ECOLOGICAL ASSESSMENT REPORT

7-101 Bayliss Road, South Ripley

February 2019

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CONTENTS

1 INTRODUCTION

The following Ecological Assessment Report (EAR) has been prepared by Litoria Consulting for Lin Hai Development Pty Ltd for land described as 7-101 Bayliss Road, South Ripley Qld 4306 (Lot 80 on SP162940). Refer to Figure 1 for a current aerial photograph of the site.

The purpose of the EAR is to:

- Describe the ecological features and processes of the development site and adjacent lands;
- Provide an assessment of the nature conservation values of these features and processes;
- Provide a description of threatening processes evident on site;
- Document potential development impacts upon these ecological values and features; and,
- Detail impact mitigation measures which will be undertaken to avoid or mitigate those impacts to an acceptable standard.

The EAR includes the following:

- Description of existing environment (vegetation, habitats, waterways, wetlands, biodiversity/conservation values etc.);
- GIS mapping of vegetation communities and habitats;
- Impact assessment;
- Environmental management and compliance measures; and,
- Technical appendices.

The EAR is organised into the following sections:

- A description of the proposed development;
- Statutory requirements (Commonwealth, State and Local);
- Existing environment
- Impact assessment;
- Environmental management strategies; and,
- Summary assessment

Figure 1: Rectified digital aerial orthophotograph of the site (NearMap 2017).

2 PROPOSED DEVELOPMENT

The proposed development is for a residential subdivision, including, residential lots, new road, basins and recreational parkland.

The proposed plan of development can be seen in Figure 2 and is attached as Appendix 1.

Figure 2: Proposed development (Source: Proposed Subdivision Plan; LAUDink, SK004, February 2019).

3 STATUTORY REQUIREMENTS

3.1 COMMONWEALTH

Environmental regulation at the federal government level is driven by the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act). The EPBC Act deals mainly with matters of national environmental significance (protected matters) including:

- World Heritage places;
- National Heritage places;
- RAMSAR wetlands (Wetlands of international importance);
- Nationally threatened species and ecological communities;
- Migratory species;
- Commonwealth marine areas; and,
- Nuclear Actions.

Any actions likely to have a 'significant impact' on any of these protected matters may require that a development application is referred to the Commonwealth as part of a separate assessment process to IDAS. Where required, referrals to the Commonwealth for protected matters under the EPBC Act are assessed outside of State timeframes.

The Commonwealth Government's *Environment Protection and Biodiversity Conservation Act 1999* Protected Matters Search Tool (PMST) was used to identify the likely occurrence of protected matters such as RAMSAR wetlands and potential habitats for migratory or threatened species. The results of a search of the Commonwealth's EPBC Act Protected Matters database for the subject site are given in Appendix 2.

3.2 STATE

Relevant State legislation and planning policies were reviewed to determine their applicability to the subject site.

3.2.1 FISHERIES ACT 1994

The *Fisheries Act 1994* (Qld) and associated *Fisheries Regulation 2008* (Qld) defines specific regulatory constraint rights and allocation requirements for the protection and disturbance of Queensland fisheries resources, in particular, development involving:

- Aquaculture in tidal water, marine and freshwater;
- Building or operational works in a declared fish habitat area;
- Constructing or raising a waterway barrier; and/or,
- Removal, destruction or damage of marine plants.

An assessment of the relevant fisheries resource mapping and the proposed development indicated that the proposed development is unlikely to involve or require fisheries development approval.

3.2.2 COASTAL PROTECTION AND MANAGEMENT ACT 1995

The *Coastal Protection and Management Act 1995* (Qld) defines requirements for the protection of Queensland's coastal zone and coastal management districts.

An assessment of relevant mapping indicates that the site is located outside of the coastal management district. As such, the proposed development does not involve or require coastal development approval.

3.2.3 VEGETATION MANAGEMENT ACT 1999

The *Vegetation Management Act 1999* (Qld) (VM Act) regulates the clearing of vegetation on freehold land which is assessable development ('work') under the *Planning Act 2016* (Qld) (Planning Act). The VM Act is administered by the Department of Natural Resources and Mines (DNRM). Under the VM Act, remnant vegetation and certain regrowth vegetation is classified and mapped according to the Regional Ecosystem methodology described by Sattler and Williams (1999).

The *Planning Regulation 2017* (Qld) (Planning Reg.) prescribes assessable (and exempt) clearing of native vegetation under the Planning Act. Vegetation which is regulated under the Act is indicated on the *Regulated Vegetation Management Map*.

Current Department of Natural Resources and Mines (DNRM) regulatory mapping indicates that the site contains Category C (High value regrowth vegetation) regulated vegetation (Figure 3) containing *of concern* regional ecosystem (RE) 12.9-10.7. A copy of the regulatory map is contained in Appendix 3.

In this instance, clearing of regulated vegetation is *exempt clearing work* in accordance with Schedule 21, Part 2, Item 2 (g) of the Planning Reg. as the clearing is for an urban purpose in an urban area and is regulated regrowth vegetation.

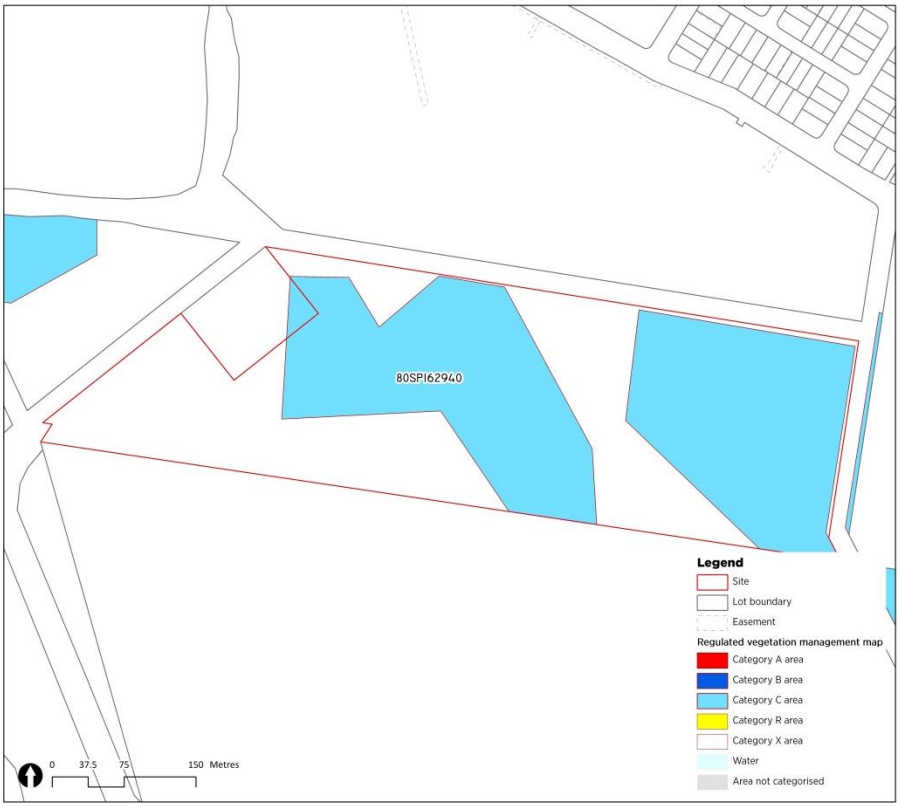

Figure 3: Regulated Vegetation Management Map (Department of Natural Resources Mines and Energy 2018).

3.2.4 NATURE CONSERVATION ACT 1992

The *Nature Conservation Act 1992* (Qld) (NC Act) is the principal legislation for the protection of all native wildlife (flora and fauna) and the creation and management of *protected areas* in Queensland. Of relevance to the site is the potential presence of threatened[1] wildlife (plant or animal) species.

