 1:** Site preparation of retained Koala habitat (where necessary) and offset habitat areas.
- **Phase 2:** Initial planting - will commence as soon as the Bush Regeneration team is satisfied that weed species have been successfully controlled.
- **Phase 3:** Establishment and initial maintenance - It is planned that the establishment period will be of a minimum length of twelve (12) months during which time weeds will be controlled and watering will be undertaken on an 'as needs' basis.
- **Phase 4:** Supplementary planting to replace dead seedlings - will commence within two (2) months of the initial planting in each area. Replacement of seedlings/saplings that have died (with the exception of Forest red gum within Dry Primary compensatory habitat areas) will continue during the approved monitoring period at a rate that will ensure a >90% survival of planted stock. Forest red gum replacement plantings within Dry Primary compensatory habitat areas will not occur if losses are greater than 15%.
- **Phase 5:** Additional plantings - works can commence where advanced canopy growth is evident and the Bush Regeneration team determines that additional planting is necessary to satisfy the objectives of the offset strategy.
- **Phase 6:** Ongoing maintenance - will continue indefinitely on an as needed basis until performance targets have been met. If the performance targets have not been met, corrective actions will be implemented in accordance with **SECTION 13.2.3**.

Site Preparation

Site preparation will include the following actions:

- Erection of protective fencing and signage in accordance with **SECTION 10.9**;
- Identification of retained vegetation (**SECTION 10.4**);
- Each retained Koala habitat area and rehabilitation (compensatory habitat) area will be allocated an individual identifying number. Each different rehabilitation area will be separated by flat (5 cm x 1 cm) pegs painted in white at the top with the allocated identifying area number written on the white paint faced towards the relevant area;
- Primary and Secondary weed control in accordance with the following sections; and
- Sourcing and/or propagation of revegetation stock.

It should be noted that no slashing, clearing, filling or other impacts upon native vegetation within retained or offset areas should occur to achieve the KPoM outcomes.

¹⁵ A Bush Regeneration company that has demonstrable experience in the rehabilitation or revegetation of native vegetation communities in the Tweed region.

Weed Control

Primary Weeding

Weed eradication will be undertaken within the retained Koala habitat (as necessary) and the proposed offset areas on a progressive basis through localised treatment of grass species via mechanical removal (hoe/rake, hand pulling and/or slashing) or with Roundup Biactive®. Woody weed species will be hand pulled or controlled using best practice weed control techniques.

All chemical users should be experienced and licensed in accordance with the relevant legislation. Utmost care must be taken when utilising chemicals to ensure that no drift occurs outside of the treatment area. Spraying should not occur on windy days or within 24 hours of predicted rainfall.

Primary weeding should commence, prior to the commencement of construction, ideally at the start of the active growing period (approximately November), and on an as needed basis. Preparation before spraying, in the form of manual clearing weeds from around native plants, must be carried out.

Weed material that does not contain any fertile parts will be mulched and spread on the ground and any weeds that may have fertile parts present will be disposed of at an approved waste disposal facility such as Council landfills or transfer stations.

Secondary Weeding

Secondary weeding involves the eradication of weeds that have been overlooked or re-shoot after primary treatment. Secondary weeding will occur 3 to 4 months after primary weeding and no later than 6 months.

Natural Regeneration

Natural regeneration refers to the natural process by which plants replace or re-establish themselves. Natural regeneration can be described as the “regrowth” or “vegetative recovery” which occurs spontaneously, by seed or otherwise, after a stress or disturbance (Temple & Bungey 1980). As long as mature and healthy native plants occur on the subject site, natural regeneration is an option (Petrie 1999).

Natural regeneration is a powerful tool that can be used to re-establish native vegetation. It ensures that the new growth is derived from genetic material (i.e. parents) that currently occupies the site and as such is adapted to local conditions. Additionally, the chance of outbreeding depression is reduced.

Natural regeneration will be encouraged within all retained Koala habitat and rehabilitation areas. Natural recruitment will be monitored for the life of the rehabilitation project however it is not intended that native shrub and groundcover species are planted if/where natural recruitment is poor due to canopy closure, as the aim of the revised planting schedule (as agreed by the relevant agencies) is to provide large numbers of preferred Koala food trees rather than fully structured vegetation communities.

