Preliminary Documentation Report

(Part A)

Springfield Residential Development
Mur Boulevard, Springfield, QLD

(EPBC 2019/8575)

Prepared for Cherish Enterprises Pty Ltd

3 July 2026

Document Control

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Foreword

Saunders Havill Group (SHG) act on behalf of Cherish Enterprises Pty Ltd in the coordination and production of the response to the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) Controlled Action Determination assessment on Preliminary Documentation for the proposed Springfield Residential Development, in Springfield (the project) (EPBC Reference: 2019/8575).

On the 13th November 2019 a referral under the EPBC Act was made to the Commonwealth Department of Agriculture, Water and the Environment (DAWE), now Department of Climate Change, Energy, the Environment and Water (DCCEEW) for a controlled action assessment. On the 9th April 2020, this application was deemed a Controlled Action requiring assessment by "Preliminary Documentation" (refer to **Attachment A1** for Controlled Action determination).

The Controlled Action decision was based on the determination of potential impacts on the following Matters of National Environmental Significance (MNES):

- Listed threatened species and ecological communities (sections 18 & 18A) protected under Part 3 of the EPBC Act, specifically:
    - Koala (*Phascolarctos cinereus* – combined populations of Qld, NSW and the ACT) listed as Vulnerable;
    - Grey-headed flying-fox (*Pteropus poliocephalus*) listed as Vulnerable; and
    - Lowland Rainforest of Subtropical Australia listed as Critically Endangered.
- The Department also considers that there is a real chance or possibility that significant impacts may arise in relation to the following:
    - Swift parrot (*Lathamus discolor*) listed as Critically Endangered; and
    - Regent honeyeater (*Anthochaera phrygia*) listed as Critically Endangered.

As per ongoing correspondence from the Department, additional information has been provided in this document to support an assessment that significant impact on greater glider (*Petauroides volans*), listed as Vulnerable under the EPBC Act, is unlikely.

It is acknowledged that the referral application, which included an assessment of the project against the applicable EPBC Act guidelines and policies, including the Significant Impact Guidelines 1.1, nominated the project as 'a controlled action' (refer to **Part B** for a copy of the original Referral Application).

With the April 2020 controlled action determination, the (former) DAWE then provided a list of additional information required to be addressed within the Preliminary Documentation report. A copy of this PD additional information request (IR) is included as **Attachment A2** and each item has been extracted as each subsequent chapter of this PD. As part of this assessment processes, the Preliminary Documentation must be published for public comment. It is noted the PD IR also contains various advice notes from the department. These have been considered, however, in some cases, have become no longer relevant to the

assessment due to changes in accepted methodologies and regulatory documents. For example, the PD IR notes the department's view on the application of the Koala Habitat Assessment Tool (KHAT), however, this assessment method is no longer used for assessments of koala impacts therefore is irrelevant to the assessment.

Purpose

The purpose of this Preliminary Documentation Report is to provide additional information to the Department of Climate Change, Energy, the Environment and Water (DCCEEW) to accompany the Preliminary Documentation assessment process to ultimately obtain formal approval for the Springfield Residential Development.

Document Structure

For readability of this document, the supporting information has been separated into two folders using the following structure:

- **Part A: Preliminary Documentation Report.**
- **Part B: Referral Material and Technical Studies.**

Part A: Preliminary Documentation Report refers to this document. Part A includes relevant figures, plans and supporting material required to support full assessment of the action by DAWE. These have been referenced with the prefix A (*i.e.,* Figure A1, Plan A1, Attachment A1). Figures and Plans have been provided in **Section 11** and Attachments in **Section 12** at the back of the PD for ease of reference. Refer to the front of this document for a full table of contents and complete list of attachments.

The following sections within this Preliminary Documentation report address the item requirements of the request for additional information, and have been numbered to correspond to each of the additional information item requests, specifically:

- Section 1: Description of the action
- Section 2: Description of the environment and Matters of National Environmental Significance
- Section 3: Quantification of impacts
- Section5: Avoidance and mitigation
- Section 6: Proposed offsets
- Section 7: Economic and social matters
- Section 8: Ecologically sustainable development

Part B: Referral Material and Technical Studies refers to a copy of the full referral material originally submitted for the controlled action assessment as well as any supporting studies and requests for information responses prepared by technical consultants. It is noted that relevant sections from each of these

documents have been brought forward and incorporated into Part A of the PD for ease of reference and readability. It is also noted that changes to the referral material are not possible and Part A of the PD supersedes the information in the referral.

Reference Table

This section provides a reference table indicating report chapters that correspond with items requested within the additional information request included as **Attachment A2**. Each item has been extracted and provided within the corresponding chapter of this PD.

Table F1: Reference Table

Item	Details	Section
1.0.	Description of the Action	1
2.0.	Description of the Environment and Matters of National Environmental Significance	2
3.0.	Quantification of Impacts	3, 4
4.0.	Avoidance and Mitigation	5
5.0.	Proposed Offsets	6
6.0.	Economic and Social Matters	7
7.0	Ecologically Sustainable Development	8

Table of Contents

1. Description of the action 1
1.1 The location, boundaries and size of the impact 1
1.1.1 Project context and details 1
1.1.2 Development Footprint 3
1.1.3 Local government approval context 4
1.1.4 Ecological attributes within and adjoining referral area 5
1.1.5 Impacts from vehicle access and associated activities 5
1.2 Timeframes and staging 6
1.3 Construction and operation 6

2. Description of the Environment and Matters of National Environmental Significance 9
2.1 Description of potential MNES that occur on, and adjacent to, the Project 9
2.1.1 Likelihood of Occurrence Assessment 9
2.2 Description of the current land use and natural environment 22
2.2.1 Current land use 22
2.2.2 Topography 22
2.2.3 Waterways and waterbodies 22
2.2.4 Vegetation Communities 23
2.2.5 Habitat for threatened species 33
2.3 Technical detail on MNES present at, or in the vicinity to, the project site (as listed in 2.1) 34
2.3.1 Lowland Rainforest of Subtropical Australia Threatened Ecological Community 34
2.3.2 Koala (*Phascolarctos cinereus*) 41
2.3.3 Grey-headed flying-fox (*Pteropus poliocephalus*) 50
2.3.4 Swift parrot (*Lathamus discolor*) 54
2.3.5 Regent honeyeater (*Anthochaera phrygia*) 59
2.3.6 Greater glider (*Petauroides volans*) 64
2.3.7 White-throated Needletail (*Hirundapus caudacutus*) 71
2.3.8 Collared delma (*Delma torquata*) 73
2.4 Information about the methods, data and literature used to identify and assess environmental values 92
2.4.1 Desktop analysis 92
2.4.2 Scientific Permits 93
2.4.3 Field Survey Methods 93
2.5 Field Survey Results 105
2.5.1 Observed native flora 105
2.5.2 Observed introduced flora 108
2.5.3 Threatened Flora 109
2.5.4 General fauna observations 111
2.5.5 Camera survey results 115

3. Quantification of impacts 118

3.1 Proposed impact, intended land uses and retention areas 118
3.2 Timing and delivery of project 119
3.3 Habitat connectivity 120

4. MNES Impact Assessment 121
4.1 Koala 123
4.1.1 Assessment Methodology 123
4.1.2 Discussion 129
4.2 Grey-headed flying-fox 138
4.2.1 Assessment methodology 138
4.2.2 Discussion 146
4.3 Swift parrot 153
4.3.1 Assessment methodology 153
4.3.2 Discussion 154
4.4 Regent honeyeater 159
4.4.1 Assessment methodology 159
4.4.2 Discussion 160
4.5 Greater glider 164
4.6 White-throated Needletail 171
4.7 Collared delma 174
4.8 Lowland Rainforest of Subtropical Australia 179
4.8.1 Patch location 179
4.8.2 Construction impacts 179
4.9 Indirect, facilitated and cumulative impacts 180
4.9.1 Impacts summary 181
4.9.2 Additional consultations and findings 182
4.9.3 Indirect impact analysis 183

5. Avoidance and Mitigation 190
5.1 Site Selection 190
5.2 Design Minimisation 191
5.3 Description of pre-clearance and clearance procedures 192
5.3.1 MNES Management Plan 192
5.3.2 Vegetation Clearing and Fauna Management Plan 194
5.3.3 Environmental pre-clearance package 196
5.3.4 Fauna Spotter Catcher roles and reporting 197
5.3.5 Adoption of the RSPCA / ESU of WW Draft Code for Fauna Spotting 198
5.3.6 *Phytophthora cinnamomi* management 200
5.4 Description of buffers or proposed exclusion zones 203
5.4.1 Fauna friendly tree protection fencing 203
5.4.2 Temporary fauna exclusion fencing 203
5.4.3 LRSA TEC shade cloth fencing 205
5.4.4 Other barriers/fencing 205

5.5 Details on rehabilitation measures 205
5.5.1 Mitigation Plantings – Opossum Creek 207
5.6 Details of the proposed ongoing management activity 207
5.6.1 Safe Passage Road Fauna Movement Solutions 207
5.6.2 Fauna awareness signage 208
5.6.3 Lighting 208
5.6.4 Landscaping 209
5.6.5 Education and awareness 209
5.6.6 Dog control measures 209
5.6.7 Stormwater management 209
5.7 Further details of measures proposed 211
5.7.1 Clearing and construction impacts 212
5.7.2 Operational impacts 218

6. Proposed offsets 221
6.1 Significant Residual Impact Summary 222
6.2 Offset Proposal 222
6.3 Esk Landholdings offset area 225
6.3.1 Offset area values 225
6.3.2 Current Management and Threats to MNES 229
6.3.3 Koala offset score 230
6.3.4 Grey-headed flying-fox offset score 231
6.3.5 Swift parrot offset value 231
6.3.6 Regent honeyeater offset value 232
6.3.7 General Suitability EPBC Offset Policy Criteria 234
6.4 Avonvale offset area 239
6.4.1 Offset area values 239
6.4.2 Koala offset value 245
6.4.3 Grey-headed flying-fox offset value 245
6.4.4 Swift parrot offset value 246
6.4.5 Regent honeyeater offset value 247
6.4.6 General Suitability EPBC Offset Policy Criteria 248
6.5 Mount Walker West offset area 252
6.5.1 Offset area values 252
6.5.2 Current Management and Threats to MNES 257
6.5.3 Koala offset value 258
6.5.4 Grey-headed flying-fox offset value 259
6.5.5 Swift parrot offset value 260
6.5.6 Regent honeyeater offset value 261
6.5.7 General suitability EPBC Offset Policy Criteria 262

7. Economic and social matters 267
7.1 Economic costs and / or benefits 267
7.2 Social costs and / or benefits 267
7.3 Stakeholder engagement and consultation activities 268

7.4 Cultural Heritage Considerations 268

8. Ecologically sustainable development 270

9. Conclusion 274

10. References 275

11. Figures and Plans 282

12. Attachments 382

Tables

Table A1: Referral area property details 2
Table A2: Project staging details 6
Table A3: Likelihood of Occurrence Assessment Criteria 11
Table A4: Refined version of likelihood of occurrence assessment for relevant MNES adapted from the MNES – Ecological Technical Report (PD Part B Attachment 1) 13
Table A5: Regional ecosystem descriptions (Queensland Herbarium) for vegetation communities within and adjoining referral area 23
Table A6: Observed woody species within LRSA TEC consistent with Appendix A of *Lowland Rainforest of Subtropical Australia listing advice* (2011) 36
Table A7: TEC field survey summary 40
Table A8: Summary of spotlighting and drone surveys targeting koala 45
Table A9: Koala Activity Level Classification (Phillips and Callaghan 2011) 47
Table A10: Summary of SAT survey results 47
Table A11: Grey-headed flying-fox field surveys – key dates 52
Table A12: Summary of swift parrot field survey dates 57
Table A13: Summary of regent honeyeater field survey dates 62
Table A14: Summary of greater glider field survey dates 66
Table A15: Greater Glider Survey Guidelines compared to SHG Survey Effort 68
Table A16: Collared delma field survey effort relative to guidelines 80
Table A17: Collared delma potential microhabitat sites 82
Table A18: Summary of targeted field survey techniques and survey effort 94
Table A19: Field survey dates and methods summary 97
Table A20: Observed native flora species 105
Table A21: Observed introduced flora species 108
Table A22: Observed fauna species 113
Table A23: Motion sensor camera survey results 2023 116
Table A24: Significant Impact Guidelines 1.1 definitions 121
Table A25: Koala site condition scoring attributes (BioCondition Manual) 123
Table A26: Koala site context scoring attributes 126
Table A27: Koala Species Stocking Rate Scoring 128

Table A28:	MHQA final weighted scores	129
Table A29:	Quality and availability of foraging and shelter habitat scoring metric	130
Table A30:	Assessment Unit 1 – MHQA results (koala)	134
Table A31:	Assessment Unit 1 – Koala Species Stocking Rate Results	135
Table A32:	Assessment Unit 2 –MHQA results (koala)	136
Table A33:	Assessment Unit 2 – Koala Species Stocking Rate Results	137
Table A34:	GHFF FHA Vegetation Condition Scoring	143
Table A35:	GHFF FHA Canopy Species Richness Scoring	143
Table A36:	GHFF FHA Flower Score (average) Scoring	143
Table A37:	GHFF FHA Timing of Biological Shortages Scoring	143
Table A38:	GHFF FHA Quality of Foraging Habitat (trees >0.65 wt p*r) Scoring	143
Table A39:	GHFF FHA Non-Native Plant Cover Scoring	144
Table A40	GHFF FHA Size of Patch Scoring	144
Table A41:	GHFF FHA Connectedness Scoring	144
Table A42:	GHFF FHA Context Scoring	144
Table A43:	GHFF FHA Ecological Corridors Scoring	144
Table A44:	Threats to species (GHFF) scoring	145
Table A45:	Role of site location to GHFF overall population in the State scoring	145
Table A46:	GHFF Species Stocking Rate Scoring	145
Table A47:	GHFF FHA assessment score summary	146
Table A48:	Grey-headed flying-fox – FHA assessment summary	147
Table A49:	Swift parrot feature-based assessment results	154
Table A50:	Significant impact assessment (SIG 1.1) – swift parrot (critically endangered species)	154
Table A51:	Regent honeyeater feature-based assessment results	160
Table A52:	Significant impact assessment (SIG 1.1) – regent honeyeater (critically endangered species) 160	
Table A53:	Significant impact assessment (SIG 1.1) – greater glider (vulnerable species)	165
Table A54:	EPBC Act Significant impact criteria for vulnerable species – White-throated Needletail	172
Table A55:	EPBC Act Significant impact criteria for vulnerable species – collared delma	175
Table A56:	Direct, Indirect and Facilitated Impacts Summary	180
Table A57:	Indirect Impact Analysis – MNES	184
Table A58:	Proposed management actions for *P. cinnamomi*	201
Table A59:	*P. cinnamomi* corrective actions	202
Table A60:	Temporary exclusion fencing options	204
Table A61:	Clearing and construction Impacts	212
Table A62:	Operational impacts	218
Table A63:	MNES impact compensation summary	224
Table A64:	Esk offset area Queensland Herbarium RE Descriptions	225
Table A65:	Esk offset area Assessment Unit Descriptions	226
Table A66:	Esk Offset Area – Koala proposed offset gain	230
Table A67:	Esk Offset Area – GHFF proposed offset gain	231
Table A68:	Esk Offset Area – Swift parrot proposed offset gain	232
Table A69:	Esk Offset Area – Regent honeyeater proposed offset gain	233
Table A70:	Esk Landholdings Offset Area (General Suitability)	234

Table A71: Avonvale offset area Queensland Herbarium RE Descriptions 240
Table A72: Avonvale offset area Assessment Unit Description 241
Table A73: Avonvale – Koala MHQA proposed offset gain 245
Table A74: Avonvale – GHFF FHA proposed offset gain 246
Table A75: Avonvale – Swift parrot proposed offset gain 247
Table A76: Avonvale – Regent honeyeater proposed offset gain 248
Table A77: Avonvale Offset Area (General Suitability) 248
Table A78: Queensland Herbarium Regional Ecosystem Descriptions 254
Table A79: MWW offset area Assessment Unit Descriptions 254
Table A80: MWW – Koala MHQA proposed offset gain 259
Table A81: MWW – GHFF FHA proposed offset gain 260
Table A82: MWW – Swift parrot proposed offset gain 261
Table A83: MWW – Regent honeyeater proposed offset gain 262
Table A84: MWW Offset Area (General Suitability) 262
Table A85: ESD Principles defined under the EPBC Act, section 3A 270

Figures

Figure A1: Site context 283
Figure A2: Site aerial 284
Figure A3: Referral area topography and waterways 285
Figure A4: Regulated Vegetation Management Map (Qld) 286
Figure A5: Vegetation Management Regional Ecosystem Map (Qld) 287
Figure A6: ASRIS Soils 288
Figure A7: Queensland Fire Scar Mapping 1994 289
Figure A8: Queensland Fire Scar Mapping 2012 290
Figure A9: Springfield Structure Plan 291
Figure A10: South East Queensland Regional Plan 292
Figure A11: Esk Offset Site Context 293
Figure A12: Esk Offset Site Aerial 294
Figure A13: Avonvale Offset Site Context 295
Figure A14: Avonvale Offset Site Aerial 296
Figure A15: Mount Walker West Offset Site Context 297
Figure A16: Mount Walker West Offset Site Aerial 298

Plans

Plan A1: Development Footprint and Rehabilitation 299
Plan A2: Development Layout 300
Plan A3: Indicative Location of External Infrastructure 301
Plan A4: Indicative Project Phasing 302

Plan A5: Stage 1 – Village 2 Phasing 303
Plan A6: Stage 2 – Village 3 Phasing 304
Plan A7: Surrounding EPBC projects 305
Plan A8: Field Survey Effort – Vegetation 306
Plan A9: Lowland Rainforest of Subtropical Australia Threatened Ecological Community ground-truthed extent 307
Plan A10: Assessment Units and Habitat Quality Transects 308
Plan A11: Koala critical habitat 309
Plan A12: Koala records and potential habitat 310
Plan A13: Surrounding Conservation Areas 311
Plan A14: Field Survey Effort – Koala 312
Plan A15: GHFF critical habitat 313
Plan A16: GHFF roosts 314
Plan A17: GHFF records and potential habitat 315
Plan A18: Field Survey Effort – Grey-headed flying-fox 316
Plan A19: Swift parrot critical habitat 317
Plan A20: Swift Parrot records and potential foraging habitat 318
Plan A21: Swift Parrot and Regent Honeyeater Foraging Habitat SEQ 319
Plan A22: Field Survey Effort – Swift parrot and regent honeyeater 320
Plan A23: Regent honeyeater critical habitat 321
Plan A24: Regent Honeyeater records and potential foraging habitat 322
Plan A25: Queensland Vegetation Mapping 323
Plan A26: Barrier Analysis 324
Plan A27: Greater glider records 325
Plan A28: Greater glider suitable regional ecosystems 326
Plan A29: Forest Maturity Map (Griffith University) 327
Plan A30: Greater glider corridor analysis 328
Plan A31: Field Survey Effort – greater glider 339
Plan A32: White-throated Needletail records and potential and known habitat 340
Plan A33: Collared delma broad vegetation types – patch-level 341
Plan A34: Collared delma records and broad vegetation types – locality 342
Plan A35: Collared delma microhabitat survey 343
Plan A36: MNES impact assessment – koala 344
Plan A37: Koala context assessment 345
Plan A38: Ecological corridors 346
Plan A39: Koala hospital data 347
Plan A40: MNES impact assessment – Grey-headed flying-fox 348
Plan A41: Grey-headed flying-fox context assessment 349
Plan A42: MNES impact assessment – Lowland Rainforest of Subtropical Australia TEC 350
Plan A43: Historical Landholdings and Dedications 351
Plan A44: Design Minimisation 352
Plan A45: Proposed shade cloth TEC fencing locations 353
Plan A46: On-site Rehabilitation Areas 354
Plan A47: Fauna Sensitive Design Measures 355

Plan A48: Esk Landholdings Offset Area – Context 356
Plan A49: Esk Landholdings Offset Area – Location of Offset Area and BLEs 357
Plan A50: Esk Landholdings Offset Area – Ecological Corridors and Habitat Areas 358
Plan A51: Esk Landholdings Offset Area – Topography and Water Resources 359
Plan A52: Esk Landholdings Offset Area – Assessment Units 360
Plan A53: Esk Landholdings Offset Area – Koala Records and Habitat 361
Plan A54: Esk Landholdings Offset Area – Grey-headed Flying-fox Records and Habitat 362
Plan A55: Esk Landholdings Offset Area – Swift Parrot Records and Habitat 363
Plan A56: Esk Landholdings Offset Area – Regent Honeyeater Records and Habitat 364
Plan A57: Avonvale Offset Area – Context 365
Plan A58: Avonvale Offset Area – Ecological Corridors and Habitat Areas 366
Plan A59: Avonvale Offset Area – Topography and Water Resources 367
Plan A60: Avonvale Offset Area – Offset Area Assessment Units 368
Plan A61: Avonvale Offset Area – Koala Records and Habitat 369
Plan A62: Avonvale Offset Area – Grey-headed Flying-fox Records and Habitat 370
Plan A63: Avonvale Offset Area – Swift Parrot Records and Habitat 371
Plan A64: Avonvale Offset Area – Regent Honeyeater Records and Habitat 372
Plan A65: Mount Walker West Offset Area – Context 373
Plan A66: Mount Walker West Offset Area – Location of Offset Area and BLEs 374
Plan A67: Mount Walker West Offset Area – Regional Connectivity Assessment 375
Plan A68: Mount Walker West Offset Area – Topography and Water Resources 376
Plan A69: Mount Walker West Offset Area – Assessment Units 377
Plan A70: Mount Walker West Offset Area – Koala Records and Habitat 378
Plan A71: Mount Walker West Offset Area – Grey-headed Flying-fox Records and Habitat 379
Plan A72: Mount Walker West Offset Area – Swift Parrot Records and Habitat 380
Plan A73: Mount Walker West Offset Area – Regent Honeyeater Records and Habitat 381

Attachments

Attachment A1 – EPBC Act Controlled Action Decision Notice
Attachment A2 – EPBC Additional Information Request
Attachment A3 – Koala Connectivity and Sustainability Analysis, prepared by BAAM Pty Ltd 2025
Attachment A4 – SAT survey data
Attachment A5 – Flowering eucalypt surveys July 2020 and November 2022
Attachment A6 – Greater Springfield fauna spotter catcher data
Attachment A7 – Habitat Quality Raw Data – Impact Site
Attachment A8 – MNES Management Plan, SHG 2025
Attachment A9 – Overarching Vegetation Clearing and Fauna Management Plan, SHG 2025
Attachment A10 – Preliminary Bushland Management Plan, SHG 2025
Attachment A11 – Dispersive Soils Management Plan, Gallagher Environmental 2024
Attachment A12 – Stormwater Management Plan, Design Flow 2024
Attachment A13 – Bushfire Management Plan, LEC 2024
Attachment A14 – Esk Landholdings Offset Area Management Plan, BAAM Pty Ltd 2026

Attachment A15 – Avonvale Offset Area Management Plan, SHG 2026
Attachment A16 – Mount Walker West Offset Area Management Plan, SHG 2026
Attachment A17 – Cultural Heritage Plan, June 2004

Acronyms and Abbreviations

Legislation, Policies and Guidelines

EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cth)
EOP	*EPBC Act Environmental Offsets Policy 2012*
NCA	*Nature Conservation Act 1992* (Qld)
OAG	Offsets assessment guide
SIG 1.1	Significant Impact Guidelines 1.1 – Matters of National Environmental Significance
VMA	*Vegetation Management Act 1999* (Qld)

Government Departments

DAWE	Department of Agriculture, Water and the Environment (Cth) – former
DAF	Department of Agriculture and Fisheries (Qld)
DCCEEW	Department of Climate Change, Energy, the Environment and Water (Cth)
DES	Department of Environment and Science (Qld) – former
DETSI	Department of Environment, Tourism, Science and Innovation (Qld)
DNRME	Department of Natural Resources, Mines and Energy (Qld) – former
DOR	Department of Resources (Qld)
DSDMIP	Department of State Development, Manufacturing, Infrastructure and Planning (Qld)
DTMR	Department of Transport and Main Road (Qld)
EHP	Former, Department of Environmental and Heritage Protection (Qld) – former
ICC	Ipswich City Council
SRC	Somerset Regional Council
SRRC	Scenic Rim Regional Council

General Terms

ADP	Area Development Plan
BMP	Bushland Management Plan
CEMP	Construction Environmental Management Plan
DSMP	Dispersive Soils Management Plan
ESCP	Erosion and Sedimental Control Plan
ESD	Ecologically sustainable development
FHA	Foraging Habitat Assessment
GHFF	Grey-headed flying-fox
ha	hectares
KDC	Key Diagnostic Criteria
KHAT	Koala Habitat Assessment Tool (as per the Koala Referral Guidelines)
km	kilometres

LGA	Local Government Area
LLR	Little Liverpool Range
LLRI	Little Liverpool Range Initiative
LRSA TEC	Lowland Rainforest of Subtropical Australia threatened ecological community
m	metres
MNES	Matters of National Environmental Significance
MHQA	Modified Habitat Quality Assessment
MSES	Matters of State Environmental Significance
OAMP	Offset Area Management Plan
OPW	Operational works
PMST	Protected Matters Search Tool
RE	Regional Ecosystems
RPA	Remotely Piloted Aircraft
SAT	Spot Assessment Technique
SHG	Saunders Havill Group
SMP	Stormwater Management Plan
SRI	Significant Residual Impact
SSP	Springfield Structure Plan
TEC	Threatened Ecological Community
UAV	Unmanned Aerial Vehicle
VCFMP	Vegetation Clearing and Fauna Management Plan
VDEC	Voluntary Declaration
WONS	Weeds of National Significance
WPMP	Wildlife Protection and Management Plan
WHIMP	Wildlife Habitat Impact Mitigation Plan

Reference Documents

Code of Practice

Wildlife and Threatened Species Operations Branch, Department of Environment and Science (DES), Code of Practice – Care of Sick, Injured or Orphaned Protected Animals in Queensland, Nature Conservation Act 1992, August 2020.

Draft Code

Hanger, J & Nottidgem B., Queensland code of practice for the welfare of wild animals affected by land-clearing and other habitat impacts and wildlife spotter /catchers, Australia Wildlife Hospital, 2009.

DTMR (2024)

Manual – *Fauna Sensitive Transport Infrastructure Delivery*. State of Queensland (Department of Transport and Main Roads), June 2024.

EPBC Environmental Offsets Policy

Environment Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy (October 2012), Commonwealth of Australia, 2012.

EPBC Offsets Guide

Environment Protection and Biodiversity Conservation Act 1999 How to use the offsets assessment guide, (October 2012), Commonwealth of Australia, 2012.

KCHMP

Koala Conservation and Habitat Management Plan, Ipswich City Council, 2017.

Koala Referral Guidelines

EPBC Act referral guidelines for the vulnerable koala (combined populations of Queensland, New South Wales and the Australian Capital Territory, Commonwealth of Australia, 2014.

SI Guidelines

Matters of National Environmental Significance: Significant impact guidelines 1.1 Environment Protection and Biodiversity Conservation Act 1999, Commonwealth of Australia, 2013.

1. Description of the action

This section responds to Item 2 of the PD request which requires the proponent to provide a description of the action, including:

1.1 The location, boundaries and size of the impact

Item 2.1(a) of the PD Request asks for ***"the location, boundaries, and size (in hectares) of the disturbance footprint, and of adjoining areas and vegetation, which may be indirectly impacted by the proposal, including from material stockpiles, vehicle access and associated activities."***

1.1.1 Project context and details

EPBC 2019/8575 for the Springfield Residential Development located in City of Greater Springfield was lodged with the Department in 2019 and formally determined a Controlled Action on the 9th of April 2020. Contextually, the site covers 161.4 hectares (ha) and is located approximately 15 kilometres (km) south-east of Ipswich City CBD (refer **Figure A1**). Neighbouring land uses include general residential development, education (The Springfield Anglican College), recreation and open space (*i.e.*, Brookwater Golf Course, reserves and parklands) (refer **Figure A2**).

The Department's original request for information was issued on the 15th of May 2020 and a detailed submission covering Preliminary Documentation Version 1 was issued to the Department on the 29th of October 2021. Comments on the first PD were issued by the Department in February 2022. A number of subsequent meetings with the Department introduced a range of further items to be considered largely centred on changes in the formal 'Conservation Advice' for listed species. It is noted that some of the specific information now requested by the Department is not contained within the written information request issued to the proponent and in effect reflects a changed view on specific species. On the 21st of February 2023 a meeting was held in Canberra with Department representatives to confirm the additional species the Department sought clarity on. On the 5th of June 2023 representatives from the Department including Assessment Officers, Assistant Directors and the Branch Head attended site for a half day inspection. The result of the discussions and extensive additional site ecological surveys led to a change in design specifically in relation to the Opossum and Woogaroo Creek corridors. The revised design changes were formally presented to the Department in Canberra on the 17th of August 2023.

Meetings held with the Department on the 4th and 5th November 2024 and correspondence received from the Department on the 4th of December 2024 provided additional clarity on required components to address significant impacts on the greater glider (*Petauroides volans*) species. As requested by the Department, detailed assessment of contextual and on-site factors relating to the greater glider are provided in this document.

Despite the long currency of the project, containing an original determination date in 2020, the introduction of the *Nature Positive Plan* (December 2022) has resulted in additional scrutiny on all EPBC Act projects. Of core additional consideration is the need for projects to outline measures deployed to avoid and minimise impacts on Matters of National Environmental Significance (MNES). These are presented in detail in **Section 5**.

Table A1: Referral area property details

Address	7001 Mur Boulevard, Springfield, QLD, 4300
Real Property Description	Lot 9999 on SP292760 Part of Lot 9002 on SP292760, Lot 9998 on SP236942, Lot 9995 on SP307769, Lot 9004 on SP292760, and Lot 51 on SP242316
Referral area size	161.4 ha
Local Government Area	Ipswich City Council
Local Planning Scheme	*Ipswich Planning Scheme 2006* / Springfield Structure Plan (SSP)
Springfield Structure Plan	• Community residential • Open space
Existing Land Use	Vacant land and natural areas
Proposed Land Use	Urban, environmental retention

1.1.2 Development Footprint

The proposed action site is 161.4 ha in size located over Lot 9999 on SP292760 and part of Lot 9002 on SP292760, Lot 9998 on SP236942, Lot 9995 on SP307769, Lot 9004 on SP292760, and Lot 51 on SP242316. The proposed action proposes disturbance areas (permanent and temporary) to support the ultimate residential land uses, and vegetation retention areas which will be avoided from development impacts. The proposed development footprint (*i.e.,* disturbance areas) and retention areas are provided on **Plan A1** and is reflective of the Precinct Plan approved by Ipswich City Council (ICC) on 21st of March 2024 (ref 6243/2023/LAP) under the Springfield Structure Plan (SSP). Further details of the local government approval process and context are provided in the **Section1.1.3**.

The development footprint (*i.e.,* disturbance areas) is distinguished into three ultimate land use components: urban/residential, stormwater management infrastructure, and linear open space areas. Approximately 2.6 ha of vegetation is required to be to facilitate the construction of batters adjoining the vegetation retention areas. While subject to direct impacts, it is noted that these areas will be rehabilitated full-strata post-clearing as demonstrated on **Plan A1**. The post-construction development layout is shown on **Plan A2**. For clarity, these areas have been included in the critical habitat impact area discussed within this PD. **Plan A1** also includes the location of the approved EPBC action Kalina Village One (EPBC 2014/7306) of which 7.6 ha partially overlaps the proposed action site with the intended land use of providing road links from Panorama Drive located within Kalina Village One to Mur Boulevard.

An area of 27.5 ha of vegetation predominantly located Opossum Creek and Woogaroo Creek in the western portion of the proposed action site is proposed to be wholly retained and excluded from main development impacts.

The following provides a summary on the impact area including proposed retention area corresponds to **Plan A1**.

Development footprint	133.9 ha
Proposed urban	123 ha
Bioretention / drainage basins	8.2 ha
Temporary impacts (rehabilitation) – includes additional minor clearing	2.6 ha
Stormwater outlet	0.1 ha
Vegetation Retention Area (no impact)	27.5 ha
Total (proposed action site)	161.4

It is noted that some minor clearing is required within the adjoining Council-owned environmental areas to facilitate the delivery of essential infrastructure including stormwater infrastructure which will become future Council-owned assets. Extensive consultation has occurred with Council to discuss the requirement and initial design principles to be resolved as part of the operational works approval process. As such detailed designs are not available at this stage as these will be resolved with the operational works approval process which

occur progressively per development staging, however, the indicative locations of the external stormwater infrastructure and pedestrian link are provided on **Plan A3**. Upon detailed design completed as part of obtaining operational works approvals, all works will be subject to ecological investigation such as detailed tree plot surveys to inform the design and clearing extent and minimise impacts to vegetation in these areas in addition to geomorphology investigations.

It is noted that it is Ipswich City Council's long-term vision for the area is to deliver a pedestrian or vehicle link across Woogaroo Creek to the west to connect the proposed residential areas subject to this proposed action with the suburb of Bellbird Park, located west of Woogaroo Creek. The proposed road linkage is contemplated in the Precinct Plan and ADP approval material for Village 3 in line with future planning requirements. However, the proposal for any kind of linkage continuing west of the disturbance footprint and Village 3 boundary to cross Woogaroo Creek is not considered to form part of the proposed action. The bridge is proposed to be delivered as part of an Ipswich City Council driven infrastructure plan and if delivered, will be tied to the later stages or post-completion of Village 3 (2036-2040). The plan is considered to be in its infancy with limited planning, ecological investigations and costings established to support the project, creating uncertainty as to the feasibility of the project. Additionally, the proponent of the works has not been determined. For these reasons it is not considered as part of the proposed action, which is to deliver residential development for Villages 2 and 3.

1.1.3 Local government approval context

The Springfield Structure Plan (SSP) identifies development areas and sectors, the high-level 'structure' and the Land Use Concept Master Plan. Approval of the Precinct Plan encompassing Villages 2 and 3 is the first phase of local government approval through ICC as required under the SSP.

While the SSP provides the broadscale intended land use, this is further refined through the development and approval of an overarching Precinct Plan. The purpose of the Precinct Plan is to provide a thorough understanding and analysis of the site-specific characteristics and context, and the requirements of the Springfield Structure Plan in order to demonstrate the preferred and practicable form of development. The Precinct Plan for Villages 2 and 3 was approved by ICC on the 21st of March 2024 (ICC ref: 6243/2023/LAP).

Area Development Plan (ADP) applications have been prepared and submitted to ICC as separate applications for Villages 2 and 3. The ADP functions as the reconfiguration or land use proposal to produce an integrated plan for the development of an area, putting into effect the previous master planning initiatives (refer Springfield Structure Plan). An approved ADP results in a development permit for the proposed work and represents the last major refinement of development boundaries. To inform Council's assessment of the proposed ADP, a large component of the detailed design is undertaken as part of infrastructure modelling (water, sewer, stormwater, power and traffic) and if necessary, bushfire modelling. Each individual allotment and street is designed to achieve the required standards (e.g. driveway access, suitable orientation, road width, parking, waste collection, street landscaping).

Both stages have been submitted to Council as part of the ADP applications with approval obtained for Village 2 (ICC ref: 4272/2020/ADP) on the 28th June 2024 and Village 3 (ICC ref: 5547/2020/ADP) on 14th May 2025.

Following approval of the ADP, the final stage of Council approvals is the Operational Works Plan. The operational works (OPW) approvals represent the final design and bulk earthworks outcomes approved by Council and typically occur as stages within the approved ADP. The extent of detail is wide ranging and includes, for example, where each street tree will be planted and the pavement type for footpaths. These ultimate design details directly inform the on-ground implementation and civil construction methodologies. An example of details typically included as part of OPW plans include:

- areas to be grassed,
- footpath alignments,
- locations for future plantings and
- flora species types.

OPW approvals are currently being sought for the first staging areas within Village 2, including:

- Stages 1 to 16 (ref 9281/2024/OW) comprising vegetation clearing, earthworks and stormwater work.
- Stages 1 to 4a (ref 9293/2024/OW) comprising road work, drainage work, stormwater, earthworks and signage.

The remaining OPW approvals within Village 2 and Village 3 will be obtained as the development progresses and engineering details are refined.

All development approval documentation is publicly available at https://developmenti.ipswich.qld.gov.au/

1.1.4 Ecological attributes within and adjoining referral area

The subject site is currently comprised of remnant bushland. Areas of the site have been exposed to weed invasion and historical logging and plantation practices. Vegetation across the site is dominated largely by eucalypt woodland and over 150 ha is mapped as regulated vegetation under the *Vegetation Management Act 1999* (VMA). Vegetation surrounding the referral area is mostly consistent of that mapped on-site, containing similar flora species and regional ecosystem characteristics with the addition of riverine vegetation communities within the waterways located west and east of the referral area.

A series of minor drainage lines are mapped under the Queensland *Water Act 2000* are present within the proposed action area and are regarded as ephemeral drainage features based on detailed site surveys. Opossum Creek is situated adjacent to the western and south-western boundary and connects to Woogaroo Creek downstream. Woogaroo Creek is located to the north-west of the referral area and flows downstream to the north. Minor waterway O'Dwyer's Gully is situated east of the referral area eastern boundary and flows downstream to the north. A small section of the upstream portion of O'Dwyer's Gully traverses part of the southern extent of the referral area. These waterways provide a somewhat distinct boundary for the subject site and are located in Council-owned land parcels of which were previously owned by the Proponent.

1.1.5 Impacts from vehicle access and associated activities

Internal access tracks exist across the site and a combination of heavy rainfall and unauthorised vehicle use has resulted in erosion and scouring. There is existing vehicle access to the site from Mur Boulevard to the east. Vehicle access is also possible via Panorama Drive at the south-east of the site through the Kalina

development. Additional areas outside of the referral boundary are unlikely to be directly or indirectly impacted by vehicle access requirements, stockpiles or other activities.

1.2 Timeframes and staging

Item 2.1(b) of the PD Request asks for ***"a description of all components of the proposed action, including the anticipated timing and duration, (including start and completion dates) of each component of the proposed action. This should include a detailed outline of the expected timing of any staged clearing over the construction period."***

The project is proposed to be approved and undertaken as two overarching stages: Stage 1 – Village 2 and Stage 2 – Village 3.

Stage 1 (Village 2) is proposed to commence first and be completed in its entirety, followed by Stage 2 (Village 3). Refer to **Plan A2** for the proposed development layout for Stage 1 – Village 2 and Stage 2 – Village 3.

Details of the timing and delivery of project phasing to deliver Village 2 and Village 3 are indicative only at this stage. An indicative project phasing plan indicating the location of bulk vegetation clearing and earthworks is provided on **Plan A4**. Details regarding indicative timing and staging information are provided in the **Table A2**.

Table A2: Project staging details

Stage	Timing	Description
Stage 1 (Village 2)	Q2 2026 to Q4 2031	Located in the eastern extent of the project area, connecting to the existing Mur Boulevard and through to Panorama Drive. The proposed impact area for Village 2 encompassing vegetation clearing and earthworks is approximately 72.5 hectares. Refer to **Plan A5** for phasing detail. The final area modified area post-construction is approximately 56.2 ha and includes 856 mixed sized residential allotments, a local centre including a childcare, local parks and stormwater infrastructure.
Stage 2 (Village 3)	Q4 2031 to Q4 2045	Located over the balance of the referral area adjacent to the western boundary of Village 2. The balance of the impact area comprising balance vegetation clearing and earthworks impacts within the Village 3 area is 57.5 ha. Refer to **Plan A6** for phasing detail. The modified area post-construction is approximately 74.7 ha and includes 979 mixed sized residential allotments, a sports field and associated infrastructure, linear park, rehabilitation and retained natural areas, and stormwater infrastructure.

1.3 Construction and operation

Item 2.1(c) of the PD Request asks for ***"a description of the construction and operation of the residential development and associated works (i.e. activities that comprise its operation)."***

Cherish Enterprises Pty Ltd propose to develop a residential subdivision located within Springfield, Queensland. The proposed action is within the 'Springfield community residential designation' and 'open space designation' zoning and will be undertaken in accordance with the *Ipswich Planning Scheme 2006* and Springfield Structure Plan.

The following land uses are proposed to be delivered as part of the action:

- residential;
- local sports park;
- linear open space and local park/s;
- rehabilitation and retained natural areas;
- local centre (local shops);
- childcare centre; and
- access roads and other associated infrastructure.

The construction is to occur over two separate stages referred to as Village 2 and Village 3, as stated in the previous section. The construction and associated works to be involved in the delivery of this action will include earthworks, vegetation clearing, and rehabilitation measures which are to occur commensurate with development (*i.e.,* within the relevant staging boundaries for Village 2 and Village 3). The staging boundaries for Village 2 and Village 3 are provided in **Plan A5** and **Plan A6**, respectively.

