



ANNUAL HABITAT MONITORING REPORT

**Birrigan Iluka Beach, Iluka
Lot 99 on DP823635 (Parent Lot)**

A Report Prepared for
The Stevens Group

NOVEMBER 2022

JWA Pty Ltd

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1 INTRODUCTION

1.1 Background

JWA Pty Ltd have been engaged by The Stevens Group to prepare an Annual Habitat Monitoring report for the Birrigan Iluka Beach development site, located at Hickey Street, Iluka - originally described as Lot 99 on DP823635 (parent lot). This lot has been subdivided into Lot 1, Lot 2 and Lot 3 DP271283. The Birrigan Iluka Beach development is an approved 141 lot community scheme subdivision over the subject land (**FIGURES 1 & 2**). The subdivision incorporates 140 residential allotments and one (1) Community Property allotment (now Lot 1 DP271283) containing retained bushland. The Community Property Lot will be owned and maintained by the Birrigan Iluka Beach Association.

JWA previously prepared a Habitat Management Plan (HMP) (JWA 2020) as required by EPBC Act approval (2017/8003) which included an amelioration strategy designed to minimise the impacts on fauna during both the construction and operational phases, undertake nature regeneration/revegetation works and to ensure that ecological processes and corridor function within the identified rehabilitation areas are protected and amplified. The HMP was subsequently approved by Minister for the Environment on the 3rd August 2020.

As part of the amelioration strategy, an ongoing monitoring program was established to meet the conditions of the Clarence Valley Council (CVC) and Commonwealth Department of Environment and Energy (DEE) approvals. The ongoing monitoring program includes:

- Fauna management;
- Nest boxes;
- Retained habitat/rehabilitation;
- Subdivision infrastructure construction by Contractor; and
- Operational management by the Association.

A separate Koala Monitoring and Reporting Program has been prepared in accordance with Condition 4f of the EPBC Act approval (2017/8003). Some of the fauna management procedures during vegetation clearing are also relevant to the koala, and this is noted where applicable.

This report details the methodology and results from the 2nd annual habitat monitoring program.

1.2 Project Status

The following provides an update on the key milestones and current status of the Birrigan Iluka Beach development.

- The project received approval under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) on 22nd March 2019 (EPBC Act Ref 2017/8003).



LEGEND
[Red Box] Site Boundary



Scale 1:20 000 - Lengths in metres
200 0 200 400 600 800 1000

SOURCE: Open Street Maps

SCALE: 1 : 20 000 @ A3

JWA PTY LTD
Ecological Consultants

CLIENT
Ocean Park Consulting Pty Ltd
PROJECT
Annual Koala Monitoring Report
Birrigan Estate
Lot 99 on DP823635, Hickey Street, Iluka NSW
Clarence Valley Council LGA

FIGURE 2
PREPARED: BW
DATE: 08 September 2021
FILE: N202001_SAT_20210908.dwg

TITLE
LOCALITY PLAN

- Clarence Valley Council (CVC) approved the Stage 1 Vegetation Clearing and Bulk Earthworks on the 2nd December 2020 (CVC Ref CC 2020/0623).
- Stage 1 Vegetation Clearing and Bulk Earthworks commenced on site on the 3rd December 2020 and were completed on the 18th December 2020.
- CVC approved the Subdivision Works Certificate - Stage 2 Vegetation Clearing on the 1st July 2021 (CVC Ref CC 2021/0061).
- Stage 2 Vegetation Clearing commenced on site on the 23rd August 2021 and were completed on the 8th September 2021.
- Stage 1 Bushland Rehabilitation works commenced on the 27th September 2021.
- A small area of additional clearing (within Elizabeth Street Road reserve) was completed on 26th October 2021.
- Stage 3 & 4 (cleared simultaneously) Vegetation Clearing commenced on site on the 30th May 2022 and were completed on the 22nd June 2022.

2 MANAGEMENT STRATEGY IMPLEMENTATION

This Annual Habitat Monitoring Report has been prepared to discuss the results of the monitoring of management strategies implemented to date in relation to retained vegetation and rehabilitation, koala infrastructure, and construction and operational management against the Monitoring Performance Criteria identified in the approved HMP (JWA 2020). Management strategies within the approved HMP are apportioned to pre-construction, construction and operational phases of the development.

The Implementation Schedules below (**TABLES 1-3**) have been extracted from the approved HMP and identify the associated personnel, and timing for all pre-construction, construction and operational phase management actions. Performance measures to be achieved during the 'establishment period' and 'maintenance period' of the project are also included in the implementation tables where appropriate. The Implementation Tables have been reproduced below as a checklist for whether the relevant management actions have been complied with, and appropriate evidence is also provided where relevant.

TABLE 1: PRE-CONSTRUCTION PHASE IMPLEMENTATION TABLE

| Management Strategy | Applicable Management Area/s | Management Action | Responsibility | Performance Measure | Compliant | Details |
|---|---|---|--|--|-----------|--|
| Education of Site Personnel | MA1 / MU1 | An induction program will be developed prior to construction commencing and all construction personnel, and any other persons/contractors completing works on the site during the construction phases, are to complete the induction prior to starting work on the site in accordance with SECTION 6.2 of the HMP. | Principal Contractor / Site Supervisor | Induction program developed and all relevant personnel completed induction prior to starting work on the site. Records of all training conducted maintained. | ✓ | A site induction was completed with construction personnel and contractors prior to construction commencing by Adam McArthur, Principal Ecologist (JWA), on the 2 nd December 2020. |
| Nest Boxes | MA2 / MU2 MA3 / MU4 MA4 / MU7 MA5 / MU10 | Hollows removed for development replaced with nest boxes at minimum 1:1 ratio one (1) month prior to clearing works in accordance with SECTION 6.3 of the HMP. | Project Ecologist | Nest boxes installed and details of each installation provided to Council. | ✓ | Nest boxes were installed on the 27 th July 2020. Additional boxes were installed as required post Stage 2 clearing works on the 13 th January 2022. Monitoring results are provided in APPENDIX 1 . Additional boxes were installed as required post Stage 3 and 4 clearing works on the 14 th October 2022. These nest boxes will be included in the next round of monitoring. |
| Provision of Spotter Catcher | MA1 / MU1 | A suitably qualified fauna spotter catcher will be appointed to conduct a pre-clearing site inspection and oversee all clearing works in accordance with SECTION 6.3.2 of the HMP. | Principal Contractor / Site Supervisor | Fauna spotter catcher appointed. | ✓ | Pre-clearing inspection and supervision of clearing works have been undertaken prior to Stage 1 clearing, Stage 2 clearing and a small amount of additional clearing required within the Elizabeth Street road reserve. Pre-clearing inspection and supervision of clearing works have been undertaken prior to Stage 3 and 4 clearing between the 30 th May and 22 nd June 2022. Copies of relevant documentation are provided in APPENDIX 2 . |
| Pre-clearing Site Inspection for Habitat Features | MA1 / MU1 | Site Inspection completed no more that one (1) day prior to commencement of clearing with each stage to identify and mark for habitat trees/features in accordance with SECTION 6.3.3 of the HMP. | Project Ecologist | Site inspection completed and habitat trees/features marked. | ✓ | Pre-clearing site inspection were completed and habitat/trees were marked by a JWA ecologist prior to clearing of Stage 1 and Stage 2. Pre-clearing site inspection were completed and habitat/trees were marked by a JWA ecologist prior to clearing of Stage 3 and Stage 4. Refer to copies of relevant documentation in APPENDIX 2 . |
| | MA1 / MU1 | A pre-clearing report prepared prior to clearing in accordance with SECTION 6.3.3 of the HMP. | Project Ecologist | Report prepared. | ✓ | |
| Erosion and Sediment Control Measures | MA1 / MU1 | All measures contained in the Sediment and Erosion Control Plan to be implemented prior to the commencement of construction in accordance with SECTION 6.5 of the HMP. | Proponent | Sediment and erosion control measures implemented. | ✓ | Sediment and erosion control measures have been implemented as necessary. |
| Management of Retained Habitat | MA2 MA3 MA4 MA5 MA6 | Retained habitat within Bushland Parks A - E clearly identified on site with marking pegs prior to commencement of construction works in accordance with SECTION 6.8 of the HMP. | Principal Contractor / Site Supervisor | Boundaries of retained habitat areas identified and marked. | ✓ | Retained habitat within Bushland Parks A - E was clearly identified on site prior to commencement of clearing works. |
| Retained Habitat / Rehabilitation Monitoring | MA2 MA3 MA4 MA5 MA6 | Baseline retained habitat monitoring completed prior to commencement of construction in accordance with SECTION 7.4 of the HMP. | Project Ecologist | Baseline retained habitat monitoring completed. | ✓ | Baseline retained habitat monitoring has been completed and a copy of the report is provided in the Annual Habitat Monitoring Report 1 (JWA 2021). |
| | MA2 MA3 MA4 MA5 MA6 | Baseline monitoring report prepared in accordance with SECTION 7.6.1 of the HMP. | Project Ecologist | Baseline monitoring report completed. | ✓ | |

TABLE 2 - CONSTRUCTION PHASE IMPLEMENTATION TABLE

| Management Strategy | Applicable Management Area/s | Management Action | Responsibility | Performance Measure | Compliant | Details |
|---|---|---|--|--|-----------|---|
| No Go Zones | MA2 MA3 MA4 MA5 MA6 | Access to no-go zones (Management Areas 2 - 6) by construction personnel and machinery is prohibited during clearing works except for non-destructive works (e.g. bush regeneration) with prior approval in accordance with SECTION 6.4.3 of the HMP. | Principal Contractor / Site Supervisor / Project Ecologist | No unauthorised access to no-go zones. | ✓ | No unauthorised access to no-go zones has occurred. |
| | MA2 MA3 MA4 MA5 MA6 | In accordance with SECTION 6.3.5 of the HMP the following activities are not permitted within the No Go Zones: <ul style="list-style-type: none"> Storage and mixing of materials; Vehicle parking; Liquid disposal; Machinery repairs and/or refuelling; Construction site office or shed; Combustion of any material; Stockpiling of soil, rubble and debris, cleared vegetation and site mulch; Any filling or excavation including trench line, topsoil skimming and/or surface excavation; and Unauthorised pesticide, herbicide or chemical applications. | Principal Contractor / Site Supervisor | No prohibited activities within no go zones. | ✓ | No prohibited activities within no go zones have occurred. |
| Pre-clearing Site Inspection for Fauna | MA1 / MU1 | Clearing area to be inspected for presence of koalas and other fauna prior to the commencement of clearing each day in accordance with SECTION 6.3.4 of the HMP. | Fauna Spotter Catcher | Pre-clearing site inspection for fauna completed. | ✓ | Pre-clearing inspection and supervision of clearing works have been undertaken prior to Stage 1 clearing, Stage 2 clearing and a small amount of additional clearing required within the Elizabeth Street road reserve. Pre-clearing inspection and supervision of clearing works have been undertaken prior to Stage 3 and 4 clearing between the 30 th May and 22 nd June 2022. No native animals have been observed to be injured or killed to date. Copies of relevant documentation is provided in APPENDIX 2 . |
| | | | | No native animals injured or killed. | ✓ | |
| Nest Boxes | MA2 / MU2 MA3 / MU4 MA4 / MU7 MA5 / MU10 | Additional hollows removed during clearing works replaced with nest boxes at minimum 1:1 ratio in accordance with SECTION 6.3 of the HMP. | Project Ecologist | Nest boxes installed and details of each installation provided to Council. | ✓ | Nest boxes were installed on the 27 th July 2020. Additional boxes were installed as required post Stage 2 clearing works on the 13 th January 2022. Monitoring results are provided in APPENDIX 1 . Additional boxes were installed as required post Stage 3 and 4 clearing works on the 14 th October 2022. These nest boxes will be included in the next round of monitoring. |
| | MA2 / MU2 MA3 / MU4 MA4 / MU7 MA5 / MU10 | Nest boxes monitored and maintained on an annual basis until completion of all stages and then for an additional period of three (3) years in accordance with SECTION 7.3 of the HMP. | Project Ecologist / Community Property (Lot 1) Contractor | Nest boxes monitored and repaired/replaced as required. | ✓ | |
| | MA2 / MU2 MA3 / MU4 MA4 / MU7 MA5 / MU10 | Annual nest box monitoring results to be included in the Annual Habitat Monitoring Report in accordance with SECTION 7.3 and SECTION 7.6.2 of the HMP. | Project Ecologist / Community Property (Lot 1) Contractor | Reporting completed. | ✓ | |
| Vegetation and Fauna Management During Construction Phase | MA1 / MU1 | Tree clearing undertaken in accordance with procedures outlined in SECTION 6.3.6 and SECTION 6.3.7 of the HMP. | Principal Contractor / Site Supervisor / Fauna Spotter Catcher | Tree clearing procedures followed. | ✓ | All tree clearing procedures have been followed under the supervision of a suitably qualified fauna spotter catcher. Copies of relevant documentation is provided in APPENDIX 2 . |
| | MA1 / MU1 | Vegetation waste to be mulched and retained on site for re-use in landscape works or disposed of appropriately in accordance with SECTION 6.3.6 of the HMP. | Principal Contractor / Site Supervisor | Vegetation waste reused on site or disposed of appropriately. | ✓ | Vegetation has been mulched and reused in rehabilitation areas - refer to APPENDIX 3 . |

| Management Strategy | Applicable Management Area/s | Management Action | Responsibility | Performance Measure | Compliant | Details |
|--|------------------------------|--|--|---|-----------|---|
| | MA1 / MU1 | Hollow logs to be relocated to areas proposed for rehabilitation works in accordance with SECTION 6.3.6 of the HMP. | Project Ecologist | Hollow logs relocated where appropriate. | ✓ | Hollow logs have been relocated to areas proposed for rehabilitation where appropriate - refer to the spotter catcher reports (APPENDIX 2). |
| | MA1 / MU1 | Stockpile areas are to be clearly delineated on plans and on the ground and soil and vegetation debris must be stockpiled within defined areas in accordance with SECTION 6.3.6 of the HMP. | Principal Contractor / Site Supervisor | Stockpile locations identified and marked. Soil and vegetation debris stockpiled in designated areas. | ✓ | Stockpile locations were identified and marked prior to commencement. Soil and vegetation debris has been stockpiled in designated areas. |
| | MA1 / MU1 | Construction zone to be regularly monitored for weeds and any weeds controlled in accordance with SECTION 6.3.6 of the HMP. | Principal Contractor / Site Supervisor | Weeds controlled during construction phase. | ✓ | Weeds have been suitably controlled during construction phase of Stage 1, Stage 2, Stage 3 and Stage 4. |
| | ALL | Hygiene protocols for machinery (such as wash-down procedures) and personnel (such as boot-cleaning), are to be strictly observed to minimise the spread of weeds and the movement of pathogens in accordance with SECTION 6.3.6 of the HMP. | Principal Contractor / Site Supervisor | Hygiene protocols followed. | ✓ | Hygiene protocols have been appropriately followed. |
| | MA1 / MU1 | Any fauna captured on site during clearing works will be relocated/translocated by the spotter catcher to a suitable habitat area/s on or adjacent to the site the same day of capture in accordance with SECTION 6.3.7.4 of the HMP. | Fauna Spotter Catcher | Fauna relocated as required. | ✓ | Any fauna captured on site during clearing works have been suitably relocated/translocated. Refer to the spotter catcher reports (APPENDIX 2). |
| | MA1 / MU1 | Any animals injured or requiring support / rehabilitation during tree clearing to be immediately removed from site and taken to an appropriately qualified veterinary surgeon / wildlife carer or centre as required in accordance with SECTION 6.3.7.4 and SECTION 6.3.8 of the HMP. | Fauna Spotter Catcher | Animals provided appropriate care. | ✓ | No animals have been injured to date. Refer to the spotter catcher reports (APPENDIX 2). |
| | MA1 / MU1 | Earthworks and/or the clearing of native vegetation will be temporarily suspended (up to 72 hrs) within a 25 m radius of any tree in which a koala is located and will not resume until the koala has moved outside of the clearing area of its own accord (SECTION 6.3.7.4 of the HMP). If the animal does not self-relocate out of the clearing area within 72 hrs of its initial observation, experts will be consulted in relation to an appropriate protocol to encourage the animal to relocate. The tree can only to be removed following inspection by an appropriately qualified ecologist/fauna handler to ensure that the koala has dispersed and that the removal of the tree poses no direct threat to the health or survival of the koala. | Fauna Spotter Catcher | Procedures for tree clearing in vicinity of koalas observed. | ✓ | No koalas located during clearing works of Stage 1, Stage 2, Stage 3 or Stage 4. Spotter catcher reports are included in APPENDIX 2 . |
| | MA1 / MU1 | A Post Clearing Fauna Spotter Report to be prepared within two (2) weeks of completion of each stage of clearing activities and forwarded to all relevant agencies including CVC in accordance with SECTION 6.3.7.4 of the HMP. | Principal Contractor / Site Supervisor / Fauna Spotter Catcher | Post Clearing Fauna Spotter Report prepared and provided to relevant agencies. | ✓ | Spotter catcher reports are included in APPENDIX 2 . |
| Protocols for the Discovery of an Injured or Dead Animal | ALL | Any animals injured or requiring support / rehabilitation during construction phase to be immediately removed from site and taken to an appropriately qualified veterinary surgeon / wildlife carer or centre as required in accordance with SECTION 6.3.7.4 and SECTION 6.3.8 of the HMP. | Principal Contractor / Site Supervisor / Fauna Spotter Catcher | Animals provided appropriate care. | ✓ | No animals have been injured to date. Refer to the spotter catcher reports (APPENDIX 2). |
| | ALL | WIRES to be notified of any dead animals in accordance with SECTION 6.3.8 of the HMP. | Principal Contractor / Site Supervisor / Fauna Spotter Catcher | WIRES notified as required. | ✓ | No animals have been killed to date. Refer to the spotter catcher reports (APPENDIX 2). |

| Management Strategy | Applicable Management Area/s | Management Action | Responsibility | Performance Measure | Compliant | Details |
|-----------------------------|------------------------------|---|---|--|-----------|--|
| | ALL | Any koala observation or incident during the construction phase should result in an observation/incident report in accordance with SECTION 6.3.8 of the HMP. | Principal Contractor / Site Supervisor / Fauna Spotter Catcher | Observation/incident report completed as required. | ✓ | No koalas located during clearing works of Stage 1, Stage 2, Stage 3 or Stage 4. Spotter catcher reports are included in APPENDIX 2 . |
| Fencing During Construction | MA1 / MU1 | The works area to be clearly delineated with temporary fencing (e.g. with high visibility para-webbing) during clearing and construction works in accordance with SECTION 6.4.1 of the HMP. | Principal Contractor / Site Supervisor | Temporary fencing installed. | ✓ | Temporary fencing has been installed and inspected as required. No repairs have been necessary to date. |
| | MA1 / MU1 | Temporary fencing to be inspection at not less than one (1) monthly intervals in accordance with SECTION 6.4.1 of the HMP. | Principal Contractor / Site Supervisor | Temporary fencing inspected. | ✓ | |
| | MA1 / MU1 | Any damage to fences to be repaired within two (2) working days of the discovery in accordance with SECTION 6.4.1 of the HMP. | Principal Contractor / Site Supervisor | Temporary fencing repaired as required. | n/a | |
| Construction Signage | ALL | Temporary signage to be installed during construction phases in accordance with SECTION 6.4.3 of the HMP. Following signage required: <ul style="list-style-type: none"> Signs warning all personnel and the public of dangers, work health and safety requirements and contact details for the Site Manager. At appropriate and highly visible locations noting the total prohibition of dogs on the site; Beside temporary roads/haul routes noting a 50 km/hr speed limit, or 40 km/hr speed limit where roads traverse the environmental protection areas; and At approximately 100 m intervals along all fencing stating "Environmental Protection Zone - No Unauthorised Entry". | Principal Contractor / Site Supervisor | Temporary signage installed. | ✓ | Temporary signage has been installed as appropriate. |
| Permanent Signage | ALL | Permanent signage to be installed at end of construction phase at each Bushland Park in accordance with SECTION 6.4.4, SECTION 6.11 and SECTION 6.10 of the HMP. Following types of signage required: <ul style="list-style-type: none"> Notification of conservation area (including educational material on significant flora, fauna and EECs known to occur within the local area - Coastal Cypress Pine Forest and Littoral rainforest); Specific information regarding the Iluka Peninsula Koala population; Prohibition of dumping of garden refuse in bushland areas; The importance of dog control, particularly between dusk and dawn and warning of total prohibition of dogs within the conservation area; Contact details for WIRES as the primary organization for the rehabilitation of sick and injured koalas in the locality; and Contact information for incident reporting. | Principal Contractor / Site Supervisor | Permanent signage installed. | n/a | Stage 1: Landscape signage post signs and interpretive signs installation planned mid-September 2022. Stages 2-4: Not applicable - the project is not yet at the end of construction phase. |

