



WALLUM SEDGE FROG CONTINGENCY AND OFFSET STRATEGY

Kings Forest - Stage 1

**A Report Prepared for
Project 28 Pty Ltd**

APRIL 2020

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DOCUMENT CONTROL

Document

Title	Wallum Sedge Frog Contingency and Offset Strategy. Kings Forest - Stage 1
Job Number	97017
File Reference	97017/WSFCOS (2020)/Report
Version and Date	Rw3 17/04/20
Client	Project 28 Pty Ltd

Revision History (office use only)

Issue	Version	Draft/ Final	Date Sent	Distributed To	No. Copies	Media	Delivery Method
1	Rw1	Draft	07.04.20	JWA	1	Word	email
2	Rw2	Draft	16.04.20	JWA	1	PDF	email
2	Rw3	Final	17.04.20	Client	1	PDF	email

Client Issue

Version	Date	Author		Approved by	
		Name	Initials	Name	Initials
Rw3	17.04.20	Phoebe Chapman / Belinda Whyburn / Adam McArthur	PC / BW / AM	Adam McArthur	AM

TABLE OF CONTENTS

1	INTRODUCTION	6
1.1	Background	6
1.2	Plan Preparation	6
1.3	The Subject Site and Proposed Development	7
2	EPBC ACT APPROVAL (2012/6328)	10
3	WALLUM SEDGE FROG MANAGEMENT PLAN	13
3.1	Introduction	13
3.2	Aim and Objectives.....	13
3.3	Management Actions	13
3.4	Monitoring and Reporting	14
4	STAGE 1 CONTINGENCY AND OFFSET STRATEGY.....	15
4.1	Introduction	15
4.2	Stage 1 WSF Compensatory Habitat Areas	15
4.3	Legal Protection of WSF Compensatory Habitat Areas.....	19
4.4	Bond for Environmental Restoration and Maintenance Works	19
4.5	Ongoing Management	20
4.6	Monitoring and Performance Criteria.....	20
4.7	Stage 1 Contingency Management Actions.....	22
	REFERENCES	25

LIST OF TABLES

TABLE 1 - Indicative Development Staging

TABLE 2 - EPBC Act Approval (2012/6328) Conditions that Relate to WSF Habitat Protection and Enhancement

TABLE 3 - Stage 1 Impacts on WSF Habitat

TABLE 4 - Stage 1 Proposed WSF Compensatory Habitat Planting Details

TABLE 5 - Stage 1 Precinct Specific Compensatory Habitat Categories

TABLE 6 - Total Number of Plantings in Each Precinct

TABLE 7 - Development Stage/Precinct Specific Offsets

TABLE 8 - Compensatory Habitat Performance Criteria and Corrective Actions

TABLE 9 - Threats to Compensatory Habitat Creation and Contingency Measures

LIST OF FIGURES

FIGURE 1 - Locality

FIGURE 2 - Zoning

FIGURE 3 - Aerial photograph

FIGURE 4 - Concept Plan

FIGURE 5 - Precinct Plan

FIGURE 6 - Stage 1 Environmental Management Areas

FIGURE 7 - Stage 1 WSF impacts

FIGURE 8 - Stage 1 WSF Compensatory Habitat

FIGURE 9 - Stage 1 WSF Retained and Compensatory Habitat

FIGURE 10 - Proposed Areas to be Dedicated to NPWS

1 INTRODUCTION

1.1 Background

JWA Pty Ltd (JWA) has been engaged by Project 28 Pty Ltd (the Proponent) to prepare a Wallum Sedge Frog Contingency and Offset Strategy (WSFCOS) for Stage 1 of the Kings Forest development.

This WSFCOS has been prepared to fulfil the requirements of Condition 17 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) Approval Decision (2012/6328). The Kings Forest project was granted approval under the EPBC Act in May 2015 subject to conditions, and subsequently varied approval on the 29th June 2017. Several conditions of the EPBC Act Approval relate to the management, monitoring and mitigation measures for the Wallum sedge frog (WSF) (*Litoria olongburensis*) and its habitat.

A Wallum Sedge Frog Management Plan (WSFMP) (JWA 2020a) has been prepared and lodged with the Commonwealth Department of Agriculture, Water and the Environment (DAWE) for approval in April 2020. The WSFMP sets out strategies to mitigate the potential impacts of development on the WSF on the Kings Forest site, including measures for the protection and enhancement of existing WSF habitat to be retained, and provisions for the creation of 47.35 ha of compensatory WSF habitat (9.52 ha of which occur within Stage 1). The WSFMP also defines success criteria, that includes measures of WSF presence, habitat quality and water chemistry for areas of created compensatory habitat.

This WSFCOS refers specifically to Stage 1 of the Kings Forest development and outlines actions to be implemented if the compensatory WSF habitat works on the site fail to meet the success criteria outlined in the WSFMP after the monitoring and maintenance period. This WSFCOS will specifically be triggered and implemented if:

1. WSF monitoring completed in accordance with the WSFMP indicates that there has been a statistically significant reduction in WSF occupancy rates over Stage 1 of the Kings Forest site over two (2) successive monitoring periods; or
2. The created WSF compensatory habitat within Stage 1 of the Kings Forest project (9.52 ha) does not meet the success criteria as defined in the approved Wallum Sedge Frog Management Plan (WSFMP) within seven (7) years.

Separate Contingency and Offset Strategies will be prepared for subsequent stages.

1.2 Plan Preparation

The preparation of the WSFMP and this WSFCOS have been based on details ecological and hydrological assessments, a comprehensive review of the latest literature relating to the protection of WSF and their habitat, and recommendations from Tweed Shire Council (TSC), NSW Department of Planning, Industry and Environment (DPI&E), NSW Biodiversity and Conservation Division (BCD) and DAWE.

Dr Arthur White (Biosphere Environmental Consultants), a frog specialist, completed extensive field surveys over the Kings Forest site and produced a number of reports relevant

to the WSF populations on the site, and has been consulted on a range of issues during the preparation of the WSFMP and this WSFCOS.

1.3 The Subject Site and Proposed Development

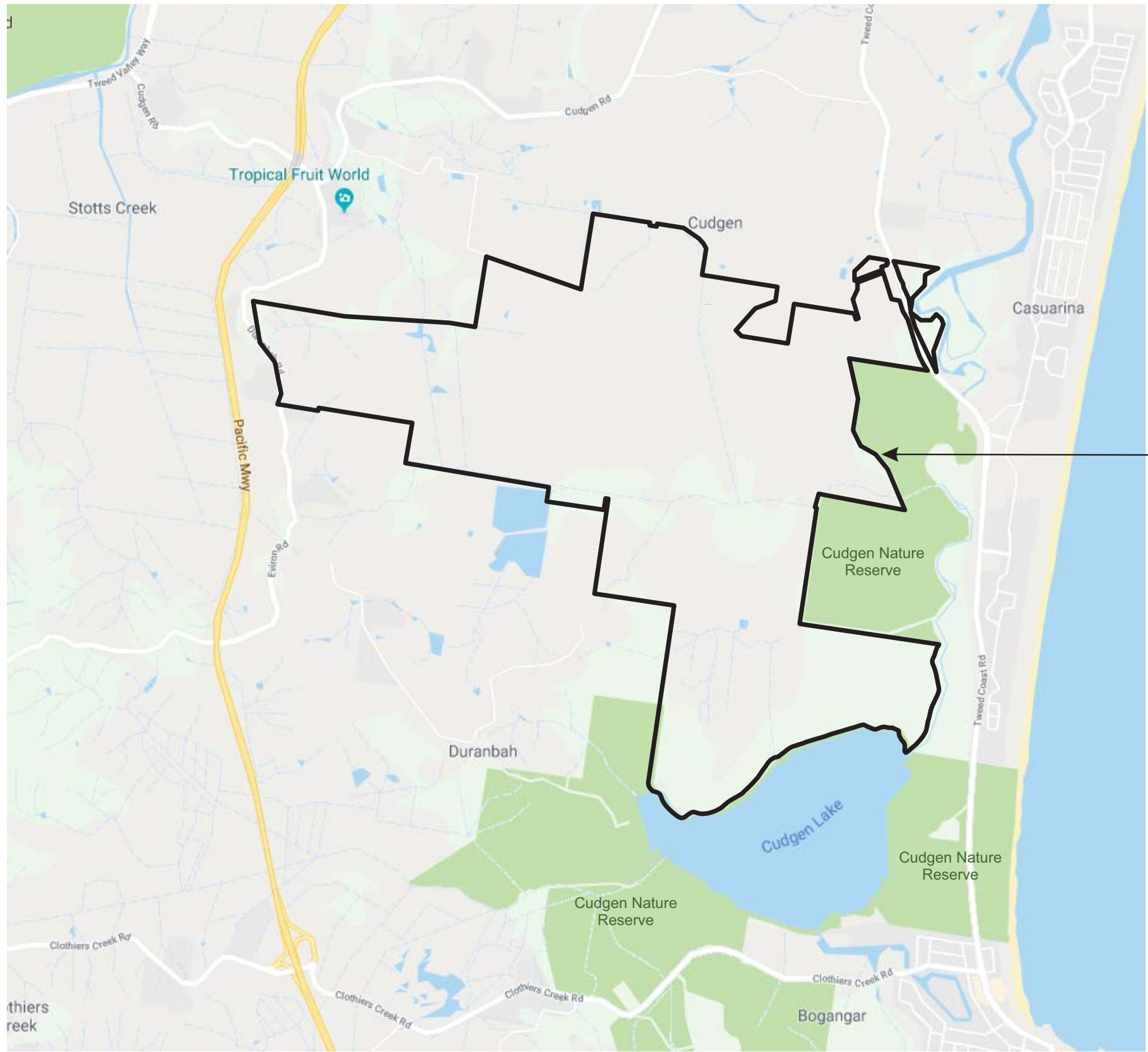
The Kings Forest site is 846 hectares in area and is located in the coastal zone of the Tweed Shire Local Government Area (LGA), between Bogangar (in the south) and Kingscliff (in the north) (**FIGURE 1**). The Kings Forest site has a decades-long history of various land uses and land management practices, including pine plantation, sand mining, pasture improvement and turf production, dairy farming, small cropping and sugar cane production. Project 28 (the Proponent) owns and manages the Kings Forest site which is currently used for cattle grazing and silviculture.

The site was zoned for residential and commercial development in the early 1990's and has been subject to a lengthy Commonwealth, State and Council approval process. Land use zones over the Kings Forest development site are identified on the NSW Planning SEPP Major Development 2005 - Kings Forest land zoning map (**FIGURE 2**). The undisturbed/intact areas of the site, including SEPP 14 wetland areas as well as a number of smaller wetland and Littoral rainforest parcels, are generally zoned for Environment Protection. Substantial buffer zones occur wherever the 2(c) Urban Expansion lands abut neighbouring agricultural land (150 metres) and Environmental Protection Zones (50 metre). A recent aerial photograph of the Subject Site is provided in **FIGURE 3**.

