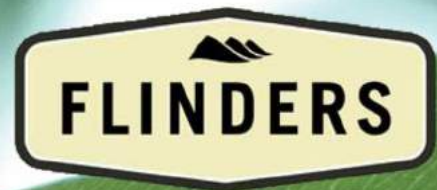


PLANS AND DOCUMENTS
referred to in the PDA
DEVELOPMENT APPROVAL

Approval no: DEV2017/844
Date: 25 October 2017



environmental management



Undullah-Woollaman Creek Corridor Connectivity Analysis

PACIFIQ

PACIFIQ Group
26 July 2017
8020



Document Control

Title	Undullah-Woollaman Creek Corridor Connectivity Analysis
Address	Wyatt Road, Undullah
Job Number	8020
Client	PACIFIQ Group

Document Issue

Issue	Date	Prepared By	Checked By
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Reports and/or Plans by Others

Reports and/or plans by others may be included within this Connectivity Memo to support the document.



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I. Introduction

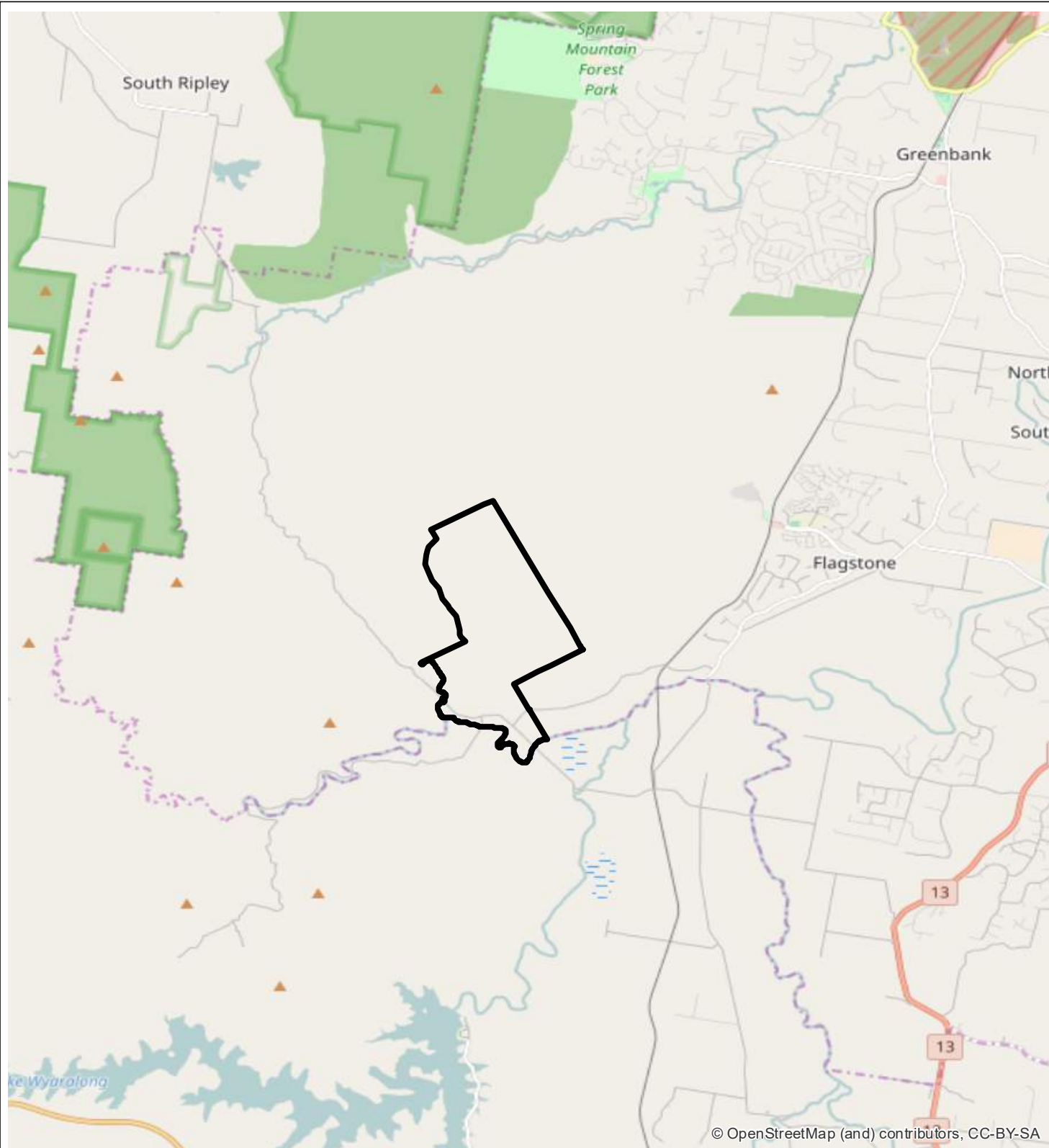
This Technical Memo provides an analysis of connectivity values both inherent in the Undullah-Woollaman Creek Corridor (UWC Corridor) in its current condition and projected to occur post development based on readily available GIS analysis tools and site attributes rectified on-ground. Existing corridor assessments are reviewed and a contemporary and localised connectivity analysis matrix that considers the relationships between pre- and post-development scenarios is presented.

It is acknowledged that the proposed development will reduce the extent of remnant Regional Ecosystems and Koala habitat, as well as lesser habitat values across the broader Precinct 1 site. However, development contained within highly disturbed areas and the retention of the highest value habitat in relatively large tracts covering the north of the Precinct 1 site, where connectivity values are maximised, is considered to effectively contribute toward mitigation of these impacts.

The subject of this assessment, the UWC Corridor, will provide for fauna connectivity through the broader disturbed landscape that has been set aside under planning intent at both Local and State Government levels for accelerated residential development (refer **Figures 1 & 2** for Site Context and Aerial, respectively).

The UWC Corridor was subject to desktop and ground assessment as part of the *Significant Biodiversity Assessment Report* submitted under the most recent MCU application (refer **Plans 1.1 & 1.2**). In general, the UWC corridor was highly disturbed, maintaining extensive weed infestations and isolated, though relatively large, *Eucalyptus tereticornis* (River Red Gum) specimens outside of remnant areas. Those areas mapped as remnant vegetation within the corridor were confirmed in description and status with minor discrepancies in extent at the property scale. Other regrowth areas were dominated by mono-specific *Acacia* stands and *Lantana* undergrowth with some *Eucalyptus* and *Corymbia* recruitment evident. Areas mapped as Koala Bushland Habitat did not necessarily coincide with vegetative values on-ground, with portions of these mapped polygons over cleared paddocks (**Plan 1.1**). Flow paths mapped as watercourses (**Plans 1.1 & 1.2**) were generally considered to constitute 'drainage features' as defined under the *Water Act 2000*. Regardless, it is anticipated that the lower reaches interacting with the UWC Corridor will be retained and enhanced within conservation areas and open space uses under the proposal.

It is understood that the UWC Corridor constitutes a buffer of 100 m to the high bank of Undullah / Woollaman Creeks with a core 50 m conservation corridor to be replanted and rehabilitated and the outer corridor accommodating complementary open space uses amongst retained and rehabilitated remnant and regrowth areas (**Plan 1.1**). In its current state, the UWC Corridor provides disjunct 'stepping stone' connectivity at best, with limited fauna habitat value contained to disturbed remnant and regrowth areas. The rehabilitation of the UWC Corridor is considered a far superior ecological outcome, especially with respect to connectivity, to that currently present on-ground, and in keeping with the intent of the PDA Development Scheme.



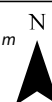
Legend

 Project site

Figure 1
Site Context

File ref. 8020 E Figure 1 Site Context A
Date 18/07/2017
Project Wyatt Road, Undullah

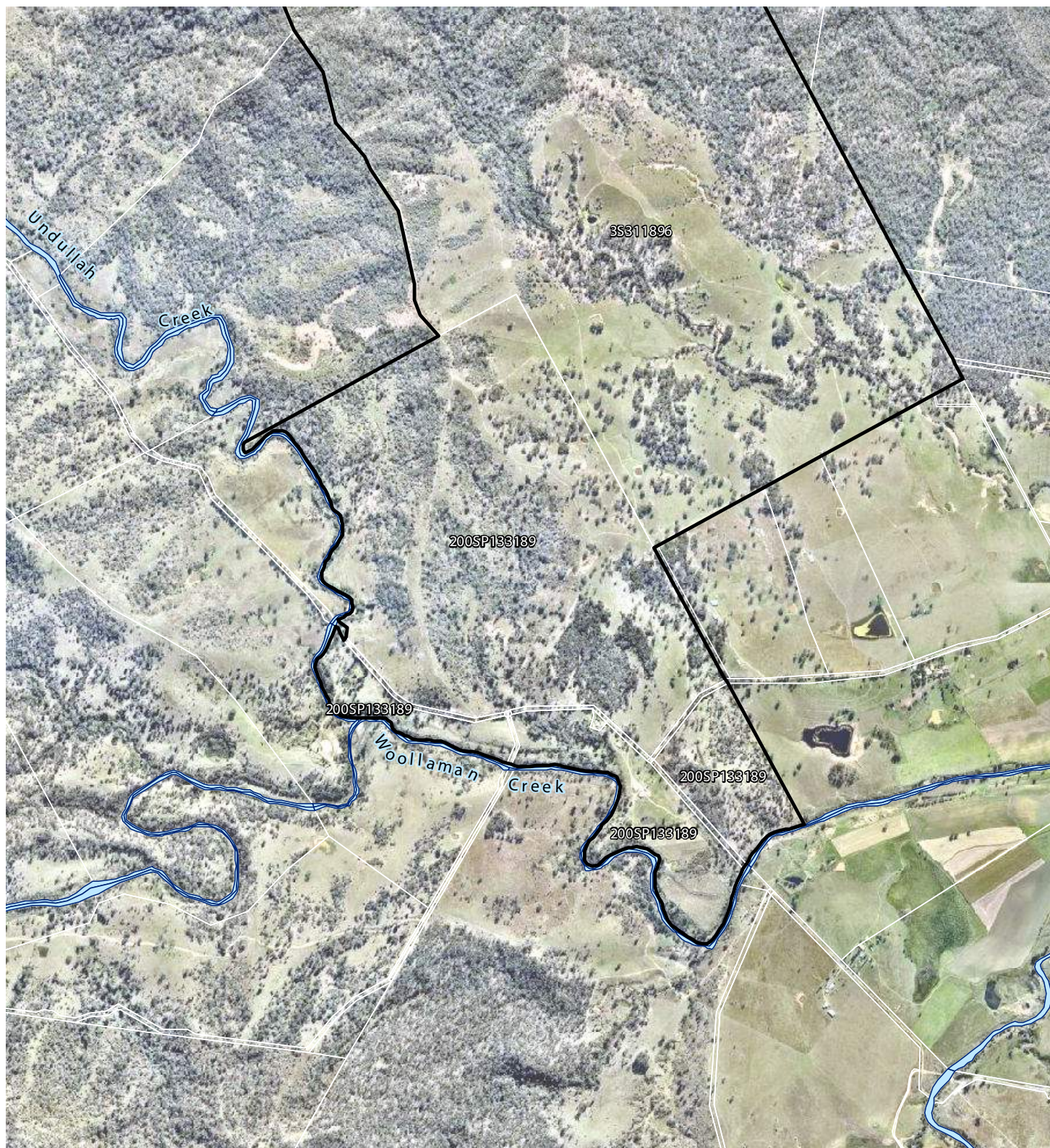
0 1,000 2,000 4,000 6,000 m
Scale (A4): 1:125,000 [GDA 1994 MGA Z56]



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Legend

-  Project site
-  Qld DCDB

Figure 2
Site Aerial

File ref. 8020 E Figure 2 Site Aerial A
Date 18/07/2017
Project Wyatt Road, Undullah

0 200 400 600 800 1,000 m

Scale (A4): 1:25,000 [GDA 1994 MGA Z56]