| Management Strategy | Applicable Management Area/s | Management Action | Responsibility | Performance Measure | Compliant | Details |
|---------------------------------------|---------------------------------|---|--|--|-----------|---|
| Erosion and Sediment Control Measures | MA1 / MU1 | All measures contained in the Sediment and Erosion Control Plan to be implemented and maintained throughout construction phase in accordance with SECTION 6.5 of the HMP. | Principal Contractor / Site Supervisor | Sediment and erosion control measures implemented and maintained. | ✓ | Sediment and erosion control measures have been implemented as necessary. |
| Access and Traffic Management | ALL | All traffic access to occur via Hickey Street or at the intersection of Elizabeth Street and Micalo Street, or within the existing bushfire access track during construction in accordance with SECTION 6.6 of the HMP. | Principal Contractor / Site Supervisor | Appropriate traffic and access controls implemented. | ✓ | Appropriate traffic and access controls have been implemented. |
| | ALL | Vehicles and deliveries are not to block any access along roads or the fire trail in accordance with SECTION 6.6 of the HMP. | Principal Contractor / Site Supervisor | Appropriate traffic controls implemented. | ✓ | |
| | ALL | Vehicles and construction plant to be restricted to a maximum speed of 40 kph (or less as identified by the contractor) and daylight operation for the duration of the construction phase in accordance with SECTION 6.6 of the HMP. | Principal Contractor / Site Supervisor | Appropriate traffic controls implemented. | ✓ | |
| | | | | No reported vehicle strike mortalities | ✓ | To date there has been no reported vehicle strike mortalities. |
| Verge Management and Maintenance | MA1 / MU1 | Tree planting in the road verges to be completed in accordance with the Landscape Master Plan (Moir Landscape Architecture 2018) and SECTION 6.7 of the HMP. | Principal Contractor / Site Supervisor | Tree planting in road verges completed as required. | n/a | Construction is ongoing and landscaping works are in progress for Stages 2, 3 and 4. Final inspection of Stage 1 Landscaping was completed on the 26 th August 2022. |
| Management of Retained Habitat | ALL | Retained habitat to be maintained/improved through weed control and rehabilitation works in accordance with the protocols as described in SECTION 6.8 and SECTION 6.9 of the HMP. | Bush Regeneration Company | Weed control and rehabilitation works completed as required. Specific performance indicators and targets for rehabilitation works are provided in SECTION 7.4.3 . | ✓ | <p>Weed control and rehabilitation works commenced on 27th September 2021.</p> <p>Stage 1 went to 'On Maintenance' on the 24th March 2022.</p> <p>Compliance with Specific performance indicators and targets for rehabilitation works was assessed during the first round of monitoring completed June 2022 - refer to the Retained Vegetation Monitoring Report 2022 (APPENDIX 4).</p> <p>Lot 1 north of Stage 3 weed removal underway in late September 2022. Dead vegetation / leaves caused by prolonged surface stormwater inundation in 2021 / 2022 rain / flood events.</p> <p>Late September 2022: Lot 1 north-east corner area adjacent to Iluka Road first round of weed removal underway.</p> |
| Rehabilitation Strategy | MA2 MA3 MA4 MA5 MA6 | Rehabilitation works and weed control to be completed in accordance with SECTION 6.9 of the HMP. | Bush Regeneration Company | Rehabilitation works and weed control completed. Specific performance indicators and targets for rehabilitation works are provided in SECTION 7.4.3 . | ✓ | Weed control and rehabilitation works commenced on 27th September 2021 and the first follow-up inspection and treatment occurred in November 2021. Compliance with Specific performance indicators and targets for rehabilitation works were assessed during the first round of monitoring in June 2022 - refer to the Vegetation Monitoring Report 2022 (APPENDIX 4). |
| | MA2 MA3 MA4 MA5 MA6 | Weed monitoring visits will be completed every month for the duration of the establishment period, and every six (6) months during the maintenance period in accordance with SECTION 6.9.5.5 of the HMP. | Bush Regeneration Company | Weed monitoring completed. | ✓ | Weed control and rehabilitation works commenced on 27th September 2021 and the first follow-up inspection and treatment occurred in November 2021. Compliance with Specific performance indicators and targets for rehabilitation works were assessed during the first round of monitoring in June 2022 - refer to the Vegetation Monitoring Report 2022 (APPENDIX 4). |

| Management Strategy | Applicable Management Area/s | Management Action | Responsibility | Performance Measure | Compliant | Details |
|--|---------------------------------|--|--|--|-----------|---|
| | MA2 MA3 MA4 MA5 MA6 | Plantings within the APZs are to be minimal and consist of low, 'fire retardant' ground covers in accordance with SECTION 6.9.7.4 of the HMP. | Bush Regeneration Company | Minimal plantings within APZ. | ✓ | Rehabilitation works within APZs are compliant. |
| | MA2 MA3 MA4 MA5 MA6 | No rehabilitation plantings are to occur within the existing fire break along the southern boundary in accordance with SECTION 6.9.7.4 of the HMP. | Bush Regeneration Company | No plantings within fire break. | ✓ | No plantings have occurred within the fire break. |
| | MA2 MA3 MA4 MA5 MA6 | Replacement preferred koala food trees to be planted in rehabilitation areas in accordance with SECTION 6.9.7.4 of the HMP. | Bush Regeneration Company | Replacement trees planted. | ✓ | Weed control and rehabilitation works commenced on 27th September 2021 and the first follow-up inspection and treatment occurred in November 2021. Replacement preferred koala food trees have been planted. |
| | ALL | No plantings of any <i>Acronychia</i> species are to occur on site in accordance with SECTION 6.9.7.4 of the HMP. | Bush Regeneration Company | No <i>Acronychia</i> species planted. | ✓ | No <i>Acronychia</i> species have been planted. |
| Domestic Pet Controls | ALL | All dogs will be banned from the subject site during the construction phase in accordance with SECTION 6.10 of the HMP. | Contractor / Site Supervisor | No dogs on site. | ✓ | To date there has been no dogs reported on site |
| | ALL | Any evidence of dogs within Bushland Parks observed during monitoring or maintenance works to be reported to the Community Association in accordance with SECTION 6.10 of the HMP. | Contractor / Site Supervisor | Evidence of dogs reported. | ✓ | |
| Fire Management | ALL | Fire hazard within Bushland Parks managed appropriately in accordance with SECTION 6.12 of the HMP. | The Proponent | Fire management activities completed as required. | n/a | Fire management activities have not occurred/been necessary at this stage. |
| Fauna Management Monitoring | MA1 / MU1 | Details of all fauna encountered during clearing works are to be recorded and reported in accordance with SECTION 7.2 of the HMP. | Project Ecologist / Fauna Spotter Catcher | Reporting completed. | ✓ | Spotter catcher reports are included in APPENDIX 2 . No other encounters with fauna have occurred to date. |
| Retained Habitat / Rehabilitation Monitoring | MA2 MA3 MA4 MA5 MA6 | Retained habitat/rehabilitation monitoring to be completed six (6) monthly until the establishment period performance criteria are met and then annually during the maintenance period in accordance with SECTION 7.4.2 of the HMP. | Project Ecologist | Retained habitat / rehabilitation monitoring completed | ✓ | Weed control and rehabilitation works commenced on 27th September 2021 and the first follow-up inspection and treatment occurred in November 2021. Compliance with Specific performance indicators and targets for rehabilitation works were assessed during the first round of monitoring in June 2022 - refer to the Vegetation Monitoring Report 2022 (APPENDIX 4). |
| | MA2 MA3 MA4 MA5 MA6 | The bush regeneration team to keep work sheets detailing works completed in accordance with SECTION 7.4.2.4 of the HMP. | Bush Regeneration Company | Reporting completed. | ✓ | Weed control and rehabilitation works commenced on 27th September 2021 and the first follow-up inspection and treatment occurred in November 2021. Compliance with Specific performance indicators and targets for rehabilitation works were assessed during the first round of monitoring in June 2022 - refer to the Vegetation Monitoring Report 2022 (APPENDIX 4). |
| Infrastructure, Construction and Operational | ALL | Relevant construction activities and infrastructure to be monitored during and after construction in accordance with SECTION 7.5 of the HMP. | Contractor / Site Supervisor / Project Ecologist | Monitoring completed. | ✓ | Relevant monitoring during the construction period is ongoing. |

| Management Strategy | Applicable Management Area/s | Management Action | Responsibility | Performance Measure | Compliant | Details |
|--|---------------------------------|--|---|--|-----------|--|
| Management Monitoring | ALL | Construction/installation of temporary and/or permanent fences and signage to be monitored to ensure that no barriers to wildlife movement created and temporary fencing does not prevent koalas accessing koala habitat on the site in accordance with SECTION 7.5.2 of the HMP. | Project Ecologist | Fencing and signage installation/construction monitored and no barriers created. | ✓ | Temporary fencing has been installed and inspected and as required. |
| | ALL | Visual inspections of infrastructure to be completed on a monthly basis during construction phase in accordance with SECTION 7.5.2 of the HMP. | Project Ecologist | Inspections completed. | ✓ | Relevant monitoring during the construction period is ongoing. |
| | ALL | Where damage or other failures to infrastructure are observed a report will be prepared within 24 hours and the damage or failure corrected within 48 hours of the report in accordance with SECTION 7.5.2 of the HMP. | Principal Contractor / Site Supervisor | Report completed. Damage or failure corrected. | ✓ | No damage or other failures to infrastructure have been observed to date. |
| Disease Management for Koalas | ALL | In the event that a suspected diseased koala is observed during monitoring, the time, date and location of the sighting must be recorded and provided to an appropriate wildlife care organization as soon as practicable in accordance with SECTION 8.3.2 of the HMP. | Project Ecologist | Suspected diseased koalas reported. | ✓ | No sick koalas have been observed to date. |
| Annual Habitat Monitoring Report | ALL | Annual Habitat Monitoring Report to be prepared and submitted to CVC and DAWE in accordance with SECTION 7.5.2 , SECTION 7.6.2 and SECTION 7.6.3 of the HMP. | Project Ecologist | Annual Habitat Monitoring Report prepared and submitted. | ✓ | This report represents the second Annual Habitat Monitoring Report. |
| Annual Koala Activity Monitoring and Reporting | MA2 MA3 MA4 MA5 MA6 | Annual Koala activity monitoring to be completed from the date of commencement of works and continue for a period extending to five (5) years after completion of the final stage in accordance with SECTION 8.3.2 of the HMP. | Project Ecologist | Koala activity monitoring completed. | ✓ | Annual Koala Monitoring Reports have been completed and latest report is included in APPENDIX 5 . |
| | MA2 MA3 MA4 MA5 MA6 | Additional koala activity monitoring event to be completed in the event of an uncontrolled bushfire occurring on the Birrigan Iluka Beach site in accordance with SECTION 8.3.3 of the HMP. | Project Ecologist | Additional monitoring completed as required. | n/a | Not applicable. No uncontrolled bushfires have occurred. |
| | MA2 MA3 MA4 MA5 MA6 | Annual Koala Monitoring Report to be prepared in accordance with SECTION 8.3.2 and SECTION 8.6.2 of the HMP. | Project Ecologist | Annual Koala Monitoring Report prepared. | ✓ | The Annual Koala Monitoring Reports have been completed and latest report is included in APPENDIX 5 . |
| Lighting | MA1 / MU1 | Lighting in public areas to be kept at a minimum required for safety and amenity in accordance with SECTION 6.4.5 of the HMP. | Contractor, Utility Service Provider (electricity and lighting) | Appropriate lighting installed. | n/a | Construction is ongoing and installation of lighting is yet to commence. |
| | MA1 / MU1 | All street lighting to be capped and/or positioned to minimise light spill into retained habitat and habitat rehabilitation areas in accordance with SECTION 6.4.5 of the HMP. | Contractor, Utility Service Provider (electricity and lighting) | Street lighting capped and/or appropriately positioned. | n/a | Construction is ongoing and installation of lighting is yet to commence. |

TABLE 3 - OPERATIONAL PHASE IMPLEMENTATION TABLE

| Management Strategy | Applicable Management Area/s | Management Action | Responsibility | Performance Measure | Compliance | Details |
|-------------------------------|------------------------------|---|---|---|------------|---|
| Fencing Post Construction | ALL | No fencing to be constructed within Bushland Parks in accordance with SECTION 6.4.2 of the HMP. | Community Property (Lot 1) Contractor | No fencing installed in Bushland Parks. | n/a | Not Applicable - Operational Phase is yet to commence |
| | ALL | Bollards or large stone blocks to be installed (where required) to delineate boundaries of Bushland Parks and prevent vehicle incursion in accordance with SECTION 6.4.2 of the HMP. | Community Property (Lot 1) Contractor | Appropriate measures installed where required to delineate Bushland Park boundaries and prevent vehicle access. | n/a | Not Applicable - Operational Phase is yet to commence |
| Permanent Signage | ALL | Permanent signage to be maintained in accordance with SECTION 6.4.4 , SECTION 6.11 and SECTION 6.10 of the HMP. | Community Property (Lot 1) Contractor | Permanent signage maintained. | n/a | Not Applicable - Operational Phase is yet to commence |
| Lighting | MA1 / MU1 | Lighting in public areas to be kept at a minimum required for safety and amenity in accordance with SECTION 6.4.5 of the HMP. | Contractor, Utility Service Provider (electricity and lighting) | Appropriate lighting installed. | n/a | Not Applicable - Operational Phase is yet to commence |
| | MA1 / MU1 | All street lighting to be capped and/or positioned to minimise light spill into retained habitat and habitat rehabilitation areas in accordance with SECTION 6.4.5 of the HMP. | Contractor, Utility Service Provider (electricity and lighting) | Street lighting capped and/or appropriately positioned. | n/a | Not Applicable - Operational Phase is yet to commence |
| | MA1 / MU1 | Outdoor lighting in residential lots to be of low-wattage and of a type that reduces spills and glare in accordance with SECTION 6.4.5 of the HMP. | Owners and Occupiers | Appropriate lighting installed. | n/a | Not Applicable - Operational Phase is yet to commence |
| | MA1 / MU1 | No lights to be directed towards the retained bushland or into the entrances of pre-existing hollows in accordance with SECTION 6.4.5 of the HMP. | Community Property (Lot 1) Contractor / Residents | Lighting appropriately positioned. | n/a | Not Applicable - Operational Phase is yet to commence |
| Swimming Pools | MA1 / MU1 | Backyard swimming pools to include an acceptable Koala escape mechanism in accordance with SECTION 6.4.6 of the HMP. | Owners and Occupiers | Koala escape mechanisms provided to swimming pools. | n/a | Not Applicable - Operational Phase is yet to commence |
| Access and Traffic Management | ALL | Access to the Bushland Parks to be via the existing roads and fire trails and internal tracks within the development footprint in accordance with SECTION 6.6 of the HMP. | Community Property (Lot 1) Contractor | No unauthorised vehicle access. | n/a | Not Applicable - Operational Phase is yet to commence |
| | ALL | No vehicular access to the site is to occur through the Bushland Parks or via any new access point from Iluka Road in accordance with SECTION 6.6 of the HMP. | Community Property (Lot 1) Contractor | No unauthorised vehicle access. | n/a | Not Applicable - Operational Phase is yet to commence |
| | ALL | Fire trail and APZs are to remain clear and act as maintenance tracks in accordance with SECTION 6.6 of the HMP. | Community Property (Lot 1) Contractor | Fire trails and APZs managed and maintained. | n/a | Not Applicable - Operational Phase is yet to commence |
| | MA1 / MU1 | Traffic calming measures to be implemented after occupation in accordance with SECTION 6.6 of the HMP. | Community Property (Lot 1) Contractor | Appropriate traffic calming measures installed where required. | n/a | Not Applicable - Operational Phase is yet to commence |
| | ALL | Awareness of potential for vehicle strike. Vehicles not to exceed speed limits. | Community Property (Lot 1) | No native animals injured or killed on roads. | n/a | Not Applicable - Operational Phase is yet to commence |

| Management Strategy | Applicable Management Area/s | Management Action | Responsibility | Performance Measure | Compliance | Details |
|----------------------------------|------------------------------|---|---|--|------------|---|
| | | | Contractor | | | |
| Verge Management and Maintenance | MA1 / MU1 | Internal public road verges on site and existing external public road verges surrounding the site to be managed and maintained in accordance within SECTION 6.7 of the HMP. | Community Property (Lot 1) Contractor | Road verges managed and maintained. | n/a | Not Applicable - Operational Phase is yet to commence |
| Management of Retained Habitat | ALL | Weeds to be controlled within Bushland Parks in accordance with SECTION 6.8 and SECTION 6.9.5 of the HMP. | Community Property (Lot 1) Contractor | Weeds controlled as needed. | n/a | Not Applicable - Operational Phase is yet to commence |
| Domestic Pet Controls | ALL | Any evidence of dogs within Bushland Parks observed during monitoring or maintenance works to be reported to the Community Association in accordance with SECTION 6.10 of the HMP. | Community Property (Lot 1) Contractor | Evidence of dogs reported. | n/a | Not Applicable - Operational Phase is yet to commence |
| | MA1 / MU1 | Dog-proof and koala-proof exclusion fences and koala escape posts / planks to be installed at premises with dogs in accordance with SECTION 6.10 of the HMP. | Owners and Occupiers | Dog-proof and koala-proof exclusion fences and koala escape posts / planks installed where required. | n/a | Not Applicable - Operational Phase is yet to commence |
| | MA1 / MU1 | Dogs to be on leash at all times within the subdivision when outside of fenced premises in accordance with SECTION 6.10 of the HMP. | Owners and Occupiers | Dogs properly controlled when outside fenced premises. | n/a | Not Applicable - Operational Phase is yet to commence |
| | MA1 / MU1 | Domestic dogs to be confined indoors or within a koala exclusion external fence in accordance with SECTION 6.10 of the HMP. | Owners and Occupiers | No domestic dogs outside premises or enclosures. | n/a | Not Applicable - Operational Phase is yet to commence |
| | MA1 / MU1 | Domestic cats to be confined indoors or within a cat-proof enclosure in accordance with SECTION 6.10 of the HMP. | Owners and Occupiers | No domestic cats outside premises or enclosures. | n/a | Not Applicable - Operational Phase is yet to commence |
| | ALL | All domestic pets are prohibited from Bushland Parks in accordance with SECTION 6.10 of the HMP. | Community Property (Lot 1) Contractor / Residents | No domestic pets in Bushland Parks. | n/a | Not Applicable - Operational Phase is yet to commence |
| | MA1 / MU1 | Dogs and cats are to be desexed in accordance with SECTION 6.10 of the HMP. | Owners and Occupiers | Dogs and cats desexed. | n/a | Not Applicable - Operational Phase is yet to commence |
| | MA1 / MU1 | All domestic pets are to be microchipped and registered within the CVC in accordance with SECTION 6.10 of the HMP. | Owners and Occupiers | Dogs and cats microchipped and registered. | n/a | Not Applicable - Operational Phase is yet to commence |
| | MA1 / MU1 | Vaccinations for all dogs and cats are to be kept up to date at all times in accordance with SECTION 6.10 of the HMP. | Owners and Occupiers | Dogs and cats vaccinated. | n/a | Not Applicable - Operational Phase is yet to commence |
| | MA1 / MU1 | Dogs and cats are to be wearing appropriate identification (collar and tag) at all times in accordance with SECTION 6.10 of the HMP. | Owners and Occupiers | Dogs and cats wearing identification. | n/a | Not Applicable - Operational Phase is yet to commence |
| | MA1 / MU1 | Domestic cats are to either be fitted with a bell to their collar or a motion activated audible and visual alarm to warn nearby wildlife in accordance with SECTION 6.10 of the HMP. | Owners and Occupiers | Cats wearing bell or alarm. | n/a | Not Applicable - Operational Phase is yet to commence |

| Management Strategy | Applicable Management Area/s | Management Action | Responsibility | Performance Measure | Compliance | Details |
|--|---------------------------------|---|---|--|------------|---|
| Disease Management for Koalas | ALL | In the event that a suspected diseased koala is observed during monitoring, the time, date and location of the sighting must be recorded and provided to an appropriate wildlife care organization as soon as practicable in accordance with SECTION 8.3.2 of the HMP. | Project Ecologist / Community Property (Lot 1) Contractor | Suspected diseased koalas reported. | n/a | Not Applicable - Operational Phase is yet to commence |
| Fire Management | ALL | Fire hazard within Bushland Parks managed appropriately in accordance with SECTION 6.12 of the HMP. | Community Property (Lot 1) Contractor | Fire management activities completed as required. | n/a | Not Applicable - Operational Phase is yet to commence |
| Raising Community Awareness and Education | MA1 / MU1 | All new residents will be provided with a copy of the Community Management Statement/bylaws and an environmental education package in accordance with SECTION 6.13 of the HMP. | The Proponent | Community Management Statement/bylaws and an environmental education package provide to all new residents. | n/a | Not Applicable - Operational Phase is yet to commence |
| Retained Habitat / Rehabilitation Monitoring and Reporting | MA2 MA3 MA4 MA5 MA6 | Retained habitat / rehabilitation monitoring to be completed six (6) monthly until the establishment period performance criteria are met and then annually during the maintenance period in accordance with SECTION 7.4.2 of the HMP. | Project Ecologist / Community Property (Lot 1) Contractor | Retained habitat / rehabilitation monitoring completed | n/a | Not Applicable - Operational Phase is yet to commence |
| | MA2 MA3 MA4 MA5 MA6 | The bush regeneration team to keep work sheets detailing works completed in accordance with SECTION 7.4.2.4 of the HMP. | Bush Regeneration Company | Reporting completed. | n/a | Not Applicable - Operational Phase is yet to commence |
| | MA2 MA3 MA4 MA5 MA6 | Annual Habitat Monitoring Report to be prepared and submitted to CVC and DAWE in accordance with SECTION 7.6.2 of the HMP. | Project Ecologist / Community Property (Lot 1) Contractor | Annual Habitat Monitoring Report prepared and submitted. | n/a | Not Applicable - Operational Phase is yet to commence |
| Annual Koala Activity Monitoring and Reporting | MA2 MA3 MA4 MA5 MA6 | Annual Koala activity monitoring to be completed from the date of commencement of works and continue for a period extending to five (5) years after completion of the final stage in accordance with SECTION 8.3.2 of the HMP. | Project Ecologist / Community Property (Lot 1) Contractor | Koala activity monitoring completed. | n/a | Not Applicable - Operational Phase is yet to commence |
| | MA2 MA3 MA4 MA5 MA6 | Additional koala activity monitoring event to be completed in the event of an uncontrolled bushfire occurring on the Birrigan Iluka Beach site in accordance with SECTION 8.3.3 of the HMP. | Project Ecologist / Community Property (Lot 1) Contractor | Additional monitoring completed as required. | n/a | Not Applicable - Operational Phase is yet to commence |
| | MA2 MA3 MA4 MA5 MA6 | An Annual Koala Monitoring Report to be prepared in accordance with SECTION 8.6.2 of the HMP. | Project Ecologist | Report prepared. | n/a | Not Applicable - Operational Phase is yet to commence |

3 CONCLUSION

All pre-construction phase requirements have been complied with. The construction phase is underway, and all relevant fauna and habitat management related actions have been completed in compliance with the requirements of the approved HMP. No non-compliances with the requirements of the approved HMP (JWA 2020) have occurred or been identified to date.

REFERENCES

JWA Pty Ltd (2020) Habitat Management Plan, Birrigan Iluka Beach, Hickey Street, Iluka (Lot 99 on DP823635). Report to Steven Holdings Pty Ltd.

JWA Pty Ltd (2021) Annual Habitat Monitoring Report 1, Birrigan Iluka Beach, Hickey Street, Iluka (Lot 99 on DP823635). Report to The Stevens Group.