A range of management and mitigation measures during vegetation clearing, construction and operation of the development post-construction are proposed. These are described in detail in **Section 5**. This includes several management plans prepared to support the Precinct Plan and ADP approvals and PD submission. The management plans proposed will be used to guide various stages of the development. Where possible, a draft version of the management plan has been provided (refer **Section 5**). This includes:

- Overarching Vegetation Clearing and Fauna Management Plan (VCFMP)
    - Phase-specific VCFMPs will be produced for each relevant phasing area in accordance with local government operational works approvals.
- Preliminary Bushland Management Plan
- MNES Management Plan
- Stormwater Management Plan
- Dispersive Soils Management Plan
- Bushfire Management Plan

Additionally, precinct-specific management plans will be produced prior to the commencement of the relevant stages for approval by Ipswich City Council which includes detailed precinct-specific VCFMPs, Construction Environmental Management Plan(s) (CEMP) and Erosion and Sediment Control Plan(s) (ESCP). Suitably qualified persons will be engaged to supervise activities on-site including but not limited to an

Arborist qualified as Level 5 under the Australian Qualification Framework (AQF) and a Department of Environment, Science, Tourism and Innovation (DETSI) approved Fauna Spotter Catcher.

2. Description of the Environment and Matters of National Environmental Significance

This section responds to Item 3 of the PD request which requires the proponent to provide a description of the environment affected by and surrounding the proposed action area, over both the short and long term. Specific matters this section address include, but are not limited to, the following subheadings.

2.1 Description of potential MNES that occur on, and adjacent to, the Project

Item 3.1 of the PD Request asks for ***"a description of any potential matters of national environmental significance (MNES) (including but not limited to those listed below [on page 4 of the PD Request]) that occur in the project area and adjacent areas."***

The MNES listed on page 4 of the PD Request recognised as matters likely to be significantly impacted by the proposed action include:

- Koala (*Phascolarctos cinereus* – combined populations of Qld, NSW and the ACT) – Vulnerable;
- Grey-headed flying-fox (*Pteropus poliocephalus*) – Vulnerable; and
- Lowland Rainforest of Subtropical Australia – Critically Endangered;

In addition, the Department consider there is a possibility that significant impacts may arise to the following species:

- Swift parrot (*Lathamus discolor*) – Critically Endangered; and
- Regent honeyeater (*Anthochaera phrygia*) – Critically Endangered.

2.1.1 Likelihood of Occurrence Assessment

Section 5 and Section 11 of the MNES – Ecological Technical Report on MNES (SHG, 2019) submitted as part of the referral documentation (refer **Preliminary Documentation Part B – Attachment 1**), provides a detailed Likelihood of Occurrence assessment of MNES including threatened ecological communities and threatened and migratory species. This was completed for MNES recorded within a 5 km radius of the referral area. The assessment which combined desktop and field survey data identified several MNES as having a moderate or higher likelihood of occurring within the referral area.

A refined version of the Likelihood of Occurrence Assessment has been completed and provided within this PD. The Likelihood of Occurrence Assessment utilising the assessment criteria provided in **Table A3** has been updated to include an updated list of relevant MNES incorporating contemporary database records and field survey data. Refer to **Table A4** for the refined assessment including the following MNES:

- Lowland Rainforest of Subtropical Australia – Critically Endangered;
- Koala (*Phascolarctos cinereus* – combined populations of Qld, NSW and the ACT) – Vulnerable;
- Grey-headed flying-fox (*Pteropus poliocephalus*) – Vulnerable;
- Greater glider (*Petauroides volans*) – Vulnerable;
- Swift parrot (*Lathamus discolor*) – Critically Endangered;
- Regent honeyeater (*Anthochaera phrygia*) – Critically Endangered;
- White-throated Needletail (*Hirundapus caudacutus*) – Vulnerable;
- Collared Delma (*Delma torquata*) – Endangered;
- Macadamia nut (*Macadamia integrifolia*) – Vulnerable;
- Shaggy-leaved coleus (*Coleus habrophyllus*) – Endangered;
- Angle-stemmed myrtle (*Gossia gonoclada*) – Endangered.

Marine / Migratory Species:

- Spectacled Monarch (*Monarcha trivirgatus*) – Migratory / Marine
- Black-faced Monarch (*Monarcha melanopsis*) – Migratory / Marine
- Rainbow Bee-eater (*Merops ornatus*) – Marine / Migratory; and
- Rufous fantail (*Rhipidura rufifrons*) – Marine / Migratory.

Detailed surveys to determine presence of potential MNES have been completed in accordance with the relevant Commonwealth survey guidelines from 2019 to 2024, including but not limited to, targeted flora surveys, baited camera trapping, spotlighting and Unmanned Aerial Vehicle (UAV) drone surveys. The methodology and timing of these surveys is described in **Section 2.4**.

Notably, some of the above listed MNES were identified as having a low risk of impact due to the proposed action as detailed in the MNES – Ecological Technical Report on MNES (SHG, 2019) provided at **Preliminary Documentation Part B – Attachment 1**. This includes *Macadamia integrifolia* (macadamia nut), *Coleus habrophyllus* (shaggy-leaved Coleus) and *Rhipidura rufifrons* (rufous fantail) and *Gossia gonoclada* (Angle-stemmed Myrtle). These four (4) species were not identified to be likely to be at risk of significant impacts as a result of the proposed action. The assessment and justification for this is provided in **Preliminary Documentation Part B – Attachment 1, Sections 9-11**. While these MNES are included in the assessment provided in **Table A4**, further significant impact analysis for these MNES is not considered necessary as part of this PD.

Table A3: Likelihood of Occurrence Assessment Criteria

Likelihood of occurrence	Assessment criteria[1]
Unlikely	The investigation area does not contain habitat types or resources known to be utilised by the species during any stage of its lifecycle. OR No contemporary[2] species records within 5 km of the investigation area and at least one of the following criteria is met: • The investigation area is beyond the known geographic range of the species; OR • The investigation area does not contain habitat types or resources known to be utilised by that species during any stage of its lifecycle ; OR • The investigation area and/or surrounding land is highly disturbed[3].
Low	There are contemporary species records more than 1 km but less than 5 km of the investigation area, and it contains habitat types or resources known to be utilised by the species. OR There are contemporary species records more than 5 km but within 20 km of the investigation area and the following criteria are met: • The investigation area contains habitat types or resources known to be utilised by the species; AND • No major barriers to dispersal[4] for the species exist between the location of the record and the investigation area; AND • The investigation area and/or surrounding land is relatively undisturbed and there is potential for individuals of the species to survive in the short-term.
Moderate	There are contemporary species records within 1 km of the investigation area and it contains habitat types or resources known to be utilised by the species. OR There are contemporary species records within 5 km of the investigation area and the following criteria are met: • The investigation area contains habitat types or resources known to be utilised by the species; AND • No major barriers to dispersal for the species between the location of the record and the investigation area; AND • The investigation area and/or surrounding land is relatively undisturbed and there is potential for individuals of the species to survive in the short-term.
High	There are contemporary species records within 1 km of the investigation area and the following criteria are met:

[1] Criteria should be used as a guide only. Site- and species-specific factors should be considered by the assessment.
[2] Within 20 years of the date of the assessment.
[3] Contains minimal vegetation cover with a dominant land use such as development, extractive industries, intensive agriculture
[4] Barriers to dispersal will be species specific, but for tree or ground dwelling fauna may include major roads with no fauna crossing features or dense development.

Likelihood of occurrence	Assessment criteria[1]
	• The investigation area contains habitat types or resources known to be utilised by the species; AND • No major barriers to dispersal for the species between the location of the record and the investigation area; AND • The investigation area and/or surrounding land is relatively undisturbed and there is potential for individuals of the species to survive in the short-term.
Known	Species positively identified during field surveys within the investigation area OR there are multiple contemporary species records within the investigation area.

Table A4: Refined version of likelihood of occurrence assessment for relevant MNES adapted from the MNES – Ecological Technical Report (PD Part B Attachment 1)

Species	EPBC status*	Habitat preferences, breeding / nesting requirements and / or seasonal influences	Species distribution	Likelihood of occurrence on or adjacent to site, post-field survey
Lowland Rainforest of Subtropical Australia	CE	Typically, there is a relatively low abundance of species from the genera Eucalyptus, Melaleuca and Casuarina. Buttresses are common as is an abundance and diversity of vines. This community is usually associated with REs 12.3.1 (more recently mapped as 12.3.16), 12.5.13, 12.8.3, 12.8.4, 12.8.13, 12.11.1, 12.11.10, 12.12.1, and 12.12.16.	The ecological community primarily occurs from Maryborough in Queensland to the Clarence River (near Grafton) in NSW. Most of the remaining patches are small (< 10 ha) and scattered (DSEWPC, 2011). Lowland rainforest mostly occupies areas on highly fertile basaltic and alluvial soils. These areas have been heavily cleared due to their suitability for agricultural use.	Isolated and contracted patches of Lowland Rainforest of Subtropical Australia TEC are known to occur on and adjacent to the western extent of the proposed action site. The extent of the TEC has been confirmed through on-ground ecological survey analysis. Further details of methodology used to confirm the spatial extent of the TEC are provided in **Section 2.3.1**.
Koala (*Phascolarctos cinereus*)	V	Koalas inhabit a range of temperate, sub-tropical and tropical forest, woodland and semi-arid communities dominated by species from the genus *Eucalyptus*. The Koala is a leaf-eating specialist. Its diet is restricted mainly to foliage of Eucalyptus spp. It may also consume foliage of related genera, including *Corymbia* spp., *Angophora* spp. and *Lophostemon* spp. and at times supplement its diet with other species, including *Leptospermum* spp. and *Melaleuca* spp (DAWE, 2022).	The Koala is endemic to Australia and is widespread in coastal and inland areas from north-east Queensland to Eyre Peninsula, SA (DAWE, 2022). Koalas are found in a range of habitats, from coastal islands and tall eucalypt forests to low woodlands inland. The species is known from the surrounding area and evidence has been recorded on-site.	Koalas are known to occur within the proposed action site and adjacent to within creeklines corridors due to the dominance of eucalypt woodland. The presence of koala has been confirmed through multiple means including ecological field surveys, drone surveys and public database records. A more detailed assessment of surveys and technical information is provided in **Section 2.3.2**.
Grey-headed flying-fox (*Pteropus poliocephalus*)	V	The Grey-headed Flying-fox (GHFF) requires foraging resources and roosting sites. It is a canopy-feeding frugivore and nectarivore, which utilises vegetation communities including rainforests, open forests, closed and open woodlands, Melaleuca swamps and Banksia woodlands. It also feeds in introduced tree species in urban areas and in commercial fruit crops. The primary food source is blossom from	Occurs in the coastal belt from Rockhampton in central Queensland to Melbourne in Victoria. Brisbane, Newcastle, Sydney and Melbourne are occupied continuously; however, the remainder of the range depends on season and foraging habitat present. According to the National flying-fox monitoring viewer, GHFF camps identified as active within a 5 km radius of the site in the last round of surveys (*i.e.,* 2023 and 2024) are:	Grey-headed flying-foxes are known to occur on and adjacent to the proposed action site, however, is limited to foraging activity only. A review of the National Flying-fox monitoring viewer indicate camps are not present on or adjacent to site, however, the high number of camps within 20 km of the referral area suggest high potential for foraging activity to occur within the proposed action site.

Species	EPBC status*	Habitat preferences, breeding / nesting requirements and / or seasonal influences	Species distribution	Likelihood of occurrence on or adjacent to site, post-field survey
		Eucalyptus and related genera, but in some areas, it also utilises a wide range of rainforest fruits. None of the vegetation communities used by the GHFF produces continuous foraging resources throughout the year, and the species has adopted complex migration traits in response to ephemeral and patchy food resources (DoE, 2021). The GHFF roosts in aggregations of various sizes on exposed branches, commonly of emergent trees. Roost sites are typically located near water, such as lakes, rivers or the coast. Roost vegetation includes rainforest patches, stands of Melaleuca, mangroves and riparian vegetation, but colonies also use highly modified vegetation in urban and suburban areas. The species can maintain fidelity to roost sites for extended periods, although new sites have been colonised in recent times.	• Camira, Barbara St (140), • Redbank (Pan Pacific Peace Garden) (428), and • Redbank Plains, Phillip Street (878).	A more detailed assessment of surveys and technical information is provided in **Section 2.3.3.**
Regent honeyeater (*Anthochaera phrygia*)	CE	Regent honeyeaters mostly occur in dry Box-Ironbark Eucalypt woodland and dry sclerophyll forest associations in areas of low to moderate relief, wherein they prefer moister, more fertile sites. These areas are generally associated with creek flats, river valleys and foothills. These woodlands have a significantly large numbers of mature trees, high canopy cover and abundance of mistletoes. They are a generalist forager, mainly feeding on nectar from a wide range of eucalypts and mistletoes.	Regent honeyeaters are endemic to mainland Australia, from South East Queensland, throughout New South Wales and the Australian Capital Territory to Central Victoria. With regent honeyeaters current distribution there are four known key breeding areas where the species is regularly recorded, Bundarra-Barraba, Capertee Valley and Hunter Valley districts in New South Wales, and the Chiltern area in north-east Victoria. Breeding has also been regularly recorded in the	There is considered a moderate likelihood of the regent honeyeater to occur on or adjacent to the proposed action site during winter foraging season due to the presence of records within 5 km of the site, absence of barriers to movement and presence of preferred foraging tree species *Corymbia citriodora* (Spotted Gum). A more detailed assessment of surveys and technical information is provided in **Section 2.3.4.**

Species	EPBC status*	Habitat preferences, breeding / nesting requirements and / or seasonal influences	Species distribution	Likelihood of occurrence on or adjacent to site, post-field survey
			Cement Mills-Durakai area west of Warwick, southern Queensland and in the Australian Capital Territory.	
Swift parrot (*Lathamus discolor*)	CE, M	Swift parrots breed in Tasmania during spring to early summer and migrates to the mainland during autumn and winter. Species presence is influenced by the availability and timing of flowering of trees in various locations. Usually seen in small parties of up to 30 birds, or occasionally in larger flocks around abundant food sources. Non-breeding birds preferentially feed in inland box-ironbark and grassy woodlands, and coastal swamp mahogany (E. robusta) and spotted gum (*Corymbia maculata*) woodland when in flower; otherwise often in coastal forests from eastern Victorian to the central coast of NSW.	The swift parrot is in Tasmania during breeding season (spring to early summer), migrating north to the mainland during autumn and winter where it follows a nomadic existence linked to the availability and timing of flowering of trees in various locations. Small numbers of Swift Parrots are observed in the Australian Capital Territory and in south-eastern Queensland on a regular basis. The species is less frequently observed in the southern Mount Lofty Ranges and the Bordertown-Naracoorte area in south-eastern South Australia.	There is considered a moderate likelihood of the swift parrot to occur on or adjacent to the proposed action site during winter foraging season due to the presence of records within 5 km of the site, absence of barriers to movement and presence of preferred foraging tree species *Corymbia citriodora* (Spotted Gum) and *Eucalyptus tereticornis* (Forest Red Gum). A more detailed assessment of surveys and technical information is provided in **Section 2.3.5.**
Greater glider (*Petauroides volans*)	V	Greater gliders are arboreal nocturnal marsupials that are mostly restricted to eucalypt forests and woodlands, although also occur in highest abundance in taller, montane, moist eucalypt forests with abundant (large) hollow-bearing trees for shelter and a variety of eucalypt species for feeding. Diet consists of eucalypt leaves, and occasionally flowers. Small home ranges and low dispersability make this species sensitive to clearing and fragmentation, with low persistence in small forest fragments.	The greater glider is restricted to eastern Australia, occurring from the Windsor Tableland in north Queensland through to central Victoria (Wombat State Forest), with an elevational range from sea level to 1200 m above sea level.	There is considered a low likelihood of the greater glider to occur on or adjacent to the proposed action site attributed to the high level of surrounding fragmentation and lack of connecting habitat to contiguous vegetation areas. The referral area is surrounded by recently developed areas within the suburbs of Bellbird Park, Brookwater and Springfield. Connecting habitat is limited to lineal strips of vegetation provide limited potential for consistent population-level connectivity. Additionally, significant linear infrastructure including the Centenary Highway and adjoining rail easement represent a significant barrier for movement between the potential habitat areas within the referral area and contiguous habitat areas to the east

Species	EPBC status*	Habitat preferences, breeding / nesting requirements and / or seasonal influences	Species distribution	Likelihood of occurrence on or adjacent to site, post-field survey
				and south-west where required gliding distances on either side of the barriers regularly exceed 100 m. The absence of a greater glider population within the proposed action site and broader habitat patch is corroborated through the presence of records of the species within a 5 km radius of the site being limited to White Rock Conservation Park located approximately 3.9 km to the south-west and Greenbank Military Training Area located approximately 2 km to the east. Additionally, targeted spotlighting and drone surveys completed within the referral area and broader patch have not detected the species. It is noted that one (1) ALA record dated August 2023 is located within an active construction zone adjacent to the broader vegetation patch to the south. The validity of the record was queried with ALA and iNaturalist who confirmed the original coordinate was obfuscated due to its sensitive nature. The publicly available positional accuracy was increased to a 0.2 x 0.2 degree cell (29 km area) and the coordinate is replaced with a random point within that cell. The ungeneralised coordinate was provided which confirmed its location within White Rock Conservation Park. The closest verifiable record is 3 km east of the site within the contiguous vegetation areas of Greenbank Military Training Area. However, this record is separated by significant expanses of urban development with limited

Species	EPBC status*	Habitat preferences, breeding / nesting requirements and / or seasonal influences	Species distribution	Likelihood of occurrence on or adjacent to site, post-field survey
				connecting vegetation. In this case, while the record is within a 5 km radius of the site, the high level of fragmentation substantially reduces the ability of the species to access the site. A more detailed review of greater glider likelihood of occurrence incorporating site habitat attributes and landscape connectivity assessment is provided in **Section 2.3.6**.
White-throated Needletail (*Hirundapus caudacutus)*	V	The White-throated Needletail is predominantly an aerial species and occurs over most types of habitat. They are probably recorded most often above wooded areas, including open forest and rainforest, and may also fly between trees or in clearings, below the canopy, but they are less commonly recorded flying above woodland. They also commonly occur over heathland, but less often over treeless areas, such as grassland or swamps.	The White-throated Needletail is widespread in eastern and south-eastern Australia. In eastern Australia, it is recorded in all coastal regions of Queensland and NSW, extending inland to the western slopes of the Great Divide and occasionally onto the adjacent inland plains.	The site contains suitable foraging habitat for the White-throated Needletail. The Flinders-Karawatha Bioregional Corridor which constitutes >20,000 ha of continuous remnant vegetation is located approximately 2 km east of the site and forms critical foraging habitat for the species. WildNet records indicate the species has previously been recorded on the site, however, this record was in the year 1990. Due to the presence of potential foraging and roosting habitat on-site and presence of a historical record, this species was assigned a likelihood of occurrence of moderate. Further assessment is provided in **Sections 2.3.7 and 4.6.**
Collared Delma (*Delma torquata*)	V	The Collared Delma occurs on rocky hillsides on basalt and lateritic soils supporting open eucalypt and Acacia woodland with a sparse	The Collared Delma is known from the western suburbs of Brisbane, Queensland, and the following sites: Bunya Mountains, Blackdown Tableland	The Collared Delma was considered as part of the broader likelihood of occurrence assessment undertaken as part of the referral.

Species	EPBC status*	Habitat preferences, breeding / nesting requirements and / or seasonal influences	Species distribution	Likelihood of occurrence on or adjacent to site, post-field survey
		understorey of shrubs and tussocks or semi-evergreen vine thicket. They rely on specific microhabitats— small to medium-sized rocks, fallen timber, native grasses and sedges and leaf litter. Studies suggest a preference for larger rocks (100-200 cm diameter) and a south-west to north-west facing slope.	National Park (NP), Bullyard Conservation Park, D'Aguilar Range NP, Expedition NP, Naumgna and Lockyer Forest Reserves, Western Creek near Millmerran and the Toowoomba Range. The Collared Delma occurs within the South East Queensland, Condamine, Burnett Mary and Fitzroy (Queensland) Natural Resource Management regions.	Broad vegetation types suitable to support the Collared Delma including open eucalypt woodland occurs within the project site with scattered areas of potential microhabitat confirmed through contemporary surveys. Within the Ipswich region, there is one ALA/iNaturalist record of the species (dated 2023) present within the White Rock Conservation Park, south-west of the project area, however, is noted to be an obfuscated record with a spatial uncertainty of 29.7 km with the grid overlapping parts of Ipswich, Logan and Brisbane city suburbs. Historical surveys for Collared Delma conducted by ecological consultant groups within the referral area and Greater Springfield have noted lower quality habitats and no evidence of presence. The action area has been subject to historical fire disturbance with subsequent fragmentation occurring around the site associated with development. A review of records, survey data and disturbance suggest a low likelihood that the species is present within the action area. For greater confirmation, further assessment is provided in **Sections 2.3.8 and 4.7.**
Macadamia nut (*Macadamia integrifolia*)	V	The Macadamia nut grows in remnant rainforest. It prefers to grow in mild frost-free areas with reasonably high rainfall. Vegetation communities	Macadamia nut is considered a rare to occasional plant found in remnant rainforest in northern NSW and south-east Queensland. The Macadamia nut is	*Macadamia integrifolia* is known to occur within and adjacent to proposed action site within the limited extent of the LRSA TEC. It is noted that no individuals

Species	EPBC status*	Habitat preferences, breeding / nesting requirements and / or seasonal influences	Species distribution	Likelihood of occurrence on or adjacent to site, post-field survey
		range from notophyll mixed forest, extremely tall closed forest, simple notophyll mixed very tall closed forest to simple microphyll-notophyll mixed mid-high closed forest with Araucaria and Argyrodendron emergents.	known from north of Gympie to Currumbin Valley in the Gold Coast hinterland.	of the species have been confirmed within eucalypt woodland areas within the referral area.
Shaggy-leaved Coleus (*Coleus habrophyllus*)	E	Plants have been recorded growing on chert or sandstone outcrops, in open woodlands often in shaded situations near vine forest.	Restricted to South East Queensland, near Ipswich and near Ormeau, south of Beenleigh.	*Coleus habrophyllus* is confirmed to occur adjacent to proposed action site only. Field survey confirms a small area of rocky outcrop to the south-west of the site which supports specimens of *Coleus habrophyllus*. The whole site has been traversed multiple times by experienced flora ecologists and no specimens or microhabitat to support the species have been recorded within the referral area, therefore there is a low likelihood that the species is present or would occur on-site. For further details refer to **Section 2.5.3.1**.
Angle-stemmed myrtle (*Gossia gonoclada*)	E	*Gossia gonoclada* typically occurs along riverine environments. The species prefers to grow is lowland remnant riparian rainforest and notophyll vine forest in subtropical South-east Queensland. Some have been recorded in the ecotone areas between vine forest and rainforest vegetation and that of eucalypts.	The DCCEEW conservation advice states that the angle-stemmed myrtle is endemic to south-east Queensland along the lower reaches of the Brisbane and Logan rivers. The species formerly occurred around Moggill and New Farm in Brisbane but there have been no recent discoveries in these areas. There are currently eight known populations with 72 individual wild plants within these. The species occurs or may occur in the following mapped Regional Ecosystems in south-east Queensland; 12.1.1, 12.1.3, 12.3.1, 12.3.7, 12.3.7a, 12.3.11, 12.3.11a, 12.5.13a, 12.11.10, 12.11.3 and 12.11.3a (Queensland Herbarium 2015).	*Gossia gonoclada* has been confirmed to occur adjacent to the proposed action site within rainforest habitat areas associated with Opossum Creek and Woogaroo Creek. Four (4) angle-stemmed myrtle individuals were recorded by the University of Queensland in 2020 and 2021 as part of Myrtle rust surveys of Eastern Australia (Fensham *et al*., 2021). The records were located along Opossum Creek and Woogaroo Creek within rainforest dominated vegetation, located outside the referral area and adjoining vegetation retention areas proposed as part of the action. One (1) record from the study located along Opossum Creek and dated July 2020 is published on ALA. While the species was confirmed

Species	EPBC status*	Habitat preferences, breeding / nesting requirements and / or seasonal influences	Species distribution	Likelihood of occurrence on or adjacent to site, post-field survey
				to occur adjacent to the site, due to the absence of suitable rainforest habitat types within the referral area there is considered a low likelihood that the species would occur within the referral area.
Marine / Migratory Species **These species are highly mobile, migratory or nomadic woodland and forest birds that utilise a broad range of habitats across eastern Australia. While they may occur within the wider region on a seasonal or transient basis, the site is not considered to provide important habitat such as known breeding areas or regionally significant foraging resources. In accordance with the Significant Impact Guidelines, an action is likely to have a significant impact on a listed marine species if it substantially modifies, destroys or isolates important habitat, or disrupts ecologically significant populations. Given the small scale and localised nature of disturbance, any individuals present would be able to readily disperse into the retained Opossum Creek corridor and broader conservation areas in the surrounding locality.**				
Rainbow Bee-eater (***Merops ornatus***)	M / MI	The Rainbow Bee-eater occurs mainly in open forests and woodlands, shrublands, and in various cleared or semi-cleared habitats, including farmland and areas of human habitation.	The Rainbow Bee-eater is found throughout mainland Australia, as well as eastern Indonesia, New Guinea and, rarely, the Solomon Islands. In Australia it is widespread, except in desert areas, and breeds throughout most of its range, although southern birds move north to overwinter.	The Rainbow Bee-eater was identified as part of ecological surveys. The Rainbow Bee-eater while listed as a marine species is a relatively widespread and common species in Queensland and for the reasons detailed above does not warrant further assessment under the EPBC Act.
Black-faced Monarch (*Monarcha melanopsis)*	M / MI	The Black-faced Monarch mainly occurs in rainforest ecosystems, including semi-deciduous vine thickets, complex notophyll vine forests, tropical (mesophyll) rainforest, subtropical (notophyll) rainforest, mesophyll (broadleaf) thicket/shrubland, warm temperate rainforest, dry (monsoon) rainforest and occasionally cool temperate rainforest.	In Queensland, it is widespread from the islands of the Torres Strait and on Cape York Peninsula, south along the coasts (occasionally including offshore islands) and the eastern slopes of the Great Divide, to the New South Wales border.	The referral area is predominantly comprised of dry sclerophyll forest with limited areas of vine forest. The species is considered to have a low likelihood of occurring. More suitable habitat attributes are located within the gully lines of Woogaroo and Opossum Creek.
Spectacled Monarch (*Monarcha trivirgatus)*	M / MI	The Spectacled Monarch's natural habitats are subtropical or tropical moist lowland forests, subtropical or tropical mangrove forests, and	The Spectacled Monarch is found in coastal north-eastern and eastern Australia, including coastal islands, from Cape York, Queensland to Port Stephens, New South Wales.	The species' primary habitat is comprised of tropical moist lowland forests, subtropical or tropical mangrove forests and subtropical or tropical moist

Species	EPBC status*	Habitat preferences, breeding / nesting requirements and / or seasonal influences	Species distribution	Likelihood of occurrence on or adjacent to site, post-field survey
		subtropical or tropical moist montane forests. Its preference is for thick understorey areas.		montane forests. The referral area is predominantly comprised of dry sclerophyll forest. Suitable habitat to support the species was not identified within or adjoining the referral area. The species is considered unlikely to occur.
Rufous Fantail (*Rhipidura rufifrons*)	M / MI	The rufous fantail mainly inhabits wet sclerophyll forests, often in gullies dominated by Eucalypts such as *Eucalyptus microcorys, Eucalyptus pilularis, Eucalyptus resinifera* and a number of other Eucalyptus species.	The rufous fantail is known to occur in coastal and near coastal districts of northern and eastern Australia.	The rufous fantail is known to occur and forage within the proposed action site particularly within adjoining major gully lines and rainforest vegetation areas. The species has been observed on multiple occasions through ecological field surveys and is considered relatively common in the surrounding landscape and locality.

* CE = Critically Endangered, V = Vulnerable, E = Endangered, MI = Migratory (Bonn Convention), M = Marine

2.2 Description of the current land use and natural environment

Item 3.2 of the PD Request asks for ***"a description of the current land use, land topography, surface and ground water bodies, waterways and vegetation communities (habitat types as they relate to the below listed threatened species) on the proposed action site and adjoining areas."***

The following subsections provide information of the current land use and environmental features recorded and assessed during the field survey period.

2.2.1 Current land use

The referral area is currently comprised of mostly intact vegetation where some areas show evidence of historical logging and varying densities of weed invasion. Evidence of public access to the site to utilise as a walking path was noted during survey effort. The site is bound by a highly modified environment, consisting of an education facility to the east, existing residential development, a golf course, and patches of intact vegetation retained largely in lineal strips associated with local waterways. Existing development works are occurring in the south-east adjacent to the EPBC development Kalina Village One (EPBC 2014/7306). The surrounding landscape also contains several EPBC referrals that are either approved or awaiting approval (refer **Plan A7**).

2.2.2 Topography

The ground elevations ranging from approximately 90 m AHD at the central and southern portions of the referral area to 30 m AHD at the western and northern boundaries towards the creek lines. The average elevation across the site is 10 %. Refer to **Figure A3** for referral area topography and **Photo set 1** for images representative of the topography of the referral area.

Photo set 1: Vegetation and topography characteristic of a large portion of the referral area.

2.2.3 Waterways and waterbodies

The referral area is predominantly located within areas of high elevation relative to the surrounding areas and therefore waterway values are predominantly located in areas adjoining the referral area. The referral area

contains drainage features mapped under the Queensland *Water Act 2000*; however, these were not observed to contain features indicative of a true watercourse such as a defined channel and bed and bank features. On-ground surveys have rectified any mapped watercourses to occur outside of the referral area bounds. Refer to **Figure A3** for the location of waterways mapped under the Queensland *Fisheries Act 1992* adjoining the referral area.

Major waterways and creek line values adjoin the referral area to the east, west and north-west. Woogaroo Creek is located adjacent to the north-western boundary and Opossum Creek is situated adjacent to the western and south-western boundary. O'Dwyer's Gully is situated adjacent to the eastern boundary and runs in a south-north direction with the upstream extent traversing a small section of the south-eastern portion of the referral area which is to be wholly retained under the proposal. The creek line areas were observed to contain some pooled water, where Woogaroo and Opossum Creeks were considered to contain some potential frog habitat values. Rocky habitat was recorded in association with the drainage lines on-site and western ridgelines, providing potential habitat for reptiles and small mammals.

2.2.4 Vegetation Communities

Over 150 ha of the site is mapped Category B (remnant) vegetation and approximately 3.5 ha is Category X (non-remnant) vegetation. Most of the Category B (remnant) is mapped as RE12.9-10.2/12.9-10.7/12.9-10.19 (60% / 20% / 15%). Small portions of Least Concern RE12.9-10.17 and Endangered RE12.3.16. RE12.9-10.15 and composite RE12.3.7/12.3.3 (80% / 20%) extend across part of the northern, eastern and western referral area boundaries. Refer to **Figure A4** and **Figure A5** for Queensland Regional Ecosystem mapping (Regulated Vegetation Management Map and Vegetation Management Regional Ecosystem Map). A regional ecosystem not mapped was also identified within the referral area, being RE12.9-10.3. Descriptions of the above listed regional ecosystems and their occurrence in relation to the referral area are provided in **Table A5**.

Table A5: Regional ecosystem descriptions (Queensland Herbarium) for vegetation communities within and adjoining referral area

Regional Ecosystem	VMA Status	Description	Within or adjoining referral area
12.9-10.7	Of Concern	*Eucalyptus crebra* +/- *E. tereticornis*, *Corymbia tessellaris*, *Angophora leiocarpa*, *E. melanophloia* woodland. Occurs on Cainozoic and Mesozoic sediments. Not a Wetland. (BVG1M: 13c).	Elements contained within (non-dominant RE)
12.9-10.2	Least Concern	*Corymbia citriodora* subsp. *variegata* open forest or woodland usually with *Eucalyptus crebra*. Other species such as *Eucalyptus tereticornis, E. moluccana, E. acmenoides* and *E. siderophloia* may be present in scattered patches or in low densities. Understorey can be grassy or shrubby. Shrubby understorey of *Lophostemon confertus* (whipstick form) often present in northern parts of bioregion. Occurs on Cainozoic and Mesozoic sediments. Not a Wetland. (BVG1M: 10b).	Elements contained within (non-dominant RE)

Regional Ecosystem	VMA Status	Description	Within or adjoining referral area
12.9-10.19	Least Concern	*Eucalyptus fibrosa* subsp. *fibrosa* woodland +/- *Corymbia citriodora* subsp. *variegata*, *E. acmenoides or E. portuensis, Angophora leiocarpa, E. major*. Understorey often sparse. Localised occurrences of *Eucalyptus sideroxylon*. Occurs on Cainozoic and Mesozoic sediments. (BVG1M: 12a)	Dominant RE within referral area
12.9-10.3		*Eucalyptus moluccana* open forest. Other canopy species include *Eucalyptus siderophloia* or *E. crebra, E. tereticornis* and *Corymbia citriodora* subsp. *variegata*. Understorey generally sparse but can become shrubby in absence of fire. Occurs on Cainozoic and Mesozoic sediments, especially shales. Prefers lower slopes. Not a Wetland. (BVG1M: 13d)	Dominant RE within referral area
12.9-10.15	Endangered	Low microphyll vine forest +/- *Araucaria cunninghamii* and semi-evergreen vine thicket. Characteristic species include *Brachychiton rupestris, Flindersia collina, F. australis, Alectryon diversifolius, A. subdentatus, Elattostachys xylocarpa*, *Erythroxylum* sp. (Splityard Creek L.Pedley 5360), *Psydrax odorata forma buxifolia, Diospyros geminata, Planchonella cotinifolia, Croton insularis, Bridelia exaltata* and *Bursaria incana*. *Melaleuca bracteata* is often present along watercourses. Occurs on Cainozoic and Mesozoic sediments. Not a Wetland. (BVG1M: 7a).	Within referral area (western area)
12.3.3	Endangered	*Eucalyptus tereticornis* woodland. *Eucalyptus crebra* and *E. moluccana* are sometimes present and may be relatively abundant in places, especially on edges of plains and higher level alluvium. Other species that may be present as scattered individuals or clumps include *Angophora subvelutina* or *A. floribunda*, *Corymbia clarksoniana, C. intermedia, C. tessellaris, Lophostemon suaveolens* and *E. melanophloia*. Occurs on Quaternary alluvial plains, terraces and fans where rainfall is usually less than 1000mm/y. Not a Wetland. (BVG1M: 16c).	Adjoining referral area located within O'Dwyer's Gully to east
12.3.7	Of Concern	Narrow fringing woodland of *Eucalyptus tereticornis, Casuarina cunninghamiana* subsp. *cunninghamiana +/- Melaleuca viminalis*. Other species associated with this RE include *Melaleuca bracteata, M. trichostachya, M. linariifolia*. North of Brisbane *Waterhousea floribunda* commonly occurs and may at times dominate this RE. *Melaleuca fluviatilis* occurs in this RE in the north of the bioregion. *Lomandra hystrix* often present in stream beds. Occurs on fringing levees and banks of rivers and drainage lines of alluvial plains throughout the region. Riverine. (BVG1M: 16a).	Adjoining referral area located within O'Dwyer's Gully to east

Regional Ecosystem	VMA Status	Description	Within or adjoining referral area
12.3.16	Endangered	Complex notophyll to microphyll vine forest. Typical canopy species include *Aphananthe philippinensis, Argyrodendron* sp. (Kin Kin W.D.Francis AQ81198), *Argyrodendron trifoliolatum, Diospyros fasciculosa, Drypetes deplanchei, Dysoxylum mollissimum* subsp. *molle*, *Jagera pseudorhus, Mallotus discolor, Melia azedarach, Mischocarpus pyriformis* subsp. *pyriformis, Planchonella pohlmaniana, Toona ciliata* and *Vitex lignum-vitae*. *Casuarina cunninghamiana* may occur in scattered patches or low densities along channel banks. Grevillea robusta commonly occurs south of Maryborough. Emergents of *Araucaria cunninghamii, Eucalyptus tereticornis* and *Lophostemon confertus* may occur. Typical sub-canopy species include *Streblus brunonianus, Cryptocarya triplinervis, Gossia bidwillii, Diospyros australis, Arytera divaricata, Capparis arborea, Cleistanthus cunninghamii* and *Polyalthia nitidissima*. Occurs on Quaternary alluvial plains and channels. Riverine. (BVG1M: 4b).	Adjoining and within referral area proximal to Opossum Creek

Vegetation assessment surveys indicate vegetation communities within the referral area are generally reflective of the broad mapping with refinements to boundaries completed based on ground-truthing. The dominant vegetation communities observed within the referral area are broadly representative of RE12.9-10.19 and RE12.9-10.3 with elements of RE12.9-10.7 and RE12.9-10.2 also present. Refer to **Plan A8** for vegetation field survey effort including ground-truthed regional ecosystems and broad vegetation communities.

Native vegetation on-site included, *Eucalyptus fibrosa* (Broad-leaved Ironbark), *Eucalyptus crebra* (narrow-leaved ironbark), *Eucalyptus siderophloia* (northern grey ironbark), *Corymbia citriodora* (Spotted Gum), *Eucalyptus propinqua* (grey gum), *Eucalyptus tereticornis* (forest red gum) and *Eucalyptus moluccana* (gum-topped box). Although the sub-canopy and shrub layer across the site was largely lacking, where present, species composition included *Lophostemon confertus* (swamp box), *Acacia leiocalyx* (early flowering wattle), *Alphitonia excelsa* (soap tree) and *Acacia fimbriata* (fringing wattle).

Across the referral area, the presence of significant sized trees (*i.e.*, greater than 400 mm DBH) was lacking which is attributed to historical logging and site modification. Introduced species were observed to be concentrated within and proximal to the gully lines mapped on-site and in isolated patches. Species included *Lantana camara* (lantana), *Opuntia tomentosa* (velvety tree pear), *Asparagus aethiopicus* (asparagus fern), *Asparagus africanus* (climbing asparagus fern) and *Solanum nigrum* (blackberry nightshade).

2.2.4.1 Lowland Rainforest of Subtropical Australia TEC

The Lowland Rainforest of Subtropical Australia threatened ecological community (LRSA TEC) has typically relatively low abundance of species from the genera *Eucalyptus, Melaleuca* and *Casuarina*. Buttresses are common as is an abundance and diversity of vines. This community is usually associated with REs 12.3.1 (now described as RE12.3.16), 12.5.13, 12.8.3, 12.8.4, 12.8.13, 12.11.1, 12.11.10, 12.12.1, and 12.12.16, none of which were recorded on or adjacent to the application site.

A summary LRSA TEC is provided in this section, with further information regarding details of the field surveys and assessment against the Approved Conservation Advice for the Lowland Rainforest of Subtropical Australia provided in **Section 2.3.1**.

RE12.3.16 (listed as Endangered under the VMA) is recognised as a regional ecosystem containing vegetation characteristics associated with the LRSA TEC. RE12.3.16 is mapped in two locations adjoining the central-western boundary area within the Opossum Creek gully, a portion of which extends into the site. The RE mapping is used as a trigger to assess the potential presence of a TEC and its spatial extent. Ground-truthing exercises were completed to define the extent of the TEC. Ground-truthing assessment confirmed the presence of flora and vegetation characteristics representative of the LRSA TEC are present within Opossum Creek, generally in line with the RE mapping.

RE12.3.16 contains species reflective of the LRSA TEC which were observed within the westernmost portion of the proposed action bounds (refer **Photo set 2**). Evidence of revegetation works was observed within areas of the Endangered RE12.3.16 to the west of the site, proximal to Opossum Creek. A portion of the RE within Opossum Creek was also noted to contain mature *Cinnamomum camphora* (camphor laurel). As camphor laurel are typically indicative of a modified environment, the location of this species was used as part of the TEC refinement process. The refined LRSA TEC mapping located on-site is situated within the lowest section of the adjoining gully line within a relatively narrow extent. It is noted that Endangered RE12.9-10.15 which is not a trigger for the LRSA TEC is also mapped as adjoining the mapped RE12.3.16 in the western portion of the site (refer **Figure A5** and **Photo set 3**), the extent of which was also ground-truthed. **Plan A9** provides the refined extent of RE12.3.16 and RE12.9-10.15.

Photo set 2: Species consistent with LRSA TEC within western gully adjoining western boundary.

Photo set 3: Vegetation characteristic of Endangered RE 12.9-10.15 within the western site extent.

2.2.4.2 Assessment Units

The vegetation communities present within the referral area were delineated into two assessment units (AUs) based on the presence of broad vegetation communities across the referral area. Within each of these areas there remain sub-areas and ecotonal changes which alter the balance of features based on factors including topography, drainage, aspect, level of ongoing maintenance, nexus to tracks and other weed access points. The assessment units are:

- AU1: Remnant (RE12.9-10.19) [141.1 ha]
- AU2: Remnant (RE12.9-10.3) [19.3 ha]

The two broad vegetation communities / assessment units are displayed on **Plan A10** and are described below.

2.2.4.3 Assessment Unit 1 – Remnant RE12.9-10.19

Assessment Unit 1 is described as open eucalypt woodland dominated by ironbark species *E. fibrosa* with *E. moluccana, E. crebra, E. siderophloia, C. citriodora* and *Angophora leiocarpa*. The AU also contains small patches of *E. propinqua*, *E. tereticornis* and *C. citriodora* indicating elements of RE12.9-10.2 and RE12.9-10.7 are present, with RE12.9-10.19 being the dominant regional ecosystem as indicated by the general dominance of *E. fibrosa* throughout the area.