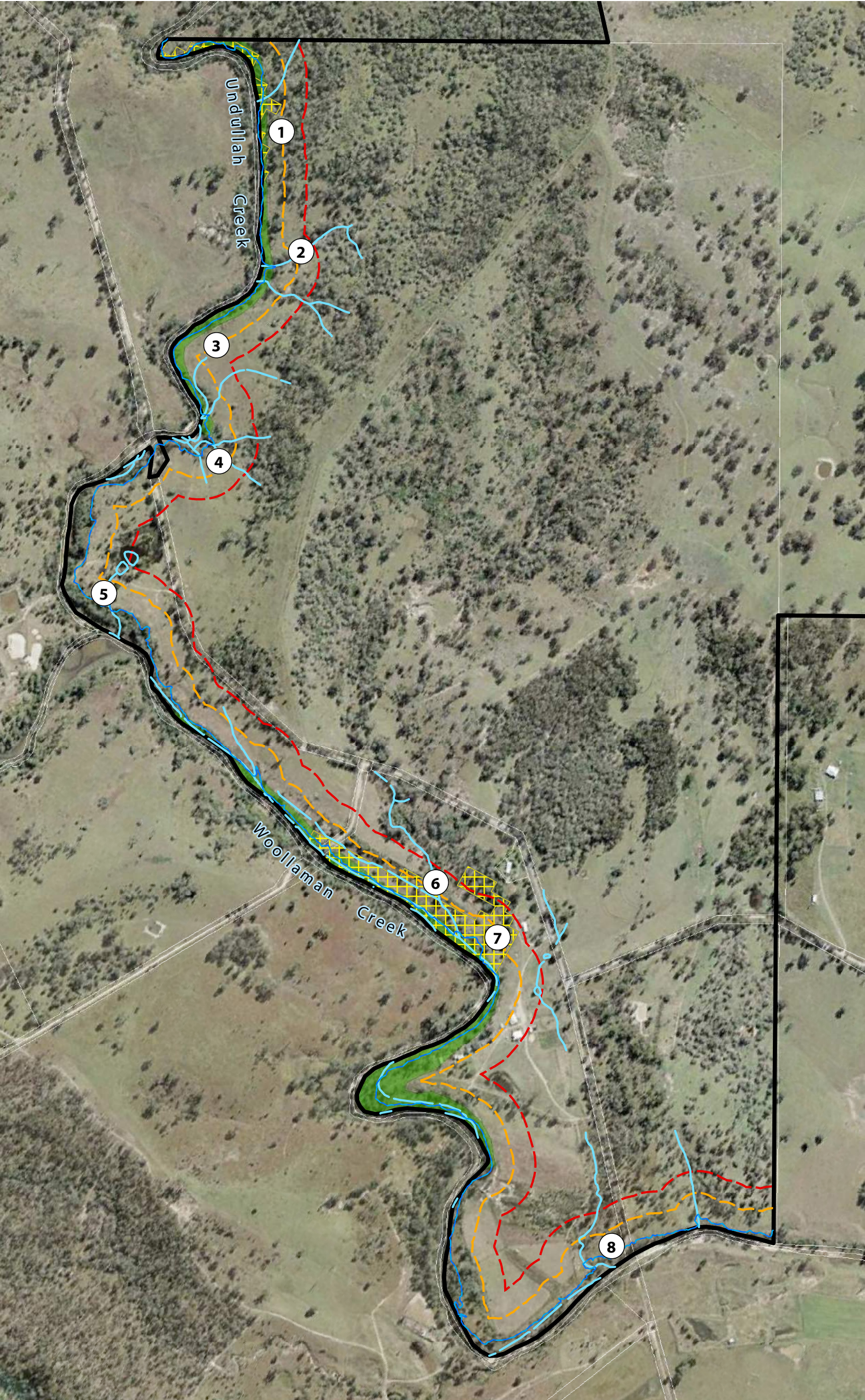


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I.I. Woollaman & Undullah Creek Assessment



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Layer Sources: QLD GIS Layers (QLD Gov. Information Service 2017), Aerial (Qld Globe/Google 2015)

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LEGEND

- 1 Photo location (see plan 1.2)
- Qld DCDB
- Project site boundary
- MSES watercourse
- Woollaman Creek high bank
- 50m buffer (from top of bank)
- 100m buffer (from top of bank)
- Koala bushland habitat
- Least Concern RE - 12.3.7

PLAN ISSUE:				
Issue	Date	Description	Drawn	Checked
A	18/07/2017	Prelim Draft	TC	FM

0 100 200 400 m

Universal Transverse Mercator GDA 1994 MGA Zone 56 1:9,000 @ A3

I.2. Woollaman & Undullah Creek Buffer Area Assessment (Photo Plan)





2. GIS Resources Analysis

2.1. Biodiversity Assessment and Mapping Methodology

The Biodiversity Assessment and Mapping Methodology (BAMM) provides a consistent approach for assessing biodiversity values at the landscape scale using vegetation mapping data as a fundamental basis. It is utilised by the **Department of Environment and Heritage Protection** (DEHP) to generate Biodiversity Planning Assessments for bioregions in eastern Queensland under most development pressure.

The methodology has application for identifying areas with various levels of significance for biodiversity reasons. These include threatened ecosystems or taxa, large tracts of habitat in good condition and buffers to wetlands or other types of habitat important for the maintenance of biodiversity or ecological processes. However, natural resource values such as dryland salinity and soil erosion potential are not dealt with explicitly, nor are cultural heritage, scenic amenity or wilderness values. For this reason, the method is described as a biodiversity assessment tool, not a conservation assessment tool in its broadest sense.

BAMM is essentially a spatial application. Assessments are compiled and integrated for mapping using databases and geographic information systems (GIS). This approach allows the known biodiversity values in an area to be presented in a clear and transparent manner for use by decision makers.

Many factors contribute to the assessment of biodiversity values. The BAMM methodology focuses on a number of consistent and reliable criteria that are transparent, objective and scientifically defensible. Seven diagnostic criteria use reliable and uniformly available information that is usually accessible in database format that can be queried to automatically generate significance classes using consistent rules of combination. Although intended for landscape scale Biodiversity Planning Assessments, for the purposes of this local landscape assessment *Criterion G Context and Connection* and *Criterion J Corridors* of the BAMM database have been scrutinised.

Criterion G Context and Connection

Critical components of this Criterion include the presence of Water, Endangered Ecosystems and Physical Connections.

Water

The presence or inclusion of a wetland or waterway within or adjacent to remnant vegetation increases the vegetation's significance for contributing to ecological processes and protecting aquatic biodiversity. This criterion applies where waterways and wetlands have been mapped and integrated with Regional Ecosystem coverage. Where a remnant unit buffers a waterway or important wetland, the area of the remnant unit outside the buffer is flagged in the database by assigning a medium value and cartographically identified as a potentially important buffer area.



Endangered Ecosystems

Remnant units bordering Endangered Regional Ecosystems have additional importance as buffers. Buffers are only applied to heterogeneous remnant units where the Endangered RE represents more than 30% of the remnant unit. Where a remnant unit buffers an Endangered RE, the area of the remnant unit outside the buffer is flagged in the database by assigning a medium value and cartographically identified as a potentially important buffer area.

Physical Connection

The degree to which a remnant unit is connected to other vegetation is assessed as Physical Connection. Connected remnant units are more representative of biodiversity, contribute more to a habitat network and have greater resilience to the effects of disturbance than small isolated remnant units.

Analysis

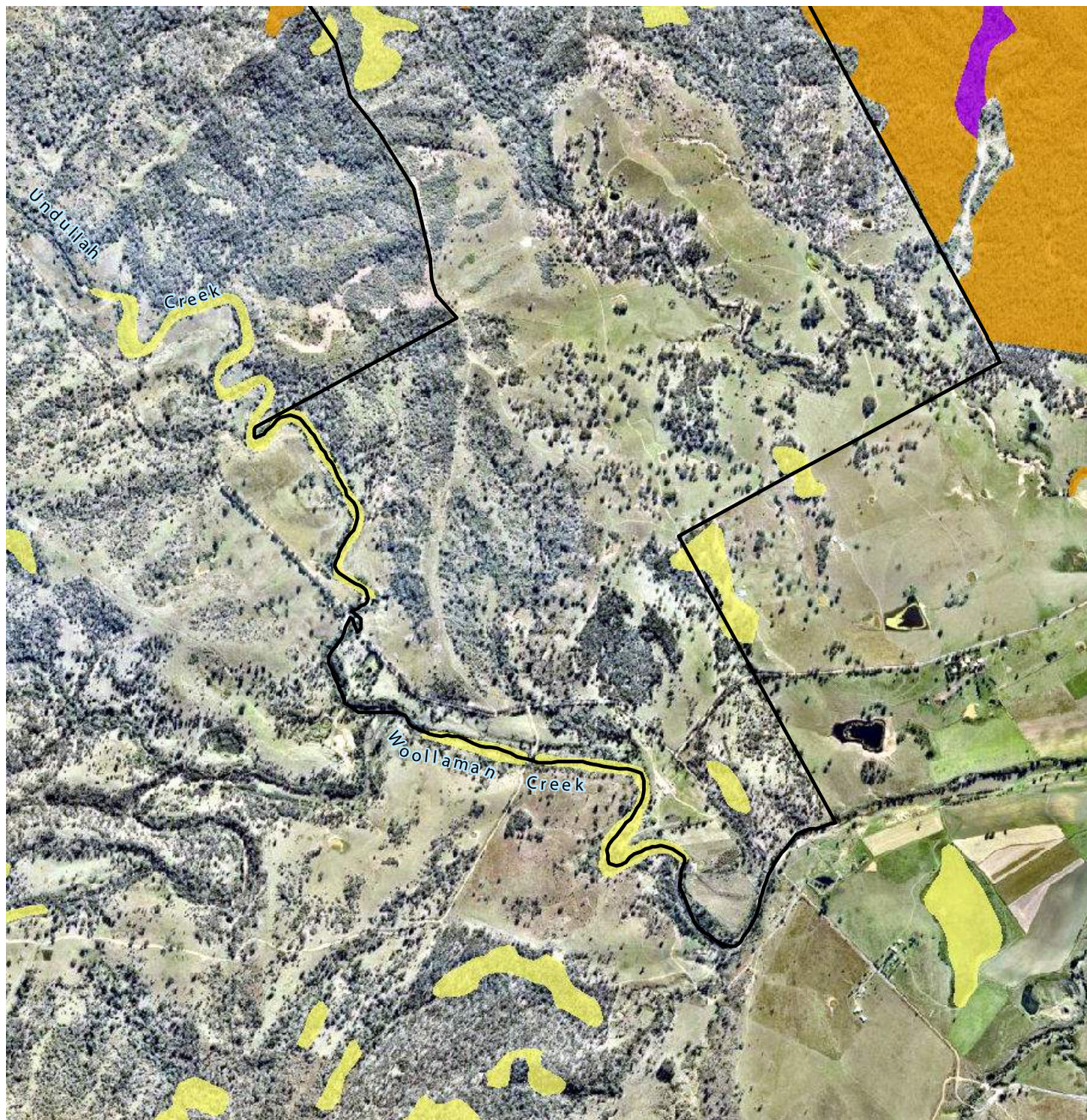
It is important to note that this Criterion is based on Regional Ecosystem mapping and not necessarily reflective of vegetation attributes and RE status ground-rectified under PMAV. The corridor in its present state displays relatively poor connectivity, with disjointed remnants of 'Low' connectivity value effectively isolated and completely fragmented (refer **Figure 3**). Mapped 'Low' value connectivity features continue along Undullah Creek to the north for a short extent beyond the Precinct 1 boundary as per remnant mapping, and the southern polygon is completely fragmented to within the project boundary. The UWC Corridor currently displays negligible connectivity with respect to Criterion G.

Criterion J Corridors

Areas identified under this Criterion are done so outside of the automated system by an expert panel and qualify either because they are existing vegetated corridors important for contiguity, including regrowth or cleared areas that could serve this purpose if revegetated.

Analysis

There are only small polygons of remnant vegetation distant from the UWC Corridor that have been attributed this Criterion under BAMM (refer **Figure 4**). The UWC Corridor is not currently considered relevant to connectivity corridor planning at the State level.



Legend

 Project site

Biodiversity Planning Assessment

Grating

 VERY HIGH

 HIGH

 MEDIUM

 LOW

Figure 3

DEHP - Biodiversity Planning Assessment - Criterion G: Context and Connection

File ref. 8020 E Figure 3 Criterion G A

Date 18/07/2017

Project Wyatt Road, Undullah

0 100 200 400 600 800 1,000 m

Scale (A4): 1:25,000 [GDA 1994 MGA Z56]



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Legend

 Project site

Biodiversity Planning Assessment

J rating

 Regional

 State

Figure 4

DEHP - Biodiversity Planning Assessment - Criterion J: Corridors

File ref. 8020 E Figure 4 Criterion J A

Date 18/07/2017

Project Wyatt Road, Undullah

0 100 200 400 600 800 1,000 m

Scale (A4): 1:25,000 [GDA 1994 MGA Z56]



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2.2. Initial Landscape Analysis

The following environmental GIS layers as well as field survey data were utilised for the initial landscape analysis (refer **Plan 2**):

- Aerial Photography
- Property Map of Assessable Vegetation
- SEQ Koala State Planning Policy Habitat Values Mapping
- Logan City Council Corridors Mapping

From **Plan 2**, highest value remnant vegetation and Koala habitat values are mapped in isolated fragments along the UWC Corridor. Remnant vegetation does extend north of the Precinct 1 boundary along the UWC Corridor, but not for any great distance. Beyond the northern remnant extent, there is a relatively small and isolated patch of mapped Koala habitat associated with the upper reaches of the UWC Corridor. To the south, there is negligible mapped remnant or habitat connectivity along the UWC Corridor, and areas to the east and west contain no mapped values reflective of the high disturbance levels inherent in pastoral production areas (**Plan 2**).