Revegetation Works

Introduction

Revegetation will commence no later than six (6) months after the primary weeding is completed. Successful completion of primary weeding will be determined by the appointed Bushland restoration team. At this time, an assessment will be made as to level of natural regeneration present within retained Koala habitat and rehabilitation areas. Any areas where the native seedling germination is considered to be low and impeding the achievement of rehabilitation objectives will require revegetation.

Propagation

Plants to be used for revegetation are to be either propagated in a nursery using material (seeds, cuttings, tissues, etc.) from species which occur onsite or obtained from a local nursery able to supply stock from local provenance. Where existing nursery stock from local provenance is not available, collection should be carried out as detailed below. The following details will be collected from each source plant:

- Location (GPS position);
- Date of collection;
- Name of collector;
- Soil type;
- Health of plant; and
- Collection method.

Whenever possible, seed will be removed directly from plants by shaking or cutting branches over a tarpaulin. Secateurs will be sterilised between each use. Seed will be placed in small envelopes with the collection details clearly marked. If the seed is extremely small, it will be stored in glass or plastic vials to avoid undue loss.

It is expected that during the seed collection program, a site will be visited on several occasions to ensure optimum seed ripeness. The seed collection program will be prepared in consultation with Council and NSW National Parks and Wildlife Service (NPWS) prior to commencement. The program will be prepared by the bushland restoration team.

The amount of seed collected will not exceed 5% per plant. Seed will not be collected from isolated populations or rare plants.

The seed will be cleaned, its viability checked and prepared for storage. Seed that has lost viability will not be used in the revegetation works due to the dangers of genetic aberration.

If seed collection proves difficult or impossible, other forms of propagation, such as cuttings, may be attempted.

Planting Program

Seedlings will be sufficiently developed so as to have a significant chance of survival. Seedlings will be at least the sixth leaf stage and/or 20cm in height.

Tube stock seedlings will primarily be used for the plant-out.

Tube stock will be sun hardened (plants should be held in full sunlight and systematically stressed to the point of wilting for at least two months prior to planting).

All exclusionary fencing will be in place prior to the commencement of construction and before planting occurs.

Planting will occur at the optimum time of year when there is high soil moisture (between January and May), unless irrigation is available and accessible. In this regard, water may be sourced either from bores or from a large lake that occurs on adjacent land (owned by the proponent) known as 'Turners'.

If required, the restoration team may make minor alterations to this revegetation strategy depending on the site requirements. The following strategy will be employed:

- Secondary weeding - Seedling sites will be spot sprayed with Roundup Biactive© one (1) week prior to commencement;
- All seedlings will be soaked in water overnight prior to planting;
- All seedlings will be provided with a wetting agent such as rain-saver¹⁶ crystals;
- Weeds will be controlled, in the short term, through the application of suitable mulch around individual plantings and with spot applications of an appropriate herbicide.
- All seedlings will be protected by a tree guard (commercial tubing or equivalent); and
- Watering will be undertaken after the seedlings have been planted on an 'as needed' basis.

The plants growing medium should be soaked prior to planting and the plant cores should be buried to approx. 1-2cm deep.

The seedlings shall be planted on the same day (or as soon as practicable) as their transport from the nursery. No seedlings will be left unprotected on the site whilst awaiting planting. Planted seedlings will be marked with a piece of biodegradable tape and staked.

Only nitrogenous fertilisers will be used to avoid the introduction of Phosphorous, Potassium and other micronutrients.

Planting in areas exposed to full sun or westerly sun will be avoided in the peak summer months, where possible.

Planting Density and Species Selection

A list of species to be used for planting within the proposed offset habitat areas is provided in **TABLE 1**.

¹⁶ Rain-saver is a polymer water crystal that has been specifically developed for plants. The polymer absorbs and holds water and nutrients at a specific tension which makes it available to plant roots but does not release to the soil. Rain-saver has proven very successful in more difficult environments (e.g. Roadside plantings on the Pacific Motorway between Brisbane and the Gold Coast and in frontal dunes at Pottsville (R. Keene *pers comm.* 2000).