The understorey is generally open with typical subcanopy species being *Lophostemon confertus* (swamp box), *Acacia leiocalyx* (early flowering wattle), *A. disparrima* (hickory wattle), *Alphitonia excelsa* (soap tree) and *A. fimbriata* (fringing wattle).

The shrub layer is quite sparse with sparsely observed shrubs including *Breynia oblongifolia* (coffee bush), *Jacksonia scoparia* (dogwood), *Daviesia ulicifolia* (native gorse), *Westringia eremicola* (slender westringia), *Hibbertia stricta* (narrow-leaved guinea-bush) and regenerating canopy and subcanopy species.

The ground layer is predominantly comprised of native forbs, grasses and sedges including *Gahnia aspera* (saw sedge), *Goodenia rotundifolia* (star goodenia), *Lobelia purpurascens* (white root), *Eustrephus latifolius* (wombat berry), *Cheilanthes distans* (bristle cloak fern), *Dianella caerulea* (blue flax-lily), *Lomandra longifolia* (long-leaved mat-rush), *Cymbopogon refractus* (barbed wire grass), *Entolasia stricta* (wiry panic), *Themeda triandra* (kangaroo grass), *Eragrostis brownii* (Brown's love grass), *Aristida vagans* (threeawn speargrass) and *Sporobolus elongatus* (slender rat's tail grass). A large portion of the ground layer is comprised of leaf litter.

Refer to **Photo set 4** for representative images of AU1.

2.2.4.4 Assessment Unit 2 – Remnant RE12.9-10.3

Assessment Unit 2 is described as open eucalypt woodland dominated by *E. moluccana* and *E. siderophloia* with *E. tereticornis* and *C. citriodora*. The vegetation is broadly mapped as RE12.9-10.2/12.9-10.7/12.9-10.19 (65/20/15%). Due to the dominance of *E. moluccana* in this area, it was determined on-ground that the

vegetation more accurately reflected RE12.9-10.3 which aligns with the description of the RE provided in **Table A5** which includes the observed species as typical to the RE. The extent of RE12.9-10.3 was ground-truthed on-ground based on the dominance of *E. moluccana*, whereby the *E. fibrosa* dominated woodland located over the majority of the referral area transitioned to woodland dominated by *E. moluccana* in the southern portion, particularly where the referral area slopes to the south-west.

The understorey is generally open with typical subcanopy species being *Lophostemon confertus* (swamp box), *Acacia leiocalyx* (early flowering wattle), *A. disparrima* (hickory wattle), *Alphitonia excelsa* (soap tree) and *A. fimbriata* (fringing wattle).

The shrub layer is quite sparse with sparsely observed shrubs including *Breynia oblongifolia* (coffee bush), *Jacksonia scoparia* (dogwood), *Daviesia ulicifolia* (native gorse), *Westringia eremicola* (slender westringia), *Hibbertia stricta* (narrow-leaved guinea-bush) and regenerating canopy and subcanopy species.

The ground layer is predominantly comprised of native forbs, grasses and sedges including *Gahnia aspera* (saw sedge), *Goodenia rotundifolia* (star goodenia), *Lobelia purpurascens* (white root), *Eustrephus latifolius* (wombat berry), *Cheilanthes distans* (bristle cloak fern), *Dianella caerulea* (blue flax-lily), *Lomandra longifolia* (long-leaved mat-rush), *Cymbopogon refractus* (barbed wire grass), *Entolasia stricta* (wiry panic), *Themeda triandra* (kangaroo grass), *Eragrostis brownii* (Brown's love grass), *Aristida vagans* (threeawn speargrass) and *Sporobolus elongatus* (slender rat's tail grass). A large portion of the ground layer is comprised of leaf litter.

Refer to **Photo set 5** for representative images of AU2.

Photo set 4: Assessment Unit 1 dominated by *Eucalyptus fibrosa* (RE12.9-10.19) with example elements of other regional ecosystems including RE12.9-10.2 (*Corymbia citriodora*).

Photo set 5: Assessment Unit 2 dominated by *Eucalyptus moluccana* (RE12.9-10.3).

2.2.5 Habitat for threatened species

The referral area contains a mix of environs, including waterways, differing vegetation communities and rocky substrates in locations. Minimal clearing in more recent years and overall vacancy has minimised the evidence and consequence of anthropogenic impacts, although the site varies in intensity of modified environs and disturbances.

Within the original referral MNES – Ecological Technical Assessment (refer **Preliminary Documentation Part B – Attachment 1**) a number of MNES were identified as having the potential to occur within or adjoining the referral area and therefore were targeted as part of the field survey effort. Two MNES flora species were observed during field survey effort as being located outside of the referral boundary: *Coleus habrophyllus* (Shaggy-leaved Coleus) and *Macadamia integrifolia* (Macadamia nut). Both specimens were located outside of the impact area within dedicated vegetation retention areas and therefore are considered highly unlikely they will be impacted by the development as per assessment against the Significant Impact Guidelines 1.1. (refer **Preliminary Documentation Part B – Attachment 1, Sections 9-11**). As detailed ecological surveys have been undertaken across the referral area including niche habitat areas, there is a high level of confidence that the balance of the site and impact area do not contain these species.

MNES considered to have potential to occur on or be at higher risk of being impacted by the proposed development as per the revised likelihood of occurrence assessment provided in **Table A4** include:

- *Phascolarctos cinereus* (koala);
- *Pteropus poliocephalus* (grey-headed flying-fox);
- *Lathamus discolor* (swift parrot); and
- *Anthochaera phrygia* (regent honeyeater).

The development will result in the clearing of vegetation identified by DCCEEW as critical habitat for the above listed species. As such, an offset will be delivered in accordance with the *EPBC Act Environmental Offsets Policy 2012*. Refer to **Sections 3** to **6** for detailed assessment and conclusions.

2.3 Technical detail on MNES present at, or in the vicinity to, the project site (as listed in 2.1)

Item 3.3 of the PD Request asks ***"for listed threatened species and ecological communities that have the potential, or are likely, to be present at and in the vicinity of the project site, including but not limited to those listed below, this section must provide the following:***

a. Information on the abundance, distribution, ecology and habitat preference of the species or communities.

b. Quantification of the extent of habitat and (if known) the number of individuals present or historical patterns of use on and surrounding the development footprint (including maps identifying known or potential habitat).

c. Assessment of quality and importance of known or potential habitat for the species or communities within the proposed action site and surrounding areas.

d. Information detailing known populations or records within at least five kilometres of the development footprint and (if known) the size of these populations.

e. An assessment of the adequacy of any surveys undertaken (including survey effort and timing). In particular, the extent to which these surveys were appropriate for the species and undertaken in accordance with relevant survey guidelines."

2.3.1 Lowland Rainforest of Subtropical Australia Threatened Ecological Community

a) Information on the abundance, distribution, ecology and habitat preference of the species or communities.

Distribution

The LRSA TEC primarily occurs from Maryborough in Queensland to the Clarence River (near Grafton) in New South Wales (NSW). It includes isolated areas between the Clarence River and Hunter River, such as Bellinger Valley. Lowland Rainforest mostly occurs in areas < 300 m above sea level, and typically occurs in areas with high annual rainfall (> 1300 mm).

Habitat and ecology

Patches of Lowland Rainforest are generally small in size (<10 ha) and scattered / isolated. The Lowland Rainforest mostly occupies areas on highly fertile basaltic and alluvial soils, including sand and old or elevated alluvial soils as well as floodplain alluvia. These areas have been heavily cleared as they are the most suitable for agricultural use.

The ecological community is generally a moderately tall (≥ 20 m) to tall (≥ 30 m) closed forest (canopy cover ≥ 70 %). Tree species with compound leaves are common and leaves are relatively large (notophyll to mesophyll). Typically, there is a relatively low abundance of species from the genera *Eucalyptus*, *Melaleuca* and *Casuarina*. Buttresses are common as is an abundance and diversity of vines.

The LRSA TEC provides habitat for a large number of animals including a high proportion of frugivorous birds and a large number of threatened species.

Threats

Under the *Threat abatement plan for disease in natural ecosystems caused by Phytophthora cinnamomi* (Commonwealth of Australia, 2018), the LRSA TEC is identified as a TEC that may be affected by dieback caused by the root-rot fungus *Phytophthora cinnamomi* due to its capacity to induce dieback in native plants endemic to the TEC.

b) Quantification of the extent of habitat and (if known) the number of individuals present, or historical patterns of use on, and surrounding, the development footprint (including maps identifying known or potential habitat).

Key Diagnostic Characteristics

The identification and delineation of the LRSA TEC is principally determined by using the key diagnostic characteristics (KDCs) and the condition thresholds provided in the *Lowland Rainforest of Subtropical Australia listing advice* 2011 ('LRSA TEC Listing Advice'). The KDCs are:

- Distribution of the ecological community is primarily in the NSW North Coast and South Eastern Queensland bioregions, according to Interim Biogeographic Regionalisation for Australia (IBRA) version 6.1 (2004).
- The ecological community occurs on: soils derived from basalt or alluvium; or enriched rhyolitic soils; or basaltically enriched metasediments.
- The ecological community generally occurs at an altitude less than 300 m above sea level.
- The ecological community typically occurs in areas with high annual rainfall (>1300mm).
- The ecological community is typically more than 2 km inland from the coast.
- The structure of the ecological community is typically a tall (20 m–30 m) closed forest, often with multiple canopy layers.
- Patches of the ecological community typically have high species richness (at least 30 woody species from Appendix A).

A desktop delineation of potential habitat where the LRSA TEC could occur in the areas adjoining the referral area in Opossum Creek is shown on **Plan A9** which is based on regional ecosystem mapping associations. A large portion of this area was surveyed which showed the extent of the TEC patches to be relatively confined.

The vegetation generally meets the context characteristics under the first five KDCs including presence of basalt or alluvium soils, position relative to the coast and within the TEC's distribution. Therefore, the identification and delineation of the LRSA TEC during field surveys was guided by the final two key diagnostic characteristics relating to the structure and species richness of the vegetation as well as alignment with the landform and floral characteristics of the associated RE 12.3.16.

On-ground delineation of TEC

Vegetation was ground-truthed and assessed against VMA RE mapping of RE12.3.16 and pre-clear mapping. This included reviewing the accuracy and extent of mapped RE types in addition to the broad vegetation

condition. Specific surveys to identify the presence and extent of the LRSA TEC were completed during vegetation survey effort on 7th, 15th and 16th August 2019.

A comprehensive flora survey was undertaken using a methodology consistent with the established formats used by the Queensland Herbarium (Nelder *et al.,* 2020 and Hnatiuk *et al.,* 2009). Survey methodology comprised an initial visual audit of the vegetation communities to identify the vegetation structure and species richness at the location where the regional ecosystems indicative of the LRSA TEC were mapped. The flora species characteristic of the TEC is listed in Appendix A of the Conservation Advice available on the LRSA TEC's SPRAT profile.

An antenna-based GPS unit was used to delineate the extent of the TEC based on the vegetation structure (*i.e.,* tall, closed forest) and location of characteristic species (*i.e.,* RE12.3.16 and Appendix A of LRSA TEC Listing Advice). Rainforest species indicative of the LRSA TEC were mostly confined to the lower gully line within a limited area. A total of 16 woody species that align with Appendix A of the LRSA TEC Listing Advice were recorded within the ground-truthed patches (refer **Table A6**). A portion of the RE within Opossum Creek was noted to contain mature *Cinnamomum camphora* (camphor laurel). These areas of RE12.3.16 were overly modified, lacking the species characteristic of the TEC, therefore were excluded from the ground-truthed polygons. The refinement process identified the extent of LRSA TEC comprises a portion of the mapped RE12.3.16 and is situated within the lowest section of the adjoining gully line. It is noted that Endangered RE12.9-10.15 which is not a trigger for the LRSA TEC is also mapped as adjoining the mapped RE12.3.16 in the western portion of the site (refer **Figure A5** and **Photo set 3**), the extent of which was also ground-truthed.

Plan A9 outlines the extent of the LRSA TEC identified and delineated within and adjacent to the referral area. The ground-truthed extent of the LRSA TEC are spread across two discontinuous patches with the northern patch being 0.68 ha (Patch 1) and the southern being 0.17 ha (Patch 2) totalling 0.85 ha. Evidence of rehabilitation efforts were observed within the northern patch, where planting of vegetation reflective of the LRSA TEC flora composition is present. This is an indication that the community was historically impacted and modified. Notably, development is not to occur within the ground-truthed LRSA TEC patches nor impact on the potentially suitable habitat for the ecological community with a proposed buffer of 50 m between the ground-truthed edge and development extent.

Table A6: Observed woody species within LRSA TEC consistent with Appendix A of *Lowland Rainforest of Subtropical Australia listing advice* (2011)

Scientific name	Common name
Aphananthe philippinensis	Rough-leaved elm
Araucaria cunningamii	Hoop pine
Breynia oblongifolia	Coffee bush
Ficus fraseri	Sandpaper fig
Ficus obliqua	Small-leaved fig
Flindersia australis	Crows ash
Glochidion ferdinandi	Cheese tree

Scientific name	Common name
Grevillea robusta	Silky oak
Lophostemon confertus	Brush box
Macadamia integrifolia	Macadamia nut
Maclura cochinchinensis	Cockspur thorn
Mallotus philippensis	Red kamala
Melia azedarach	White cedar
Phyllanthus microcladus	Brush sauropus
Streblus brunonianus	Whalebone tree
Toona ciliata	Red cedar

Condition threshold

The patches of indicative TEC were also generally considered to meet the condition thresholds of the TEC (refer **Extract A1**) except for species richness of woody native species which notes at least 30 native woody species are required in order to be considered a class B or C TEC. However, it was considered that the vegetation community contained enough of the characteristics to be considered a TEC.

Patch Type (evidence of remnant vegetation & regeneration status)	**A** Natural remnant evident by the persistence of mature residual trees from Appendix B. **AND**	**B** Some residual trees from Appendix B are present plus evidence of either; natural regeneration[*1] **AND/OR** regeneration with active management[*2] **AND**	**C** A non-remnant patch that has recovered through a) natural regeneration[*1] **AND/OR** b) supplementary planting that has stature and quality that is reflective of the 'Description' [*3] **AND**
Patch Size (excludes buffer zone)	≥ 0.1 ha **AND**	≥ 1 ha **AND**	≥ 2 ha **AND**
Canopy Cover (over entire patch)[*4]	Emergent/canopy/subcanopy[*4] cover is ≥ 70% **AND**		
Species Richness (over entire patch)	contains ≥ 40 native woody species[*5] from Appendix A **AND**	contains ≥ 30 native woody species[*5] from Appendix A **AND**	
Percent of total vegetation cover that is native [*6] (use sample plot)	≥70% of vegetation [*6] is native	≥50% of vegetation [*6] is native	

Notes:

[*1] Evidence of natural regeneration is shown by the presence of seedlings of a range of native species that did not originate through deliberate plantings.

[*2] A patch that is **actively managed** has regular (e.g. every 1–2 years) on the ground human regenerative activity such as weed control or supplementary plantings.

[*3] Closed canopy, 20–30 m tall, of representative species (e.g. white booyong, hoop pine, figs, brush box, yellow carabeen, red cedar, rosewood, white beech)

[*4] Canopy cover (projective foliage cover) is estimated over the entire patch. When assessing the ecological community, the canopy includes the emergents and subcanopy (everything above 10 m tall). Canopy/sub-canopy includes all trees and vines (native and non-native).

[*5] Woody species are trees, shrubs or vines that contain wood or wood fibres that consist mainly of hard lignified tissues. Excluded from woody species are graminoids, other herbs and non-woody vines.

[*6] Total vegetation cover includes emergents/canopy/subcanopy and understorey and ground layers.

Extract A1: Condition threshold assessment for LRSA TEC patches. Orange boxes indicate condition of LRSA TEC achieved on-site.

c) *Assessment of quality and importance of known potential habitat for the species or communities within the proposed action site and surrounding areas.*

On-ground field survey identified that the *in situ* vegetation and landform characteristics of the LRSA TEC located to the west of the referral area are present across a smaller area than what was initially thought based on the mapped regional ecosystem extents. Two patches of LRSA TEC were ground-truthed during detailed field survey effort as detailed in the preceding section. The patches are very confined in extent with a total area of 0.85 ha and found to occur in an historically modified and disturbed environment within the adjoining Opossum Creek. The refined LRSA TEC mapping located on-site is situated within the lowest section of the adjoining gully line. RE12.3.16 and the ground-truthed TEC was found to be restricted to a relatively narrow extent along a portion of the gully line.

During ground-truthing surveys, evidence of revegetation works was observed within areas of the Endangered RE12.3.16 to the west of the referral area, proximal to Opossum Creek. A portion of the vegetation within Opossum Creek was also noted to contain mature *Cinnamomum camphora* (camphor laurel) and the southern patch was bound by an area dominated by Lantana camara (lantana) to the south.

Since the 2019 / 2020 bushfires the importance of the LRSA TEC has increased as a significant proportion of the vegetation community nationwide was affected. This shift in importance has been considered when assessing the community relevant to the referral area.

Predation by the European red fox, biological effects (toxic ingestion) caused by cane toads, and the invasion of escaped garden plants are included within the key threatening processes that are considered relevant to the LRSA TEC (Department of Sustainability, Environment, Water, Population and Communities, 2011). Field survey recorded European red foxes, cane toads and introduced plant ochna (*Ochna serrulata*) specimens within the proposed action boundary, indicating the LRSA TEC is already exposed to harm from invasive species. Ochna is included within the most damaging weed species that are known to infest this TEC, and should be managed to prevent impacts to the integrity of the LRSA TEC. As a result of the proposed action, pest management mechanisms will be implemented to reduce existing threats. Therefore, the quality of the TEC is reduced in its current state.

It is noted that the two patches of LRSA TEC will be retained *in situ* as a result of the development. A vegetated buffer will be retained between the hardstand development infrastructure and the TEC, minimising the potential impacts to the community in future.

d) *Information detailing known populations or recorded within at least five kilometres of the development footprint and (if known) the size of these populations.*

There is less than 6 ha of mapped vegetation in the surrounding 5 km of the subject site that has potential to align with the LRSA TEC. This has been desktop assessed via regional ecosystem mapping under the VMA, and therefore is used as an indication as it has not been ground-truthed. The mapping of regional ecosystems indicative of the LRSA TEC are in smaller patches and restricted to lower elevations associated with gullies and creek lines. Due to the high level of disturbance within the surrounding landscape, it is likely that the extent of the LRSA TEC is limited and confined to retained, alluvial systems.

e) An assessment of the adequacy of any surveys undertaken (including survey effort and timing). In particular, the extent to which these surveys were appropriate for the species and undertaken in accordance with the relevant survey guidelines.

A full list of ecological surveys completed within the referral area are provided in **Section 2.4.3 – Table A18** and **Table A19**. A summary of field surveys dates is provided in **Table A7**.

Vegetation was ground-truthed and assessed against the regional ecosystem mapping. This included reviewing the accuracy and extent of mapped RE types in addition to the broad vegetation condition. Particular attention was made in identifying whether TECs identified as having the potential to occur on or proximal to the site were present during field survey.

The vegetation surveys involved assessing each vegetation structure at the location where the regional ecosystems indicative of the LRSA TEC were mapped. The characteristic flora species appendices associated with the LRSA TEC Listing Advice were referred to during the assessment process, along with the key diagnostic characteristics and condition thresholds to delineate the boundaries of the TEC. Surveys were in accordance with the current LRSA TEC Listing Advice and utilised available assessment material provided on the Departments SPRAT profile for the LRSA TEC.

Table A7: TEC field survey summary

Survey date	Temperature data	Rainfall data	Methods applied
14 March 2019	22.0°C min – 31.9°C max	0 mm	Spot Assessment Technique Koala Surveys, flora and fauna assessments, Threatened ecological community ground truthing
7 August 2019	6.8°C min – 23.1°C max	0 mm	Endangered Regional Ecosystem and Threatened ecological community ground truthing, waterway interface tree plot
15 August 2019	2.9°C min – 24.3°C max	0.6 mm	Endangered Regional Ecosystem and Threatened ecological community ground truthing, waterway interface tree plot
16 August 2019	5.7°C min – 26.0°C max	0 mm	Endangered Regional Ecosystem and Threatened ecological community ground truthing, waterway interface tree plot
17 September 2019	9.7°C min – 30.9°C max	0 mm	Vegetation and threatened ecological community ground truthing

2.3.2 Koala (*Phascolarctos cinereus*)

a) Information on the abundance, distribution, ecology and habitat preference of the species or communities.

Distribution

The koala is found from north-east Queensland to the south-east corner of South Australia. As a consequence of translocations, the Koala are found outside their historic range, for example, Kangaroo Island. The distribution of Koala is influenced by altitude, temperature and leaf moisture. The density of the koala population in coastal regions is generally greater than inland areas.

Habitat and Ecology

In South East Queensland, a study completed by Rhodes *et al.* (2015) indicates that the average koala density across the region is estimated to be 0.04 koalas/ha. The majority of the region is predicted to have low population densities, suggesting that koalas in SEQ may be relatively widely distributed, but of low density in most areas (Rhodes *et al*. 2015). Rhodes *et al*. (2015) found a negative relationship between temperature and koala densities, which is associated with low koala densities in Ipswich and west Logan, where temperatures are relatively high. The Rhodes *et al*. (2015) data indicates that the average koala density in the Logan LGA from 1996 to 2015 is 0.12 koalas/ha. Utilising this data and extrapolating the more recent figures, the koala density in the Logan LGA from 2008 until 2015 is 0.04 koalas/ha, while from 1996 to 2008, the koala density was 0.26 koalas/ha. The Rhodes et al. (2015) survey also indicates that the koala density in Ipswich is approximately 0.033 koalas/ha based on surveys completed in 2011 and 2012.

Home ranges are also known to vary considerably due to a variety of factors including location (e.g. home ranges in habitats of lower productivity being larger than those within higher quality habitats) and availability of preferred forage trees, though typically, males have larger home ranges on average than females. In South East Queensland, Koala Coast home ranges were found to vary between 2-20 ha (Thomson, 2006), whilst in rural south-east Queensland, home ranges varied between 5.3-91.4 ha (White, 1999). Koalas successfully use highly fragmented habitats that have only small remnants of the original vegetation (White, 1999; QEPA , 2006a and references cited therein). They also use young forest and highly modified vegetation such as grazed, disturbed or thinned forest and regrowth areas, moving significant distances across the ground between preferred trees (e.g. White, 1999). Research has also found they prefer larger trees (QEPA, 2006a and references cited herein).

While koalas choose their habitat based on the suitability of food trees, the reasons for choosing these trees are not well understood. Soil fertility is thought to strongly influence the acceptability, palatability and nutritional content of selected browse species, whilst chemical composition is also suspected as a major factor determining the acceptance of selected foliage (Cork & Sanson, 1990; Cork & Braithwaite, 1996; Moore & Foley 2000; Moore *et al.,* 2005). Collectively, the suite of tree species considered to be of primary and/or secondary importance to koalas within South East Queensland include the following (after: Pahl 1993; QEPA, 2002 & 2006a; EHP, 2012): *Eucalyptus acmenoides, E. carnea, E. crebra, E. exserta, E. fibrosa, E. grandis, E. major, E. moluccana, E. populnea, E. propinqua, E. racemosa, E. resinifera, E. robusta, E. seeana, E. siderophloia, E. signata, E. tereticornis, E. tindaliae, E. microcorys, E. umbra, Corymbia citriodora, C. intermedia, Lophostemon confertus*, and *Melaleuca quinquenervia*.

Current data indicate that koalas in the SEQ (though also the Brigalow Belt and Mulga Lands bioregions) are subject to substantial declines (Dique *et al.* 2004; DERM 2009). The so-called Koala Coast has been the subject of long-term monitoring of koala ecology and population dynamics and the data derived from the area have been widely used as an important reference to assess the overall health of the Koala population of South East Queensland, as well as provided reference points for assessments of Koala elsewhere in the bioregion. On the basis of the results of the former DERM (now DETSI) 2008 Koala Coast Koala survey, the 2008 population estimate of 2,279 Koalas represented a 51% decline in less than three years and a 64% decline in the decade following the original 1996-1999 estimate of 6,246 koalas (see data cited in Dique *et al*., 2004 and DERM, 2009). This decline in koala population is supported by the recent Rhodes *et al*. (2015) study which indicates koala populations have declined across SEQ.

Threats

DERM (2009) identified that the largest declines occurred in bushland areas which showed a 59% reduction in koala numbers compared with a 30% reduction in urban areas. The large reduction of koalas in otherwise secure bushland was thought to be a flow on effect from excessive habitat loss and mortality in urban areas (DERM 2009). DERM (2009) concluded that the reduction in adequate recruitment to apparently secure bushland habitat areas is likely to be evidence of a dynamic process operating between the urban and bushland koala populations. DERM (2010) concluded that whilst there was a decline detected between the 2008 and 2010 surveys, the apparent difference was not statistically significant, meaning that there was no clear evidence of a decrease between the two years when margins of error were considered. DERM (2010) also concluded that the long-term downward trend since the 1996-1999 survey was still statistically significant, showing a 68 per cent decline between 1996-1999 and the most recent (2010) survey.

The influence of wild dog predation within the Ipswich City Council Local Government (LGA) is largely unknown as data within the LGA consists predominantly of publicly reported records collated by the Ipswich Koala Protection Society (ICC, 2017). However, dog attacks and vehicle strikes have been identified as primary threats within the LGA by the local government (ICC, 2017). Generally speaking, the main identified threats to the koala are loss and fragmentation of habitat, vehicle strike, disease, and predation by dogs (*Canis lupus familiaris*) (DERM 2009). Studies completed as part of the Moreton Bay Rail project (DTMR, 2016) found that between 2013 and 2016, 113 koalas had been killed by wild dogs with an additional 38 koala deaths suspected as wild dog predation, 82 koala deaths caused by illness and nine (9) vehicle strike deaths. While this study was not completed within the Ipswich City Council LGA, it represents one of the few dedicated studies successful in illustrating the significance of the threat of wild dogs on the koala in urban and peri-urban areas. The findings of this study and threat of wild dogs is corroborated by multiple studies (Beyer *et al.,* 2018; Hanger *et al.,* 2017; Mifsud, 2011).

b) *Quantification of the extent of habitat and (if known) the number of individuals present, or historical patterns of use on, and surrounding, the development footprint (including maps identifying known or potential habitat).*

The koala has the potential to occur within the referral area given the presence of non-juvenile koala habitat trees (NJKHTs). Indirect evidence in the form of scats were observed during field surveys. The referral area contains 161.4 ha of koala habitat in the form of open eucalypt woodland identified as critical habitat for the koala (refer **Plan A11**).

Vegetation surveys conducted across the site determined the property is dominated by species that achieve the definition of 'woodland' and 'forest' as referenced in the Koala Referral Guidelines. Ecological survey of the site shows the referral area is predominately dominated by *Eucalyptus crebra* (narrow-leaved ironbark), *Eucalyptus moluccana* (gum-topped box) and *Corymbia citriodora* (spotted gum). Other species present include *Eucalyptus fibrosa* (broad-leaved ironbark), *Eucalyptus propinqua* (Grey Gum), *Eucalyptus tereticornis,* (Forest Red Gum), *Eucalyptus siderophloia* (northern grey ironbark), *Lophostemon confertus* (brush box) and *Angophora leiocarpa* (smooth-bark apple). The site is recorded largely lacking large trees (DBH greater than 400 mm), sub-canopy and shrub layer species suggesting the site has been subject to historical clearing with habitat quality consequently affected.

Habitat within the referral area has been stratified into two (2) vegetation communities based on the on-ground values. Refer to **Plan A10** for the location of these communities which have been delineated into Assessment Units. These are:

- AU1 – Remnant RE12.9-10.19: remnant eucalypt woodland dominated by ironbark species *E. fibrosa* with *E. moluccana* and *C. citriodora*.
- AU2 – Remnant RE12.9-10.3: remnant eucalypt woodland dominated by *E. moluccana* and *E. siderophloia* with *E. tereticornis* and *C. citriodora*.

A review of previous ecological assessment results within and adjoining the referral area indicated that the following is applicable for the koala:

- The species is known to occur within the Springfield locality and evidence of activity has been confirmed within and adjoining the referral area via ecological assessment and through review of publicly available records including the Queensland Wildlife Online database and Atlas of Living Australia (ALA). These records are shown on **Plan A12**.
- Vehicle strike and dog predation is known threat within urban areas of Ipswich City Council LGA, however, is identified by ICC as an area requiring further research to understand the underlying rate of mortality attributed to wild and domestic dog attack (ICC, 2017).
- Areas of high ecological significance (*i.e.,* conservation areas) are present within the locality including Flinders-Karawatha Bioregional Corridor, White Rock Conversation Area, Greenbank Military Training Area and the White Rock-Spring Mountain Conservation Estate (refer **Plan A13**).

Further details regarding anticipated impacts on the koala as a result of the proposed development are discussed in **Section 4.1**, avoidance, management and mitigation measures are discussed in **Section 5,** and proposed offsets are discussed in **Section 6**.

c) Assessment of quality and importance of known potential habitat for the species or communities within the proposed action site and surrounding areas.

The referral area is located within a large remaining pocket of remnant vegetation which is earmarked for urban development under the Springfield Structure Plan. Koala habitat in the form of open eucalypt woodland is located across the referral area and adjoins habitat areas associated with Opossum Creek,

Woogaroo Creek and O'Dwyer's Gully located within Council land to the west and east. Notably, the referral area is bounded by two EPBC referrals to the south (ref EPBC 2020/8651 and EPBC 2020/8629).

The referral area maintains connectivity to the north and west utilising the adjoining waterway corridors, however, the site is broadly disconnected from the broader vegetated areas associated with regional corridors and conservation land within the locality including the Flinders-Karawatha Bioregional Corridor and White Rock Conservation Park. This is attributed to the location of urban areas and Centenary Highway to the south-east of the site. Outside of adjoining waterway corridors, the broader landscape is dominated by residential areas reflective of the urban intent of the Springfield Structure Plan.

While the referral area represents a large remaining pocket of vegetation, connectivity to contiguous vegetation is limited, except via Opossum and Woogaroo Creeks. It is important to recognise that these habitat areas do not link with broader habitat areas where local populations of koala are more likely to be present such as within White Rock Conservation Park due to the presence of land barriers. Recognising the importance of these waterway corridors as means of habitat for koala, it is noted that an area bushland located within the western portion of the referral area adjoining Opossum Creek and Woogaroo Creek is to be retained and enhanced which will serve to provide ongoing functional connectivity. The retained environmental areas are proposed to provide a general linear connection to the broader intact vegetation areas.

In specific response to this PD Request item, a habitat connectivity and suitability analysis was completed by BAAM Ecological Consultants to examine the surrounding barriers to movement for the koala and the capacity of the vegetation retention areas and surrounding creekline areas to support the local koala population. The analysis is provided at **Attachment A3**.

Details on significant impacts and quantification of habitat quality is provided in **Section 4.1.**

d) Information detailing known populations or recorded within at least five kilometres of the development footprint and (if known) the size of these populations.

Ipswich supports a regionally significant and genetically distinctive population of koalas. Population size estimates based on a 2016 study by Bussey and Ellis suggest a conservative population size of at least 4,000 koalas across the Ipswich LGA. The Rhodes et al. (2015) survey also indicates that the koala density in Ipswich is approximately 0.033 koalas/ha based on surveys completed in 2011 and 2012. It is noted that recent data-driven population estimates for the koala published in May 2025 by the National Koala Monitoring Program (NKMP) in collaboration with the CSIRO suggest a higher population estimate of koala populations within Queensland than previously estimated. Specific estimates for the Ipswich LGA have not been published.

Genetic analyses of Ipswich koala populations such as Kjeldsen et al. (2015) indicate the Ipswich–Beaudesert population is genetically distinct from coastal koala populations, increasing its conservation value as a source of genetic diversity for the region. Importantly, koalas in Ipswich are known to be regularly sighted within fragmented and peri-urban landscapes including riparian corridors, roadside vegetation and isolated trees in grazing paddocks (ICC, 2017).

Detailed analysis of DETSI data indicates numerous records (approximately 200) of koala exist within a 5 km radius of the referral area since the year 2000 (refer to **Plan A12**). Additionally, DETSI koala hospital records show a large portion of koala records to the north of the referral area have been for sick / injured or deceased individuals. The data available suggest a koala population is present within the immediate and broader locality, however, due to the urban / residential designation to support a growing population, risk to koala has increased. More specific population information within 5 km or more of the referral area such as relating to the size of the population are not known other than what can be extrapolated via records.

e) *An assessment of the adequacy of any surveys undertaken (including survey effort and timing). In particular, the extent to which these surveys were appropriate for the species and undertaken in accordance with the relevant survey guidelines.*

Spotlighting and Wildlife Aerial Thermal drone surveys

Targeted koala presence surveys have been undertaken within the site and broader vegetation patch from 2019 to 2024 which includes spotlighting by ecologists and targeted Wildlife Aerial Thermal drone surveys by qualified mapping personnel. Targeted surveys were completed by SHG ecologists in accordance with the *Survey Guidelines for Australia's Threatened Mammals* (DSEWPaC, 2011b) in the form of spotlighting searches undertaken in 2019 and 2023 for a total survey effort of 30 person hours and obtaining good coverage over the site and broader patch. Spotlighting is a recommended method for detection of arboreal mammals including koala. Refer **Plan A14** for location of SHG surveys.

In August 2024, additional spotlighting surveys were completed by BAAM Pty Ltd ecologists and incorporated RPA (remotely piloted aircraft) technology equipped with a thermal sensor to detect the presence of koalas. The drone results are compiled in the Koala Connectivity and Sustainability Analysis Report prepared by BAAM, provided at **Attachment A3**. Two koalas were observed as part of the drone surveys located (refer Attachment A3 – Attachment 1) identified on 26 August 2024 and 28 August 2024 (refer **Plan A14 for location of records**). Both were observed outside the referral area. It is noted as these sightings were recorded two days apart, it is possible they are the same individual.

A broader scope of field surveys has also been completed by SHG ecologists within the broader habitat patch in areas not subject to this application. Spotlighting surveys were completed in September 2023 by SHG ecologists south of the proposed action site incorporating RPA (remotely piloted aircraft) technology equipped with a thermal sensor to detect the presence of koalas. No koalas were observed during any spotlighting meanders or drone surveys completed as part of this scope.

A summary of survey dates, personnel and methods applied by SHG and BAAM are provided in **Table A8**, below.

Table A8: Summary of spotlighting and drone surveys targeting koala

Survey date	Methods applied	Location within habitat patch	Consultant group	Koala presence
11 March 2019	Spotlighting	Northern	SHG	No sighting

Survey date	Methods applied	Location within habitat patch	Consultant group	Koala presence
13 March 2019	Spotlighting	Northern	SHG	No sighting
2 August 2023	Spotlighting	Northern	SHG	No sighting
3 August 2023	Spotlighting	Northern	SHG	No sighting
10 August 2023	Spotlighting	Northern	SHG	No sighting
11 September 2023	Spotlighting	Southern	SHG	No sighting
13 September 2023	Spotlighting, RPA Wildlife Aerial Thermal surveys	Southern	SHG	No sighting
20 September 2023	Spotlighting, RPA Wildlife Aerial Thermal surveys	Southern	SHG	No sighting
26 August 2024	Spotlighting, RPA Wildlife Aerial Thermal surveys	Northern	SHG and BAAM Ecological Consultants	Yes – 1 koala
28 August 2024	Spotlighting, RPA Wildlife Aerial Thermal surveys	Northern	SHG and BAAM Ecological Consultants	Yes – 1 koala

Spot Assessment Technique method

In accordance with the *EPBC Act Referral Guidelines for the Vulnerable Koala* (hereafter referred to as the 'Koala referral guideline'), the Spot Assessment Technique (SAT) was applied to search the referral area for the presence and activity levels of the koala. The SAT method, developed by the Australian Koala Foundation and Phillips and Callaghan (2011), is an assessment of Koala activity involving a search for any koalas and signs of Koala usage. The SAT involves identifying a focal tree where a Koala or scats are found. The next closest habitat tree to the first tree is then assessed and so on until the 30 closest trees to the original focal tree have been recorded. The number of trees showing evidence of koalas is expressed as a percentage of the total number of trees sampled to indicate the frequency of koala usage. Assessment of each tree involves a systematic search for koala scats beneath the tree within a 1 m radius of the trunk. After approximately 2-minutes of searching for scats, the base of the trunk is observed for scratches and the crown for potential koala presence.

A total of sixteen (16) koala SAT surveys have been completed across the referral area which were completed on multiple occasions, on 14th and 15th of March 2019, on 22nd of July 2020 and on 8th of August 2023 (refer **Plan A14** for location of surveys). Eight (8) Koala SAT surveys were conducted in March 2019, six (6) in July 2020 at habitat quality transects and two (2) in 2023. SAT surveys were focused in areas containing predominantly koala habitat trees. The SAT survey locations were chosen to provide an understanding of koala utilisation within the referral area.

SAT survey results are interpreted using the broad population categories provided in the Australian Koala Foundation Koala activity level classification table. These categories being 'East Coast (low)', 'East Coast (med-

high)' and 'Western (med-high)' are shown in **Table A9** and are used to estimate koala activity within a given area. Depending on the population category applied, koala activity is described as 'low', 'moderate', or 'high'. Population categories are assigned as follows:

- Sites considered to be suitable or have high suitability for koalas are assigned the 'East Coast (med-high)' category;
- Sites considered to have low suitability are assigned the 'East Coast (low)' category; and
- The 'Western (med-high)' category does not apply to South East Queensland local government areas.

Table A9: Koala Activity Level Classification (Phillips and Callaghan 2011)

Activity	East Coast (low)	East Coast (med-high)	Western (med-high)
Low	<3.33%	<22.5%	<35.8
Moderate	3.33-12.6%	22.5-32.8%	35.8-46.7
High	>12.6%	>32.8	>46.7

It is considered that the referral area is most accurately described by the East Coast (med-high) population category for multiple reasons. The East Coast (med-high) activity thresholds are applicable in habitats dominated by residual, transferral or alluvial type landscapes considered med-high nutrient soils with good water holding capacity (Steve Phillips, personal communication). The Australian Soil Resource Information System (ASRIS) maps dermosols across the referral area and suit the landscape description outlined below (refer **Figure A6**).

Description	Dermosols are red, brown, yellow, grey or black and have loam to clay textures. This type of soil covers the higher-rainfall coastal and sub-coastal regions. Important areas of these soils are the Burdekin delta and the Lockyer and Fassifern valleys.

Preferred habitat features are broadly present within the referral area which may indicate a higher expected density of koalas. This includes the presence of riparian corridors and alluvial (fertile) soils and presence of preferred forage tree *Eucalyptus tereticornis* (Forest Red Gum) and *Eucalyptus propinqua* (Grey Gum), particularly within adjoining watercourses.

Table A10 presents the koala usage scores for the 16 SAT surveys completed (refer **Attachment A4** for full data sets). Scats were detected at several sites, however, generally indicate low evidence of koala activity across the majority of the referral area using the East Coast (med-high) population category (refer **Photo set 6**). High levels of usage have been recorded within the western part of the referral area adjoining Woogaroo Creek at SAT Location 1 and also via opportunistic scat observation (refer **Plan A14**).

Table A10: Summary of SAT survey results

SAT survey ID	Year completed	Transect	Number of trees with scats	Evidence of Koala activity (%)	Koala use (East Coast med-high)
1	2019	-	11	36.67 %	High
2	2019	-	3	10.00 %	Low
3	2019	-	2	6.67 %	Low
4	2019	-	2	6.67 %	Low
5	2019	-	5	16.67 %	Low
6	2019	-	3	10.00 %	Low
7	2019	-	2	6.67 %	Low
8	2019	-	3	10.00 %	Low
9	2020	1	0	0.00 %	Low
10	2020	2	1	3.33 %	Low
11	2020	3	2	6.67 %	Low
12	2020	4	0	0.00 %	Low
13	2020	5	2	6.67 %	Low
14	2020	6	5	16.67 %	Low
15	2023	-	0	0.00 %	Low
16	2023	-	0	0.00 %	Low

Photo set 6: Koala scat and vegetation characteristics where faecal pellets were recorded.

Summary of koala activity

A variety of survey techniques were utilised to detect koala activity and abundance within and adjoining the referral area. This included spotlighting, UAV drone surveys, motion-triggered camera surveys and SAT surveys. Combining the findings of each survey method, patterns of koala usage and activity within and adjoining the site can be inferred. SAT surveys confirm koala utilisation of the broader referral area through

the detection of scats, with higher levels of scats recorded within the western portion of the referral area adjoining the Woogaroo Creek gully areas. In addition, both koala sightings recorded through the drone surveys were also located within the western interface areas. The second sighting was notably outside the referral area within the riparian area of Woogaroo Creek. These data suggest a preference for riparian or ecotonal areas between Land Zone 3 and Land Zone 9-10 where preferred foraging trees such as *Eucalyptus tereticornis* have a higher abundance.