A search was undertaken to identify threatened wildlife that may occur, are likely to occur or are known to occur within 3km of the site. A search of the Queensland DEHP Wildlife Online database (Department of Environment and Heritage Protection 2017) was undertaken for species recorded within a 3km radius of the site since 1980 (Appendix 4).

The NC Act includes a risk-based approach to the management of *protected plants*. Where an area proposed to be cleared contains native plants *in the wild* and the area is shown as *high risk area* on the Protected Plants Flora Survey Trigger Map, a flora survey of the *clearing impact area* must be undertaken prior to any potential clearing. The protected plants requirements are independent of vegetation management requirements under other Acts and are intended to regulate the clearing of *endangered*, *vulnerable* and/or *near threatened* (collectively, EVNT) plants listed under the *Nature Conservation (Wildlife) Regulation 2006* (Qld) that are, or are likely to be, present within the area to be cleared.

[1] Extinct in the Wild (EX), Endangered (E), Vulnerable (V) or Near threatened (NT) wildlife pursuant to the *Nature Conservation (Wildlife) Regulation 2006* (Qld) (NC Reg.).

The *Protected Plants Flora Survey Trigger Map* (Department of Environment and Heritage Protection 2017) indicated that the site is not located within a *high risk area*. A copy of the regulatory map is contained in Appendix 3.

3.2.5 PLANNING ACT 2016 (KOALA ASSESSABLE DEVELOPMENT AREAS)

Certain development within koala *assessable development areas* is assessable under the Planning Reg. The koala assessable development areas mapping depicts koala habitat values occurring within certain areas defined under the Planning Act and Planning Reg.:

- Schedule 10 of the Planning Reg. prohibits development applications for an urban activity (MCU) which are wholly or partly located on land which is zoned for conservation, open space, rural or rural residential purposes and is located within a priority koala assessable development area.
- Schedule 11 of the Planning Reg. applies to certain types of development located within either an *assessable development area*[2] or an *identified koala habitat broad-hectare area*[3].

An assessment of current State Government regulatory mapping indicates that the subject site is not located within an *assessable development area*, nor an *identified broad hectare area*. A copy of the regulatory map is contained in Appendix 3.

3.2.6 STATE PLANNING POLICY

The State Planning Policy (July 2017) (SPP) defines the Queensland Government's policies about matters of state interest in land use planning and development. The SPP identifies State interests that a local government must take into account when preparing or amending planning schemes and, in some cases, assessing development applications.

The SPP has effect throughout Queensland and sits above regional plans and local planning instruments in the hierarchy of planning instruments under the Planning Act. This means that the SPP prevails over these instruments, to the extent that they are inconsistent with the SPP.

The current SPP (July 2017) has not yet been appropriately integrated into the scheme. In accordance with section (8)(4)(a) of the Planning Act, the SPP applies to the extent of any inconsistency. Under the Planning Reg., the assessment benchmarks apply if a state interest has not been appropriately integrated into a planning scheme.

[2] *assessable development area* means an area shown as either of the following on a *map of assessable development areas*—
(a) *a koala assessable development area*;
(b) a *priority koala assessable development area*.
[3] *identified koala broad-hectare area* means either of the following areas, if a local planning instrument contains provisions facilitating the development of the area for urban purposes—
(a) an area shown on an *identified koala broad-hectare area map* as an *identified koala broad-hectare area*;
(b) an area that is an *assessable development area* and identified in a gazette notice by the Minister as an *identified koala broad-hectare area*.

In this instance the development application must be assessed against the assessment benchmarks to the extent of any inconsistency of the planning scheme with the assessment benchmarks and where the assessment manager considers these assessment benchmarks are relevant to the proposed development.

In addition, the assessment manager must have regard to the SPP (including the relevant state interest statement and policies), where the planning scheme has not appropriately integrated the state interest. The SPP only applies where the assessment manager considers these matters are relevant to the proposed development and only to the extent of any inconsistency with the planning scheme.

The current State-wide register of SPP integration in planning schemes (July 2017) indicates that the State interest statement and policies for Biodiversity may apply to development assessment (subject to the extent of any inconsistency and where relevant).

(1) Development is located in areas to avoid significant impacts on matters of national environmental significance and considers the requirements of the Environment Protection and Biodiversity Conservation Act 1999.
(2) Matters of state environmental significance are identified and development is located in areas that avoid adverse impacts; where adverse impacts cannot be reasonably avoided, they are minimised.
(3) Matters of local environmental significance are identified and development is located in areas that avoid adverse impacts; where adverse impacts cannot be reasonably avoided, they are minimised.
(4) Ecological processes and connectivity is maintained or enhanced by avoiding fragmentation of matters of environmental significance.
(5) Viable koala populations in South East Queensland are protected by conserving and enhancing koala habitat extent and condition.

The SPP Interactive Mapping System (Figure 4) indicates that the site contains Matters of State Environmental Significance (MSES):

- *MSES - Regulated vegetation (category C)*; and,
- *MSES - Regulated vegetation (intersecting a watercourse)*.

Figure 4: SPP Matters of State Environmental Significance (MSES) (Department of Environment and Science 2017).

3.2.7 RIPLEY VALLEY PRIORITY DEVELOPMENT AREA

The site is located in the Ripley Valley Priority Development Area (PDA) and is subject to the Ripley Valley Urban Development Area Development Scheme. Relevant mapping contained in the Development Scheme indicates that the site is located outside of:

- Mapped riparian corridors, waterways, regional ecosystem and essential habitat areas on *Map 2 – Values* (Figure 5); and,
- Environmental protection areas on *Map 4 – Zones* (Figure 6).

The site is zoned as *urban* on *Map 4 – Zones* (Figure 6).

Figure 5: Excerpt from Ripley Valley Urban Development Area Development Scheme Map 2 – Values.

Figure 6: Excerpt from Ripley Valley Urban Development Area Development Scheme Map 4 – Zones.

4 EXISTING ENVIRONMENT

This section of report describes the existing environmental values of the site based on a combination of:

i. Spatial analysis (GIS data);
ii. Field investigations; and,
iii. Review of relevant wildlife databases (DEHP Wildlife Online, DSEWPC EPBC Protected Matters Search Tool), including fauna habitat suitability assessment.

Results are described for physical characteristics of the site including topography, geology and the presence of waterways and/or wetlands, together with biological features including vegetation and fauna.

4.1 TOPOGRAPHY

The landform pattern in the vicinity of the proposed development can be described as *undulating rises* (UR) to *undulating low hills* (UL) according to the National Committee on Soil and Terrain (2009), with much of the land lying between 50m - 66m AHD. The modal slope class of the site is approximately <10%, with a predominantly west facing aspect.