During the exhibition and submission phases in 2017/2018, TSC recommended that the proposed planting methodology be varied to allow for:

- The planting of high densities of preferred browse tree species at the expense of those listed for the relevant plant communities that were preferable for planting in the designated compensatory habitat areas; and
- The increase in density of the actual tree plantings from 1 tree/25 m² to 1 tree/9 m² with no plantings of shrubs or groundcovers.

The aim was to significantly increase the number of primary browse species in the compensatory habitat areas, with reliance on the natural regeneration of shrubs and groundcovers over time.

It is therefore not intended to plant native shrub and groundcover species as it is considered likely that natural regeneration in these strata will occur over the majority of the proposed compensatory habitat areas. Natural recruitment will be monitored for the life of the rehabilitation project however it is not intended that native shrub and groundcover species are planted if/where natural recruitment is poor due to canopy closure, as the aim of the revised planting schedule (as agreed by the relevant agencies) is to provide large numbers of preferred Koala food trees rather than fully structured vegetation communities.

TABLE 1
PLANTING DETAILS

Koala Compensatory Habitat Type	Total Area	Depth to groundwater	Vegetation community plant community type to be recreated	Broad structure of the vegetation type to be created	Minimum total number of koala food trees to be planted	Species list
Dry primary koala habitat	25.80 ha	-1m to > -2m	PCT 1136 / TVMS 306	Open Forest	Primary Trees: 14,339 Secondary Trees: 14,339	<i>Eucalyptus tereticornis</i> ($\geq 50\%$) +/- <i>Eucalyptus racemosa</i> , <i>Eucalyptus robusta</i> , <i>Corymbia intermedia</i> , <i>Corymbia gummifera</i> , <i>Syncopia glomulifera</i>
Dry primary koala habitat plus dry heath	6.00 ha	-1m to > -2m	PCT 1136 / TVMS 306	Open Forest	Primary Trees: 3,333 Secondary Trees: 3,333	<i>Eucalyptus tereticornis</i> ($\geq 50\%$) +/- <i>Eucalyptus racemosa</i> , <i>Eucalyptus robusta</i> , <i>Corymbia intermedia</i> , <i>Corymbia gummifera</i> , <i>Syncopia glomulifera</i>
Wet primary koala habitat	27.15 ha	-0.2 to -1m	PCT 1230 / TVMS 305	Open/Closed Forest	Primary Trees: 21,109 Secondary Trees: 9,047	<i>Eucalyptus robusta</i> ($\geq 70\%$) +/- <i>Eucalyptus tereticornis</i> , <i>Melaleuca quinquenervia</i> , <i>Lophostemon suaveolens</i> and <i>Cupaniopsis anacardioides</i>
Wet primary koala habitat plus wet heath	0.23 ha	-0.2 to -1m	PCT 1230 / TVMS 305	Open/Closed Forest	Primary Trees: 179 Secondary Trees: 77	<i>Eucalyptus robusta</i> ($\geq 70\%$) +/- <i>Eucalyptus tereticornis</i> , <i>Melaleuca quinquenervia</i> , <i>Lophostemon suaveolens</i> and <i>Cupaniopsis anacardioides</i>
Wet secondary koala habitat	3.33 ha	0 to -0.2m	PCT 1064 / TVMS 401	Open/Closed Forest	Primary Trees: 370 Secondary Trees: 3,330	<i>Melaleuca quinquenervia</i> ($\geq 90\%$) +/- <i>Eucalyptus robusta</i> , <i>Eucalyptus tereticornis</i> , <i>Lophostemon suaveolens</i>
Subtotal	62.51 ha				Primary Trees: 39,330 Secondary Trees: 30,126	

Koala Compensatory Habitat Type	Total Area	Depth to groundwater	Vegetation community plant community type to be recreated	Broad structure of the vegetation type to be created	Minimum total number of koala food trees to be planted	Species list
East-West Corridor - Dry primary koala habitat	2.90 ha	-1m to > -2m	PCT 1136 / TVMS 306	Open Forest	Primary Trees: 1,611 Secondary Trees: 1,611	<i>Eucalyptus tereticornis</i> ($\geq 50\%$) +/- <i>Eucalyptus racemosa</i> , <i>Eucalyptus robusta</i> , <i>Corymbia intermedia</i> , <i>Corymbia gummifera</i> , <i>Syncarpia glomulifera</i>
East-West Corridor - Wet primary koala habitat	3.36 ha	-0.2 to -1m	PCT 1230 / TVMS 305	Open/Closed Forest	Primary Trees: 2,613 Secondary Trees: 1,120	<i>Eucalyptus robusta</i> ($\geq 70\%$) +/- <i>Eucalyptus tereticornis</i> , <i>Melaleuca quinquenervia</i> , <i>Lophostemon suaveolens</i> and <i>Cupaniopsis anacardioides</i>
Subtotal - East-West Corridor	6.26 ha				Primary Trees: 4,224 Secondary Trees: 2,731	
TOTALS	68.77 ha				Primary Trees: 43,554 Secondary Trees: 32,857	