APPENDIX 1 - NEST BOX MONITORING REPORT 2022



NEST BOX MONITORING REPORT

**Birrigan Iluka Beach, Iluka
Lot 99 on DP823635**

A Report Prepared for
The Stevens Group

AUGUST 2022

NEW SOUTH WALES

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DOCUMENT CONTROL

Document

| | |
|-------------------------|--|
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| Job Number | N202001 |
| File Reference | \\SERVER\data\2020 CLIENTS\202001 - Birrigan Iluka Beach - Iluka\Nest Box Monitoring |
| Version and Date | RW1 15/08/22 |
| Client | The Stevens Group |

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Client Issue

| Version | Date | Author | | Approved by | |
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| | | Name | Initials | Name | Initials |
| RW1 | 15/08/22 | Nicole Davies | ND | Adam McArthur | AM |
| | | | | | |
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1 INTRODUCTION

1.1 Background

JWA Pty Ltd (JWA) have been engaged by The Stevens Group to undertake required annual nest box monitoring at the Birrigan Iluka Beach development site, located at Hickey Street, Iluka - formally described as Lot 99 on DP823635. The Birrigan Iluka Beach development is an approved 141 lot community scheme subdivision over the subject land (**FIGURES 1 & 2**). JWA previously prepared a Habitat Management Plan (HMP) (JWA 2020) which included an amelioration strategy designed to minimise the impacts on fauna during both the construction and operational phases, undertake nature regeneration/revegetation works and to ensure that ecological processes and corridor function within the identified rehabilitation areas are protected and amplified.

As part of the amelioration strategy, an ongoing nest box monitoring program was established. This report details the methodology and results from the 2nd annual nest box monitoring completed by JWA during July 2022.

1.2 Nest Box Installation/Locations

The installation of nest boxes is required in accordance with the development consent issued for the Birrigan Iluka Beach development to meet the conditions of the Clarence Valley Council (CVC) and Commonwealth Department of Environment and Energy (DEE) approvals.

JWA completed an initial habitat tree audit over the proposed Stage 1 and 2 clearing areas and identified eight (8) hollow-bearing trees within and adjoining the Stage 1 clearing area containing a total of eighteen (18) small hollows, one (1) medium hollow and one (1) large hollow. Based on the 1:1 offset ratio required and the fauna species recorded from the site, particularly the Threatened species that rely on hollows, JWA recommend installing twenty (20) nest boxes.

The nest boxes were installed within the retained habitat areas on the 27th July 2020 by qualified ecologists to compensate for the loss of hollow-bearing trees as part of the development. Nest boxes were designed for target species (Hollow Log Homes Pty Ltd CYPLAS Boxes) and consisted of:

- One (1) Black cockatoo/large owl box (Approx. 360mm l, 490mm w, 640mm h, 150mm opening);
- One (1) Possum box (Approx. 260mm l, 340mm w, 460mm h, 110mm opening);
- Nine (9) Bat boxes (Approx. 300mm l, 160mm w, 340mm h, bottom opening); and
- Nine (9) Small parrot boxes (Approx. 180mm l, 200mm w, 490mm h, 75mm opening).

Additional boxes were installed as required post Stage 2 clearing works in 13th January 2022:

- 3 x bat boxes (approx. 300mm l, 160mm w, 340mm h, bottom opening);



PROJECT:
ILUKA
LOT 99 ON DP 823635

LOCATION:
ILUKA ROAD, ELIZABETH, RIVERVIEW AND HICKEY STREETS
ILUKA, NSW, 2466

| DEVELOPMENT CHARACTERISTICS | |
|-----------------------------|-----------------|
| ITEM | DESCRIPTION |
| PROPERTY DESCRIPTION | LOT 99 DP823635 |
| AREA OF LOT 99 | 19.41 ha. |
| TOTAL NUMBER OF LOTS | 141 |
| PART LOT 1 (Approx.) | 5.29 ha. |

CLARENCE VALLEY COUNCIL
New Bushfire Trail Connection
APPROVAL

**This is the plan referred to in Council's
Notice of Determination of SUB2015/0034**

Date: 13/11/2019

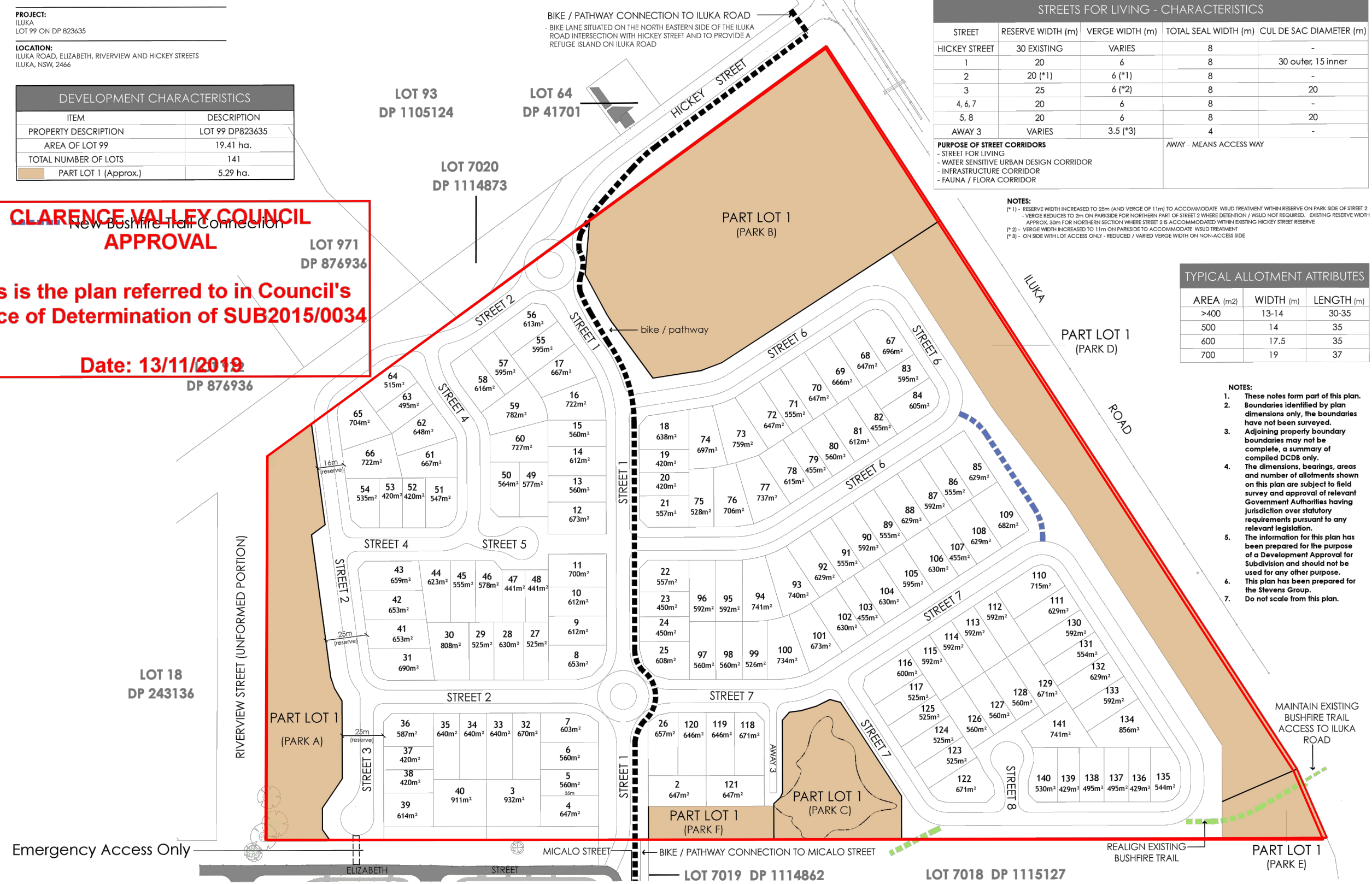
BIKE / PATHWAY CONNECTION TO ILUKA ROAD
- BIKE LANE SITUATED ON THE NORTH EASTERN SIDE OF THE ILUKA ROAD INTERSECTION WITH HICKEY STREET AND TO PROVIDE A REFUGE ISLAND ON ILUKA ROAD

| STREETS FOR LIVING - CHARACTERISTICS | | | | |
|---|-------------------|-----------------|-------------------------|-------------------------|
| STREET | RESERVE WIDTH (m) | VERGE WIDTH (m) | TOTAL SEAL WIDTH (m) | CUL DE SAC DIAMETER (m) |
| HICKEY STREET | 30 EXISTING | VARIES | 8 | - |
| 1 | 20 | 6 | 8 | 30 outer, 15 inner |
| 2 | 20 (*1) | 6 (*1) | 8 | - |
| 3 | 25 | 6 (*2) | 8 | 20 |
| 4, 6, 7 | 20 | 6 | 8 | - |
| 5, 8 | 20 | 6 | 8 | 20 |
| AWAY 3 | VARIES | 3.5 (*3) | 4 | - |
| PURPOSE OF STREET CORRIDORS - STREET FOR LIVING - WATER SENSITIVE URBAN DESIGN CORRIDOR - INFRASTRUCTURE CORRIDOR - FAUNA / FLORA CORRIDOR | | | AWAY - MEANS ACCESS WAY | |

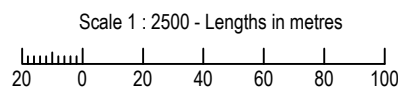
NOTES:
(*1) - RESERVE WIDTH INCREASED TO 25m (AND VERGE OF 11m) TO ACCOMMODATE WSUD TREATMENT WITHIN RESERVE ON PARK SIDE OF STREET 2
- VERGE REDUCES TO 2m ON PARKSIDE FOR NORTHERN PART OF STREET 2 WHERE DETENTION / WSUD NOT REQUIRED. EXISTING RESERVE WIDTH APPROX. 30m FOR NORTHERN SECTION WHERE STREET 2 IS ACCOMMODATED WITHIN EXISTING HICKEY STREET RESERVE
(*2) - VERGE WIDTH INCREASED TO 11m ON PARKSIDE TO ACCOMMODATE WSUD TREATMENT
(*3) - ON SIDE WITH LOT ACCESS ONLY - REDUCED / VARIED VERGE WIDTH ON NON-ACCESS SIDE

| TYPICAL ALLOTMENT ATTRIBUTES | | |
|------------------------------|-----------|------------|
| AREA (m ²) | WIDTH (m) | LENGTH (m) |
| >400 | 13-14 | 30-35 |
| 500 | 14 | 35 |
| 600 | 17.5 | 35 |
| 700 | 19 | 37 |

- NOTES:**
- These notes form part of this plan.
 - Boundaries identified by plan dimensions only, the boundaries have not been surveyed.
 - Adjoining property boundary boundaries may not be complete, a summary of compiled DCDB only.
 - The dimensions, bearings, areas and number of allotments shown on this plan are subject to field survey and approval of relevant Government Authorities having jurisdiction over statutory requirements pursuant to any relevant legislation.
 - The information for this plan has been prepared for the purpose of a Development Approval for Subdivision and should not be used for any other purpose. This plan has been prepared for the Stevens Group.
 - Do not scale from this plan.



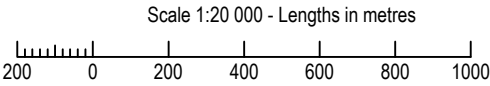
note: the layout is preliminary only and subject to detailed engineering and surveying input. all dimensions and areas are indicative only.



| | | | |
|---|---|---|----------------------------|
| SOURCE: OneCollective - Masterplan (191113 CVC Approved Plans - Extract.pdf) | CLIENT Ocean Park Consulting Pty Ltd | FIGURE 1 | APPROVED MASTER PLAN |
| SCALE: 1 : 2500 @ A3 | PROJECT Nest Box Monitoring Report Birrigan Estate Lot 99 on DP823635, Hickey Street, Iluka NSW Clarence Valley Council LGA | | |
| JWA PTY LTD Ecological Consultants | | PREPARED: BW DATE: 18 November 2021 FILE: N202001_Nest Box 211118.dwg | |



LEGEND
[Red Outline Box] Site Boundary



SOURCE: Open Street Maps

SCALE: 1 : 20 000 @ A3

JWA PTY LTD
Ecological Consultants

CLIENT
Ocean Park Consulting Pty Ltd
PROJECT
Nest Box Monitoring Report
Birrigan Estate
Lot 99 on DP823635, Hickey Street, Iluka NSW
Clarence Valley Council LGA

FIGURE 2
PREPARED: BW
DATE: 18 November 2021
FILE: N202001_Nest Box 211118.dwg

TITLE
**LOCALITY
PLAN**

- 3 x small parrot boxes (approx. 180mm l, 200mm w, 490mm h, 75mm opening);
- 4 x possum box (approx. 260mm l, 340mm w, 460mm h, 110mm opening); and
- 3 x black cockatoo/large owl box (approx. 360mm l, 490mm w, 640mm h, 150mm opening).

FIGURE 3 shows the nest box locations.

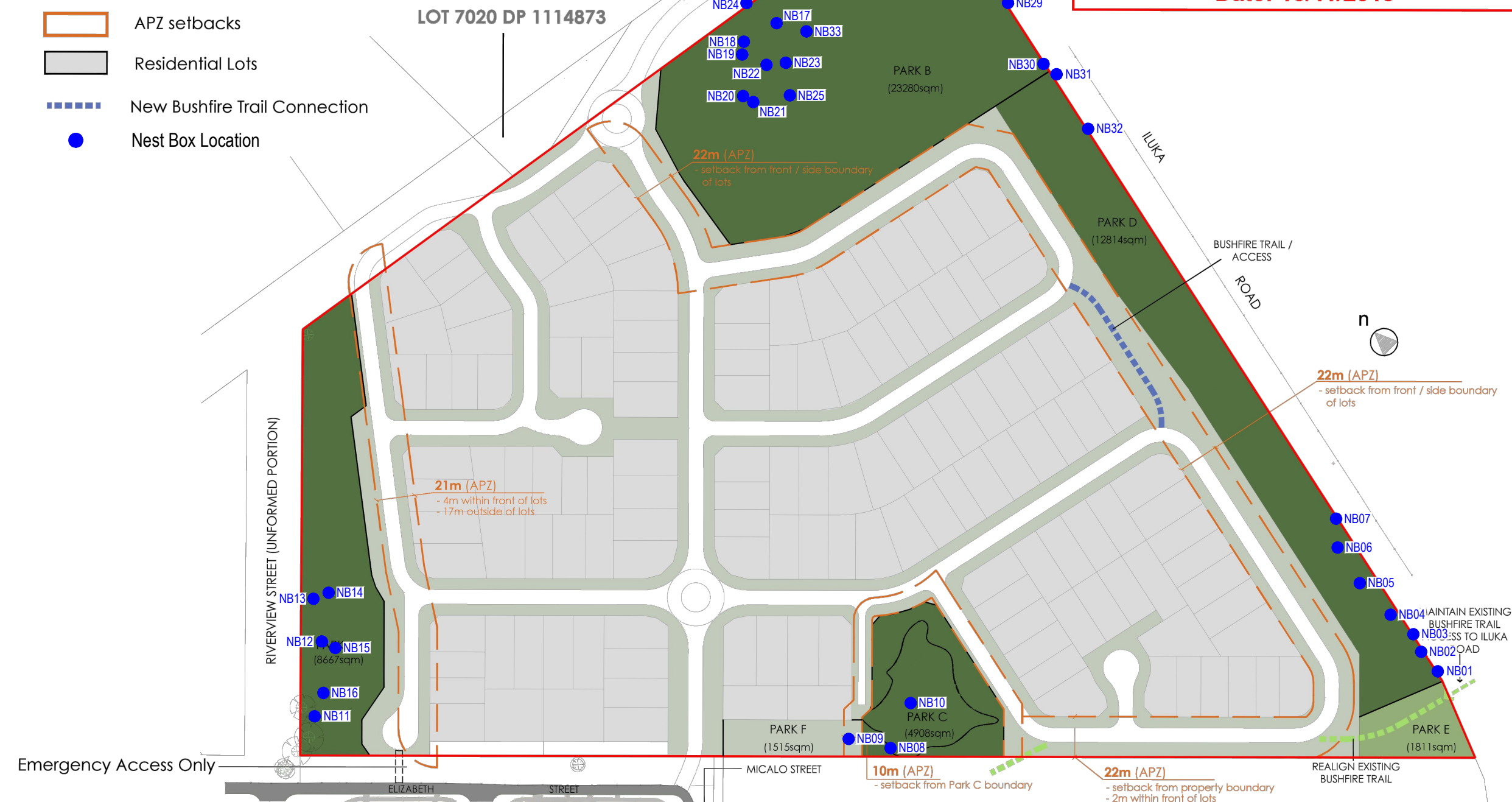
LOT 99 DP 823635

- Core Conservation Zone
- Bushfire Trail Zone
- Street Verges / Landscape Zone
- APZ setbacks
- Residential Lots
- New Bushfire Trail Connection
- Nest Box Location

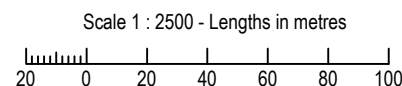
CLARENCE VALLEY COUNCIL APPROVAL

This is the plan referred to in Council's
Notice of Determination of SUB2015/0034

Date: 13/11/2019



note: the layout is preliminary only and subject to detailed engineering and surveying input. all dimensions and areas are indicative only.



| | | | |
|---|---|--|--|
| <p>SOURCE: JWA Site Investigations; OneCollective - Vegetation Zones (191113 CVC Approved Plans - Extract.pdf) SCALE: 1 : 2500 @ A3</p> <p>JWA PTY LTD Ecological Consultants</p> | <p>CLIENT Ocean Park Consulting Pty Ltd PROJECT Nest Box Monitoring Report Birrigan Estate Lot 99 on DP823635, Hickey Street, Iluka NSW Clarence Valley Council LGA</p> | <p>FIGURE 3</p> <p>PREPARED: BW DATE: 19 August 2022 FILE: N202001_Nest Box 20220819.dwg</p> | <p>TITLE</p> <p>NEST BOX LOCATIONS</p> |
|---|---|--|--|

2 METHODOLOGY

2.1 Introduction

The methodology for the nest box monitoring program has been outlined in detail in the HMP (JWA 2020). The methodologies are briefly described in the following sections.

2.2 Monitoring Program

Nest boxes are to be monitored by an experienced ecologist on an annual basis for obvious signs of disrepair and replaced as necessary. Any boxes occupied by feral bees are to be replaced. The annual monitoring of nest boxes will occur until completion of all stages and then for an additional period of three (3) years. The requirement for further ongoing monitoring of nest boxes is to be reviewed upon cessation of this three (3) year period.

An inspection camera mounted on an extendable pole will be used to inspect the contents of nest boxes.

Monitoring of nest boxes will be undertaken and documented by a suitably qualified Ecologist trained to handle fauna (in the event that non-target species are found in the boxes) and to identify fauna species, so target species are not unnecessarily removed or harassed. Records of all inspections are to be provided to the Applicant.

Monitoring should determine the occupation of the boxes by the target species and highlight any maintenance actions that are required. During each monitoring event, a visual inspection of each nest box should be completed, and the following information recorded:

- Any native/pest species occupancy; and
- Any nest box maintenance requirements.

Visual inspection will enable the observer to perform a close inspection for signs of fauna occupancy including feathers, droppings/scats, hair, nesting material and animals themselves. During monitoring, any maintenance requirements should be considered including:

- The need to remove non-target species such as European bees and Ants;
- Replacement of fallen or damaged nest boxes;
- The GPS location of any damaged boxes;
- Re-positioning, re-installation and/or relocation of any wrongly installed or ineffective nest boxes; and
- Checking that each box is not holding water.

2.3 Controls and Corrective Actions

The following controls and corrective actions will be implemented:

- If a nest box becomes occupied by exotic or invasive fauna, the fauna is to be removed within one (1) month of monitoring event; and
- Where damage to a nest box is identified during a monitoring event, the nest box is to be repaired or replaced within one (1) month of monitoring event.

2.4 Reporting

Results of the annual nest box monitoring will be included in the Annual Habitat Monitoring Report.

3 RESULTS

3.1 Nest box monitoring

Nest boxes at the subject site were monitored on the:

- 12th August 2021 by one (1) ecologist; and
- 27th July 2022 by one (1) ecologist.

Nest box monitoring results are shown in **TABLE 1**.

No nest boxes required maintenance/replacing due to damage. No nest boxes were occupied by feral bees.

TABLE 1
NEST BOX MONITORING RESULTS

| Nest Box | | Monitoring Period | |
|------------------|-------|--|--|
| | | July 2020 - August 2021 | September 2021 - July 2022 |
| Bat Box | Nb-01 | Unoccupied | Unoccupied |
| | Nb-03 | Unoccupied | Unoccupied |
| | Nb-05 | Estimated 5 microbats observed. Not identified to species level to avoid disturbance | Microbats observed. Not identified to species level to avoid disturbance |
| | Nb-08 | Unoccupied | Unoccupied |
| | Nb-09 | Unoccupied | Unoccupied |
| | Nb-11 | Unoccupied | Unoccupied |
| | Nb-12 | Estimated 6 microbats observed. Not identified to species level to avoid disturbance | Unoccupied |
| | Nb-13 | Unoccupied | Unoccupied |
| | Nb-18 | Unoccupied. Vines and ant nest removed | Unoccupied |
| | Nb-21 | - | Microbats observed. Not identified to species level to avoid disturbance |
| | Nb-26 | - | Unoccupied |
| | Nb-27 | - | Unoccupied |
| Small Parrot Box | Nb-02 | Unoccupied | Gliders |
| | Nb-04 | Unoccupied | Unoccupied. Evidence of occupation observed i.e. leaf nest. |
| | Nb-07 | Unoccupied | Unoccupied. Evidence of occupation observed i.e. leaf nest. |
| | Nb-10 | Unoccupied | Gliders |
| | Nb-14 | Unoccupied. Evidence of occupation observed i.e. leaf nest | Unoccupied. Evidence of occupation observed i.e. leaf nest |
| | Nb-15 | Unoccupied | Unoccupied. Evidence of occupation observed i.e. leaf nest |
| | Nb-16 | Unoccupied. Evidence of occupation observed i.e. leaf nest | Unoccupied. Evidence of occupation observed i.e. leaf nest |
| | Nb-19 | Unoccupied | Unoccupied |

| | | | |
|----------------------------------|-------|------------|---|
| | Nb-20 | Unoccupied | Unoccupied. Evidence of occupation observed i.e. leaf nest. |
| | Nb-28 | | Unoccupied |
| | Nb-29 | | Unoccupied |
| Kookaburra box | Nb-22 | - | Unoccupied. Evidence of occupation observed i.e. leaf nest. |
| | Nb-31 | - | Brush-tail possum |
| Possum Box | Nb-06 | Unoccupied | Unoccupied. Evidence of occupation observed i.e. leaf nest. |
| | Nb-24 | - | Unoccupied. Evidence of occupation observed i.e. leaf nest. |
| | Nb-25 | - | Unoccupied |
| | Nb-30 | - | Unoccupied |
| | Nb-32 | - | Unoccupied. Evidence of occupation observed i.e. leaf nest. |
| | Nb-33 | - | Unoccupied |
| Black Cockatoo/ Large Owl Box | Nb-17 | Unoccupied | Unoccupied. Evidence of occupation observed i.e. leaf nest |
| | NB-23 | - | Unoccupied. Evidence of occupation observed i.e. leaf nest. |

3.2 Corrective actions

No nest boxes required maintenance/replacing due to damage or pest species during the 2022 monitoring round. No corrective actions are required at the time of this monitoring report.