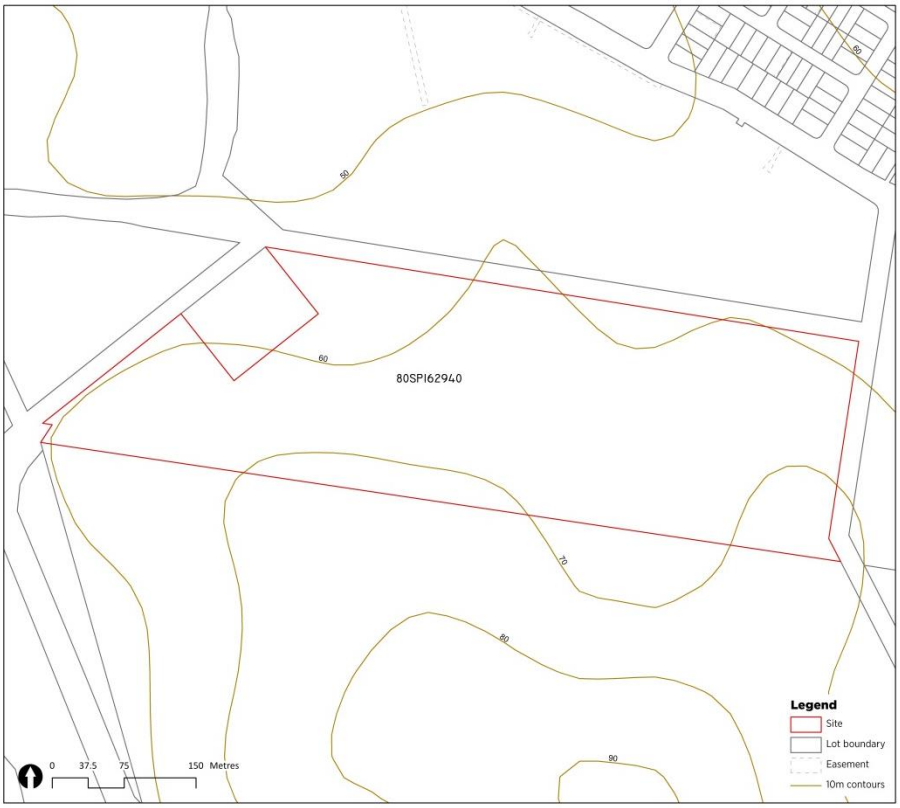

Figure 7: 10m contours (Department of Environment and Resource Management 2010).

4.2 GEOLOGY

Geological data was obtained from the Geological Survey of Queensland (2011). The geology of the site is Gatton Sandstone. Site geology is described in Table 1, with extents shown in Figure 8.

Table 1: Geology of the site.

Name	Land Zone	Description
Gatton Sandstone	9-10	Lithic labile and feldspathic labile sandstone

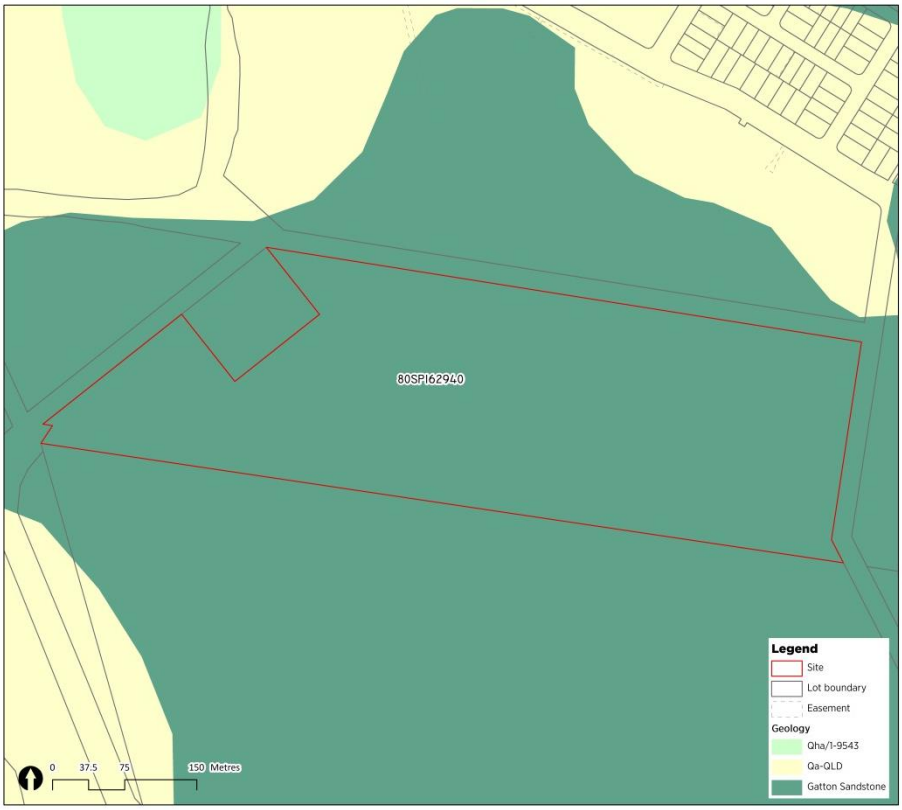

Figure 8: Geology of the site (Geological Survey of Queensland 2011).

4.3 WATERWAYS AND WETLANDS

The site is located within the Bundamba Creek catchment, which is located to the west of the site. State mapping indicates that the site contains a watercourse running north south across the site. Site assessment indicated that no watercourse was present; however a small dam was identified in the centre of the site.

Queensland Department of Science, Information Technology, Innovation and the Arts' Wetland Mapping and Classification Version 4.0 (Department of Science Information Technology Innovation and the Arts) is a set of comprehensive, non-regulatory maps of

Queensland's wetlands at a scale and level of detail that help wetland managers make accurate decisions about the protection and care of wetlands. The Queensland Wetlands Map (DSITIA 2013) (Figure 10) indicates the site does not contain any wetlands.

Site inspection indicated that the site contain two small artificially modified dams only. The location of these can be seen in Figure 1.

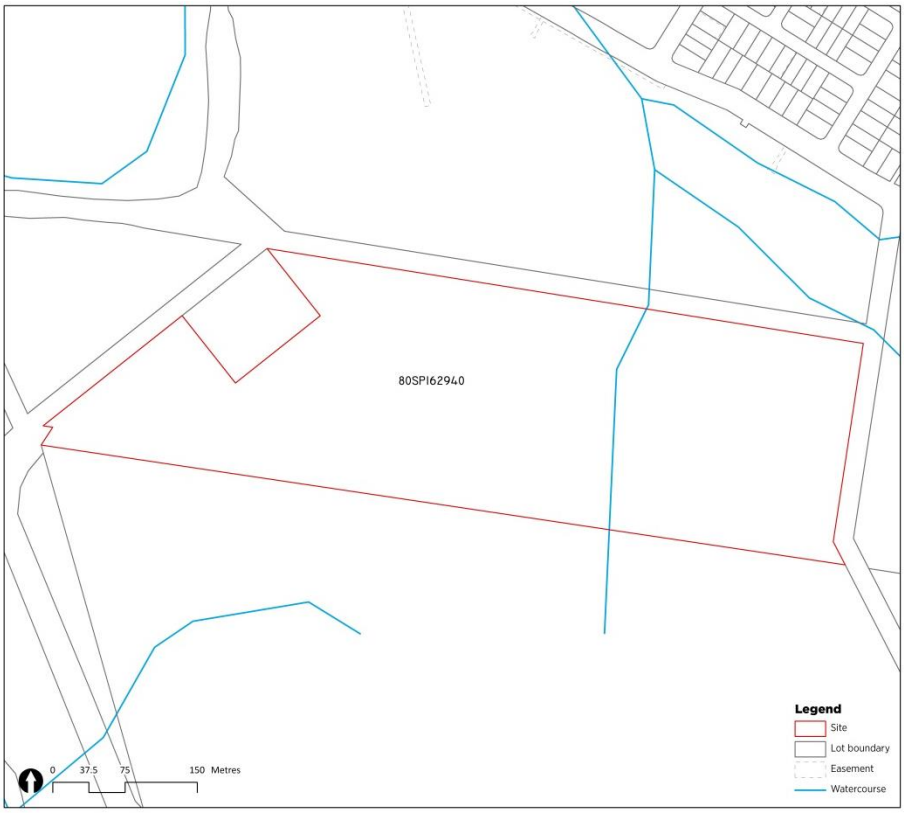

Figure 9: Watercourses (GeoScience Australia 2003).