The Kings Forest site is proposed to be developed into a master planned residential community. The areas proposed for residential development are shown on the Revised Concept Plan, Revision B dated the 5th December 2013 (**FIGURE 4**). The total area of the proposed development is 422.32 ha and will include the following in accordance with the Concept Plan Approval (as modified Mods 1 to 5):

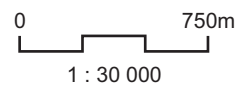
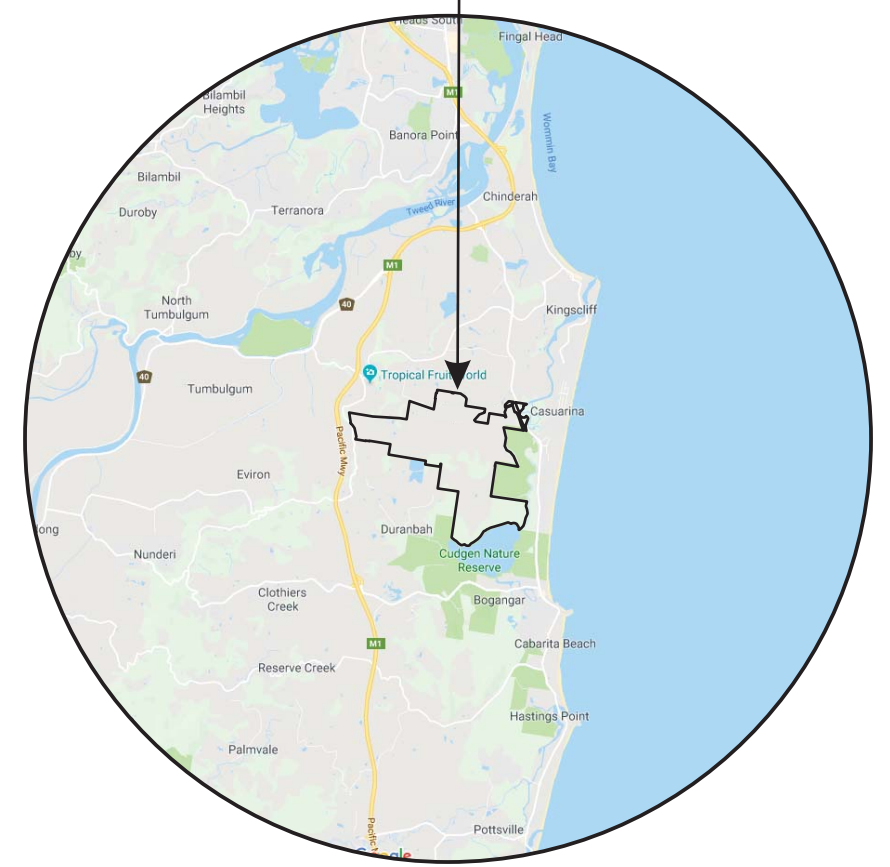
- Residential development for approximately 4500 dwellings;
- Town centre and neighbourhood centre for future retail and commercial uses;
- Community and education facilities;
- Employment land;
- 18 hole Golf Course;
- Open space;
- Wildlife corridors;
- Protection and rehabilitation of environmentally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

Retained vegetation and habitat areas across the site generally occur within Environmental Protection Zones (EPZs) and associated buffers. To assist in identifying the staging of rehabilitation and management actions, these EPZ and buffer areas have been associated



LEGEND
□ Kings Forest Boundary

SUBJECT SITE

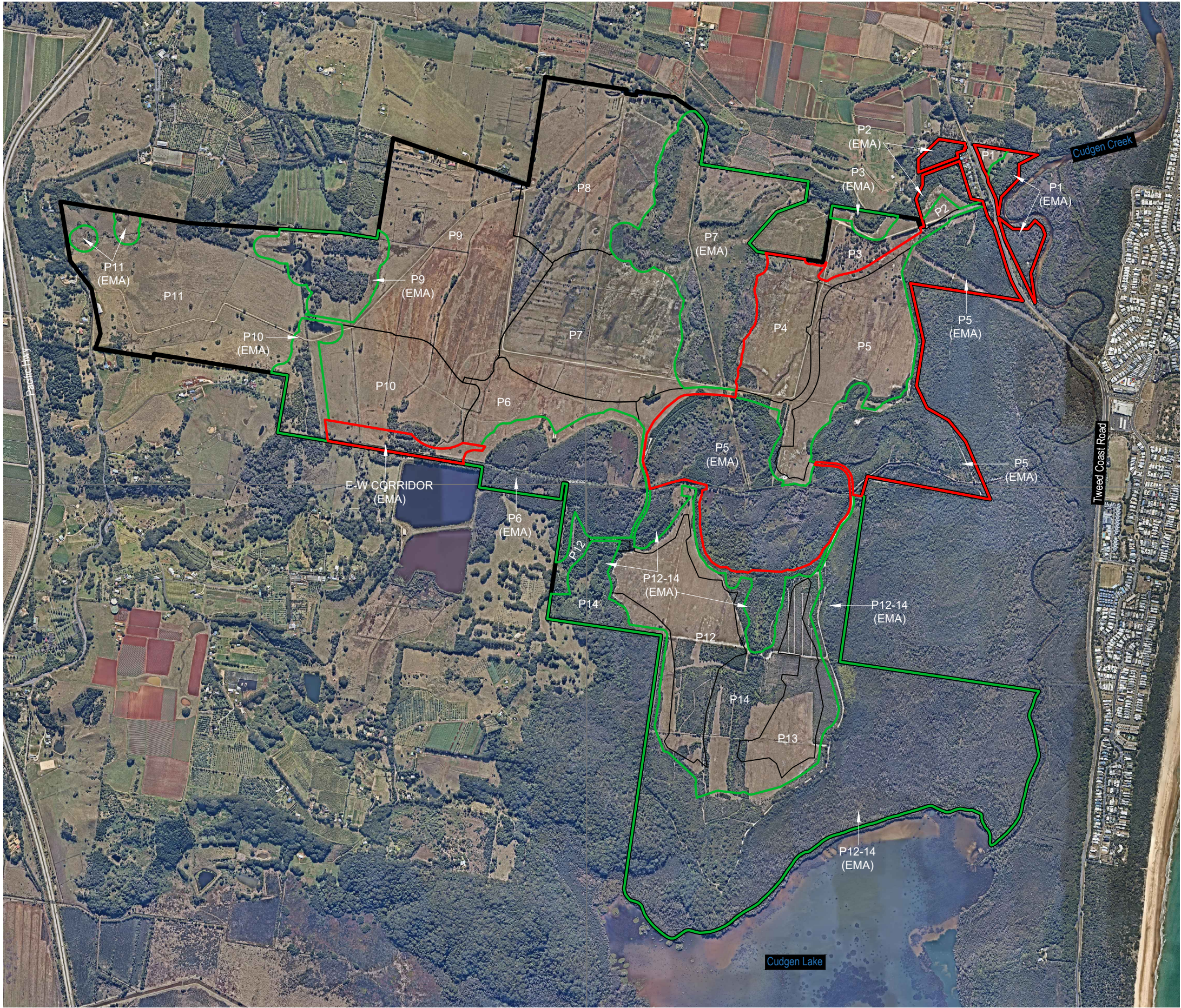


SOURCE: Google Maps
SCALE: 1 : 30 000 @ A3
JWA PTY LTD
Ecological Consultants

CLIENT
Project 28 Pty Ltd
PROJECT
WSF Contingency & Offset Strategy
Kings Forest
Melaleuca Drive, Duranbah, NSW
Shire of Tweed

FIGURE 1
PREPARED: BW
DATE: 16 April 2020
FILE: N97017_Locality.cdr

TITLE
LOCALITY PLAN



LEGEND

- Stage 1 Boundary
- Environmental Management Area (EMA) Boundary (#1)
- Precinct Boundary
- Kings Forest Boundary

Note 1:
To assist in identifying the staging of rehabilitation and management actions, EPZs and buffer areas have been associated with a relevant development precinct and are collectively titled as Environmental Management Areas (EMAs).

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SOURCE: Near Map 08/08/18 Aerial

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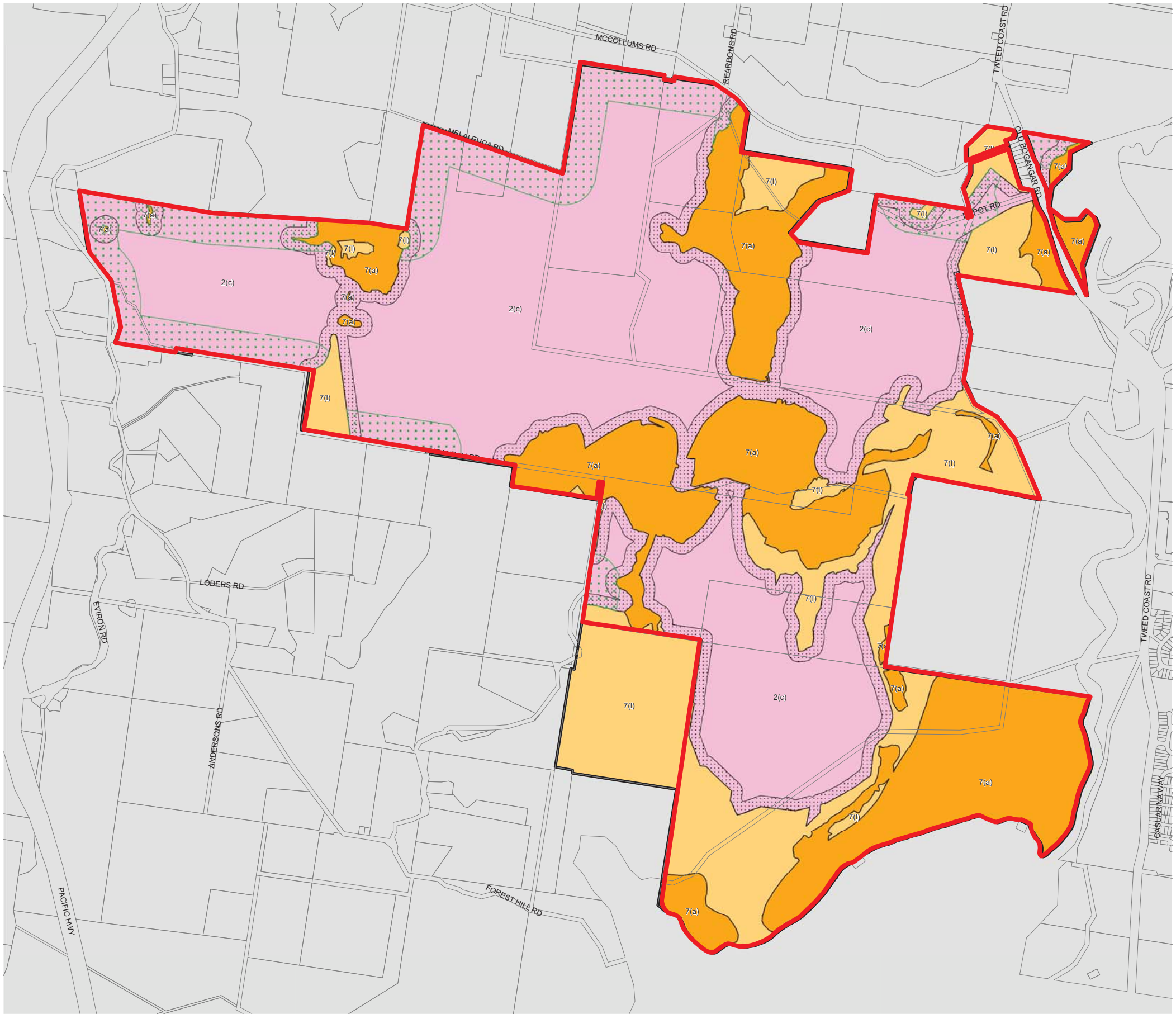
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Shire of Tweed