4 NEXT MONITORING ROUNDS

The requirements and future survey dates for the nest box monitoring program are present in **TABLE 2**. Monitoring reports will be prepared annually.

TABLE 2
MONITORING PROGRAM REQUIREMENTS AND SURVEY DATES

| Requirement | Frequency | Latest Survey Date | Next Survey Date |
|---------------------|--------------------------------------|---------------------------|-------------------------|
| Nest box monitoring | Boxes physically inspected annually | July 2022 | July/August 2023 |
| Monitoring reports | Monitoring reports prepared annually | August 2022 | August 2023 |

APPENDIX 2 - PRE-CLEARING INSPECTION & SPOTTER CATCHER REPORTS

Our Ref: AM/N202001/Lw1

8th August 2022

Stevens Holdings Pty Ltd
C/- Ocean Park Consulting Pty Limited
PO Box 99
Miami, QLD 4220

Attention: Rangi Campbell (rangi@oceanparkqld.com.au)

Dear Rangi,

RE: Birrigan Iluka Beach - Spotter Catcher Services (Stage 3 & 4 Clearing Works)

JWA Pty Ltd (JWA) were commissioned by Stevens Holdings Pty Ltd, the holder of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) approval issued on 22nd March 2019 (Ref No. 2017/8003), to provide fauna spotter catcher services during Stage 3 and 4 (cleared simultaneously) vegetation clearing works which occurred on land at Hickey Street, Iluka - formally described as Lot 99 on DP82363.

The following outlines the methodologies and results of the fauna spotter catcher services provided during clearing works between the 30th May and 22nd June 2022.

Pre-clearance inspections

Prior to any heavy disturbance activities each day, a thorough pre-clearance inspection within the clearance boundaries was undertaken. Survey methodologies included:

- Terrestrial habitats
 - Targeted searches for indications of occupancy of rocks and rock piles, hollow logs, bark exfoliations, scattered timber and timber piles, burrows, soil cracks and termite mounds, ground nests, dense shrubs, leaf litter and grasses;
 - Occupancy indicators include: wildlife presence, scats, tracks, slide marks, food scraps or diggings.
 - Any high value terrestrial habitat was clearly delineated.
- Arboreal habitats
 - Visual searches for indications of occupancy of nests, hollows, exfoliating bark, fissures, dreys and arboreal termitaria.

- Occupancy indicators include: wildlife presence, detritus (scats/scraps/hair) in the drip zone, markings or scratches to trunk, chew marks and/or smooth entries to hollows, incisions in trunk and adult presence at nests.
- All koala food trees were searched for the presence of koalas.
- Any high value habitat was clearly delineated.

Vegetation clearance procedures

The fauna spotter catcher worked alongside the machinery operator to ensure tree felling was undertaken in a methodical, systematic way facilitating the best possible fauna management outcomes.

Communication between the fauna spotter catcher and clearing operators involved the use of UHF radios, direct communication and visual communications where appropriate.

The fauna spotter catcher directly supervised the felling and/or disturbance of all site vegetation. If no wildlife could be sighted, habitat trees were felled in a manner to cause minimal impact to features that could potentially conceal undetected fauna.

Where fauna was present in standing vegetation the tree was either left standing overnight or the animal/s was encouraged out of the tree and/or captured by the fauna spotter.

Once a habitat tree was felled the fauna spotter catcher inspected all habitat features for the presence of fauna.

Fauna spotter catcher results

ATTACHMENT 1 details the clearing location, the fauna found, the actions taken and the habitat types impacted with details as required. No fauna injuries or fatalities were observed from Stage 3 and 4 clearing operations.

Hollow-bearing tree audit

The installation of nest boxes is required to meet relevant conditions of the Clarence Valley Council (CVC) and Commonwealth Department of Environment and Energy (DEE) approvals. JWA completed an initial habitat tree audit over the proposed Stage 3 and 4 clearing area prior to clearing commencing.

It is noted that the following nest boxes were installed prior to Stage 1 clearing works in December 2020:

- 9 x bat boxes (approx. 300mm l, 160mm w, 340mm h, bottom opening);
- 9 x small parrot boxes (approx. 180mm l, 200mm w, 490mm h, 75mm opening);
- 1 x possum box (approx. 260mm l, 340mm w, 460mm h, 110mm opening); and
- 1 x black cockatoo/large owl box (approx. 360mm l, 490mm w, 640mm h, 150mm opening).

Additional boxes were installed as required post Stage 2 clearing works in 13th January 2022:

- 3 x bat boxes (approx. 300mm l, 160mm w, 340mm h, bottom opening);
- 3 x small parrot boxes (approx. 180mm l, 200mm w, 490mm h, 75mm opening);
- 4 x possum box (approx. 260mm l, 340mm w, 460mm h, 110mm opening); and
- 3 x black cockatoo/large owl box (approx. 360mm l, 490mm w, 640mm h, 150mm opening).

The approved Habitat Management Plan (JWA 2020) notes that additional/supplementary boxes may need to be installed after the felled trees are inspected within each development stage and the numbers and characteristics of the hollows properly determined. Additional/supplementary nest boxes (if required) are to be erected as soon as possible after the clearing.

Nest box monitoring (July 27th) was completed after the recent Stage 3 and 4 clearing works and determined that seventeen (17) of the thirty-three (33) nest boxes were currently occupied or showed signs of usage. An additional two (2) bat boxes were also recorded in use in 2021.

An audit of actual hollows removed from the clearing area was completed by the fauna spotter catcher (**ATTACHMENT 1**). In total, the clearing removed fifteen (15) small hollows, eleven (11) medium hollows and seven (7) large hollows.

Based on the 1:1 offset ratio required within the approved HMP, the fauna species recorded from the site (particularly the Threatened species that rely on hollows), and with consideration of the nest boxes previously installed that are not currently in use, JWA recommends that the following additional nest boxes are installed:

- 2 x bat boxes (approx. 300mm l, 160mm w, 340mm h, bottom opening);
- 4 x small parrot boxes (approx. 180mm l, 200mm w, 490mm h, 75mm opening); and
- 1 x possum box (approx. 260mm l, 340mm w, 460mm h, 110mm opening).

Summary and Conclusion

All vegetation on the site was cleared/felled under the supervision of the fauna spotter/catcher. All recovered native vertebrate fauna were assessed for injuries and the appropriate actions taken. No fauna injuries or fatalities were observed from Stage 3 and 4 clearing operations.

Sufficient numbers and types of nest boxes were installed prior to clearing works. Based on an audit of actual hollows removed from the clearing area completed by the fauna spotter catcher and with consideration of the 1:1 offset ratio required within the approved HMP, the fauna species recorded from the site (particularly the Threatened species that rely on hollows), and the nest boxes previously installed that are not currently in use, seven (7) additional / supplementary nest boxes are now proposed to be installed ASAP.

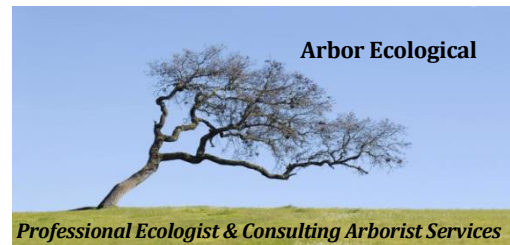
Please do not hesitate to contact me if you require any further information.

Yours faithfully,
JWA Pty Ltd

A handwritten signature in black ink, appearing to read 'Adam McArthur', with a long, sweeping horizontal stroke extending to the right.

Adam McArthur
Director / Principal Ecologist

Michael Hallinan
Arbor Ecological
334 Pearces Creek Road
Alstonville NSW 2477
Ph: 02 6628 0365
Mob: 0424 064 002
e: arborecological@netspace.net.au
www.arborecological.com.au



Date 27/06/22

JWA Ecological Consultants Pty Ltd
Attn. Adam McArthur

Re: Birrigan Iluka Beach Stage 3 ecologist pre-clearing inspections and spotter catcher ecologist monitoring of clearing works

Between 30/05/22 and 22/06/22 ecologists Michael Hallinan, Annika Hallinan and Jordan Rochfort completed daily pre-clearing fauna inspections and undertook spotter catcher ecologist monitoring during tree clearing works on days when tree clearing occurred.

Tree clearing was undertaken with excavators using a two stage clearing process as follows:

- Living and dead standing and fallen trees and logs suspected to be substantially hollow-bearing were flagged for clearing in the second stage of the clearing process.
- The first stage of the clearing process focused on clearing of non-hollow bearing trees and vegetation around hollow bearing trees to isolate them for at least 24 hours.
- For stage two clearing, hollow bearing trees were gently bumped by an excavator three times over a minimum five minute period with a minimum of one minute pause between bumps. The aim of this procedure is to encourage nesting, sheltering or roosting hollow dependent fauna to disperse.
- At least one minute after the final bump, the subject trees were felled as gently as possible to avoid possible injury to any fauna remaining within hollows.
- Once felled, the project ecologist inspected hollows at ground level with the aid of bright torchlight and a pointed metal probe. Estimates of hollow numbers and opening size ranges were recorded.
- Substantially hollow-bearing trees were left in situ for at least 48 hours after being felled to permit any remaining fauna to self-relocate.
- Any non-mobile fauna detected within clearing areas were relocated to suitable habitat in identified environmental protection zones on the site with consideration of appropriate fauna release times and release locations.

Pre-clearing searches and habitat inspections were made before works commenced on each day of clearing. Searches targeted clearing areas, vegetation piles and environmental protection zones. Tree crowns were examined with the aid of binoculars and a pointed metal probe was used to examine dead sections and under decorticating bark of living and dead trees. Searches for fauna scats, pellets and other signs of fauna use and occupation were made near the base of large trees and stags/ dead standing trees.

Searches were also made following tree clearing of any small hollowed sections associated with deadwood and branch shedding with the aid of a pointed metal probe and high-powered torch light. Cleared trees were then moved to into piles for processing. Spotter catcher ecologist monitoring of clearing works continued until works were completed on 22/06/22.

Vacant hollow stems, branches, and pipes/ spouts were recorded with approximate opening sizes of small (<6cm), medium (6 – 12cm) and large (>12cm) as follows,

- 3 large, 4 medium and 5 small hollows in fallen hollow logs and piles.
- 2 large, 2 medium and 4 small hollows in Brush Box (*Lophostemon confertus*).
- 1 medium and 2 small hollows in Pink Bloodwood (*Corymbia intermedia*).
- 2 large, 4 medium and 4 small hollows in standing dead stags.

Threatened Eastern Osprey and White-bellied Sea-eagle were observed flying over the site. No other signs of threatened species use or occupation, including koalas, were detected and no fauna injuries or fatalities were observed from clearing operations.

Numerous commonly occurring bird and skink species were observed on the site, flying over, and in environmental protection zones. Details of fauna and other fauna habitat observations are included below in Table 1.





Don't hesitate to contact me if you require clarification or further information regarding works undertaken or findings.





Regards





Michael Hallinan

Bachelor of Applied Science - Environmental Resource Management
Scientific License SL100965 – Ecological survey/ consultancy
Biodiversity Assessment Method (BAM) Accredited Assessor: BAAS21025
Diploma in Arboriculture - AQF Level 5
Associate Diploma in Horticulture (Arboriculture)

Table 1. Ecological data from tree clearing, Birrigan Iluka Beach Stage 3

| Date | Fauna / Habitat Feature | Details | Photos |
|----------|--|--|--|
| Various | Red-necked Wallaby <i>Notamacropus rufogriseus</i> | Regularly observed on site |  |
| 30/05/22 | Southern Dwarf Crowned Snake <i>Cacophis krefftii</i> | Within clearing area. Relocated to environmental protection zone |  |
| 01/06/22 | Native bee nest | Hollow with nest relocated to environmental protection zone |  |
| 01/06/22 | European bee nest | Hollow with nest relocated to environmental protection zone |  |

| Date | Fauna / Habitat Feature | Details | Photos |
|---------------------|--|--|--|
| 02/06/22 | Mature Land Mullet, <i>Bellatorias major</i> | Within clearing area. Relocated to environmental protection zone |  |
| Various | Hollow bearing trees | Relocated to environmental protection zone |  |
| 06/06/22 & 14/06/22 | Gould's Goanna <i>Varanus gouldii</i> | Within clearing area. Relocated to environmental protection zone |  |
| 07/06/22 & 15/06/22 | Common Eastern Froglet <i>Crinia signifera</i> | Within clearing area. Relocated to environmental protection zone |  |

| Date | Fauna / Habitat Feature | Details | Photos |
|---------------------|--|---|--|
| Various | Dense understory vegetation | Pre clearing searches with the aid of a pointed metal probe |  |
| 17/06/22 & 22/06/22 | Disused bird's nest | Relocated to environmental protection zone |  |
| 21/06/22 | Peron's Tree Frog, <i>Litoria peronii</i> | Relocated to environmental protection zone |  |
| Various | Active Tree Termite nest (<i>Nasutitermes walkeri</i>) | Relocated to environmental protection zone |  |

APPENDIX 3 - SITE PHOTOGRAPHS - WOOD CHIP IN PROGRESS

**BIRRIGAN ILUKA BEACH
SITE PHOTOGRAPHS – WOOD CHIP IN PROGRESS
PHOTOGRAPHS TAKEN – 15 DECEMBER 2020**



Photo 1: Wood chip operation in progress. Looking from Micalo + Elizabeth Street intersection to the project site.



Photo 2: Wood chip stockpile north of Lot 1 Park C + F. Wood chip mulch berm to Lot 1 perimeter.



Photo 3: Excavators feeding wood chip grinder on western portion of Stage 1 looking from Elizabeth Street future emergency access position.



Photo 4: Wood chip / mulch berm to edge of vegetation clearing along north / eastern internal boundary taken from existing access track.



Photo 5: “Green vegetation shoots” coming through, wood chip stockpiles looking south towards Elizabeth Street just to west of Micalo Street intersection.



Photo 6: From northern Stage 1 clearing boundary looking south towards existing bushfire trail fence behind stockpile and Lot 1 (Park C) partly behind fence + part red flag demarcation.



Photo 7: Wood chip / mulch berm to perimeter of construction compound area off Lot 7020 + Hickey Street.



Photo 8: Wood chip / mulch stockpile + berm to perimeter access to Hickey Street looking from site towards Iluka Golf Club.

APPENDIX 4 - RETAINED HABITAT MONITORING REPORT 2022



VEGETATION MONITORING REPORT

Birrigan Iluka Beach, Iluka Lot 99 on DP823635

A Report Prepared for
The Stevens Group

OCTOBER 2022

JWA Pty Ltd

Suite C, Building 21 Garden City Office Park, 2404 Logan Road, Eight Mile Plains QLD 4113

p 07 3219 9436 • **f** 07 3423 2076 • **e** brisbane@jwaec.com.au

www.jwaec.com.au

DOCUMENT CONTROL

Document

| | |
|-------------------------|--|
| Title | Baseline Vegetation Monitoring Report |
| Job Number | N202001 |
| File Reference | \\SERVER\data\2020 CLIENTS\202001 - Birrigan Iluka Beach - Iluka\Annual Monitoring - Veg |
| Version and Date | RW1 7/10/22 |
| Client | The Stevens Group |

Revision History (office use only)

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| 1 | RW1 | FINAL | 7/10/22 | JWA | 1 | .docx | Email |
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Client Issue

| Version | Date | Author | | Approved by | |
|---------|---------|---------------------------------|-----------|---------------|----------|
| | | Name | Initials | Name | Initials |
| RW1 | 7/10/22 | Nicole Davies/ Adam McArthur | ND/ AM | Adam McArthur | AM |
| | | | | | |
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1 INTRODUCTION

1.1 Background

JWA Pty Ltd have been engaged by The Stevens Group to undertake monitoring of vegetation at the Birrigan Iluka Beach development site, located at Hickey Street, Iluka - formally described as Lot 99 on DP823635.

The Birrigan Iluka Beach development is an approved 141 lot community scheme subdivision over the subject land (**FIGURES 1 & 2**). The subdivision incorporates 140 residential allotments and one (1) Community Property allotment (Lot 1) containing retained bushland. The Community Property Lot will be owned and maintained by the Birrigan Iluka Beach Association.

JWA previously prepared a Habitat Management Plan (HMP) (JWA 2020) which included an amelioration strategy designed to minimise the impacts on fauna during both the construction and operational phases, undertake nature regeneration/revegetation works and to ensure that ecological processes and corridor function within the identified rehabilitation areas are protected and amplified. The HMP contains a detailed monitoring program, including baseline and ongoing monitoring and reporting.

This report details the methodology and results of the vegetation monitoring completed across the site between November 2020 and June 2022.

1.2 Monitoring Requirements

In accordance with the HMP (JWA 2020) baseline monitoring was completed within the Community Property (Lot 1) and Bushland Park areas in November 2020 (i.e. prior to the commencement of works on the site) by suitably qualified person.

Ongoing monitoring is required six (6) monthly after commencement of rehabilitation works in each stage until the establishment period performance criteria are met, and then annually during the maintenance period.

Monitoring has been completed within the Community Property (Lot 1) and Bushland Park areas in June 2022. Where rehabilitation works have commenced in these areas, monitoring was part of the first round of ongoing monitoring. Where rehabilitation works have yet to commence in these areas, baseline monitoring results were updated.



PROJECT:
ILUKA
LOT 99 ON DP 823635

LOCATION:
ILUKA ROAD, ELIZABETH, RIVERVIEW AND HICKEY STREETS
ILUKA, NSW, 2466

| DEVELOPMENT CHARACTERISTICS | |
|-----------------------------|-----------------|
| ITEM | DESCRIPTION |
| PROPERTY DESCRIPTION | LOT 99 DP823635 |
| AREA OF LOT 99 | 19.41 ha. |
| TOTAL NUMBER OF LOTS | 141 |
| PART LOT 1 (Approx.) | 5.29 ha. |

CLARENCE VALLEY COUNCIL
New Bushfire Trail Connection
APPROVAL

**This is the plan referred to in Council's
Notice of Determination of SUB2015/0034**

Date: 13/11/2019

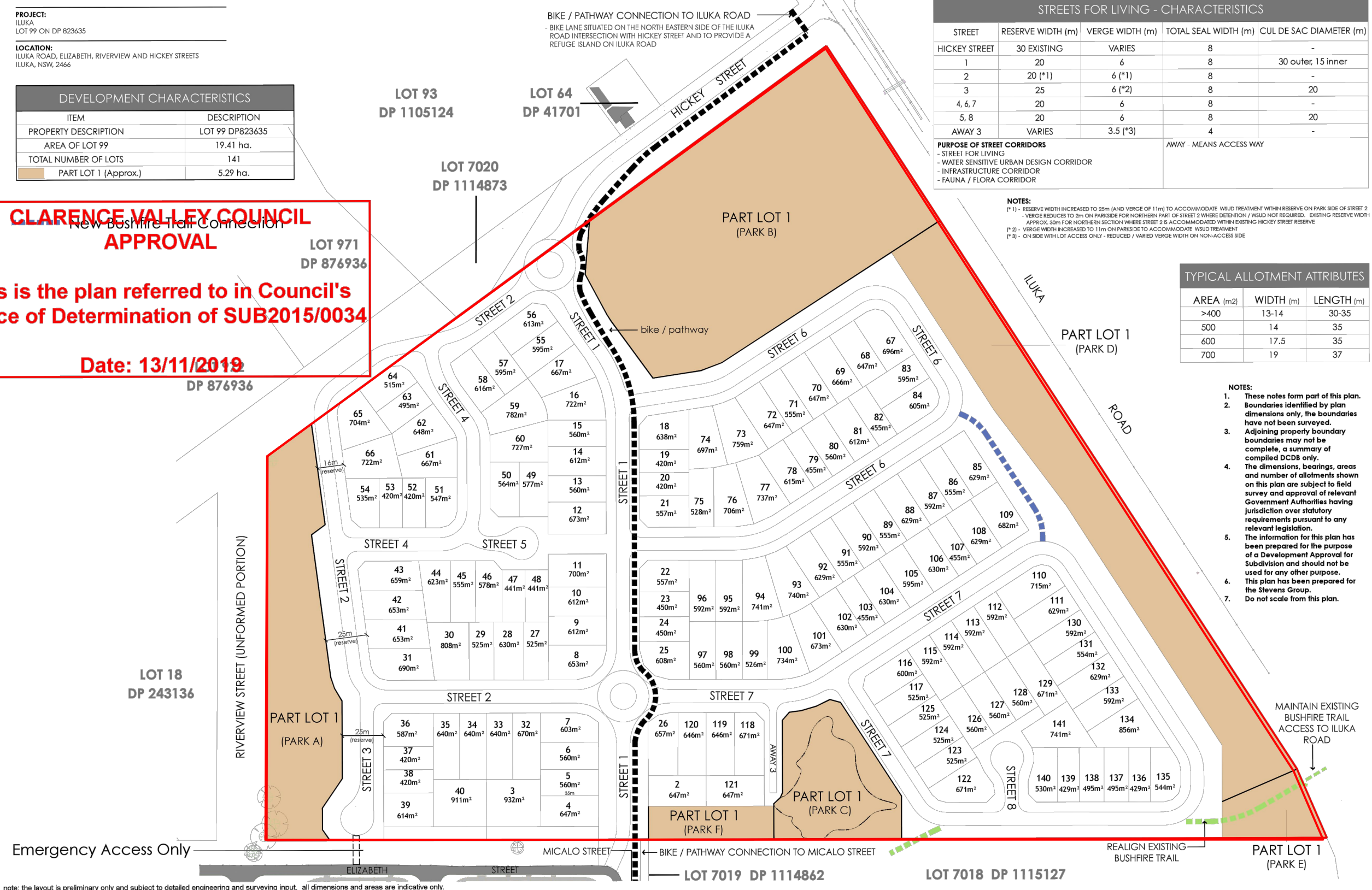
BIKE / PATHWAY CONNECTION TO ILUKA ROAD
- BIKE LANE SITUATED ON THE NORTH EASTERN SIDE OF THE ILUKA
ROAD INTERSECTION WITH HICKEY STREET AND TO PROVIDE A
REFUGE ISLAND ON ILUKA ROAD

| STREETS FOR LIVING - CHARACTERISTICS | | | | |
|---|-------------------|-----------------|-------------------------|-------------------------|
| STREET | RESERVE WIDTH (m) | VERGE WIDTH (m) | TOTAL SEAL WIDTH (m) | CUL DE SAC DIAMETER (m) |
| HICKEY STREET | 30 EXISTING | VARIES | 8 | - |
| 1 | 20 | VARIES | 8 | 30 outer, 15 inner |
| 2 | 20 (*1) | 6 (*1) | 8 | - |
| 3 | 25 | 6 (*2) | 8 | 20 |
| 4, 6, 7 | 20 | 6 | 8 | - |
| 5, 8 | 20 | 6 | 8 | 20 |
| AWAY 3 | VARIES | 3.5 (*3) | 4 | - |
| PURPOSE OF STREET CORRIDORS - STREET FOR LIVING - WATER SENSITIVE URBAN DESIGN CORRIDOR - INFRASTRUCTURE CORRIDOR - FAUNA / FLORA CORRIDOR | | | AWAY - MEANS ACCESS WAY | |