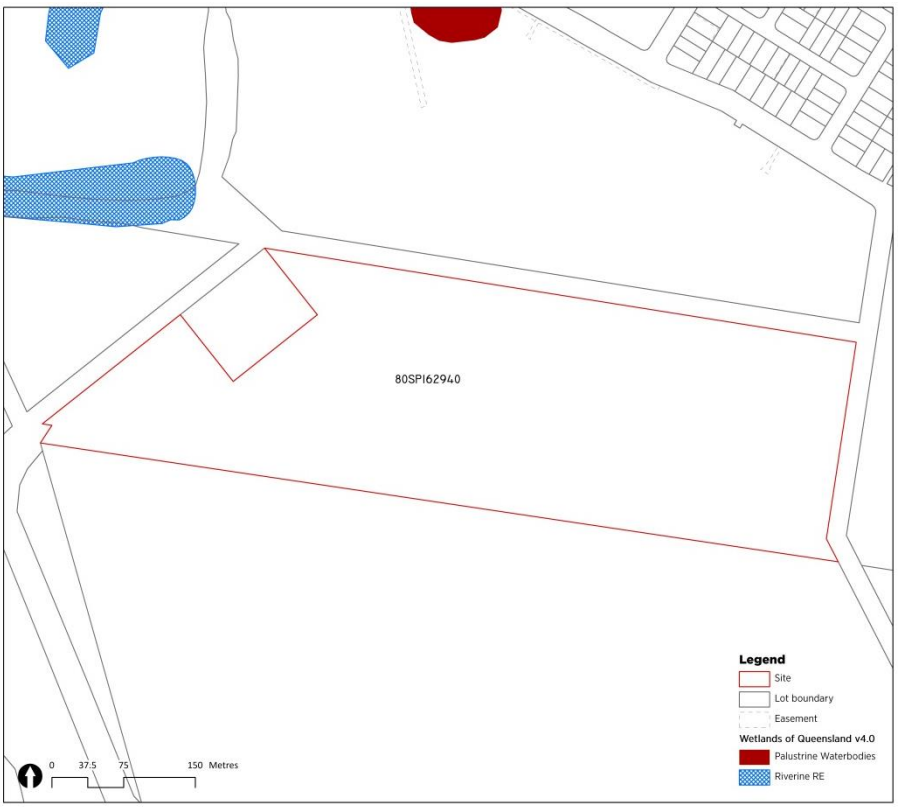

Figure 10: DSITIA Queensland Wetland Map (DSITIA 2013).

4.4 VEGETATION

4.4.1 METHODS

4.4.1.1 BOTANICAL SURVEY

A botanical survey of the site was carried out in June 2018 by up to two (2) tertiary-qualified ecologists using tertiary and quaternary methods described in *Methodology for Survey and Mapping of Regional Ecosystems and Vegetation Communities in Queensland. Version 3.2* (Neldner *et al.* 2017). The assessment was carried out generally in accordance with Council's development assessment requirements.

The purpose of the survey was to determine the ecological values of the existing vegetation according to:

- The extent, type, diversity and integrity of vegetation communities present;
- The presence of any threatened or conservation significant plant species;
- Regional ecosystems; and,
- The presence of exotic species including weeds.

Where present, the actual extents (boundaries) of remnant vegetation communities were identified using survey and/or GPS location for GIS rectification with existing vegetation

maps of the site. Relevant Council vegetation mapping was also examined as part of the assessment.

Results of the botanical survey are described according to vegetation communities (Vegetation Survey Units = VSUs) observed on site and are contained in Appendix 5. VSUs were established and classified on the basis of tertiary and quaternary methods described in Neldner *et al.* (2012) and included such criteria as:

- Strata;
- Relative species abundance in observed strata (dominant, co-dominant, common or associated);
- Landform;
- Aspect;
- Geology; and,
- Hydrology (where applicable).

4.4.1.2 TREE SURVEY

A detailed survey of all trees present within the vicinity of the proposed development footprint was undertaken in June 2018. The assessment was carried out by a tertiary-qualified botanist (AQF Level 8) and arborist (AQF Level 5) with more than 12 years of experience in vegetation management on development sites.

All trees greater than 100mm diameter at breast height (DBH) were identified and their characteristics recorded including:

- Height (m);
- Canopy spread (m);
- DBH (m);
- Condition and vigour; and,
- Fauna habitat value: presence of hollows, scratch marks, nests or other habitat features.

Trees were surveyed using a DGPS[4] to determine location. The location of all vegetation identified as part of the tree survey is indicated in the VMP drawing VMP02 (Appendix 6).

The condition / health of trees was assessed by an AQF Level 5 arborist via a qualitative assessment of their vigour and condition according to methods described in *A visual method of objectively rating the viability of urban trees for development sites and management, based on general tree and landscape assessment criteria* (Institute of Australian Consulting Arboriculturalists 2010). Tree vigour represents the ability of a tree to sustain its life processes, characterised by an assessment of crown cover, crown density (including potential accelerated growth due to seemingly beneficial changes to its growing environment), resistance to predation, evidence of dormancy (deciduous trees). Tree vigour was thus categorised as good, high, low or dormant. Tree condition represents a tree's crown form and growth habitat, as modified by its environment (aspect, suppression by other trees, soils, previous pruning), the stability and viability of the root plate, trunk and structural branches, including defects such as wounds, cavities or

[4] Sub-metre accuracy (i.e. ±0.5m)

hollows, crooked trunk or weak trunk / branch junctions and the effects of predation by pests and diseases. Tree condition was categorised as good, fair, poor or dead. The combination of vigour and condition can be used to determine the *Sustainable Retention Index Value* (SRIV) of the tree (Institute of Australian Consulting Arboriculturalists 2010).

4.4.1.3 THREATENED SPECIES SURVEY

In addition to the botanical survey and tree survey, a search of the Queensland DEHP Wildlife Online database (Department of Environment and Heritage Protection 2017) was undertaken for plant species recorded within a 3km radius of the site since 1980 (Appendix 4). A search of the Commonwealth Government's *Environment Protection and Biodiversity Conservation Act 1999* Protected Matters Search Tool (PMST) (Department of the Environment and Energy 2017) was also undertaken to identify nationally-threatened plant species that may occur, are likely to occur or are known to occur within a 3km radius of the site (Appendix 2).

A targeted survey of all areas on site for *Melaleuca irbyana* and other potential threatened species was undertaken in accordance with the *Flora Survey Guidelines – Protected Plants* (Department of Environment and Heritage Protection 2014). This included a thorough search of drainage lines and other poorly drained areas due to the association of *M. irbyana* with waterlogged / poorly drained areas.

4.4.2 RESULTS

The following sections provide an overview of the observed vegetation communities based on the results of the botanical assessment, tree survey results and an assessment of the likelihood and/or occurrence of threatened plant species identified from State and Commonwealth databases.

4.4.2.1 BOTANICAL SURVEY

The site has been historically cleared of remnant vegetation with evidence of maintenance and grazing.

The site contained a single VSU. Vegetation could be described as native regrowth vegetation. Canopy (~15-30m) species included, *inter alia*, *Eucalyptus crebra*, *E. teretincornis* and *Corymbia tessellaris*. The vegetation is characterised by the absence of a mid-storey or T2 layer. A tall shrub (~6-10m) and lower shrub (~2-6m) vegetation was sparse to mid-dense in patches. Common shrub species included canopy recruits, *Acacia* spp. *Dodonaea triquetra* and exotics such as *Lantana camara*. Understorey vegetation was moderately disturbed and dominated by native and exotic herbs and grasses.

Pest vegetation was present throughout the site, predominantly in the shrub and understorey layers. Observed pest species included environmental weeds, *Weeds of National Significance*, declared pest plants under the *Biosecurity Act 2014* and declared pest plants under the *Ipswich Pest Management Plan 2010*.

Botanical survey results are contained in Appendix 5.

4.4.2.2 TREE SURVEY

A total of 835 trees were identified as part of the survey and assessment. Of these:

- 792 were native trees, endemic to south east Queensland; and,
- 43 were dead or unidentified.

Results of the assessment of vigour (Institute of Australian Consulting Arboriculturalists 2010) identified that of the 835 trees on site:

- 773 trees were assessed as having *good* vigour;
- 21 trees were assessed as having *low* vigour; and,
- 41 trees were dead.