FIGURE 2

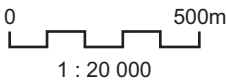
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TITLE

AERIAL
PHOTOGRAPH



- LEGEND**
- Kings Forest Boundary
- ZONING**
- 2(c) Urban Expansion
 - 7(a) Environmental Protection (Wetlands & Littoral Rainforests)
 - 7(l) Environmental Protection (Habitat)
 - Agricultural Buffer (150m)
 - Ecological Buffer (50m)



SOURCE: NSW Planning SEPP (Major Development) 2005 - Kings Forest Land Zoning Map (Ref: SEPP_MD_KIF_LZN_001_20100201)
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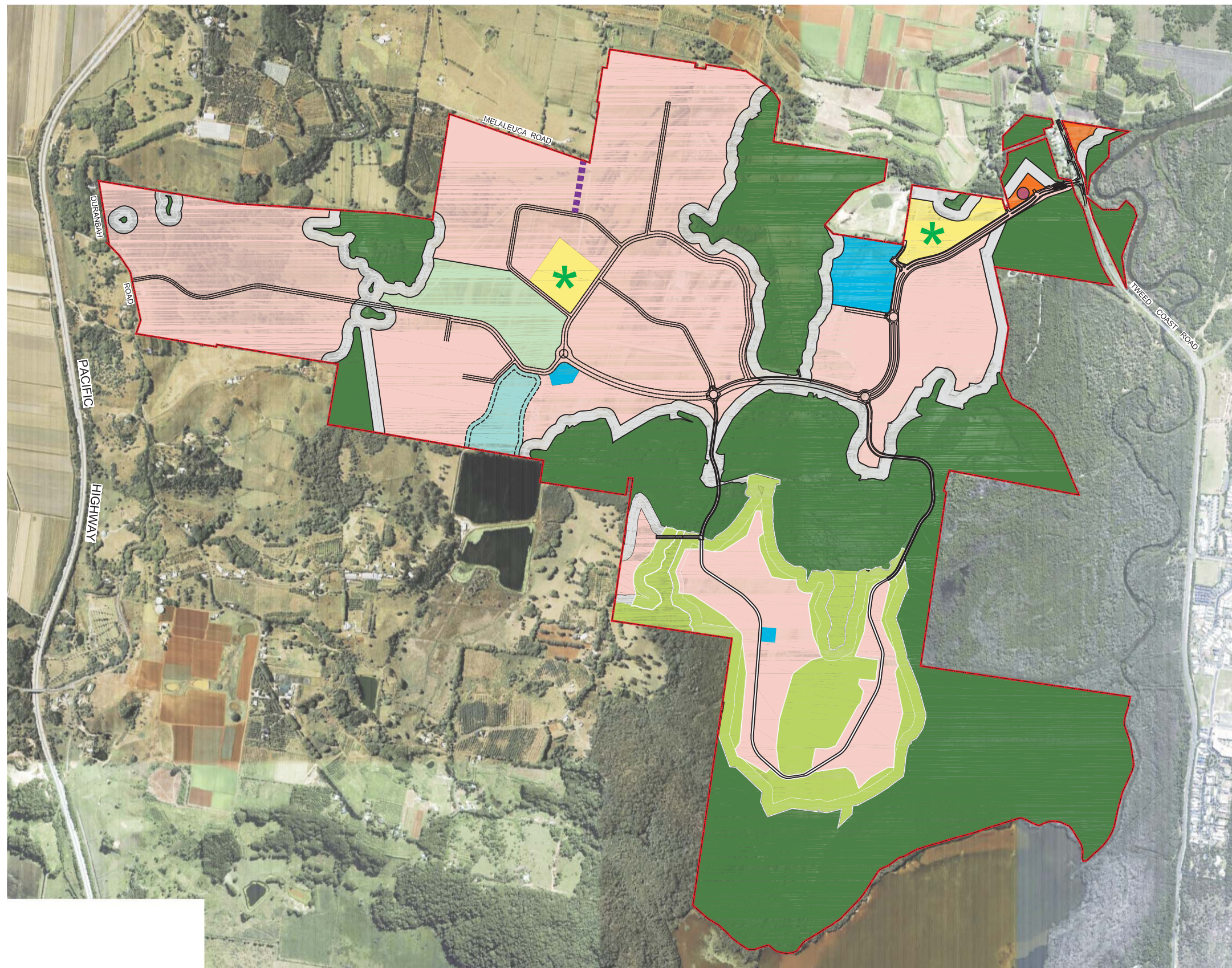
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Kings Forest
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Shire of Tweed

FIGURE 3

PREPARED: BW
DATE: 16 April 2020
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TITLE

ZONING PLAN



LEGEND

- Town Centre / Neighbourhood Centre
- Residential
- Community Facilities / Education
- Employment Land
- Structured Open Space (Active)
(Passive open space to council standards, location subject to urban design)
- Environmental Protection Area
- 50m Ecological Buffer
(includes APZ's & roads where approved)
- State School Site
- Proposed Zone Substation
(subject to Country Energy final approval)
- Potential Road Connection to Melaleuca Road
- Private Open Space
- Golf Course Area
(encompassing ecological buffers where indicated)
- Private Open Space including Lake
- Kings Forest Boundary

IMPORTANT NOTE

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

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SOURCE: RPS Revised Concept Plan Rev B
dated 05/12/13 (Ref: 113691-PSP-4b(CONCEPT
PLAN).dwg)
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Shire of Tweed

FIGURE 4

PREPARED: BW
DATE: 16 April 2020
FILE: N97017_Concept Plan.cdr

TITLE

**REVISED
CONCEPT
PLAN**

with a relevant development precinct and are collectively titled as Environmental Management Areas (EMAs).

The Kings Forest project will likely proceed over many years. The length of time will be dependent, to a certain degree, on the demand for land over time. The development of the site will be completed on a precinct-by-precinct basis (including works within associated EMA's) in accordance with approved Precinct Plan (**FIGURE 5**).

Stage 1 of the Kings Forest project encompasses Precincts 1, 2, 5, the majority of Precinct 4 and the East-West Corridor (**FIGURE 6**). The staging of development of remaining precincts will be then proceed in accordance with the approved Precinct Plan, however this may be subject change. Indicative staging is shown in **TABLE 1**.

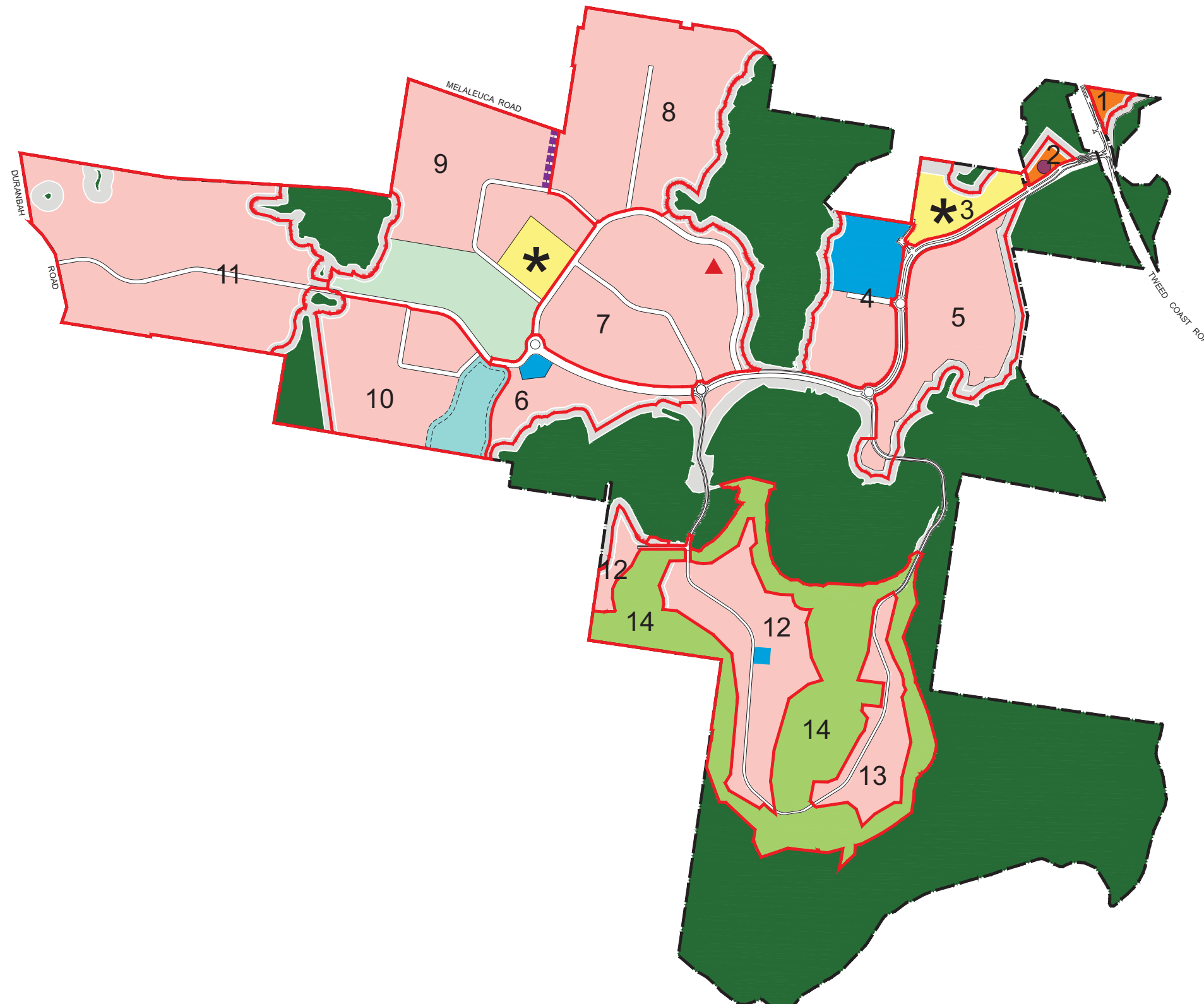
TABLE 1
INDICATIVE DEVELOPMENT STAGING

Development Stage	Precinct
Stage 1	Precinct 1
	Precinct 2
	Majority of Precinct 4
	Precinct 5
	East-West Corridor
Stage 2	Precinct 3
	Remainder of Precinct 4
Stage 3	Precinct 6
Stage 4	Precinct 7
Stage 5	Precinct 8
Stage 6	Precinct 9
Stage 7	Precinct 10
Stage 8	Precinct 11
Stage 9	Precincts 12-14

The Kings Forest site has been divided into nine (9) zones based on the management intent for each area. These management zones are:

- Zone 1 - Construction zone;
- Zone 2 - Retained koala habitat;
- Zone 3 - Retained wallum Sedge Frog (WSF) habitat;
- Zone 4 - Koala compensatory habitat;
- Zone 5 - WSF compensatory habitat;
- Zone 6 - Heath regeneration/revegetation;
- Zone 7 - Littoral rainforest regeneration/revegetation (Precinct 1);
- Zone 8 - Wetland regeneration; and
- Zone 9 - Residual lands e.g. tracks and easements.