The overall plant numbers to be installed in each of the proposed Compensatory Koala habitat areas within each Precinct are provided in **TABLE 2**. Species diversity will be maintained throughout these revegetation areas and consist of a minimum of three (3) different tree species per 100 m².

TABLE 2
TOTAL NUMBER OF PLANTINGS IN EACH PRECINCT

	Planting Density (plants / 9 sq. metres)		Dry Primary Koala Habitat	Dry Primary Koala Habitat Plus Dry Heath	Wet Primary Koala Habitat	Wet Primary Koala Habitat Plus Wet Heath	Wet Secondary Koala Habitat	Subtotal	East-West Corridor - Dry Primary Koala Habitat	East-West Corridor - Wet Primary Koala Habitat	Subtotal – East-West Corridor	TOTAL
Precinct 2	Trees	1	356	811	0	0	0	1,167	0	0	0	1,167
Precinct 3	Trees	1	656	0	400	0	0	1,056	0	0	0	1,056
Precinct 5	Trees	1	2,733	4,433	756	0	156	8,078	0	0	0	8,078
Precinct 6	Trees	1	0	0	0	0	0	0	456	33	489	489
Precinct 7	Trees	1	1,400	1,167	2,222	0	811	5,600	0	0	0	5,600
Precinct 8	Trees	1	4,722	0	1,911	0	800	7,433	0	0	0	7,433
Precinct 9	Trees	1	800	0	400	0	0	1,200	0	0	0	1,200
Precinct 10	Trees	1	0	0	0	0	0	0	2,767	3,700	6,467	6,467
Precinct 11	Trees	1	8,022	0	8,200	0	144	16,367	0	0	0	16,367
Precincts 12-14	Trees	1	9,989	256	16,267	256	1,789	28,556	0	0	0	28,556
TOTAL			28,678	6,667	30,156	256	3,700	69,455	3,222	3,733	6,956	76,411

Rehabilitation Monitoring

Monitoring is crucial in ensuring the continuing success of the rehabilitation program and will be carried out for the duration of this plan. Monitoring will be required during the 'establishment period' and 'maintenance period' of the project as defined within the Project approval (MP08_0194). Details of the rehabilitation monitoring program are provided below.

Bush Regeneration Monitoring

The Bush Regeneration team will keep detailed work sheets recording:

- all work completed each day;
- site conditions;
- chemicals used;
- problems encountered; and
- future works required.

Monitoring Vegetation Integrity (Site Condition)

Background

A detailed monitoring program of the retained Koala habitat and compensatory habitat areas (adapted from the BAM [OEH 2017b]) will also be completed by a person accredited under the accreditation scheme prepared under section 6.10 of the BC Act. Throughout this method, an accredited person is referred to as the assessor.

Plot-Based Vegetation Surveys

Plot-based vegetation surveys will be undertaken in appropriate locations within the retained Koala habitat and compensatory habitat areas. These will be permanently marked (i.e. star pickets or wooden stakes) and the end positions identified on a sitemap using a hand held Global Positioning System (GPS).

The plot-based floristic vegetation survey is based on a 20 m × 20 m plot (or 400 m² equivalent for linear areas). The assessor will assess the plot for the information contained in **TABLE 3**.