Results of the assessment of condition (Institute of Australian Consulting Arboriculturalists 2010) identified that:

- 772 trees were assessed as being in *good* condition;
- 15 trees were assessed as being in *fair* condition;
- Seven (7) trees were assessed as being in *poor* condition; and,
- 41 trees were dead.

The location of all vegetation identified as part of the tree survey is indicated in the Vegetation Management Plan (Litoria Consulting, 21/2/19, Issue B) (Appendix 6). A list of all surveyed trees, along with results of fauna habitat features and assessment of vigour and condition, is contained in Appendix 6.

4.4.2.3 THREATENED SPECIES SURVEY

The results of the Wildlife Online database search indicate that one (1) threatened plant species has been recorded within a 3km radius of the site since 1980. The results of the PMST database search indicated seven (7) plant species may occur, are likely to occur or are known to occur within a 3km radius of the site based on habitat types and known species distributions.

The combined results of both database searches are displayed in Table 2, together with the listed presence or likelihood of the species or its habitat occurring within a 3km radius of the site.

Table 2: Database search results - Threatened plants (Department of Science Information Technology Innovation and the Arts 2018; Department of the Environment and Energy 2018).

Scientific Name	Common Name	Presence	NCA	EPBC
Arthraxon hispidus	Hairy-joint Grass	M	V	V
Bosistoa transversa	Three-leaved Bosistoa	L	LC	V

Scientific Name	Common Name	Presence	NCA	EPBC
Dichanthium setosum	Bluegrass	L	-	V
Melaleuca irbyana	-	C	E	-
Notelaea lloydii	Lloyd's Native Olive	L	V	V
Notelaea ipsviciensis	-	M	E	CE
Samadera bidwillii	Quassia	L	V	V
Thesium australe	Austral Toadflax	L	V	V

TABLE CODES:

- Presence – C indicates presence confirmed within 3km of site (based on DEHP Wildlife Online search), L indicates species or habitat *likely* to occur within 3km of site and M indicates species or habitat *may* occur within 3km of site (based on *EPBC* Protected Matters Search Tool).
- NCA – Indicates the Queensland conservation status of each taxon under the *Nature Conservation Act 1992*, coded as Extinct in the Wild (EX), Endangered (E), Vulnerable (V), Near threatened (NT) or Least Concern (LC).
- EPBC - Indicates the Commonwealth conservation status of each taxon under the *EPBC Act*, coded as Extinct in the wild (XW), Critically Endangered (CE), Endangered (E), Vulnerable (V) or Conservation Dependent (CD).

Despite the results of the database searches, no threatened plant species were recorded on the subject site during the botanical survey or the targeted threatened species survey, including *Melaleuca irbyana*. Refer to Appendix 5 for vegetation survey results.

4.5 FAUNA

4.5.1 METHODS

A search was undertaken to identify threatened fauna species that may occur, are likely to occur, or are known to occur within 3km of the study site. A search of the Queensland DEHP Wildlife Online database (Department of Science Information Technology Innovation and the Arts 2018) was undertaken for all threatened fauna species recorded within a 3km radius of the site since 1980 (Appendix 4).

In addition, a search of the Commonwealth Government's *Environment Protection and Biodiversity Conservation Act 1999* Protected Matters Search Tool (EPBC PMST) (Department of the Environment and Energy 2018) was undertaken to determine fauna species of National Environmental Significance (including threatened species and migratory species listed under the EPBC Act, or their habitat) that may occur, are likely to occur or are known to occur within a 3km radius of the site (Appendix 2).

For each of the species identified from the database searches, an assessment of the likelihood of the species utilising or occupying the site was undertaken based on a heuristic decision-based approach incorporating known habitat associations and preferences of species according to expert knowledge by Litoria ecologists and published accounts of each species. Likelihood categories into which each species was divided included:

- **Confirmed:** Species observed or recorded from the site based on systematic survey or opportunistic observations by Litoria ecologists, or based on credible anecdotal observations by other sources ($p(x) = 100\%$[5]);
- **Likely:** Site contains known or potential habitats for the species and species recorded from similar habitats in locality of the site ($p(x) > 50\%$);
- **Possible:** Site contains known or potential habitats for the species; however species not recorded from locality of the site, or vice versa ($p(x) \cong 50\%$); and
- **Unlikely:** Site does not contain known or potential habitats for the species and/or species not recorded from locality of the site ($p(x) < 50\%$).

Terrestrial fauna surveys were conducted during June 2018 and February 2019 by up to five (5) qualified and experienced field ecologists using various fauna surveying techniques.

The location of various surveying techniques throughout the site was influenced primarily by the level of disturbance and assessments of important vegetation and habitat zones, and included the following:

- **Diurnal bird survey:** Diurnal bird surveys were undertaken by meandering throughout the site to ensure adequate spatial and temporal representation of different habitat areas and types. Surveys were undertaken within 30 minutes of sunrise / sunset. Bird species were identified by sight or by sound, with birds only identified by sound if the identity and location of the species was certain.
- **Nocturnal spotlight searches:** Nocturnal spotlighting was undertaken on two (2) evenings to identify any fauna utilising the site at night. Spotlighting was undertaken using a 12 volt 50 Watt xenon spotlight with red coloured filter.
- **Call playback:** Call playback was undertaken on two (2) nights during the survey period. Calls were broadcast from a loudspeaker connected to an MP3 player for approximately 2 minutes duration, followed by at least three minutes of listening.
- **Opportunistic records**: Additional records were collected opportunistically while traversing on site. These opportunistic records were observed and recorded by Litoria ecologists, and are separate to any anecdotal records, which are reported separately.
- **Koala survey and habitat assessment:** A Koala survey and habitat assessment was undertaken using the Koala Rapid Assessment Method (KRAM) developed by Woosnam *et al* (2013). In addition to the KRAM method, all trees were assessed as part of the tree survey for the presence of koalas, koala scats and koala scratches.

[5] $p(x)$ – represents the probability (p) that a given species (x) could occupy or utilise the site.

4.5.2 RESULTS

A total of 44 species of fauna were observed on site during the ecological assessments. Refer to Table 1 for a list of observed species.

Table 3: Species observed on site during field surveys.

Common name	Scientific name
Amphibians	
Eastern Sedgefrog	*Litoria fallax*
Beeping Froglet	*Crinia parinsignifera*
Peron's Tree Frog	*Litoria peronii*
Birds	
Guineafowl	*Numida meleagris*
Australian Wood Duck	*Chenonetta jubata*
Pacific Black Duck	*Anas superciliosa*
Little Eagle	*Hieraaetus morphnoides*
Masked Lapwing	*Vanellus miles*
Pied Currawong	*Strepera graculina*
Grey Fantail	*Rhipidura albiscapa*
Willie Wagtail	*Rhipidura leucophrys*
Torresian Crow	*Corvus orru*
Magpie-lark	*Grallina cyanoleuca*
Scarlet Robin	*Petroica boodang*
Pale-yellow Robin	*Tregellasia capito*
Eastern Yellow Robin	*Eopsaltria australis*
Double-barred Finch	*Taeniopygia bichenovii*
Noisy Miner	*Manorina melanocephala*
Laughing Kookaburra	*Dacelo novaeguineae*
Crested Pigeon	*Ocyphaps lophotes*
Australian Magpie	*Cracticus tibicen*
Striated Pardalote	*Pardalotus striatus*
Rainbow Lorikeet	*Trichoglossus moluccanus*
Superb Fairy-wren	*Malurus cyaneus*
Black-faced Cuckoo-shrike	*Coracina novaehollandiae*
Pied Butcherbird	*Cracticus nigrogularis*
Grey Butcherbird	*Cracticus torquatus*
Noisy Friarbird	*Philemon corniculatus*
Pheasant Coucal	*Centropus phasianinus*
Rufous Whistler	*Pachycephala rufiventris*
Black Kite	*Milvus migrans*
White-throated Gerygone	*Gerygone olivacea*
Forest Kingfisher	*Todiramphus macleayii*
Red-backed Fairy-wren	*Malurus melanocephalus*
White-eared Honeyeater	*Lichenostomus leucotis*
Figbird	*Sphecotheres viridis*
Little Lorikeet	*Glossopsitta pusilla*
Brown Treecreeper	*Climacteris picumnus*
Mammals	
Squirrel Glider	*Petaurus norfolcensis*
Common Brushtail Possum	*Trichosurus vulpecula*
Eastern Grey Kangaroo	*Macropus giganteus*
Red Fox	*Vulpes vulpes*