FIGURE 6 shows the location of each of the management zones as they relate to Stage 1 of the Kings Forest project.



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

0 500m
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SOURCE: RPS Precinct Plan Rev B dated 05/12/13 (Ref: 113691-PSP-4b(PRECINCT PLAN).dwg) SCALE: 1 : 20 000 @ A3 JWA PTY LTD <i>Ecological Consultants</i>	CLIENT Project 28 Pty Ltd PROJECT WSF Contingency & Offset Strategy Kings Forest Melaleuca Drive, Durambah, NSW Shire of Tweed	FIGURE 5 PREPARED: BW DATE: 16 April 2020 FILE: N97017_Precinct Plan.cdr	TITLE PRECINCT PLAN
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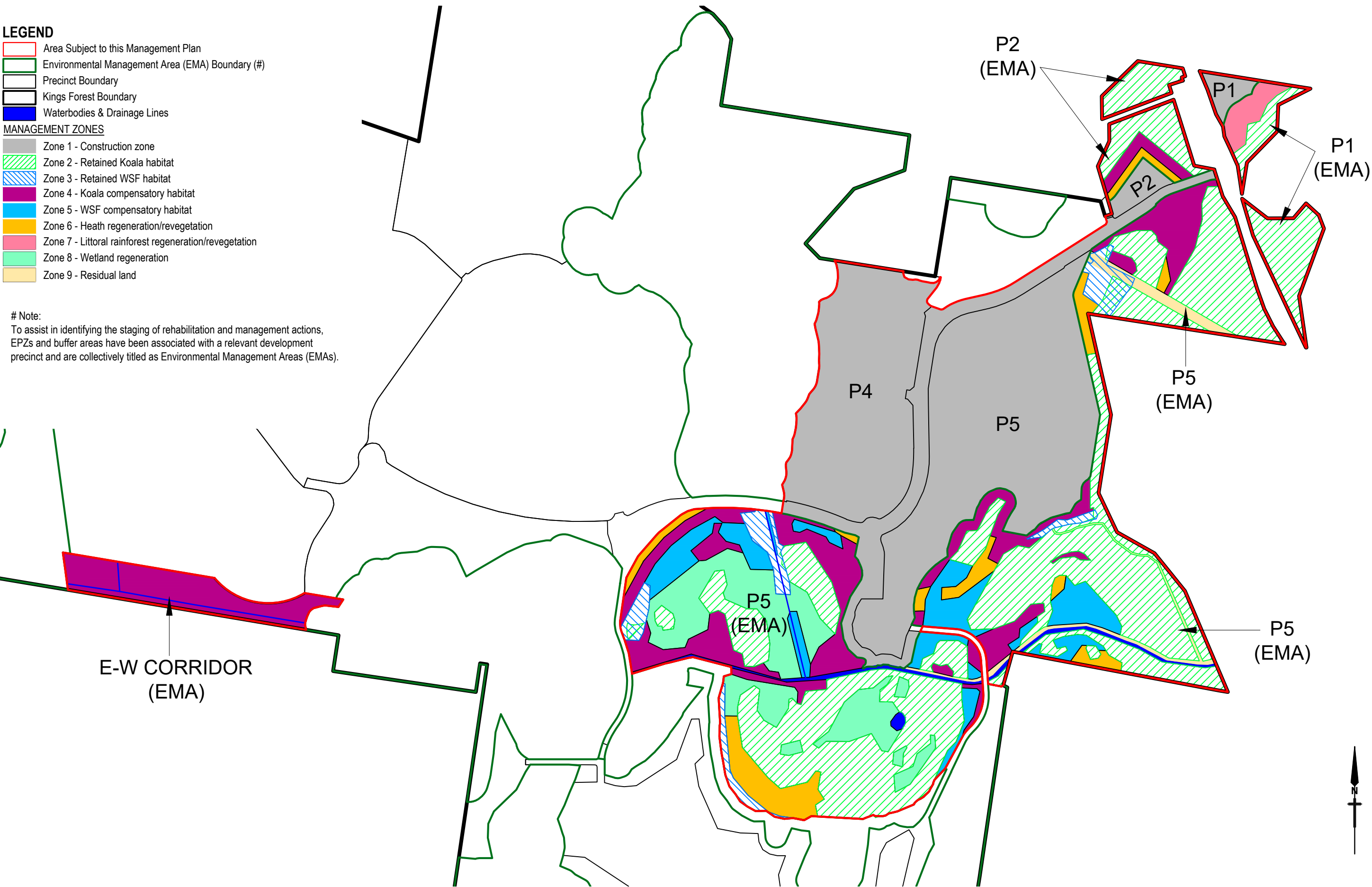
LEGEND

- Area Subject to this Management Plan
- Environmental Management Area (EMA) Boundary (#)
- Precinct Boundary
- Kings Forest Boundary
- Waterbodies & Drainage Lines

MANAGEMENT ZONES

- Zone 1 - Construction zone
- Zone 2 - Retained Koala habitat
- Zone 3 - Retained WSF habitat
- Zone 4 - Koala compensatory habitat
- Zone 5 - WSF compensatory habitat
- Zone 6 - Heath regeneration/revegetation
- Zone 7 - Littoral rainforest regeneration/revegetation
- Zone 8 - Wetland regeneration
- Zone 9 - Residual land

Note:
To assist in identifying the staging of rehabilitation and management actions, EPZs and buffer areas have been associated with a relevant development precinct and are collectively titled as Environmental Management Areas (EMAs).



SOURCE: JWA Site Investigations 2018,
Near Map 08/08/18 Aerial

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WSF Contingency & Offset Strategy
Kings Forest
Melaleuca Drive, Duranbah, NSW
Shire of Tweed

FIGURE 6

PREPARED: BW
DATE: 16 April 2020
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TITLE
STAGE 1
MANAGEMENT
ZONES

2 EPBC ACT APPROVAL (2012/6328)

The conditions of the EPBC Act Approval (2012/6328) which relate to the protection, maintenance, management and monitoring of the WSF population and its habitat on the Kings Forest site are detailed in **TABLE 2** below. **TABLE 2** also identifies how each of the relevant conditions have been satisfied.

TABLE 2
EPBC ACT APPROVAL (2012/6328) CONDITIONS THAT RELATE TO WSF HABITAT
PROTECTION AND ENHANCEMENT

Condition	Compliance
13. The approval holder must ensure the protection and conservation management of 33.63ha of existing Wallum Sedge Frog habitat and 45.09ha of created Wallum Sedge Frog habitat identified in Annexure 7 and described as follows: a) 1.8ha of existing Wallum Sedge Frog habitat and 8.82ha of created Wallum Sedge Frog habitat must be protected by a legal instrument under relevant New South Wales legislation on the title prior to commencement of bulk earthworks associated with Stage 1; b) 21.48ha of existing Wallum Sedge Frog habitat and 8.86ha of created Wallum Sedge Frog habitat must be protected by a legal instrument under relevant New South Wales legislation on the title prior to commencement of bulk earthworks associated with Stage 2; and c) 10.35ha of existing Wallum Sedge Frog habitat and 27.41ha of created Wallum Sedge Frog habitat must be protected by a legal instrument under relevant New South Wales legislation on the title prior to commencement of bulk earthworks associated with Stages 4 and 5.	Section 7.8 - Tables 4 - 6, and FIGURE 20 of the WSFMP show the location of 45.29 ha of retained WSF habitat and 47.35 ha of created WSF habitat. It is noted that the areas of WSF habitat to be retained and created on the site has increased from that originally identified on site and referred to in Condition 13. This increase is because of a combination of the following: i. ground-truthing of native vs. non-native vegetation during the preparation of this WSFMP has revealed that additional areas of suitable native vegetation had not been previously identified as existing or compensatory WSF habitat; and/or ii. corrections of mapping projection issues. Figures 24 - 27 of the WSFMP show the areas of existing habitat to be retained and the habitat creation works associated with each development precinct.
14. As defined in the Wallum Sedge Frog Management Plan (refer Condition 2j.), the created wallum sedge frog habitat must be substantially established prior to the commencement of bulk earthworks associated with each precinct.	Section 7.8.5 of the WSFMP provides that created WSF habitat will be substantially established¹ prior to the commencement of construction associated with each precinct. Prior to the issue of each Construction Certificate authorising the clearing of WSF habitat, the Proponent shall provide evidence to the Certifying Authority that the compensatory WSF habitat in the preceding stage meets the relevant establishment period completion criteria.

¹ "Substantial establishment" of the WSF 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 an independent restoration ecologist has provided a short report confirming that the plantings are established."

Condition	Compliance
15. The approval holder must undertake rehabilitation in proposed Wallum Sedge Frog habitat areas referred to in Condition 13. Details of rehabilitation actions, performance criteria and monitoring, must be in accordance with the Wallum Sedge Frog Management Plan.	Section 7.8 of the WSFMP provides the details of the proposed WSF compensatory habitat. Monitoring requirements and associated performance criteria and corrective actions are detailed in Section 8.5 of the WSFMP.
16. The instrument/s referred to in Condition 13 must: a) provide for the protection of the land referred to in Condition 13 for the duration of this approval; b) prevent any future development activities; c) ensure the active management of the land referred to in Condition 13 in accordance with the Wallum Sedge Frog Management Plan.	Sections 7.7 and 7.8 of the WSFMP provide details of the management of retained and compensatory WSF habitat, respectively. Section 7.12 of the WSFMP provides details of the transfer of land to public ownership.
17. Prior to commencement of construction associated with each precinct, for the Minister's written approval, the approval holder must submit a detailed Wallum Sedge Frog Contingency and Offset Strategy, that will be implemented should the created habitat not meet the defined success criteria detailed in the Wallum Sedge Frog Management Plan. The Strategy must incorporate the requirements of Conditions 13-17. The approved strategy must be implemented. Details must include, but not limited to: a) offset attributes of the proposed areas referred to in Condition 13; b) details of proposed arrangements for legal protection for the duration of the approval; c) details of management actions to be undertaken and how they will be costed; d) details of arrangements and responsibility for the ongoing management for the duration of the approval; e) a methodology for provision of offsets should the created habitat not meet the defined success criteria.	This WSFCOS has been prepared for Stage 1 of the Kings Forest development. Contingency Management Actions detailed in SECTION 4.7 will be triggered if: 1. WSF monitoring completed in accordance with the WSFMP indicates that there has been a statistically significant reduction in WSF occupancy rates over Stage 1 of the Kings Forest site over two (2) successive monitoring periods; or 2. the 9.52 ha of created compensatory habitat for the WSF within Stage 1 of the Kings Forest project do not meet the success criteria as defined in the latest approved WSFMP within seven (7) years. Additional Contingency and Offset Strategy documents will be completed prior to commencement of construction within each relevant Precinct. Compliance with the requirements of Conditions 13-16 for Stage 1 of the Kings Forest project have been addressed above.