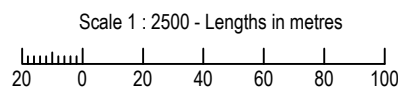
NOTES:
(*1) - RESERVE WIDTH INCREASED TO 25m (AND VERGE OF 11m) TO ACCOMMODATE WSUD TREATMENT WITHIN RESERVE ON PARK SIDE OF STREET 2
- VERGE REDUCES TO 2m ON PARKSIDE FOR NORTHERN PART OF STREET 2 WHERE DETENTION / WSUD NOT REQUIRED. EXISTING RESERVE WIDTH
APPROX. 30m FOR NORTHERN SECTION WHERE STREET 2 IS ACCOMMODATED WITHIN EXISTING HICKEY STREET RESERVE
(*2) - VERGE WIDTH INCREASED TO 11m ON PARKSIDE TO ACCOMMODATE WSUD TREATMENT
(*3) - ON SIDE WITH LOT ACCESS ONLY - REDUCED / VARIED VERGE WIDTH ON NON-ACCESS SIDE

| TYPICAL ALLOTMENT ATTRIBUTES | | |
|------------------------------|-----------|------------|
| AREA (m ²) | WIDTH (m) | LENGTH (m) |
| >400 | 13-14 | 30-35 |
| 500 | 14 | 35 |
| 600 | 17.5 | 35 |
| 700 | 19 | 37 |

- NOTES:**
- These notes form part of this plan.
 - Boundaries identified by plan dimensions only, the boundaries have not been surveyed.
 - Adjoining property boundary boundaries may not be complete, a summary of compiled DCDB only.
 - The dimensions, bearings, areas and number of allotments shown on this plan are subject to field survey and approval of relevant Government Authorities having jurisdiction over statutory requirements pursuant to any relevant legislation.
 - The information for this plan has been prepared for the purpose of a Development Approval for Subdivision and should not be used for any other purpose. This plan has been prepared for the Stevens Group.
 - Do not scale from this plan.



note: the layout is preliminary only and subject to detailed engineering and surveying input. all dimensions and areas are indicative only.



| | | | |
|---|---|---|----------------------------|
| SOURCE: OneCollective - Masterplan (191113 CVC Approved Plans - Extract.pdf) | CLIENT Ocean Park Consulting Pty Ltd | FIGURE 1 | APPROVED MASTER PLAN |
| SCALE: 1 : 2500 @ A3 | PROJECT Annual Koala Monitoring Report Birrigan Estate Lot 99 on DP823635, Hickey Street, Iluka NSW Clarence Valley Council LGA | | |
| JWA PTY LTD Ecological Consultants | | PREPARED: BW DATE: 08 September 2021 FILE: N202001_SAT_20210908.dwg | |



LEGEND
[Red Box] Site Boundary



Scale 1:20 000 - Lengths in metres
200 0 200 400 600 800 1000

SOURCE: Open Street Maps

SCALE: 1 : 20 000 @ A3

JWA PTY LTD
Ecological Consultants

CLIENT
Ocean Park Consulting Pty Ltd
PROJECT
Annual Koala Monitoring Report
Birrigan Estate
Lot 99 on DP823635, Hickey Street, Iluka NSW
Clarence Valley Council LGA

FIGURE 2

PREPARED: BW
DATE: 08 September 2021
FILE: N202001_SAT_20210908.dwg

TITLE
LOCALITY
PLAN

2 MONITORING METHODOLOGY

2.1 Monitoring Locations

The locations of baseline monitoring were identified to ensure representative sampling of all habitat types (**FIGURE 3**). The methodology for the site selection included the positioning of a 150 m x 150 m grid overlaid on the site so as to ensure uniform and unbiased coverage.

Baseline monitoring locations were used for ongoing monitoring requirements.

2.2 Plot-Based Vegetation Surveys

Plot-based vegetation surveys were undertaken at each monitoring location. Vegetation survey sites were permanently marked (i.e. star pickets or wooden stakes) and the end positions identified on a sitemap using a hand-held Global Positioning System (GPS).

The plot-based vegetation survey were based on a 20 m x 20 m plot (or 400 m² equivalent for linear areas).

Survey plots were established around a central 50 m transect as follows:

- a) One (1) 400 m² plot (standard 20 m x 20 m) is used to assess all performance indicators as set out in **TABLE 1** below.
- b) Five (5) 1 m² sub-plots can be added to the program for the first monitoring event to assess groundcover recruitment for the plot. A decision as to the utility of these plots can be made after the first or second monitoring events.

The assessor assessed the plot for the information contained in **TABLE 2**.

TABLE 1
VEGETATION SURVEY DATA TO BE COLLECTED

| Attribute | Survey required |
|-----------------------|---|
| Native Canopy Cover | Estimate the % foliage cover across the plot. Cover should be recorded in decimals if less than 1% (0.1, 0.2...), or whole numbers up to 5% (1,2,3...), or to the nearest 5% where greater than 5% cover (5,10,15,20,25...). |
| Weed Presence | Estimate the % cover in the plot of individual weed species. Count the number of each species. |
| Shrub and Groundcover | Identify native shrub and groundcover species and their percentage cover. Cover should be recorded in decimals if less than 1% (0.1, 0.2...), or whole numbers up to 5% (1, 2, 3...), or to the nearest 5% where greater than 5% cover (5, 10, 15, 20, 25...) |

The full species name (genus species) recorded for all native species, unless insufficient diagnostic plant material was present, in which case the genus name followed by a species number was used. Comments should also be included for all attributes (**TABLE 2**) on any notable

LOT 99 DP 823635

- Core Conservation Zone
- Bushfire Trail Zone
- Street Verges / Landscape Zone
- APZ setbacks
- Residential Lots
- New Bushfire Trail Connection
- Koala SAT Site

CLARENCE VALLEY COUNCIL
APPROVAL

This is the plan referred to in Council's
Notice of Determination of SUB2015/0034

Date: 13/11/2019



note: the layout is preliminary only and subject to detailed engineering and surveying input. all dimensions and areas are indicative only.

Scale 1 : 2500 - Lengths in metres
20 0 20 40 60 80 100

SOURCE: JWA Site Investigations Feb 2020;
OneCollective - Vegetation Zones
(191113 CVC Approved Plans - Extract.pdf)
SCALE: 1 : 2500 @ A3

JWA PTY LTD
Ecological Consultants

CLIENT
Ocean Park Consulting Pty Ltd
PROJECT
Annual Koala Monitoring Report
Birrigan Estate
Lot 99 on DP823635, Hickey Street, Iluka NSW
Clarence Valley Council LGA

FIGURE 3

PREPARED: BW
DATE: 08 September 2021
FILE: N202001_SAT_20210908.dwg

TITLE

KOALA
SAT SITES

variations elsewhere in the relevant management polygon - e.g. weeds occurring in the management polygon that are not (or poorly) represented in the transect.

2.3 Photo Point Monitoring

Photo-monitoring points were completed as a means of demonstrating compliance or otherwise with performance criteria. Permanent photo stations were located at each monitoring location. Where transects were established, photo points were located on each transect. Four (4) photos were taken from each photo point. Photos were taken to the north, south, east and west. Photos were labelled with the:

- Transect code or photo point code;
- Direction of view; and
- Date and time.

3 RESULTS

3.1 Transect Data

Baseline 2020 monitoring data sheets are provided in **ATTACHMENT 1**. Ongoing/Updated baseline June 2022 monitoring data sheets are provided in **ATTACHMENT 2**. A summary of the data collected for each relevant monitoring site is provided in **TABLES 2-10**. The following points provide a general overview of any improvements or declines for each monitoring site between survey periods:

Monitoring Site 1:

- Rehabilitation works were yet to commence. Updated baseline data has therefore been collected.
- Slight increase in native canopy cover
- Slight decrease in native midstorey cover
- Slight increase in exotic groundcover

Monitoring Site 2 (flood affected):

- Rehabilitation works were yet to commence. Updated baseline data has therefore been collected.
- Substantial decrease in native midstorey cover
- Substantial decrease in native groundcover
- Significant improvement in exotic midstorey cover
- Significant improvement in exotic groundcover – no exotic groundcover recorded

This site was flood affected which may have resulted in the substantial decrease in native midstorey and groundcover.

Monitoring Site 3 (flood affected):

- Rehabilitation works were yet to commence. Updated baseline data has therefore been collected.
- Substantial decrease in native canopy cover
- Slight decrease in native groundcover
- Significant improvement in exotic midstorey cover
- Significant improvement in exotic groundcover

This site was flood affected which may have resulted in the decrease in native canopy and groundcover observed.

Monitoring Site 4:

- Rehabilitation works were yet to commence. Updated baseline data has therefore been collected.
- Slight increase in native midstorey cover
- Slight increase in native groundcover
- Significant increase in exotic midstorey cover
- Slight increase in exotic groundcover

Monitoring Site 5:

- Rehabilitation works have commenced.
- Substantial increase in native midstorey cover and diversity
- Substantial increase in native groundcover and diversity
- Substantial improvement in exotic midstorey cover
- Significant improvement in exotic groundcover and diversity

Monitoring Site 6:

- Rehabilitation works have commenced.
- Slight increase in native midstorey cover and diversity
- Substantial increase in native groundcover and diversity
- Significant improvement in exotic midstorey cover
- Significant improvement in exotic groundcover and diversity

Monitoring Site 7:

- Rehabilitation works have commenced.
- Slight increase in native midstorey cover and diversity
- Slight increase in native groundcover and diversity
- Significant improvement in exotic midstorey cover
- Significant improvement in exotic groundcover and diversity

Monitoring Site 8:

- Rehabilitation works have commenced.
- Substantial increase in native midstorey cover and diversity
- Significant increase in native groundcover and diversity
- Significant improvement in exotic midstorey cover and diversity
- Significant improvement in exotic groundcover

Monitoring Site 9:

- Rehabilitation works were yet to commence. Updated baseline data has therefore been collected.
- Slight increase in native midstorey cover and diversity
- Significant increase in native groundcover and diversity
- Significant improvement in exotic groundcover

3.2 Photo points

The results of photo point monitoring are provided in **ATTACHMENT 3** where the monitoring was completed in conjunction with the plot-based vegetation surveys.

TABLE 2
VEGETATION MONITORING RESULTS - MONITORING SITE 1
 (Management Area 3: Bushland Park B)

| Date | Canopy Cover | | | | Midstorey Cover | | | | Groundcover | | | |
|---|--------------|-----|-----------|----|-----------------|-------|-----------|-----|-------------|------|-----------|-------|
| | Native | | Exotic | | Native | | Exotic | | Native | | Exotic | |
| | Diversity | % | Diversity | % | Diversity | % | Diversity | % | Diversity | % | Diversity | % |
| Nov 2020 [#] | 3 | 63% | 0 | 0% | 15 | 58.5% | 1 | 15% | 3 | 5.3% | 3 | 12.1% |
| June 2022 [#] | 3 | 65% | 0 | 0% | 15 | 57% | 1 | 25% | 3 | 5.3% | 3 | 18.5% |
| Notes [#] Rehabilitation works were yet to commence. Updated baseline data has therefore been collected. | | | | | | | | | | | | |

TABLE 3
VEGETATION MONITORING RESULTS - MONITORING SITE 2
 (Management Area 3: Bushland Park B)

| Date | Canopy Cover | | | | Midstorey Cover | | | | Groundcover | | | |
|---|--------------|-----|-----------|----|-----------------|-------|-----------|-----|-------------|-------|-----------|-----|
| | Native | | Exotic | | Native | | Exotic | | Native | | Exotic | |
| | Diversity | % | Diversity | % | Diversity | % | Diversity | % | Diversity | % | Diversity | % |
| Nov 2020 [#] | 4 | 32% | 0 | 0% | 14 | 36.4% | 1 | 20% | 3 | 10.5% | 2 | 30% |
| June 2022 ^{**} | 4 | 32% | 0 | 0% | 13 | 22.5% | 1 | 5% | 3 | 3.5% | 0 | 0% |
| Notes [#] Rehabilitation works were yet to commence. Updated baseline data has therefore been collected. ^{**} Flood affected | | | | | | | | | | | | |

TABLE 4
VEGETATION MONITORING RESULTS - MONITORING SITE 3
 (Management Area 3: Bushland Park B)

| Date | Canopy Cover | | | | Midstorey Cover | | | | Groundcover | | | |
|--|--------------|-----|-----------|----|-----------------|-------|-----------|-----|-------------|------|-----------|-------|
| | Native | | Exotic | | Native | | Exotic | | Native | | Exotic | |
| | Diversity | % | Diversity | % | Diversity | % | Diversity | % | Diversity | % | Diversity | % |
| Nov 2020 [#] | 4 | 33% | 0 | 0% | 11 | 31.9% | 1 | 10% | 1 | 1% | 3 | 40.6% |
| June 2022 ^{#*} | 4 | 23% | 0 | 0% | 11 | 31.9% | 1 | 2% | 2 | 0.6% | 1 | 10% |
| Notes [#] Rehabilitation works were yet to commence. Updated baseline data has therefore been collected. [*] Flood affected | | | | | | | | | | | | |

TABLE 5
VEGETATION MONITORING RESULTS - MONITORING SITE 4
 (Management Area 5: Bushland Park D)

| Date | Canopy Cover | | | | Midstorey Cover | | | | Groundcover | | | |
|---|--------------|-----|-----------|----|-----------------|-------|-----------|-----|-------------|------|-----------|-------|
| | Native | | Exotic | | Native | | Exotic | | Native | | Exotic | |
| | Diversity | % | Diversity | % | Diversity | % | Diversity | % | Diversity | % | Diversity | % |
| Nov 2020 [#] | 3 | 28% | 0 | 0% | 16 | 42.4% | 1 | 25% | 4 | 1% | 5 | 67.6% |
| June 2022 [#] | 3 | 28% | 0 | 0% | 16 | 42.5% | 1 | 35% | 4 | 1.1% | 5 | 69.2% |
| Notes [#] Rehabilitation works were yet to commence. Updated baseline data has therefore been collected. | | | | | | | | | | | | |

TABLE 6
VEGETATION MONITORING RESULTS - MONITORING SITE 5
(Management Area 5: Bushland Park D)

| Date | Canopy Cover | | | | Midstorey Cover | | | | Groundcover | | | |
|--|--------------|-----|-----------|----|-----------------|------|-----------|------|-------------|-------|-----------|-------|
| | Native | | Exotic | | Native | | Exotic | | Native | | Exotic | |
| | Diversity | % | Diversity | % | Diversity | % | Diversity | % | Diversity | % | Diversity | % |
| Nov 2020 [#] | 2 | 55% | 0 | 0% | 15 | 29% | 1 | 15% | 1 | 1% | 3 | 83.1% |
| June 2022 | 2 | 55% | 0 | 0% | 24 | 42.2 | 1 | 0.5% | 4 | 16.8% | 1 | 10% |
| Notes [#] Baseline Improvement from baseline Declined from baseline | | | | | | | | | | | | |

TABLE 7
VEGETATION MONITORING RESULTS - MONITORING SITE 6
(Management Area 5: Bushland Park D)

| Date | Canopy Cover | | | | Midstorey Cover | | | | Groundcover | | | |
|--|--------------|-----|-----------|----|-----------------|-------|-----------|------|-------------|-----|-----------|-------|
| | Native | | Exotic | | Native | | Exotic | | Native | | Exotic | |
| | Diversity | % | Diversity | % | Diversity | % | Diversity | % | Diversity | % | Diversity | % |
| Nov 2020 [#] | 2 | 70% | 0 | 0% | 20 | 35.7% | 1 | 25% | 1 | 2% | 3 | 60% |
| June 2022 [#] | 2 | 70% | 0 | 0% | 21 | 37.3% | 1 | 0.5% | 3 | 13% | 2 | 10.2% |
| Notes [#] Baseline Improvement from baseline Declined from baseline | | | | | | | | | | | | |

TABLE 8
VEGETATION MONITORING RESULTS - MONITORING SITE 7
 (Management Area 5: Bushland Park D)

| Date | Canopy Cover | | | | Midstorey Cover | | | | Groundcover | | | |
|--|--------------|-----|-----------|----|-----------------|-------|-----------|------|-------------|------|-----------|------|
| | Native | | Exotic | | Native | | Exotic | | Native | | Exotic | |
| | Diversity | % | Diversity | % | Diversity | % | Diversity | % | Diversity | % | Diversity | % |
| Nov 2020 [#] | 3 | 65% | 0 | 0% | 14 | 26.7% | 1 | 30% | 2 | 2.5% | 4 | 38% |
| June 2022 [#] | 3 | 65% | 0 | 0% | 17 | 30.2% | 1 | 0.5% | 4 | 4.6% | 3 | 6.1% |
| Notes [#] Baseline Improvement from baseline Declined from baseline | | | | | | | | | | | | |

TABLE 9
VEGETATION MONITORING RESULTS - MONITORING SITE 8
 (Management Area 2: Bushland Park A)

| Date | Canopy Cover | | | | Midstorey Cover | | | | Groundcover | | | |
|--|--------------|-----|-----------|----|-----------------|-------|-----------|-------|-------------|-------|-----------|-------|
| | Native | | Exotic | | Native | | Exotic | | Native | | Exotic | |
| | Diversity | % | Diversity | % | Diversity | % | Diversity | % | Diversity | % | Diversity | % |
| Nov 2020 [#] | 2 | 65% | 0 | 0% | 9 | 14.2% | 3 | 35.1% | 6 | 13.2% | 6 | 51.3% |
| June 2022 | 2 | 65% | 0 | 0% | 17 | 20% | 1 | 0.5% | 7 | 93.2% | 6 | 3.5% |
| Notes [#] Baseline Improvement from baseline Declined from baseline | | | | | | | | | | | | |

TABLE 10
VEGETATION MONITORING RESULTS - MONITORING SITE 9
 (Management Area 2: Bushland Park A)

| Date | Canopy Cover | | | | Midstorey Cover | | | | Groundcover | | | |
|---|--------------|-----|-----------|----|-----------------|-------|-----------|----|-------------|-------|-----------|-------|
| | Native | | Exotic | | Native | | Exotic | | Native | | Exotic | |
| | Diversity | % | Diversity | % | Diversity | % | Diversity | % | Diversity | % | Diversity | % |
| Nov 2020 [#] | 4 | 76% | 0 | 0% | 15 | 23.5% | 1 | 5% | 5 | 8.2% | 4 | 40.2% |
| June 2022 [#] | 4 | 76% | 0 | 0% | 15 | 24.2% | 1 | 5% | 6 | 49.1% | 4 | 10.7% |
| Notes [#] Rehabilitation works were yet to commence. Updated baseline data has therefore been collected. | | | | | | | | | | | | |

4 COMPLIANCE WITH PERFORMANCE CRITERIA

TABLE 11 provides the performance indicators and targets for Bushland Park areas and whether the sites are in compliance. Corrective actions are provided that are to be implemented if performance targets are not met.

TABLE 11
PERFORMANCE TARGETS AND CORRECTIVE ACTIONS

| Performance Indicator | Target - Establishment period ¹ | Target - Maintenance period ² | Corrective Actions | Compliance | |
|---|--|--|---|--|---|
| Survival and continued growth of seedlings (i.e. planted stock) | >95% survival of plantings during all monitoring events | >95% survival of plantings during all monitoring events | Irrigation if required. Additional planting if required. | 100% survival rate | ✓ |
| Establishment of native ground cover within revegetation areas | Planted ground covers substantially established ³ | <ul style="list-style-type: none"> >60% after three (3) years >80% after five (5) years | Supplementary planting | On track - 78% of the sites had either maintained or increased in groundcover percentage during the establishment period | ✓ |
| Establishment of native canopy cover (where applicable) within revegetation areas | Planted trees substantially established ³ | <ul style="list-style-type: none"> >60% canopy cover of native tree species >1.5 m in height after three (3) years >80% canopy cover of native tree species >2.5m in height after five (5) years | Monitoring and maintenance period must be extended until the targets are met. | On track for establishment period | ✓ |

| Performance Indicator | Target - Establishment period ¹ | Target - Maintenance period ² | Corrective Actions | Compliance | |
|--|---|--|--|--|---|
| Natural recruitment of native species throughout rehabilitation areas | Evidence of natural recruitment of shrub and ground cover species. | Increasing natural recruitment of shrub and groundcover species. | Where natural recruitment fails to meet performance targets discussions with CVC shall be initiated by the Community Association or their consultants to consider adjustments to the assisted regeneration strategy being used to improve natural recruitment. | Natural recruitment not observed. Several sites have been affected by recent floods | X |
| All identified weeds controlled to an acceptable level within retained vegetation areas | Foliage Projective Cover (FPC) (%) assessed using eye estimates or photo points: <ul style="list-style-type: none"> reduced to <5% for transformer weeds; <10% for all other weed species | Foliage Projective Cover (FPC) (%) assessed using eye estimates or photo points: <ul style="list-style-type: none"> reduced to <2% for transformer weeds; <5% for all other weed species | Weed control as necessary | 56% of the sites had less than 10% exotic weed cover in all vegetation layers. The remainder of the sites had >10% in one or more vegetation layers. | X |
| Infrastructure (e.g. protection fencing, signage, erosion and sediment control devices) functional and well-maintained | Relevant infrastructure maintained | Relevant infrastructure maintained. | Maintenance as necessary | Relevant infrastructure maintained | ✓ |

Notes:

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

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

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

5 ONGOING MONITORING AND REPORTING REQUIREMENTS

Ongoing annual vegetation monitoring shall be completed in accordance with the following:

- Six (6) monthly after commencement of rehabilitation works until the establishment period performance criteria are met; and
- Then annually during the maintenance period.

The requirements and future monitoring and reporting dates for the vegetation monitoring program are present in **TABLE 12**.