Common name	Scientific name
Unidentified Flying-fox species	*Pteropus* sp.
Brown Hare	*Lepus europaeus*

TABLE CODES:

- NCA – Indicates the Queensland conservation status of each taxon under the *Nature Conservation Act 1992*, coded as Extinct in the Wild (EX), Endangered (E), Vulnerable (V), Near threatened (NT) or Least Concern (LC).
- EPBC - Indicates the Commonwealth conservation status of each taxon under the *EPBC Act*, coded as Extinct in the wild (XW), Critically Endangered (CE), Endangered (E), Vulnerable (V) or Conservation Dependent (CD).

A number of key fauna habitat features were identified on site and immediately adjacent to the site including:

- Large stags and habitat trees that may act as perching sites for birds of prey.
- Coarse woody debris, logs and rocks provided habitat for ground-dwelling fauna.
- Scats and diggings present throughout the site. Although a range of scats were observed, none of these were positively identified as belonging to the Koala.
- Termite mounds, both ground and arboreal, were noted, some with observed hollows and/or diggings.
- Artificial / modified dams and soaks providing habitat for aquatic fauna.
- Hollow bearing trees and nests.

4.5.2.1 THREATENED FAUNA SPECIES

No threatened fauna species were identified as part of the site assessments, including no direct or indirect evidence of the Koala.

Although scats were located as part of the KRAM survey located , laboratory analysis of the scats confirmed these as belonging to species other than Koala. No scats were recorded as positively belonging to the Koala. Further, assessment of habitat use and fauna utilisation as part of the tree survey did not identify any confirmed koala scratches.

During the site assessments, foxes were observed on site, as well as domestic dogs on adjoining properties. The presence of both may contribute to the lack of Koala observations.

One (1) species of threatened fauna has been recorded within 3km of the subject site according to the DEHP Wildlife Online report. In addition, 23 nationally-threatened fauna species (and their habitats) may occur, are likely to occur or are known to occur within 3km of the site according to the PMST (Department of the Environment and Energy 2017).

Refer to Section 4.5.2.2 below for habitat suitability assessment incorporating the likelihood of listed threatened species occupying or utilising the site.

4.5.2.2 FAUNA HABITAT SUITABILITY ASSESSMENT

The likelihood of the fauna species utilising or occupying the subject was undertaken based on a fauna habitat suitability assessment considering known habitat associations

and preferences of species according to expert knowledge by Litoria ecologists and published accounts of each species (Appendix 7). Specifically, the assessment was based on a heuristic decision process (Appendix 8). The fauna habitat suitability assessment was undertaken for 23 species, incorporating:

- Confirmed observations of threatened species;
- Threatened species identified in the Wildlife Online report; and,
- Threatened species identified in the PMST report.

Of the 23 species, the fauna habitat suitability assessment indicated:

- Two (2) species are likely to be encountered utilising or occupying the site;
- One (1) species could possibly utilise or occupy the site at some time; and,
- 20 species are unlikely to utilise or occupy the site.

The 20 species deemed unlikely to occupy or utilise the site, is largely based on inappropriate habitat present within the vicinity of the site (e.g. absence of wetland environments preclude wetland species).

An overview of threatened species identified as likely or possibly utilising the site is provided below:

Southern Greater Glider (*Petauroides volans volans*) – *Vulnerable* under the NC Act and the EPBC Act. The species is largely restricted to eucalypt forests and woodlands. The Greater Glider favours forests with a diversity of eucalypt species with relatively old trees and abundant hollows (Martin *et al.* 2016). Given the presence of eucalypts and hollow bearing trees on site, this species was categorised as possible to utilise the site.

Koala - SEQ bioregion (*Phascolarctos cinereus*) – *Vulnerable* in SEQ bioregion under the NC Act and the EPBC Act. Koalas inhabit a range of temperate, sub-tropical and tropical forest, woodland and semi-arid communities dominated by species from the genus *Eucalyptus*. Koala habitat can be broadly defined as any forest or woodland containing species that are known koala food trees, or shrubland with emergent food trees. The distribution of this habitat is largely influenced by land elevation, annual temperature and rainfall patterns, soil types and the resultant soil moisture availability and fertility (Department of the Environment 2014). Given the presence of koala habitat trees and the confirmed records in the vicinity of the site (Department of Science Information Technology Innovation and the Arts 2018), this species was categorised as likely to occupy or utilise the site.

Grey-headed Flying-fox (*Pteropus poliocephalus*) – *Vulnerable* under the EPBC Act and *least concern* under the NC Act. The species occupies a variety of habitats from rainforest to woodland to wetland, foraging on nectar and pollen of native trees including *Eucalyptus*, *Melaleuca*, *Banksia* in addition to the fruits of rainforest trees and vines. Given the presence of native trees throughout the site, and the large number of Grey-headed Flying-fox recorded throughout much of the greater Brisbane region, it is possible that this species could utilise the site for foraging. Assessment of impacts on the Grey-headed Flying Fox are guided by the *EPBC Act Administrative Guidelines on Significance - Supplement for the Grey-headed Flying-fox* (Department of the Environment and Heritage 2003). As the proposed development does not impact directly on roosting habitats for the species, significant impacts under the *EPBC Act* are not expected to occur.

4.6 SUMMARY

Overall results of the ecological assessment indicate that the existing environment could be summarised as follows:

- The landform pattern in the vicinity of the proposed development can be described as *undulating rises* (UR) to *undulating low hills* (UL) according to the National Committee on Soil and Terrain (2009), with much of the land lying between 50m - 66m AHD.
- The geology of the site is Gatton Sandstone.
- The site is located within the Bundamba Creek catchment, which is located to the west of the site. Site assessment indicated that no watercourses were present; however, the site contains two small artificial / modified dams.
- The site has been historically cleared of remnant vegetation with evidence of maintenance and grazing. Existing vegetation could be described as native regrowth vegetation.
- No threatened plant species were recorded on the subject site during the botanical survey or targeted threatened species survey, including *Melaleuca irbyana*, which is known to occur in the vicinity of the site.
- Terrestrial fauna surveys were conducted during June 2018 and February 2019.
- A total of 44 species of fauna were observed on site during the ecological assessments.
- No threatened fauna species were identified as part of the site assessments, including no direct or indirect evidence of the Koala.
- Fauna habitat suitability assessment was undertaken for threatened species known, or likely, to utilise or occupy the site. Results indicated that the majority of potential species are unlikely to utilise or occupy the site, on account of an absence of any appropriate habitat on or in the vicinity of the site.
- In addition to direct observations, a number of key fauna habitat features were identified on site and immediately adjacent the site including:
    - Large stags and habitat trees that may act as perching sites for birds of prey.
    - Coarse woody debris, logs and rocks provided habitat for ground-dwelling fauna.
    - Scats and diggings present throughout the site. Although a range of scats were observed, none of these were positively identified as belonging to the Koala.
    - Termite mounds, both ground and arboreal, were noted, some with observed hollows and/or diggings.
    - Artificial / modified dams and soaks providing habitat for aquatic fauna.
    - Hollow bearing trees and nests.