3 WALLUM SEDGE FROG MANAGEMENT PLAN

3.1 Introduction

The Wallum Sedge Frog Management Plan (WSFMP) (JWA 2020a) has been prepared to address Commonwealth and State approval conditions and describes the management approach for the WSF population occurring within the Kings Forest site. Broadly, the WSFMP describes the existing WSF habitat conditions and landscape ecology context of the site and sets out the mitigation strategy for the WSF, including measures for the protection and enhancement of existing key habitats to be retained and provisions for the creation of 47.35 ha of compensatory WSF habitat (9.52 ha of which occur within Stage 1) within relevant EMAs. The following sections provide a summary of the key components of the WSFMP.

3.2 Aim and Objectives

The aim of the WSFMP is to protect and conserve the WSF population in the Kings Forest area to ensure the ongoing survival of the population through appropriate management of project impacts.

The objectives are:

- To ensure that the proposed development does not remove areas of habitat outside of approved clearing areas;
- To ensure that movement corridors for the local WSF population are maintained and/or improved;
- To protect WSF from injury or other adverse impacts during the development phases through the implementation of appropriate management actions;
- To improve the habitat values of the site, including the creation of WSF habitat as part of a comprehensive and staged offset strategy;
- To ensure that WSF continue to utilise habitat at Kings Forest;
- To raise awareness and promote community ownership of environmental management (including the conservation of the local WSF population);
- Compliance with relevant conditions; and
- Revision of the WSFMP and WSFCOS as appropriate.

3.3 Management Actions

Under the WSFMP, the WSF will be protected during the pre-construction, construction (including all clearing activities, bulk earthworks, road construction and building) and operational phases of the development. Management actions to be implemented are discussed in Sections 7.2 - 7.14 of the WSFMP and include:

- Construction phase management measures, including:
 - Education of site personnel;
 - Vegetation management protocols;

- Pre-clearing WSF surveys and fauna spotter catcher;
- Restrictions to be placed on construction vehicles;
- Fauna incident reporting protocols.
- Erosion and sediment control measures;
- Stormwater management;
- Avoidance and management of acid sulphate soils;
- Exclusion fencing, fauna underpasses, road crossings and other infrastructure;
- Management of retained WSF habitat;
- Compensatory WSF habitat;
- Improving habitat connectivity and linkage corridors;
- Disease management;
- Controlling pest species (i.e. Mosquito fish and Cane toad occurrence);
- Transfer of land to public ownership;
- Fire management;
- Engaging with the relevant Local Government, NPWS and community groups; and
- Raising community awareness.

A key action under the WSFMP is the creation of 47.35 ha of compensatory WSF habitat to compensate for the loss/fragmentation of habitat and indirect impacts due to the development. Stage 1 of the Kings Forest development will include 9.52 ha of these compensatory habitat works.

3.4 Monitoring and Reporting

The WSFMP also details the monitoring requirements, reporting commitments, key performance indicators and corrective actions for created compensatory WSF habitat. Monitoring of compensatory habitat has been designed to assess the condition and success of created habitat and management measures designed to protect existing, retained habitat.

Section 8 of the WSFMP outlines a comprehensive baseline and annual monitoring program that will be undertaken to determine the effectiveness of mitigation measures implemented.

4 STAGE 1 CONTINGENCY AND OFFSET STRATEGY

4.1 Introduction

The following sections details the Stage 1 offset attributes, the triggers for implementing the contingency and offset strategy, the corrective actions to be completed and the proposed arrangements and responsibilities for the ongoing management and legal protection of the offsets.

4.2 Stage 1 WSF Compensatory Habitat Areas

Approximately 6.29 ha of WSF habitat, comprised of 0.20 ha of breeding habitat and 6.09 ha of forage habitat, will be directly removed during Stage 1 of the Kings Forest development (**FIGURE 7**). **TABLE 3** details the precinct specific impacts associated with Stage 1 works.

To compensate for this unavoidable loss of WSF habitat, 9.52 ha of land has been identified within Stage 1 EMAs as suitable for providing compensatory WSF habitat (**FIGURE 8**). **TABLE 4** summarises the proposed compensatory WSF habitat including habitat types, vegetation community type and structure to be recreated, and the species to be used for planting.

The extent of each WSF compensatory habitat category on a precinct-by-precinct basis is summarised in **TABLE 5**. The overall plant numbers to be planted in each of the proposed compensatory WSF habitat areas within each Precinct are provided in **TABLE 6**.

The proposed WSF compensatory habitat areas will result in a net gain of 3.21 ha (after direct impacts of 6.29 ha) of WSF habitat within Stage 1 EMAs in the medium to long term and will enhance existing movement corridors. **FIGURE 9** shows the distribution of WSF retained habitat and compensatory habitat within Stage 1 EMAs after development.

Proposed WSF compensatory habitat offsets will be completed by a suitably qualified² Bush Regeneration company using methodology and specifications as outlined in the WSFMP. These specifications provide details of the proposed rehabilitation phases, site preparation, weed control, natural regeneration, revegetation works and rehabilitation monitoring.

Proposed WSF compensatory habitat offsets will be completed in a staged manner with works within the Stage 1 EMAs completed in accordance with the calculations provided in **TABLE 7**. Offsets will be substantially established³ in any Precinct prior to the commencement of construction in any subsequent Precinct. Prior to the issue of each Construction Certificate authorising the clearing of WSF habitat, the Proponent shall provide evidence to the Certifying Authority that the compensatory WSF habitat in the preceding stage meets the relevant establishment period completion criteria.

² A Bush Regeneration company that has demonstrable experience in the rehabilitation or revegetation of native vegetation communities in the Tweed region.

³ "Substantial establishment" of the WSF habitat/plantings means "the habitat/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."

LEGEND

- Stage 1 Boundary
- Environmental Management Area (EMA) Boundary (#)
- Environmental Protection Zone (EPZ)
- 50m Buffer to EPZ
- Precinct Boundary
- Kings Forest Boundary

WSF HABITAT THAT WILL BE REMOVED FOR DEVELOPMENT

- WSF breeding habitat to be removed for development
- WSF forage habitat to be removed for development

WSF HABITAT THAT WILL BE POTENTIALLY REMOVED DUE TO INFRASTRUCTURE IN THE 20M OUTER BUFFER

- WSF breeding habitat to be potentially removed due to infrastructure in the 20m outer buffer
- WSF forage habitat to be potentially removed due to infrastructure in the 20m outer buffer

WSF HABITAT THAT WILL LOSE HABITAT VALUE DUE TO GROUNDWATER CHANGES

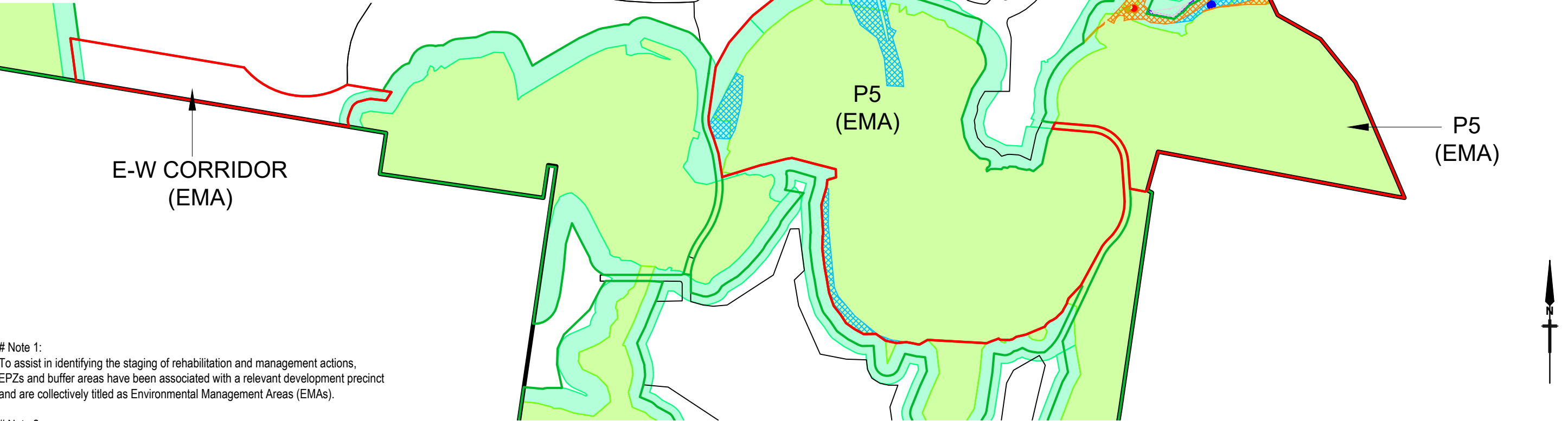
- WSF breeding habitat that will not maintain suitable groundwater conditions to support habitat post-development
- WSF forage habitat that will not maintain suitable groundwater conditions to support habitat post-development

WSF HABITAT THAT WILL BE POTENTIALLY LOST DUE TO UNCERTAINTY WITH GROUNDWATER MODEL ACCURACY [#2]

- WSF breeding habitat to be potentially lost due to small size
- WSF forage habitat to be potentially lost due to small size

WSF HABITAT THAT WILL REMAIN AS HABITAT AFTER DEVELOPMENT

- WSF breeding habitat with suitable groundwater conditions to remain as breeding habitat post-development
- WSF forage habitat with suitable groundwater conditions to remain as forage habitat post-development