2.3.3 Grey-headed flying-fox (*Pteropus poliocephalus*)

a) *Information on the abundance, distribution, ecology and habitat preference of the species or communities.*

Distribution

The grey-headed flying-fox occurs between Rockhampton in Queensland to Melbourne in Victoria. The species will usually selectively forage where food is available and as such, its patterns of occurrence and relative abundance vary between seasons and years. There are no separate or distinct populations due to the constant genetic exchange and movement between camps throughout its geographic range.

Habitat and Ecology

Grey-headed flying-foxes require foraging resources and roosting sites to persist. The species is known to use a wide variety of habitats including subtropical and temperate rainforests, tall sclerophyll forest and woodlands, heaths, swamps and also urban and agricultural areas where food trees have been cultivated. The species is highly adaptive with its diverse native diet, which it can supplement with introduced species. It is known to forage within a variety of habitat areas as each resource does not produce food throughout the entire year.

b) *Quantification of the extent of habitat and (if known) the number of individuals present, or historical patterns of use on, and surrounding, the development footprint (including maps identifying known or potential habitat.*

The referral area contains 161.4 ha of suitable foraging resources for the GHFF (refer **Plan A15**). SEQ has a permanent and abundant population of GHFF and available habitat is spread throughout the region given the high prevalence of eucalypts. GHFF foraging habitat is considered analogous with habitat critical to the survival of koala except where functional movement is compromised for the koala for otherwise suitable foraging habitat for GHFF. Foraging habitat is considered present within and surrounding the referral area, being abundant in the surrounding locality.

Specific surveys were completed during winter of 2020 to assess potential presence winter foraging resources, specifically the relative capacity of the referral area to support foraging activity during seasonal bottlenecks. The volume of flowering resources that would be available for foraging was estimated based on data extrapolated from a series of survey plots. A total of 23 10 x 10 metre plots were established across the referral area whereby the numbering of trees, their species and an assessment of whether the trees were flowering or not was recorded on 22nd of July 2020.

The survey identified zero flowering eucalypts within plots which predominantly included species that are known to flower in winter months (refer **Attachment A5** for complete data). It was also noted at habitat quality transects 1 to 6 which were also completed in July 2020 that there were no flowering eucalypts recorded at any of the transect locations at time of survey. The poor flowering capacity is possibly attributed to the lack of old growth trees or hydrology of the site, with flowering more frequently observed within fertile areas such as within waterway corridors. Based on this assessment, it is considered that the capacity of potential foraging habitat within the referral area is limited relative to contiguous habitat areas within the locality.

A review of the grey-headed flying-fox population data available through the CSIRO Data Access Portal (McKeown and Vanderduys, 2024) identified three (3) recently active flying-fox roosts containing GHFF within 5 km of the referral area boundary (refer **Plan A16**). These camps are not identified as nationally important, however, increases the likelihood of GHFF utilising foraging habitat on-site due to the proximity. There are twenty (20) roosts within 20 km of the site, including four (4) Level 3 and one (1) nationally important roost. **Plan A17** provides the recorded sightings of the GHFF available via public databases. It is noted GHFF has not been recorded directly utilising the site, where the species has been observed as fly-over only.

It is noted roost activity can change spatially and temporally and intermittent monitoring data provides an unclear picture of which roosts are currently active. The Interactive Flying-Fox Web Viewer which was intermittently updated with monitoring data from various roost sites between August 2012 and November 2022 was decommissioned on 25th June 2025. The location of the above identified roost sites is unlikely to reflect GHFF activity at all points in time, rather, provides a broad area of known occurrence showing roost sites which are currently occupied, previously occupied or may be occupied again in the future.

c) *Assessment of quality and importance of known potential habitat for the species or communities within the proposed action site and surrounding areas.*

The referral area is surrounded by urban development and is located between several established roosting sites (refer **Plan A16**). Given its placement in the landscape and presence of foraging resources, it is likely to be utilised by GHFFs in at least an intermittent capacity. The relative importance of the vegetation within the referral area should be considered relative to the biology of the GHFF and provision of foraging resources within the landscape, particularly within conservation land that will not be impacted by development.

Due to the nature of GHFF being highly mobile and the vast areas of highly suitable foraging habitat located within the same locality as the site (*i.e.,* within the Flinders-Karawatha Bioregional Corridor and White Rock Conservation Park), the relative importance of the vegetation on-site is considered reduced. The removal of foraging habitat is unlikely to have a significant impact on the availability of habitat in the landscape or ability of GHFFs to fulfil their biological needs given the vast quantity and availability of eucalypts in the surrounding area.

Furthermore, exhaustive surveys have not detected evidence of roosting within or adjacent to the referral area. Individuals have been recorded as a fly-over species, however, not directly utilising the referral area.

A detailed assessment of habitat quality within the referral area is provided in **Section 4.2**.

d) *Information detailing known populations or recorded within at least five kilometres of the development footprint and (if known) the size of these populations.*

SEQ has a permanent and abundant population of GHFF, and available habitat is spread throughout the region given the high prevalence of eucalypt dominated vegetation communities. Data derived from the CSIRO Data Access Portal (https://data.csiro.au/collection/csiro:61449) indicates there is one GHFF camp of national importance within 20 km of the referral area, being Mount Ommaney – Westlake Drive (400). There are several GHFF camps of other importance and identified as containing GHFFs within the last 3 years

identified within a 20 km radius of the referral area (refer **Plan A17**). Sightings of GHFF have been recorded within a 20 km buffer of the referral area according to publicly available data.

It is noted roost activity can change spatially and temporally and intermittent monitoring data provides an unclear picture of which roosts are currently active. The Interactive Flying-Fox Web Viewer which was intermittently updated with monitoring data from various roost sites between August 2012 and November 2022 was decommissioned on 25th June 2025. The location of the above identified roost sites is unlikely to reflect GHFF activity at all points in time, rather provides a broad area of known occurrence showing roost sites which are currently occupied, previously occupied or may be occupied again in the future.

Flying-fox roost searches were conducted across the referral area. This search was conducted during the day within the survey area, watching for flying-foxes and listening for their distinctive calls. This search is not only for flying-fox camps, but the presence of food plants to assess the potential importance of the survey area to the species. The search for flying-fox roosts was justified due to the proximity of the site to an active Flying-fox camp located at Camira, Barbara Street, approximately 1.3 km north-east of the site. No suitable roosting sites occur on or adjacent to the subject site. Suitable foraging trees are present on the subject site and alternative foraging habitat is freely available in the broader landscape.

e) *An assessment of the adequacy of any surveys undertaken (including survey effort and timing). In particular, the extent to which these surveys were appropriate for the species and undertaken in accordance with the relevant survey guidelines.*

Detailed ecological surveys have been completed over the project area and adjoining areas by SHG ecologists on multiple occasions for the purpose of detection of individuals and camps. The survey methods were applied in accordance with the accepted methodologies detailed in the *Survey guidelines for Australia's threatened bats* which include diurnal searches for food trees and roosts and nocturnal surveys (spotlighting).

A full list of ecological surveys completed within the referral area are provided in **Section 2.4.3 – Table A18** and **Table A19**. A summary of key field surveys dates utilising spotlighting, ultrasonic bat call detection and searches for flying-fox roosts is provided in **Table A11**.

Table A11: Grey-headed flying-fox field surveys – key dates

Survey date	Temperature data	Rainfall data	Methods applied
11 March 2019	20.7°C min – 37.9°C max	0 mm	Spotlighting, ultrasonic bat call detection, vegetation and flora ground-truthing surveys, search for flying-fox roosts within and adjoining referral area
12 March 2019	20.5°C min – 40.9°C max	0.2 mm	Waterway and drainage feature ground-truthing, vegetation and flora ground-truthing and general fauna surveys
13 March 2019	18.1°C min – 36.4°C max	0 mm	Spotlighting, ultrasonic bat call detection, flying-fox roost searches
8 August 2023	6.0°C min – 21.5°C max	2.0 mm	Spotlighting

Survey date	Temperature data	Rainfall data	Methods applied
10 August 2023	3.4°C min – 23.9°C max	0.2 mm	Collect motion sensor camera traps, spotlighting

Targeted nocturnal surveys for GHFF were conducted on multiple occasions including 11th and 13th March 2019 which also utilised the ultrasonic bat call detectors, and 8th and 10th August 2023. Targeted flying-fox roost searches were also completed on 11th and 13th March 2019 flying-fox roost searches.

The flying fox roost search was conducted during the day within the survey area, watching for flying-foxes and listening for their distinctive calls. This search is not only for flying-fox camps, but the presence of food plants to assess the potential importance of the survey area to the species. This involved assessing tree canopies whilst completing meanders across the site. The search for flying-fox roosts was justified due to the proximity of the site to an active flying-fox camp located at Camira, Barbara Street, approximately 1.3 km north-east of the site.

Echolocation call detection was also completed in initial surveys. This method is an unobtrusive and non-invasive technique used to target areas of interest such as creeks, rocky outcrops and potential flyaways for microbats, and is particularly useful for detecting species in the Rhinolophidae and Hipposideridae families. An ANABAT II ultrasonic bat call detection unit and associated ZCAIM interface module were also used to capture the calls of insectivorous bat species within representative habitat types on 11th and 13th March 2019.

It is noted that the referral area has been assessed on multiple occasions in 2019, 2020, 2021 and 2023 and evidence of roosting activities has not been detected on or adjoining the site.

2.3.4 Swift parrot (*Lathamus discolor*)

a) Information on the abundance, distribution, ecology and habitat preference of the species or communities.

Distribution

The swift parrot breeds in Tasmania during the summer and the entire population migrates north to mainland Australia for the winter. They occupy habitats across all tenures, with the majority of habitats occurring outside formal conservation reserves. The breeding range of the swift parrot is largely restricted to the east and south-east coast of Tasmania and closely mirrors the distribution of blue gum (*Eucalyptus globulus*). The species breeds in the north-west of the state between Launceston and Smithton, however, the number of birds involved and frequency of these breeding events is not well understood. Potential breeding habitat remaining in the northwest is scarce and highly fragmented. During the winter foraging season on the Australian mainland the swift parrot disperses widely, foraging on flowers and lerps in *Eucalyptus spp.* mainly in Victoria and New South Wales (DCCEEW, 2024). Only a small number of swift parrots are observed in Queensland on a regular basis.

Habitat and Ecology

Swift parrots breed in tree-hollows in old-growth or other forest with suitable hollows, in relatively close proximity to the main food source, flowering Tasmanian blue gum. Several pairs often nest in close proximity, in the same or neighbouring trees. Breeding success is correlated with the intensity and extent of flowering, which is highly variable between years. In poor years, swamp (black) gum (*Eucalyptus ovata*) is used as food source.

They feed preferentially in the largest trees available. Their distribution fluctuates with food availability as they feed on psyllid lerps, seeds and fruit. Non-breeding birds preferentially feed in inland box-ironbark and grassy woodlands, and coastal swamp mahogany (*Eucalyptus robusta*) and spotted gum (*Corymbia maculata*) woodland when in flower; otherwise often in coastal forests from eastern Victorian to the central coast of New South Wales. Key foraging species include Yellow Gum (*E. leucoxylon*), Red Ironbark (*E. tricarpa*), Mugga Ironbark (*E. sideroxylon*), Grey Box (*E. macrocarpa*), White Box (*E. albens*), Yellow Box (*E. melliodora*), Swamp Mahogany (*E. robusta*), Forest Red Gum (*E. tereticornis*), Blackbutt (*E. pilularis*), and Spotted Gum (*Corymbia maculata*). It is noted that *Corymbia citriodora* is recognised synonymously in terms of foraging value for the species. The species prefers large trees which flower consistently (DCCEEW, 2024).

Threats

The *National Recovery Plan for the Swift Parrot* (DCCEEW, 2024) identifies urban development and tree clearing as a key threat for the species' persistence. In Queensland, urban development is of particular concern to the Swift Parrot at the northern extent of their winter range. In particular, the Gold Coast, Toowoomba and the Greater Brisbane region are at risk from tree removal associated with residential and industrial development.

b) Quantification of the extent of habitat and (if known) the number of individuals present, or historical patterns of use on, and surrounding, the development footprint (including maps identifying known or potential habitat.

As described under item (i) above, swift parrot habitat within SEQ is limited to foraging resources as their occurrence on the Australian mainland, and therefore in SEQ, is dictated by seasonal dispersal patterns to support the foraging part of their life cycle which only occurs during winter months.

Foraging resources, and therefore potential foraging habitat, is broadly defined as winter flowering eucalypt trees. Habitat for the swift parrot within the referral area includes winter flowering foraging species being *C. citriodora, E. tereticornis*, *E. crebra*, *E. siderophloia*, *E. moluccana* and *E. fibrosa*. It is noted that the site contains only two (2) of the ten (10) preferred foraging species listed under the *National Recovery Plan for the Swift Parrot* (DCCEEW, 2024) being *C. citriodora/C. maculata* and *E. tereticornis*. As the referral area contains preferred foraging eucalypts which may provide foraging habitat for the species, it is considered to contain critical habitat for the swift parrot, identified on **Plan A19**.

A review of the available potential and known foraging habitat in the surrounding area is provided on **Plan A20** through utilising the regional ecosystem mapping and analysing the aerial imagery.

c) *Assessment of quality and importance of known potential habitat for the species or communities within the proposed action site and surrounding areas.*

The potential for swift parrot to occur in South East Queensland and the broader locality is likely which is supported by the presence of records in the locality within the past five years and the habitat destruction that resulted from the 2019 / 2020 bushfires in the southern portion of the foraging range which may lead to a potential shift in foraging patterns. The potential for swift parrot occurrence in the locality is acknowledged, however, the relative importance of the vegetation within the referral area to support swift parrot is considered reduced based on the abundance of foraging resources in the locality that are protected and the quality of potential foraging resources within the referral area.

The quality and importance of foraging habitat has been considered based on landscape and contextual factors and on an assessment of *in situ* values within the referral area.

<u>Context factors</u>

Potential foraging habitat is considered abundant within the landscape and SEQ generally. Within a 5 km and 20 km radius surrounding the referral area, foraging resources are abundant and are predominantly located within contiguous habitat areas located within the Flinders-Karawatha Bioregional Corridor that includes White Rock Conservation Park and the Greenbank Military Training Area (refer **Plan A20**). Mapped swift parrot foraging habitat within SEQ is mapped in **Plan A21** identifying a large volume of potential habitat across the region.

<u>On-site factors</u>

The habitat quality of the referral area for swift parrot has been assessed through multiple quantitative and qualitative means including counting winter flowering trees, large foraging trees, recording flowering tree locations where observed.

Of particular importance to the life cycle of swift parrots are large eucalypt specimens due to their greater capacity to supply foraging resources. Due to historical land management practices, the presence of large

trees is limited. An analysis of the habitat quality transect data indicates that the average number of large trees per hectare is 6 for RE12.9-10.19 and 9 for RE12.9-10.3. The benchmark large trees per hectare for the 'remnant' vegetation communities as per the Queensland Herbarium Benchmark guideline is 66 for RE12.9-10.19 and 26 for RE12.9-10.3 As such, the vegetation communities within the proposed action area meet approximately 9% and 34% of the large tree benchmark for the RE12.9-10.19 and RE12.9-10.3, respectively. This data indicates that although the vegetation communities on-site contain potential foraging species for the swift parrot, the preference of the species to forage in large, mature trees therefore limits the availability of preferred habitat on-site.

Specific surveys were completed during winter of 2020 to assess potential presence of the swift parrot and also an assessment of the suitability of foraging resources, specifically the relative capacity of the referral area to support foraging activity. The volume of flowering resources that would be available for foraging was estimated based on data extrapolated from a series of survey plots. A total of 23 10 x 10 metre plots were established across the referral area whereby the numbering of trees, their species and an assessment of whether the trees were flowering or not was recorded on 22nd of July 2020.

The survey identified zero flowering eucalypts within plots which predominantly included species that are known to flower in winter months (refer **Attachment A5** for complete data). It was also noted at habitat quality transects 1 to 6 which were also completed in July 2020 that there were no flowering eucalypts recorded at any of the transect locations at time of survey. The poor flowering capacity is possibly attributed to the lack of old growth trees or hydrology of the site, with flowering more frequently observed within fertile areas such as within waterway corridors. Based on this assessment, it is considered that the capacity of potential foraging habitat within the referral area is limited relative to contiguous habitat areas within the locality.

In November 2022, 10 20 x 20 m assessment plots were completed to describe the foraging habitat irrespective of seasonal flowering, in particular the frequency of tree sizes to determine the capacity for flowering. Data on individual trees was recorded including the species, size and presence of regenerating trees. Key findings included that four trees out of 114 were recorded with a diameter at breast height (DBH) above 500 mm which are considered higher quality foraging habitat with DBHs of 610, 625, 670 and 695 mm. Out of a total of 114 trees recorded across the 10 plots the median DBH was 210 mm within the T1 (canopy layer). Refer to **Attachment A5** for raw data.

d) Information detailing known populations or recorded within at least five kilometres of the development footprint and (if known) the size of these populations.

There are recorded sightings of the swift parrot within 5 km of the referral area (refer **Plan A20**). The most recent sighting is June 2019 and is located at Springfield Lakes area. All other recorded sightings within the region since 2000 are more than 8 km from the referral area. The swift parrot occurs as a single migratory population with breeding occurring in Tasmania and foraging on the Australian mainland. Time spent on the Australian mainland is temporally limited to the foraging season (*i.e.,* winter months) and the documented and potential distribution is spatially quite broad, predominantly encompassing New South Wales and Victoria foraging habitat with some reach into Queensland. Occurrence is limited to flocks or pairs within the foraging range.

The lack of recorded sightings within the locality since the year 2000 may be attributed to the relationship between observers and potential habitat areas. It is likely that potential occurrence of swift parrot within the broader locality is confined to habitat areas within the extensive Flinders-Karawatha Bioregional Corridor and White Rock Conservation Park where the chance of observation is inherently limited. Springfield Lakes is a highly frequented area therefore increasing the chance of incidental observation. Notably, over 50 hours of targeted meander surveys for swift parrot were completed within the referral area in June/July 2020 which did not detect the species.

e) An assessment of the adequacy of any surveys undertaken (including survey effort and timing). In particular, the extent to which these surveys were appropriate for the species and undertaken in accordance with the relevant survey guidelines.

Detailed ecological surveys have been completed within project area and adjoining areas by SHG ecologists to assess potential presence of the swift parrot and assessment of habitat values.

A summary of field survey dates is provided in **Table A12** below. Refer to **Section 2.4.3** for full field survey effort.

Table A12: Summary of swift parrot field survey dates

Survey date	Temperature data	Rainfall data	Methods applied	Survey effort
2020				
29 June 2020	5.2°C min 22.0°C max	– 0.4 mm	Crepuscular bird meander surveys – dawn and dusk	6 hours
30 June 2020	4.7°C min 21.7°C max	– 0.2 mm	Crepuscular bird meander surveys – dawn and dusk	6 hours
2 July 2020	6.5°C min 23.8°C max	– 0 mm	Crepuscular bird meander surveys – dawn and dusk	6 hours
3 July 2020	8.2°C min 25.2°C max	– 0 mm	Crepuscular bird meander survey – dawn	3 hours
27 July 2020	10.9°C min 19.1°C max	– 1.4 mm	Crepuscular bird meander surveys – dawn and dusk, flowering tree 10 x 10 metre plots	6 hours + diurnal incidental surveys during flowering tree assessments
28 July 2020	8.3°C min 21.6°C max	– 0 mm	Crepuscular bird meander surveys – dawn and dusk	6 hours
29 July 2020	2.7°C min 23.2°C max	– 0 mm	Crepuscular bird meander surveys – dawn and dusk	6 hours
30 July 2020	4.5°C min 23.4°C max	– 0 mm	Crepuscular bird meander surveys – dawn and dusk	6 hours
31 July 2020	5.3°C min 22.4°C max	– 0 mm	Crepuscular bird meander surveys – dawn and dusk	6 hours

Survey date	Temperature data	Rainfall data	Methods applied	Survey effort
2022				
23 November 2022	14.0°C min – 28.0°C max	0 mm	Stem density assessment plots – foraging habitat assessment for threatened bird species	N/A
24 November 2022	11.4°C min – 29.9°C max	0 mm	Stem density assessment plots – foraging habitat assessment for threatened bird species	N/A

Targeted and opportunistic surveys have been undertaken across the referral area and in adjacent land. Targeted area searches were completed in winter, from 29th June to 3rd July 2020, and again from 27th July to 31st July 2020, inclusive. Targeted area searches involved walking meanders in the early morning and afternoon when birds are most active and vocal, and targeted areas where flowering eucalypts were present, where possible. Survey methodology was generally in accordance with the recommended methodology detailed in *Survey guidelines for Australia's threatened birds*, specific to the swift parrot.

This involved listening for the calls and recording species observed or heard. A series of 10 x 10 m and 20 x 20 m assessments plots were completed to quantify flowering winter eucalypt species present were completed on 22nd July 2020 (winter) and 23rd and 24th November 2022 (summer) which involved recording the number and species of eucalypt species that were flowering.

The survey effort is shown in **Plan A22** and the raw data for assessment plots is provided in **Attachment A5**.

2.3.5 Regent honeyeater (*Anthochaera phrygia*)

a) Information on the abundance, distribution, ecology and habitat preference of the species or communities.

Distribution

The regent honeyeater is endemic to mainland south-eastern Australia. It has a patchy distribution which extends from south-east Queensland, through New South Wales (NSW) and the Australian Capital Territory (ACT), to central Victoria. Records are widely distributed across its range, but it is only found regularly at a few localities in NSW and Victoria where most of the sightings have been recorded. There are four known key breeding areas: three in NSW and one in Victoria.

The species range and numbers have contracted greatly since about the 1940s. It previously ranged from near Rockhampton in Queensland to Wilmington in South Australia. It was last recorded in South Australia in 1977 and is now probably extinct in that state. There were reports of 'immense' numbers and 'very large flocks' in the early 20th century, but flocks of more than 30 birds are now uncommon.

Habitat and Ecology

The species mostly inhabits inland slopes of the Great Dividing Range, in areas of low to moderate relief with moist, fertile soils. It is most commonly associated with box-ironbark eucalypt woodland and dry sclerophyll forest, but also inhabits riparian vegetation such as sheoak (*Casuarina* sp.) where it feeds on needle-leaved mistletoe and sometimes breeds. It sometimes utilises lowland coastal forest, which may act as a refuge when its usual habitat is affected by drought. It also uses a range of other habitats including remnant patches in farmland and urban areas, roadside reserves and travelling stock routes.

The regent honeyeater's diet primarily consists of nectar, however, also includes invertebrates (mostly insects) and their exudates (e.g. lerps and honeydew), and occasionally fruit. Its time spent foraging for nectar ranges from 10% to 90% depending on availability. It obtains nectar chiefly from eucalypts and mistletoe and appears reliant on select species which provide reliable nectar flows. It prefers taller and larger diameter trees for foraging, as these typically produce more nectar. Preferred foraging tree species for the regent honeyeater include *Eucalyptus sideroxylon, Eucalyptus melliodora, Eucalyptus albens, Eucalyptus leucoxylon, Corymbia maculata/citriodora, Eucalyptus robusta*. Mistletoe species important for foraging include *Amyema cambagei*, *A. miquelii* and *Dendropthoe vitellina* (DoE, 2016).

The species' movement patterns are thought to be governed by the flowering of select eucalypt species. It is nomadic and partly migratory, with some predictable seasonal movements observed. The species is highly mobile and capable of travelling large distances; however, the regularity and extent of long-distance movements are unknown. Aggregations historically occurred at nectar sources, mostly during autumn and winter, but these events are now rare. The species roosts communally in small groups or large flocks, in trees with dense foliage. Foraging trees are rarely used as roosting sites.

b) *Quantification of the extent of habitat and (if known) the number of individuals present, or historical patterns of use on, and surrounding, the development footprint (including maps identifying known or potential habitat.*

As described under item (i) above, regent honeyeater habitat within SEQ is limited to foraging resources as their occurrence on the Australian mainland, and therefore in SEQ, is dictated by seasonal dispersal patterns to support the foraging part of their life cycle which only occurs during winter months.

Foraging resources may include winter flowering eucalypt trees. Potential habitat for the regent honeyeater may include winter flowering foraging species. Within the referral area this includes *C. citriodora*, *E. tereticornis*, *E. crebra*, *E. siderophloia*, *E. moluccana* and *E. fibrosa*. Only one (1) preferred foraging species listed under the National Recovery Plan for the Regent Honeyeater (DoE, 2016) is present within the referral area being *C. citriodora*/*C. maculata*. As the referral area contains preferred foraging trees, it is considered to contain critical habitat for the regent honeyeater which is identified on **Plan A19**.

A review of the available potential and known foraging habitat in the surrounding area is provided in **Plan A24** through utilising the regional ecosystem mapping and analysing the aerial imagery.

c) *Assessment of quality and importance of known potential habitat for the species or communities within the proposed action site and surrounding areas.*

The potential for regent honeyeater to occur in South East Queensland and the broader locality is likely which is supported by the presence of records in the locality within the past five years and the habitat destruction that resulted from the 2019 / 2020 bushfires in the southern portion of the foraging range which may lead to a potential shift in foraging patterns. The potential for regent honeyeater occurrence in the locality is acknowledged, however, the relative importance of the vegetation within the referral area to support the species is considered reduced based on the abundance of foraging resources in the locality that are protected compared to the quality and abundance of preferred foraging resources within the referral area, examinedfurther below.

The quality and importance of foraging habitat has been considered based on landscape and contextual factors and on an assessment of *in situ* values within the referral area.

<u>Context factors</u>

Potential foraging habitat is considered abundant within the landscape and SEQ generally. Within a 5 km and 20 km radius surrounding the referral area, foraging resources are abundant and are predominantly located within contiguous habitat areas located within the Flinders-Karawatha Bioregional Corridor that includes White Rock Conservation Park and the Greenbank Military Training Area (refer **Plan A24**).

Mapped regent honeyeater foraging habitat within SEQ is mapped in **Plan A21** identifying a large volume of potential habitat across the region connected via regional corridors.

On-site factors

The habitat quality of the referral area for the regent honeyeater has been assessed through multiple quantitative and qualitative means including counting winter flowering trees, large foraging trees and recording flowering tree locations where observed.

Of particular importance to the species' life cycle are large eucalypt specimens of these species due to their greater capacity to supply foraging resources. Due to historical land management practices, the presence of large trees is limited across the referral area. An analysis of the habitat quality transect data indicates that the average number of large trees per hectare is 6 for RE12.9-10.19 and 9 for RE12.9-10.3. The benchmark large trees per hectare for the 'remnant' vegetation communities as per the Queensland Herbarium Benchmark guideline is 66 for RE12.9-10.19 and 26 for RE12.9-10.3 As such, the vegetation communities within the proposed action area meet approximately 9% and 34% of the large tree benchmark for the RE12.9-10.19 and RE12.9-10.3, respectively. This data indicates that although the vegetation communities on-site contain potential foraging species for the regent honeyeater, the preference of the species to forage in large, mature trees therefore limits the availability of preferred habitat on-site.

Specific surveys were completed during winter of 2020 to assess potential presence of the regent honeyeater and to assess the suitability of foraging resources, specifically the relative capacity of the referral area to support foraging activity. The volume of flowering resources that would be available for foraging was estimated based on data extrapolated from a series of survey plots. A total of 23 10 x 10 metre plots were established across the referral area whereby the numbering of trees, their species and an assessment of whether the trees were flowering or not was recorded on 22nd July 2020.

The survey identified zero flowering eucalypts within plots which predominantly included species that are known to flower in winter months (refer **Attachment A5** for complete data). It was also noted at habitat quality transects 1 to 6 which were also completed in July 2020 that there were no flowering eucalypts recorded at any of the transect locations at time of survey. The poor flowering capacity is possibly attributed to the lack of old growth trees or hydrology of the site, with flowering more frequently observed within the more fertile areas associated with the adjoining waterways. Based on this assessment, it is considered that the capacity of potential foraging habitat within the referral area is highly limited.

In November 2022, 10 20 x 20 m assessment plots were completed to describe the foraging habitat irrespective of seasonal flowering, in particular the frequency of tree sizes to determine the capacity for flowering. Data on individual trees was recorded including the species, size and presence of regenerating trees. Key findings included that four trees out of 114 were recorded with a diameter at breast height (DBH) above 500 mm which are considered higher quality foraging habitat with DBHs of 610, 625, 670 and 695 mm. Out of a total of 114 trees recorded across the 10 plots the median DBH was 210 mm within the T1 (canopy layer). Refer to **Attachment A5** for raw data.

It is also noted that regent honeyeaters prefer the wettest, most fertile sites within box-ironbark associations such as along creek flats, broad river valleys and foothills. Sub-optimal habitat based on preferred vegetation composition was recorded in association with gully lines and sloping hillsides. Given the superior mobility capacity of the species and abundance of preferential habitat within close proximity of the referral area

(Greenbank Military Training Area and White Rock Conservation Park located within the Flinders-Karawatha Corridor), potential foraging habitat on-site is not considered of a significant or high quality.

d) *Information detailing known populations or recorded within at least five kilometres of the development footprint and (if known) the size of these populations.*

There are recorded sightings of the regent honeyeater within 5 km of the referral area, however, are limited (refer **Plan A24**). This most recent sighting is dated June 2019, located at Springfield Lakes.

The lack of recorded sightings through public databases within the locality since the year 2000 may be attributed to the relationship between presence of potential observers and potential habitat areas. It is likely that regent honeyeaters would predominantly occur within habitat areas located within the extensive Flinders-Karawatha Bioregional Corridor and White Rock Conservation Park due to the higher quality habitat and where the chance of observation is inherently limited. Springfield Lakes is a highly frequented area therefore increasing the chance of incidental observation.

In addition, due to the sensitivity of this species, the Queensland Department of Environment and Science do not release official record details of this species. As such, many of the publicly available records are generalised and not shown in the actual area of sighting. Subsequently, it is not possible to obtain an accurate indication of where this species has occurred in the local area from publicly available data and populations are unknown.

It is thought that the regent honeyeater comprises one population (DoE, 2016) which breeds exclusively its southern distribution. Population information and activity within SEQ is unknown and may be limited to vagrant individuals.

e) *An assessment of the adequacy of any surveys undertaken (including survey effort and timing). In particular, the extent to which these surveys were appropriate for the species and undertaken in accordance with the relevant survey guidelines.*

Extensive field effort has been completed within the referral area to determine species' presence and usage of the site. Over 50 hours of targeted meander surveys for regent honeyeater were completed within the referral area in June/July 2020 which did not detect the species.

Detailed ecological surveys have been completed within the project area and adjoining areas by SHG ecologists to assess potential presence of the regent honeyeater and assessment of habitat values. A summary of field survey dates is provided in **Table A13** below. Refer to **Section 2.4.3** for full field survey effort.

Table A13: Summary of regent honeyeater field survey dates

Survey date	Temperature data	Rainfall data	Methods applied	Survey effort
2020				
29 June 2020	5.2°C min – 22.0°C max	0.4 mm	Crepuscular bird meander surveys – dawn and dusk	6 hours

Survey date	Temperature data	Rainfall data	Methods applied	Survey effort
30 June 2020	4.7°C min 21.7°C max	– 0.2 mm	Crepuscular bird meander surveys – dawn and dusk	6 hours
2 July 2020	6.5°C min 23.8°C max	– 0 mm	Crepuscular bird meander surveys – dawn and dusk	6 hours
3 July 2020	8.2°C min 25.2°C max	– 0 mm	Crepuscular bird meander survey – dawn	3 hours
27 July 2020	10.9°C min 19.1°C max	– 1.4 mm	Crepuscular bird meander surveys – dawn and dusk, flowering tree 10 x 10 metre plots	6 hours + diurnal incidental surveys during flowering tree assessments
28 July 2020	8.3°C min 21.6°C max	– 0 mm	Crepuscular bird meander surveys – dawn and dusk	6 hours
29 July 2020	2.7°C min 23.2°C max	– 0 mm	Crepuscular bird meander surveys – dawn and dusk	6 hours
30 July 2020	4.5°C min 23.4°C max	– 0 mm	Crepuscular bird meander surveys – dawn and dusk	6 hours
31 July 2020	5.3°C min 22.4°C max	– 0 mm	Crepuscular bird meander surveys – dawn and dusk	6 hours
2022				
23 November 2022	14.0°C min 28.0°C max	– 0 mm	Stem density assessment plots – foraging habitat assessment for threatened bird species	N/A
24 November 2022	11.4°C min 29.9°C max	– 0 mm	Stem density assessment plots – foraging habitat assessment for threatened bird species	N/A

Targeted and opportunistic surveys have been undertaken across the referral area and in adjacent land. Targeted area searches were completed in winter, from 29th June to 3rd July 2020, and again from 27th July to 31st July 2020, inclusive. Targeted area searches involved walking meanders in the early morning and afternoon when birds are most active and vocal, and targeted areas where flowering eucalypts were present, where possible. Survey methodology was generally in accordance with the recommended methodology detailed in *Survey guidelines for Australia's threatened birds*, specific to regent honeyeater detection.

This involved listening for the calls and recording species observed or heard. A series of 10 x 10 m and 20 x 20 m assessments plots were completed to quantify flowering winter eucalypt species present were completed on 22nd July 2020 (winter) and 23rd and 24th November 2022 (summer) which involved recording the number and species of eucalypt species that were flowering.

The survey effort is shown in **Plan A22** and the raw data for assessment plots is provided in **Attachment A5**.

2.3.6 Greater glider (*Petauroides volans*)

a) Information on the abundance, distribution, ecology and habitat preference of the species or communities.

Distribution

The greater glider is restricted to eastern Australia, occurring from the Windsor Tableland in north Queensland through to central Victoria (Wombat State Forest), with an elevational range from sea level to 1200 m above sea level.

Habitat and Ecology

The greater glider is an arboreal nocturnal marsupial, largely restricted to eucalypt forest and woodlands. It is primarily folivorous with a diet mostly comprising of eucalypt leaves and occasionally flowers. It is typically found in highest abundance in taller, montane, moist eucalypt forests with relatively old trees and abundant hollows. The species favours forests with a diversity of eucalypt species, due to seasonal variation in its preferred tree species.

During the day it shelters in tree hollows, with a particular preference for large hollows in large, old growth trees (Smith *et al.,* 2007). The species is considered to be particularly sensitive to forest clearance and intensive logging practices (Kavanagh & Wheeler, 2004). Consequently, greater gliders have relatively low persistence in small forest fragments and disperse poorly across vegetation that is not native forest. Modelling suggest that they require native forest patches of at least 160 km^2 to maintain viable populations (Eyre, 2002).

b) Quantification of the extent of habitat and (if known) the number of individuals present, or historical patterns of use on, and surrounding, the development footprint (including maps identifying known or potential habitat.

The site is located within a large, fragmented patch of remnant eucalypt vegetation located in the emerging and well-established City of Springfield. The action proposes medium and standard density residential development being adjacent to the City Centre, schools, train station, other critical infrastructure and amenities. At the regional scale, the area is not included in any State mapped ecological corridors under the *ShapingSEQ 2017* and therefore is not supported by ecological land uses for broader connectivity. Locally, the vegetation on-site retains a degree of landscape connection as set out in the open space provisions of the Springfield Structure Plan including areas like the Brookwater Golf Course and adjoining creek corridors including O'Dwyer's Gully, Opossum Creek and Woogaroo Creek. The connecting areas are predominantly comprised of lineal strands of retained vegetation, trees in parkland settings, newly rehabilitated vegetation which limit movement and persistence opportunities of the disturbance-sensitive greater glider.

Where connected lineal vegetation appears to occur within identified linkages to the proposed action site, area plans in this submission show corridors are a mix of non-remnant, regrowth or remnant vegetation mapped under the *Vegetation Management Act 1999* and vary in width from 15 m at the narrowest points up to 100 m in less disturbed areas (refer **Plan A25**). Corridor linkages are intersected and severed at multiple locations by major infrastructure including the Springfield Line rail corridor and major or minor roads, with the most significant of these being the Centenary Highway (refer **Plan A26**).

Greater glider records available on public databases (*i.e.,* Atlas of Living Australia) within the past 5 to 10 years are almost exclusively located within large, connected tracts of remnant bushland, near or with direct connectivity to State Government Protected Estates and National Parks (refer **Plan A27**). The exception to this is a record recently published in late 2024 (dated August 2023) shown as occurring on the First Nine Project site which was cleared in accordance with EPBC 2016/7676 in 2020. The validity of the record was queried with ALA and iNaturalist who confirmed the original coordinate was obfuscated due to its sensitive nature. The publicly available positional accuracy was increased to a 0.2 x 0.2 degree cell (29 km area) and the coordinate was replaced with a random point within that cell. The ungeneralised coordinate was provided which confirmed its location within White Rock Conservation Park. Historical records (*i.e.,* pre-2000) are present surrounding the site; however, these records are reflective of a time when the surrounding landscape was predominantly vegetated and well-connected.

Long-term and extensive establishment of housing and supporting infrastructure results in the vegetation patch as being functionally disconnected from the contiguous conservation areas within the locality including the White Rock Conservation Park and Flinders-Karawatha Bioregional Corridor. Under the *Vegetation Management Action 1999*, remnant and regrowth mapped vegetation, used as an indicator of tree age and maturity, within the landscape is reduced to fragments, isolated patches or linear strands which do not connect into the larger tracts of surrounding bushland and remain severed by significant infrastructure (refer **Plan A25**).

Delineating the extent of potential habitat for the greater glider in Queensland is dependent on a number of habitat factors including the presence of suitable regional ecosystems, confirmed records, live and dead hollow-bearing trees for denning and habitat connectivity (Eyre *et al.,* 2022). Greater glider suitable regional ecosystems identified by Eyre *et al.* (2022) are highly fragmented within the surrounding landscape and are restricted to narrow, linear corridors adjoined by urban environments (refer **Plan A28**). Integrating the other habitat factors listed above, it is likely that the potential habitat for greater glider is less extensive than that shown on **Plan A28** which is based on the location of suitable regional ecosystems alone. The vegetation on-site while mapped as remnant vegetation under the VMA, has been historically disturbed through logging and as a result, lacks the density of large, old growth habitat trees required to support the greater glider (refer **Plan A8**). An audit of live and dead hollow-bearing trees within and adjoining the referral area indicates the density of hollows within the assessed area is approximately 1.94 per ha. The former timber harvesting use of the entire Springfield Structure Plan Area is reflected in the Griffith University assessment of mature vegetation age (Norma & Mackey, 2024) (refer **Plan A29**) which identifies the vegetation patch as predominantly 'Young to intermediate Age.'

Using contemporary aerial photography and knowledge of the local area, four (4) potential linkage corridors of connected vegetation have been explored for the potential of supporting greater glider movement (refer plan series at **Plan A30**). A detailed review of these corridors is provided in **Plan A30, 1.1-4.2** which highlights and describes each major barrier and pinch points within each corridor.

The Conservation Advice for the *Petauroides volans* (greater glider (southern and central) – July 5, 2022, notes that '*Greater gliders disperse poorly across vegetation that is not native forest and so do not readily recolonise isolated sites*.' The land on which the project occurs has been subjected to extensive ecological survey by numerous ecological experts and has not been recorded as supporting the greater glider species. Records of

expanding development zones over the past 8 years in Springfield support this finding, with the land providing only marginal aspects of greater glider habitat definitions based on the premise of one day being considered suitable to support the species. For greater gliders to utilise the proposed action site it is considered that recolonisation would need to occur from nearby unconnected Protected Estates and National Parks which would require the species to navigate unconnected fragments of immature vegetation, cross multiple major infrastructure corridors, navigate narrow (15 m) compromised pinch points directly adjacent to housing and roads to ultimately persist in an environment of ever-expanding city infrastructure and housing.

Based on the analysis provided, it is considered unlikely that recolonisation of this area of bushland would occur.

c) *Assessment of quality and importance of known potential habitat for the species or communities within the proposed action site and surrounding areas.*

An assessment of the quality and importance of habitat on and surrounding the site is also provided in b) above.

d) *Information detailing known populations or recorded within at least five kilometres of the development footprint and (if known) the size of these populations.*

Contiguous vegetation areas known to support the greater glider are present within 5 km of the site outside of the urban landscape in which in the site is located. Greater gliders are known to occur within nearby contiguous vegetation areas including Greenbank Military Training Area located approximately 2.3 km east of the site and within White Rock Conservation Park are located 3.6 km south-west of the site (refer **Plan A27**). The size of the population is not known. Historical records (*i.e.,* pre-2000) are present surrounding the site; however, these records are reflective of a time when the surrounding landscape was predominantly vegetated and well-connected.

e) *An assessment of the adequacy of any surveys undertaken (including survey effort and timing). In particular, the extent to which these surveys were appropriate for the species and undertaken in accordance with the relevant survey guidelines.*

Surveys targeting greater glider included recording hollow-bearing trees within and adjoining the referral area, spotlighting completed in accordance with the relevant survey guidelines and UAV drone surveys. Refer to **Table A14** below for a summary of relevant survey dates and methodologies applied targeting greater glider. Further details of each survey methodology are provided in the subsections below.