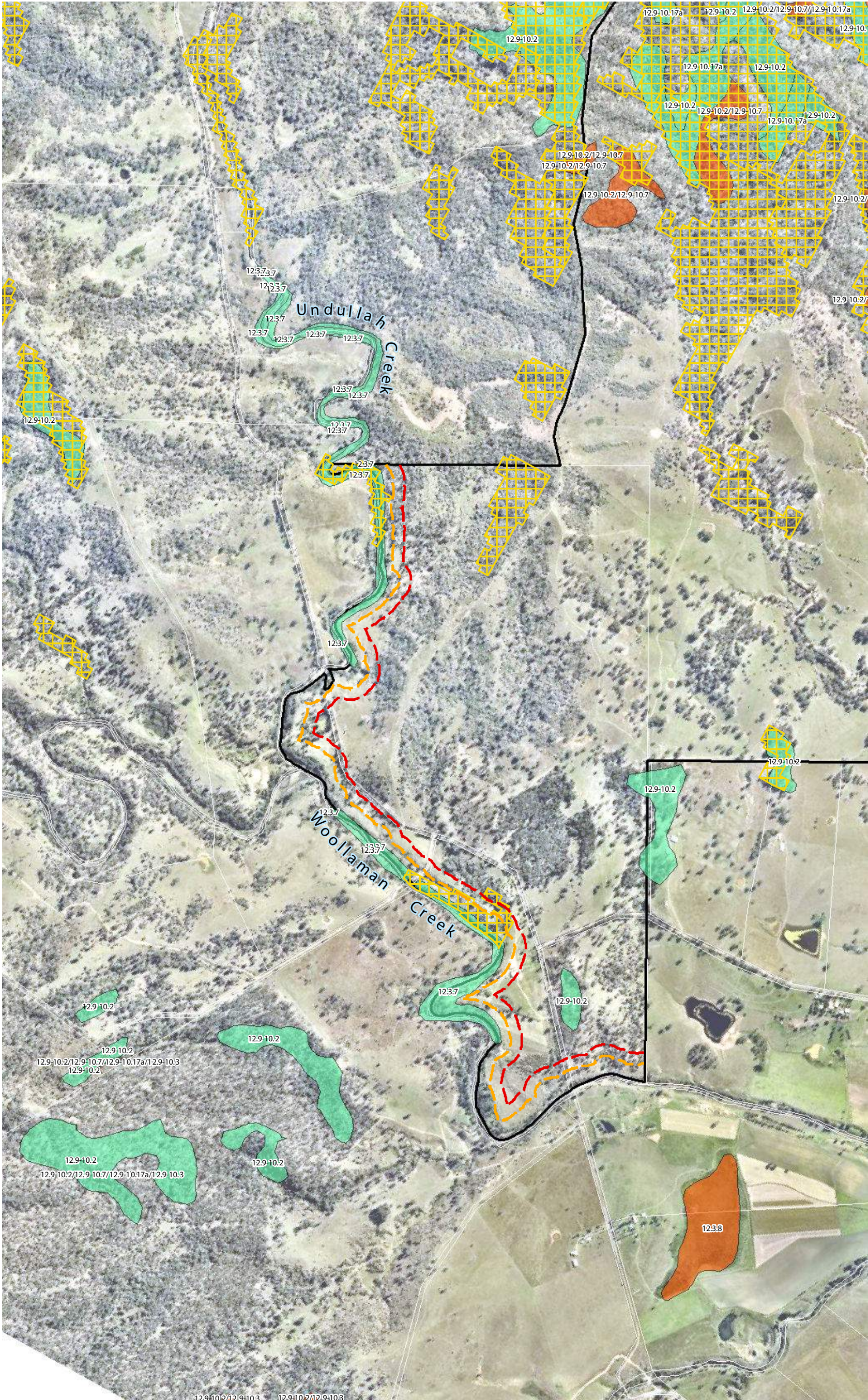
The relatively high levels of previous clearing and disturbance reflect values mapped on-ground and incorporated into the BAMB assessment discussed in **Section 2.1**. As mentioned previously, in its current state, the UWC Corridor provides disjunct 'stepping stone' connectivity at best, with limited fauna habitat value contained to these disturbed remnant and regrowth areas. As such, the UWC Corridor is not a component of State connectivity planning.

Although the provisions of the *Logan Planning Scheme 2015* do not apply in a PDA, it is noteworthy that the UWC Corridor retains local level connectivity planning as identified by **Logan City Council** (LCC) under the *Scheme* as a Biodiversity Corridor (refer *Figure 13* of the *MCU Significant Biodiversity Assessment Report*). Under the *Scheme*, the intent of the Biodiversity Corridor overlay is that development is designed and located to:

- a) provide for habitat links
- b) facilitate safe wildlife movement
- c) facilitate wildlife refuge
- d) enhance habitat values
- e) rehabilitate degraded areas with native vegetation

The proposal to rehabilitate the UWC Corridor with a core 50 m conservation area and 50 m buffer containing additional rehabilitation as well as complimentary uses is considered to align with LCC planning intent.

2. Existing Mapped Connectivity Values



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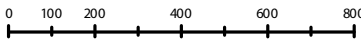
Layer Sources: QLD GIS Layers (QLD Gov. Information Service 2017), Aerial (Nearmap 2017)

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LEGEND

- Qld DCDB
- Project site boundary
- 50m buffer (from top of bank)
- 100m buffer (from top of bank)
- Koala bushland habitat
- Regional Ecosystems mapping (seq)**
 - Category A or B area containing endangered regional ecosystems
 - Category A or B area containing of concern regional ecosystems
 - Category A or B area that is a least concern regional ecosystem

PLAN ISSUE:				
Issue	Date	Description	Drawn	Checked
A	18/07/2017	Prelim Draft	TC	FM



Universal Transverse Mercator GDA 1994 MGA Zone 56 1:17,500 @ A3



3. Connectivity Matrix Analysis

3.1. Introduction

A spatial analysis of connectivity values utilising various habitat attributes is provided within this Section. The purpose of the analysis is to compare quantifiable connectivity values between two scenarios; namely pre- and post-development (refer **Appendix A** for MCU Context Plan). Assessment units utilised are based on Property Map of Assessable Vegetation ground-rectified Regional Ecosystems and other relevant mapping layers (i.e. Koala habitat values and BPA wetland values) with the spatial configuration and relative size of assigned ecological units analysed and compared between scenarios.

3.2. Methodology

Specific ecological units analysed and compared between scenarios include Regional Ecosystems, Koala habitat values and mappable wetlands (Riverine REs) including peripheral extent and total area measurements for each.

Spatial attributes assessed for ecological units include relative:

- Polygon areas (positive relationship reflects an increase in area)
- Adverse edge effects measured as the lineal adjunct between polygons and non-mapped areas (negative relationship is considered beneficial in that it reflects a reduction in potential edge effects)
- Edge (effects) to area ratios (negative relationship is considered beneficial in that it reflects a reduction in area potentially affected by edge effects)

3.3. Remnant Vegetation

The *Vegetation Management Act 1999* (VMA) is the key mechanism by which the Queensland Government protects the state's environmental resources pertaining to vegetation. Under the VMA, a series of maps delineate vegetation features across the landscape which are each assigned a conservation value directly related to the remaining extent of these features in the landscape. The VMA also protects 'essential habitat' vegetation where listed threatened species have been known to occur. Although the provisions of the VMA are not applicable in a PDA (refer *Planning Regulation 2017*, Schedule 21, Part 2, Section 2e), Regional Ecosystem mapping that underpins this legislation provides a valuable tool for landscape analyses.

Isolated polygons along the UWC Corridor are mapped under the VMA as Least Concern Regional Ecosystem 12.3.7 (refer **Plans 1.1 & 2** and description, below).



Least Concern RE 12.3.7

Description	Narrow fringing woodland of <i>Eucalyptus tereticornis</i> , <i>Casuarina cunninghamiana</i> subsp. <i>cunninghamiana</i> +/- <i>Melaleuca viminalis</i> . Other species associated with this RE include <i>Melaleuca bracteata</i> , <i>M. trichostachya</i> , <i>M. linariifolia</i> . North of Brisbane <i>Waterhousea floribunda</i> commonly occurs and may at times dominate this RE. <i>Melaleuca fluviatilis</i> occurs in this RE in the north of the bioregion. <i>Lomandra hystrix</i> often present in stream beds. Occurs on fringing levees and banks of rivers and drainage lines of alluvial plains throughout the region. (BVG1M: 16a)
--------------------	---

Under the long description for this Regional Ecosystem, it has special values described as '*habitat for an extensive range of aquatic flora and fauna*'. Specific to threatened species recognised on-site, these aquatic values may provide habitat, especially once rehabilitated, for the Green-thighed Frog (*Litoria brevipalmata*) and Tusked Frog (*Adelotus brevis*). Given that the Regional Ecosystem structure is comprised of recognised Koala food and shelter trees, it also considered to provide suitable habitat for the Koala (*Phascolarctos cinereus*).

Although not recorded in the area, the UWC Corridor has limited potential to form part of the wider foraging or dispersal habitat for the Powerful Owl (*Ninox strenua*) noted in the north of Precinct 1 and upper reaches of Woollaman Creek, and perhaps Spot-tailed Quoll (*Dasyurus maculatus maculatus*), although this species was not recorded on-site, is notoriously reclusive and rarely recorded outside of undisturbed conservation areas.

A comparison of functional attributes based on literature review between scenarios was undertaken for each threatened species analysed and is presented in **Section 3.6** and **Table 4**.

Table 1 below outlines the attributes of the Remnant Vegetation analysis based on rehabilitation of the UWC Corridor ultimately achieving remnant status. Refer to **Plan 3** for spatial scenario comparisons of attributes.

Table 1: Remnant Vegetation Connectivity Matrix

Attribute	Pre-development	Post-development	Relationship
Area	7.20 ha	45.13 ha	+ 526.8%
Edge Effects	2,879 m	5,136 m	+ 78.4%
Edge Effects : Area	1 : 25.0	1 : 87.9	- 251.6%

Analysis of Regional Ecosystems pre- to post-development revealed a significant increase (+526.8%) in the area of Regional Ecosystems once rehabilitation is complete. The relatively large increase in Regional Ecosystem area unfortunately increases linear edge effects, however, this is substantially mitigated via a vastly reduced Edge Effect to Area ratio. The post-development outcome is therefore considered superior in terms of a vastly increased remnant area and, via consolidation, the sustainable management of potential future edge effects.



3.4. Koala Habitat

Table 2 below outlines the attributes of the Koala habitat values analysis. Refer to **Plan 4** for spatial scenario comparisons of attributes.

Table 2: Koala Habitat Connectivity Matrix

Attribute	Pre-development	Post-development	Relationship
Area	4.91 ha	45.73 ha	+ 831.4%
Edge Effects	1,087 m	5,482 m	+ 404.3%
Edge Effects : Area	1 : 45.2	1 : 83.4	- 84.5%

The post-development scenario will provide a very significant increase (831.4%) in Koala habitat values relative to those currently mapped within the UWC Corridor. As for Regional Ecosystems in **Section 3.3**, the increased area of Koala habitat brings with it a longer periphery (404.3% longer), however, this is substantially mitigated via a vastly reduced Edge Effect to Area ratio (-84.5%). As for Regional Ecosystems, the post-development outcome is therefore considered superior in terms of a vastly increased Koala habitat area and, via consolidation, sustainable management of potential future edge effects.

3.5. Wetland Values

It is anticipated that aquatic values within the UWC Corridor will be significantly enhanced via the rehabilitation efforts proposed, however, the extent of mapped water values as per the BPA methodology (i.e. Riverine Waterbodies, refer **Plan 5**) is not considered likely to change significantly nor is it testable without access to underlying criteria. As such, this analysis relies solely on BPA mapped extent of Riverine Regional Ecosystems pre- and post-development (**Plan 5**) on the assumption that rehabilitation efforts will return the extent of the UWC Corridor to Regional Ecosystem status.

Table 3 below outlines the attributes of the Riverine REs analysis. Refer to **Plan 5** for spatial scenario comparisons of attributes.