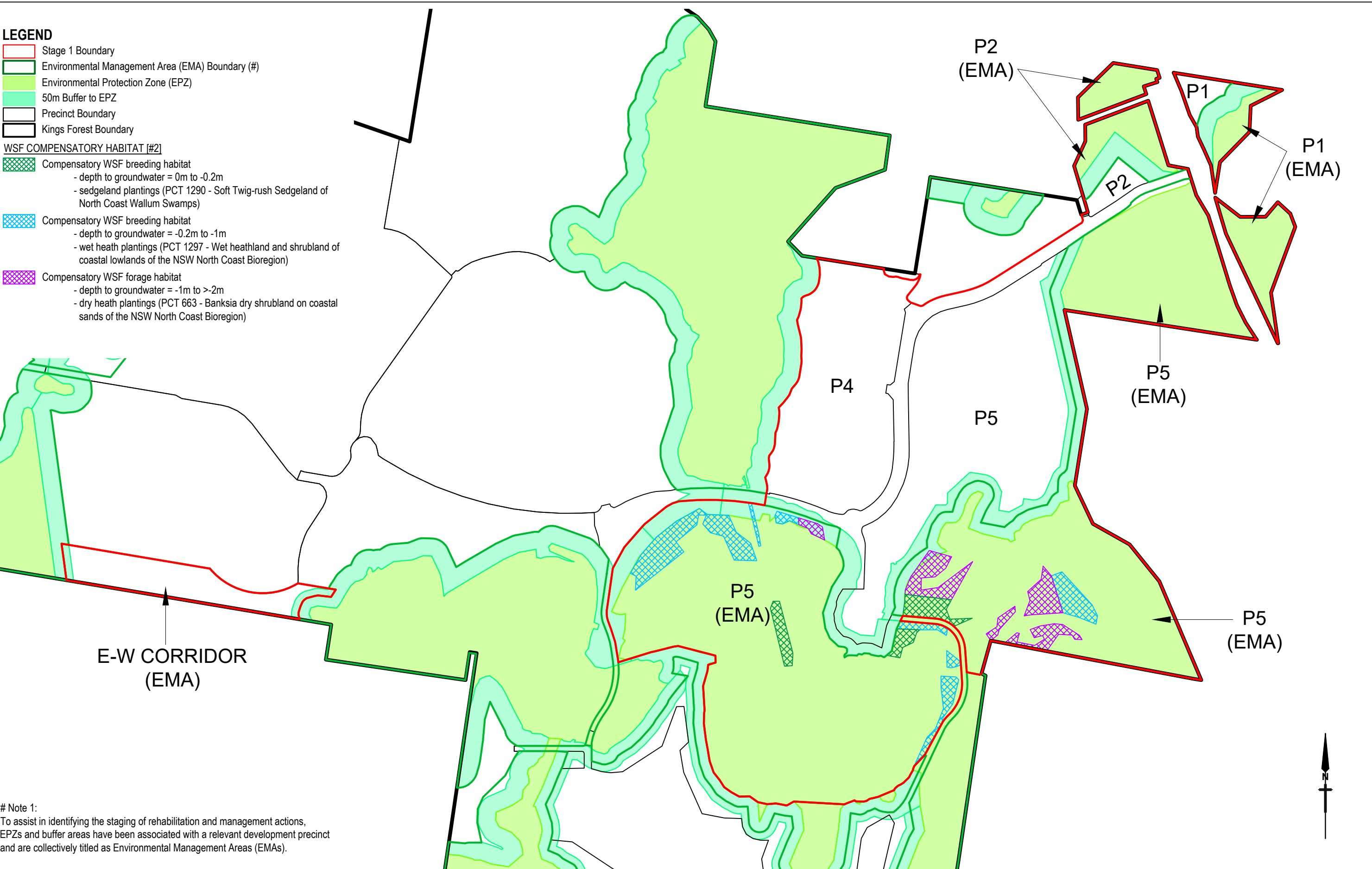
Note 1:
To assist in identifying the staging of rehabilitation and management actions, EPZs and buffer areas have been associated with a relevant development precinct and are collectively titled as Environmental Management Areas (EMAs).

Note 2:
Areas excluded based on groundwater model accuracy - defined as areas where total connected post-developed habitat (including compensatory habitat) is less than 400m².

SOURCE: JWA WSFMP (April 2020)	CLIENT Project 28 Pty Ltd	FIGURE 7	TITLE STAGE 1 WALLUM SEDGE FROG HABITAT TO BE LOST & RETAINED
SCALE: 1 : 10 000 @ A3	PROJECT WSF Contingency & Offset Strategy Kings Forest Melaleuca Drive, Duranbah, NSW Shire of Tweed		
JWA PTY LTD Ecological Consultants		PREPARED: BW DATE: 16 April 2020 FILE: N97017_WSF COS_20200416.dwg	

LEGEND

- Stage 1 Boundary
- Environmental Management Area (EMA) Boundary (#)
- Environmental Protection Zone (EPZ)
- 50m Buffer to EPZ
- Precinct Boundary
- Kings Forest Boundary
- WSF COMPENSATORY HABITAT #2]**
 - Compensatory WSF breeding habitat
 - depth to groundwater = 0m to -0.2m
 - sedgeland plantings (PCT 1290 - Soft Twig-rush Sedgeland of North Coast Wallum Swamps)
 - Compensatory WSF breeding habitat
 - depth to groundwater = -0.2m to -1m
 - wet heath plantings (PCT 1297 - Wet heathland and shrubland of coastal lowlands of the NSW North Coast Bioregion)
 - Compensatory WSF forage habitat
 - depth to groundwater = -1m to >-2m
 - dry heath plantings (PCT 663 - Banksia dry shrubland on coastal sands of the NSW North Coast Bioregion)



Note 1:
To assist in identifying the staging of rehabilitation and management actions, EPZs and buffer areas have been associated with a relevant development precinct and are collectively titled as Environmental Management Areas (EMAs).

Note 2:
Areas which will become WSF habitat after rehabilitation. Identified as areas with:
a) pre-clearing vegetation categorised as wetland (Terrestria 2014), and
b) developed depth to groundwater of:
(i) less than 1m for breeding habitat, or
(ii) 1 to 2m for forage habitat.

SOURCE: JWA WSFMP (April 2020)

SCALE: 1 : 10 000 @ A3

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WSF Contingency & Offset Strategy
Kings Forest
Melaleuca Drive, Duranbah, NSW
Shire of Tweed

FIGURE 8

PREPARED: BW
DATE: 16 April 2020
FILE: N97017_WSF COS_20200416.dwg

TITLE
STAGE 1
WALLUM SEDGE FROG
COMPENSATORY
HABITAT

LEGEND

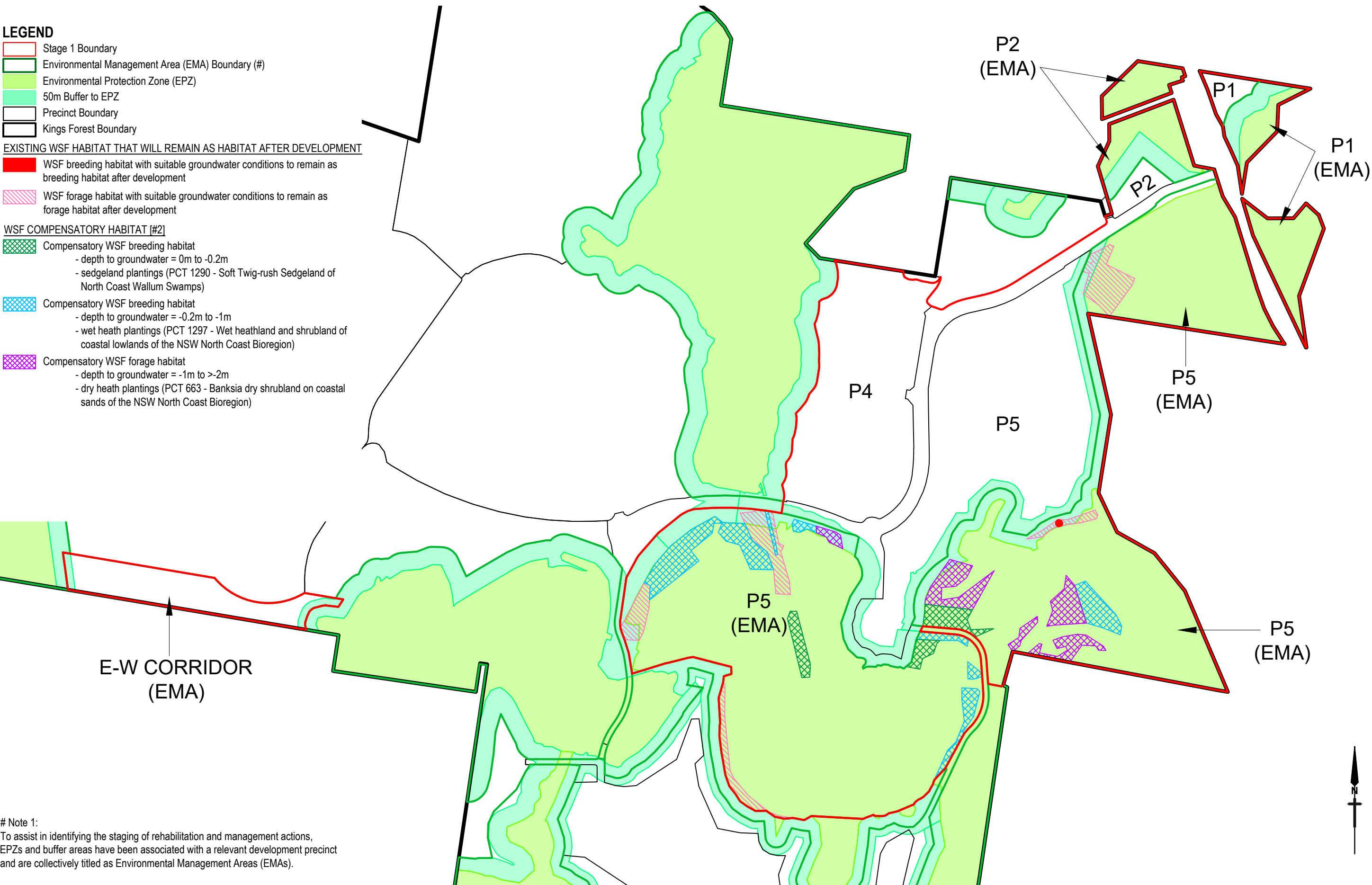
- Stage 1 Boundary
- Environmental Management Area (EMA) Boundary (#)
- Environmental Protection Zone (EPZ)
- 50m Buffer to EPZ
- Precinct Boundary
- Kings Forest Boundary

EXISTING WSF HABITAT THAT WILL REMAIN AS HABITAT AFTER DEVELOPMENT

- WSF breeding habitat with suitable groundwater conditions to remain as breeding habitat after development
- WSF forage habitat with suitable groundwater conditions to remain as forage habitat after development

WSF COMPENSATORY HABITAT [#2]

- Compensatory WSF breeding habitat
 - depth to groundwater = 0m to -0.2m
 - sedgeland plantings (PCT 1290 - Soft Twig-rush Sedgeland of North Coast Wallum Swamps)
- Compensatory WSF breeding habitat
 - depth to groundwater = -0.2m to -1m
 - wet heath plantings (PCT 1297 - Wet heathland and shrubland of coastal lowlands of the NSW North Coast Bioregion)
- Compensatory WSF forage habitat
 - depth to groundwater = -1m to >-2m
 - dry heath plantings (PCT 663 - Banksia dry shrubland on coastal sands of the NSW North Coast Bioregion)



Note 1:
To assist in identifying the staging of rehabilitation and management actions, EPZs and buffer areas have been associated with a relevant development precinct and are collectively titled as Environmental Management Areas (EMAs).

Note 2:
Areas which will become WSF habitat after rehabilitation. Identified as areas with:
a) pre-clearing vegetation categorised as wetland (Terrestria 2014), and
b) developed depth to groundwater of:
(i) less than 1m for breeding habitat, or
(ii) 1 to 2m for forage habitat.

SOURCE: JWA WSFMP (April 2020)

SCALE: 1 : 10 000 @ A3

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Shire of Tweed

FIGURE 9

PREPARED: BW
DATE: 16 April 2020
FILE: N97017_WSF COS_20200416.dwg

TITLE
STAGE 1
WALLUM SEDGE FROG
RETAINED &
COMPENSATORY
HABITAT

TABLE 3
STAGE 1 PRECINCT SPECIFIC WSF HABITAT IMPACT CALCULATIONS

Precinct	Area to be Removed/Impacted								TOTAL	
	Area to be Removed for Development		Area that may be Removed within the 20 m Outer Buffer*		Area to be Impacted due to Groundwater Changes**		Area Impacted due to Size - Below 400 sqm			
	Breeding Habitat	Forage Habitat	Breeding Habitat	Forage Habitat	Breeding Habitat	Forage Habitat	Breeding Habitat	Forage Habitat	Breeding Habitat	Forage Habitat
Precinct 1	-	-	-	-	-	-	-	-	-	-
Precinct 2	-	-	-	-	-	-	-	-	-	-
Precinct 4	0.03 ha	2.47 ha	-	-	-	-	-	-	0.03 ha	2.47 ha
Precinct 5	0.12 ha	1.98 ha	0.01 ha	0.13 ha	0.03 ha	1.47 ha	0.01 ha	0.04 ha	0.17 ha	3.62 ha
East-West Corridor	-	-	-	-	-	-	-	-	-	-
TOTAL	0.15 ha	4.45 ha	0.01 ha	0.13 ha	0.03 ha	1.47 ha	0.01 ha	0.04 ha	0.20 ha	6.09 ha

Notes:

* These areas may be impacted by construction of infrastructure (e.g. stormwater, pathways, etc.) within the outer 20 m buffer zone of Precinct 5 (additional to area to be removed for development).