Table A14: Summary of greater glider field survey dates

Survey date	Temperature data	Rainfall data	Methods applied
11 March 2019	20.7°C min – 37.9°C max	0 mm	Spotlighting, ultrasonic bat call detection, vegetation and flora ground-truthing surveys, search for flying-fox roosts within and adjoining referral area

Survey date	Temperature data	Rainfall data	Methods applied
13 March 2019	18.1°C min – 36.4°C max	0 mm	Spotlighting, ultrasonic bat call detection
31 July 2023	7.4°C min – 27.9°C max	0 mm	GPS locate habitat features and significant habitat trees
1 August 2023	7.5°C min – 27.2°C max	0 mm	GPS locate habitat features and significant habitat trees
2 August 2023	10.9°C min – 24.4°C max	0 mm	Spotlighting, GPS locate habitat features and significant habitat trees
8 August 2023	6.0°C min – 21.5°C max	2.0 mm	Spotlighting
10 August 2023	3.4°C min – 23.9°C max	0.2 mm	Spotlighting
UAV surveys			
26 August 2024	14.4°C min – 30.6°C max	0 mm	Spotlighting and Wildlife Aerial Thermal drone surveys and spotlighting (BAAM Ecological Consultants)
28 August 2024	16.2°C min – 31.6°C max	0 mm	Spotlighting and Wildlife Aerial Thermal drone surveys and spotlighting (BAAM Ecological Consultants)

Detection surveys

Spotlighting surveys targeting greater glider were completed in accordance with the prescribed spotlighting methodology for arboreal mammals within the *Survey Guidelines for Australia's Threatened Mammals* while also meeting the survey standards produced by The Department of Sustainability and Environment (Victoria, Australia), *Approved Survey Standards: Greater Glider Petauroides volans* (May 2011) (version 1.0). These surveys are applied prior to logging and are considered adequate to detect presence of the species. The surveys included identification of large hollow bearing trees and spotlighting transects covering the entire site. No evidence or direct observation of the species was recorded during extensive field surveys, which indicates a low likelihood of the species presence on-site. The Victorian Department of Environment, Land, Water and Planning methodology for greater glider noted in the *Guidance Note: Reporting detections of Greater Gliders* was also reviewed to confirm consistency with survey methodologies.

For spotlighting, the requirement to cover a total distance of as close to 1 km as possible per transect was targeted at a pace of 10 minutes per 100m, as outlined within The Department of Environment, Land, Water and Planning Forest Protection Survey Program *Survey Guideline – Spotlighting and Call Playback* (2020) (version 4.1) and Conservation Regulator Victoria *Guidance Note: Reporting detections of Greater Gliders* (2021). Multiple transects were conducted where necessary to meet the total of 1 km requirement of the guideline. All fauna species observed located in trees during the transects were recorded. This included birds and frogs as well as arboreal mammals. During the spotlighting surveys, hollows were observed with a spotlight and binoculars. In accordance with the *Terrestrial Vertebrate Fauna Survey Guidelines for Queensland* (2022) a high-quality pair of binoculars and 14W spotlight was used to detect arboreal species. High-powered spotlights (Fenix HP25R Rechargeable LED Headlamp – 1000 lumens) were used to detect cryptic and nocturnal fauna.

Five (5) spotlighting meanders were completed on-foot within the referral area by SHG ecologists (refer **Plan A31**) with an additional two (2) completed by BAAM ecologists (refer **Attachment A3**). The greater glider was not detected during these surveys.

Research into the effectiveness of spotlighting in detection for greater glider indicated that where the species is present and sufficient survey effort has been given, detection is highly likely (Eyre, 2006; Lindenmayer *et al.,* 2001a; Kavanagh, 1984). Targeted greater glider surveys involved spotlighting on-foot by two (2) SHG ecologists for approximately 25 person hours across the referral area as per recommended survey guidelines (refer **Plan A31 and Table A15**). Targeted Wildlife Aerial Thermal surveys were also conducted simultaneously by SHG mapping personnel with observations verified on-ground by BAAM ecologists. These surveys involved using RPA (remotely piloted aircraft) equipped with a thermal sensor to detect the presence of greater glider within and adjoining the referral area. The methodology and findings of the wildlife aerial thermal surveys are provided in **Attachment A3.**

Thermal drone surveys are becoming an increasingly used method for detecting greater glider, with recent studies demonstrating detection rates comparable to traditional spotlighting and, in some cases, improved ability to identify individuals across larger and less accessible areas (Wagner et al. 2025; Vinson et al. 2020). Thermal surveys are particularly effective for detecting low-density or widely dispersed populations and can complement ground-based methods by increasing overall survey coverage and reducing the likelihood of false absences (Wagner et al. 2025). However, consistent with current best practice and survey guidance, no single survey technique is considered sufficient in isolation due to inherent detection limitations associated with each method (e.g. canopy obstruction, observer bias, and environmental conditions) (Vinson et al. 2020; Commonwealth of Australia 2013). Accordingly, the combination of best practice survey approaches utilised including thermal drone surveys and spotlighting is considered suitable to detect the species.

The total distance of spotlighting surveys conducted at the site by SHG was 22.06 km across five (5) nights with a survey effort of approximately 750 minutes (refer **Table A15**). Furthermore, as two observers surveyed the site the total duration of surveys is 1,500-person minutes in accordance with *Terrestrial Vertebrate Fauna Survey Guidelines for Queensland* (2022) which is considered sufficient effort to detect the presence of greater glider on-site.

It is considered that the survey effort, timing, and equipment used was appropriate for surveying greater gliders and was undertaken suitably in accordance with the relevant survey guidelines discussed above. Considering that studies have shown that detection of the species is highly likely where sufficient spotlighting survey effort has occurred and the species is present, it is therefore a low likelihood the species is present within the referral area.

Table A15: Greater Glider Survey Guidelines compared to SHG Survey Effort

Transect	Date	Time	Duration	Observers	Distance
Transect 1	11 March 2019	6:30pm – 9:00 pm	150 minutes	Two (300-person minutes)	7.65 km

Transect	Date	Time	Duration	Observers	Distance
Transect 2	13 March 2019	6:30pm – 9:00 pm	150 minutes	Two (300-person minutes)	5.16 km
Transect 3	2 August 2023	6:30pm – 9:00 pm	150 minutes	Two (300-person minutes)	2.19 km
Transect 4	8 August 2023	6:30pm – 9:00 pm	150 minutes	Two (300-person minutes)	2.45 km
Transect 5	10 August 2023	6:30pm – 9:00 pm	150 minutes	Two (300-person minutes)	4.61 km
Total	N /A	N/A	750 minutes		22.06 km
Survey Guidelines (Victoria)	N / A	10 mins per 100 m	1 hr 40 minutes per transect		1 km per transect
Survey Guidelines (Queensland)			30-person minutes		100 m x 100 m survey site, 100 m per transect

Greater glider habitat surveys

As greater gliders require hollow-bearing trees for denning, large trees are considered a suitable proxy for potential habitat as these trees have the potential for forming denning resources into the future (Eyre and Smith *et al.,* 2022).

A tree survey to locate hollow-bearing trees was completed across the referral area and adjoining areas within O'Dwyer's Gully and Opossum Creek. A handheld GPS device (Trimble) is used to record sub-metre accurate locations (in some cases use survey accurate locations), and the following parameters of each tree specimen recorded:

- tree species, via a combination of observations of the gum nuts, buds, leaves, bark and growth form;
- diameter of the trunk of the tree is measured using the standard method of Diameter at Breast Height (DBH);
- height of the tree is measured using a laser rangefinder with three-point measurement capability (inclinometer);
- canopy spread;
- health assessment (canopy, trunk); and
- habitat values (for example, presence and/or number of hollows, nests, termites, scratches, scats).

Fauna spotter catcher data

Fauna Spotter Catcher data has been collated across a large portion of Greater Springfield. The greater glider has never been recorded in any detailed pre- or post-clearance fauna surveys undertaken through the surrounding Springfield City developments, including Springfield Rise (EPBC 2013/7057), Kalina (EPBC 2014/7306), Woogaroo Heights (EPBC 2017/7875) and Brookwater (EPBC 2016/7676) (refer **Attachment A6** for further details). This includes detailed pre-clearance fauna surveys undertaken over much larger approved development areas pre-, during and post-clearing totalling 350 days between October 2016 and March 2026. Notably, the Fauna Spotter Catcher data analysed relates to clearing events that were undertaken when Springfield was much more connected.

2.3.7 White-throated Needletail (*Hirundapus caudacutus*)

a) Information on the abundance, distribution, ecology and habitat preference of the species or communities.

Distribution

White-throated Needletails often occur in large numbers over eastern and northern Australia.

Habitat and Ecology

This species is a non-breeding migrant to Australia, arriving from their breeding grounds in the northern hemisphere in October each year and leaving between May and August.

White-throated Needletails are aerial birds and because of this, it has been stated that conventional habitat descriptions are inapplicable, but there are, nevertheless, certain preferences exhibited by the species. Although they occur over most types of habitat; they are probably recorded most often above wooded areas, including open forest and rainforest, and may also fly between trees or in clearings, below the canopy. They also commonly occur over heathland, but less often over treeless areas, such as grassland or swamps.

White-throated Needletails almost always forage aerially, primarily on insects, at heights up to 'cloud level', above a wide variety of habitats ranging from heavily treed forests to open habitats, such as farmland, heathland or mudflats. White-throated Needletails are known to roost in woodland and forest habitat, amongst canopy or in hollows. The species breeds in the northern hemisphere in wooded lowlands and sparsely vegetated hills, as well as mountains covered with coniferous forests.

b) Quantification of the extent of habitat and (if known) the number of individuals present, or historical patterns of use on, and surrounding, the development footprint (including maps identifying known or potential habitat.

The ALA spatial portal shows several records within the broader landscape, with the closest being approximately 1.9 km south-east within the Springfield Lakes area, recorded in 2018 (refer **Plan A32**). Historical records include one record published in 1990 located approximately 2 km north-west of the site, another in 1990 is located directly south of the site within the Peninsula Precinct (EPBC 2020/8629) and one approximately 3.5 km south of the site within the suburb of Spring Mountain when the landscape was historically much more vegetated.

Vegetation containing potential foraging and roosting habitat for the White-throated Needletail is located on-site. In the broader landscape, higher quality and vast areas of habitat are present within the Greenbank Military Base located 2 km east of the site and White Rock Conservation Park located within the Flinders-Karawatha Corridor approximately 3.5 km south of the site.

Refer to **Plan A32** for known and suitable White-throated Needletail habitat within a 20 km radius of the site, including the location of protected areas and corridors.

c) Assessment of quality and importance of known potential habitat for the species or communities within the proposed action-site and surrounding areas.

The site contains vegetation that is potential foraging and roosting habitat for the White-throated Needletail, however, given the extent of potential habitat in the broader landscape associated with the large areas of nearby protected land including the Greenbank Military Base located approximately 2 km east of the site and White Rock Conservation Park located within the Flinders-Karawatha Corridor approximately 3.5 km south of the site, the small area of habitat on-site is not considered to comprise important habitat for the species.

d) *Information detailing known populations or recorded within at least five kilometres of the development footprint and (if known) the size of these populations.*

Detailed analysis of public database records show several records of White-throated Needletail within 5 km of the project area within the past 20 years (refer **Plan A32**). This is consistent with a broad landscape use across potential habitat.

e) *An assessment of the adequacy of any surveys undertaken (including survey effort and timing). In particular, the extent to which these surveys were appropriate for the species and undertaken in accordance with the relevant survey guidelines.*

Specific surveys targeting the White-throated Needletail were not completed. Available survey methods for the White-throated Needletail generally involve meander surveys and watching the aerial space, however, are documented to be unreliable due to the species' movement patterns. According to the SPRAT profile, the White-throated Needletail has not been well surveyed throughout Australia as it is difficult to conduct systematic surveys due to its mobility and ability to cover huge distances in a day. In the past there have been attempts to survey the species by soliciting and collating sightings from scattered observers at disparate sites throughout the species' range in Australia between 1951 and 1967, and though they were organised, these cannot be considered to have been systematic. It is unlikely that targeted survey efforts would be able to provide more information regarding the species' location on and around the site.

2.3.8 Collared delma (*Delma torquata*)

a) Information on the abundance, distribution, ecology and habitat preference of the species or communities.

Distribution

The collared delma (*Delma torquata*) is a small legless lizard endemic to Queensland and is listed as Vulnerable under both the EPBC Act and the Queensland NCA. The species has a naturally restricted and fragmented distribution within south-east and central Queensland and extending into northern NSW. Records occur primarily within the western suburbs of Brisbane, with additional populations recorded in the Lockyer Valley, Bunya Mountains, Expedition National Park, Blackdown Tableland and other areas of the Brigalow Belt Bioregion (Hines et al. 2000; Peck, 2004; Peck and Hobson, 2007).

The species is considered highly fragmented throughout its range, with populations occurring as isolated clusters associated with suitable rocky woodland habitat. Within the Brisbane region, records are concentrated in Mt Crosby, Moggill State Forest, Pullenvale, Pinjarra Hills, Anstead, Upper Brookfield, Kenmore and surrounding localities. Surveys have demonstrated that suitable habitat may support relatively localised populations, and the patchy distribution of rocky refugia is considered a key factor influencing the species' occurrence.

The collared delma is recognised as a sedentary species with limited dispersal capability and high site fidelity. Consequently, further habitat fragmentation and habitat removal presents a significant threat to population persistence, with many known populations occupying relatively small and isolated habitat patches of approximately 100 m x 100 m (Peck, 2004).

Habitat and Ecology

The collared delma inhabits eucalypt-dominated woodland and open forest communities, typically associated with relatively undisturbed ridges and slopes containing rocky outcrops or scattered surface rocks on Land Zones 3, 9 and 10 (DCCEEW, 2026), usually with a westerly aspect (Peck, 2003). The species is generally associated with dry open forest communities with potential preference for certain vegetation types such as *Eucalyptus populnea* (poplar box) and *Eucalyptus crebra* (narrow-leaved ironbark) dominated woodlands. In the Toowoomba Range suitable habitat is commonly associated with exposed rocky outcrops on ridges or slopes in vegetation communities dominated by *Eucalyptus crebra* (narrow-leaved ironbark) and *Corymbia citriodora* (spotted gum). Recognised habitat characteristics associated with vegetation types for the region west of Brisbane consists of a mid-storey of *Alphitonia excelsa* (soap tree), *Acacia* species, *Lophostemon confertus* (brush box) and *Hovea longifolia* (Hovea). Preferred habitat typically contains an open mid-storey, a grassy understorey dominated by native grasses such as *Themeda triandra* (kangaroo grass) and *Cymbopogon refractus* (barbed-wire grass), and a well-developed leaf litter layer.

A defining habitat feature for the species is the presence of exposed rocks in direct contact with the soil surface. These rocks provide essential shelter, thermoregulatory sites and protection from predators. The species is most frequently recorded beneath small to medium-sized rocks, fallen timber and leaf litter. Western Brisbane populations have been recorded on stony lithosols with exposed quartzite ridges and on basalt-derived soils containing abundant surface rocks. A preference for larger sized rocks was noted by Porter (1998) in a study of the Mt Crosby population with average rock sizes of rocks utilised by lizards of 172 cm. The

presence of rocks, logs, bark and other coarse woody debris, and mats of leaf litter (typically 30–100 mm thick) appears to be an essential characteristic of the Collared Delma microhabitat and is always present where the species occurs (DCCEEW, 2026). This may be the limiting factor for the Collared Delma recolonising in recently burnt areas (Peck, 2003). Habitat quality may be reduced where weeds, particularly Creeping Lantana (*Lantana montevidensis*), obscure or replace rock refugia.

The collared delma is insectivorous and feeds primarily on small invertebrates, including cockroaches, crickets and potentially subterranean termites (Peck, 2004). The species is cryptic and spends much of its time sheltering beneath rocks and within leaf litter, making detection difficult during field surveys. Available information indicates that populations occur at relatively low densities and individuals exhibit strong site fidelity (Porter, 1998). Recapture studies have recorded individuals beneath the same rocks over extended periods, while movements between capture events have generally been less than 20 metres, indicating small home ranges and limited dispersal capacity (Porter, 1998).

The principal threats to the species are habitat loss, fragmentation and degradation associated with urban expansion, infrastructure development and agricultural activities. Removal of surface rocks, inappropriate fire regimes and weed invasion, particularly *Lantana montevidensis* (Creeping Lantana) are also recognised threats due to their potential to reduce the availability and quality of critical shelter and foraging habitat. Given the species' limited mobility, fragmented distribution and dependence on specific microhabitat features, the collared delma is particularly sensitive to habitat disturbance.

b) *Quantification of the extent of habitat and (if known) the number of individuals present, or historical patterns of use on, and surrounding, the development footprint (including maps identifying known or potential habitat.*

The site is located within a large, fragmented patch of eucalypt dominated woodland located on Land Zones 9-10. Within the referral area, the dominant Land Zone is 9-10 with vegetation communities including RE12.9-10.19 and RE12.9-10.3 with a small area of RE12.9-10.15. It is noted that the dominant vegetation community on-site is *E. fibrosa* (broad-leaved ironbark) which does not align with the species' key canopy tree preferences. *Corymbia citridora* (spotted gum) and *E. crebra* (narrow-leaved ironbark) are present as scattered trees or isolated patches.

Land Zone 3 is dominant within the surrounding creek line systems of Opossum Creek and Woogaroo Creek with patches of Land Zone 9-10 containing composite vegetation communities (refer **Plan A33**). The site and immediate surrounding areas contain broad vegetation types that are consistent with the broad macrohabitat requirements for the collared delma. Similar vegetation community types are found within the broader locality of Greater Springfield and surrounds and includes urban fragments, waterway corridors and vegetation reserves such as White Rock-Spring Mountain Conservation Park and Greenbank Military Training Area (refer **Plan A34**).

While Greater Springfield contains broad vegetation types suitable to support the collared delma, species occurrence is dependent on the presence of suitable microhabitat, including sloping rocky outcrops or scattered rocks and dense mats of leaf litter. The referral area contains scattered areas of potential habitat including sloping ridgelines and rocky outcrops.

c) Assessment of quality and importance of known potential habitat for the species or communities within the proposed action-site and surrounding areas.

The referral area and immediate surrounding areas including where the patch continues to the south, and adjoining creek line areas contain broad vegetation characteristics suitable for the collared delma (i.e., Land Zones 9, 10 and 3 and open eucalypt vegetation) (refer **Plan A34**). Surveys completed by SH on 22nd June 2026 identified scattered microhabitat areas across the referral area which were shown to vary in quality and extent. Microhabitat characteristics which were searched for included rocky outcrops and sloping rocky areas, coarse woody debris, leaf litter and native grass tussocks and most notably medium-sized surface rocks (100-200 cm in diameter) which are considered a key microhabitat resource (Porter, 1998). The site contains a number of exposed bedrock sites, however, are not frequently accompanied by medium-sized rocks with small surface rocks (<30 cm) being the most dominant.

Additionally, the collared delma is known to be particularly sensitive to fire disturbance due to their sedentary nature and low dispersal capability (DEWHA, 2008). Inappropriate bushfire regimes are damaging as they are known to deplete critical habitat attributes, shelter and availability of invertebrate prey needed for the species to survive. The vegetation within the referral area, broader patch and large parts of Greater Springfield were affected by a large, unplanned wildfire in September 1994 as shown by Queensland fire scar mapping (refer **Figure A7**). The September 1994 wildfires occurred as part of major outbreaks across a number of South East Queensland local government areas. Unplanned wildfires are typically hot and sweep through the landscape quickly and as a result deplete woody debris, vegetation and insects more readily and for a longer time. While these attributes have been progressively replenished throughout the site, the species' potential for recolonisation is limited and presence of resources do not equate to presence. Additionally, the following years would see progressive development commence in the adjoining suburb of Camira, hindering potential recolonisation.

Patterns of appropriate fire use have also been recorded in the locality, conducted by ICC and QFES. Notably, a series of hazard reduction burns were carried out in White Rock Conservation Area and White Rock-Spring Mountain Conservation Estate in October 2012 (refer **Figure A8**). These hazard reduction burns employed cool burn techniques and a mosaic pattern to reduce intensity and scale and preserve patches of the landscape and habitat values, unlike the 1994 fires which were uncontrolled, high intensity and broad sweeping.

The Springfield locality including the referral area have been subject to previous assessments of collared delma by ecological consultants Cardno and Austecology which similarly confirm the presence of microhabitat areas, however, indicate a pattern of low or marginal quality habitat. The Austecology report (2013) which surveyed microhabitats in a 300-ha study area in Spring Mountain in April 2013 stated "Whilst microhabitats known to be used by the Collared Delma are patchily distributed across the site, they are not abundant and the diversity of such microhabitats is not high at any of the potential target survey areas. Furthermore, a moderate to dense tussock grass cover, also regarded as an important microhabitat resource, is not a feature of any of the survey sites (attaining a moderate foliage projection cover at best)." The Cardno study which focused on habitat within the referral area concluded "Despite extensive searches, it is unlikely the species occurs within the Study Area owing to the scarcity of habitat, historic disturbance and lack of local records."

It is considered that the historical high-intensity bushfire disturbance and the subsequent removal of vegetation communities in the surrounding areas indicates a reduced likelihood that the site currently supports a resident population due to the species' limited capacity to recolonise historically disturbed areas, particularly in a locality where the species has not been documented previously.

d) Information detailing known populations or recorded within at least five kilometres of the development footprint and (if known) the size of these populations.

The collared delma's distribution is comprised of fragmented populations within a relatively restricted range. Within the Brisbane-Ipswich region confirmed areas of occurrence are predominantly concentrated within the western suburbs of Brisbane, from approximately 10 km north of the referral area and north of the Brisbane River. The population sizes are generally unknown, however, the Mt Crosby population which has been subject to extensive study confirmed the presence of 39 individuals (DCCEEW, 2026).

Records of the collared delma within the Ipswich locality and surrounding the referral area are notably sparse. One record dated April 2023 is located 5.5 km south-west of the referral area within White Rock Conservation Park. It is noted the record metadata indicates the location has been generalised to a 29.7 km grid located over parts of Ipswich, Logan and Brisbane city suburbs, however, the approximate location was confirmed to be within the contiguous vegetation areas of White Rock and Spring Mountain.

Outside of the confirmed record, a population of collared delma has not been documented within the Ipswich region despite the presence of suitable vegetation communities. Targeted surveys have been carried out by ecological consultants previously within the referral area specifically and areas of Greater Springfield. Cardno completed an extensive collared delma survey within the referral area in 2014 as part of the assessment for EPBC 2014/7306 and included identification and delineation of potential microhabitat, and completion of active searches and pitfall trapping to detect presence (Cardno, 2014). Despite the presence of microhabitat attributes, no collared delmas were detected as part of these surveys. Additionally, targeted collared delma surveys were completed by Austecology in 2013 across a 300-ha study area as part of ecological assessments completed for the masterplanned development Springfield Rise (EPBC 2013/7057) which similarly did not detect the species with the assessment concluding that microhabitats were of a low quality (Austecology, 2013). Both reports are publicly available through the EPBC Act Public Portal.

The lack of historical records of collared delma within Ipswich, and more specifically, Greater Springfield is noteworthy when considering the dominance of macrohabitat. It is however noted that research and survey efforts within the region have been markedly less than within the suburbs of western Brisbane, which have been the focus of ongoing monitoring and restoration efforts by local bush care groups due to it being a known stronghold for the species.

e) An assessment of the adequacy of any surveys undertaken (including survey effort and timing). In particular, the extent to which these surveys were appropriate for the species and undertaken in accordance with the relevant survey guidelines.

Historical surveys

The history of targeted surveys encompassing large areas of Springfield including the referral area with no evidence of presence documented, is considered a relevant consideration for this assessment, largely due to the species' ecology and element of repeat surveys across time. Noting the collared delma's sedentary nature, sensitivity to disturbance and low recolonisation potential, the lack of recorded presence both from the ecological surveys completed and public records suggests a low potential for persistence in a landscape where records are already sparse to absent and disturbance associated with vegetation clearing for development has all but expanded.

Survey guidelines generally agree that optimal survey timing is during the spring or broadly from September to late March when conditions are warm and maximum temperatures are greater than 25°C (DCCEEW, 2023; DSEWPaC 2011c), therefore timing being autumn is considered appropriate. Active searching is generally considered more effective at locating the species than other methods such as pitfall trapping based on multiple studies (DSEWPaC, 2011c). A minimum of three survey days incorporating repeat surveys is recommended as a minimum survey effort (DCCEEW, 2026).

The surveys conducted by Cardno (2014) within the referral area were associated with EPBC 2014/7306 and utilised a combination of pitfall trapping and active searching methods including turning over logs and rocks, lifting loose bark, investigating hollow log and disturbing leaf litter for a period of 15 search hours in March/April 2014 over four days. The Austecology study in Spring Mountain was completed in the previous year in April 2013 as part of assessments to support EPBC 2013/7057 and included hand searches and rock-turning at 15 microhabitat sites across the 300-ha study area over a 21-day survey period. A summary of survey effort with reference to recommend survey guidelines is provided in **Table A16**.

Despite these surveys occurring in 2013 and 2014, they provide a relevant overview of patterns of occurrence and microhabitat distribution in the locality and continue to be relevant where considering the species' known dispersal limitations and strong site fidelity.

Microhabitat surveys – SH 2026

On 22nd June 2026, microhabitat ground-truthing surveys were completed within the referral area by two experienced SH ecologists. Microhabitat was actively searched for across the site with a particular focus on areas of sloping terrain which are a key component of the habitat for the species. Microhabitat attributes recorded included exposed embedded rocks, scattered un-embedded surface rocks, presence and density of leaf litter, coarse woody debris, native grasses and sedges, and orientation of the slope. Additionally, the presence and cover of creeping lantana was noted as it can alter the suitability of microhabitat by smothering rocks and other sheltering features. While not a documented threat to microhabitat, *Passiflora suberosa* (corky passion vine) was also noted as these can form dense clumps which may also degrade microhabitat. Broad vegetation attributes including dominant canopy and understorey species were noted due to the known

vegetation preferences of the species. Targeted searches for the collared delma presence were not completed due to timing being outside the optimal window for surveying.

Potential microhabitat is scattered across the referral area. A total of 20 microhabitat sites, abbreviated as 'MH sites', were identified, distinguished primarily as a rocky outcrop or sloping rocky terrain with varying presence of other microhabitat characteristics such as leaf litter and native grass. MH sites were assigned a habitat suitability of low, moderate or high depending on the availability of microhabitat attributes. The extent of potential microhabitat was also broadly mapped based on the extent of identified microhabitat (refer **Plan A35**). The recorded microhabitat areas and presence of microhabitat attributes are described in **Table A17** and displayed on **Plan A35**.

The referral area contains a central ridgeline running from north to south which divides a large portion of the referral area into a predominantly eastern or western facing orientation. Another ridgeline runs through the site in an east-west direction. The majority of the referral area including MH sites 1-4 and 13-14 is north-east to south-east facing. The areas of highest quality microhabitat recorded were located in western parts of the referral area and in an area in the northern extent, comprising MH sites 5-11 and 17. These were characterised by a north-west to south-west facing slope and complex ground-layer mosaic. These areas typically contained a mix of embedded rocks and frequent small (<30 cm), moderate (30-100 cm) and large (100-200 cm) sized surface rocks with partial contact with the soil layer to support sheltering, with the added presence of grass tussocks, sedges and woody debris.

Areas of moderate- or low- quality habitat contained necessary microhabitat components, however, generally contained a more simplified ground-layer structure, less suited to sheltering, such as a dominance of embedded rocks in conjunction with a lower abundance of suitably sized surface rocks, were located on a plateau or slopes with an unsuitable aspect and contained a dominance of *E. fibrosa*. Low quality areas were generally defined based on a low abundance or absence of suitably sized surface rocks with rock sizes in these areas generally within the small range, averaging 20 cm in diameter.

Groundcover weed species *L. montevidensis* and vine *P. suberosa* were recorded at a number of microhabitat sites, however, were generally low in extent and not considered to impede the value. Infestations of *L. montevidensis* and *P. suberosa* were recorded throughout the referral area, however, were generally not dominant within microhabitat areas.

<u>Fauna Spotter Catcher data</u>

Fauna Spotter Catcher data has been collated across a large portion of Greater Springfield. The collared delma has never been recorded in any detailed pre- or post-clearance fauna surveys undertaken through the surrounding Springfield City developments, including Springfield Rise (EPBC 2013/7057), Kalina (EPBC 2014/7306), Woogaroo Heights (EPBC 2017/7875) and Brookwater (EPBC 2016/7676) (refer **Attachment A6** for further details). This includes detailed pre-clearance fauna surveys undertaken over much larger approved development areas pre-, during and post-clearing totalling 350 days between October 2016 and March 2026. Additionally, fauna spotter records of the QUU sewer clearing undertaken throughout Brookwater was reviewed. Notably, the Fauna Spotter Catcher data analysed relates to clearing events that were undertaken when Springfield was much more connected.

Pre-clearance surveys were completed by suitably qualified fauna spotter catchers and included systematic searches for terrestrial habitat features such as leaf litter and scattered rocks and considered the potential for species to occur on-site based on the presence of these features. A number of these reports identified the potential for presence of the collared delma. Due to the attention towards identifying microhabitats, a review of fauna spotter-catcher records is considered to provide relevant contextual information regarding potential occurrence of the species in the context of Greater Springfield, particularly where substantial areas of potentially suitable habitat have been progressively cleared and monitored without records of the species being obtained.

Table A16: Collared delma field survey effort relative to guidelines

Relevant Guidelines	Recommended Methodology	Cardno Survey Effort	Austecology Survey Effort	Survey Adequacy
Draft referral guidelines for the nationally listed Brigalow Belt reptiles and the Survey Guidelines for Australia's Threatened Reptiles.	One-off diurnal searches • Searching microhabitats, such as carefully turning woody debris, rocks and artificial debris, raking the soil surface or leaf litter beneath trees and looking beneath peeling bark for reptiles or their sloughs • Optimal survey time is during the coolest parts of the day • Survey over a minimum of 1.5 person hours per hectare for habitats of average complexity per targeted species • Survey over a minimum of 3 days	Diurnal searches • Flipping rocks, disturbing woodpiles, investigating hollow logs and disturbing leaf litter in suitable habitat. The searches covered areas of rocky slopes • 15 search hours over 11 ha search area • Conducted over 4 days • Conducted during morning and evening	Diurnal searches • Systematic hand searches at microhabitat sites and opportunistic searches conducted over 21 days • Conducted in November 2012 and April 2013	**Guidelines met** • Surveys were conducted at an appropriate time of year where maximum temperatures are greater than 25°C. • Primary survey methods used recommended survey techniques (diurnal hand searches) with pitfall trapping employed by Cardno. • Repeat surveys conducted by Austecology. • For confirmed microhabitat areas, Cardno search effort aligns with minimum survey effort.
Survey guidelines for Australia's threatened reptiles	• One-off hand searches (including raking through leaf litter) in appropriate habitats • pitfall trapping during late spring to summer. A series of pitfall trap lines comprising six 4–10 litre buckets and funnel traps spread along a 15 metre fence would be an appropriate trap design	Hand searches (see above) Pitfall trapping • A single pitfall and funnel trap array was established at four transects • Each pitfall and funnel array comprised four 20L plastic buckets, six funnel traps and	Hand searches (see above)	

Relevant Guidelines	Recommended Methodology	Cardno Survey Effort	Austecology Survey Effort	Survey Adequacy
		approximately 50m of drift fence arranged in a T-shape. This gives a total of 160 trap nights for the survey period. • The Pitfall and funnel array was consistent with the recommended design in the Terrestrial Vertebrate Fauna Survey Guidelines for Queensland (Eyre et. al., 2012).		

Table A17: Collared delma potential microhabitat sites

Site	Surface rock abundance and size	Coarse woody debris	Leaf Litter cover	Native grass/sedge cover	Aspect	Weed cover	Habitat suitability	Reference Image
MH1	Low – dominated by exposed bedrock, lacking surface rocks for sheltering	Low	30% dense mats around rocks	20%	South-east	Nil	Moderate	
MH2	High – mix of embedded and small to medium surface rocks	Low	50%	5%	South	Nil	Moderate	

Site	Surface rock abundance and size	Coarse woody debris	Leaf Litter cover	Native grass/sedge cover	Aspect	Weed cover	Habitat suitability	Reference Image
MH3	Low – dominated by medium sized embedded rocks	Low	35%	15%	South-east	Nil	Moderate	
MH4	Low – small area containing limited small to medium embedded rocks	Low	25% (thin layer)	20%	South-east	Nil	Low	

Site	Surface rock abundance and size	Coarse woody debris	Leaf Litter cover	Native grass/sedge cover	Aspect	Weed cover	Habitat suitability	Reference Image
MH5	High – large area of exposed bedrock with scattered small to medium surface rocks scattered down the slope	Moderate	45%	10%	West	5% corky passion vine	High	
MH6	Low – scattered medium sized surface and embedded rocks	Low	65%	15%	West	Nil	Low	

Site	Surface rock abundance and size	Coarse woody debris	Leaf Litter cover	Native grass/sedge cover	Aspect	Weed cover	Habitat suitability	Reference Image
MH7	Low – scattered small to medium sized surface and embedded rocks	Low	55%	25%	West	Nil	Low	
MH8	Low – scattered medium sized embedded rocks with scattered small surface rocks	Moderate	35%	20%	South-west	Nil	Low	

Site	Surface rock abundance and size	Coarse woody debris	Leaf Litter cover	Native grass/sedge cover	Aspect	Weed cover	Habitat suitability	Reference Image
MH9	Moderate – mix of medium to large sized embedded and surface rocks	Low	60%	15%	South-west	5% corky passion vine	High	
MH10	Low – large intact rocky outcrop with overlapping medium sized surface rocks increasing downslope	Low	25%	25%	North-west	5% creeping lantana	High	

Site	Surface rock abundance and size	Coarse woody debris	Leaf Litter cover	Native grass/sedge cover	Aspect	Weed cover	Habitat suitability	Reference Image
MH11	High – mix of medium to large sized embedded and surface rocks	Moderate	45% - dense mats around rocks	20%	West	10% creeping lantana	High	
MH12	Low – medium to large embedded rocks with scattered surface rocks	Low	60% - dense mats around rocks	10%	West	10% corky passion	Moderate	

Site	Surface rock abundance and size	Coarse woody debris	Leaf Litter cover	Native grass/sedge cover	Aspect	Weed cover	Habitat suitability	Reference Image
MH13	High – scattered small surfaces rocks, no embedded rocks	Low	65% forming dense mats	10%	North-east	Nil	Low	
MH14	Low – scattered embedded rocks	Low	70% - thin surface layer	5%	South-east	Nil	Low	

Site	Surface rock abundance and size	Coarse woody debris	Leaf Litter cover	Native grass/sedge cover	Aspect	Weed cover	Habitat suitability	Reference Image
MH15	Low – large embedded rocks with intermittent medium sized surface rocks	Moderate	60%	20%	South-west	10% creeping lantana / corky passion vine	Low	
MH16	Low – small sized scattered surface rocks (10-30 cm), intermittent embedded rocks	Moderate	55%	30%	South-west	Nil	Low	

Site	Surface rock abundance and size	Coarse woody debris	Leaf Litter cover	Native grass/sedge cover	Aspect	Weed cover	Habitat suitability	Reference Image
MH17	High – mix of small, medium and large sized rocks embedded and partially embedded surface rocks	Moderate	70%	5%	South-west	Nil	High	
MH18	Low – scattered small sized partially embedded surface rocks	Low	35%	30%	North-west	Nil	Low	

Site	Surface rock abundance and size	Coarse woody debris	Leaf Litter cover	Native grass/sedge cover	Aspect	Weed cover	Habitat suitability	Reference Image
MH19	Moderate – scattered small to medium sized rocks	Moderate	40%	20%	North	Nil	Moderate	
MH20	Moderate – mix of medium to large embedded rocks with scattered surface rocks	Low	25% forming thick mats	10%	South-west	5% creeping lantana	Moderate	

2.4 Information about the methods, data and literature used to identify and assess environmental values

Item 3.4 of the PD Request asks for *"**information about the methods, data and scientific literature used to identify and assess the environmental values on the proposed action site and surrounding area, including survey data and historical records. Survey data for the proposed action site must be provided for the above listed threatened species, should be as recent as possible, and must not have been collected more than five years before the date of this letter**."*

This PD provides all literature reviewed and cited within a reference list. The source of survey methods, guidelines and historical records are also provided. All survey methods undertaken have been guided by best practice and where applicable, Commonwealth and State survey guidelines for threatened species. This includes the following methodologies:

- *Terrestrial Vertebrate Fauna Survey Guidelines*
- *Survey guidelines for Australia's Threatened Bats*
- *Survey Guidelines for Australia's Threatened Mammals*
- *Survey Guidelines for Australia's Threatened Birds*
- *Survey Guidelines for Australia's Threatened Reptiles*
- *EPBC Act Referral Guidelines for the Vulnerable Koala*
- Queensland *Guide to determining terrestrial habitat quality: A toolkit for assessing land based offsets under the Queensland Environmental Offsets Policy* (version 1.2)
- *Biocondition: A Condition Assessment Framework for Terrestrial Biodiversity in Queensland* (version 2.1)

2.4.1 Desktop analysis

Prior to the commencement of field surveys, a desktop analysis was conducted of Commonwealth, State and Local environmental databases and overlay mapping to identify potential MNES and included the following:

- Commonwealth MNES protected under the EPBC Act on and around the referral area using the protected matters search tool with a 5 km radius (refer **PART B – Appendix A**);
- *Nature Conservation Act 1992* (NCA) listed threatened species on and around the referral area using the wildlife online database search tool with a 5 km radius (refer **PART B – Appendix B**);
- Public environmental databases including Atlas of Living Australia and BioMaps;
- National Flying-fox monitoring program (Commonwealth);
- State regulated vegetation management and vegetation supporting maps under the Queensland *Vegetation Management Act 1999* (VMA) including essential habitat mapping; and
- Local government records where MNES threatened species and communities are known to occur in the area.

Additionally, a review of aerial photography history was undertaken via QImagery to assist with the broad delineation of vegetation communities and to determine historical patterns to local vegetation communities.

2.4.2 Scientific Permits

Ecological field surveys were conducted on the subject site in the attempt to confirm presence of potential MNES. Fauna surveys were conducted under the following permits held by Saunders Havill Group:

- Scientific Purposes Permit **WA0022007** granted under Section 12(f) of Nature Conservation (Administration) Regulation 2017
- Department of Agriculture and Fisheries (DAF) Ethics clearance **CA 2020/02/1355**
- Scientific User Registration **SUR000451**

2.4.3 Field Survey Methods

Several field survey techniques were implemented during the field survey period which occurred from 2019 to 2023. A summary of field survey techniques applied targeting specific MNES, the survey guidelines used, total combined survey effort and field survey personnel and qualifications for each method are provided in **Table A18**.

A summary of field survey dates and methods applied on each day are provided in **Table A19**. The project area has been subject to a number of ecological assessment surveys over several years.

Field survey methodologies applied during the survey period are described in the following subsections.