TABLE 3
VEGETATION SURVEY DATA TO BE COLLECTED

Attribute	Survey requirement
Stratum (& layer)	Stratum & layer in which each species occurs
Growth form	Growth form for each recorded species
Species name	Scientific name and common name
Cover	Estimate the % foliage cover across the plot of each species rooted in or overhanging the plot. Cover should be recorded in decimals if less than 1% (0.1, 0.2...), or whole numbers up to 5% (1,2,3...), or to the nearest 5% where greater than 5% cover (5,10,15,20,25...)
Abundance rating	For species with cover less than or equal to 5%, count or estimate the number of individuals or shoots of each species within the plot,

Attribute	Survey requirement
	using the following intervals: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 20, 50, 100, 500, 1000, 1500, 2000, etc. Numbers above 20 are estimates only, and the recorded abundance is the upper end of each class (e.g. 50 represents an estimated abundance of between 20 and 50) For species with cover greater than 5%, abundance estimates are not required (but may be recorded if desired)

The assessor must assign each native plant species to an adult/mature growth form group according to the definitions set out in Appendix 4 of the BAM (i.e. tree, shrub, grass & grass-like, forb, fern, other). The assessor must assign a native species to only one growth form based on the adult/mature growth form of the species.

The full species name (*Genus species*) must be recorded for all native species, unless insufficient diagnostic plant material is present, in which case the genus name followed by a species number must be used.

Following completion of each monitoring event (i.e. plot-based floristic vegetation survey), the map of PCTs should be amended to reflect the outcomes of the vegetation survey.

Vegetation Integrity Survey Plots

Plots used for the floristic vegetation survey may also be used as vegetation integrity plots. The minimum number of plots/transects that must be sampled for each vegetation zone is detailed in **TABLE 4** below.

TABLE 4
MINIMUM NUMBER OF PLOTS AND TRANSECTS REQUIRED PER ZONE AREA

Vegetation zone area (ha)	Minimum number of plots/transects
<2	1 plot/transect
>2-5	2 plots/transects
>5-20	3 plots /transects
>20-50	4 plots/transects
>50-100	5 plots/transects
>100-250	6 plots/transects
>250-1000	7 plots/transects; more plots may be needed if the condition of the vegetation is variable across the zone
>1000	8 plots/transects; more plots may be needed if the condition of the vegetation is variable across the zone

Plots/transects must be established to provide a representative assessment of the vegetation integrity of the vegetation zone, accounting for the level of variation in the broad condition state of the vegetation zone.

Acceptable methods to establish or randomly locate plots within stratification units to provide a representative assessment of the vegetation integrity of the vegetation zone include:

- a) marking waypoints and bearings randomly to provide a representative assessment of the vegetation integrity of the vegetation zone in the assessment area and establishing plots at all or some of these waypoints, or
- b) walking a random distance into the vegetation zone. The survey data must be collected from that location on a randomly generated compass bearing, with the process repeated elsewhere within the vegetation zone.

Plots should not be located in or near ecotones, vehicle tracks and their edges, or other disturbed areas that are readily distinguishable from the broad condition state of the vegetation zone.

Where separate areas of land are mapped into a single vegetation zone, the plots/transects must be evenly located across the separate areas of the vegetation zone.

The assessor must establish survey plots around a central 50 m transect as follows:

- a) One 400 m² plot (standard 20 m x 20 m) is used to assess all of the composition and structure attributes set out in **TABLE 5** below.
- b) One 1,000 m² (standard 20 m x 50 m) plot is used to assess the function attributes: number of large trees, stem size class, tree regeneration and length of logs.
- c) Five 1 m² sub-plots are used to assess average litter cover (and other optional groundcover components) for the plot.

TABLE 5
GROWTH FORM GROUPS AND ATTRIBUTES USED TO ASSESS THE COMPOSITION, STRUCTURE AND FUNCTION COMPONENTS OF VEGETATION INTEGRITY

Growth form groups used to assess composition and structure	Attributes used to assess function
a) Tree	a) Number of large trees
b) Shrub	b) Tree regeneration
c) Grass and grass like	c) Tree stem size class
d) Forb	d) Total length of fallen logs
e) Fern	e) Litter cover
f) Other	f) High threat exotic vegetation cover
	g) Hollow bearing trees

Composition

Assessment of composition is based on the number of native plant species (richness) observed and recorded by the assessor within a plot for each growth form group shown in **TABLE 5**.