Table 3: Wetland Values Connectivity Matrix

Attribute	Pre-development	Post-development	Relationship
Area	10.86 ha	45.13 ha	+ 315.6%
Edge Effects	4,141 m	5,136 m	+ 24.0%
Edge Effects : Area	1 : 26.2	1 : 87.9	- 235.5%

As for Regional Ecosystems (**Section 3.3**), this analysis revealed a large increase (+315.6%) in the area of Riverine REs once rehabilitation is complete. The associated relatively minor increase in linear edge effects (+ 24.0%) is mitigated via a vastly reduced Edge Effect to Area ratio (-235.5%). The increased Riverine RE area and sustainable management of potential future edge effects adds further to the value to the UWC Corridor post-development.



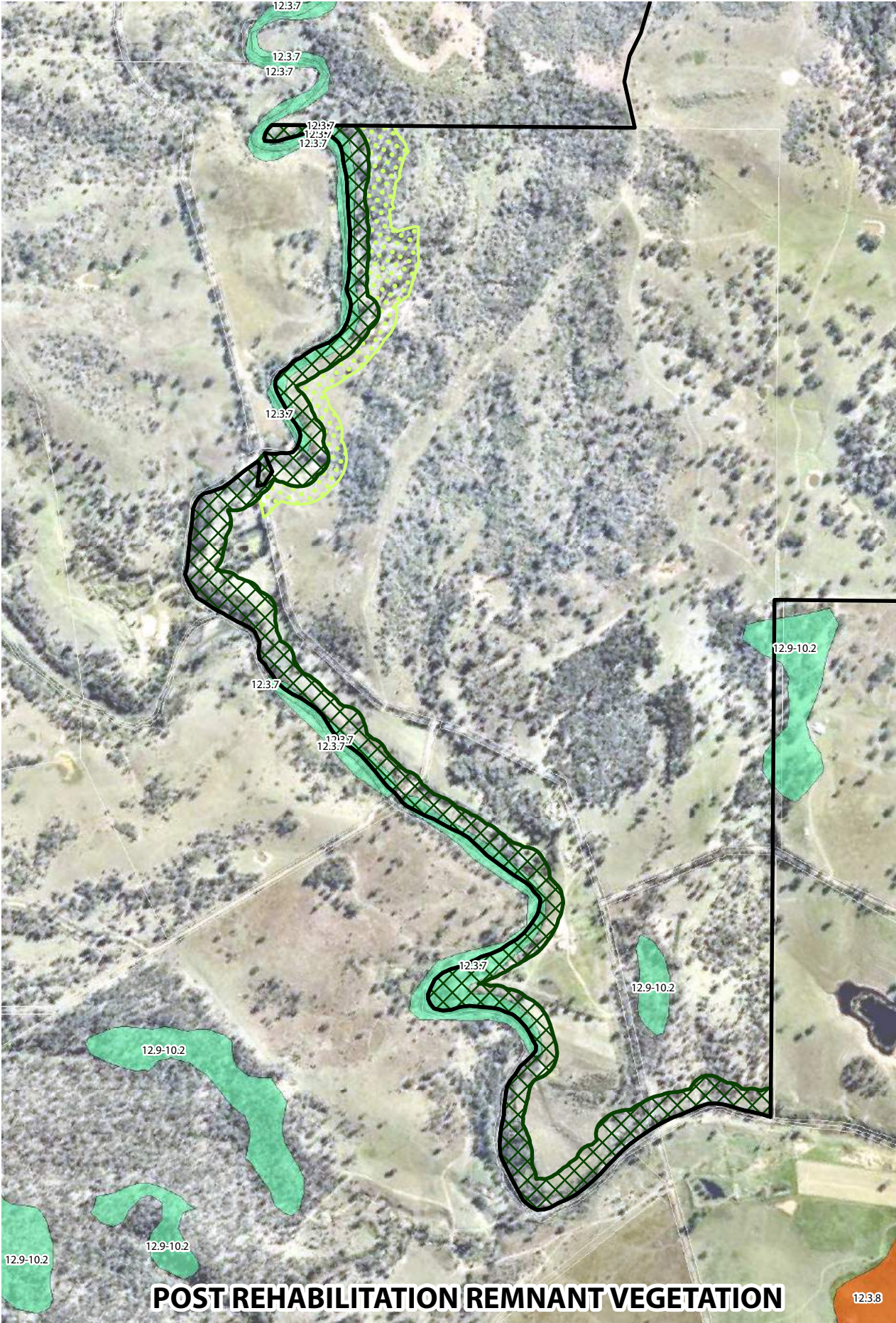
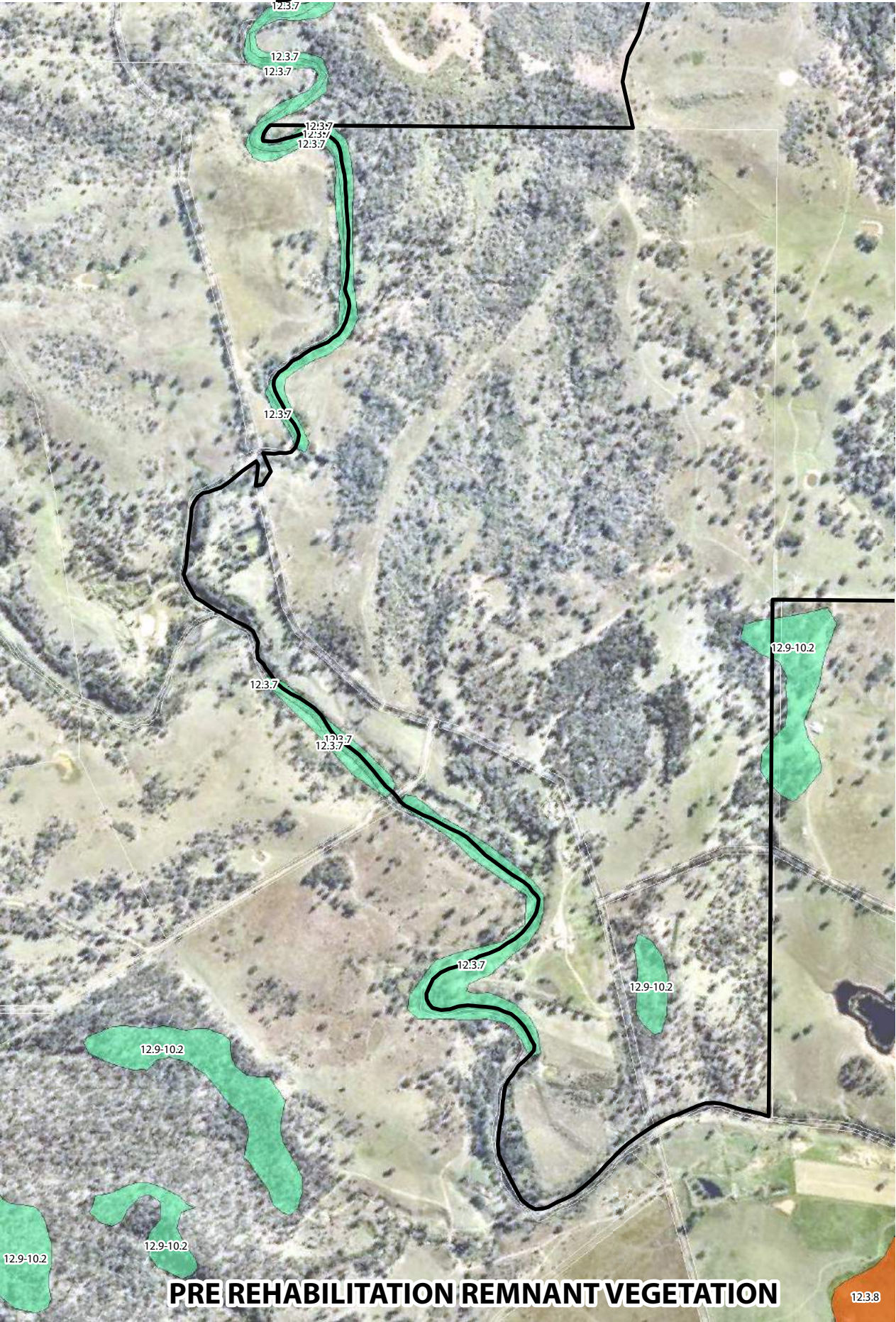
Other threatened species

Ninox strenua (Powerful Owl) and *Dasyurus maculatus maculatus* (Spot-tailed Quoll) are considered highly mobile species with broad foraging ranges. The extent of available foraging and dispersal habitat for these species is likely to increase under the proposal, however, this increase in potential habitat may be marginal relative to northern portions of Precinct 1 adjoining the Flinders-Karawatha Bioregional Corridor. Improvement in their ability to utilise the UWC Corridor as part of a broader home range may not be discernible and is most probably adversely impacted by extraneous factors, such as adjoining disturbance levels and the current lack of connectivity beyond the site.

It is acknowledged that the watercourse within the UWC Corridor provides potential habitat for *Litoria brevipalmata* (Green-thighed Frog) and *Adelotus brevis* (Tusked Frog). As mentioned, it is anticipated that the rehabilitation of the UWC Corridor will enhance habitat values for these important species.

A comparison of functional attributes based on literature review between scenarios was undertaken for each of these threatened species and is presented in **Section 3.6** and **Table 4**.

3. Remnant Vegetation Pre & Post Rehabilitation



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Layer Sources: QLD GIS Layers (QLD Gov. Information Service 2016), Aerial (Nearmap 2016)

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LEGEND

Project site boundary

Qld DCDB

Woollaman & Undullah Creek

Core Corridor rehabilitation area

Additional Corridor rehabilitation area

Regional Ecosystems mapping (seq)

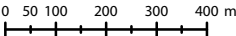
Category A or B area containing endangered regional ecosystems

Category A or B area containing of concern regional ecosystems

Category A or B area that is a least concern regional ecosystem

Issue	Date	Description	Drawn	Checked
A	19/07/2017	Preliminary	TC	MS

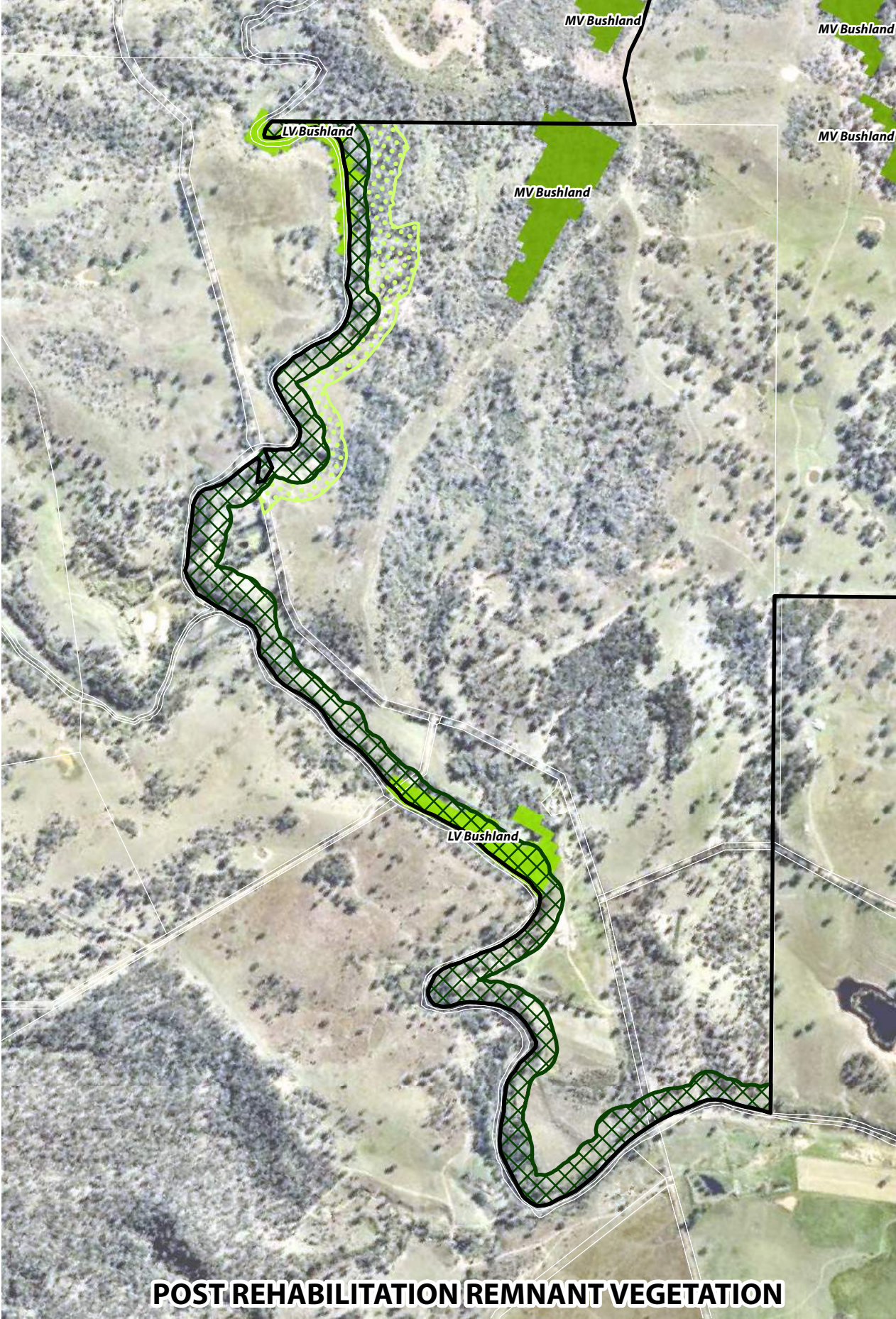
Transverse Mercator | GDA 1994 | Zone 56 | 1:15,000 @ A3