Table A18: Summary of targeted field survey techniques and survey effort

Scientific Name	Common Name	Survey guidelines	Techniques Implemented and survey effort	Field personnel qualifications
Phascolarctos cinereus	Koala	*Survey guidelines for Australia's threatened mammals* Phillips and Callaghan (2011)	• 16 Spot Assessment Technique surveys (8 in 2019, 6 in 2020 and 2 in 2023) • 15 hours of spotlighting meanders over 5 days (March 2019 and August 2023) • Assessment of foraging and breeding values (habitat suitability) • 10 motion triggered camera traps deployed for 15 nights (August 2023)	**Senior Ecologist** • 15+ years of relevant experience • Bachelor of Applied Science (Natural Systems and Wildlife Management) **Ecologist** • Three years of relevant experience • Bachelor of Science (Ecology) and Master of Environmental Management **Graduate Ecologist** • Two years of relevant experience • Bachelor of Science (Ecology and Zoology)
Pteropus poliocephalus	Grey-headed flying-fox	*Survey guidelines for Australia's threatened bats*	• Daytime roost/camp searches (2019, 2021 and 2023) • 15 hours of spotlighting meanders over 5 days (March 2019 and August 2023) • Assessment of foraging values and habitat suitability	**Senior Ecologist** • 15+ years of relevant experience • Bachelor of Applied Science (Natural Systems and Wildlife Management) **Senior Ecologist** • 5 years of relevant experience • Bachelor of Science (Ecology and Zoology) **Senior Ecologist** • 5 years of relevant experience

Scientific Name	Common Name	Survey guidelines	Techniques Implemented and survey effort	Field personnel qualifications
				• Bachelor of Environmental Management (Natural Systems and Wildlife) **Graduate Ecologist** • Two years of relevant experience • Bachelor of Science (Ecology and Zoology)
Petauroides volans	Greater glider	*Survey guidelines for Australia's threatened mammals* *Reporting detections of Southern Greater Gliders* (Conservation Regulator Victoria) *Approved Survey Standards: Greater Glider Petauroides volans V1.0* (Department of Sustainability and Environment (Victoria, Australia, May 2011)	• 15 hours of spotlighting meanders over 5 days (March 2019 and August 2023) • Assessment of breeding habitat (hollows) and foraging values • GPS location of hollow-bearing trees and significant trees (≥800 mm diameter measured at breast height) within and adjoining project area (August/September 2023)	**Senior Ecologist** • 5 years of relevant experience • Bachelor of Science (Ecology and Zoology) **Senior Ecologist** • 5 years of relevant experience • Bachelor of Environmental Management (Natural Systems and Wildlife) **Graduate Ecologist** • Two years of relevant experience • Bachelor of Science (Ecology and Zoology)
Anthochaera phrygia	Regent honeyeater	*Survey guidelines for Australia's threatened birds*	• 27 hours of dawn meander surveys over 9 days in June/July 2020 • 24 hours of dusk meander surveys over 8 days in June/July 2020 • Stem density assessment plots – assessment of foraging values (winter flowering eucalypts) • Flowering tree plots	**Principal Ecologist** • 10+ years of relevant experience • Bachelor of Science (Threatened Species Ecology and Zoology) **Senior Environmental Scientist** • 5+ years of relevant experience

Scientific Name	Common Name	Survey guidelines	Techniques Implemented and survey effort	Field personnel qualifications
				• Bachelor of Science; Doctor of Philosophy **Senior Ecologist** • 15+ years of relevant experience • Bachelor of Applied Science (Natural Systems and Wildlife Management) **Graduate Ecologist** • Two years of relevant experience • Bachelor of Science (Ecology and Zoology)
Lathamus discolor	Swift parrot	*Survey guidelines for Australia's threatened birds*	• 27 hours of dawn meander surveys over 9 days in June/July 2020 • 24 hours of dusk meander surveys over 8 days in June/July 2020 • Stem density assessment plots – assessment of foraging values (winter flowering eucalypts) • Flowering tree plots	**Principal Ecologist** • 10+ years of relevant experience • Bachelor of Science (Threatened Species Ecology and Zoology) **Senior Ecologist** • 15+ years of relevant experience • Bachelor of Applied Science (Natural Systems and Wildlife Management) **Senior Environmental Scientist** • 5+ years of relevant experience • Bachelor of Science; Doctor of Philosophy **Graduate Ecologist** • Two years of relevant experience • Bachelor of Science (Ecology and Zoology)

Table A19: Field survey dates and methods summary

Survey date	Temperature data	Rainfall data	Methods applied
2019			
11 March 2019	20.7°C min – 37.9°C max	0 mm	Spotlighting, ultrasonic bat call detection, vegetation and flora ground-truthing surveys, search for flying-fox roosts within and adjoining referral area
12 March 2019	20.5°C min – 40.9°C max	0.2 mm	Waterway and drainage feature ground-truthing, vegetation and flora ground-truthing and general fauna surveys
13 March 2019	18.1°C min – 36.4°C max	0 mm	Spotlighting, ultrasonic bat call detection
14 March 2019	22.0°C min – 31.9°C max	0 mm	Spot Assessment Technique Koala Surveys, flora and fauna assessments, Threatened ecological community ground truthing
15 March 2019	18.0°C min – 34.6°C max	No data	Spot Assessment Technique Koala Surveys, flora and fauna assessments
7 August 2019	6.8°C min – 23.1°C max	0 mm	Endangered Regional Ecosystem and Threatened ecological community ground truthing, waterway interface tree plot
15 August 2019	2.9°C min – 24.3°C max	0.6 mm	Endangered Regional Ecosystem and Threatened ecological community ground truthing, waterway interface tree plot
16 August 2019	5.7°C min – 26.0°C max	0 mm	Endangered Regional Ecosystem and Threatened ecological community ground truthing, waterway interface tree plot
17 September 2019	9.7°C min – 30.9°C max	0 mm	Vegetation and threatened ecological community ground truthing
2020			
29 June 2020	5.2°C min – 22.0°C max	0.4 mm	Crepuscular bird meander surveys – dawn and dusk
30 June 2020	4.7°C min – 21.7°C max	0.2 mm	Crepuscular bird meander surveys – dawn and dusk
2 July 2020	6.5°C min – 23.8°C max	0 mm	Crepuscular bird meander surveys – dawn and dusk
3 July 2020	8.2°C min – 25.2°C max	0 mm	Crepuscular bird meander survey – dawn
22 July 2020	10.3°C min – 19.2°C max	0 mm	Habitat quality assessment transects, Spot Assessment Technique Koala Surveys
27 July 2020	10.9°C min – 19.1°C max	1.4 mm	Crepuscular bird meander surveys – dawn and dusk, flowering tree 10 x 10 metre plots
28 July 2020	8.3°C min – 21.6°C max	0 mm	Crepuscular bird meander surveys – dawn and dusk

Survey date	Temperature data	Rainfall data	Methods applied
29 July 2020	2.7°C min – 23.2°C max	0 mm	Crepuscular bird meander surveys – dawn and dusk
30 July 2020	4.5°C min – 23.4°C max	0 mm	Crepuscular bird meander surveys – dawn and dusk
31 July 2020	5.3°C min – 22.4°C max	0 mm	Crepuscular bird meander surveys – dawn and dusk
2022			
23 November 2022	14.0°C min – 28.0°C max	0 mm	Stem density assessment plots – foraging habitat assessment for threatened bird species and greater glider
24 November 2022	11.4°C min – 29.9°C max	0 mm	Stem density assessment plots – foraging habitat assessment for threatened bird species and greater glider
2023			
27 July 2023	5.5°C min – 22.3°C max	0 mm	Install baited motion sensor camera traps
31 July 2023	7.4°C min – 27.9°C max	0 mm	GPS locate habitat features and significant habitat trees
1 August 2023	7.5°C min – 27.2°C max	0 mm	GPS locate habitat features and significant habitat trees
2 August 2023	10.9°C min – 24.4°C max	0 mm	GPS locate habitat features and significant habitat trees, Spotlighting
3 August 2023	8.5°C min – 20.5°C max	2.2 mm	Two (2) Supplementary Spot Assessment Technique Koala Surveys, spotlighting
4 August 2023	10.4°C min – 23.4°C max	0.2 mm	Waterway and top of high bank ground-truthing survey
10 August 2023	3.4°C min – 23.9°C max	0.2 mm	Collect motion sensor camera traps, spotlighting
2024			
26 August 2024	14.4°C min – 30.6°C max	0 mm	Wildlife Aerial Thermal drone surveys and spotlighting (BAAM Ecological Consultants)
28 August 2024	16.2°C min – 31.6°C max	0 mm	Wildlife Aerial Thermal drone surveys and spotlighting (BAAM Ecological Consultants)
2026			
22 June 2026	14°C min – 23.2°C max	2.8 mm	Collared delma microhabitat mapping

NB: Temperature and rainfall data sourced from Bureau of Meteorology (BoM) – Station 140009 Greenbank (Defence).

2.4.3.1 Targeted and incidental bird surveys

Targeted bird surveys were completed in accordance with the *Survey Guidelines for Australia's Threatened Birds* to address survey requirements for identified MNES bird species with consideration to species-specific survey requirements. This technique is a non-intrusive active area search that provides a direct census of bird species occurrence and abundance. Surveys involved walking slowly through woodland habitat with an emphasis on areas containing flowering eucalypts. Birds were identified either from direct observation or their calls. Inclement weather was avoided as this greatly reduces the detection of bird species.

Targeted meander surveys with a focus on detection for regent honeyeater and swift parrot were undertaken during winter of 2020 during the winter foraging season, from 29th June to 3rd of July 2020, and again from 27th July to 31st of July 2020, inclusive, in accordance with survey timeframes described in the *Survey Guidelines for Australia's Threatened Birds*. In addition to targeted surveys, incidental observations were also recorded during other survey activities including spotlighting and vegetation assessments.

For threatened birds, quadrat assessments to quantify flowering winter eucalypt species (*i.e.,* foraging habitat) present were completed on 22nd July 2020 (winter) and November 2022 (summer) which involved assessing quadrats for the number of eucalypt species that were flowering. Surveys were completed in accordance with the recommended methodology detailed in *Survey guidelines for Australia's threatened birds* with survey effort exceeding recommended effort under the guidelines.

2.4.3.2 Observational survey for species and communities

The site area was walked to ensure all species (flora and fauna) were recorded and identified. Particular attention was paid to any MNES that were listed as possibly occurring on or within the vicinity of the site and specific micro-assemblages which may support these threatened species. This included observations of vertebrate fauna present on or proximal to the site and species listed as migratory under the EPBC Act.

The observational survey included identification of ecological features and values such as broad vegetation communities, fauna habitats and ecological corridors. Recording fauna habitat features within the project area included the identification of habitat trees and micro-habitat for the collared delma including exposed rocky outcrops, scattered surface rocks, coarse woody debris and dense leaf litter and native grasses.

2.4.3.3 Flowering tree foraging assessment

Surveys were completed during winter of 2020 to assess potential presence of the swift parrot and regent honeyeater and also an assessment of the suitability of foraging resources. Specifically, the volume of flowering resources that would be available for foraging, and therefore provide an indication of the relative capacity of the referral area to support foraging activity was measured. A total of 23 10 x 10 metre plots were established across the referral area whereby the number of trees, their species and an assessment of whether the trees were flowering or not was recorded. This was completed on 22nd of July 2020.

A follow-up assessment was completed on 23rd and 24th of November 2022 whereby 10 20 x 20 metre plots were established with the following data recorded:

- T1 and T2 – count of tree species, size, hollows (if any) and mistletoe (if present); and
- Native shrub and ground layer species and weed species.

Raw data is located at **Attachment A6**.

2.4.3.4 Flying fox roost searches

Targeted surveys for grey-headed flying-fox were conducted on 11th and 13th of March 2019 for the ultrasonic bat call detectors and 13th of March 2019 flying-fox roost searches. The searches were completed in accordance with the accepted methodologies detailed in the *Survey guidelines for Australia's threatened bats*.

The flying fox roost search was conducted during the day within the survey area, watching for flying-foxes and listening for their distinctive calls. This search is not only for flying-fox camps, but the presence of food plants to assess the potential importance of the survey area to the species. This involved assessing tree canopies whilst completing meanders across the site. The search for flying-fox roosts was justified due to the proximity of the site to an active flying-fox camp located at Camira, Barbara Street (140), approximately 1.3 km north-east of the site.

Additional opportunistic surveys were completed across the survey period and spotlighting was completed on 2nd, 8th and 10th August 2023 to detect any flying fox species utilising the site.

2.4.3.5 Ground-truthing of vegetation communities

Vegetation was ground-truthed and assessed against current VMA Regional Ecosystem (RE) mapping and pre-clear mapping. This included reviewing the accuracy and extent of mapped RE types in addition to the broad vegetation condition. Particular attention was made in identifying the presence and extents (where applicable) of threatened ecological communities (TECs) listed as having the potential to occur on or proximal to the site.

A comprehensive flora survey was undertaken using a methodology consistent with the established formats used by the Queensland Herbarium (Nelder *et al.,* 2020 and Hnatiuk *et al.,* 2009). Survey methodology comprised an initial visual audit, followed by quantitative assessment of vegetation associations and communities. Distinct vegetation community boundaries were delineated during field survey assessment.

Targeted surveys to assess vegetation communities on-site and on land adjacent to the subject site were completed on 11th, 12th and 14th of March 2019, 7th, 15th and 16th of August 2019, 17th of September 2019 and 22nd of July 2020.

Specific surveys to identify the presence and extent of the LRSA TEC were completed during vegetation survey effort. This involved assessing each vegetation structure at the location where the regional ecosystems indicative of the LRSA TEC were mapped. The characteristic flora species appendices associated with the listing advice on the LRSA TEC's SPRAT profile was referred to during the assessment process, along with the condition thresholds to delineate the boundaries of the regional ecosystem. Surveys were in accordance with the current listing advice and utilised available assessment material provided on the Departments SPRAT profile for LRSA TEC.

2.4.3.6 Koala habitat and SAT surveys

Tools for determining localised levels of use by *Phascolarctos cinereus* (koala) included the Spot Assessment Technique (SAT) and opportunistic observations for Koala and Koala activity throughout the field survey effort. The SAT surveys were undertaken in accordance with methodology developed by the Australian Koala Foundation (AKF) and Phillips and Callaghan (2011) and specified in the *EPBC Act Referral Guidelines for the Vulnerable Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory)*. The guidelines and recommended methodology were used at the time of surveys conducted during 2019 to 2023.

The SAT method is an assessment of koala activity involving a search for any koalas and signs of koala usage. The SAT involves identifying a non-juvenile tree of any species within the site that is either observed to have a koala or scats, or is known to be a food tree or otherwise important for koalas, and recording any evidence of koala usage of that tree including physical presence, identifiable scratches or scats. The nearest non-juvenile tree is then identified and the same data recorded. The next closest non-juvenile tree to the first tree is then assessed and so on until 30 trees have been surveyed. Assessment of each tree involves a systematic search for koala scats beneath the tree within a 1 m radius of the trunk. After approximately two minutes of searching for scats, the base of the trunk is observed for scratches and the crown for koala. The number of trees showing evidence of koala activity is expressed as a percentage of the total number of trees sampled to indicate the frequency of koala usage.

A total of sixteen (16) SAT surveys have been completed across the project area. Of the SAT surveys completed, eight (8) were completed on 14th and 15th of March 2019 (autumn), six (6) on 22nd of July 2020 (winter) and two (2) on 8th of August 2023 (winter). The SAT surveys in 2020 were completed where vegetation assessment transects were conducted to support vegetation suitability assessment.

2.4.3.7 Motion sensor camera trap

Camera trapping involves setting up a fixed digital camera to capture images or video of animals that pass in front of a camera with an infrared trigger. This survey technique identifies fauna activity beyond the scope of direct observational studies and with the absence of potential observer impacts. Cameras were attached 30-100 cm from the ground on a tree or post and directed towards landscape features. Camera traps were installed on 27th of July 2023 and collected on 10th of August 2023, for a period of 15 nights. The cameras were

Photo 7: Example of motion sensor camera set up.

baited with chicken necks to target nocturnal carnivorous mammal species. Refer to **Photo 7** for an example of the camera set up. Refer to **Plan A14** for the location of surveys.

2.4.3.8 Spotlighting and call playback

A combination of high-powered spotlights and head torches were used to detect nocturnal mammals, birds and reptiles within the referral area in accordance with the relevant Commonwealth and State survey guidelines. Spotlighting meander surveys were completed on foot by two observers and involved slowly walking through eucalypt woodland at an average pace of 10 minutes per 100 m. Observers took care to ensure areas already surveyed were not revisited during the same survey transect. It was also ensured that surveys were not completed during inclement weather such as strong winds or rain to limit the potential for reduced detectability.

Spotlighting surveys were completed in accordance with the prescribed spotlighting methodology for arboreal mammals and nocturnal bird species within the relevant survey guidelines including *Survey Guidelines for Australia's Threatened Mammals* and *Survey Guidelines for Australia's threatened birds*. A total of five (5) two-person spotlighting meander surveys have been completed over the project area including 11th and 13th of March 2019 and the 2nd, 8th and 10th of August 2023. Each spotlighting meander transect was completed over a period of approximately three or more hours between 16:00 and 21:30.

Spotlighting surveys were preceded by an assessment of potential habitat features or evidence within the referral area which included locating large, old growth trees, arboreal and terrestrial hollows. Refer to **Plan A31** for the location of recorded habitat features.

Each spotlighting meander in 2023 included broadcast surveys (also referred to as 'call playback') for Powerful Owl. Broadcast surveys provide a highly effective method for detecting a wide variety of birds, especially for nocturnal or visually cryptic species. Broadcast detection involves playing a recording of the vocalisations of the target species over a loudspeaker and detecting individuals of that species that respond to the call vocally, or are attracted by the call and observed as a result. Three to five broadcast surveys were completed during each spotlighting meander which included an initial scan of the chosen site, broadcasting the call via a speaker then waiting for approximately 30 seconds to hear a vocalisation or activity in response. This was repeated at least three times at each site.

2.4.3.9 RPA Wildlife Aerial Thermal Surveys

Targeted Wildlife Aerial Thermal drone surveys by qualified mapping personnel. These surveys used RPA (remotely piloted aircraft) equipped with a thermal sensor to detect the presence of arboreal mammals including koala greater glider. Completed on 26th and 28th of August 2024 within the referral area. This method was completed in tandem with spotlighting to confirm detections on-ground. Refer to **Attachment A3** for Koala Connectivity and Sustainability Analysis prepared by BAAM Ecological Consultants for detailed methods and results. An extract of the methods is provided below.

BAAM Principal Ecologist and Chief Pilot Adrian Caneris attended the drone surveys to oversee drone operations and to undertake additional flights to confirm absence in various locations. The drone assessment flights were performed during daylight conditions prior to surveying the referral area to establish flight paths and assess terrain for obstacles and areas of possible interference.

The targeted koala survey was undertaken during evenings well after dark when temperatures were lower (20:00-2:00) to fully utilise the thermal sensor capabilities. A combination of autonomous flight and manual operation was used to undertake the survey. This method allows for detailed searching of large areas in a single evening. Frequent stops were necessary to observe for suspicious thermal signatures (other than target species) and assess whether closer inspection was necessary (*i.e.,* small heat signatures and animal activities that can be readily classified e.g. Flying-foxes).

When a potential thermal signature was detected, the RPA was put into "hover mode" to maintain position without further outputs from the pilot. Thermal and RGB still images are then captured for further analysis during the desktop processing. After confirming the features of the image to be wildlife, several still images were taken to capture the subject from different angles. Direct overhead still image was also captured to provide GPS location. The georeferenced location is also recorded within Flight Hub 2 to assist with desktop analysis. After performing the image and location capture, the RPA then resumes automated flight along the predetermined flight path until the area search is complete.

2.4.3.10 Ultrasonic bat call detectors

Echolocation call detection was also completed. This method is an unobtrusive and non-invasive technique used to target areas of interest such as creeks, rocky outcrops and potential flyaways for microbats, and is particularly useful for detecting species in the Rhinolophidae and Hipposideridae families.

An ANABAT II ultrasonic bat call detection unit and associated ZCAIM interface module were also used to capture the calls of insectivorous bat species within representative habitat types on 11th and 13th March 2019. Refer to **Plan A18** for the location of Anabat surveys.

2.4.3.11 Waterway and drainage line ground-truthing

The VMA watercourse mapped in the north-western and south-eastern portion of the site was investigated with *in situ* values observed which involved recording the following details:

- General description and photos
- Vegetation quality and coverage (e.g. embankments, channel and overall corridor)
- Extent of invasive weed cover

Key observations were also recorded at potential drainage lines present within the site recording the following details. Additionally, while located off-site, a ground-truthing assessment of the O'Dwyer's Gully waterway including the upstream tributary was also completed which included mapping the waterway centreline and western top of high bank using a handheld GPS. This was completed to provide greater certainty regarding waterway flow path locations and the quality of waterway values to inform setback requirements. This assessment is essential in providing the appropriate buffers to the waterway.

2.4.3.12 Frog surveys and call playback

Call playback targeting threatened frog species with the potential to occur on the site was completed at specific locations. Call playback is a detection technique used to target fauna species which may respond to

mating or territorial calls from members of the same species. A pre-recorded call is played from a device for a specific period of time, then a period of quiet follows to detect any species-specific response. This call-playback technique is often repeated several times within suitable habitat for the target species. Seasonal and temporal timing may be critical to the likelihood of detecting some species due to timing of mating calls for frog species or weather response. The call playback was completed at several times at waterbodies containing potential habitat attributes to support the species.

2.4.3.13 Modified Habitat Quality Assessment (MHQA)

The Modified Habitat Quality Assessment (MHQA) methodology was utilised to assess the referral area condition, site context and species stocking rate. Refer to **Section 4.1.1** for more detail on methodology.

The referral area was broken into two (2) assessment units to reflect the differing states of the vegetation within the referral area, described in **Section 2.2.4.2**. In order to determine the quantum and quality of the habitat suitable for koala within the referral area, vegetation/habitat quality was derived from the Modified Habitat Quality Assessment tool.

2.4.3.14 Collared delma microhabitat searches

On 22nd June 2026, microhabitat ground-truthing surveys were completed within the referral area by two experienced SH ecologists. Microhabitat was actively searched for across the site with a particular focus on areas of sloping terrain which are a key component of the habitat for the species. Microhabitat attributes recorded included exposed embedded rocks, scattered un-embedded surface rocks, presence and density of leaf litter, coarse woody debris, native grasses and sedges, and orientation of the slope. Additionally, the presence and cover of creeping lantana was noted as it can alter the suitability of microhabitat by smothering rocks and other sheltering features. While not a documented threat to microhabitat, *Passiflora suberosa* (corky passion vine) was also noted as these can form dense clumps which may also degrade microhabitat. Broad vegetation attributes including dominant canopy and understorey species was noted due to the known vegetation preferences of the species. Targeted searches for the collared delma presence were not completed due to timing being outside the optimal window for surveying.

2.5 Field Survey Results

General field survey results including recorded flora and fauna are detailed in the followed subsections. Further details on field survey results where it relates to MNES are discussed in **Section 2.3**.

2.5.1 Observed native flora

During the field survey, 123 flora species were recorded across the site, with 97 considered native species (refer **Table A20** for the detailed native flora species list).

Table A20: Observed native flora species

Scientific Name	Common Name
Acacia concurrens	Black Wattle
Acacia disparrima	Hickory Wattle
Acacia fimbriata	Fringed Wattle
Acacia leiocalyx	Early-flowering Black Wattle
Acacia maidenii	Maiden's Wattle
Acacia podalyriifolia	Silver Wattle
Adiantum hispidulum	Rough Maidenhair Fern
Alchornea ilicifolia	Native Holly
Allocasuarina littoralis	Black Sheoak
Alphitonia excelsa	Red Ash
Alyxia ruscifolia	Chain Fruit
Angophora leiocarpa	Smooth-barked Apple
Aphananthe philippinensis	Rough-leaved Elm
Araucaria cunninghamii	Hoop Pine
Brachychiton acerifolis	Flame Tree
Brachychiton discolor	Lace Bark Tree
Breynia oblongifolia	Coffee Bush
Callitris glaucophylla	White Cypress-pine
Casuarina cunninghamiana	River Sheoak
Cayratia cleatidea	Slender Grape
Clematicissus opaca	Forest Grape
Cordyline rubra	Cordyline
Corymbia citriodora	Spotted Gum
Corymbia intermedia	Pink Bloodwood

Scientific Name	Common Name
Corymbia tessellaris	Moreton Bay Ash
Cupaniopsis anarcoides	Tuckeroo
Cymbopogon refractus	Barbwire Grass
Cyperus polystachyos	Bunchy Sedge
Desmodium rhytidophyllum	Hairy Trefoil
Dianella caerulea	Blueberry Lilly
Drypetes deplanchei	Yellow Tulip
Entolasia stricta	Wiry Panic
Erythrina vespertilio	Batswing Coral Tree
Eucalyptus acmenoides	White Mahogany
Eucalyptus carnea	Broad-leaved White Mahogany
Eucalyptus cloeziana	Gympie Messmate
Eucalyptus crebra	Narrow-leaved Ironbark
Eucalyptus fibrosa	Red Ironbark
Eucalyptus grandis	Flooded Gum
Eucalyptus major	Grey Gum
Eucalyptus microcorys	Tallowwood
Eucalyptus moluccana	Gum-topped Box
Eucalyptus propinqua	Grey Gum
Eucalyptus saligna	Sydney Blue Gum
Eucalyptus seeana	Narrow-leaved Red Gum
Eucalyptus siderophloia	Northern Grey Ironbark
Eucalyptus tereticornis	Forest Red Gum
Eustrephus larifolius	Wombat Berry
Ficus fraseri	Sandpaper Fig
Ficus obliqua	Small-leaved Fig
Flindersia australis	Crows Ash
Gahnia aspera	Rough Saw-sedge
Geitonoplesium cymosum	Scrambling Lilly
Glochidion fernandii	Cheese Tree
Goodenia rotundifolia	Star Goodenia

Scientific Name	Common Name
Grevillea robusta	Silky Oak
Heteropogon contortus	Black Speargrass
Imperata cylindrica	Blady Grass
Jagera pseudorhus	Foam Bark
Juncus usitatus	Common Rush
Leichhardtia coronata	Slender Milkvine
Lomandra hystrix	Green Mat-rush
Lomandra longifolia	Matrush
Lomandra multiflora	Many-headed Mat Rush
Lophostemon confertus	Brush Box
Lophostemon suaveolens	Swamp Box
Lygodium microphyllum	Climbing Maidenhairs Fern
Macadamia integrifolia	Macadamia Nut
Maclura cochinchinesis	Cockspur Thorn
Mallotus mollissinus	Soft kamala
Mallotus phillipensis	Red Kamala
Melaleuca irbyana	Swamp Tea-tree
Melaleuca quinquenervia	Broad-leaved Paperbark
Melaleuca saligna	White Bottlebrush
Melia azederach	White Cedar
Melichrus procumbens	Jam Tarts
Ottochloa gracillima	Graceful Grass
Oxalis corniculata	Creeping Woodsorrel
Panicum effusum	Hairy Panic
Parsonsia straminea	Monkey Rope Vine
Pellaea nana	Sickle Fern
Petalostigma pubescens	Quinine Bush
Phyllanthus microcladus	Small-leaved Phyllanthus / Brush sauropus
Plectranthus habrophyllus	Plectranthus
Podocarpus elatus	Brown Pine
Pomax umbellata	Pomax

Scientific Name	Common Name
Pteridium esculentum	Bracken Fern
Pultenaea villosa	Hairy Pea Bush
Sarcopetalum harveyanum	Pearl Vine
Smilax australis	Barbwire Vine
Streblus brunonianus	Whalebone tree
Syzygium leuhmannii	Small-leafed Lilly Pilly
Themeda triandra	Kangaroo Grass
Toona ciliata	Red Cedar
Trema tomentosa	Poison Peach
Waterhousia floribunda	Weeping Lilly Pilly
Xanthorrhoea latifolia	Grass Tree

2.5.2 Observed introduced flora

During the field survey, 123 flora species were recorded across the site, with 24 considered introduced species (refer to **Table A21** for the detailed introduced flora species list). It should be noted that eight (8) of these species are listed as restricted matters under the Queensland *Biosecurity Act 2014* and two (2) are identified as Weeds of National Significance (WONS). Introduced species were observed to be concentrated within and proximal to the gully lines mapped on-site and in isolated patches. Key species included *Lantana camara* (lantana), *Opuntia tomentosa* (velvety tree pear), *Asparagus aethiopicus* (asparagus fern), *Asparagus africanus* (climbing asparagus fern) and *Solanum nigrum* (blackberry nightshade).

Management of restricted invasive plants under the *Biosecurity Act 2014* are to be managed at the Local Government level through a biosecurity plan that covers invasive plants and animals in its area.

Table A21: Observed introduced flora species

Scientific name	Common name	Restricted under *Biosecurity Act 2014*	Weeds of National Significance
Ageratum houstonianum	Blue Billygoat Weed		
Asparagus aethiopicus	Asparagus Fern	3	
Asparagus africanus	Climbing Asparagus Fern	3	
Bidens pilosa	Cobblers Peg		
Celtis sinensis	Chinese Celtis	3	
Chloris virgata	Rhodes Grass		
Cinnamomum camphora	Camphor Laurel	3	
Cyperus polystachyos	Bunchy Sedge		

Scientific name	Common name	Restricted under *Biosecurity Act 2014*	Weeds of National Significance
Ipomoea indica	Mile-a-Minute		
Lantana camara	Lantana	3	Yes
Lantana monteviredensis	Creeping Lantana	3	
Macroptilium atropurpureum	Siratro		
Megathyrsus maximus	Guinea Grass		
Ochna serrulata	Ochna		
Opuntia tomentosa	Velvety Prickly Pear	3	Yes
Passiflora suberosa	Corky Passionflower		
Passiflora subpeltata	White Passion Flower		
Schinus terebinthifolius	Broad-leaved Pepper	3	
Solanum mauritianum	Wild Tobacco		
Solanum nigrum	Blackberry Nightshade		
Solanum seaforthianum	Brazilian Nightshade		
Solanum torvum	Devils Fig		
Ulmus parvifolia	Chinese Elm		
Urochloa decumbens	Signal Grass		

2.5.3 Threatened Flora

For the purposes of this report, a significant flora species has been defined as a species that is:

- scheduled as Critically Endangered, Endangered, Vulnerable or Conservation Dependent under the Commonwealth EPBC Act; and/or
- scheduled as Endangered, Vulnerable, or Near Threatened under the Queensland NCA; and/or
- identified by ICC as a locally significant species in Ipswich Planning Scheme.

The EPBC Act PMR listed 17 threatened native flora species considered to have potential to occur on-site or within a 5 km radius of a central point within the site. Two of these flora species were observed and recorded during the field surveys, *Coleus habrophyllus* (formerly known as *Plectranthus habrophyllus*) and *Macadamia integrifolia* (Macadamia nut). *Coleus habrophyllus* was observed to be off-site, adjacent to the south-western corner of the site and will not be impacted by the proposed development.

One individual Macadamia nut specimen was recorded outside of the proposed action area within the ground-truthed rehabilitated LRSA TEC. It is unclear whether the Macadamia nut specimen has been planted as part of the rehabilitation efforts, or if it is naturally occurring. Despite search efforts, no additional

Macadamia Nut specimens were identified within the bounds of the site or proposed earthworks area. No threatened flora species listed under the EPBC Act were identified within the proposed development.

It is also noted that *Gossia gonoclada* (angle-stemmed myrtle) has been confirmed to occur adjacent to the proposed action site within rainforest habitat areas associated with Opossum Creek and Woogaroo Creek. Four (4) angle-stemmed myrtle individuals were recorded by the University of Queensland in 2020 and 2021 as part of Myrtle rust surveys of Eastern Australia (Fensham *et al.,* 2021). The records were located along Opossum Creek and Woogaroo Creek within rainforest dominated vegetation, located outside the referral area and adjoining vegetation retention areas proposed as part of the action. One (1) record from the study located along Opossum Creek and dated July 2020 is published on ALA. No specimens of the species were detected by SHG.

Further detail on *Coleus habrophyllus* and *Macadamia integrifolia* located proximal to the disturbance footprint are provided in the following subsections.

2.5.3.1 Coleus habrophyllus

Coleus habrophyllus occurs on chert or sandstone outcrops, in open woodlands often in shaded situations near vine forest. The species has a highly limited distribution with only seven known populations including: Oxley Creek, Greenbank; Opposum Creek, Springfield; Woogaroo Creek, Goodna; three populations within White Rock Conservation Park, incorporating Six Mile Creek and near Ormeau (south of Beenleigh). *Coleus habrophyllus* specimens were recorded as to the south-west of the subject site (refer **Plan A8** and **Photo set 7**). Three small patches were observed in this location measuring approximately 1 m^2.

The referral area and adjoining areas have been traversed multiple times over multiple years by experienced flora ecologists and no specimens or microhabitat to support the species have been recorded within the referral area. The whole referral area has been assessed as part of flora surveys (refer **Plan A8**). SHG Ecologists have over 10 years of experience in detecting this species as part of impact assessments within Greater Springfield. As a result, the species is considered to be highly detectable noting the specific habitat requirements and characteristic features. It is unlikely that any specimens, if present within the referral area, would not have been observed. The confirmed presence of a confined area of specimens south-west of the referral area provides additional certainty that survey effort to detect the species is sufficient.

Photo set 7: ***Coleus habrophyllus*** **specimens observed off-site, adjacent to the south-western boundary**

2.5.3.2 *Macadamia integrifolia* (Macadamia Nut)

Macadamia integrifolia grows in remnant rainforest and is an indicator species of the LRSA TEC. It prefers to grow in mild frost-free areas with reasonably high rainfall. Vegetation communities range from notophyll mixed forest, extremely tall closed forest, simple notophyll mixed very tall closed forest to simple microphyll-notophyll mixed mid-high closed forest with Araucaria and Argyrodendron emergents. One (1) *Macadamia integrifolia* specimen was recorded within the area identified to contain indicators of LRSA TEC to the west of the site (refer **Plan A8** and **Photo 8**) and will not be impacted by the proposed development.

Photo 8: ***Macadamia integrifolia*** **(Macadamia nut) observed off-site, adjacent to western boundary**

2.5.4 General fauna observations

The following observations were made based on the field survey:

- A total of 77 fauna species were observed on-site or as fly over species over the total combined survey effort completed by SHG (refer **Table A22**). The fauna species consisted of 59 bird, 13 mammal, four (4) reptile and one (1) amphibian species.

- Detailed surveys to record potential habitat features were undertaken across the site. This included burrows, terrestrial termite mounds, arboreal termite mounds, hollow-bearing trees and rocky outcrops.
- A number of the species observed are common to the local area and typically found in urbanised environments. One species, the cane toad (*Rhinella marina*), listed as invasive under the EPBC Act was observed during field survey and European red fox (*Vulpes vulpes*) has been observed on multiple occasions within the site. Species of significance were observed within the site including the rufous fantail (*Rhipidura rufifrons*), rainbow bee-eater (*Merops ornatus*) and grey-headed flying-fox (*Pteropus poliocephalus)*. The rufous fantail and rainbow bee-eater are listed under the EPBC Act as migratory and marine, where a number of individuals were recorded across the site and are considered relatively abundant within the area.
- A total of sixteen (16) SAT surveys have been undertaken across the referral site to understand Koala usage. All SAT surveys recorded koala faecal pellets, where all indicated a low usage level utilising the East Coast medium-high classification except for SAT 1 which indicated a *high* usage level (raw data is provided in **Attachment A4**). Only indirect evidence of koala was recorded during field survey, where no physical observations of koala were recorded. Koala SAT survey results are detailed in **Section 2.3.2.**
- Spotlighting meanders completed in August 2023 detected multiple species including southern boobook owl (*Ninox boobook*), tawny frogmouth (*Podargus strigoides*), common brushtail possum (*Trichosurus vulpecula*), microbats (*Microchiroptera* sp.) and the grey-headed flying-fox (*Pteropus poliocephalus*) which was recorded as a fly-over species.
- UAV drone surveys and spotlighting completed by BAAM confirmed the presence of two (2) koalas in August 2024 (refer **Attachment A3**).

Table A22: Observed fauna species

Scientific name	Common name	Significance status	Detection method
Birds			
Acanthiza pusilla	Brown Thornbill		Direct observation
Acanthorhynchus tenuirostris	Eastern Spinebill		Direct observation
Alectura lathami	Australian Brush-Turkey		Direct observation
Alisterus scapularis	Australian King Parrot		Direct observation
Artamus leucorynchus	White-Breasted Woodswallow		Direct observation
Cacatua galerita	Sulphur-Crested Cockatoo		Direct observation
Caligavis chrysops	Yellow-Faced Honeyeater		Direct observation
Climacteris picumnus	Brown Treecreeper		Direct observation (off-site)
Coracina novaehollandiae	Black-Faced Cuckoo-Shrike		Direct observation
Cormobates leucophaea	White-Throated Treecreeper		Direct observation
Corvus orru	Torresian Crow		Direct observation
Cracticus nigrogularis	Pied Butcherbird		Direct observation
Cracticus tibicen	Australian Magpie		Direct observation
Cracticus torquatus	Grey Butcherbird		Direct observation
Dacelo novaeguineae	Laughing Kookaburra		Camera, direct observation
Dicrurus bracteatus	Spangled Drongo		Direct observation
Entomyzon cyanotis	Blue-Faced Honeyeater		Direct observation
Eolophus roseicapilla	Galah		Direct observation
Eopsaltria australis	Eastern Yellow Robin		Direct observation
Geopelia humeralis	Bar-Shouldered Dove		Call
Geopelia striata	Peaceful Dove		Call
Grallina cyanoleuca	Magpie-Lark		Direct observation
Gymnorhina tibicen	Australian Magpie		Camera, direct observation
Hirundo neoxena	Welcome Swallow		Direct observation
Lichenostomus chrysops	Yellow-Faced Honeyeater		Direct observation
Lichenostomus fuscus	Fuscous Honeyeater		Direct observation
Lichmera indistincta	Brown Honeyeater		Direct observation
Macropygia phasianella	Brown Cuckoo-dove		Direct observation
Malurus cyaneus	Superb Fairy-Wren		Direct observation
Malurus lamberti	Variegated Fairy Wren		Direct observation

Scientific name	Common name	Significance status	Detection method
Malurus melanocephalus	Red-Backed Fairy Wren		Direct observation
Manorina melanocephala	Noisy Miner		Direct observation
Meliphaga lewinii	Lewins Honeyeater		Direct observation
Melithreptus albogularis	White-Throated Honeyeater		Direct observation
Merops ornatus	Rainbow Bee-Eater	EPBC Act – Migratory / Marine	Direct observation
Milvus migrans	Black Kite		Direct observation
Myzomela sanguinolenta	Scarlet Honeyeater		Direct observation
Neochmia temporalis	Red-Browed Finch		Direct observation
Ninox boobook	Southern Boobook		Direct observation
Pachycephala rufiventris	Rufous Whistler		Direct observation
Pardalotus striatus	Striated Pardalote		Direct observation
Petroica rosea	Rose Robin		Direct observation
Phaps chalcoptera	Common Bronzewing		Direct observation
Philemon corniculatus	Noisy Friarbird		Direct observation
Podargus srigoides	Tawny Frogmouth		Direct observation
Psophodes olivaceus	Eastern Whipbird		Direct observation
Rhipidura fuliginosa	Grey Fantail		Direct observation
Rhipidura leucophrys	Willie Wagtail		Direct observation
Rhipidura rufifrons	Rufous Fantail	EPBC Act – Migratory / Marine	Direct observation
Sericornis frontalis	White Browed Scrub Wren		Direct observation
Strepera graculina	Pied Currawong		Direct observation
Taeniopygia bichenovii	Double-Barred Finch		Direct observation
Todiramhus macleayii	Forest Kingfisher		Direct observation
Trichoglossus chlorolepidotus	Scaly-Breasted Lorikeet		Direct observation
Trichoglossus haematodus	Rainbow Lorikeet		Direct observation
Turnix varius	Painted Button Quail		Direct observation
Vanellus miles	Masked Lapwing		Direct observation
Zanda funerea	Yellow-tailed Black cockatoo		Direct observation
Zosterops lateralis	Silvereye		Direct observation
Reptiles			
Calia vivax	Lively Rainbow Skink		Direct observation

Scientific name	Common name	Significance status	Detection method
Chlamydosaurus kingii	Australian Frilled Lizard		Direct observation
Intellagama lesueurii	Australian Water Dragon		Direct observation
Lampropholis guichenoti	Common Garden Skink		Direct observation
Pogona barbata	Eastern Bearded Dragon		Camera
Varanus varius	Lace Monitor		Direct observation
Amphibians			
Rhinella marina	Cane Toad	Invasive	Direct observation
Mammals			
Chalinolobus gouldii	Gould's Wattled Bat		Anabat
Macropus giganteus	Eastern Grey Kangaroo		Camera
Macropus rufogriseus	Red-necked Wallaby		Camera
Miniopteris australis	Little Bent-Wing Bat		Anabat
Mormopterus norfolkensis	East-Coast Free-Tailed Bat		Anabat
Phascogale tapoatafa	Brush-tailed Phascogale		Camera
Phascolarctos cinereus	Koala	EPBC Act – Vulnerable	Scats, direct observation spotlighting (BAAM)
Pteropus poliocephalus	Grey-Headed Flying-Fox (fly-over only)	EPBC Act - vulnerable	Direct observation
Rattus fuscipes	Bush Rat		Camera
Tachyglossus aculeatus	Short-beaked Echidna	NCA – Special Least Concern	Camera
Trichosurus vulpecula	Common Brushtail Possum		Camera
Vulpes vulpes	European Red Fox	Invasive	Camera, direct observation
Wallabia bicolor	Swamp Wallaby		Camera

2.5.5 Camera survey results

A total of ten (10) baited motion-triggered camera traps were installed across the site and broader landholdings for fifteen (15) nights in August 2023 to increase the potential for observations of cryptic or nocturnal species. The camera traps were baited with chicken necks to target native carnivorous mammals and incidental observation of fauna such as koala. Several native species were recorded including species that were not previously recorded as part of previous survey efforts. The species recorded and detection dates are summarised in **Table A23**.