The minimum vegetation survey data required to be recorded by the assessor for composition at each 20 m x 20 m condition plot are:

- a) full species name (*Genus species*) for the three dominant native species within each growth form group. Dominant native species means those native species that contribute most to the total cover of the growth form group; and
- b) genus name or the full species name where practicable for all other species. Practicable means that sufficient plant material is present to make a species level identification and the assessor has sufficient skills and knowledge to make the identification in the field.
- c) whether each species is native, exotic, or high threat exotic.
- d) the growth form group to which each native species has been allocated.

The composition of each growth form group is assessed by counting the number of different native plant species recorded within each growth form group within each 20 m x 20 m condition plot.

Structure

Structure is the assessment of foliage cover for each growth form group within the 20 m x 20 m plot boundary. Foliage cover for a growth form group is the percentage of cover of all living plant material of all individuals of the species present for that group. This includes leaves, twigs, branchlets and branches as well as canopy overhanging the plot even if the stem is outside the plot.

The assessor must:

- record an estimate of the foliage cover for each native and exotic species present within the 20 m x 20 m plot. Foliage cover estimates for each species must draw from the following number series: 0.1, 0.2, 0.3,.....1, 2, 3,.....10, 15, 20, 25,.....100%.
- not use methods such as Braun-Blanquet (or other) classes, or a transect point intercept method to record the foliage cover score for a growth form group. The structure of each growth form group for the 20 m x 20 m plot is recorded by the assessor as the sum of all the individual foliage cover estimates of all native plant species recorded within each growth form group within each plot.
- assign each non-native (exotic) plant species a foliage cover estimate and either E (exotic) or HTE (high threat exotic).

Function

Function is the assessment of physical parameters which, together, allow the vegetation to function as a whole e.g. tree size, numbers of trees of different sizes, groundcover components and tree hollow occurrence and numbers on each tree. A discussion of these parameters is provided below:

- The number of large trees, tree stem size class, tree regeneration and length of fallen logs is recorded within the 1,000 m² plot.
- Tree stem size classes should be measured at 1.3 m above ground height, referred to as 'diameter at breast height over bark' or DBH.

- Tree stem size classes are: <5, 5-9, 10-19, 20-29, 30-49, 50-79, and 80+ cm DBH and include all species in the tree growth form group.
- Only living trees contribute to counts for determination of presence and for a multi-stemmed tree, only the largest living stem is included in the count.
- The number of large trees is a count of all living stems with a DBH equal to or greater than the large tree benchmark DBH size for that PCT or vegetation class.
- For a multi-stemmed tree, at least one living stem must be equal to or greater than the large tree benchmark DBH size to count as a large tree.
- Stem size class is based on the presence or absence of living tree stems within size classes that fall between regenerating stems (<5cm DBH) and the large tree benchmark DBH size(s).
- For a multi-stemmed tree, only the largest living stem is counted for determining the presence or absence of stems within each size class.
- Regeneration is based on the presence or absence of living trees with stems <5cm DBH.
- The length of fallen logs is the total length in metres of all woody material greater than 10 cm in diameter that is dead and entirely or in part on the ground within the 20m x 50m plot. Where logs extend outside of the plot, the assessor must only record the length of fallen log that is contained within the plot.
- Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots evenly located along the central transect. Litter cover includes leaves, seeds, twigs, branchlets and branches (<10 cm in diameter). The assessment of litter cover must include all plant material that is detached from a living plant. Dead material still attached to a living plant (such as a grass) is assessed as litter cover where it is in contact with the ground. Dead material still attached to a living plant that is not in contact with the ground, or litter suspended in the canopies of other plants is not assessed as litter cover. Litter cover should be considered as the two-dimensional litter layer and includes litter under the canopies of erect plants.
- The number of trees with hollows is determined by counting the number of trees with hollows that are visible from the ground in the 20 m x 50 m plot. The number of trees with hollows can include native species allocated to the shrub growth form group. It must include both living and dead trees.

Determining the Vegetation Integrity Score

To determine the vegetation integrity score for a vegetation zone, the assessor must:

- determine the composition score, structure score and function score using the plot survey data collected for the vegetation zone; and
- use Equations 8-16 set out in Appendix 6 and the BAM Credit Calculator to determine the vegetation integrity score during each monitoring visit.

Timing of Monitoring Visits

Site visits should occur:

- 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.

Performance Targets and Corrective Actions

TABLE 6 provides the performance indicators and targets for the proposed rehabilitation strategy. Corrective actions are provided that are to be implemented if performance targets are not met.