TABLE 12
MONITORING PROGRAM REQUIREMENTS AND SURVEY DATES

| Requirement | Frequency | Latest Date | Next Date |
|---|--------------------------------------|--------------|---|
| Rehabilitation monitoring - establishment period | 6 monthly | June 2022 | 6 months after commencement of rehabilitation works |
| Rehabilitation monitoring - maintenance period | Annually | n/a | TBD |
| Monitoring reports | Monitoring reports prepared annually | October 2022 | October 2023 |

REFERENCES

JWA (2020) Habitat Management Plan. Birrigan Iluka Beach Hickey Street, Iluka (Lot 99 on DP823635). Report prepared for Steven Holdings Pty Ltd by JWA Pty Ltd. July 2020.

ATTACHMENT 1 - MONITORING DATA SHEETS

| 400 m ² plot: Sheet _ of _ | | Survey Name | Plot Identifier | Recorders | | | |
|---------------------------------------|-------------|-------------|-----------------|-----------|--|--|--|
| Date | 03 / 06 /22 | Birrigan | 1 | AM | | | |

| GF Code | Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable | N, E or HTE | Cover | Abund | stratum | voucher |
|---------|---|-------------|-------|-------|---------|---------|
| | 1 Eucalyptus tereticornis | | 40 | | C | |
| | 2 Pink bloodwood | | 15 | | C | |
| | 3 Yellow pear fruit | | 20 | | M | |
| | 4 Acronychia imperforata | | 25 | | M | |
| | 5 Tuckeroo | | 1 | | M | |
| | 6 Bracken fern | | 5 | | G | |
| | 7 Lantana | | 25 | | | |
| | 8 Molasses grass | | 15 | | | |
| | 9 Smilax australis | | 0.2 | | M | |
| | 10 Cyperus gracilis | | 0.2 | | G | |
| | 11 Scrambling lily | | 0.1 | | M | |
| | 12 Dianella caerulea | | 0.1 | | G | |
| | 13 Elkhorn fern | | 1 | | M | |
| | 14 Solanum seaforthianum | | 0.5 | | | |
| | 15 Cymbidium madidum | | 0.2 | | M | |
| | 16 Acacia disparrima | | 10 | | C | |
| | 17 Tree heath | | 2 | | M | |
| | 18 Celery wood | | 5 | | M | |
| | 19 Stephania japonica | | 0.1 | | M | |
| | 20 Ribbonwood | | 2 | | M | |
| | 21 Parsonsia straminea | | 0.1 | | M | |
| | 22 White kamala | | 0.1 | | M | |
| | 23 Acmena hemilampra | | 0.1 | | M | |
| | 24 Milk vine | | 0.1 | | M | |
| | 25 Ground asparagus | | 3 | | | |
| | 26 | | | | | |
| | 27 | | | | | |
| | 28 | | | | | |
| | 29 | | | | | |
| | 30 | | | | | |
| | 31 | | | | | |
| | 32 | | | | | |
| | 33 | | | | | |
| | 34 | | | | | |
| | 35 | | | | | |
| | 36 | | | | | |
| | 37 | | | | | |
| | 38 | | | | | |
| | 39 | | | | | |
| | 40 | | | | | |

GF Code: see Growth Form definitions in Appendix 1

N: native, **E:** exotic, **HTE:** high threat exotic

GF – circle code if 'top 3'.

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); **Note:** 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

| 400 m ² plot: Sheet _ of _ | | Survey Name | Plot Identifier | Recorders | | | |
|---------------------------------------|--------------|-------------|-----------------|-----------|--|--|--|
| Date | 03 / 06 / 22 | Birrigan | 2 | AM | | | |

| GF Code | Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable | N, E or HTE | Cover | Abund | stratum | voucher |
|---------|---|-------------|-------|-------|---------|---------|
| | 1 Pink bloodwood | | 20 | | C | |
| | 2 Acacia disparrima | | 5 | | C | |
| | 3 Acronychia imperforata | | 10 | | M | |
| | 4 Yellow pear fruit | | 2 | | M | |
| | 5 Lantana | | 5 | | | |
| | 6 Molasses grass | | 0 | | | |
| | 7 Ground asparagus | | 0 | | | |
| | 8 Morinda jasminoides | | 0 | | | |
| | 9 Bracken fern | | 0.5 | | G | |
| | 10 Hairy psychotria | | 0.2 | | M | |
| | 11 Lomandra longfolia | | 2.5 | | G | |
| | 12 Tuckeroo | | 0.5 | | M | |
| | 13 Brown bollygum | | 0.1 | | M | |
| | 14 Milk vine | | 0.2 | | M | |
| | 15 Elkhorn fern | | 1 | | M | |
| | 16 Tree heath | | 2 | | M | |
| | 17 Mock olive | | 0.1 | | M | |
| | 18 Smilax australis | | 5 | | M | |
| | 19 Flindersia schottiana | | 5 | | C | |
| | 20 Brushbox | | 2 | | C | |
| | 21 Cyperus gracilis | | 0.5 | | G | |
| | 22 Parsonsia straminea | | 0.2 | | M | |
| | 23 Hibbertia scandens | | 0 | | | |
| | 24 Water vine | | 1 | | M | |
| | 25 Silky oak | | 0.2 | | M | |
| | 26 | | | | | |
| | 27 | | | | | |
| | 28 | | | | | |
| | 29 | | | | | |
| | 30 | | | | | |
| | 31 | | | | | |
| | 32 | | | | | |
| | 33 | | | | | |
| | 34 | | | | | |
| | 35 | | | | | |
| | 36 | | | | | |
| | 37 | | | | | |
| | 38 | | | | | |
| | 39 | | | | | |
| | 40 | | | | | |

GF Code: see Growth Form definitions in Appendix 1

N: native, **E:** exotic, **HTE:** high threat exotic

GF – circle code if 'top 3'.

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); **Note:** 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

| 400 m ² plot: Sheet _ of _ | | Survey Name | Plot Identifier | Recorders | | | |
|---------------------------------------|--------------|-------------|-----------------|-----------|--|--|--|
| Date | 03 / 06 / 22 | Birrigan | 3 | AM | | | |

| GF Code | Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable | N, E or HTE | Cover | Abund | stratum | voucher |
|---------|---|-------------|-------|-------|---------|---------|
| | 1 Acacia disparrima | | 10 | | C | |
| | 2 Yellow pear fruit | | 20 | M | | |
| | 3 Brush Canthium | | 0.1 | M | | |
| | 4 Blue lilly pilly | | 3 | M | | |
| | 5 Tuckerroo | | 5 | M | | |
| | 6 Ribbonwood | | 5 | | C | |
| | 7 Lantana | | 2 | | | |
| | 8 Brachen fern | | 0.5 | | G | |
| | 9 Molasses grass | | 10 | | | |
| | 10 Elkhorn fern | | 1 | | M | |
| | 11 Smilax australis | | 0.2 | | M | |
| | 12 Acronychia imperforata | | 0.2 | | M | |
| | 13 Celerywood | | 2 | | M | |
| | 14 Cymbidium madidum | | 0.2 | | M | |
| | 15 Coffee bush | | 0.1 | | M | |
| | 16 Pink bloodwood | | 3 | | C | |
| | 17 Eucalyptus tereticornis | | 5 | | C | |
| | 18 Pittosporum revolutum | | 0.1 | | M | |
| | 19 Ground asparagus | | 0 | | | |
| | 20 Asparagus fern | | 0 | | | |
| | 21 Native wandering jew | | 0.1 | | G | |
| | 22 | | | | | |
| | 23 | | | | | |
| | 24 | | | | | |
| | 25 | | | | | |
| | 26 | | | | | |
| | 27 | | | | | |
| | 28 | | | | | |
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| | 36 | | | | | |
| | 37 | | | | | |
| | 38 | | | | | |
| | 39 | | | | | |
| | 40 | | | | | |

GF Code: see Growth Form definitions in Appendix 1

N: native, **E:** exotic, **HTE:** high threat exotic

GF – circle code if 'top 3'.

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); **Note:** 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

| 400 m ² plot: Sheet _ of _ | | Survey Name | Plot Identifier | Recorders | | | |
|---------------------------------------|---|-------------|-----------------|-----------|---------|---------|--|
| Date | 03 06 /22 | Birrigan | 4 | AM | | | |
| GF Code | Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable | N, E or HTE | Cover | Abund | stratum | voucher | |
| | 1 Pink bloodwood | | 8 | | C | | |
| | 2 Acacia disparrima | | 15 | | C | | |
| | 3 Yellow pear fruit | | 20 | | M | | |
| | 4 Celerywood | | 2 | | M | | |
| | 5 Acronychia imperforata | | 5 | | M | | |
| | 6 Lantana | | 35 | | | | |
| | 7 Molasses grass | | 60 | | | | |
| | 8 Ground asparagus | | 5 | | | | |
| | 9 Wandering jew | | 2 | | | | |
| | 10 Exotic ground cover sp. | | 2 | | | | |
| | 11 Birds nest fern | | 0.2 | | M | | |
| | 12 Elkhorn fern | | 3 | | M | | |
| | 13 Flindersia schottiana | | 1 | | M | | |
| | 14 Tuckeroo | | 5 | | M | | |
| | 15 Lomandra longfolia | | 0.2 | | G | | |
| | 16 Cyperus gracilis | | 0.2 | | G | | |
| | 17 Solanum seaforthianum | | 0.2 | | | | |
| | 18 Bracken fern | | 0.2 | | G | | |
| | 19 Cymbidium madidum | | 0.2 | | M | | |
| | 20 Yellow tulip | | 0.1 | | M | | |
| | 21 Ribbonwood | | 5 | | M | | |
| | 22 Brushbox | | 5 | | C | | |
| | 23 Hairy psychotria | | 0.1 | | M | | |
| | 24 Mock olive | | 0.1 | | M | | |
| | 25 Scrambling lily | | 0.1 | | M | | |
| | 26 Dianella caerulea | | 0.5 | | G | | |
| | 27 Smilax australis | | 0.5 | | M | | |
| | 28 Milk vine | | 0.1 | | M | | |
| | 29 Hibbertia scandens | | 0.1 | | M | | |
| | 30 | | | | | | |
| | 31 | | | | | | |
| | 32 | | | | | | |
| | 33 | | | | | | |
| | 34 | | | | | | |
| | 35 | | | | | | |
| | 36 | | | | | | |
| | 37 | | | | | | |
| | 38 | | | | | | |
| | 39 | | | | | | |
| | 40 | | | | | | |

GF Code: see Growth Form definitions in Appendix 1

N: native, **E:** exotic, **HTE:** high threat exotic

GF – circle code if 'top 3'.

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); **Note:** 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

| 400 m ² plot: Sheet _ of _ | | Survey Name | Plot Identifier | Recorders | | | |
|---------------------------------------|---|-------------|-----------------|-----------|---------|---------|--|
| Date | 03 / 06 / 22 | Birrigan | 5 | Am | | | |
| GF Code | Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable | N, E or HTE | Cover | Abund | stratum | voucher | |
| | 1 Acacia disparrima | | 45 | | C | | |
| | 2 Acronychia imperata | | 15 | | M | | |
| | 3 Yellow pear fruit | | 15 | | M | | |
| | 4 Celerywood | | 2 | | M | | |
| | 5 Tuckeroo | | 0.5 | | M | | |
| | 6 Lantana | | 0.5 | | | | |
| | 7 Molasses grass | | 10 | | | | |
| | 8 Elkhorn fern | | 3 | | M | | |
| | 9 Lomandra longfolia | | 1 | | G | | |
| | 10 Cymbidium madidum | | 2 | | M | | |
| | 11 Tree heath | | 0.5 | | M | | |
| | 12 Smilax australis | | 0.2 | | M | | |
| | 13 Coffee bush | | 0.1 | | M | | |
| | 14 Dianella caerulea | | 0.2 | | M | | |
| | 15 Scrambling lily | | 0.1 | | M | | |
| | 16 Pink bloodwood | | 10 | | C | | |
| | 17 Foambark | | 0.1 | | M | | |
| | 18 Blue lilly pilly | | 0.5 | | M | | |
| | 19 Ribbonwood | | 0.1 | | M | | |
| | 20 Mock olive | | 0.1 | | M | | |
| | 21 Clerodendrum floribundum | | 0.2 | | M | | |
| | 22 Bracken | | 0.5 | | G | | |
| | 23 Native wandering jew | | 15 | | G | | |
| | 24 Bangalow Palm | | 0.5 | | M | | |
| | 25 Blueberry ash | | 0.1 | | M | | |
| | 26 Muttonwood | | 0.7 | | M | | |
| | 27 Red ash | | 0.1 | | M | | |
| | 28 Notelaea | | 0.3 | | M | | |
| | 29 Common lilly pilly | | 0.2 | | M | | |
| | 30 Dianella | | 0.3 | | G | | |
| | 31 Forest red gum | | 0.6 | | M | | |
| | 32 Banksia integrifolia | | 0.1 | | M | | |
| | 33 Blush walnut | | | | | | |
| | 34 | | | | | | |
| | 35 | | | | | | |
| | 36 | | | | | | |
| | 37 | | | | | | |
| | 38 | | | | | | |
| | 39 | | | | | | |
| | 40 | | | | | | |

GF Code: see Growth Form definitions in Appendix 1

N: native, **E:** exotic, **HTE:** high threat exotic

GF – circle code if 'top 3'.

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); **Note:** 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

| 400 m ² plot: Sheet _ of _ | | Survey Name | Plot Identifier | Recorders | | | |
|---------------------------------------|---|-------------|-----------------|-----------|---------|---------|--|
| Date | 03 / 06 / 22 | Birrigan | 6 | AM | | | |
| GF Code | Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable | N, E or HTE | Cover | Abund | stratum | voucher | |
| | 1 Pink bloodwood | | 30 | | C | | |
| | 2 Acacia disparrima | | 40 | | C | | |
| | 3 Yellow pear fruit | | 10 | | M | | |
| | 4 Brush canthium | | 0.1 | | M | | |
| | 5 Lantana | | 0.5 | | | | |
| | 6 Ground asparagus | | 0 | | | | |
| | 7 Molasses grass | | 10 | | | | |
| | 8 Coast cypress pine | | 2 | | M | | |
| | 9 acronchia imperforata | | 10 | | M | | |
| | 10 Celerywood | | 0.5 | | M | | |
| | 11 Bracken fern | | 2 | | M | | |
| | 12 Exotic ground cover sp. | | 0 | | | | |
| | 13 Lomandra longifolia | | 2.5 | | G | | |
| | 14 Foambark | | 1 | | M | | |
| | 15 Morinda jasminoides | | 0.5 | | M | | |
| | 16 Elkhorn fern | | 2 | | M | | |
| | 17 Brown bollygum | | 0.1 | | M | | |
| | 18 Tuckeroo | | 0.5 | | M | | |
| | 19 Tree heath | | 5 | | M | | |
| | 20 Mock olive | | 0.1 | | M | | |
| | 21 Suave orchid | | 0.1 | | M | | |
| | 22 Scrambling lily | | 0.1 | | M | | |
| | 23 Smilax australis | | 1 | | M | | |
| | 24 Native hoya | | 1 | | M | | |
| | 25 Yellow tulip | | 0.1 | | M | | |
| | 26 Clerodendrum floribundum | | 0.1 | | M | | |
| | 27 Water vine | | 1 | | M | | |
| | 28 Native wandering jew | | 10 | | G | | |
| | 29 White passion flower | | 0.2 | | | | |
| | 30 Muttonwood | | 0.1 | | M | | |
| | 31 Cyperus gracilis | | 0.5 | | G | | |
| | 32 | | | | | | |
| | 33 | | | | | | |
| | 34 | | | | | | |
| | 35 | | | | | | |
| | 36 | | | | | | |
| | 37 | | | | | | |
| | 38 | | | | | | |
| | 39 | | | | | | |
| | 40 | | | | | | |

GF Code: see Growth Form definitions in Appendix 1

N: native, **E:** exotic, **HTE:** high threat exotic

GF – circle code if 'top 3'.

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); **Note:** 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

| 400 m ² plot: Sheet _ of _ | | Survey Name | Plot Identifier | Recorders | | | |
|---------------------------------------|---|-------------|-----------------|-----------|---------|---------|--|
| Date | 03 / 06 / 22 | Birrigan | 7 | AM | | | |
| GF Code | Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable | N, E or HTE | Cover | Abund | stratum | voucher | |
| | 1 Pink bloodwood | | 20 | | C | | |
| | 2 Acacia disparrima | | 20 | | C | | |
| | 3 Brush box | | 25 | | C | | |
| | 4 Yellow pear fruit | | 2 | | M | | |
| | 5 Acronychia littoralis | | 10 | | M | | |
| | 6 Celerywood | | 2 | | M | | |
| | 7 Bracken fern | | 1 | | G | | |
| | 8 Tuckeroo | | 1 | | M | | |
| | 9 Molasses grass | | 5 | | | | |
| | 10 Ground asparagus | | 0 | | | | |
| | 11 Smilax australis | | 3 | | M | | |
| | 12 Elkhorn fern | | 1 | | M | | |
| | 13 Scrambling lily | | 2 | | M | | |
| | 14 Asparagus fern | | 0.1 | | | | |
| | 15 Acmena hemilampra | | 0.2 | | M | | |
| | 16 Exotic ground cover sp. | | 1 | | | | |
| | 17 Tree heath | | 1 | | M | | |
| | 18 Lomandra longfolia | | 3 | | G | | |
| | 19 Pandorea pandorana | | 0.1 | | M | | |
| | 20 Acronychia imperforata | | 5 | | M | | |
| | 21 Native hoya | | 0.5 | | M | | |
| | 22 Banksia integrifolia | | 1 | | M | | |
| | 23 Blueberry ash | | 1 | | M | | |
| | 24 Lantana | | 0.5 | | | | |
| | 25 Coffee bush | | 0.2 | | M | | |
| | 26 Cryptocarya foetida | | 0.1 | | M | | |
| | 27 Ottochloa gracillima | | 0.5 | | G | | |
| | 28 Pearl vine | | 0.1 | | M | | |
| | 29 Cyperus gracilis | | 0.1 | | G | | |
| | 30 | | | | | | |
| | 31 | | | | | | |
| | 32 | | | | | | |
| | 33 | | | | | | |
| | 34 | | | | | | |
| | 35 | | | | | | |
| | 36 | | | | | | |
| | 37 | | | | | | |
| | 38 | | | | | | |
| | 39 | | | | | | |
| | 40 | | | | | | |

GF Code: see Growth Form definitions in Appendix 1

N: native, **E:** exotic, **HTE:** high threat exotic

GF – circle code if 'top 3'.

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); **Note:** 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

| 400 m ² plot: Sheet _ of _ | | Survey Name | Plot Identifier | Recorders | | | |
|---------------------------------------|---|-------------|-----------------|-----------|---------|---------|--|
| Date | ___/___/___ | | | | | | |
| GF Code | Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable | N, E or HTE | Cover | Abund | stratum | voucher | |
| | 1 Pink bloodwood | | 35 | | C | | |
| | 2 Acacia disparrima | | 30 | | C | | |
| | 3 Acronychia imperforata | | 8 | | M | | |
| | 4 Lantana | | 0.5 | | | | |
| | 5 Lomandra longifolia | | 3 | | G | | |
| | 6 Ground asparagus | | 0.5 | | | | |
| | 7 Smilax australis | | 3 | | G | | |
| | 8 Exotic groundcover sp. | | 2 | | | | |
| | 9 Molasses grass | | 0.5 | | | | |
| | 10 Bracken fern | | 2 | | G | | |
| | 11 Cyperus gracilis | | 7 | | G | | |
| | 12 Ochna | | 0.1 | | | | |
| | 13 Yellow pear fruit | | 5 | | M | | |
| | 14 Tree heath | | 0.5 | | M | | |
| | 15 Solanum seaforthianum | | 0.1 | | | | |
| | 16 Stephania japonica | | 0.1 | | M | | |
| | 17 Scrambling lily | | 0.1 | | M | | |
| | 18 White passion flower | | 0.2 | | | | |
| | 19 Native wandering jew | | 75 | | G | | |
| | 20 Dianella caerulea | | 0.5 | | G | | |
| | 21 Yellow tulip | | 0.1 | | M | | |
| | 22 Tuckeroo | | 0.1 | | M | | |
| | 23 Birds nest fern | | 0.2 | | M | | |
| | 24 Elkhorn fern | | 0.2 | | M | | |
| | 25 Coffee bush | | 0.2 | | M | | |
| | 26 Pearl vine | | 0.1 | | M | | |
| | 27 Native grape | | 0.1 | | M | | |
| | 28 Solanum sp. | | 0.1 | | | | |
| | 29 Snake vine | | 0.1 | | M | | |
| | 30 Forest red gum | | 3.5 | | M | | |
| | 31 Brushbox | | 0.9 | | M | | |
| | 32 Lomandra | | 2.7 | | G | | |
| | 33 Common lilly pilly | | 0.4 | | M | | |
| | 34 Melicope | | 0.4 | | M | | |
| | 35 | | | | | | |
| | 36 | | | | | | |
| | 37 | | | | | | |
| | 38 | | | | | | |
| | 39 | | | | | | |
| | 40 | | | | | | |

GF Code: see Growth Form definitions in Appendix 1

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GF – circle code if 'top 3'.

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); **Note:** 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

| 400 m ² plot: Sheet _ of _ | | Survey Name | Plot Identifier | Recorders | | | |
|---------------------------------------|-----------|-------------|-----------------|-----------|--|--|--|
| Date | 03 06 /22 | Birrigan | 9 | AM | | | |

| GF Code | Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable | N, E or HTE | Cover | Abund | stratum | voucher |
|---------|---|-------------|-------|-------|---------|---------|
| | 1 Pink bloodwood | | 30 | | C | |
| | 2 Acacia disparrima | | 45 | | C | |
| | 3 Acronychia imperforata | | 10 | | M | |
| | 4 Tree heath | | 5 | | M | |
| | 5 Paperbark | | 0.5 | | C | |
| | 6 Brushbox | | 0.5 | | C | |
| | 7 Lantana | | 5 | | | |
| | 8 Milk vine | | 0.2 | | M | |
| | 9 Ground asparagus | | 5 | | | |
| | 10 Lomandra longfolia | | 5 | | G | |
| | 11 Yellow pear fruit | | 5 | | M | |
| | 12 Blue lilly pilly | | 0.2 | | M | |
| | 13 Cabbage tree palm | | 1 | | M | |
| | 14 Sweet morinda | | 0.2 | | M | |
| | 15 Smilax | | 1 | | M | |
| | 16 Cordyline stricta | | 0.1 | | M | |
| | 17 Bracken | | 2 | | G | |
| | 18 Hibbertia scandens | | 0.1 | | M | |
| | 19 Tuckeroo | | 0.1 | | M | |
| | 20 Hard corkwood | | 0.1 | | M | |
| | 21 Ochna | | 0.1 | | | |
| | 22 Elkhorn fern | | 0.5 | | M | |
| | 23 Cyperus gracilis | | 2 | | G | |
| | 24 Birds nest fern | | 0.5 | | M | |
| | 25 Asparagus fern | | 0.1 | | | |
| | 26 Molasses grass | | 5 | | | |
| | 27 Dianella caerulea | | 0.5 | | G | |
| | 28 Mock olive | | 0.2 | | M | |
| | 29 Wandering jew | | 40 | | G | |
| | 30 Solanum seaforthianum | | 0.5 | | | |
| | 31 Pomax umbellata | | 0.1 | | G | |
| | 32 | | | | | |
| | 33 | | | | | |
| | 34 | | | | | |
| | 35 | | | | | |
| | 36 | | | | | |
| | 37 | | | | | |
| | 38 | | | | | |
| | 39 | | | | | |
| | 40 | | | | | |

GF Code: see Growth Form definitions in Appendix 1

N: native, **E:** exotic, **HTE:** high threat exotic

GF – circle code if 'top 3'.