** Although these calculations are related to indirect impacts, they have been included in this table for ease of reference and perspicuity.

TABLE 4
STAGE 1 PROPOSED WSF COMPENSATORY HABITAT PLANTING DETAILS

WSF Compensatory Habitat Type	Total Area	Depth to Groundwater	Vegetation Community to be Recreated (PCT* / TVMS#)	Broad Structure of the Vegetation Type to be Created	Trees, Shrubs, or Groundcover Plant Species to be Planted
Compensatory breeding habitat - sedgeland & at underpass entrances (as appropriate)	1.78 ha	0m to 0.2m	PCT 1290 / TVMS 701	Sedgeland	Ground - <i>Baloskion pallens</i> , <i>Baumea arthropphylla</i> , <i>Baumea articulata</i> , <i>Baumea rubiginosa</i> , <i>Cladium procerum</i> , <i>Eleocharis sphacelate</i> , <i>Lepironia articulata</i> , <i>Leptocarpus tenax</i> , <i>Schoenus brevifolius</i> .
Compensatory breeding habitat - wet heath	4.61 ha	0.2m to 1m	PCT 1297 / TVMS 502	Wet heathland	Small trees/Shrubs - <i>Baeckea frutescens</i> , <i>Baeckea linifolia</i> , <i>Banksia ericifolia</i> subsp. <i>macrantha</i> , <i>Banksia oblongifolia</i> , <i>Banksia robur</i> , <i>Leptospermum juniperinum</i> , <i>Leptospermum liversidgei</i> , <i>Melaleuca nodosa</i> , <i>Sporadanthus interruptus</i> , <i>Xanthorrhoea fulva</i> Ground - <i>Eurychorda complanata</i> , <i>Pteridium esculentum</i> , <i>Sprengelia sprengelioides</i>
Compensatory forage habitat - dry heath	3.13 ha	1m to >2m	PCT 663 / TVMS 501	Dry heathland	Small trees/Shrubs - <i>Allocasuarina littoralis</i> , <i>Banksia aemula</i> , <i>Boronia pinnata</i> , <i>Calytrix tetragona</i> , <i>Dillwynia retorta</i> , <i>Leptospermum semibaccatum</i> , <i>Leptospermum trinervium</i> , <i>Melaleuca nodosa</i> , <i>Monotoca scoparia</i> , <i>Phyllota phyllicoides</i> , <i>Xanthorrhoea glauca</i> , <i>Leptospermum polygalifolium</i> . Ground - <i>Caustis recurvata</i> , <i>Coleocarya gracilis</i> , <i>Platysace lanceolata</i> , <i>Pteridium esculentum</i> .

*Relevant Plant Community Type (PCT) descriptions which were accessed via the BioNet Vegetation Classification System.

#Refer to Tweed Vegetation Management Strategy (Kingston et al. 2004)

TABLE 5
STAGE 1 PRECINCT SPECIFIC WSF COMPENSATORY HABITAT CATEGORIES

Precinct/ EMA	WSF Compensatory Habitat (PCT* / TVMS#)			
	Compensatory Breeding Habitat - Sedgeland (PCT 1290 / TVMS 701)	Compensatory Breeding Habitat - Wet Heath (PCT 1297 / TVMS 502)	Compensatory Forage Habitat - Dry Heath (PCT 663 / TVMS 501)	Total
Precinct 1	-	-	-	-
Precinct 2	-	-	-	-
Precinct 4	-	-	-	-
Precinct 5	1.78 ha	4.61 ha	3.13 ha	9.52 ha
East-West Corridor	-	-	-	-
TOTAL	1.78 ha	4.61 ha	3.13 ha	9.52 ha
*Relevant Plant Community Type (PCT) descriptions which were accessed via the BioNet Vegetation Classification System.				
#Refer to Tweed Vegetation Management Strategy (Kingston et al. 2004)				

TABLE 6
TOTAL NUMBER OF PLANTINGS IN EACH PRECINCT

Precinct/ EMA	WSF Compensatory Habitat - Number of Plants (*)					
	Planting Density (plants / 25 sq. metres)		Compensatory Breeding Habitat - Sedgeland (PCT 1290)	Compensatory Breeding Habitat - Wet Heath (PCT 1297)	Compensatory Forage Habitat - Dry Heath (PCT 663)	Total
Precinct 1	Shrubs	8	-	-	-	-
	Ground covers	16				
Precinct 2	Shrubs	8	-	-	-	-
	Ground covers	16				
Precinct 4	Shrubs	8	-	-	-	-
	Ground covers	16				
Precinct 5	Shrubs	8	0	14,760	10,016	24,776
	Ground covers	16	11,375	29,520	20,031	60,926
East-West Corridor	Shrubs	8	-	-	-	-
	Ground covers	16				
TOTAL	Shrubs	8	0	14,760	10,016	24,776
	Ground covers	16	11,375	29,520	20,031	60,926

TABLE 7
DEVELOPMENT STAGE/PRECINCT SPECIFIC OFFSETS

Development Stage	Precinct/EMA	WSF Habitat to be Retained	WSF Habitat to be Removed/ Impacted	WSF Offset Created Habitat	Cumulative Net Gain/Loss
Stage 1	Precinct 1	0	0	0	+ 3.21 ha
	Precinct 2	0	0	0	
	Majority of Precinct 4	0	2.50 ha	0	
	Precinct 5	4.57 ha	3.80 ha	9.52 ha	
	East-West Corridor	0	0	0	

4.3 Legal Protection of WSF Compensatory Habitat Areas

Stage 1 WSF compensatory habitat areas will be legally protected in perpetuity via transfer to public ownership.

A minimum of 150 ha of the Kings Forest site, contiguous with Cudgen Nature Reserve (**FIGURE 10**), is proposed to be transferred to public ownership through agreement with BCD (formerly OEH). This undertaking was originally contained in the Proponent's Statement of Commitments forming part of the approved Concept Plan and includes approximately 1.85 ha (40%) of existing WSF habitat to be retained and 4.69 ha (49%) of created compensatory habitat within Stage 1 of the development (**FIGURE 9**). These areas will be protected by Nature Reserve zoning and status under the NPWS Act in perpetuity.

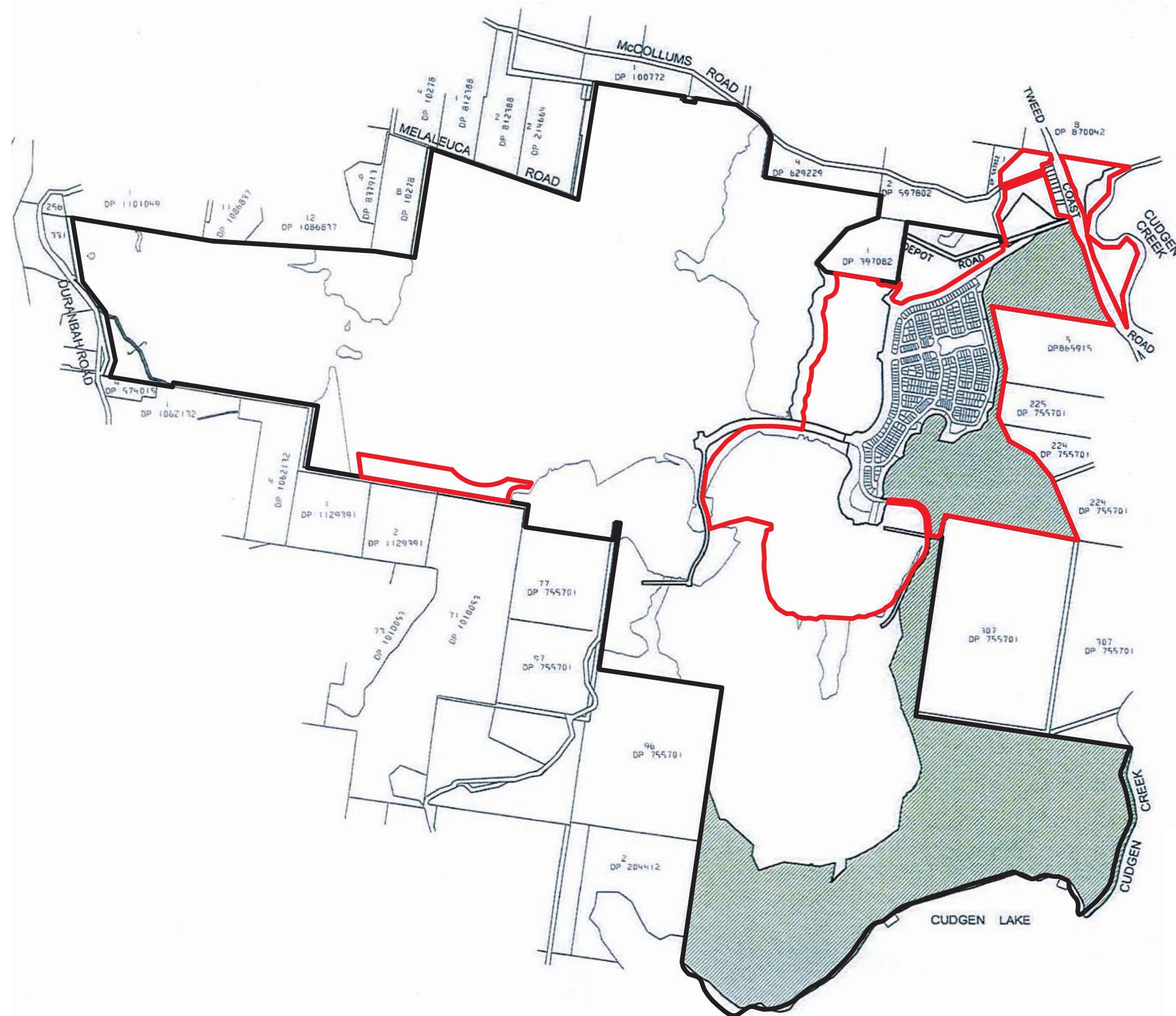
The remaining EMAs across Stage 1 of the development site may also be transferred to public ownership, subject to agreement with Tweed Shire Council. These areas include a further 2.72 ha (60%) of existing WSF habitat to be retained and 4.83 ha (51%) of created compensatory habitat within Stage 1 of the Kings Forest development site.