5 IMPACT ASSESSMENT

The purpose of this section of the report is to address development impacts in the context of the observed / existing environment values of the site which were identified via a combination of spatial analysis (GIS data), field investigations, and a review of relevant wildlife databases (DEHP Wildlife Online, EPBC Protected Matters Search Tool).

Environmental management and impact mitigation, described in detail in the following section, is referenced in this section of the report where applicable.

The assessment is divided into the following sections:

1. Vegetation;
2. Fauna; and,
3. Waterways and wetlands.

5.1 VEGETATION

Environmental impacts of development relating to vegetation included direct and indirect impacts. Direct impacts on vegetation could include:

- Reduced canopy species richness;
- Reduced species abundance; and,
- Changes to the structure of the vegetation communities - directly via vegetation removal and indirectly via survivorship and recruitment.

Direct impacts are primarily associated with vegetation removal needed to facilitate development during the construction stage and physical damage to retained vegetation post construction. Damage to conserved vegetation may be deliberate or accidental.

Indirect impacts include incidental effects of development which cause changes in biotic and abiotic factors which affect the structure and function of retained vegetation communities including:

- Weed invasion and competition;
- Changes to hydrological regimes and runoff quality (i.e. stormwater runoff); and,
- Changes to microclimate (e.g. humidity, solar irradiation, nutrients, soil chemistry and structure).

A Vegetation Management Plan (Litoria Consulting, 21/2/19, Issue B) has been developed for the site which assesses the impact of the proposed development on all trees greater than 100mm DBH.

The results of the assessment indicated that of the 835 surveyed trees:

- 811 trees are to be removed within the site boundary;
- 22 trees will require removal to facilitate works external to the site;

- Two (2) trees external to the site will be retained; and,

Trees to be removed are indicated in the VMP drawings (Appendix 6), together with management recommendations and requirements.

Despite the large number of trees being removed to facilitate the development, the site is not mapped in an environmental protection area under the Ripley Valley Urban Development Area Development Scheme. As such, subject to the adoption of the management measures outlined in Section 6 of the EAR, the proposed development is consistent with the outcomes sought by the Ripley Valley Urban Development Area Development Scheme.

Although the State Planning Policy identifies that the site contains *MSES - Regulated vegetation (category C)*, this is consistent with the area mapped as Category C (High value regrowth vegetation) regulated vegetation on the DNRM Regulated vegetation management map and has been assessed as being *exempt clearing work* in accordance with Schedule 21, Part 2, Item 2 (g) of the Planning Reg.

5.2 FAUNA

Potential impacts on fauna can be categorised as direct impacts associated with habitat loss to indirect impacts on conserved habitat features. Possible fauna impacts of the proposed development include:

- Potential clearing of vegetative habitat, including habitat trees and replacement of habitat niches (e.g. conversion of open grassy areas to built structures);
- Changes in habitat niche availability caused by indirect impacts on the structure and function of conserved vegetation communities;
- Competition and predation via the introduction and spread of pest animal species (e.g. cats, dogs and other domestic pets);
- Potential impacts of light pollution on the structure and function of fauna communities through creation of 'night-light niches', favouring some species (e.g., some species of Microchiropteran bats) often to the detriment of other species (e.g., compromised immune function of some species associated with elevated stress levels due to predation risk foraging in higher than normal ambient light conditions, as well as alteration to circadian clocks, while some frogs limit movement and breeding activity as a result of elevated predation risk associated with high light conditions); and,
- Increased risk of road kills associated with increased traffic volumes.

Based on the proposed development footprint and associated engineering works, the proposed development will result in the clearing of the entire site, including fauna habitat features identified in Section 4.5.2 above.

Although the proposed development results in the clearing of koala habitat, it is not expected to have major impacts on the Koala as:

- No direct or indirect evidence of the koala was observed as part of the assessment; and,

- Any residual impacts will be minimised via the management practices and mitigation strategies identified in Section 6.

Despite the impacts of development on fauna habitat, the site is not mapped in an environmental protection area under the Ripley Valley Urban Development Area Development Scheme. As such, subject to the adoption of the management measures outlined in Section 6 of the EAR, the proposed development is consistent with the outcomes sought by the Ripley Valley Urban Development Area Development Scheme.

5.3 WATERWAYS AND WETLANDS

Direct and indirect impacts of development on waterways include:

- Physical disturbance including clearing of riparian vegetation and earthworks;
- Changes to hydrological regimes (e.g. peak flow discharge);
- Changes in water quality (physical and chemical); and,
- Changes to microclimate (e.g. humidity, solar irradiation, nutrients, soil chemistry and structure).

These impacts can result in changes to habitat structure and function which in turn, impacts on the distribution of plant and animal species within riparian ecosystems.

Site assessment indicated that the mapped waterway was not present on site, with the site containing two small artificial / modified dams only. Any impacts of development on these are proposed to be offset through the management measures outlined in Section 6, including rehabilitation of the proposed basins.

The Ripley Valley Urban Development Area Development Scheme identified that the site is located outside of riparian corridors and waterways. As such, subject to the adoption of the management measures outlined in Section 6 of the EAR, the proposed development is consistent with the outcomes sought by the Ripley Valley Urban Development Area Development Scheme.

A mapped *MSES – Regulated vegetation (intersecting a watercourse)* is located within the proposed development footprint; however, results of the ecological assessment indicated that this was not present on site.

6 ENVIRONMENTAL MANAGEMENT

This section of the EAR describes environmental management measures which are intended to manage, mitigate and/or offset the identified environmental impacts of the proposed development. Compliance with the applicable outcomes is subject to the implementation of management actions. Management measures have been categorised according to the stages of development.

The following subsections describe recommended management actions and can be structured by Council as conditions as part of a development permit. Proposed measures include:

i. Vegetation management;
ii. Fauna management;
iii. Landscaping; and,
iv. Rehabilitation.

Management measures relating to the management of stormwater runoff, including erosion and sediment control are addressed as part of separate reports to Council.

6.1 VEGETATION MANAGEMENT

This section describes management practices and mitigation strategies which aim to reduce impacts on native vegetation present on the site. The following vegetation management measures can be conditioned as part of a development permit:

- Vegetation clearing extents are clearly identified on-site prior to the commencement of works;
- Vegetation protection fencing is established at the interface between all works areas and vegetation to be retained/conserved during clearing works;
- Individual habitat trees to be retained within the development footprint are clearly flagged and vegetation protection fencing is established is established in accordance with *AS 4970 2009 Trees and development* (12 x DBH(m));
- Vegetation removal to be undertaken by suitably qualified contractors;
- Vegetation clearing is staged or takes place sequentially, allowing animals to move to adjoining habitats;
- Any tree pruning or maintenance works is carried out by qualified arborist in accordance with *AS 4373 2007 Pruning of amenity trees*;
- All cleared native vegetation is mulched on-site and recycled for use in landscape treatments;
- Mulch stockpiles are to be located in existing cleared areas, outside of TPZs and at least 40m from waterway/wetland areas;
- Mulch stockpiles are subject to erosion/sediment control measures in accordance with Council design standards; and,
- Exotic vegetation mulch is to be disposed of as green waste at landfill.

A Vegetation Management Plan (Litoria Consulting, 21/2/19, Issue B) (Appendix 6) has also been has been prepared which includes management practices.

Residual impacts shall be mitigated in accordance with the management measures in Section 6, including rehabilitation of the proposed basins.

6.2 FAUNA MANAGEMENT

This section describes management practices and mitigation strategies which aim to reduce impacts on native animals present on the site.