4. Koala Bushland Habitat Pre & Post Rehabilitation



PRE REHABILITATION REMNANT VEGETATION



POST REHABILITATION REMNANT VEGETATION

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LEGEND

Project site boundary

Qld DCDB

Woollaman & Undullah Creek

Core Corridor rehabilitation area

Additional Corridor rehabilitation area

Koala Habitat Values

Bushland Habitat

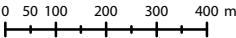
High Value Bushland

Medium Value Bushland

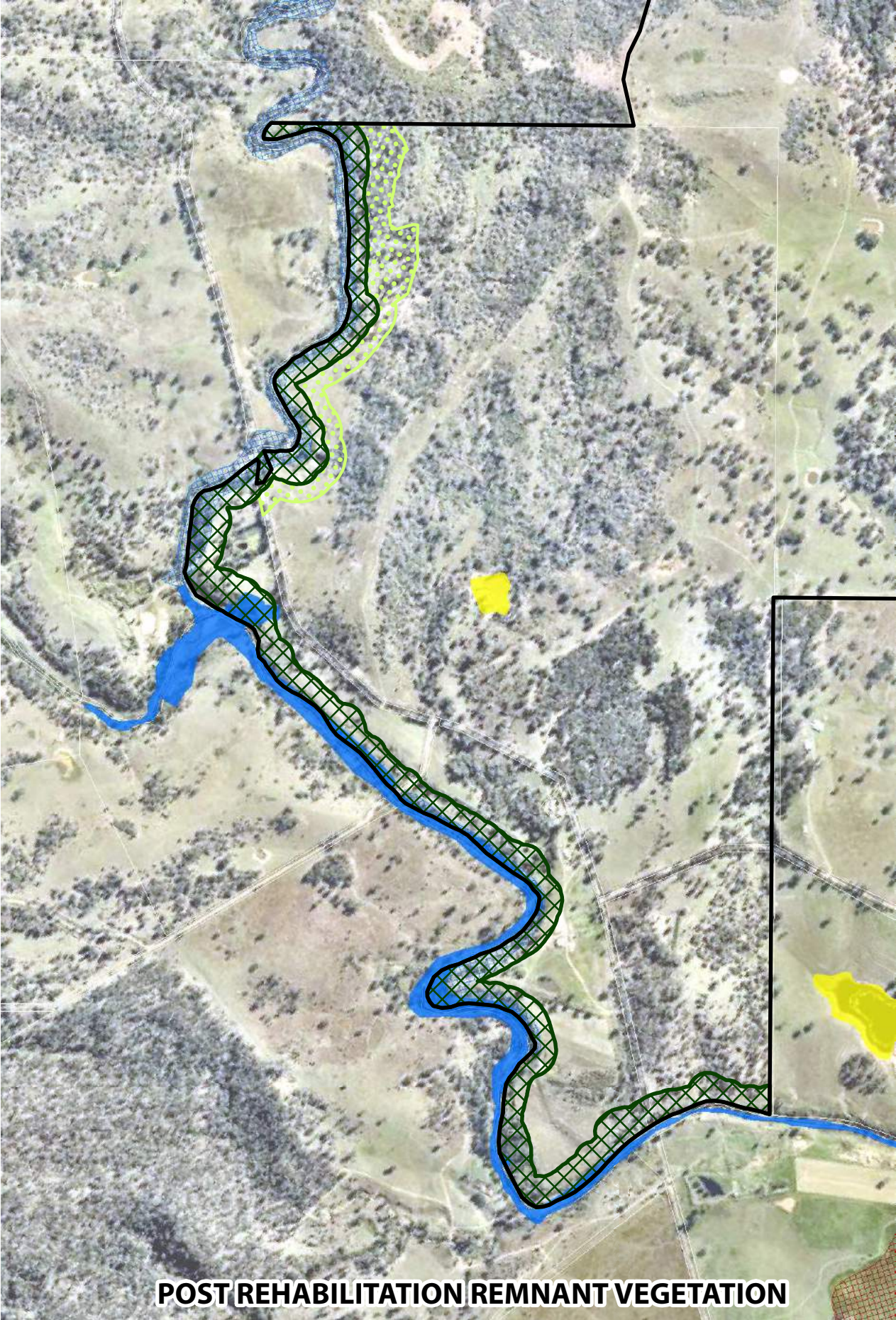
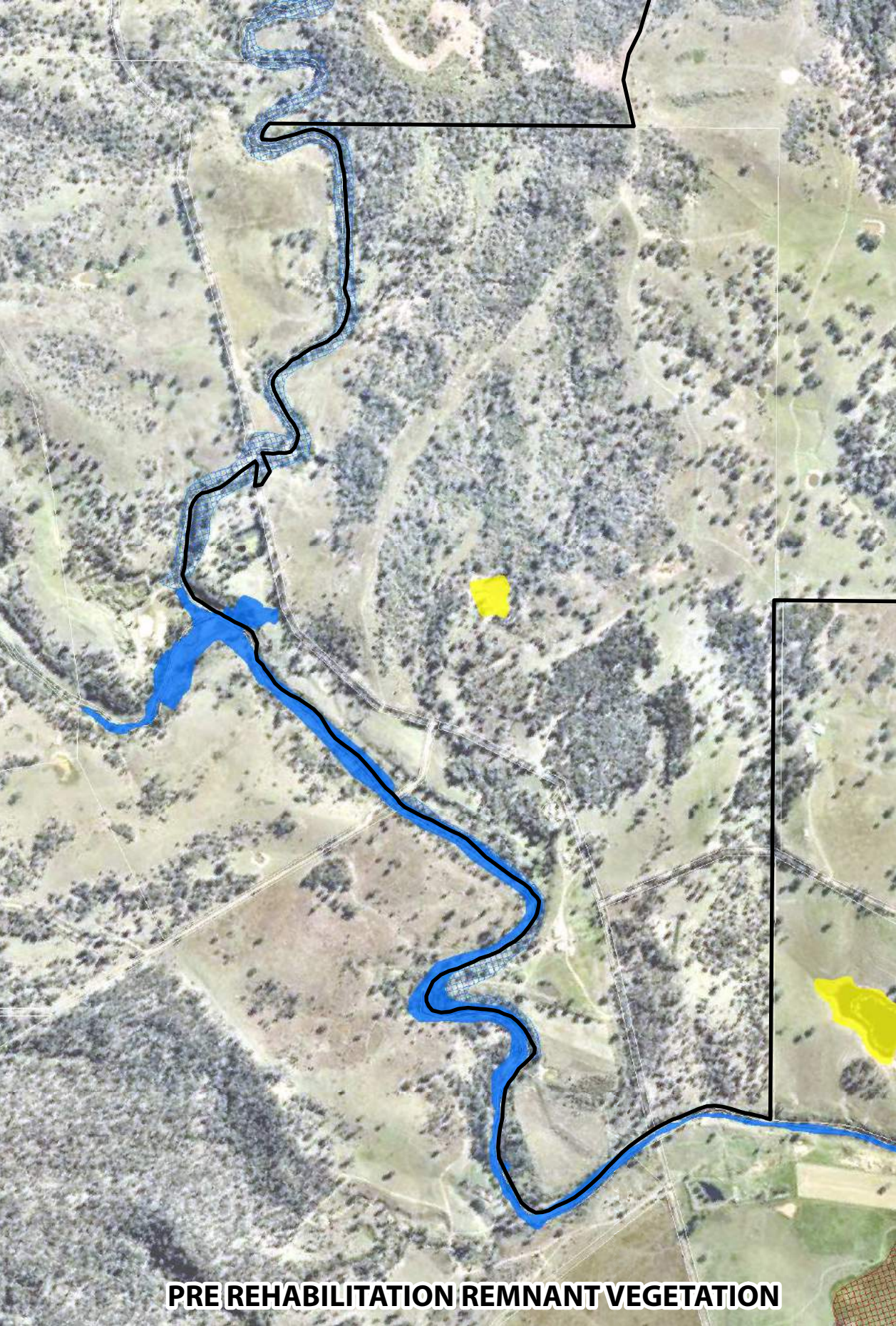
Low Value Bushland

Issue	Date	Description	Drawn	Checked
A	19/07/2017	Preliminary	TC	MS

Transverse Mercator | GDA 1994 | Zone 56 | 1:15,000 @ A3



5. Qld Wetland Values Pre & Post Rehabilitation



NOTES
This plan was prepared as a desktop assessment tool. The information on this plan is not suitable for any other purpose. Property dimensions, areas, numbers of lots and contours and other physical features shown have been compiled from existing information and may not have been verified by field survey. These may need verification if the development application is approved and development proceeds, and may change when a full survey is undertaken or in order to comply with development approval conditions. No reliance should be placed on the information on this plan for detailed design or for any financial dealings involving the land. Saunders Havill Group therefore disclaims any liability for any loss or damage whatsoever or howsoever incurred, arising from any party using or relying upon this plan for any purpose other than as a document prepared for the sole purpose of accompanying a development application and which may be subject to alteration beyond the control of the Saunders Havill Group. Unless a development approval states otherwise, this is not an approved plan.

Layer Sources: QLD GIS Layers (QLD Gov. Information Service 2016), Aerial (Nearmap 2016)

* This note is an integral part of this plan/data. Reproduction of this plan or any part of it without this note being included in full will render the information shown on such reproduction invalid and not suitable for use.

LEGEND

Project site boundary

Qld DCDB

Woollaman & Undullah Creek

Core Corridor rehabilitation area

Additional Corridor rehabilitation area

QLD wetland v4

Marine waterbodies

Estuarine Waterbodies

Riverine Waterbodies

Lacustrine waterbodies

Palustrine waterbodies

Marine REs

Estuarine REs

Riverine REs

Lacustrine REs

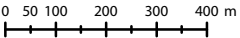
Palustrine REs

REs 51-80% wetland (mosaic units)

REs 1-50% wetland (mosaic units)

Issue	Date	Description	Drawn	Checked
A	19/07/2017	Preliminary	TC	MS

Transverse Mercator | GDA 1994 | Zone 56 | 1:15,000 @ A3



3.6. Species Functional Attributes Analysis

The following analysis provides a comparison of functional attributes for each potential threatened species based on literature review between the pre- and post-development scenarios.