In accordance with Condition 3 of the Major Project Application 08_0194, Project 28 will submit to the Secretary a form of dealing(s) which will be registered on the title to the Potential Council Land (PCL) and future BCD land. This registration will bind all future landowners to manage the dedicated land for conservation purposes, ensure compliance with relevant management plans (in particular the WSFMP), permit access by DPI&E, Council and BCD at all times and provide a release for any public authority from the registered dealing(s).

Prior to the commencement of works in a precinct, a registered surveyor will prepare survey plans and permanently mark the boundaries of the PCL and the future BCD land. These plans will be lodged with DPI&E on a precinct-by-precinct basis.

4.4 Bond for Environmental Restoration and Maintenance Works

In accordance with Major Projects Condition 50, prior to commencement of bulk earth works for each precinct, and every two (2) years thereafter, a cash bond or bank guarantee shall be lodged with TSC to ensure that the relevant environmental management plans for the



- LEGEND**
- Stage 1 Boundary
 - Kings Forest Boundary
 - Indicative Areas to be dedicated to NPWS
 - Conservation offset (Nature Reserve addition) land approx total area 180 ha (150 ha per concept plan condition C3, additional 30 ha subject to agreement with NPWS)

Note: Final boundaries are subject to agreement with Dept of Planning and Infrastructure

	NSW GOVERNMENT Planning
<i>Issued under the Environmental Planning and Assessment Act 1979</i>	
Approved Application No. <u>08-0194</u>	
granted on the <u>11/8/13</u>	
Signed <u>[Signature]</u>	
Sheet No. <u>38</u> of <u>41</u>	

0 500m
1 : 20 000

SOURCE: Landsurv (Ref: Landsurv Revision C.pdf dated 23.08.12)

SCALE: 1 : 20 000 @ A3

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Shire of Tweed

FIGURE 10

PREPARED: BW
DATE: 16 April 2020
FILE: N97017_Landsurv NPWS ded.cdr

TITLE
**PROPOSED
AREAS TO BE
DEDICATED TO NPWS**

associated Potential Council Land (PCL) are implemented. The amount of such bond will be based on 135% of the cost of the environmental works (repair and/or enhancement) for the associated precinct/PCL for the establishment period specified in the approved environmental management plans. Two (2) written quotes from suitably experienced and qualified contractors must be submitted to the TSC which detail the cost of all works required within each two (2) year period.

The above cash bond or bank guarantee will be refunded at the end of each two (2) year maintenance period, following the Secretary's written approval of the environmental audit report prepared in accordance with Section 8.7.3 of the WSFMP. Bi-annual bonding will no longer be required following the Proponent providing evidence to the Secretary that the final audit has been conducted in accordance with Major Projects Condition 49 which demonstrates that the relevant works have been completed and written evidence is provided to the Secretary that the lands have been transferred into public ownership.

4.5 Ongoing Management

The proponent will be responsible for the management of all compensatory habitat works until such time as an agreement is reached with BCD and TSC regarding the dedication of the land. The maintenance of WSF compensatory habitat and infrastructure on land dedicated with each relevant Precinct will become the responsibility of the new landowner at the time of dedication. The Proponent's intention is to dedicate land on a precinct by precinct basis, with all lands proposed to be dedicated prior to 2035.

4.6 Monitoring and Performance Criteria

4.6.1 Introduction

Section 8 of the WSFMP outlines a comprehensive baseline and annual monitoring program and associated performance criteria that will be undertaken to determine the effectiveness of mitigation measures implemented. Monitoring will focus on two (2) key factors considered essential to the success of the WSFMP:

- WSF occupancy rates;
- Creation of compensatory WSF habitat.

4.6.2 WSF Occupancy Rates

WSF population monitoring shall be completed in association with each relevant stage of the Kings Forest development on an annual basis as a responsibility of the Proponent, from the date of "commencement" of works in each relevant development stage, and will continue for a period extending to five (5) years after completion of the relevant development stage or until the retained habitat associated with the relevant development stage is dedicated, whichever is sooner. Annual WSF monitoring will comprise three (3) sampling events undertaken per WSF breeding season (i.e. between late September and early March) during appropriate weather conditions and will be completed following the methodology described the WSFMP.

An abundance measure of WSF will be obtained by counting all WSF within 1 m of each survey transect to derive a standard unit of measure expressed as the number of frogs per 100 m² of habitat. A test of significance utilising the Paired Student t-test will be completed after each monitoring event to determine if a statistically significant reduction in WSF occupancy rates has occurred (i.e. to test the hypothesis that pre-development WSF occupancy rates are higher than the post-development WSF occupancy rates)

For monitoring purposes, the benchmark habitat occupancy rate to be achieved for WSF 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 WSFMP can only be considered successful if the extent of habitat being utilised by WSF across the Kings Forest site 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 2 years) by examining both the occupancy trend over the intervening two (2) year period and by a direct comparison to the occupancy estimate of two (2) years previous.

If monitoring results indicate that there has been a statistically significant reduction in WSF occupancy rates within Stage 1 of the Kings Forest site over two (2) successive monitoring periods, the contingency management actions discussed in **SECTION 4.7.2** will be triggered.

4.6.3 Compensatory WSF Habitat

Compensatory WSF habitat will be monitored six-monthly during the minimum twelve (12) months establishment period. Following the successful creation of WSF habitat, there is a minimum seven (7) year maintenance period during which the created habitat will be monitored annually to demonstrate that key performance indicators have been met.

Performance indicators and targets for the compensatory WSF habitat to be achieved during the establishment and maintenance period of the project are contained in Section 7.8.3 of the WSFMP and are presented in **TABLE 8**. If compensatory habitat does not achieve the performance targets at the end of the maintenance period, the contingency management actions discussed in **SECTION 4.7.3** will be triggered.

TABLE 8
COMPENSATORY HABITAT PERFORMANCE CRITERIA

Performance Indicator	Target - Establishment Period¹	Target - Maintenance Period²
Survival and continued growth of seedlings (i.e. planted stock).	>90% survival of plantings.	>90% survival of plantings.
Establishment of native ground cover within revegetation areas (including at the entrances to	Plantings substantially established. ³	Foliage Projective Cover (FPC) (%) of native groundcovers assessed using eye estimates or photo

Performance Indicator	Target - Establishment Period ¹	Target - Maintenance Period ²
underpasses where appropriate).		points: • >60% after 3 years; and • <80% after 5 years.
All identified weeds controlled to an acceptable level in accordance with the approved Kings Forest Weed Management Plans.	Foliage Projective Cover (FPC) (%) of weeds assessed using eye estimates or photo points reduced to <10% within first year.	FPC (%) of weeds assessed using eye estimates or photo points: • FPC of weeds reduced to <10% within the 1st and 2nd years; • <5% in the third year and consecutive years.
Natural recruitment of native species within rehabilitation areas (including at the entrances to underpasses).	Evidence of natural recruitment.	Increasing natural recruitment.
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 of the NSW DPI&E. 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 of the NSW DPI&E. ³ “Substantial establishment” of the WSF 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 an independent restoration ecologist approved by the Secretary has provided a short report confirming that the plantings are established.”		

Following the successful creation of WSF habitat, there is a minimum seven (7) year maintenance period where the created habitat will be monitored annually to demonstrate that key performance indicators have been met and the area can be transferred to either NSW National Parks and Wildlife Service (NPWS) as an extension to the adjoining Cudgen Nature Reserve, or to Tweed Shire Council (TSC) as conservation reserve.

4.7 Stage 1 Contingency Management Actions

4.7.1 Introduction

The following sections outline the contingency measures that will be implemented in the event that:

1. WSF monitoring completed in accordance with the methodology discussed in Section 8.3 of the WSFMP indicates that there has been a statistically significant reduction in WSF occupancy rates over Stage 1 of the Kings Forest site over two (2) successive monitoring periods; or

2. The created compensatory habitat relevant to each precinct within Stage 1 does not meet the defined performance criteria outlined in Section 8.5.6 of the WSFMP as determined under the monitoring regimes detailed in Section 8.5 of the WSFMP within seven (7) years.

4.7.2 WSF Occupancy Rates

If monitoring results indicate that there has been a statistically significant reduction in WSF occupancy rates within Stage 1 of the Kings Forest site over two (2) successive monitoring periods an investigation of threatening processes will be completed. This investigation will be completed by an independent WSF specialist jointly appointed by NSW DPI&E and DAWE and funded by Project 28. The independent WSF specialist will prepare a report. The report should consider the following factors:

- A thorough review of potential WSF 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;
- Whether or not the observed decline is due to development impacts or part of a more general trend affecting WSF locally. It is considered that if the proponent remains compliant with the conditions of approval and approved management strategies relevant to WSF (i.e. this WSFMP and related environmental management plans) they should not be held responsible for any local declines in the WSF population;
- Consideration of bringing the proposed revegetation and rehabilitation effort across the whole development site forward to provide better habitat and connectivity for the WSF population;
- Consultation with all stakeholders i.e. DPI&E, BCD, TSC, relevant community groups and landowners/developers; and
- Recommendations to halt (and reverse) the decline in WSF occupancy rate will be provided in the report.

This report will be assessed by Project 28, DAWE, NSW DPI&E and NSW BCD. NSW DPI&E will provide Project 28 with recommendations relating to the current status of the Kings Forest WSF population and proposals to increase the occupancy rates on the Kings Forest site to assist in the formulation of a revised Contingency and Offset Strategy.

Project 28 will retain their right to appeal to the NSW Land and Environment Court if they contest any of the recommendations from NSW DPI&E.

4.7.3 Compensatory WSF Habitat

If monitoring results indicate that the created WSF compensatory habitat relevant to each precinct within Stage 1 does not meet the defined performance criteria within seven (7) years, the contingency measures detailed in **TABLE 9** will be implemented.

TABLE 9
THREATS TO COMPENSATORY HABITAT CREATION AND CONTINGENCY MEASURES

Risk	Corrective Action	Responsibility
Poor plant survival (thresholds discussed in Section 8.4.6 of the WSFMP).	Additional plantings and irrigation where required.	Project 28/ Rehabilitation contractor
Native groundcovers do not meet benchmark (thresholds discussed in Section 8.5.6 of the WSFMP)	The monitoring and maintenance period must be extended until targets are met.	Project 28/ Rehabilitation contractor
Excessive weed infestation (thresholds discussed in Section 8.5.6 of the WSFMP)	Further weed control to be undertaken, as necessary.	Project 28/ Rehabilitation contractor
Poor natural recruitment of native species (thresholds discussed in Section 8.5.6 of the WSFMP)	Additional/supplementary planting if required.	Project 28/ Rehabilitation contractor
Unmanaged fire	If a bushfire occurs within land owned by Project 28 an investigation will be triggered to assess damage to WSF and their habitat on the relevant Kings Forest lands. The investigation will include a survey of the WSF population occurring on the Kings forest site (see Section 8.3 of the WSFMP for Methodology). Consultation will occur with RFS, TSC and BCD 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.	Project 28/ Ecologist

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JWA (2020c) Kings Forest Precincts 6 - 11 Vegetation Management Plan. Report prepared for Project 28 Pty Ltd.

JWA (2020d) Kings Forest Precincts 12 - 14 Vegetation Management Plan. Report prepared for Project 28 Pty Ltd.

JWA (2020e) *Kings Forest Precinct 1 - 5 Buffer Management Plan*. Report prepared for Project 28 Pty Ltd.

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