Generally, offsets utilising the BAM (OEH 2017b) have a 20 year timeframe in which to reach PCT benchmarks. The maintenance and monitoring of retained Koala habitat and compensatory habitat areas at the Kings Forest site will generally occur for a minimum of 5 years prior to handover to the relevant authorities. In this regard, target PCT benchmarks have been selected to reflect this shorter monitoring and maintenance timeframe.

An adaptation to the calculation of vegetation integrity scores and comparison to benchmark data is also proposed for areas where natural regeneration of shrubs and groundcovers is poor due to canopy closure by densely planted trees (as agreed by the relevant agencies). In these areas an adapted assessment will be completed whereby benchmark shrub and groundcover data (with reference to relevant PCT) is entered automatically.

A number of performance indicators i.e. in relation to plant survival and canopy cover will not be applicable to proposed Dry primary koala compensatory habitat areas. These areas were originally identified as suitable for rehabilitation as Dry 'Secondary' Habitat (i.e. PCT 1136 / TVMS 306). However, at the request of OEH and TSC officers > 50% of trees planted in this compensatory habitat type will be Forest red gum (*Eucalyptus tereticornis*), thus resulting in a Dry 'Primary' Habitat designation. The aim was to significantly increase the number of primary browse species in the compensatory habitat areas, with reliance on the natural regeneration of shrubs and groundcovers over time. However, Forest red gum have not previously been recorded from these areas of the site, and do not generally occur on sand plains. Dry primary koala compensatory habitat areas may therefore develop as open woodland communities (with some losses of Forest red gum) and in this regard will be measured against the appropriate PCT 1136 / TVMS 306 for monitoring purposes as this is still considered the most likely community to be recreated (albeit with a greater proportion of Forest red gum).

TABLE 6
PERFORMANCE TARGETS AND CORRECTIVE ACTIONS

Performance Indicator	Target - Establishment period¹	Target - Maintenance period²	Corrective Actions
Survival and continued growth of seedlings (i.e. planted stock) <u>Note:</u> not applicable to Dry 'Primary' compensatory habitat areas	>90% survival of koala tree plantings during all monitoring events (with the exception of Forest red gum within Dry Primary compensatory habitat areas). Forest red gum replacement plantings within Dry Primary compensatory	>90% survival of koala tree plantings during all monitoring events.	Irrigation if required. Additional planting if required.

Performance Indicator	Target - Establishment period ¹	Target - Maintenance period ²	Corrective Actions
	habitat areas will not occur if losses are greater than 15%.		
Establishment of native canopy cover within revegetation areas Note: not applicable to Dry 'Primary' compensatory habitat areas	Planted trees substantially established ³	>60% canopy cover of native tree species >1.5 m in height after three years; and >80% canopy cover of native tree species >2.5m in height after five years.	If these targets are not achieved then the monitoring (for all monitoring) and maintenance period must be extended until the targets are met.
All identified weeds controlled to an acceptable level within retained Koala habitat and rehabilitation areas in accordance with the approved Weed Management Plan/s (JWA 2018k, 2018l, 2018m).	Foliage Projective Cover (FPC) (%) assessed using eye estimates or photo points reduced to <10% within first year.	Foliage Projective Cover (FPC) (%) assessed using eye estimates or photo points: - FPC of weeds reduced to <10% within first year; <10% in second year; <5% in the third year and consecutive years.	Weed control as necessary
Infrastructure (e.g. protection fencing, signage, erosion and sediment control devices) functional and well-maintained	Relevant infrastructure maintained	Relevant infrastructure in condition suitable for hand over to Tweed Shire Council	Maintenance as necessary
In areas where natural regeneration of shrubs and groundcovers is occurring - A fully structured vegetation communities (with reference to Plant Community Type (PCT) benchmark descriptions accessed on the NSW Office of Environment & Heritage (OEH) database i.e. The BioNet Vegetation Classification System) are provided through assisted regeneration	Planted trees are substantially established ³	Assisted regeneration and revegetation plantings achieve the following Vegetation Integrity Benchmark levels for primary attributes of biodiversity for relevant PCTs - Composition - 100%; - Structure - 50%; - Function - 25%.	Continue until performance targets are met