Table 12: Species Functional Attributes Analysis

Species	Habitat and Connectivity Requirements	Current Values	Post-development Values	Impact Analysis
<i>Phascolarctos cinereus</i> (Koala)	Koalas inhabit a range of temperate, sub-tropical and tropical forest, woodland and semi-arid communities dominated by <i>Eucalyptus</i> and <i>Corymbia</i> spp. In Queensland, Koala populations are known to occur in moist coastal forests, sub-humid woodlands, eucalypt woodlands along watercourses and non-riverine communities in the semiarid environments, from southern Queensland through to the Atherton Tablelands (Munks et al. 1996; Patterson 1996; Melzer et al. 2000; Ellis et al. 2002a; Sullivan et al. 2003. In Queensland, there are generally more Koalas in sclerophyll forests and woodlands occurring on more fertile soils of coastal landscapes (QEPA 2006a) and the highest density of Koalas occurs within the southeast part of the state (Dique et al. 2004). Home ranges are known to vary considerably due to a variety of factors including location (e.g. home ranges in habitats of lower productivity being larger than those within higher quality habitats) and availability of preferred forage trees, though typically, males have larger home ranges on average than females. In South East Queensland, Koala Coast home ranges were found to vary between 2-20ha (Thomson 2006), whilst in rural south-east Queensland, home ranges varied between 5.3-91.4ha (White 1999). Koalas successfully use highly fragmented habitats that have only small remnants of the original vegetation (White 1999; QEPA 2006a and references cited therein). They also use young forest and highly modified vegetation such as grazed, disturbed or thinned forest and regrowth areas, moving significant distances across the ground between preferred trees (e.g. White 1999). Collectively, the suite of tree species considered to be of primary and/or secondary importance to Koalas within South East Queensland include the following (after: Pahl 1993; QEPA 2002 & 2006a; & EHP 2012): <i>Eucalyptus acmenoides</i>, <i>E. carnea</i>, <i>E. crebra</i>, <i>E. exserta</i>, <i>E. fibrosa</i>, <i>E. grandis</i>, <i>E. major</i>, <i>E. moluccana</i>, <i>E. populnea</i>, <i>E. propinqua</i>, <i>E. racemosa</i>, <i>E. resinifera</i>, <i>E. robusta</i>, <i>E. seeana</i>, <i>E. siderophloia</i>, <i>E. signata</i>, <i>E. tereticornis</i>, <i>E. tindaliae</i>, <i>E. microcorys</i>, <i>E. umbra</i>, <i>Corymbia citriodora</i>, <i>C. intermedia</i>, <i>Lophostemon confertus</i>, and <i>Melaleuca quinquenervia</i>.	In general, the UWC Corridor was highly disturbed, maintaining extensive weed infestations and isolated and fragmented remnant values with areas mapped as Koala Bushland Habitat along the corridor that do not necessarily coincide with vegetative values on-ground. The corridor maintains extensive weed infestations and isolated, though relatively large, <i>Eucalyptus tereticornis</i> (River Red Gum) specimens outside of remnant areas. Those areas mapped as remnant vegetation within the corridor were confirmed in description and status with minor discrepancies in extent at the property scale. Other regrowth areas were dominated by mono-specific <i>Acacia</i> stands and <i>Lantana</i> undergrowth with some <i>Eucalyptus</i> and <i>Corymbia</i> recruitment evident. Flow paths and tributaries were generally considered to constitute ‘drainage features’ and it is anticipated that their lower reaches interacting with the UWC Corridor will be retained and enhanced within conservation areas and open space uses under the proposal. Evidence of <i>Phascolarctos cinereus</i> (Koala) was recorded on-site, however, no individual specimens were observed throughout the survey periods (refer MUC SBAR). The survey for Koala included twelve (12) Spot Assessment Technique (SAT) Surveys, which provided various details on Koala activity levels throughout the property with three (3) recording medium use and nine (9) recording a low Koala use. It is noted that six (6) other Scat meanders recorded ‘no use’ (refer MCU SBAR Appendix D for SAT Survey results). Although the results showed variation in use it is believed that the medium use areas are not a true representation of Koala activity levels as in these locations the surveys were conducted in selectively cleared isolated patches of vegetation that are surrounded by large areas of open space where no trees are recorded. The predominance of retained Koala trees in these areas positively skews scat levels in the absence of expected non-habitat species producing what is considered an anomaly under the SAT methodology. Importantly, no Koala activity or evidence of their use was recorded in the UWC Corridor.	Analysis revealed a significant increase in the area of available habitat for the Koala post-development, as well as a significant reduction in edge effects with tangible connectivity along the entire length of the UWC Corridor anticipated. Koala are generally recognised to be highly mobile species. Given the current general lack of adjoining Koala habitat values beyond the site extent it is probable that Koala may not utilise the UWC Corridor in the short term, however, if the Corridor is extended and widened to the opposite bank to connecting values as per planning intent its true habitat and connectivity value for this highly mobile species is likely to be realised. The proposed retention and rehabilitation of the corridor in concert with complementary open space uses amongst retained and rehabilitated remnant and regrowth areas is considered a far superior ecological outcome to that currently present on-ground, and in keeping with the intent of the Development Scheme. Pre- to post-development scenarios are considered to improve considerably with respect to habitat and connectivity values for the Koala.	Significant improvement anticipated.
<i>Dasyurus maculatus maculatus</i> (Spot-tailed Quoll)	Spot-tailed Quolls are solitary animals, except during mating season, and are predominately nocturnal and partly arboreal. Spot-tailed Quolls occur in a wide variety of habitats including rainforests, wet and dry sclerophyll forests, coastal heath, scrub and sometimes Red Gum forests along inland rivers. They are found from sea-level to sub-alpine and shelter in rock caves, boulder piles and hollow logs or trees, with basking sites usually nearby. Males occupy overlapping and undefended home ranges whereas females appear to defend exclusive territories. Home range size is generally greater for males than females, averaging 783 hectares to 1,202 hectares over five (5) days for males in the Granite Belt of South East Queensland. The species feeds on a variety of prey	Specific habitat assessment surveys were completed for <i>Dasyurus maculatus maculatus</i> (Spot-tailed Quoll), however, no individual specimens were observed throughout the assessment period and suitable habitat was generally lacking. Spot-tailed Quoll were not captured during targeted surveys using cage traps. Both infra-red camera to record cage trap shy fauna and selectively located individually baited cameras did not detect Spot-tailed Quoll. Likewise, extensive targeted camera surveys throughout the broader Logan area conducted by community have not detected Quolls, suggesting this species may be locally extinct.	It is considered highly unlikely that Spotted-tail Quoll will utilise the site post-development given the current and proposed level of disturbance and fragmentation and the distinct lack of evidence for their presently utilising the site. As mentioned, it is possible that Spot-tailed Quoll may venture into the northern portion of Precinct 1 given the conservation designation of	Species considered highly unlikely to occur and so impacts or improvements not anticipated. Markedly reduced edge to area ratio post-



Species	Habitat and Connectivity Requirements	Current Values	Post-development Values	Impact Analysis
	including small and medium-sized mammals, birds, large arthropods, carrion and food scraps, however mammals constitute approximately 80% of its diet. Studies from north-east New South Wales indicate that mating occurs from May to June with young born in July and August. During the mating season, males range widely in search of oestrus females. Quolls defecate at specific points within their home range called latrines. Peak latrine use only occurs during breeding season, suggesting they are used to communicate presence and reproductive status. Young leave the pouch after 10-12 weeks, and are weaned after 16-18 weeks. Females breed at one year of age but do not usually breed beyond their second year. Life expectancy in the wild is approximately three years although a very few individuals survive into their fourth year. It has been suggested that the South East Mainland sub-species is probably locally extinct in Brisbane, although historical records indicate it would have potential to occur if provided with appropriate habitat and safe movement opportunities from adjacent bushland areas. In 2011, the Wildlife Preservation Society of Queensland (WPSQ) received support through the EnviroGrants program for Logan City Council (LCC) to undertake a three (3) year study – ‘Looking out for Quolls in Logan 2011-2014’- to confirm the presence of Spot-tailed Quolls in the LCC region. Despite a number of community sighting records, no Quolls have been recorded during their study despite targeted camera surveys and trapping in the Greenbank Area. (Alina Zwar, WPSQ, pers. comm). Notwithstanding the above, the results of a search of EHP’s Wildlife Online Database indicate that there have been a total of fifteen (15) unconfirmed observations on the sub-species within 10km of the project site.	Survey identified that the broader Precinct 1 site supports some of the preferred habitat requirements for Spot-tailed Quoll, namely eucalypt woodland and forest providing foraging habitat with good availability of frogs, birds and medium-sized mammals that Spot-tailed Quoll prey on. The study area, however generally lacked the following important habitat features for Spot-tailed Quoll: • Large hollow logs were sparse; • Large, hollow bearing trees were limited; and • Suitable denning habitat in the form of rock caves or boulder piles does not occur or is sub-optimal in the north of Precinct 1. Other features that reduce the suitability of the study area for Spot-tailed Quoll include: • Abundant evidence of dogs (domestic and/or wild) in the form of tracks across the area, which may prey on Spot-tailed Quoll; • Proximity of the study area to unsuitable cleared areas, significant disturbance, regrowth vegetation and increasing development It is possible that Spot-tailed Quoll may venture into the northern portion of Precinct 1 adjoining the Flinders-Karawatha Bioregional Corridor, however, it is considered highly unlikely that they would utilise the UWC Corridor for foraging or dispersal in its current state.	this area post-development and its proximity to the Flinders-Karawatha Bioregional Corridor. In consideration of planning intent for the surrounding landscape, it is probable that the UWC Corridor will one day facilitate connectivity for urbanised species throughout a relatively developed landscape. Given the reclusive nature of this rare mammal, it is considered highly unlikely that the UWC Corridor will be utilised for, let alone critical to, their ongoing viability.	development reflects consolidated values and mitigation of potential edge effects.
<i>Litoria brevipalmata</i> (Green-thighed Frog)	Green-thighed Frogs are named for the bright green or blue-green colour on the groin and back of the thighs. They are small frogs (to 40 mm in length), rich brown to chocolate brown on the back, sometimes with smaller black flecks. A broad black stripe runs from the snout to the flank, ending as a series of blotches. The call is a continuous series of ‘quack’ or ‘wok’ sounds. The Green-thighed Frog is a Hylid frog (refer Tyler et al. 1972) found in forests and swamps of the coast and adjacent ranges from central New South Wales to south-east Queensland (Lemckert et al. 2006; Cogger 2000; Barker et al. 1995, Hines et al. 1999). Details of its biology are limited and uncertain (Lemckert et al. 2006). For example, Robinson (1993), Griffiths (1997) and Cogger (2000) list the breeding season as summer whereas Barker et al. (1995) record it as October and January. Calling may last for only a few days (Nattrass and Ingram 1993; Barker et al. 1995) and during “heavy rains” (Barker et al.1995; Ehmann 1997). Males call around flooded semi-permanent or ephemeral pools, usually in grassy areas (Robinson 1993; Barker et al. 1995; Cogger 2000). This species may have varying habitat requirements across its range (Lemckert et al. 2006). Cogger (2000), Robinson (1993) and Barker et al. (1995) associate this species with moist forests, however, records from the northern parts of its range appear to predominantly come from dry sclerophyll forest (McDonald 1974; Czechura 1978; Nattrass and Ingram 1993; Aridis, 1996). The Green-thighed Frog is listed as vulnerable in New South Wales (Threatened Species Conservation Act 1995) and rare in Queensland (Nature Conservation Act 1992), though	Undullah and Woollaman Creeks are largely ephemeral with some longer lasting pools evident where fringed by remnant vegetation. The banks and outer margins are considered highly disturbed and erosional, resulting in increased turbidity and general water quality degradation. Flora assemblages are generally dominated by weedy and exotic species. The corridor maintains isolated, though relatively large, <i>Eucalyptus tereticornis</i> (River Red Gum) specimens outside of remnant areas. Those areas mapped as remnant vegetation within the corridor were confirmed in description and status with minor discrepancies in extent at the property scale. Other regrowth areas were dominated by mono-specific <i>Acacia</i> stands and <i>Lantana</i> undergrowth with some <i>Eucalyptus</i> and <i>Corymbia</i> recruitment evident. 	It is anticipated that the rehabilitation and buffering of the UWC Corridor and the instigation of water quality treatment as per required Stormwater Management Plans will enhance aquatic habitat values significantly with respect to the requirements of the Green-thighed Frog. The species was recorded in the immediate vicinity of the UWC Corridor associated with more permanent though equally disturbed water features, and enhanced connectivity and restoration of the natural watercourse is likely to encourage their dispersal and utilisation of the UWC Corridor. Likewise, the establishment of a core conservation corridor 50 m wide (and presumed to be replicated on the opposing bank in the future) devoid of development except for complimentary uses and buffered from urban development is considered a significant improvement in ecological values relative to	Significant improvement anticipated.