Table A23: Motion sensor camera survey results 2023

ID	Date	Scientific Name	Common Name	Taxa	Native/ Introduced
1	28/07/2023	*Wallabia bicolor*	Swamp Wallaby	Mammal	Native
	30/07/2023	*Macropus rufogriseus*	Red-necked Wallaby	Mammal	Native
	5/08/2023				
	1/08/2023	*Macropus giganteus*	Eastern Grey Kangaroo	Mammal	Native
2	-	-	-	-	-
3	2/08/2023	*Ratus fuscipes*	Bush Rat	Mammal	Native
	2/08/2023	*Climacteris picumnus*	Brown Treecreeper	Bird	Native
4	27/07/2023	*Phascogale tapoatafa*	Brush-tailed Phascogale	Mammal	Native
	28/07/2023	*Gymnorhina tibicen*	Australian Magpie	Bird	Native
	29/07/2023				
	30/07/2023				
	30/07/2023	*Macropus giganteus*	Eastern Grey Kangaroo	Mammal	Native
	31/07/2023	*Macropus rufogriseus*	Red-necked Wallaby	Mammal	Native
	3/08/2023	*Trichosurus vulpecula*	Common Brushtail Possum	Mammal	Native
	5/08/2023	*Dacelo novaeguineae*	Laughing Kookaburra	Bird	Native
	8/08/2023	*Vulpes vulpes*	European Red Fox	Mammal	Introduced
	10/08/2023				
5	27/07/2023	*Macropus rufogriseus*	Red-necked Wallaby	Mammal	Native
	10/08/2023				
6	27/07/2023	*Trichosurus vulpecula*	Common Brushtail Possum	Mammal	Native
	4/08/2023				
	9/08/2023				
	10/08/2023				
	28/07/2023	*Pogona barbata*	Eastern Bearded Dragon	Reptile	Native
	5/08/2023				
	31/07/2023	*Vulpes vulpes*	European Red Fox	Mammal	Introduced
	3/08/2023				
	31/07/2023	*Macropus giganteus*	Eastern Grey Kangaroo	Mammal	Native
	1/08/2023				
	2/08/2023				
	6/08/2023				
	31/07/2023	*Tachyglossus aculeatus*	Short-beaked Echidna	Mammal	Native
7	1/08/2023	*Macropus rufogriseus*	Red-necked Wallaby	Mammal	Native
	3/08/2023				
	7/08/2023				
	8/08/2023				
	28/07/2023	*Wallabia bicolor*	Swamp Wallaby	Mammal	Native
	6/08/2023				
	30/07/2023	*Macropus giganteus*	Eastern Grey Kangaroo	Mammal	Native
	8/08/2023				

ID	Date	Scientific Name	Common Name	Taxa	Native/ Introduced
	9/08/2023				
	31/07/2023	*Vulpes vulpes*	European Red Fox	Mammal	Introduced
	1/08/2023				
	2/08/2023				
	7/08/2023				
	3/08/2023	*Tachyglossus aculeatus*	Short-beaked Echidna	Mammal	Native
8	29/07/2023	*Macropus rufogriseus*	Red-necked Wallaby	Mammal	Native
	1/08/2023				
	6/08/2023				
	8/08/2023				
	30/07/2023	*Macropus giganteus*	Eastern Grey Kangaroo	Mammal	Native
	3/08/2023	*Wallabia bicolor*	Swamp Wallaby	Mammal	Native
	4/08/2023				
	7/08/2023	*Vulpes vulpes*	European Red Fox	Mammal	Introduced
	7/08/2023	*Tachyglossus aculeatus*	Short-beaked Echidna	Mammal	Native
9	27/07/2023	*Macropus rufogriseus*	Red-necked Wallaby	Mammal	Native
	30/07/2023				
	31/07/2023				
	4/08/2023				
	6/08/2023				
	7/08/2023				
	4/08/2023	*Trichosurus vulpecula*	Common Brushtail Possum	Mammal	Native
	4/08/2023	*Macropus giganteus*	Eastern Grey Kangaroo	Mammal	Native
	10/08/2023				
	4/08/2023	*Tachyglossus aculeatus*	Short-beaked Echidna	Mammal	Native
	5/08/2023	*Vulpes vulpes*	European Red Fox	Mammal	Introduced
10	31/07/2023	*Macropus giganteus*	Eastern Grey Kangaroo	Mammal	Native
	7/08/2023				
	7/08/2023	*Vulpes vulpes*	European Red Fox	Mammal	Introduced

3. Quantification of impacts

Items 4.1, 4.2, 4.3 and 4.4 of the PD Request are responded to in this section.

Item 4.1 of the PD Request asks to ***"provide a description of all components of the proposed action, including the anticipated timing and duration (including start and completion dates) of each component of the proposed action, including clearing, construction, and any rehabilitation activities. This should include an outline of the expected timing of all components of the proposed action."***

Item 4.2 of the PD Request asks to ***"provide a description of the intended land uses proposed as part of the completed development, including of the proposed open space and conservation areas and associated ongoing activities, and details of the intended party that would be responsible for future management activities."***

Item 4.3 of the PD Request requests ***"include current maps and coordinates/shapefile of the proposed impact area and areas of Koala habitat to be retained. Maps must clearly identify development footprints, buffer zones, and any conservation areas where impacts will be avoided, and areas of adjacent habitat that would be subject to indirect impacts, including areas of threatened ecological communities that are to be retained within and adjacent to the site."***

Item 4.4 of the PD Request asks to ***"confirm the area of habitat that will be directly and indirectly impacted by the proposed action, including areas where:***

a) Connectivity to surrounding habitat will be retained or removed.

b) Adjacent habitat will be subject to intensification of ongoing impacts (for example, through increased levels of dust or polluted runoff)."

3.1 Proposed impact, intended land uses and retention areas

As detailed in **Section 1**, the intended land uses proposed as part of the completed development can broadly be distinguished as areas to be impacted and retained. The areas to be impacted total 133.9 ha of the 161.4 ha project site and are comprised by three main land uses including 123 ha of urban areas (residential and community infrastructure), 8.2 ha of bioretention basins, 0.1 ha of stormwater outlets internal to the development, and 2.6 ha of temporary impacts for the construction of batters which will be rehabilitated as linear open space areas (refer **Plan A1**). It is noted that 7.6 ha of the 133.9 ha development land uses within the project area have been previously approved for removal by the Department under EPBC 2014/7306, resulting in a disturbance footprint as a result of the action of 126.4 ha.

It is noted that a maximum of 128 ha of disturbance/impact footprint is proposed to cater for a level of unknown finishes around infrastructure installation and earthworks edges associated with future operational works approvals.

The final landform of the proposed action site will include a large portion of mixed sized residential allotments, a local centre including a childcare, local and linear parks, a sports field and associated infrastructure, stormwater infrastructure, rehabilitation and retained natural areas. Rehabilitation work proposed in association with the abutting Woogaroo and Opossum Creeks will be undertaken by a contractor and handed over to local government for ongoing future management activities. Further, the development has been designed to situate esplanade roads, stormwater management systems and smaller rehabilitation / park areas between residential dwellings and retained natural and riparian areas. This is to provide additional buffers between the core habitats of retained corridors adjacent to the development footprint. This also assists in the mitigation of ongoing impacts to existing and future vegetation condition, fauna occurrence and ecosystem function.

An area of 27.5 ha of remnant vegetation identified as habitat for the koala, grey-headed flying-fox, regent honeyeater and swift parrot is proposed to be retained *in situ* for conservation purposes and will receive rehabilitation efforts as part of future management (e.g. weed removal, invasive species extraction, or infill planting) undertaken during the construction and operational phases of the action. The proposed vegetation retention area is located predominantly within the western portion of the site and will contribute to ongoing functional connectivity associated with Opossum Creek and Woogaroo Creek corridors adjoining the site (refer **Plan A1**). The area to be retained contains the two patches of ground-truthed LRSA TEC restricted which will be rehabilitated as part of the project. **Plan A42** demonstrates a minimum of a 50-metre buffer will be delivered between the LRSA TEC and development land uses including impacts associated with clearing and construction and all permanent land uses including recreational open space areas.

Indirect impacts to the proposed vegetation retention areas during clearing and construction are to be managed in accordance with the mitigation measures detailed in **Section 5.3**.

The consolidation of the development footprint and consideration of areas at locations around the boundary to be rehabilitated provides a high level of confidence as to the entire disturbance footprint. It is unlikely the development will impact areas outside of that assessed in **Plan A36** and **Plan A42**. Furthermore, the development layout facilitates continued movement opportunity via the riparian corridor associated with Opossum and Woogaroo Creeks and the drainage line along the western boundary.

3.2 Timing and delivery of project

The expected timing of clearing and construction aspects and components of the proposed action have been detailed within **Section 1.2**. Broadly, the project will be delivered as two separate stages being Stage 1 – Village 2 (2025 to 2030) and Stage 2 – Village 3 (2030 to 2045).

27.5 ha of remnant vegetation will be retained and rehabilitated as part of the action. A Preliminary Bushland Management Plan (BMP) has been prepared detailing the overall area and broad management zones that will be subject to rehabilitation and management techniques proposed to be implemented. It is noted that the Preliminary BMP is a draft document a detailed version(s) will be prepared and submitted to Ipswich City Council as required by the ADP approvals for Village 2 and Village 3. The BMP(s) will form part of the documentation required to obtain operational works approvals for the relevant phase and will be implemented in accordance with the development staging (refer **Plan A4**).

Specific timing for the timing of operational works approvals and therefore rehabilitation management is not available at this stage, noting these approvals are proposed to be obtained over the life of the project estimated to be delivered over a 20-year period from Q4 2025 to Q4 2045. Indicatively, the proposed rehabilitation area associated with the road crossing at O'Dwyer's Gully from Mur Boulevard is a critical development component and will likely occur in the initial stages of the development. Rehabilitation works in the proposed areas within O'Dwyer's Gully will occur after the construction of the road crossing, likely to be complete by 2027.

The proposed rehabilitation within the western vegetation retention area located in the western part of the site within Stage 2 – Village 3 will occur progressively in line with operational works approvals obtained from 2030 to 2045. This will enable potential edge effects to be managed commensurate with adjoining development impacts. Refer to **Section 5.5** for further details on the rehabilitation measures proposed. Section 5.3 of the MNES Management Plan provided at **Attachment A7** details management measures, proposed monitoring activities and associated timeframes to assess rehabilitation outcomes.

3.3 Habitat connectivity

An area of 27.5 ha of remnant vegetation will be retained within the proposed action site. The majority of the vegetation retention area is located in the western portion of the proposed action site, directly adjoining creekline areas including Opossum Creek and Woogaroo Creek. The surrounding riparian corridors are retained within Council land and will be buffered by the retained bushland area within the proposed action site (refer **Plan A36**).

Additionally, the LRSA TEC patches located in the western part of the impact area are located within the proposed vegetation retention areas and development impacts will be wholly avoided with a minimum of 50 m buffer delivered between the extent of the patches and all development uses and work activities (refer **Plan A42**). No development land uses including during clearing and construction are proposed between the patches and the Opossum Creek, allowing continued connectivity and facilitating dispersal by fauna and flora. The riparian areas of Opossum Creek, Woogaroo Creek and O'Dywer's Gully located outside of the proposed action site were previously handed over to Council to manage as Council-owned land.

An analysis of potential direct and indirect impacts on MNES habitat including adjoining habitat areas are provided in **Section 4.9** and detailed avoidance and mitigation measures are provided in **Section 5**.

4. MNES Impact Assessment

Item 4.5 of the PD Request asks to ***"confirm the quantity of suitable habitat to be impacted within the development footprint."***

The following subsections provide detailed information regarding the quantification of impacts for koala, grey-headed flying-fox, swift parrot, regent honeyeater, greater glider and the LRSA TEC.

In addition, an assessment against the Significant Impact Guidelines (SIG 1.1) has been completed for the following MNES:

- Swift parrot (*Lathamus discolor*) – Critically Endangered (**Section 4.3**);
- Regent honeyeater (*Anthochaera phrygia*) – Critically Endangered (**Section 4.4**); and
- Greater glider (*Petauroides volans*) – Vulnerable (**Section 4.5**).
- White-throated needletail (*Hirundapus caudacutus*) – Vulnerable (**Section 4.1.6**).
- Collared delma (*Delma torquata*) – Vulnerable (**Section 4.1.7**).

Specific definitions relating to the significant impact assessment are presented in **Table A24**.

Table A24: Significant Impact Guidelines 1.1 definitions

Term	Species Listing Status applicable	Definition
Important population	Vulnerable species	An **'important population'** is a population that is necessary for a species' long-term survival and recovery. This may include populations identified as such in recovery plans, and / or that are: • key source populations either for breeding or dispersal • populations that are necessary for maintaining genetic diversity, and/or • populations that are near the limit of the species range.
Population of a species	Critically Endangered and Endangered species	A **'population of a species'** is defined under the EPBC Act as an occurrence of the species in a particular area. In relation to critically endangered, endangered or vulnerable threatened species, occurrences include but are not limited to: • a geographically distinct regional population, or collection of local populations, or • a population, or collection of local populations, that occurs within a particular bioregion.

Term	Species Listing Status applicable	Definition
Invasive species	Critically Endangered and Endangered species	An **'invasive species'** is an introduced species, including an introduced (translocated) native species, which out-competes native species for space and resources or which is a predator of native species. Introducing an invasive species into an area may result in that species becoming established. An invasive species may harm listed threatened species or ecological communities by direct competition, modification of habitat or predation.
Habitat critical to the survival of a species of ecological community	Critically Endangered and Endangered species	**'Habitat critical to the survival of a species or ecological community'** refers to areas that are necessary: • for activities such as foraging, breeding, roosting, or dispersal • for the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators) • to maintain genetic diversity and long-term evolutionary development, or • for the reintroduction of populations or recovery of the species or ecological community. Such habitat may be but is not limited to: habitat identified in a recovery plan for the species or ecological community as habitat critical for that species or ecological community; and/or habitat listed on the Register of Critical Habitat maintained by the minister under the EPBC Act.
Significant Impact	Critically Endangered, Endangered and Vulnerable species	A **'significant impact'** is an impact which is important, notable, or of consequence, having regard to its context or intensity. Whether or not an action is likely to have a significant impact depends upon the sensitivity, value, and quality of the environment which is impacted, and upon the intensity, duration, magnitude and geographic extent of the impacts. A proponent should consider all of these factors when determining whether an action is likely to have a significant impact on matters of national environmental significance In order to decide whether an action is likely to have a significant impact, it is necessary to take into account the nature and magnitude of potential impacts. In determining the nature and magnitude of an action's impacts, it is important to consider matters such as: • the sensitivity of the environment which will be impacted • the timing, duration and frequency of the proposed development and its impacts • all on-site and off-site impacts • all direct and indirect impacts

Term	Species Listing Status applicable	Definition
		• the total impact which can be attributed to the proposed development over the entire geographic area affected, and over time • existing levels of impact from other sources, and • the degree of confidence with which the impacts of the proposed development are known and understood.

4.1 Koala

4.1.1 Assessment Methodology

The action proposes impacts to **127.02 ha** (excluding the approved Mur Boulevard extension EPBC 2014/7306) of vegetation that is identified as providing critical habitat for the koala. This includes direct impacts to 126.45 and the functional loss of 0.57 ha. A maximum impact area of **128 ha** has been nominated to account for potential changes to clearing edges that may occur with during the operational works phases of the action (refer **Section 3.1**). The site was delineated into two assessment units (AUs) to reflect the differing states of the vegetation on-site (refer **Plan A10**). To determine the quantum impact and quality of the habitat suitable for koala on-site, vegetation / habitat quality was derived from the Modified Habitat Quality Assessment (MHQA) tool. This assessment approach utilises the Queensland *Guide to determining terrestrial habitat quality: A toolkit for assessing land based offsets under the Queensland Environmental Offsets Policy* (version 1.2) and Queensland *BioCondition Assessment* method combined with site context and species stocking rate assessments to determine the habitat quality of the referral area.

Modified Habitat Quality Assessment

The following section details the methodology utilised to assess the site condition, site context and species stocking rate under the MHQA.

Site Condition (30 %)

Assessing site condition is an integral step in determining specific quantification of impacts, while also determining whether an offset site is suitable to establish a desired capacity to support the prescribed environmental matters being offset. The on-site condition is a key element of habitat quality and has a direct influence on the biodiversity it supports. Site condition is assessed using a suite of attributes to describe the structure and function of the vegetation community and is benchmarked against the expected range for a relatively undisturbed community.

The site condition assessment under the MHQA is assessed using 15 condition characteristics. Each condition characteristic and the relevant scoring and benchmark percentage is provided in **Table A25**.

Table A25: Koala site condition scoring attributes (BioCondition Manual)

Site condition attribute	Scoring and benchmark percentage			
	Score	0	3	5

Site condition attribute	Scoring and benchmark percentage				
(1) Recruitment of woody perennial species in ecologically dominant layer in EDL*	Benchmark	<20%	≥20-75%		≥75%
(2) Native plant species richness – trees	Score	0	2.5		5
	Benchmark	<25%	≥25-90%		≥90%
(3) Native plant species richness – shrubs	Score	0	2.5		5
	Benchmark	<25%	≥25-90%		≥90%
(4) Native plant species richness – grasses	Score	0	2.5		5
	Benchmark	<25%	≥25-90%		≥90%
(5) Native plant species richness – forbs	Score	0	2.5		5
	Benchmark	<25%	≥25-90%		≥90%
(6) Tree canopy height	Score	0	3		5
	Benchmark	<25%	≥25-70%		≥70%
(7) Tree canopy cover	Score	0	2	3	5
	Benchmark	<10%	≥10%-<50%	≥200%	≥50-200%
(8) Shrub canopy cover	Score	0	3		5
	Benchmark	<10%	≥10%-<50% or ≥200%		≥50-<200%
(9) Native perennial grass cover	Score	0	1	3	5
	Benchmark	<10%	≥10-50%	≥50-90%	≥90%
(10) Organic litter	Score	0	3		5
	Benchmark	<10%	≥10%-50% or ≥200%		≥50-<200%
(11) Large trees	Score	0	5	10	15
	Benchmark	0%	0-50%	≥50-100%	≥100%
(12) Coarse woody debris	Score	0	2		5
	Benchmark	<10%	<50% or ≥200%		≥50% or <200%
(13) Non-native plant cover	Score	0	3	5	10
	Benchmark	>50%	≥25-50%	≥5-25%	<5%
(14) Quality and availability of food and foraging habitat	Score	1	5		10
	Benchmark	<33%	33-66%		>66%
(15) Quality and availability of shelter	Score	1	5		10
	Benchmark	<33%	33-66%		>66%

Assessment methodology of the above condition characteristics mostly do not differ from the traditional terrestrial habitat quality assessment. In developing the MHQA to better incorporate MNES, two (2) species habitat index characteristics, being (1) 'quality and availability of food and foraging habitat', and (2) 'quality and availability of shelter', have been added to the site condition indicator.

The two koala habitat index attributes are based on relevant site condition attributes that are considered to contribute to quality and availability of food and foraging habitat and quality and availability and shelter. The following six site condition attributes are utilised

- (1) Recruitment of woody perennial species in ecologically dominant layer in EDL
- (2) Native plant species richness – trees
- (6) Tree canopy height

- (7) Tree canopy cover
- (8) Shrub canopy cover
- (11) Large trees

For vegetation communities considered as koala habitat (*i.e.,* those containing *Eucalyptus*, *Corymbia*, *Angophora*, *Melaleuca*, or *Lophostemon* as part of the EDL), these attributes are all considered relevant to this scoring metric as each attribute contributes directly to the availability of foraging and shelter habitat.

Under the Habitat Quality Guideline from which these attributes are derived, each attribute is weighted equally, out of a score of 5, with the exception of 'large trees' which contributes a maximum score of 15. For the purpose of scoring the quality and availability of food and foraging habitat and quality and availability of shelter, the above attributes are proposed to be weighted equally based on relative value to the koala. The widely used minimum threshold for a koala foraging tree is a 'non-juvenile' tree (*i.e.,* ≥100mm DBH). As non-juvenile koala foraging trees are considered a foraging resource, large trees relative to the benchmark are not necessarily considered to provide greater habitat value than attributes such as 'canopy height' and 'native plant species richness – trees.' Therefore, an equal weighting has been applied to all six attributes as there is considered lack of evidence to suggest a higher weighting of any attribute relative to the value it provides for koala specifically.

A total weighted score out of 100 is achieved utilising an equally weighted score of the above attributes. Based on the overall weighted score, a score for 'quality and availability of food and foraging habitat' and 'quality and availability and shelter' is then scored as follows:

- <33 = 1
- 33 – 66 = 5
- >66 = 10

Site Context (30 %)

The site context assessment considers the landscape characteristics adjoining the site. Site context is measured using a suite of attributes to describe the location of the habitat within the surrounding landscape and the influence of its associated threats. This assessment also considers the influence of adjacent vegetated areas and ecological corridors. Under the MHQA, site context is measured using seven characteristics. In developing the MHQA, three species habitat index characteristics were nominated to form part of the site context characteristics: role of site location to overall species population in the state, threats to the species, and species mobility capacity. The seven characteristics are listed below with details of how each are measured in accordance with the *Guide to determining terrestrial habitat quality: A toolkit for assessing land based offsets under the Queensland Environmental Offsets Policy* (version 1.2).

- Size of patch – measured as the area of vegetation in which the assessment unit(s) is contained, and add on all other directly connecting areas of koala habitat (refer **Plan A37**).
- Connectedness – measured as the length koala habitat along the boundary of the site, calculated as a percentage (refer **Plan A37**).
- Context – measured as the percentage of koala habitat within a 1 km radius of the site (refer **Plan A37**).

- Ecological corridors – determine the proximity of the site to state, bioregional, regional or sub-regional corridors (terrestrial or riparian). An 'ecological corridor' is represented as any 'Riparian' or 'Terrestrial' feature within the 'CORR_TYPE' attribute table of the 'Queensland biodiversity and vegetation offsets special features' map (refer **Plan A38**).
- Role of site location to species overall population in the state – scored as the observed role of the site in relation to the overall population of the species considering the effect that damage to or removal of the site would have to the likelihood of overall population survival.
- Threats to the species – scored based on the number and severity of threatening processes observed at or adjacent to the site which may include clearing associated with development, creation of a barrier to movement, introduction or spread of disease or pathogens, risk of high-intensity fires, degradation of habitat from hydrological change and introducing or increasing mortality attributed to vehicle strike or dog attacks.
- Species mobility capacity – scored based on the presence and severity of factors that would contribute to a reduction in the mobility of the species such as barriers that would result in a long-term reduction in genetic fitness or access to important resources.

Unlike the traditional habitat quality assessment methodology where site connectedness is assessed against the surrounding remnant vegetation only, the MHQA size of patch, site connectedness and site context is assessed against identified koala habitat.

Koala habitat within the landscape is based on the mapping of Category B (remnant) and Category C (high value regrowth) vegetation containing suitable regional ecosystems to support the koala identified by the Queensland Herbarium. While remnant and regrowth eucalypt forest vegetation is critical habitat for koala, koalas are capable of utilising areas containing non-remnant vegetation or high value regrowth vegetation that does not yet achieve remnant status. Areas of Category X (non-remnant) areas identified as dispersal habitat are also included in the koala habitat mapping which are mapped using GIS. Therefore, site context under the MHQA accounts for broad koala habitat values rather only remnant vegetation as traditionally applied under the *Guide to determining terrestrial habitat quality*.

Scoring attributes extracted from the Habitat Quality Guideline are provided in **Table A26**.

Table A26: Koala site context scoring attributes

Site context attribute	**Scoring and benchmark percentage**				
Size of patch	0	2	5	7	10
	<5 ha	5-25 ha	26-100 ha	101-200 ha	>200 ha
Connectedness	0	2	4		5
	0-10%	>10-<50%	50-75%		>75% or >500 ha
Context	0	2	4		5
	<10% habitat	>10-30% habitat	>30-75% habitat		>75% habitat
Ecological corridors	0	4	6		

Site context attribute	Scoring and benchmark percentage			
	Not within	Sharing a common boundary	Within (whole or part)	
Role of the site location to species overall population in the state	1	4	5	
	Not or unlikely to be critical to survival of the koala	Likely to be critical to survival of the koala	Critical to the survival of the koala	
Threats to the species	1	7	15	
	High threat level	Moderate threat level	Low threat level	
Species mobility capacity	1	4	7	10
	Severely restricted (76-100% reduction)	High restricted (51-75% reduction)	Moderately restricted (26-50% reduction)	Minor restriction (0-25% reduction)

Species Stocking Rate (40 %)

The MHQA incorporates species stocking rate as an attribute not discussed under the traditional terrestrial habitat assessment methodology. Species stocking rates are estimates of the koala carrying capacity of the site at the time of undertaking the survey. Given the discreet nature of the koala and limited to no published literature on habitat carrying capacity of the species, the species stocking rate scoring methodology has been derived through the collation of site-specific surveys and surrounding contextual habitat analysis. Species stocking rate is calculated using the following parameters:

- Species presence on or adjacent to the site – whether or not evidence of koala has been recorded within or adjoining the site. Evidence may be direct in the form of observation of koalas, or indirect via the presence of scats.
- Species usage of the site (habitat type and evidenced usage) – the type of habitat includes vegetation structure such as whether it contains remnant, regrowth or non-remnant vegetation values, and evidenced usage is the confirmed presence or use of the species within the habitat. Both factors are used to inform the species usage of the site. Depending on the level of variability in vegetation and usage patterns across the site, this characteristic may be scored differently for assessment units.
- Approximate density of the species on the site – measured through the use of Spot Assessment Technique (SAT) (Phillips *et al.* 2011) and targeted searches with a high probability of detection, including UAV drone surveys. The combination of methods produces a higher reliability of data when extrapolating koala density. The SAT method is an industry recognised technique for identifying presence/absence of koala and measuring activity. SAT survey results are interpreted using the broad population categories provided in the Australian Koala Foundation Koala activity level classification table to infer an activity level or approximate density. These categories being 'East Coast (low)', 'East Coast (med-high)' and 'Western (med-high)' are shown in **Table A9** (refer **Section 2.3.2, e)**). Depending on the population category applied, koala activity is described as 0%, 'low', 'moderate', or 'high'.

- Role/importance of species population on site – the extent to which the site is considered a key source population for breeding, dispersal, is necessary for maintaining genetic diversity or near the limit of the species' range.

For subjective criteria where it is unclear whether a particular attribute score is achieved, the precautionary approach is applied to favour the higher score. **Table A27** outlines the attributes utilised to assess species stocking rate.

Table A27: Koala Species Stocking Rate Scoring

Attribute	**Scoring and criteria**				
Presence detected on or adjacent to site (neighbouring property with connecting habitat)	Score (/10)	0	5	10	
		No	Yes – adjacent to site	Yes – on-site	
Species usage of the site (habitat type and evidenced usage)	Score (/15)	0	5	10	15
		Not habitat	Dispersal habitat	Foraging habitat	Breeding habitat
Approximate density (per ha)	Score (/30)	0	10	20	30
		0%	Low	Medium	High
Role/importance of species population on site*	Score (/15)	0	5	10	15
		0	5-15	20-35	40-45
Total SSR	/70				
SSR Score	/4				

*Species Stocking Rate supplementary table – Total supplementary score 0 = 0, 5-15 = 5, 20-35 = 10, 40-45 = 15			
Key source population for breeding	Score (/10)	0	10
		No	Yes/Possibly
Key source population for dispersal	Score (/5)	0	5
		No	Yes/Possibly
Necessary for maintaining genetic diversity	Score (/15)	0	15
		No	Yes/Possibly
Near the limit of the species range	Score (/15)	0	15
		No	Yes

Scoring Weight Justification

For this project, site condition was given a weighted score out of 3, site context was given a weighted score out of 3, while species stocking rate was given a weighted score out of 4. The species stocking rate is an important component when assessing the overall habitat quality of a site as it indicates species usage and the capacity of a given area to support the koala therefore was weighted more heavily.

Site condition was weighted with a score out of 3. The koala is known to occupy a variety of habitats, ranging from non-remnant regrowth eucalypt forest / woodland through to old growth remnant forest / woodland. However, the site condition of the habitat is considered to directly influence the long-term koala carrying capacity.

Site context was weighted with a score out of 3. Site context is considered an important component when assessing the koala as it directly relates to the long-term survival rate of the species. The proximity of the site to other areas of suitable habitat, the movement pattern through the landscape of the koala (and / or barriers inhibiting movement), and threats to the species are important attributes to assess when considering the overall functionality of the site.

It is considered that the provision of this weighted scoring most accurately quantifies the ecological requirements of the koala, which will then assist in determining whether an offset site is suitable to establish a desired capacity to support the prescribed environmental matters being offset.

4.1.2 Discussion

Two (2) AUs were defined across the site to reflect the differing states of *in situ* vegetation composition. Transects were completed within each assessment unit. The AUs were delineated based upon aerial imagery and field survey ground-truthing of vegetation communities. It was determined through this approach that quantifying the vegetation condition of these two vegetation communities separately would provide the most accurate insight into the differing state of the vegetation across the AUs.

The two AUs and associated transects site numbers are as follows:

- AU1 represents RE12.9-10.19 habitat (Transects 1, 4, 5 and 6).
- AU2 represents RE 12.9-10.3 habitat (Transects 2 and 3).

The averages of the transects were taken to score each AU (refer **Table A32**). The complete raw data is located at **Attachment A7**.

The habitat quality scores for each assessment unit, combining site condition, site context and species stocking rate are reported in **Table A30** to **Table A28**. The scores for site condition are derived directly from the MHQA tool data. These scores are then used to determine the scores for quality and availability of food and foraging habitat, and quality and availability of shelter. The site was given an overall weighted habitat quality score of **6.78 (rounded to 7)** out of the total of 10 which is considered a moderate to high habitat quality score. This score is calculated based on the combined weighted habitat quality scores for each assessment unit summarise in **Table A28**.

Table A28: MHQA final weighted scores

MHQA Final Weighting	AU 1	AU 2
Assessment Unit Habitat Quality Score	6.75	6.95
Assessment Unit Area (Impact) (ha)	111.87	16.13
Total Impact Area (ha)	128.0	128.0
Size Weighting	0.874	0.126
AU Weighted Score	5.90	0.88
Total Weighted Score	**6.78**	

Site condition

The higher quality habitat is located within AU2 with a site condition score of 1.95 out of 3 (refer **Table A32**). AU1 scored 2.15 out of 3 for site condition.

AU2 makes up proportionally a smaller size of the referral area (16.13 ha out of a total 128 ha). AU2 was therefore contributed a size weighting of 0.126 in the final MHQA. The size weighting for AU1 is 0.874 (refer **Table A33**). Tree canopy cover scores met the benchmark for both AU1 and AU2, along with species richness of trees. However, other site condition benchmarks such as large trees are largely not met likely due to the historic disturbances across the referral area. The scores for the two habitat index characteristics being quality and availability of food and foraging habitat and quality and availability of shelter are discussed below. As detailed in **Section 4.1.1**, these scores are derived from the balance site condition attributes whereby koala foraging and sheltering habitat values are considered in terms of attributes including canopy crown cover, presence of large trees and average tree canopy height with a focus on how these attributes may influence the ability of the site to provide foraging and shelter resources.

Quality and availability of foraging and shelter habitat

The quality and availability of koala foraging and shelter habitat across the site is considered high. AUs 1 and 2 achieved 72.22% and 82.22% of the benchmark, respectively, therefore each achieving a score of **10 out of 10** for each attribute (refer **Table A29**).

Table A29: Quality and availability of foraging and shelter habitat scoring metric

Attribute	Weighting	Score		Weighted score	
		AU1	AU2	AU1	AU2
(1) Recruitment of woody perennial species in ecologically dominant layer in EDL	16.67	3	3	10.00	10.00
(2) Native plant species richness – trees	16.67	5	5	16.67	16.67
(6) Tree canopy height	16.67	4	5	13.33	16.67
(7) Tree canopy cover	16.67	5	5	16.67	16.67
(8) Shrub canopy cover	16.67	3	5	10.00	16.67
(11) Large Trees	16.67	5	5	5.56	5.56
	Total weighted score (/100)			**72.22%**	**82.22%**

Site context

Each assessment unit achieved the same scores for site context. Below provides a justification for the scoring of each attribute contained within the site context category.

Size of patch

This attribute is a measure of the size of the patch of vegetation in which the assessment unit is located. The scoring reflects the importance of large patches in the landscape and is based on the size of the patch of critical koala habitat connected to the site in this instance. This attribute is scored such that is reflects the fact that larger patches are less susceptible to ecological edge effects and are more likely to sustain viable populations of native flora and fauna than smaller patches. The size of patch attribute was calculated using GIS, and achieved a score of **10 out of 10** as the critical koala habitat patch on-site is calculated to be approximately 161.4 ha but is connected to a vegetated corridor of greater than 900 ha (as per the *Guideline to determining terrestrial habitat quality* methodology (refer **Plan A37**).

Connectedness

As a landscape level attribute, connectedness aims to assess the degree to which the assessment unit is connected with adjacent native vegetation. Connectedness relates to the capacity of the species to disperse through the landscape between sustainable patches of habitat, and therefore has important implications for species persistence. Connectedness was calculated using GIS, with the percentage of referral area boundary length supporting a koala critical habitat connection off and on site was calculated at 98 %, and consequently this attribute scored a **5 out of 5** as per the *Guide to determining terrestrial habitat quality* methodology (refer **Plan A37**).

Context

The context attribute refers to the amount of critical koala habitat that is retained within a 1 km buffer of the site being assessed and is calculated using GIS. Retained critical koala habitat within a 1 km buffer of the site was calculated at 48 %, and therefore the context attribute achieved a score of **4 out of 5** as per the *Queensland BioCondition Assessment* methodology (refer **Plan A37**).

Ecological corridors

GIS was utilised to identify the sites' role in any ecological corridors on or adjacent to the site (refer **Plan A38**). While the site is located outside of large regional corridors, a statewide riparian corridor overlaps the north-west boundary of the site. As a corridor is located within the site, this attribute was scored **6 out of 6.**

The site is connected to vegetation along the western boundary associated with Opossum and Woogaroo Creeks. There is a smaller patch of vegetation bounding the southern extent of the site, and a vegetation corridor associated with the unnamed tributary running in a general north-south direction abutting the eastern boundary. Residential estates dominate the wider landscape, and EPBC 2014/7306 residential development has neared the end of construction. The Flinders-Karawatha corridor is situated approximately 2 km to the east of the referral area. This corridor is anticipated to provide habitat and opportunity for fauna presence and movement with minimised risk of threats (such as vehicle strike).

Role of site location to species overall population in the state

This attribute aims to quantify the geographical importance of the site for koala populations across the broader state. This attribute achieved a score of **5 out of 5** (refer **Table A30** and **Table A32**). This score was assigned to the site as it contains a large area of remnant vegetation adjoining waterway corridors.

Threats to the species

The 'threats to the species' attribute aims to quantify the risk to the survival of koala existing within and immediately adjacent to the referral area. Key known threats to the survival of the koala include proximity to main roads which increases the risk of motor vehicle strike, as well as predation by wild or domestic dogs and European red foxes.

It is considered that the risk of motor vehicle strike to koala on and surrounding the site is relatively high due to the extent of road network abutting the site and presence of major roads. A review of publicly available databases (e.g. AKF Koala map, ALA koala recorded sightings, and Moggill Hill / Daisy Hill hospital records) indicates one koala death was recorded proximal to the site. This recording was situated approximately 1.5 km south-west of the subject site and recorded on 9 January 2010. In addition, two koala sightings have been recorded with a not of sickness / injury to the north of the site – recorded in October 2016 and January 2019. Many of the koala sightings recorded within the region have been proximal to major roads, suggesting that the risk of vehicle strike and therefore threat to koala longevity is high within the local area. Refer to **Plan A39** for hospital data of koala since the year 2000.

Due to the highly urbanised surrounding area, there is an increased presence of dogs within residential backyards. Members of the public have been observed utilising the site to walk their dogs both on- and off-leash. Fauna protection fencing bounding the site is not present, allowing ease of access from dogs. In addition, the EPBC-listed invasive species, European red fox (*Vulpes vulpes*) was sighted on-site during field survey efforts and a potential den site has been recorded. The impact of foxes on koala mortality rates is increasingly being considered as an active threat to koalas as opportunistic attacks are likely to occur when prey species abundance is lowered (Commonwealth of Australia, 2011; Department of Environment & Climate Change NSW, 2008). Due to habitat fragmentation and removal, koalas are forced to move across the ground for longer periods of time. Field surveys confirm that foxes are known to utilise the site therefore presenting a threat to koalas.

Due to the prevalence of risk of motor vehicle strike and predation by dogs and potential opportunistic predation by European red foxes, the attribute 'threats to the species' was scored **7 out of 15** or a 'moderate' level of threats. This was derived based on the high volume of recorded koala hospital records on or adjacent to the site since the year 2000, coupled with the field survey findings which confirmed koala usage on-site.

Additionally, it is noted that anticipated growth and planned residential development immediately surrounding the site will result in increased traffic flows and loss of suitable habitat adjoining the site.

Species mobility capacity

Species mobility capacity is used to quantify the ability of the species to move from the site and through the surrounding landscape to meet survival needs. Species mobility capacity is considered a particularly informative attribute in rapidly changing landscapes where broadscale land clearing and urbanisation have capacity to significantly reduce the capacity for koalas to move within a landscape. Grey-headed flying-foxes and other avifauna are considered highly mobile species due to their ability to cover large distances and because they are generally not impeded by land barriers such as highways or residential development.

Conversely, koalas are considered a relatively immobile species, requiring land for movement, and covering relatively small distances on-ground compared to other highly mobile fauna.

The species mobility capacity for the koala on-site was assigned a score of **10 out of 10**. The site contains remnant koala foraging habitat and is connected to bushland in the surrounding landscape associated with retained waterway corridors adjoining the site including Woogaroo Creek and Opossum Creek.

Species stocking rate

The final component of the MHQA technique is species stocking rate. The species stocking rate provides an estimation of the landscape's capacity to support koala and their range of life cycle requirements including dispersal, foraging and breeding as well as population-level dynamics. A species stocking rate score of **40 out of 70** was attributed to AU1 and AU2. This is based on the understanding that the site is used for foraging and breeding activities. Refer to
Table A31and **Table A33** for results.

Further details on the justification for the scoring of each attribute is provided below:

- Presence – A koala was observed within the site therefore 'presence detected on or adjacent to site' was assigned a score of **10 out of 10** for AU1 and AU2.
- Species usage of the site (habitat type and evidenced usage) – This attribute was scored a **15 out of 15** for AU1 and AU2 indicating foraging/breeding habitat.
- Approximate density – This attribute was scored as **10 out of 30** for AU1 and AU2 indicating low usage within the site as supported by on-site data including SAT surveys, drone and spotlighting data and public database records.
- Role/importance of species population on site – Using the precautionary principle, the site is considered a key source for population for dispersal under 'role/importance of species population on-site' therefore was scored a **5 out of 15** for AU1 and AU2.

To summarise, the action will impact on remnant koala habitat values of which the quality and threat level is influenced by its location within a predominantly urban setting. The vegetation on the site is connected in the landscape via the adjoining waterway corridors providing ongoing movement capacity within the landscape. Threats exist within and adjoining site which include presence of dogs, foxes and vehicle strike potential. Substantial avoidance, management and mitigation measures (described in **Section 5**) are proposed to reduce indirect impacts on koala population longevity and function in the context of the Springfield locality. It is considered that any potential impacts on koalas detected during clearing and operation can be appropriately managed through the proposed mitigation and management measures, and ongoing movement opportunity will be facilitated within retained vegetation areas on-site and vegetation located within waterway corridors adjoining the site.