Performance Indicator	Target - Establishment period ¹	Target - Maintenance period ²	Corrective Actions
and revegetation plantings			
In areas where natural regeneration of shrubs and groundcovers is poor - an adapted assessment will be completed whereby benchmark shrub and groundcover data (with reference to Plant Community Type (PCT) is entered automatically.	Planted trees are substantially established ³	Assisted regeneration and revegetation plantings achieve the following Vegetation Integrity Benchmark levels for primary attributes of biodiversity for relevant PCTs • Composition - 100%; • Structure - 50%; • Function - 25%.	Continue until performance targets are met

Notes:

¹ "Establishment period" means the period during which initial environmental repair, restoration and monitoring works required by the relevant approved environmental management plan(s) are undertaken. The establishment period ends when the works meet the establishment period performance criteria, as defined by the relevant approved environmental management plans, to the satisfaction of the Secretary.

² "Maintenance period" means the period of environmental management and monitoring works commencing immediately after the end of the establishment period. Maintenance period works are to be carried out in accordance with the relevant performance criteria (as defined by the relevant approved environmental management plan) to the satisfaction of the Secretary.

³ "Substantial establishment" of the Koala habitat plantings means "the plantings have progressed beyond the need for intensive maintenance e.g. weed control, watering etc. and are clearly established by way of persisting through a recognised growth period and a suitably qualified horticultural/environmental specialist has provided a short report confirming that the plantings are established."

Rehabilitation Monitoring Reports

The Ecologist will submit monitoring reports to Council annually. Monitoring reports should include the following:

- Works undertaken (i.e. A summary of Bush Regenerators daily reports);
- The progress of the retained Koala habitat and restoration areas against the performance indicators listed above;
- Progress of retained Koala habitat and regeneration/revegetation areas using photos and tables showing the results of the monitoring visits;
- Any problems since the previous inspection (death of a significant number of seedlings, broken fences etc.) and what effects these issues have had on the regeneration area;
- Success or failure of measures implemented to rectify previously identified problems; and
- Measures to be taken to rectify new problems.

APPENDIX 7 – KOALA AND KOALA HABITAT MONITORING METHODOLOGY

Baseline Monitoring

Introduction

Baseline Koala monitoring will be completed prior to the commencement of works on the site. All monitoring work will be undertaken by suitably qualified and/or accredited persons¹⁷.

Aims

To establish survey sites and protocols and to collect data which will allow future monitoring:

1. To determine any changes in the distribution and levels of koala activity with the Kings Forest site;
2. To assess any changes in occupancy rates within the Kings Forest site; and
3. To assess any changes in koala population demographics within the Kings Forest site over time.

Methodology

Site Selection

Field site selection is to be based on the field sites sampled in 2010 during the Tweed Coast Koala Habitat Study (Phillips *et al.* 2011) (**FIGURE 1**). During the Habitat Study, sites were positioned using a 600 m x 600 m grid overlay to enable uniform and unbiased coverage of the study area.

In the most recent study undertaken by Tweed Shire Council (Tweed Shire Council 2015), sites were selected for sampling on the following basis:

- Active sites (sites where koala activity was recorded) sampled in 2010.
- Inactive sites (where no koala activity was recorded) sampled in 2010, adjacent to modelled metapopulation boundaries. Sampling at these previously unoccupied locations is most likely to detect population expansion, or a shift in distribution should this have occurred.

The 2010 and 2015 sites were based on the original survey grid sampled by Biolink (2004), a sub-set of which were re-assessed during the Biolink (2010) and Tweed Shire Council's (2015) assessment. These sites thus offer greatest utility in terms of monitoring koala habitat use in areas within and adjacent to the Kings Forest site. Further detail of these sites are as follows:

- Forty one (41) of the original (Biolink 2004) Kings Forest sampling points contained Preferred Koala Food Trees (PKFT's). Twenty five (25) of these 41 sites have meaningful numbers of PKFT's in them (>7) so as to be independently capable of informing determinations of absence at a minimum of 95% statistical confidence (S. Phillips *pers. comm* 1 May 2018). Dr Phillips recommends sampling of the 25 sites (as noted above)

¹⁷ A "suitably qualified and/or accredited person" is a qualified wildlife ecologist with suitable experience in completing Koala surveys.