Species	Habitat and Connectivity Requirements	Current Values	Post-development Values	Impact Analysis
	not listed under the EPBC Act. Ehmann (1997) listed the species as vulnerable under IUCN rankings, but importantly that it was “probably secure” based on the assessment that “disturbance is a feature of all known sites” and that the rarity of records was probably much more a result of being “mostly undetectable”. Threats for this species are listed as loss of water quality, habitat fragmentation and/or loss, climate change and intensive forestry, particularly any future intensification of forestry activity. Hines et al. (1999) note that habitat loss (in particular), fire, timber harvesting, grazing, weed invasion and changes to hydrology and water quality all may be disturbances that impact this species. More recently, this species has been listed as Endangered under the IUCN (2001) criteria as the species has a broad distribution that is severely fragmented into isolated subpopulations. Loss and degradation of habitat is ongoing” (2003 IUCN Red List of Threatened Species - http://www.redlist.org).	This species was observed by JWA next to Woollaman Creek behind the sand mine sand heaps and was also observed near the artificial wetland adjacent to Undullah Road. In both instances, this species was found close to permanent water and both sightings were only within a few hundred metres of each other outside of Precinct 1 immediately west of the UWC Corridor. The full distribution of this species at Flinders presently remains unknown.	existing features, and of benefit to Green-thighed Frog persistence and dispersal.	
<i>Adelotus brevis</i> (Tusked Frog)	From the DSITI factsheet, the Tusked Frog is a medium sized terrestrial frog with a snout-vent length (SVL) of up to 50 mm (Robinson 1993; Barker et al. 1995; Meyer et al. 2001). The skin of the dorsum is rough and colouration is dark brown, grey or beige, with a variegated darker patterning (Cogger 2000; Hines 2012). A dark butterfly shaped patch is present on the head, starting between the eyes (Robinson 1993; Hines 2012). The smooth ventral surface is mottled or marbled white and black/grey. The groin and hind sides of the calves are marbled red and black. Rudimentary webbing present in fingers and toes and no discs are present at the tips (Meyer et al. 2001). Adult males are larger than the females, the head of the males is also broader and flatter than that of the females. Both males and females have paired tusks located at the front of the lower jaw which can only be viewed when the mouth is open (Robinson 1993; Katsikaros and Shine 1997; Cogger 2000; Meyer et al. 2001; Hines 2012). May be confused with black soled frog <i>Lechriodus fletcheri</i>, gungan <i>Uperoleia</i>, broodfrog <i>Pseudophryne</i> and froglet <i>Crinia</i> species. <i>Adelotus brevis</i> can be differentiated from <i>L. fletcheri</i> by the white and black/grey mottling or marbling on the ventral surface. The red colouration in the groin and hind sides of the calves distinguish <i>A. brevis</i> from <i>Pseudophryne</i> and <i>Crinia</i> species. <i>Adelotus brevis</i> may be distinguished from <i>Uperoleia</i> spp. by the red on the back sides of the calves (Robinson 1993; Meyer et al. 2001). Occurs in the Clarke Range (Mideast Queensland), then from Shoalwater Bay (mid-east Queensland), south to near Moss Vale (mid-east New South Wales) (Hines et al. 1999; Hines et al. 2004; Hines 2012). In Queensland, inland populations are also present at Blackdown Tableland and Carnarvon Gorge (Hines et al. 2004; Hines 2012), and in Barakula State Forest (WildNet 2012). In south-eastern Queensland, it is likely <i>A. brevis</i> has disappeared from the New England Tableland and Bunya Mountains, and has suffered declines in the Scenic Rim, probably due to the amphibian chytrid fungus (Hines et al. 1999; Hines et al. 2004; Hines 2012). However, it is still widespread in the lowlands and foothills east of the Great Dividing Range (Meyer et al. 2001; Hines 2012). Inhabits wet eucalypt forest, rainforest, and sometimes dry eucalypt forest, where it can be found in close proximity to suitable breeding habitat such as ponds and slow-moving sections of streams (Cogger 2000; Meyer et al. 2001; Hines 2012). Also recorded from dams and garden ponds in urban and peri-urban areas (Hines 2012).	As for the Green-thighed Frog analysis, Undullah and Woollaman Creeks are largely ephemeral with some longer lasting pools evident where fringed by remnant vegetation. The banks and outer margins are considered highly disturbed and erosional, resulting in increased turbidity and general water quality degradation. Flora assemblages are generally dominated by weedy and exotic species. The corridor maintains isolated, though relatively large, <i>Eucalyptus tereticornis</i> (River Red Gum) specimens outside of remnant areas. Those areas mapped as remnant vegetation within the corridor were confirmed in description and status with minor discrepancies in extent at the property scale. Other regrowth areas were dominated by mono-specific <i>Acacia</i> stands and <i>Lantana</i> undergrowth with some <i>Eucalyptus</i> and <i>Corymbia</i> recruitment evident. As per the JWA Report, while its distribution remains unknown at Flinders, the call of the Tusked Frog was detected in two different locations several kilometres apart on tributaries to the upper reaches of the UWC Corridor, indicating that <i>A. brevis</i> may be widespread along this particular drainage line. The call of <i>A. brevis</i> was not heard in any other areas within the Flinders site.	As for the Green-thighed Frog, it is anticipated that the rehabilitation and buffering of the UWC Corridor and the instigation of water quality treatment as per required Stormwater Management Plans will enhance aquatic habitat values significantly with respect to the requirements of the Tusked Frog. The species was recorded near to the upper reaches of the UWC Corridor, and enhanced connectivity and restoration of the natural watercourse is likely to encourage their dispersal and utilisation of the UWC Corridor. Likewise, the establishment of a core conservation corridor 50 m wide (and presumed to be replicated on the opposing bank in the future) devoid of development except for complimentary uses and buffered from urban development is considered a significant improvement in ecological values relative to existing features, and of benefit to Tusked Frog persistence and dispersal.	Significant improvement anticipated.



Species	Habitat and Connectivity Requirements	Current Values	Post-development Values	Impact Analysis
<i>Ninox strenua</i> (Powerful Owl)	The Powerful Owl is endemic to eastern and south-eastern Australia, mainly on the coastal side of the Great Dividing Range from Mackay to south-western Victoria. The Powerful Owl inhabits a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest. The Powerful Owl requires large tracts of forest or woodland habitat but can occur in fragmented landscapes as well. The species breeds and hunts in open or closed sclerophyll forest or woodlands and occasionally hunts in open habitats. It roosts by day in dense vegetation comprising species such as Turpentine Syncarpia glomulifera, Black She-oak Allocasuarina littoralis, Blackwood Acacia melanoxylon, Rough barked Apple Angophora floribunda, Cherry Ballart Exocarpus cupressiformis and a number of eucalypt species.	Open and closed woodland areas of the site represent potential foraging habitat for this species as part of a broader home range. The species was recorded by JWA in the northern conservation area of Precinct 1 and the upper reaches of Woollaman Creek.	Should Powerful Owl forage within the UWC Corridor post-development it is anticipated to likely be part of a broader home range. The Koala in general terms shares remnant wooded portions of the site as potential habitat with this species. From the Koala analysis, an increase in Koala habitat area and mitigation of potential edge effect impacts post-development is anticipated, which will benefit the Powerful Owl. Pre- to post-development scenarios are considered to improve with respect to habitat and connectivity values for the Powerful Owl.	Improvement anticipated.



4. Connectivity Summary

Areas adjoining Precinct 1 are currently slated for development under the PDA, *South-east Queensland Regional Plan* and the *Logan Planning Scheme*. As such, connectivity values attributed to the Undullah-Woollaman Creek Corridor in the long term are likely to favour species that are highly mobile and adapted to urbanised environments.

It is acknowledged that the proposed Precinct 1 development will marginally reduce the extent of remnant Regional Ecosystems and some lesser value habitats on-site. However, the proposed conservation area in the north of Precinct 1 is considered to largely mitigate potential adverse impacts in relatively disturbed areas that are slated for development. The UWC Corridor, by comparison, will ultimately form a localised link through the urbanised landscape, and represents an opportunity to enhance habitat connectivity values for species likely to occur.

Relative to existing values, the proposed rehabilitation and preservation of a core 50 m conservation corridor the length of the Precinct 1 boundary adjoining Undullah-Woollaman Creeks is considered a far superior outcome with respect to ongoing habitat and connectivity values. Further, the core is to be buffered with an additional rehabilitation area restricted to complimentary uses to promote stability and reduce the potential for edge effect impacts. It is anticipated that the proposed 50 m core conservation area buffered by an additional 50 m of rehabilitation and complimentary uses will ultimately be replicated as development proceeds on the opposing bank, resulting in a corridor park outcome with a total width of at least 200 m containing a core 100 m wide conservation area. Given the corridor will perform a localised connectivity function (rather than State or Regional), these dimensions are considered ample for localised fauna utilisation.

It is considered that the expansion and consolidation of high value habitat in the UWC Corridor provides a significantly more habitat and a marked reduction in the influence of potential edge effects from current fragmentation. By containing development within highly disturbed areas of the site, retaining the highest value habitat maintaining optimal connectivity values, the development is considered to effectively mitigate impacts imposed.

With regard to threatened species habitat values, it is considered that, although relatively fragmented potential habitat will be lost under the development scenario, the consolidation and expansion of high habitat values within the UWC Corridor and the enhancement of existing connectivity values adjoining this area will ensure that the project imposes negligible if any adverse impacts post-development. Rather, the nett outcome of development is anticipated to be a vast improvement to landscape level habitat and connectivity values (**Tables 1 to 4 & Plans 3 to 5**). This is considered a far superior outcome relative to current site values and in line with the intent of the PDA Development Scheme.



5. Appendices

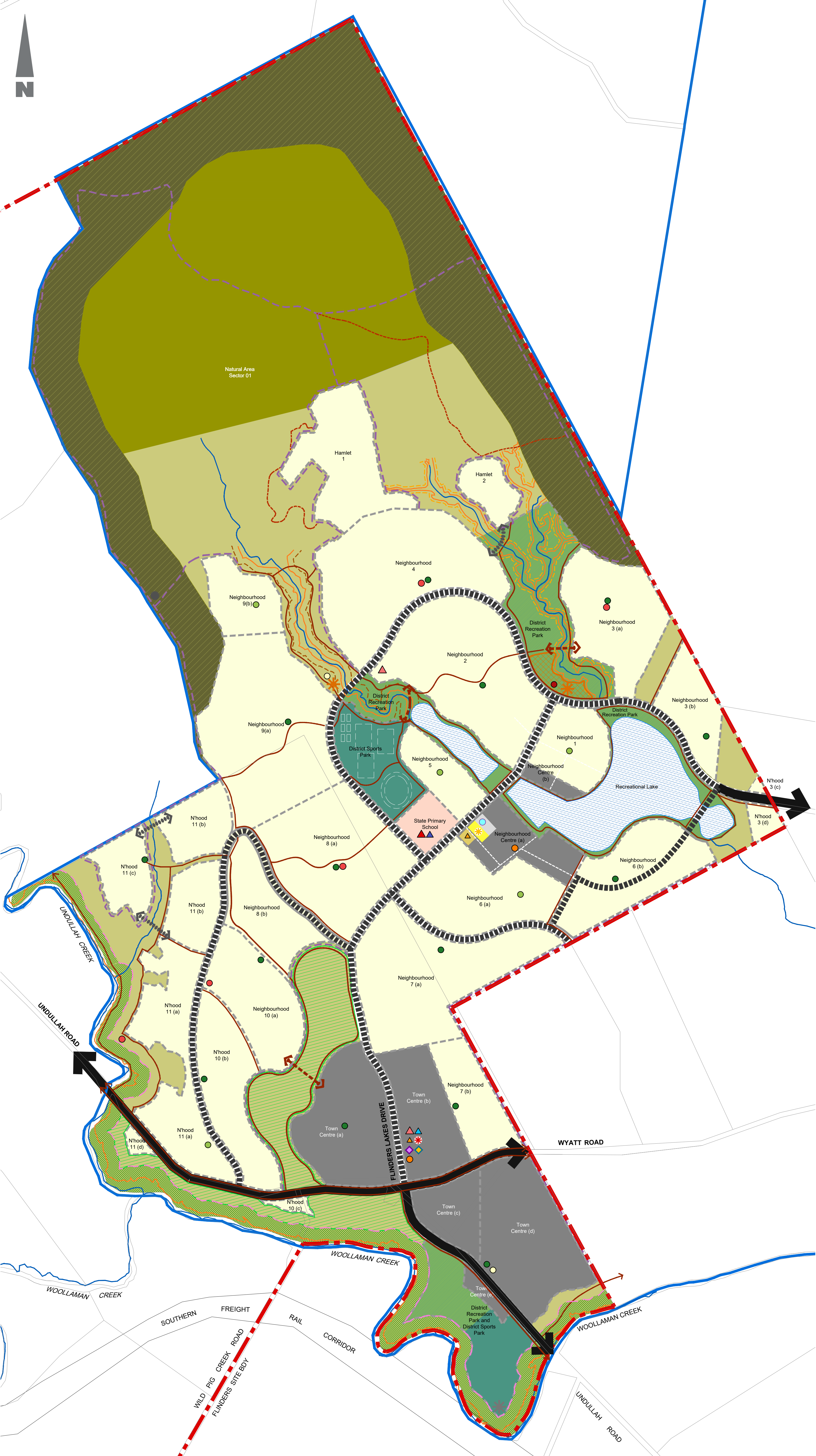
Appendix A

Context Plan



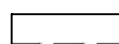
Appendix A

Context Plan



- LEGEND
- 

Flinders Site Boundary
- 

Priority Development Area (PDA) Boundary
- 

Neighbourhood / Hamlet Boundary
- 

Town Centre - minimum net residential density - 25 dwellings/ hectare
- 

Neighbourhood Centre - minimum net residential density - 20 dwellings/ hectare
- 

Urban Living - minimum net residential density - 15 dwellings/ hectare (unless it can be demonstrated this density cannot be achieved due to site constraints)