Proposed management measures include measures to be taken during construction to minimise or mitigate short-term impacts. Proposed construction measures include:

- A fauna spotter/catcher is to inspect all areas to be cleared prior to the commencement of works;
- Fauna spotter/catcher is to supervise and be present on each day that vegetation clearing takes place; and
- Where identified, active hollows, nests or other breeding places are not to be interfered with. Tampering with an animal breeding place is in violation of the *Nature Conservation Act 1999* under section 332 of the *Nature Conservation (Wildlife Management) Regulation 2006*. However, this does not apply to a person removing or otherwise tampering with the breeding place if the removal or tampering is part of an approved species management program for animals of the same species, or, the person holds a damage mitigation permit for the animal and the permit authorises the removal or tampering.

Design measures should be reflected in landscaping and subsequent development applications over the site. The following elements can be conditioned by Council as part of future development permits for the site:

- The use of traffic-calming devices where roads front existing native vegetation to minimise traffic impacts on fauna, subject to detailed design.
- Landscaping within the development footprint should complement and connect existing vegetation, thus providing conduits of dispersal for fauna throughout the site.
- All artificial night lighting to be directed downwards and away from vegetation areas through the installation of low-spillage lighting throughout the development, particularly near areas of retained vegetation and wetland and/or watercourse areas. From a CPTED perspective, lighting is more effective if pointed downwards rather than outwards as glare from non-directed lights reduces observability.
- Lighting setbacks from watercourse buffers to reduce impacts on amphibians or other wetland-dependent species.
- Lighting along any pedestrian pathways to be mounted on bollards that direct lighting downwards, thus reducing the distance that some light-tolerant and light-sensitive fauna species are influenced.
- Night lighting along such walkways or within vegetated areas should be motion-activated, and ideally, remain lit for no longer than 100 seconds once activated, to

reduce long-lasting effects on some fauna (e.g., some nocturnal species can be blinded for up to an hour under bright light, thus increasing predation risk).

- Low-pressure sodium globes or other globes emitting yellow light should be used preferentially as they generally do not generally attract flying insects, that themselves attract light-tolerant fauna.
- Rehabilitation of the proposed basins should include replacement of fauna habitat for, including:
    - Relocation of course woody debris and any hollows from felled trees.
    - The installation of a range of different sized nest boxes to offset any loss of existing natural hollows associated with clearing of vegetation. Nest boxes should be installed for a range of birds, possums and gliders.
    - The installation of koala habitat and fodder trees which are characteristic of the site and the locality.
    - The installation of known food trees for Squirrel Gliders.

6.3 LANDSCAPING

Landscaping incorporating retention of native vegetation, revegetation of cleared areas, pest management and habitat augmentation are management measures designed to reduce and offset the impacts of the proposed development. Best-practice measures involving retention of native trees, particularly hollow-bearing habitat trees and use of native species in landscaping can be used to:

- Minimise the risk of introduction of environmental weeds;
- Reduce the impact of habitat loss on native species; and,
- Improve connectivity/permeability within the landscape.

Landscaping requirements can be conditioned as part of any development permit and should address *inter alia*, the following elements of best-practice:

- Provision of perimeter roads between development and conservation/park/open space areas;
- Use of locally indigenous plant species;
- Matching plant species to observed landform / land zones / pre-clearing regional ecosystems;
- Establishment of structural layers within landscaped vegetation (understorey, shrub and canopy species);
- Promote fine-scale 'patchiness' of vegetation;
- Weed management measures;
- Habitat augmentation measures including:
    - The installation of nest boxes to offset loss of tree hollows associated with mature trees cleared for the development;
    - Incorporation of hollow logs and other microhabitat attributes into landscaping to support potential threatened fauna possibly occupying or utilising the site.
- Lighting of pathways / access in accordance with Section 6.2;
- Water management / irrigation; and,

- Control of public access to conservation areas.

6.4 REHABILITATION

Rehabilitation of the basins and park forms part of the proposed management measures designed to reduce and mitigate the impacts of the proposed development. Any Rehabilitation Plan should focus on the proposed basins and park area, including weed / pest management, installation of native species and replacement of fauna habitat.

Rehabilitation requirements can be conditioned as part of any development permit and should address *inter alia*, the following elements:

- Species selection in accordance with preclearing regional ecosystems for the site;
- Weed management;
- Pest management;
- Fauna management including:
    - Relocation of course woody debris and any hollows from felled trees.
    - The installation of a range of different sized nest boxes to offset any loss of existing natural hollows associated with clearing of vegetation. Nest boxes should be installed for a range of birds, possums and gliders.
    - The installation of koala habitat and fodder trees which are characteristic of the site and the locality.
    - The installation of known food trees for Squirrel Gliders.
- Water management / irrigation;
- Revegetation;
- Performance indicators (of biocondition); and,
- Establishment and maintenance costs.

Rehabilitation is to be in accordance with the South East Queensland Ecological Restoration Framework. Rehabilitation can be conditioned by Council as part of any development permit.

7 SUMMARY ASSESSMENT

This EAR was prepared by Litoria Consulting for Lin Hai Development Pty Ltd for land described as 7-101 Bayliss Road, South Ripley (Lot 80 on SP162940).

The purpose of the EAR is to:

- Describe the ecological features and processes of the development site and adjacent lands;
- Provide an assessment of the nature conservation values of these features and processes;
- Provide a description of threatening processes evident on site;
- Document potential development impacts upon these ecological values and features; and,
- Detail impact mitigation measures which will be undertaken to avoid or mitigate those impacts to an acceptable standard.

The EAR includes the following:

- Description of existing environment (vegetation, habitats, waterways, wetlands, biodiversity/conservation values etc.);
- GIS mapping of vegetation communities and habitats;
- Impact assessment;
- Environmental management and compliance measures; and,
- Technical appendices.

The proposed development is for a residential subdivision, including, residential lots, new road, basins and recreational parkland.

Overall results of the ecological assessment indicate that the existing environment could be summarised as follows:

- The landform pattern in the vicinity of the proposed development can be described as *undulating rises* (UR) to *undulating low hills* (UL) according to the National Committee on Soil and Terrain (2009), with much of the land lying between 50m - 66m AHD.
- The geology of the site is Gatton Sandstone.
- The site is located within the Bundamba Creek catchment, which is located to the west of the site. Site assessment indicated that no watercourses were present; however, the site contains two small artificial / modified dams.
- The site has been historically cleared of remnant vegetation with evidence of maintenance and grazing. Existing vegetation could be described as native regrowth vegetation.
- No threatened plant species were recorded on the subject site during the botanical survey or targeted threatened species survey, including *Melaleuca irbyana*, which is known to occur in the vicinity of the site.
- Terrestrial fauna surveys were conducted during June 2018 and February 2019.
- A total of 44 species of fauna were observed on site during the ecological assessments.

- No threatened fauna species were identified as part of the site assessments, including no direct or indirect evidence of the Koala.
- Fauna habitat suitability assessment was undertaken for threatened species known, or likely, to utilise or occupy the site. Results indicated that the majority of potential species are unlikely to utilise or occupy the site, on account of an absence of any appropriate habitat on or in the vicinity of the site.
- In addition to direct observations, a number of key fauna habitat features were identified on site and immediately adjacent the site including:
    - Large stags and habitat trees that may act as perching sites for birds of prey.
    - Coarse woody debris, logs and rocks provided habitat for ground-dwelling fauna.
    - Scats and diggings present throughout the site. Although a range of scats were observed, none of these were positively identified as belonging to the Koala.
    - Termite mounds, both ground and arboreal, were noted, some with observed hollows and/or diggings.
    - Artificial / modified dams and soaks providing habitat for aquatic fauna.
    - Hollow bearing trees and nests.

The proposed development was assessed against the outcomes sought by the Ripley Valley Urban Development Area Development Scheme. Results of the assessment indicated that, subject to the adoption of the management measures outlined in Section 6 of the EAR, the proposed development is consistent with the outcomes sought by the Ripley Valley Urban Development Area Development Scheme.

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