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); **Note:** 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

ATTACHMENT 2 - BASELINE PHOTOS POINTS

PLOT 1

| November 2020 | |
|---|--|
|  |  |
| North | East |
|  |  |
| South | West |

PLOT 2

| November 2020 | |
|--|---|
|  |  |
| North | East |
|  |  |
| South | West |



PLOT 3

| November 2020 | |
|--|---|
|  |  |
| North | East |
|  |  |
| South | West |



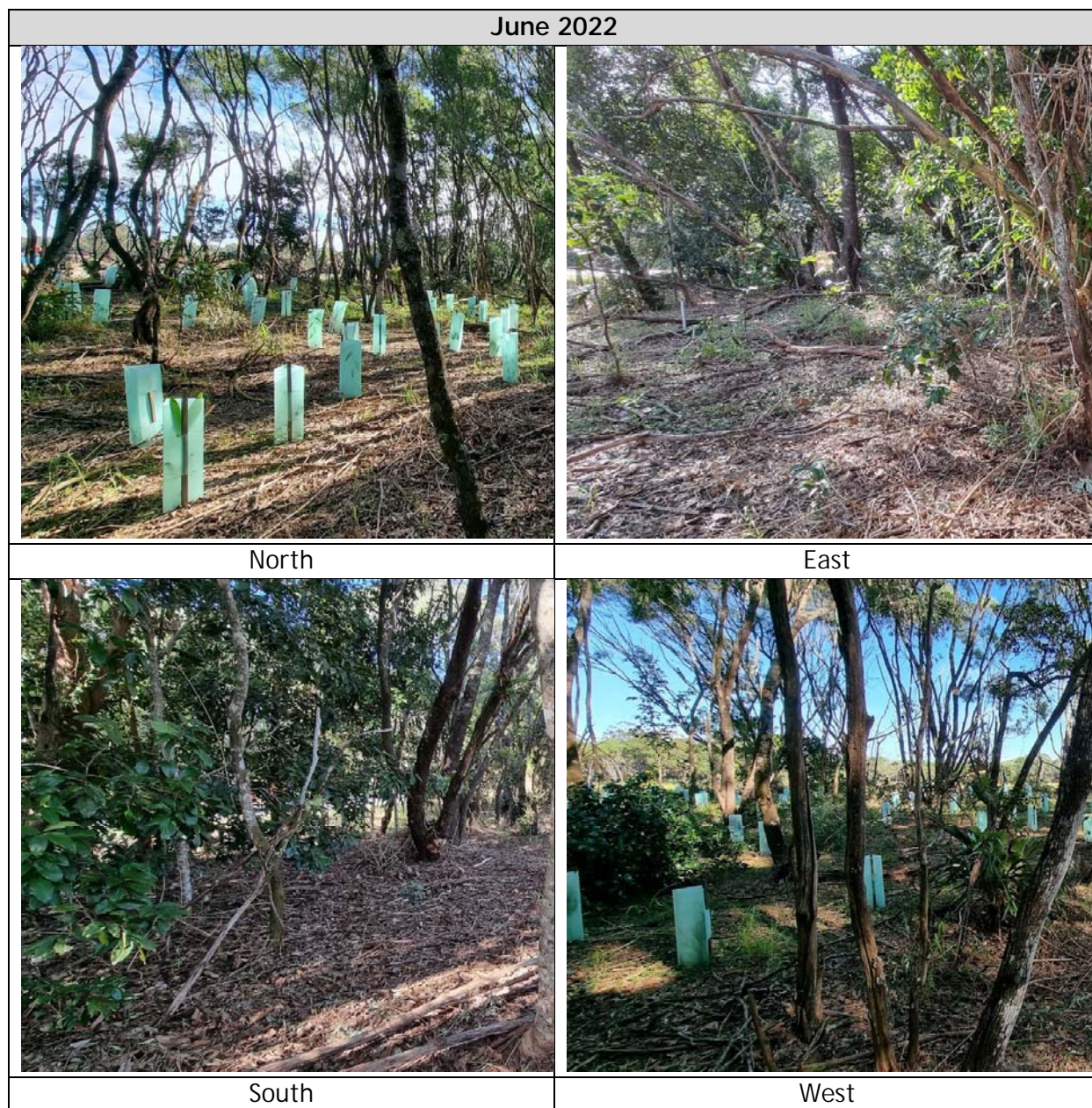
PLOT 4





PLOT 5

| November 2020 | |
|--|---|
|  |  |
| North | East |
|  |  |
| South | West |



PLOT 6





PLOT 7









PLOT 8

| November 2020 | |
|--|---|
|  |  |
| North | East |
|  |  |
| South | West |



PLOT 9

| November 2020 | |
|--|---|
|  |  |
| North | East |
|  |  |
| South | West |



APPENDIX 5 - ANNUAL KOALA MONITORING REPORT 2022



KOALA
(*Phascolarctos cinereus*)
2ND ANNUAL MONITORING REPORT

Birrigan Iluka Beach, Iluka
Lot 99 on DP823635

A Report Prepared for
The Stevens Group

SEPTEMBER 2022

NEW SOUTH WALES

105 Tamar Street (PO Box 105) Ballina NSW 2478 • **p** 02 6686 3858 • **f** 02 6681 1659 • **e** ballina@jwaec.com.au

QUEENSLAND

Suite C, Building 21 Garden City Office Park, 2404 Logan Road, Eight Mile Plains QLD 4113
p 07 3219 9436 • **f** 07 3423 2076 • **e** brisbane@jwaec.com.au

www.jwaec.com.au

DOCUMENT CONTROL

Document

| | |
|------------------|--|
| Title | Koala (<i>Phascolarctos cinereus</i>) 2 nd Annual Monitoring Report |
| Job Number | N202001 |
| File Reference | \\SERVER\data\2020 CLIENTS\202001 - Birrigan Iluka Beach - Iluka\Annual Monitoring - Koala |
| Version and Date | RW1 11/09/22 |
| Client | The Stevens Group |

Revision History (office use only)

| Issue | Version | Draft/Final | Date Sent | Distributed To | No. Copies | Media | Delivery Method |
|-------|---------|-------------|-----------|----------------|------------|-------|-----------------|
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Client Issue

| Version | Date | Author | | Approved by | |
|---------|----------|---------------|----------|---------------|----------|
| | | Name | Initials | Name | Initials |
| RW1 | 11/09/22 | Nicole Davies | ND | Adam McArthur | AM |
| | | | | | |
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1 INTRODUCTION

1.1 Background

JWA Pty Ltd have been engaged by The Stevens Group to undertake annual monitoring for the koala (*Phascolarctos cinereus*) population at the Birrigan Iluka Beach development site, located at Hickey Street, Iluka - formally described as Lot 99 on DP823635. The Birrigan Iluka Beach development is an approved 141 lot community scheme subdivision over the subject land (FIGURE 1).

The koala is listed as an endangered species within schedules of the NSW *Biodiversity Conservation Act (2016)* (BC Act). The koala (combined population in Queensland, New South Wales and the Australian Capital Territory) is listed as an endangered species within schedules of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Comprehensive Koala surveys have previously been undertaken by Keystone Ecological in 2014, using a variety of direct and indirect methods (spotlight, call broadcast, camera trap, predator scats, scratch searches, and Spot Assessment Technique surveys) (Keystone Ecological 2018). The presence of this species on the subject site was confirmed by a single camera trap image (Keystone Ecological 2018a).

In order to comply with approval condition 4f issued by the Commonwealth Department of the Environment and Energy (DEE), a Koala Monitoring and Reporting Program is required. The Koala Monitoring Program must be consistent with the provisions of the Clarence Valley Comprehensive Koala Plan of Management, including any provisions for registration of data on koala presence. Koala baseline monitoring was completed on the site by JWA in February 2020.

This report details the methodology and results from the 2nd annual koala monitoring completed by JWA during August 2022.

1.2 Site Description

Birrigan Iluka Beach is a 19.41 ha site located in Iluka, within the Clarence Valley Local Government Area (LGA) (FIGURE 2). The Birrigan Iluka Beach subdivision is surrounded by residential development in the west and south-west, bushland to the north, east and south-east and the Iluka Golf Course to the north-east. Iluka Nature Reserve and the Bundjalung National Park are in proximity to the site to the east.

The site has experienced disturbance comprising clearing, sand mining, severe fires, weed infestation, possibly some recontouring and some seeding and/or planting of unknown material. The site continues to be used by locals as a dumping ground for garden waste, old furniture, building materials and other rubbish.

The vegetation is a mosaic of regenerating locally native canopy species. The understorey is dominated by exotic species across most of the site, particularly Lantana (*Lantana camara*) and Guinea Grass (*Megathyrsus maximus*). A narrow band of vegetation at the



PROJECT:
ILUKA
LOT 99 ON DP 823635

LOCATION:
ILUKA ROAD, ELIZABETH, RIVERVIEW AND HICKEY STREETS
ILUKA, NSW, 2466

| DEVELOPMENT CHARACTERISTICS | |
|-----------------------------|-----------------|
| ITEM | DESCRIPTION |
| PROPERTY DESCRIPTION | LOT 99 DP823635 |
| AREA OF LOT 99 | 19.41 ha. |
| TOTAL NUMBER OF LOTS | 141 |
| PART LOT 1 (Approx.) | 5.29 ha. |

CLARENCE VALLEY COUNCIL
New Bushfire Trail Connection
APPROVAL

**This is the plan referred to in Council's
Notice of Determination of SUB2015/0034**

Date: 13/11/2019

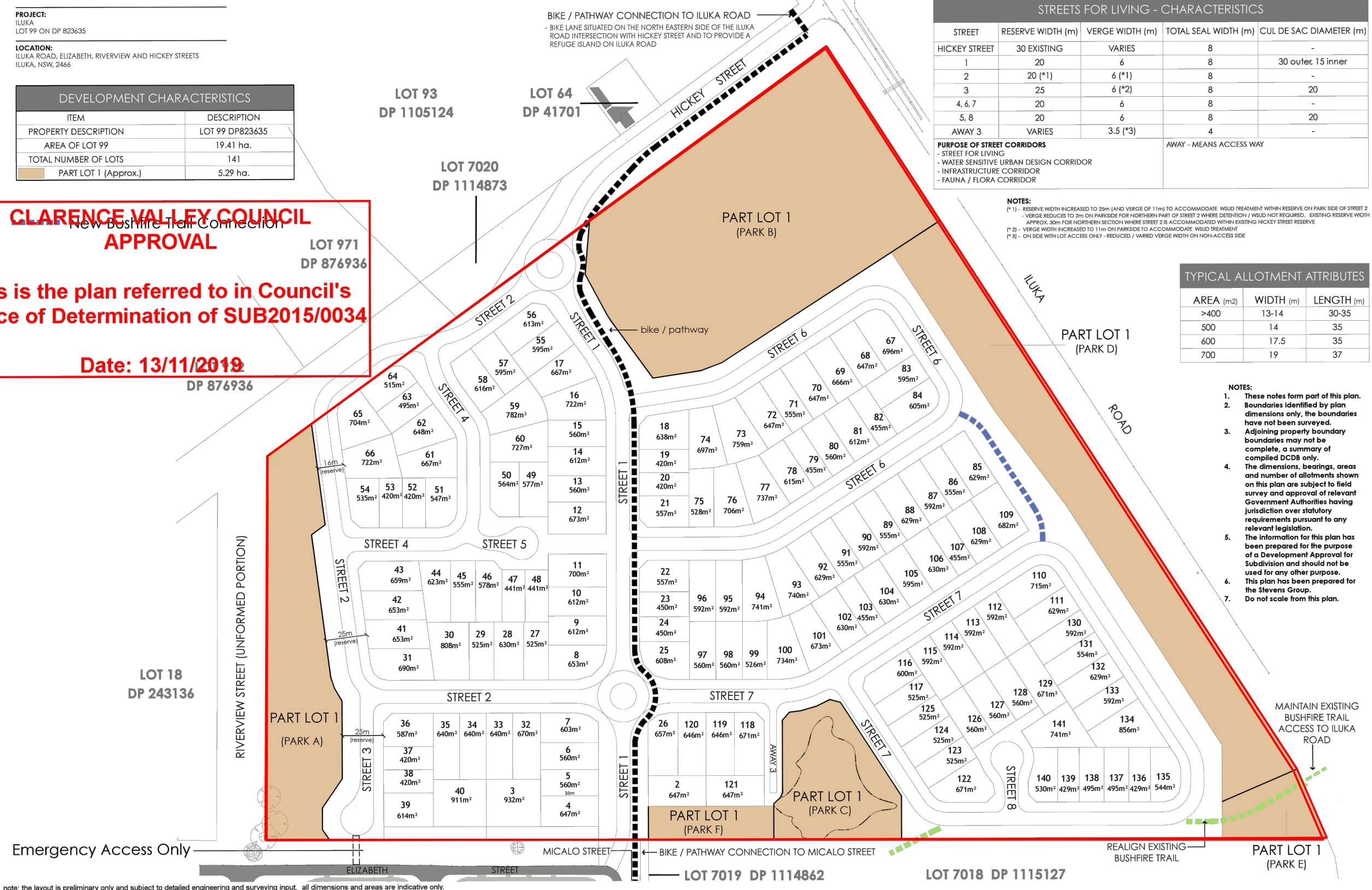
BIKE / PATHWAY CONNECTION TO ILUKA ROAD
- BIKE LANE SITUATED ON THE NORTH EASTERN SIDE OF THE ILUKA
ROAD INTERSECTION WITH HICKEY STREET AND TO PROVIDE A
REFUGE ISLAND ON ILUKA ROAD

| STREETS FOR LIVING - CHARACTERISTICS | | | | |
|---|-------------------|-----------------|-------------------------|-------------------------|
| STREET | RESERVE WIDTH (m) | VERGE WIDTH (m) | TOTAL SEAL WIDTH (m) | CUL DE SAC DIAMETER (m) |
| HICKEY STREET | 30 EXISTING | VARIES | 8 | - |
| 1 | 20 | VARIES | 8 | 30 outer, 15 inner |
| 2 | 20 (*1) | 6 (*1) | 8 | - |
| 3 | 25 | 6 (*2) | 8 | 20 |
| 4, 6, 7 | 20 | 6 | 8 | - |
| 5, 8 | 20 | 6 | 8 | 20 |
| AWAY 3 | VARIES | 3.5 (*3) | 4 | - |
| PURPOSE OF STREET CORRIDORS - STREET FOR LIVING - WATER SENSITIVE URBAN DESIGN CORRIDOR - INFRASTRUCTURE CORRIDOR - FAUNA / FLORA CORRIDOR | | | AWAY - MEANS ACCESS WAY | |

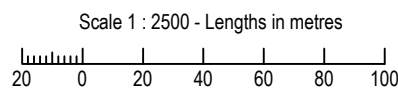
NOTES:
(*1) - RESERVE WIDTH INCREASED TO 25m (AND VERGE OF 11m) TO ACCOMMODATE WSUD TREATMENT WITHIN RESERVE ON PARK SIDE OF STREET 2
- VERGE REDUCES TO 2m ON PARKSIDE FOR NORTHERN PART OF STREET 2 WHERE DETENTION / WSUD NOT REQUIRED. EXISTING RESERVE WIDTH
APPROX. 30m FOR NORTHERN SECTION WHERE STREET 2 IS ACCOMMODATED WITHIN EXISTING HICKEY STREET RESERVE
(*2) - VERGE WIDTH INCREASED TO 11m ON PARKSIDE TO ACCOMMODATE WSUD TREATMENT
(*3) - ON SIDE WITH LOT ACCESS ONLY - REDUCED / VARIED VERGE WIDTH ON NON-ACCESS SIDE

| TYPICAL ALLOTMENT ATTRIBUTES | | |
|------------------------------|-----------|------------|
| AREA (m ²) | WIDTH (m) | LENGTH (m) |
| >400 | 13-14 | 30-35 |
| 500 | 14 | 35 |
| 600 | 17.5 | 35 |
| 700 | 19 | 37 |

- NOTES:**
- These notes form part of this plan.
 - Boundaries identified by plan dimensions only, the boundaries have not been surveyed.
 - Adjoining property boundary boundaries may not be complete, a summary of compiled DCDB only.
 - The dimensions, bearings, areas and number of allotments shown on this plan are subject to field survey and approval of relevant Government Authorities having jurisdiction over statutory requirements pursuant to any relevant legislation.
 - The information for this plan has been prepared for the purpose of a Development Approval for Subdivision and should not be used for any other purpose. This plan has been prepared for the Stevens Group.
 - Do not scale from this plan.



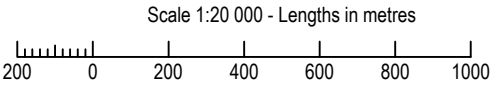
note: the layout is preliminary only and subject to detailed engineering and surveying input. all dimensions and areas are indicative only.



| | | | |
|---|--|---|---|
| SOURCE: OneCollective - Masterplan (191113 CVC Approved Plans - Extract.pdf) | CLIENT Ocean Park Consulting Pty Ltd | FIGURE 1 | TITLE APPROVED MASTER PLAN |
| SCALE: 1 : 2500 @ A3 | PROJECT Annual Koala Monitoring Report | | |
| <div>JWA PTY LTD Ecological Consultants</div> | Birrigan Estate Lot 99 on DP823635, Hickey Street, Iluka NSW Clarence Valley Council LGA | PREPARED: BW DATE: 08 September 2021 FILE: N202001_SAT_20210908.dwg | |



LEGEND
[Red Box] Site Boundary



SOURCE: Open Street Maps

SCALE: 1 : 20 000 @ A3

JWA PTY LTD
Ecological Consultants

CLIENT
Ocean Park Consulting Pty Ltd
PROJECT
Annual Koala Monitoring Report
Birrigan Estate
Lot 99 on DP823635, Hickey Street, Iluka NSW
Clarence Valley Council LGA

FIGURE 2

PREPARED: BW
DATE: 08 September 2021
FILE: N202001_SAT_20210908.dwg

TITLE
LOCALITY
PLAN

western end of the site supports large trees and the landform seems to reflect a more natural pattern of dune and swale.

Three vegetation types have been recorded on the site (Keystone Ecological 2018):

- Community 190 Coast Banksia woodland and open forest of coastal dunes: 0.41 ha of relatively undisturbed vegetation at the site's western end. This area has elements of regenerating Littoral Rainforest (for example, some vines and rainforest tree species), but it is not structurally or floristically well developed.
- Community 193 Pink Bloodwood - Brush Box open forest on coastal dunes and sandplains: dominant community, occupying 18.16 hectares.
- Community 187 Coast Cypress Pine shrubby open forest: restricted on site to a dense patch of adult trees near the site's southern boundary, occupying 0.25 hectares.

2 METHODOLOGY

2.1 Background

A Baseline Koala Monitoring program was established in February 2020 across the retained vegetation on site to collect data to allow future monitoring to determine any changes in the distribution and level of Koala activity.

Monitoring is then to be undertaken annually to determine the effectiveness of management actions implemented and to monitor the Iluka Koala population.

The first annual monitoring was completed on the 10th August 2021 by one (1) JWA ecologist. The second annual monitoring was completed on the 12th August 2022 by one (1) JWA ecologist.

2.2 Koala Monitoring Program

2.2.1 Introduction

This section discusses the proposed monitoring program for koalas at the Birrigan Iluka Beach site including the key monitoring objectives, methodologies employed during baseline monitoring and to be implemented during ongoing annual monitoring, and reporting requirements.

2.2.2 Monitoring Program

2.2.2.1 Baseline koala monitoring

The aims of the baseline monitoring are to establish survey sites and protocols and to collect data which will allow future monitoring to determine any changes in the distribution and level of Koala activity within the Birrigan Iluka Beach site.

Baseline koala monitoring has been completed across the vegetated areas to be retained on the site. Baseline monitoring was completed prior to the commencement of works on the site by suitably qualified and/or accredited persons¹. Baseline monitoring included:

- diurnal searches of Birrigan Iluka Beach koala habitat; and
- a full measure of koala activity i.e. application of Spot Assessment Technique (SAT) methodology (Phillips and Callaghan 2011).

2.2.2.2 Annual koala monitoring

Annual koala monitoring was completed over the Birrigan Iluka Beach site following the methodology described in the Baseline koala monitoring section (SECTION 2.2.2.1), and included:

- diurnal searches of Birrigan Iluka Beach koala habitat; and

¹ Means a qualified ecologist with appropriate training and at least five years of experience in undertaking surveys in relation to the relevant EPBC Act listed threatened species.

- a full measure of koala activity i.e. application of Spot Assessment Technique (SAT) methodology (Phillips and Callaghan (2011)).

In reporting of annual monitoring results, liaison is to be undertaken with the Clarence Valley Council, NSW Koala Preservation Society, NSW - Office of Environment and Heritage and/or Clarence Valley WIRES to gather data on any koala incidents that may have occurred within the area in the previous two-year period. In accordance with the HMP (Keystone Ecological 2018), annual reports detailing the results of the monitoring program is to include:

- a comparison of koala activity with data from past surveys;
- a summary of koala incidents having occurred over the previous two year period;
- any other observations of relevance to koala management; and
- a discussion of the findings of the program and any recommendations for amendment of the Community Scheme Residential Subdivision Koala Plan of Management or further action by the Birrigan Iluka Beach Association or Clarence Valley Council or other relevant party.

Reporting of Koala sightings should be in accordance with the protocol adopted by the Clarence Valley Council - refer to the Council website for “Register a Koala Sighting Form”.