- Community Facilities + Uses
- 

State Primary School
- 

Potential Private Primary School
- 

Kindergarten
- 

Potential Private Kindergarten
- 

Childcare
- 

Neighbourhood Meeting Room/ House
- 

Community Facility + Place of Assembly inc. Library
- 

District Community Centre Hub including Branch Library + Local Youth Centre
- 

Multi - Purpose Community Use Area
- 

Art Gallery
- 

Community Health Hub
- 

Potential District Community Garden
- 

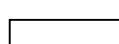
Potential Neighbourhood Community Garden
- 

Potential Urban Community Garden

- Natural Area
- 

Environmental Protection Zone
- 

Natural Area (including waterways + stream protection zones)
- 

Recreational Lake (Indicative)
- 

Waterways - indicative centreline
- 

Woollaman Creek Biodiversity Corridor (50m setback from high bank)

- Waterways - Offset lines from High Bank
- 

Approx. High Bank
- 

10m Offset from High Bank
- 

25m Offset from High Bank
- 

50m Offset from High Bank

- Open Space, Sport + Recreation
- 

Major Linear Park
- 

Local Recreation Park
- 

Neighbourhood Recreation Park
- 

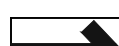
District Recreation Park
- 

District Sports Park
- 

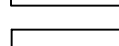
Outdoor Recreational (Golf Course) (subject to further approval)
- 

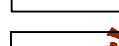
Swimming Pool
- 

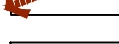
Civic Park

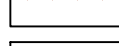
- Movement Network
- 

Urban Arterial *
- 

Trunk Connector *
- 

Shared Paths
- 

Potential Shared Path Links (Subject to investigation)
- 

Potential Low Impact Walking Trails
- 

Indicative Road Links

* Refer Movement Network Plan

- Bushfire Protection
- 

Fire Trails

- Infrastructure
- 

Reservoir(s)
- 

Public Utilities Location (subject to future designation/agreement)

Q	Remove Movement Network outside of site	140717	YD
P	Show 50m Offset to Woollaman & Undullah Creeks	290617	AR
O	Include Second Potential Private School	060617	CC
N	Adjust Primary School	120417	YD
M	Add Major road types to legend	310317	YD
L	For Issue	300317	YD
K	Response to revised engineered lake extents	290317	DSC
A	DRAFT for Review	040215	JD
no.	revision	date	initial

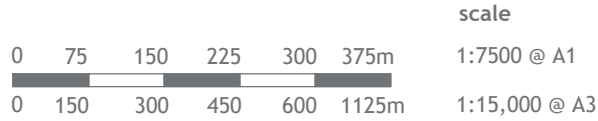
TitleFLINDERS - PRECINCT 01 CONTEXT PLAN

Prepared for PACIFIQ

Prepared by robertsday
www.robertsday.com.au

date14.07.17
sizeA1
drawing no.RD1002
revisionQ
drawnDSC
approvedCC
notesSee notations above.

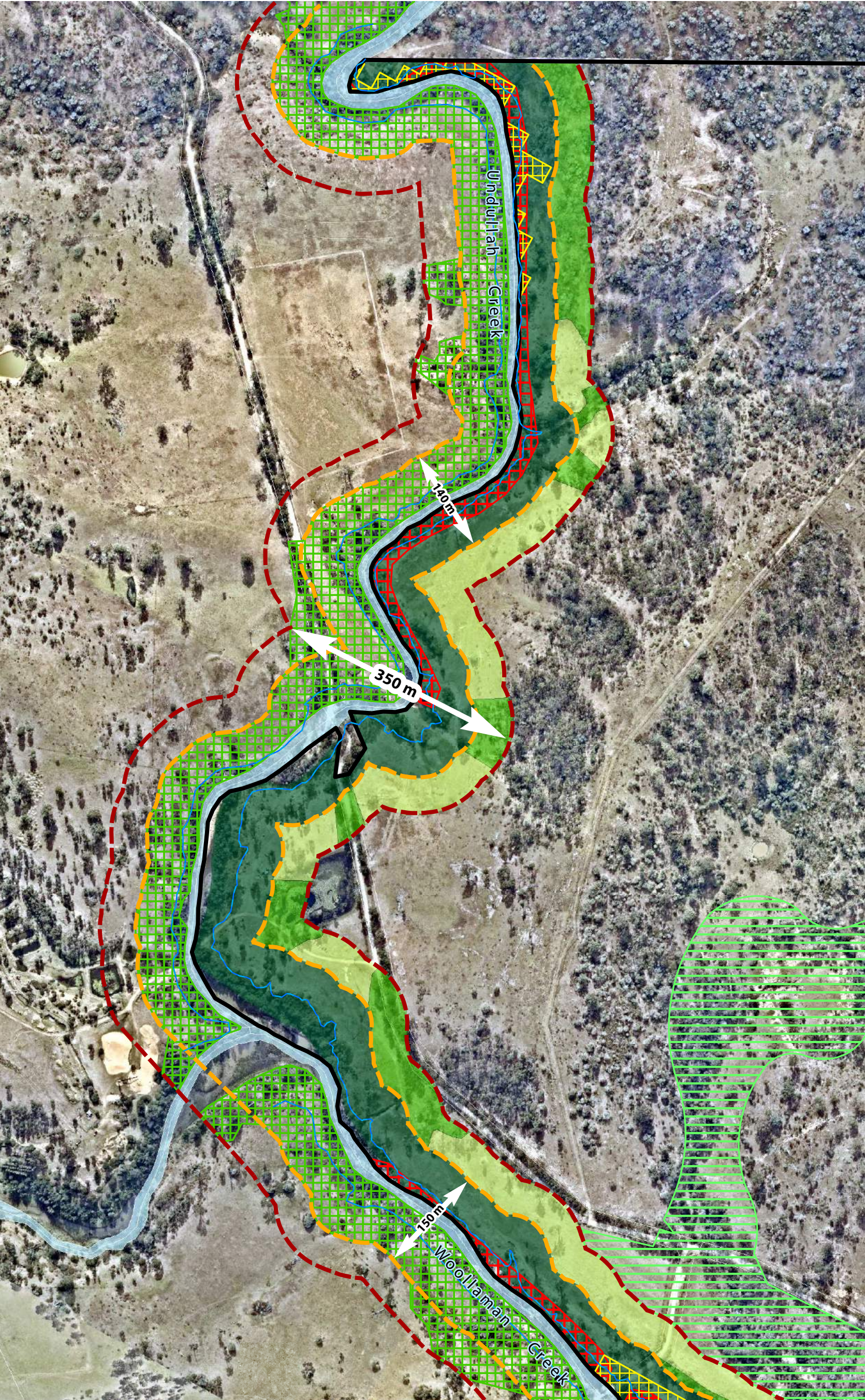
PACIFIQ



ATTACHMENT 2

UWC Corridor Potential Outcome

I.I. Woollaman & Undullah Creek Assessment



NOTES
This plan was prepared as a desktop assessment tool. The information on this plan is not suitable for any other purpose. Property dimensions, areas, numbers of lots and contours and other physical features shown have been compiled from existing information and may not have been verified by field survey. These may need verification if the development application is approved and development proceeds, and may change when a full survey is undertaken or in order to comply with development approval conditions. No reliance should be placed on the information on this plan for detailed design or for any financial dealings involving the land. Saunders Havill Group therefore disclaims any liability for any loss or damage whatsoever or howsoever incurred, arising from any party using or relying upon this plan for any purpose other than as a document prepared for the sole purpose of accompanying a development application and which may be subject to alteration beyond the control of the Saunders Havill Group. Unless a development approval states otherwise, this is not an approved plan.

Layer Sources: QLD GIS Layers (QLD Gov. Information Service 2017), Aerial (Qld Globe/Google 2015)

* This note is an integral part of this plan/data. Reproduction of this plan or any part of it without this note being included in full will render the information shown on such reproduction invalid and not suitable for use.

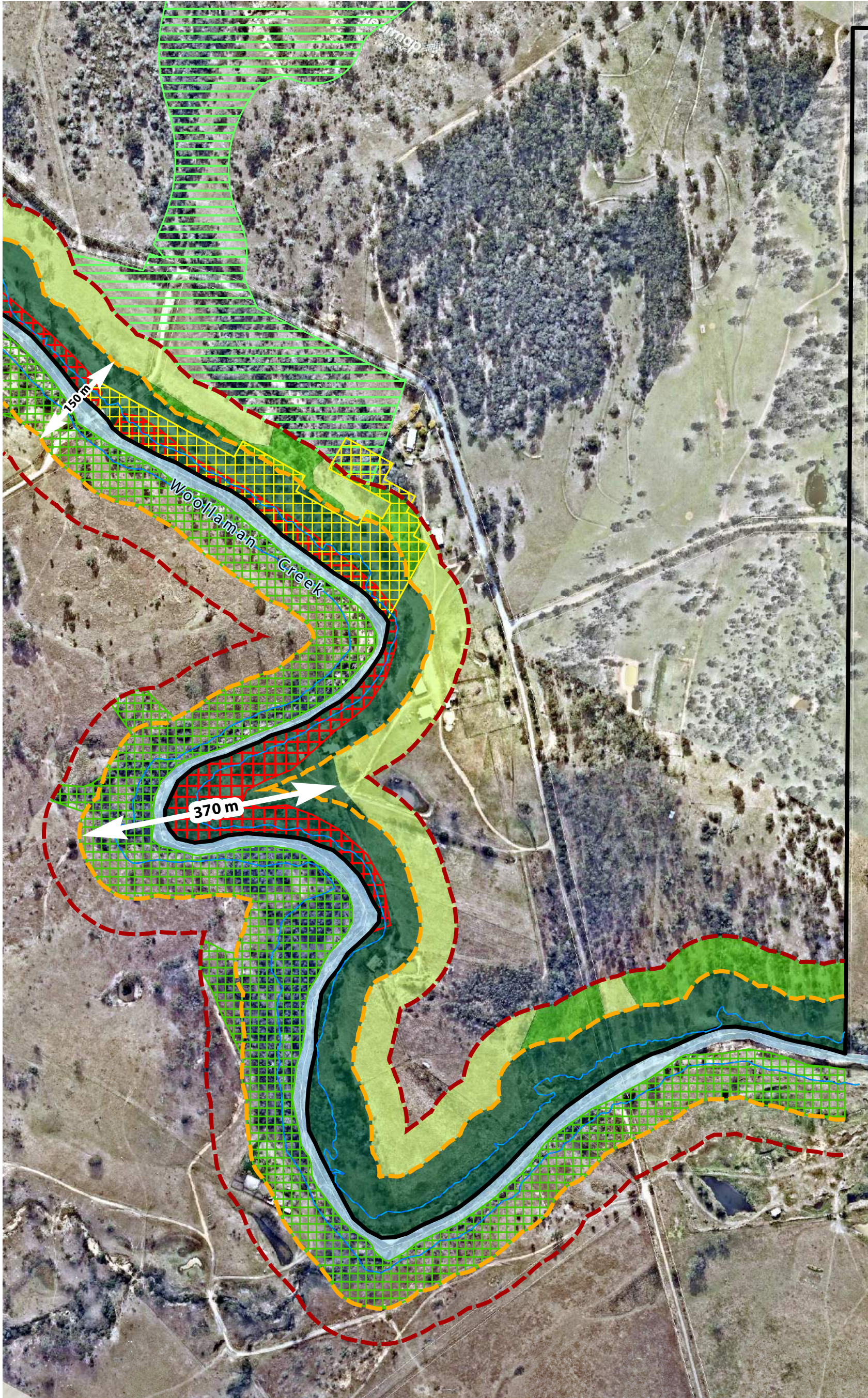
LEGEND

- Qld DCDB
- Project site boundary
- Woollaman & Undullah Creek Unallocated State Land DCDB
- Woollaman & Undullah Creek high bank
- 50m buffer (from top of bank)
- 100m buffer (from top of bank)
- Koala bushland habitat
- Least Concern RE - 12.3.7
- Undullah & Woollaman Creek**
 - Conservation/tree retention/revegetation/passive - nature based recreation
 - Area to be ground truthed as open space or conservation at ROL, dependent upon values
 - Non development open space (park/planted out detention basin etc./ golf course in areas)
 - Golf course extending past creek corridor extents
 - Neighbouring land - not part of this application. Conservation/tree retention/revegetation/passive nature based recreation (based off same methodology & requiring ground truthing)

PLAN ISSUE:				
Issue	Date	Description	Drawn	Checked
A	22/09/2017	Prelim Draft	TC	FM

0 50 100 200 300 m
Universal Transverse Mercator GDA 1994 MGA Zone 56 1:5,500 @ A3

1.2. Woollaman & Undullah Creek Assessment



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PLAN ISSUE:				
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A	22/09/2017	Prelim Draft	TC	FM

0 50 100 200 300 m
Universal Transverse Mercator GDA 1994 MGA Zone 56 1:5,500 @ A3