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

2.2.3 Monitoring Methodology

Sampling

The field surveys will utilise the Spot Assessment Technique (SAT) (Phillips and Callaghan 2011), which involves a radial assessment of koala “activity” within the immediate area surrounding a SAT site. In the field, the technique is applied as follows:

1. Locate the SAT site;
2. Identify and uniquely mark the thirty (30) nearest trees to the SAT site;
3. Undertake a search for koala faecal pellets beneath each of the thirty (30) marked trees based on a cursory inspection of the undisturbed ground surface within a distance of 100 centimetres around the base of each tree, followed (if no faecal pellets are initially detected) by a more thorough inspection involving disturbance of the leaf litter and ground cover within the prescribed search area.

For assessment purposes, a tree is defined as “a live woody stem of any plant species (excepting palms, cycads, tree ferns and grass trees) which has a diameter at breast height (DBH) of 100 mm or greater” (Phillips *et al.* 2000). In the case of multi-stemmed

trees, at least one of the live stems must have a DBH of 100 millimetres or greater in order to qualify.

Strict adherence to the 100 cm search area is a fundamental component of the SAT methodology. It is this distance that both optimises the probability of success in terms of actually finding faecal pellets, while at the same defining a workable search area (Phillips and Callaghan, 2011). In terms of search effort, an average of approximately two (2) person minutes per tree should be dedicated to the faecal pellet search. For assessment purposes, the search should be concluded once a single faecal pellet has been detected or when the maximum search time has expired, whichever happens first. This process should be repeated until each of the 30 trees in the site has been assessed. Where the location of faecal pellets falls within overlapping search areas due to two (2) or more trees growing in close proximity to each other, both should be scored for pellet(s).

In addition to the SAT analysis demographic attributes of the koala population will be determined via targeted searches of:

- a) 25 m fixed radius from the central tree (0.196 ha); and
- b) opportunistic sightings whilst traversing the subject site.

The following information relating to each koala sighting should be collected:

- Age class: Adult, sub-adult (2-4 kg) or juvenile (less than one (1) year old, less than 2 kg, not yet independent);
- Reproductive status: the presence of a pouch young, back young, or no young associated with an adult female;
- Health status: healthy, or showing signs of Chlamydia such as cystitis (wet, stained bottom) and/or conjunctivitis (red swollen eyes discharging pus), or other indicators of poor health such as discharges from nose or mouth, wasted or emaciated appearance etc.; and
- Koala location: using a map and/or GPS unit, the location of each koala should be plotted on a map to gain an overall distribution of koalas on the site.

Field sampling will be carried out between August to February (i.e. the breeding season) by ecologists experienced in koala faecal pellet identification, koala survey and tree species identification.

Data Analysis

Koala Activity

Koala ‘activity’ at each site will be determined by dividing the number of trees with a koala faecal pellet by the number of trees searched in the site (a minimum of 30). Activity thresholds of Phillip and Callaghan (2011) will be used to describe the results of field sites. This threshold allows interpretation of the activity level at each site in order to determine its relative importance to the koala population. The key measures on the east coast are summarized below in TABLE 1.

TABLE 1
SUMMARY OF KOALA ACTIVITY CATEGORIES AND THEIR INTERPRETATION

| Activity Category | Activity Level | Interpretation |
|----------------------|----------------|---|
| Significant activity | ≥ 22.52% | Site is regularly used by one or more koalas as part of normal ranging behaviour. |
| Low activity | 0% - 22.51% | Occasional or transitory use of the site by (for example) dispersing animals not yet displaying established home ranging movement patterns. |

Habitat Utilisation / Occupancy rates

Two measures of “occupancy” are to be assessed. “Occupancy” describes the proportion of a sampled area where the target species is present. The first is usage of habitat by koalas at any level (Habitat Utilisation rate), be it occasional or frequent. The second and more useful measure is occupancy by resident koala populations (Koala Occupancy rate). Changes in occupancy by resident koalas in a population is more meaningful, as it describes the trend as it relates to the majority of the koala population at any given time.

Baseline Habitat Utilisation rate will be estimated on the basis of the numbers of sampled field sites in which koala faecal pellets were recorded, while the Baseline Koala Occupancy rate will be the subset of these sites that had koala activity levels > 22.52%. The first provides a measure of what proportion of available habitat is currently utilised by koalas in any way, the second indicating what proportion of habitat is occupied by resident populations.

A Baseline koala density estimate will be determined by dividing the total number of koalas sighted within the 0.196 ha radial assessments, by the total area covered by this assessment process over the sampling period.

A test of significance utilising the Paired Student t-test will be completed after each monitoring event to determine if a statistically significant reduction in koala occupancy rates has occurred (i.e. to test the hypothesis that pre-development koala activity is higher than the post-development koala activity). As sample sizes are relatively small, however, the value of p (typically 0.05 or 0.01 in order for significance to be determined) should be raised to something that better reflects the limitations of the sample size. A p of 0.25 as the statistical benchmark of significant change should be considered, further qualified by a requirement that a major review should be initiated only after consideration of the monitoring data from two (2) successive monitoring events.

2.2.4 Performance Criteria and Corrective Actions

TABLE 2 provides the performance criteria for the koala monitoring program. Corrective actions are provided that are to be implemented if performance criteria are not met.

TABLE 2
KOALA MONITORING PERFORMANCE CRITERIA AND CORRECTIVE ACTIONS

| Performance Indicator | Corrective Action |
|--|--|
| For monitoring purposes, the benchmark habitat occupancy rate to be achieved for koala populations inhabiting the Birrigan Iluka Beach site will be equal to or greater than baseline levels | Investigate habitat usage on the Birrigan Iluka Beach site. Determine which areas of potential habitat are not being utilised by the population. Consult with OEH and koala experts to develop a strategy to improve/facilitate the usage of the potential koala habitat. Implement the strategy. |
| Mitigate processes which are limiting koala occupancy rates and / or population sizes: Bushfire related deaths or damage to habitat are minimised | If a bushfire occurs within land an investigation will be triggered to assess damage to koalas and their habitat on the Birrigan Iluka Beach lands. The investigation will include a survey of the koala population occurring on the site. Consultation will occur with RFS, Council and OEH to determine the cause of the fire. A report will be prepared after the consultation. The report will address, causes, impacts and proposed changes, if considered necessary, to Bushfire management plans. |
| Mitigate processes which are limiting koala occupancy rates and / or population sizes: No evidence or reports of dog attacks on a koala | If there is an instance of one (1) attack by a dog on a koala then an investigation of causes will be triggered. Dog management within the Birrigan Iluka Beach site will be investigated. If dog management strategies are considered to be ineffective or dog owners do not have sufficient awareness of their responsibilities, then Council, OEH and relevant specialists will be consulted and a more prescriptive dog ownership/management/education strategy will be prepared and implemented, including the installation of additional educational signage if necessary. |
| Mitigate processes which are limiting koala occupancy rates and / or population sizes: No reported vehicle strike mortalities | If there is an instance of one (1) koala killed or injured on Birrigan Iluka Beach internal roads then an investigation of causes will be triggered. |
| Mitigate processes which are limiting koala occupancy rates and / or population sizes: High rates of diseased koalas are not detected | Disease condition assessments will be carried out during the baseline monitoring assessment and in every annual assessment thereafter. If expert opinion considers that disease occurrence is over and above that which would be expected in a wild population of koalas or they consider that there has been a significant increase in diseased animals since the Baseline assessment, then |

| Performance Indicator | Corrective Action |
|--|--|
| | advice will be obtained from appropriate OEH scientists and/or other koala experts as considered necessary or appropriate. The advice will be implemented. |
| Mitigate processes which are limiting koala occupancy rates and / or population sizes: Swimming pool drownings | If there is an instance of a koala drowning in a residential pool then an investigation will be triggered to ensure pool ownership strategies are in place e.g. checking to ensure all pool owners have pool fences which are koala-proof and pools have acceptable Koala escape mechanisms installed (e.g. shallow end or a thick rope). A report will be prepared in consultation with OEH, Council and/or koala experts as necessary or appropriate. The recommendations contained in the report will be implemented. |

3 RESULTS

3.1 Koala Surveys

3.1.1 Field Sites

Nine (9) sites were sampled across the subject site by JWA ecologists as part of the baseline survey in February 2020 (FIGURE 3). These nine (9) sites were sampled again in August 2021 and August 2022. TABLE 3 provides a summary of activity/occupancy data at the nine (9) sites sampled during both the baseline and scheduled monitoring.

3.1.2 Koala Sightings

No koalas were sighted during the 2020 Baseline survey or the August 2021 and 2022 surveys (TABLE 3).

3.1.3 Koala Activity

Koala activity was not recorded from any of the nine (9) field sites sampled during this baseline study or the August 2021 and 2022 surveys.

3.1.4 Habitat Utilisation / Occupancy rates

Baseline Habitat Utilisation rates (number of sampled field sites in which koala faecal pellets were recorded) were estimated at 0% (n=0) of the 9 sampled sites. This provides a measure of what proportion of available habitat is currently utilised by koalas in any way.

Baseline Koala Occupancy rate (subset of sites that had koala activity levels > 22.52%) were estimated at 0% (n=5) of the 9 sampled sites. The Baseline Koala Occupancy rate indicates what proportion of habitat is occupied by resident populations.

The Occupancy rate during the August 2021 and 2022 monitoring surveys were also estimated at 0% of the 9 sampled sites.

3.1.5 Koala Density and Population Estimate

The Baseline koala density and population estimates could not be estimated due to no koalas seen during the baseline surveys. No koalas were recorded during the August 2021 and 2022 surveys, therefore density and population estimates still could not be estimated.

3.1.6 Summary of Recent Koala Sightings/Incidents

The Clarence Valley Koala Register mapping indicates that one (1) koala has been recorded within one (1) kilometre of the subject site in the last two (2) years. One (1) male koala was hit and killed by a car within two (2) kilometres of the subject site in the last two (2) years.

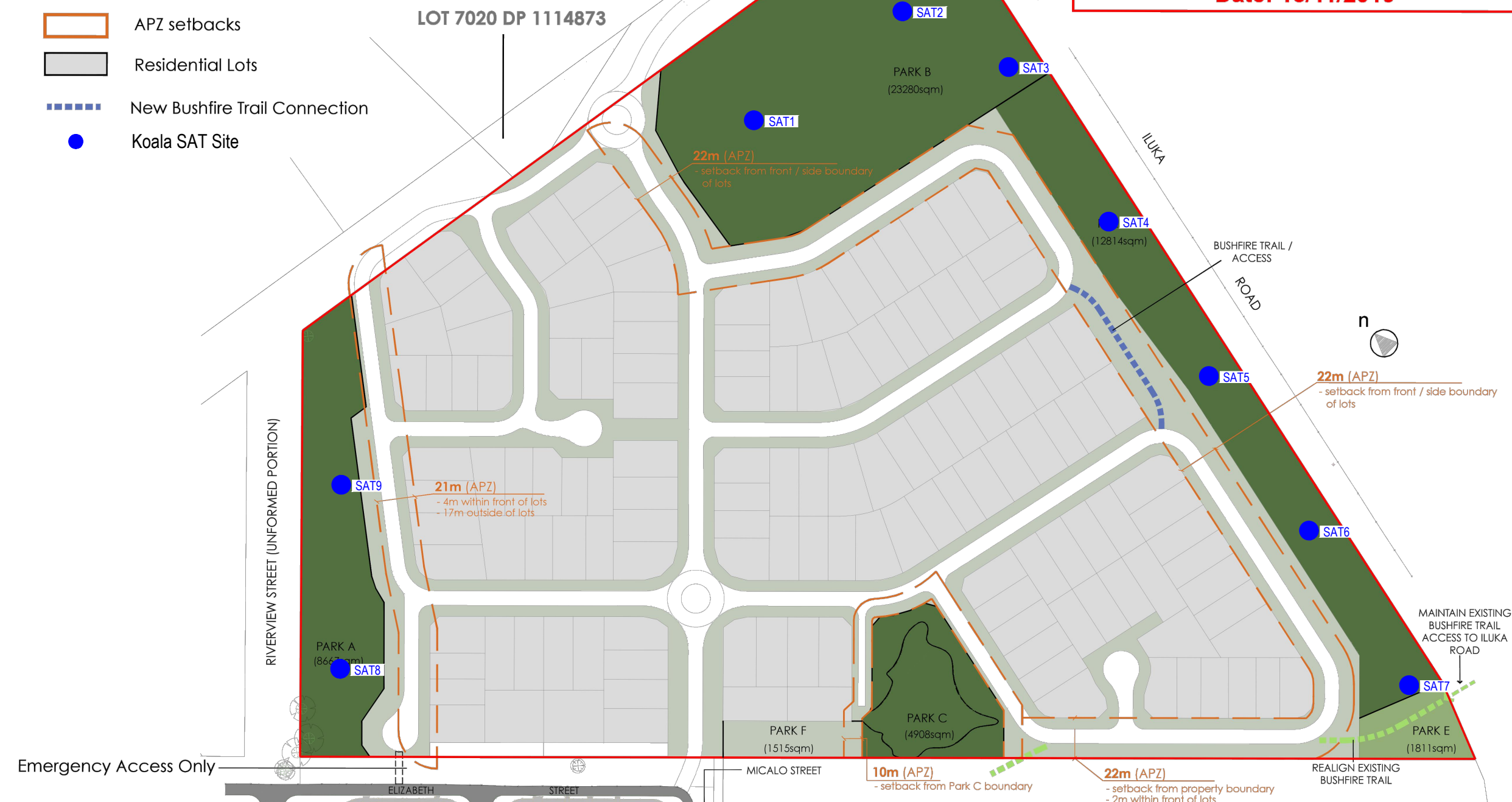
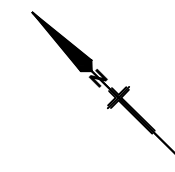
LOT 99 DP 823635

- Core Conservation Zone
- Bushfire Trail Zone
- Street Verges / Landscape Zone
- APZ setbacks
- Residential Lots
- New Bushfire Trail Connection
- Koala SAT Site

CLARENCE VALLEY COUNCIL
APPROVAL

This is the plan referred to in Council's
Notice of Determination of SUB2015/0034

Date: 13/11/2019



note: the layout is preliminary only and subject to detailed engineering and surveying input. all dimensions and areas are indicative only.

Scale 1 : 2500 - Lengths in metres
20 0 20 40 60 80 100

SOURCE: JWA Site Investigations Feb 2020;
OneCollective - Vegetation Zones
(191113 CVC Approved Plans - Extract.pdf)
SCALE: 1 : 2500 @ A3

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Ocean Park Consulting Pty Ltd
PROJECT
Annual Koala Monitoring Report
Birrigan Estate
Lot 99 on DP823635, Hickey Street, Iluka NSW
Clarence Valley Council LGA

FIGURE 3

PREPARED: BW
DATE: 08 September 2021
FILE: N202001_SAT_20210908.dwg

TITLE

KOALA
SAT SITES

No further observations of relevance to koala management with relation to the subject site have been recorded.

TABLE 3
BASELINE KOALA SURVEY RESULTS

| Site | Trees Surveyed | | Baseline (Feb 2020) | | | August 2021 | | | August 2022 | | |
|------|---|--------|-------------------------|----------------|-----------------|-------------------------|----------------|-----------------|-------------------------|----------------|-----------------|
| | Species | Number | No. of trees with Scats | Koalas Present | Koala Activity | No. of trees with Scats | Koalas Present | Koala Activity | No. of trees with Scats | Koalas Present | Koala Activity |
| 1 | Forest red gum (<i>Eucalyptus tereticornis</i>) | 4 | x | x | 0 (inactive) | x | x | 0 (inactive) | x | x | 0 (inactive) |
| | Pink bloodwood (<i>Corymbia intermedia</i>) | 7 | | | | | | | | | |
| | Hickory wattle (<i>Acacia disparrima</i>) | 19 | | | | | | | | | |
| 2 | Pink bloodwood (<i>Corymbia intermedia</i>) | 5 | x | x | 0 (inactive) | x | x | 0 (inactive) | x | x | 0 (inactive) |
| | Hickory wattle (<i>Acacia disparrima</i>) | 16 | | | | | | | | | |
| | Yellow pear-fruit (<i>Mischocarpus pyriiformis</i>) | 6 | | | | | | | | | |
| | Fraser Island apple (<i>Acronychia imperforata</i>) | 3 | | | | | | | | | |
| 3 | Forest red gum (<i>Eucalyptus tereticornis</i>) | 2 | x | x | 0 (inactive) | x | x | 0 (inactive) | x | x | 0 (inactive) |
| | Brushbox (<i>Lophostemon confertus</i>) | 2 | | | | | | | | | |
| | Pink bloodwood (<i>Corymbia intermedia</i>) | 6 | | | | | | | | | |
| | Yellow pear-fruit (<i>Mischocarpus pyriiformis</i>) | 8 | | | | | | | | | |
| | Hickory wattle (<i>Acacia disparrima</i>) | 6 | | | | | | | | | |
| | Fraser Island apple (<i>Acronychia imperforata</i>) | 6 | | | | | | | | | |
| 4 | Brushbox (<i>Lophostemon confertus</i>) | 2 | x | x | 0 (inactive) | x | x | 0 (inactive) | x | x | 0 (inactive) |
| | Fraser Island apple (<i>Acronychia imperforata</i>) | 6 | | | | | | | | | |
| | Yellow pear-fruit (<i>Mischocarpus pyriiformis</i>) | 10 | | | | | | | | | |
| | Hickory wattle (<i>Acacia disparrima</i>) | 10 | | | | | | | | | |
| | Pink bloodwood (<i>Corymbia intermedia</i>) | 2 | | | | | | | | | |
| 5 | Pink bloodwood (<i>Corymbia intermedia</i>) | 4 | x | x | 0 (inactive) | x | x | 0 (inactive) | x | x | 0 (inactive) |
| | Hickory wattle (<i>Acacia disparrima</i>) | 16 | | | | | | | | | |
| | Yellow pear-fruit (<i>Mischocarpus pyriiformis</i>) | 3 | | | | | | | | | |
| | Fraser Island apple (<i>Acronychia imperforata</i>) | 1 | | | | | | | | | |
| | Brushbox (<i>Lophostemon confertus</i>) | 1 | | | | | | | | | |
| 6 | Pink bloodwood (<i>Corymbia intermedia</i>) | 8 | x | x | 0 (inactive) | x | x | 0 (inactive) | x | x | 0 (inactive) |
| | Hickory wattle (<i>Acacia disparrima</i>) | 18 | | | | | | | | | |
| | Fraser Island apple (<i>Acronychia imperforata</i>) | 3 | | | | | | | | | |
| | Brushbox (<i>Lophostemon confertus</i>) | 1 | | | | | | | | | |
| 7 | Pink bloodwood (<i>Corymbia intermedia</i>) | 5 | x | x | 0 (inactive) | x | x | 0 (inactive) | x | x | 0 (inactive) |
| | Brushbox (<i>Lophostemon confertus</i>) | 6 | | | | | | | | | |
| | Fraser Island apple (<i>Acronychia imperforata</i>) | 10 | | | | | | | | | |
| | Hickory wattle (<i>Acacia disparrima</i>) | 9 | | | | | | | | | |
| 8 | Pink bloodwood (<i>Corymbia intermedia</i>) | 8 | x | x | 0 (inactive) | x | x | 0 (inactive) | x | x | 0 (inactive) |
| | Brushbox (<i>Lophostemon confertus</i>) | 6 | | | | | | | | | |
| | Hickory wattle (<i>Acacia disparrima</i>) | 16 | | | | | | | | | |
| 9 | Pink bloodwood (<i>Corymbia intermedia</i>) | 3 | x | x | 0 (inactive) | x | x | 0 (inactive) | x | x | 0 (inactive) |
| | Fraser Island apple (<i>Acronychia imperforata</i>) | 10 | | | | | | | | | |
| | Tree heath (<i>Trochocarpa laurina</i>) | 6 | | | | | | | | | |
| | Broad-leaved paperbark (<i>Melaleuca quinquenervia</i>) | 5 | | | | | | | | | |
| | Yellow pear-fruit (<i>Mischocarpus pyriiformis</i>) | 6 | | | | | | | | | |

4 DISCUSSION AND CONCLUSION

No Koalas or evidence of Koala activity (i.e. scats) were detected during the 2020 Baseline surveys or subsequent August 2021 and 2022 surveys. The proportion of habitat occupied by a resident koala population at the time of the baseline survey and first annual monitoring, and areas of the site that are subject to any koala use (whether occasional or frequent e.g. transient) at the time of the surveys is therefore estimated at 0%.

The nine (9) field sites sampled during this baseline study are considered to provide good coverage of the habitat on the subject site, are placed regularly throughout the landscape, and therefore provide a sound sample from which to examine trends over time. Proposed revegetation/regeneration works on the subject site in accordance with the Habitat Restoration Plan (JWA 2020) include planting of preferred koala food trees and other koala habitat embellishment measures, which may potentially lead to increased koala activity on the site. Two measures of “occupancy” will be assessed during ongoing annual koala monitoring. “Occupancy” describes the proportion of a sampled area where the target species is present. The first measure that will be monitored is usage of habitat by koalas at any level (Habitat Utilisation rate), be it occasional or frequent. The second and more useful measure that will be monitored over time is occupancy by resident koala populations (Koala Occupancy rate). Changes in occupancy by resident koalas in a population is more meaningful, as it describes the trend as it relates to the majority of the koala population at any given time.

5 NEXT MONITORING ROUNDS

The requirements and future survey dates for the annual Koala Monitoring Program are present in TABLE 4. Reporting will be annually for the duration of the monitoring program. The next monitoring event (i.e. third annual monitoring) will occur during the August 2023 to February 2024 period (i.e. the breeding season) and the results will be compared to the results of this monitoring report.

TABLE 4
MONITORING PROGRAM REQUIREMENTS AND SURVEY DATES

| Survey | Requirements/Frequency | Latest Survey Date | Next Survey Date |
|-------------------------|--|--|--|
| Baseline Koala Survey | Prior to commencement of site vegetation clearing works | Completed in February 2020 | N/A |
| Koala Monitoring Survey | Annually for a minimum five-year management period following the completion of the initial phase of habitat protection works | 2 nd Annual Monitoring: Completed August 2022 | 3 rd Annual monitoring: between August 2023 and February 2024 |

REFERENCES

Keystone Ecological (2018a) Ecological Response for Preliminary Documentation, Hickey Street Iluka, Clarence Valley LGA. Report to Stevens Group.

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Phillips, S., and Callaghan, J. (2011) The “Spot Assessment Technique”: a tool for determining localized levels of habitat use by Koalas *Phascolarctos cinereus*. *Australian Zoologist*: 35(3), 774 - 780.