Table A30: Assessment Unit 1 – MHQA results (koala)

Assessment Unit - Regional Ecosystem	AU 1 - Remnant (RE12.9-10.19)							
	RE12.9-10.19 Benchmark	Transect 1	Transect 4	Transect 5	Transect 6	Average of Transect(s)	% Benchmark	Score
SITE CONDITION								
Recruitment of woody perennial species in EDL	100	50	37.5	50	60	49.38	49.38	3
Native plant species richness - trees	5	6	8	8	5	6.75	135.00	5
Native plant species richness - shrubs	7	3	5	5	6	4.75	67.86	2.5
Native plant species richness - grasses	11	3	2	2	2	2.25	20.45	0
Native plant species richness - forbs	14	5	5	6	7	5.75	41.07	2.5
Tree canopy height (Canopy)*	28	20	16	20	20	19.00	67.86	3
Tree canopy height (Sub-canopy)*	9	15	6	5	8	8.50	94.44	5
							*Average tree canopy height	4
Tree canopy cover (Canopy)**	55	74.5	51.7	62.5	48	59.175	107.59	5
Tree canopy cover (Sub-canopy)**	19	32.4	42.3	19.7	15.8	27.55	145.00	5
							**Average tree canopy cover	5
Shrub canopy cover	15	0	4	5.9	2.6	3.13	20.83	3
Native grass cover*	19	10	21.4	8.8	15	13.80	72.63	3
Organic litter*	55	47	62.2	82.2	74.2	66.40	120.73	5
Large trees (euc plus non-euc) (per ha)	66	16	6	0	2	6.00	9.09	5
Coarse woody debris (per ha)	299	128	110	141	72	112.75	37.71	2
Non-native plant cover	0	10	7.5	0	6	5.88	5.88	5
Quality and availability of food and foraging habitat	NA	10	10	10	10	10.00	-	10
Quality and availability of shelter	NA	10	10	10	10	10.00	-	10
							Site Condition Score (/100)	65
							Overall Site Condition Score - out of 3	1.95
SITE CONTEXT								
Size of patch	10	10	10	10	10	10		10
Connectedness	5	5	5	5	5	5		5
Context	5	4	4	4	4	4		4
Ecological Corridors	6	6	6	6	6	6		6
Role of site location to species overall population in the state	5	5	5	5	5	5		5
Threats to the species	15	7	7	7	7	7		7
Species mobility capacity	10	10	10	10	10	10		7
							Site Context Score (/56)	47
							Overall Site Context Score - out of 3	2.52
SPECIES STOCKING RATE								
Koala Stocking Rate (utilising SSR & SSR Supplementary Table(s))	70	40	40	40	40	40		40
							Species Stocking Rate Score (/70)	40.00
							Overall Species Stocking Rate Score - out of 4	2.29
							Overall Assessment Unit Score	6.75

Table A31: Assessment Unit 1 – Koala Species Stocking Rate Results

Species Stocking Rate attributes	
Presence detected on or adjacent to site (neighbouring property with connecting habitat)	10/10
Species usage of the site (habitat type and evidenced usage)	15/15
Approximate density (per ha)	10/30
Role/importance of the species population on site*	5/15
Total Species Stocking Rate Score	**40/70**
Species Stocking Rate Score – out of 4	**2.29**

***Species Stocking Rate supplementary table attributes**	
Key source population for breeding	0/10
Key source population for dispersal	5/5
Necessary for maintaining genetic diversity	0/15
Near the limit of the species range	0/15

Table A32: Assessment Unit 2 –MHQA results (koala)

Assessment Unit - Regional Ecosystem	AU 2 - Remnant (RE12.9-10.3)					
	RE12.9-10.3 Benchmark	Transect 2	Transect 3	Average of Transect(s)	% Benchmark	Score
SITE CONDITION						
Recruitment of woody perennial species in EDL	100	40	30	35.00	35.00	3
Native plant species richness - trees	5	10	12	11.00	220.00	5
Native plant species richness - shrubs	5	2	3	2.50	50.00	2.5
Native plant species richness - grasses	9	5	4	4.50	50.00	2.5
Native plant species richness - forbs	17	7	6	6.50	38.24	2.5
Tree canopy height (Canopy)*	26	19	20	19.50	75.00	5
Tree canopy height (Sub-canopy)*	12	14	15	14.50	120.83	5
					*Average tree canopy height	5
Tree canopy cover (Canopy)**	50	77.6	54.7	66.15	132.30	5
Tree canopy cover (Sub-canopy)**	15	17.4	28.1	22.75	151.67	5
					**Average tree canopy cover	5
Shrub canopy cover	9	14.9	0	7.45	82.78	5
Native grass cover*	40	19	0	9.50	23.75	1
Organic litter*	40	44	32	38.00	95.00	5
Large trees (euc plus non-euc) (per ha)	26	6	12	9.00	34.62	5
Coarse woody debris (per ha)	620	422	272	347.00	55.97	5
Non-native plant cover	0	10	5	7.50	7.50	5
Quality and availability of food and foraging habitat	NA	10	10	10	-	10
Quality and availability of shelter	NA	10	10	10	-	10
					Site Condition Score (/100)	71.5
					Site Condition Score (/100)	71.5
					Overall Site Condition Score - out of 3	2.15
SITE CONTEXT						
Size of patch	10	10	10	10		10
Connectedness	5	5	5	5		5
Context	5	4	4	4		4
Ecological Corridors	6	6	6	6		6
Role of site location to species overall population in the state	5	5	5	5		5
Threats to the species	15	7	7	7		7
Species mobility capacity	10	10	10	10		10
					Site Context Score (/56)	47
					Overall Site Context Score - out of 3	2.52
SPECIES STOCKING RATE						
Koala Stocking Rate (utilising SSR & SSR Supplementary Table(s)	70	40	40	40		40
					Species Stocking Rate Score (/70)	40.00
					Overall Species Stocking Rate Score - out of 4	2.29
					Overall Assessment Unit Score	6.95

Table A33: Assessment Unit 2 – Koala Species Stocking Rate Results

Species Stocking Rate attributes	
Presence detected on or adjacent to site (neighbouring property with connecting habitat)	10/10
Species usage of the site (habitat type and evidenced usage)	15/15
Approximate density (per ha)	10/30
Role/importance of the species population on site*	5/15
Total Species Stocking Rate Score	**40/70**
Species Stocking Rate Score – out of 4	**2.29**

***Species Stocking Rate supplementary table attributes**	
Key source population for breeding	0/10
Key source population for dispersal	5/5
Necessary for maintaining genetic diversity	0/15
Near the limit of the species range	0/15

4.2 Grey-headed flying-fox

4.2.1 Assessment methodology

The proposal requires a maximum impact to **126.45 ha** of vegetation identified as providing suitable foraging habitat for the grey-headed flying-fox. A maximum impact area of **128 ha** has been nominated (refer **Section 3.1**). The impact has been assessed using a GHFF Foraging Habitat Assessment (GHFF FHA) tool developed by the Saunders Havill Group which adopts characteristics of the Queensland *Guide to determining terrestrial habitat quality: A toolkit for assessing land based offsets under the Queensland Environmental Offsets Policy* Version 1.2 April 2017, while also integrating published scientific literature on GHFF foraging habitat.

The traditional terrestrial habitat quality assessment assesses three (3) core indicators—site condition, site context and species habitat index.

The GHFF FHA tool combines the aspects of the three (3) core indicators and published scientific literature into two (site condition and site context) with site condition being weighted with 40 % and site context weighted at 30 % of the final score. The balance of the weighting (30 %) has been attributed to the third indicator which is independent of the traditional habitat quality assessment, being species stocking rate. The species stocking rate assessment incorporated in the GHFF FHA tool is focussed on 'foraging habitat' for GHFF rather than GHFF stocking rates (presence/absence of the species). This assessment of 'foraging habitat' for species stocking rate has been incorporated in the GHFF FHA tool as GHFF roosting camp or species presence was not observed on-site, however, suitable foraging habitat for the species was evident. Therefore, the density of foraging habitat available on-site is considered an appropriate assessment benchmark for species stocking rate.

The following section details the methodology utilised to assess the site condition, site context and species stocking rate under the GHFF FHA.

Site Condition (40 %)

Assessing site condition is an integral step in determining specific quantification of impacts, while also determining whether an offset site is suitable to establish a desired capacity to support the prescribed environmental matters being offset. The on-site condition is a key element of habitat quality and has a direct influence on the biodiversity it supports. Site condition is assessed using a suite of attributes to describe the structure and function of the vegetation community and is benchmarked against the expected range for a relatively undisturbed community.

The site condition assessment under the GHFF FHA is assessed using six condition characteristics being:

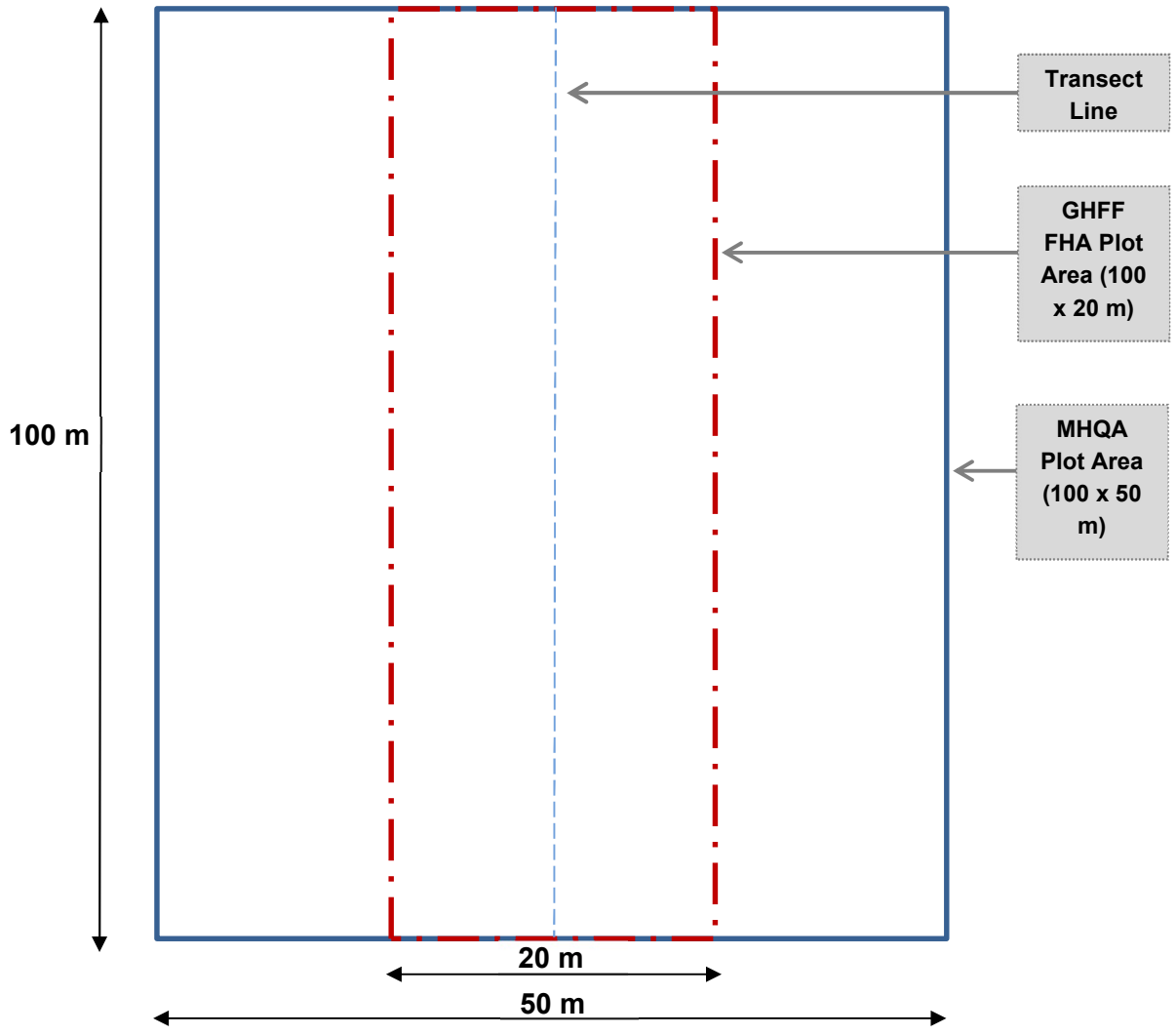
- Vegetation condition;
- Species richness (canopy trees);
- Flower scores (average);
- Timing of biological shortages;
- Quality of foraging habitat (trees >0.65 wt p*r); and
- Non-native plant cover.

Assessment methodology of the above condition characteristics is outlined below:

- *Vegetation condition* – This condition characteristic is assessed using the Queensland *Vegetation Management Act 1999* vegetation community status definition, being Category B (remnant), Category C (high-value regrowth) and Category X (non-remnant). This characteristic is scored from a desktop mapping perspective and verified on-ground during assessment. Refer to **Table A34** for the benchmark scoring values for this condition characteristic.
- *Species richness (canopy trees)* – This condition characteristic is assessed using a 100 m X 20 m plot following the contour of the land when possible. Within the plot, all canopy tree and subcanopy tree specimens are recorded. It should be noted that non-GHFF foraging species are also documented. Refer to **Table A35** for the benchmark scoring values for this condition characteristic.
- *Flower scores (average)* – This condition characteristic is assessed by analysing and cross-referencing the species recorded in the 'species richness (canopy trees)' characteristic with the published literature, specifically the information within *Ranking the feeding habitat of Grey-headed flying foxes for conservation management* (Eby and Law 2008) and the *Draft Recovery Plan for the Grey-headed Flying-fox* (DoEE 2017) and determining the flower score of the recorded canopy species. The individual score for each flowering GHFF foraging tree is then divided by the number of species recorded (GHFF foraging and non-GHFF foraging trees) to produce an average. The benchmark values for this condition characteristic have been derived from the findings published by Eby and Law (2008) (*Ranking the feeding habitat of Grey-headed flying foxes for conservation management*). Refer to **Table A36** for the benchmark scoring values for this condition characteristic.
- *Timing of biological shortages* – This condition characteristic is assessed by analysing and cross-referencing the species recorded in the 'species richness (canopy trees)' characteristic with the published literature, specifically the information within *Ranking the feeding habitat of Grey-headed flying foxes for conservation management* (Eby and Law 2008) and the *Draft Recovery Plan for the Grey-headed Flying-fox* (DoEE 2017) and determining the ability of the canopy species in the vegetation community to produce foraging habitat during biological shortages (food shortages, pregnancy and birthing, lactation, mating and conception, migration paths and fruit industries). It should be noted that this condition characteristic is weighted and 'food shortages' has been weighted heavier than the balance of the characteristics which are equal, as 'food shortages' is recognised as a major issue. Refer to **Table A37** for the benchmark scoring values for this condition characteristic.
- *Quality of foraging habitat* – This condition characteristic is assessed by analysing and cross-referencing the species recorded in the 'species richness (canopy trees)' characteristic with the published literature, specifically the information within *Ranking the feeding habitat of Grey-headed flying foxes for conservation management* (Eby and Law 2008) and the *Draft Recovery Plan for the Grey-headed Flying-fox* (DoEE 2017) and determining which canopy species recorded contain a flower score greater than 0.65 wt p*r and is recognised as a significant food plant by Eby and Law (2008). It should be noted that species recorded that are not prescribed a value by Eby and Law (2008) but are recognised as GHFF foraging trees, have been given an average weighted value of related species or, in the case of *Eucalyptus crebra* (Narrow-leaved Ironbark) been prescribed a value of 0.65 and classified as a significant food plant given its importance as a winter flowering species as acknowledged in the *Draft Recovery Plan for the Grey-headed Flying-fox* (DoEE 2017). Refer to **Table A38** for the benchmark scoring values for this condition characteristic.

- *Non-native plant cover* – This condition characteristic is assessed using a 100 m X 20 m plot following the contour of the land when possible. All non-native plant cover was assessed by estimating the cover of exotic species over the 100 m X 20 m plot. Refer to **Table A39** for the benchmark scoring values for this condition characteristic.

It should be noted that for on-ground assessment purposes, the 100 m X 20 m plot utilised for the GHFF FHA overlaps with the on-ground condition characteristics of the Koala MHQA. Refer to the **Insert 1** below for location of GHFF FHA within the MHQA Plot.



Insert 1: MHQA and GHFF FHA Plot Location Diagram

Site Context (30 %)

The site context assessment considers the landscape characteristics adjoining the site. Site context is measured using a suite of attributes to describe the location of the habitat within the surrounding landscape and the influence of its associated threats. This assessment also considers the influence of adjacent vegetated areas and ecological corridors. Under the GHFF FHA, site context is measured using the following six characteristics:

- Size of patch;
- Connectedness (active GHFF roost camps in a 20 km radius);
- Context (percentage of GHFF foraging habitat in a 20 km radius);
- Ecological corridors;
- Role of site location to species overall population in the state (active GHFF 'level 3' roost camps in a 20 km radius as shown on the CSIRO Data Access Portal (McKeown and Vanderduys, 2024)); and
- Threats to the species.

Assessment methodology of the above context characteristics is outlined below:

- *Size of patch* – This context characteristic is assessed using a modified version of the traditional habitat quality assessment with the directly connected patch of GHFF foraging habitat to site measured. This context characteristic is measured using GIS. Refer to **Table A40** for the benchmark scoring values for this context characteristic.
- *Connectedness* – This context characteristic is assessed by analysing the number of active GHFF roost camps (over the most recent monitoring period (8/22 – 8/23)) within a 20 km radius of the site. For consistency purposes this assessment is to utilise the data provided on the CSIRO Data Access Portal (McKeown and Vanderduys, 2024). Refer to **Table A41** for the benchmark scoring values for this context characteristic.
- *Context* – This context characteristic is assessed using a modified version of the traditional habitat quality assessment with the percentage of GHFF foraging habitat within a 20 km buffer of the site measured. This context characteristic is measured using GIS. Refer to **Table A42** for the benchmark scoring values for this context characteristic.
- *Ecological corridors* – This context characteristic is assessed using the traditional habitat quality assessment methodology which involves determining the proximity of the site to state, bioregional, regional or sub-regional corridors. Refer to **Table A43** for the benchmark scoring values for this context characteristic.
- *Threats to species* – This context characteristic is assessed by analysing the published scientific literature regarding threats to GHFF and determining the number and severity of the threatening processes observed at or adjacent to the site. The National Recovery Plan for the Grey-headed Flying-fox (DAWE, 2021) lists disturbance of camps, electrocution from powerlines and entanglement from netting and barbed wire. Refer to **Table A44** for the benchmark scoring values for this context characteristic.
- *Role of site location to species overall population in the state (active GHFF 'level 3' roost camps in a 20 km radius)* – This context characteristic is assessed by determining the number of active GHFF roost camps level 3 or greater (over the most recent monitoring period (8/22 – 8/23)) within a 20 km radius of the site. For consistency purposes this assessment is to utilise the data provided on the national flying-fox monitoring viewer (Australian Government). Refer to **Table A45** for the benchmark scoring values for this context characteristic.

Species Stocking Rate (30 %)

The GHFF FHA incorporates species stocking rate as an attribute not discussed under the traditional terrestrial habitat assessment methodology. As discussed above, species stocking rate for GHFF associated with this proposed action is related to the density of GHFF foraging habitat at the site at the time of undertaking the survey.

Baseline GHFF foraging tree surveys were undertaken by utilising the stem count methodology provided in the *Methodology for surveying and mapping regional ecosystems and vegetation communities in Queensland (version 5.0)* (Neldner *et al.* 2019).

This methodology involves assigning the strata for canopy (T1) and subcanopy (T2) and then counting the number of individual tree specimens within the 100 m X 20 m plot (0.2 ha) that are classed as foraging species for GHFF. A tree that branches into two or more stems above 30 cm above the ground is counted as one individual. The stem density of canopy species recorded within the 0.2 ha plot is multiplied by five (5) to produce a stem density per ha. This number is then compared to the benchmark stem density per ha based on the sum of the T1 and T2 stem densities for RE12.9-10.19 and RE12.9-10.3. Based on the technical descriptions, the average stem density taken as the sum of T1 and T2 is calculated as 340 for RE12.9-10.19 and 280 for RE12.9-10.3. Refer to **Table A46** for benchmark scoring values for species stocking rate.

The species stocking rate scoring was determined by analysing the Technical Descriptions of Regional Ecosystems of Southeast Queensland (Queensland Herbarium, 2018) and the stem density per hectare associated with the technical description of the regional ecosystem.

Table A34: GHFF FHA Vegetation Condition Scoring

Score	Description
5	Category X / non-remnant
10	Category C / regrowth
20	Category B / remnant

Table A35: GHFF FHA Canopy Species Richness Scoring

Score	Description
0	0 GHFF foraging species
5	1 – 3 GHFF foraging species
10	4 – 6 GHFF foraging species
20	> 6 GHFF foraging species

Table A36: GHFF FHA Flower Score (average) Scoring

Score	Description
2	0.01 – 0.25
5	0.26 – 0.50
8	0.51 – 0.75
10	0.76 – 1.00

Table A37: GHFF FHA Timing of Biological Shortages Scoring

Score	Description
2.5	Food shortages
1.5	Pregnancy and birthing
1.5	Lactation
1.5	Mating and conception
1.5	Migration paths
1.5	Fruit industries
Total (/10)	Combine total of above

Table A38: GHFF FHA Quality of Foraging Habitat (trees >0.65 wt p*r) Scoring

Score	Description
0	0 significant GHFF foraging tree species
5	1 – 3 significant GHFF foraging tree species
10	4 – 6 significant GHFF foraging tree species
20	> 6 significant GHFF foraging tree species

Table A39: GHFF FHA Non-Native Plant Cover Scoring

Score	Description
1	> 50 % non-native plant cover
5	25 – 50 % non-native plant cover
10	5 – 25 % non-native plant cover
20	< 5 % non-native plant cover

Table A40 GHFF FHA Size of Patch Scoring

Score	Description
0	< 5 hectares
2	5 – 25 hectares
5	26 – 100 hectares
7	101 – 200 hectares
10	> 200 hectares

Table A41: GHFF FHA Connectedness Scoring

Score	Description
0	< 1 active Grey-headed Flying-fox camp within a 20 km radius
3	1 – 3 active Grey-headed Flying-fox camp within a 20 km radius
6	4 – 6 active Grey-headed Flying-fox camp within a 20 km radius
10	> 6 active Grey-headed Flying-fox camp within a 20 km radius

Table A42: GHFF FHA Context Scoring

Score	Description
0	< 10 % Grey-headed Flying-fox foraging habitat within a 20 km radius
3	10 – 30 % Grey-headed Flying-fox foraging habitat within a 20 km radius
6	31 – 75 % Grey-headed Flying-fox foraging habitat within a 20 km radius
10	> 75 % Grey-headed Flying-fox foraging habitat within a 20 km radius

Table A43: GHFF FHA Ecological Corridors Scoring

Score	Description
0	Not within an ecological corridor
6	Sharing a common boundary with an ecological corridor
10	Within an ecological corridor

Table A44: Threats to species (GHFF) scoring

Score	Description
1	High level threat to the species
5	Moderate level threat to the species
10	Low level threat to the species

Table A45: Role of site location to GHFF overall population in the State scoring

Score	Description
0	<1 active level 3 Grey-headed Flying-fox camp within a 20 km radius
1	1 – 2 active level 3 Grey-headed Flying-fox camp within a 20 km radius
6	3 – 4 active level 3 Grey-headed Flying-fox camp within a 20 km radius
10	≥5 active level 3 Grey-headed Flying-fox camp within a 20 km radius

Table A46: GHFF Species Stocking Rate Scoring

Score	RE12.9-10.19 (AU1)	RE12.9-10.3 (AU2)
2	0-43	0-35
4	44-184	36-152
6	185-312	153-257
8	313-333	258-274
10	334-347	275-286
8	348-368	287-303
6	369-496	304-408
4	497-638	409-525
2	>639	>526

4.2.2 Discussion

Utilising the FHA scoring methodology detailed in **Section 4.2.1**, the following scores have been assigned for the impact area for GHFF. Refer to **Table A48** for the full scoring assessment. The impact site achieved a score of 7.47, rounded to a **7 out of 10**. Refer to **Plan A41** for the grey-headed flying-fox context assessment.

Site Condition (40 %)

The Site Condition for AU1 and AU2 contains moderate-high quality vegetation for the GHFF with a score of **2.52 out of 4** and **2.72 out of 4**, respectively.

Site Context (30 %)

The baseline site context characteristics for GHFF are shown on **Plan A41** with scoring justifications provided below.

- *Size of patch* –The size of patch attribute was calculated using GIS and determined the impact area to be part of a patch size of larger than 500 ha. This achieved a score of **10 out of 10**.
- *Connectedness* – Connectedness was calculated by counting the number of active GHFF camps within a 20 km radius. There are 8 active camps within a 20 km radius of the site, scoring a **10 out of 10**.
- *Context* – Existing habitat within a 20 km buffer of the site was calculated at 37%, and therefore the context attribute achieved a score of **6 out of 10**.
- *Ecological Corridors* –A score of **10 out of 10** as the site is partially located within a Statewide ecological corridor.
- *Role of site location to species overall population in the State* – There are 4 GHFF camps with a population level of 3+ within 20 km of the site so this attribute was assigned a score of **6 out of 10.**
- *Threats to the species* –Key known threats to the GHFF include barbed-wire fencing and powerlines. Due to the low incidence of barbed wire and absence of powerlines within the disturbance footprint, a low level of threats was attributed, scoring **10 out 10**.

Species Stocking Rate (30 %)

Stem density of GHFF foraging trees within AU1 and AU2 achieved an average of 333.75 and 307.5 stems per hectare, respectively, achieving a score of **8 out 10** and **6 out 10**, respectively.

Summary of GHFF baseline scores

The overall baseline habitat quality scores for GHFF are presented in **Table A47**, with detailed scoring table provided in **Table A48**.

Table A47: GHFF FHA assessment score summary

MHQA Final Weighting	AU 1	AU 2
Assessment Unit Habitat Quality Score	7.52	7.12
Assessment Unit Area (Impact) (ha)	111.87	16.13
Total Impact Area (ha)	128.0	128.0
Size Weighting	0.874	0.126
AU Weighted Score	6.57	0.90
Total Weighted Score	**7.47**	

Table A48: Grey-headed flying-fox – FHA assessment summary

		Maximum Score	Assessment Unit – Regional Ecosystem			
			AU 1 Remnant RE 12.9-10.19		AU 2 Remnant RE 12.9-10.3	
Site Condition (40%)	Vegetation Condition	**20**	**20**	AU 1 is mapped as Category B	**20**	AU2 is mapped as Category B
	Species Richness	**20**	**10**	T1 – 3 GHFF species T4 – 6 GHFF species T5 – 6 GHFF species T6 – 3 GHFF species Average – 4.5 GHFF species	**10**	T2 – 5 GHFF species T3 – 5 GHFF species Average – 5 GHFF species
	Flower Score	**10**	**8**	T1 – 0.563 T4 – 0.542 T5 – 0.532 T6 – 0.563 Average – 0.5499	**8**	T2 – 0.586 T3 – 0.672 Average – 0.629

	Timing of Biological Shortages	**10**	**10**	T1 – 10 T4 – 10 T5 – 10 T6 – 10 Average – 10	**10**	T2 – 10 T3 – 10 Average – 10
	Quality of Foraging Habitat	**20**	**5**	T1 – 2 species T4 – 2 species T5 – 3 species T6 – 2 species Average – 2.25 species	**10**	T2 – 4 species T3 – 3 species Average – 4 species
	Non-native Plant cover	**20**	**10**	T1 – 10% T4 – 7.5% T5 – 0% T6 – 6% Average – 5.88%	**10**	T2 – 10% T3 – 5% Average – 7.5%
	Site Condition Score	**100**	**63**		**68**	

	Site Condition Score – out of 4	**4.00**	**2.52**		**2.72**	
Site Context (30%)	Size of Patch	**10**	**10**	Patch size is greater than 200 ha	**10**	Patch size is greater than 200 ha
	Connectedness	**10**	**10**	>8 active camps within 20 km	**10**	>8 active camps within 20 km
	Context	**10**	**6**	37%	**6**	37%

	Ecological Corridors	**10**	**10**	Partially within Statewide riparian corridor	**10**	Partially within Statewide riparian corridor
	Roles of the site location to the species overall population in the state	**10**	**6**	4 active level 3 GHFF camps within a 20 km radius	**6**	4 active level 3 GHFF camps within a 20km radius
	Threats to species	**10**	**10**	A low level of threats is prescribed due to the absence of notable threats listed under the National Recovery Plan.	**10**	A low level of threats is prescribed due to the absence of notable threats listed under the National Recovery Plan.
	Site Context Score	**60**	**52**		**52**	

	Site Context Score – out of 3	**3.00**	**2.60**		**2.60**	
Species Stocking Rate (30%)	GHFF Foraging Tree Density per hectare	-	**8**	T1 – 325 T4 – 330 T5 – 395 T6 – 285 Average – 333.75	**6**	T2 – 335 T4 – 280 Average – 307.5
	Species Stocking Rate Score	**10**	**8**		**6**	
	Species Stocking Rate – out of 3	**3.00**	**2.40**		**1.80**	
	Total		**7.52**		**7.12**	

	Area (hectares)	**111.87**	**16.13**
	Size Weighting	**0.874**	**0.126**
	Weighted Scores	**6.57**	**0.90**
	Total Weighted Score	**7.47**	

4.3 Swift parrot

4.3.1 Assessment methodology

To quantify impacts on the swift parrot, a feature-based assessment method was utilised. The method involves calculating the number of individual habitat features to be impacted.

A habitat feature for the swift parrot is defined as a non-juvenile tree (*i.e.,* ≥100 mm DBH) which is a preferred foraging tree species identified under the *National Recovery Plan for the Swift Parrot* (DCCEEW, 2024). Listed preferred foraging tree species include:

- *Eucalyptus leucoxylon* (yellow gum)
- *Eucalyptus tricarpa* (red ironbark)
- *Eucalyptus sideroxylon* (mugga ironbark)
- *Eucalyptus macrocarpa* (grey box)
- *Eucalyptus albens* (white box)
- *Eucalyptus melliodora* (yellow box)
- *Eucalyptus robusta* (swamp mahogany)
- *Eucalyptus tereticornis* (forest red gum)
- *Eucalyptus pilularis* (blackbutt)
- *Corymbia maculata* (spotted gum). It is noted that in Queensland *Corymbia citriodora* is recognised synonymously with *Corymbia maculata*.

The number of preferred foraging trees within the site was extrapolated from stem density data collected at each MHQA transect site (refer **Plan A10**).

Stem density data at each MHQA transect was collected in accordance with the stem count methodology provided in the *Methodology for surveying and mapping regional ecosystems and vegetation communities in Queensland (version 5.0)* (Neldner *et al.* 2019). The methodology detailed in Neldner et al. (2019) uses a plot area of 50 X 10 m. For the purposes of this assessment, the area was modified to 100 X 20 m to align with the MHQA plot, however, the actual count assessment method remains the same (refer plot design in **Insert 1**). This methodology involves counting the number of individual non-juvenile tree specimens within each 100 m X 20 m plot (0.2 ha) including those that are listed as preferred foraging species for the swift parrot. A tree that branches into two or more stems 30 cm above the ground is counted as one individual.

For each AU, the number of non-juvenile trees and separately, of non-juvenile preferred foraging trees, was averaged across all habitat quality transects within the corresponding AU to produce the mean number of trees and preferred foraging trees within a 100 X 20 m plot area (0.2 ha), the same as that used for the GHFF FHA (refer plot design in **Insert 1**). The average stem density of non-juvenile trees and non-juvenile preferred foraging trees recorded within the 0.2 ha plot was multiplied by five (5) to produce an estimate of the number of trees and preferred foraging trees per ha. This was then multiplied by the area of the AU to determine an estimate of non-juvenile trees and non-juvenile preferred foraging trees within each AU.

The two AUs and associated transect site numbers are as follows:

- AU1 represents RE12.9-10.19 habitat (Transects 1, 4, 5 and 6).
- AU2 represents RE 12.9-10.3 habitat (Transects 2 and 3).

4.3.2 Discussion

Two (2) preferred foraging tree species were recorded within the site being *Corymbia citriodora* (spotted gum) and *Eucalyptus tereticornis* (forest red gum). *Eucalyptus tereticornis* was recorded at low densities across the site. The results of the assessment are presented in **Table A49**.

A total of 12,588 preferred foraging trees are estimated within the 161.4 ha referral area including 10,658 within AU1 and 1,930 within AU2. A maximum of 128 ha of vegetation is proposed to be impacted resulting in an impact total of **9,983 habitat features** to be impacted.

Table A49: Swift parrot feature-based assessment results

			Count of non-juvenile preferred foraging trees (100 X 20 m plot)					
AU	AU Area (ha)	Plot #	*Corymbia citriodora*	*Eucalyptus tereticornis*	Total	Mean number per 100 X 20 m plot	Estimate per hectare	Estimate per AU
1	142.1	1	1	0	1	15	75	10,658
1		4	22	0	22			
1		5	20	0	20			
1		6	17	0	17			
2	19.3	2	13	3	16	20	100	1,930
2		3	24	0	24			
							Total site (161.4 ha)	12,588
							Total impacted (128 ha)	9,983

The following provides an assessment against the Significant Impact Guidelines 1.1 for the swift parrot as a result of the proposed action (refer **Table A50**).

Table A50: Significant impact assessment (SIG 1.1) – swift parrot (critically endangered species)

Significant Impact Criteria	Assessment	Impact
An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:		
Lead to a long-term decrease in the size of a population	The proposed action will result in the removal of potential foraging habitat for the swift parrot including winter flowering eucalypt species, namely *Eucalyptus fibrosa, Corymbia citriodora* and *E. tereticornis,* the latter two (2) of which are identified as preferred foraging species for the species.	Significant impact not likely

Significant Impact Criteria	Assessment	Impact
	While habitat clearing for development is identified as a threat to the species (DCCEEW, 2024), it is not known the extent to which this process in Queensland contributes to the decline of the species or its relative abundance within the Queensland range. Queensland does not contain any Key Biodiversity Areas for the species, with critical areas for the species located within New South Wales, Victoria and Tasmania. The site also contains only two (2) of the ten (10) preferred foraging species (DCCEEW, 2024), and large areas of potential foraging resources are highly abundant within the landscape including the Greenbank Military Training Area, Flinders-Karawatha Bioregional Corridor and White Rock Conservation Park (refer **Plan A13**), therefore the removal of vegetation on-site is not considered to impede foraging potential at the local or landscape scale. It is considered unlikely that the proposed development will result in a decline of the species.	
Reduce the area of occupancy of the species	The proposed development will result in the removal of preferred foraging habitat for the species including *Corymbia citriodora* and *E. tereticornis*. While swift parrots were not recorded on-site despite extensive surveys, the presence of foraging habitat and recent evidence of foraging activity in the locality, it is considered that the removal of potential habitat may reduce the area of potential occupancy for the species.	**Potential for significant impact**
Fragment an existing population into two or more populations	The swift parrot is highly mobile and foraging habits of the species are difficult to predict. Due to the highly mobile nature of the species, the dispersal capability is unlikely to be impacted by the removal of potential foraging habitat.	Significant impact not likely
Adversely affect habitat critical to the survival of a species	Under to the *National Recovery Plan for the Swift Parrot Lathamus discolor* (DCCEEW, 2024), habitat critical to the survival of a species is defined as areas that are necessary: • For activities such as foraging, breeding, roosting, or dispersal; • For the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators); • To maintain genetic diversity and long-term evolutionary development; or	**Potential for significant impact**

Significant Impact Criteria	Assessment	Impact
	• For the reintroduction of populations or recovery of the species or ecological community. The Recovery Plan identifies that within Queensland this includes "all preferred foraging species within known and likely foraging habitat on the mainland including Yellow Gum (*E. leucoxylon*), Red Ironbark (*E. tricarpa*), Mugga Ironbark (*E. sideroxylon*), Grey Box (*E. macrocarpa*), White Box (*E. albens*), Yellow Box (*E. melliodora*), Swamp Mahogany (*E. robusta*), Forest Red Gum (*E. tereticornis*), Blackbutt (*E. pilularis*), and Spotted Gum (*Corymbia maculata*)." The site contains potential winter foraging resources (*i.e.,* with suitable phenological characteristics) which may potential provide foraging resources during the winter foraging season, however, the site contains only two (2) of the ten (10) preferred foraging species including *E. tereticornis* and *Corymbia citriodora* (northern species of spotted gum).	
Disrupt the breeding cycle of a population	The swift parrot breeds exclusively in Tasmania during the Australian summer. Therefore, the proposed development will not affect the breeding cycle of the swift parrot.	Significant impact not likely
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The proposed development will remove potential foraging habitat for the swift parrot in the form of winter flowering eucalypt trees, namely *C. citriodora* and *E. tereticornis*. However, the locality contains larger, more contiguous areas of similar vegetation communities within White Rock Conservation Park and the Flinders-Karawatha Bioregional Corridor that are likely to be used preferentially to the vegetation on-site. Due to the abundance of resources within the broader landscape and SEQ generally, it is unlikely that the removal of vegetation on-site will contribute to the decline of the swift parrot.	Significant impact not likely
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	There are no known invasive species that are directly harmful to the swift parrot. It is unlikely that the proposed action will introduce invasive species that are harmful to the swift parrot.	Significant impact not likely

Significant Impact Criteria	Assessment	Impact
Introduce disease that may cause the species to decline	Psittacine beak and feather disease (PBFD) is an existing disease present among swift parrots and parrots generally. Transmission of the disease occurs within wild populations of parrots. The risk of spread of disease may only be tempered by a successful implementation of a Threat Abatement Plan including administering of a vaccine among wild and captive parrots to reduce incidence of the disease in wild populations and captive breeding programs (DCCEEW 2021). There are no other diseases known to affect the species.	Significant impact not likely
Interfere substantially with the recovery of the species	Several threats to the swift parrot are identified in the National Recovery Plan which includes habitat loss and alteration in both breeding and foraging ranges (DCCEEW, 2024). In particular, the loss of breeding habitat remains a significant threat to the continued persistence of the species (DCCEEW, 2024). The *National Recovery Plan for the Swift Parrot Lathamus discolor* (DCCEEW, 2024) identifies several actions and performance criteria that work toward the recovery of the species. Key actions include the management and protection of known breeding and foraging habitat at the local, regional and landscape scale, reducing sugar glider predation at breeding sites, understanding population dynamics and monitoring threats and other sources of mortality. While habitat clearing for development is identified as a threat to the species (DCCEEW, 2024), it is not known the extent to which this process in Queensland has or is contributing to the decline of the species or its relative abundance within the Queensland range. The impact of clearing is disproportionately represented by breeding areas which are identified as "scarce and fragmented" in the Recovery Plan. Additionally, key threats to the species occur only in breeding habitat (*i.e.,* predation by sugar gliders) which is acknowledged to affect breeding success for the species and declines for the species. It is considered that the extent to which clearing for urban development in foraging habitat contributes to declines in the species is reduced compared to the same impacts in areas of key breeding habitat. Additionally, Queensland does not contain any Key Biodiversity Areas for the species, with critical areas for the species located within New South Wales, Victoria and Tasmania. The site also contains only two (2) of the ten (10) preferred foraging species (DCCEEW, 2024), and large areas of potential foraging resources are highly abundant within the landscape including the Greenbank Military Training Area, Flinders-Karawatha	Significant impact not likely

Significant Impact Criteria	Assessment	Impact
	Bioregional Corridor and White Rock Conservation Park (refer **Plan A13**), the volume of clearing on-site is not considered to be of a scale that would impede the capacity for foraging within the locality. The removal of vegetation will reduce the extent of potential foraging resources, however, it is not considered that the development will interfere substantially with the recovery of the species.	
Conclusion	**Potential for significant impact**	

4.4 Regent honeyeater

4.4.1 Assessment methodology

To quantify impacts on the regent honeyeater, a feature-based assessment method was utilised. The method involves calculating the number of individual habitat features to be impacted.

A habitat feature for the regent honeyeater is defined as a non-juvenile tree (*i.e.,* ≥100 mm DBH) which is a preferred foraging tree species identified under the *National Recovery Plan for the Regent Honeyeater* (DoE, 2016). Listed preferred foraging tree species include:

- *Eucalyptus leucoxylon* (yellow gum)
- *Eucalyptus sideroxylon* (mugga ironbark)
- *Eucalyptus albens* (white box)
- *Eucalyptus melliodora* (yellow box)
- *Eucalyptus robusta* (swamp mahogany)
- *Corymbia maculata* (spotted gum). It is noted that in Queensland *Corymbia citriodora* is recognised synonymously with *Corymbia maculata*.

The number of preferred foraging trees within the site was extrapolated from stem density data collected at each MHQA transect site (refer **Plan A10**).

Stem density data at each MHQA transect was collected in accordance with the stem count methodology provided in the *Methodology for surveying and mapping regional ecosystems and vegetation communities in Queensland (version 5.0)* (Neldner et al. 2019). The methodology detailed in Neldner et al. (2019) uses a plot area of 50 X 10 m. For the purposes of this assessment, the area was modified to 100 X 20 m to align with the MHQA plot, however, the actual count assessment method remains the same (refer plot design in **Insert 1**). This methodology involves counting the number of individual non-juvenile tree specimens within each 100 m X 20 m plot (0.2 ha) including those that are listed as preferred foraging species for the regent honeyeater. A tree that branches into two or more stems 30 cm above the ground is counted as one individual.

For each AU, the number of non-juvenile trees and separately, of non-juvenile preferred foraging trees, was averaged across all habitat quality transects within the corresponding AU to produce the mean number of trees and preferred foraging trees within a 100 X 20 m plot area (0.2 ha), the same as that used for the GHFF FHA (refer plot design in **Insert 1**). The average stem density of non-juvenile trees and non-juvenile preferred foraging trees recorded within the 0.2 ha plot was multiplied by five (5) to produce an estimate of the number of trees and preferred foraging trees per ha. This was then multiplied by the area of the AU to determine an estimate of non-juvenile trees and non-juvenile preferred foraging trees within each AU.

The two AUs and associated transect site numbers are as follows:

- AU1 represents RE12.9-10.19 habitat (Transects 1, 4, 5 and 6).
- AU2 represents RE 12.9-10.3 habitat (Transects 2 and 3).

4.4.2 Discussion

One (1) preferred foraging tree species was recorded within the site being *Corymbia citriodora* (spotted gum). The results of the assessment are presented in **Table A49**.

A total of 12,588 preferred foraging trees are estimated within the 161.4 ha referral area including 10,658 within AU1 and 1,785 within AU2. A maximum of 128 ha of vegetation is proposed to be impacted resulting in an impact total of **9,868 habitat features** to be impacted.

Table A51: Regent honeyeater feature-based assessment results

			Count of non-juvenile preferred foraging trees (100 X 20 m plot)			
AU	AU Area (ha)	Plot #	*Corymbia citriodora*	Mean number per 100 X 20 m plot	Estimate per hectare	Estimate per AU
1	142.1	1	1	15	75	10,658
1		4	22			
1		5	20			
1		6	17			
2	19.3	2	13	20	100	1,785
2		3	24			
					Total site (161.4 ha)	12,443
					Total impacted (128 ha)	9,868

The following provides an assessment against the Significant Impact Guidelines 1.1 for the regent honeyeater as a result of the proposed action (refer **Table A52**).

Table A52: Significant impact assessment (SIG 1.1) – regent honeyeater (critically endangered species)

Significant Impact Criteria	Assessment	Impact
An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:		
Lead to a long-term decrease in the size of a population	The proposed development will result in the removal of potential foraging habitat including winter flowering eucalypt species. *National Recovery Plan for the Regent Honeyeater (Anthochaera phrygia)* (DoE 2016) lists key tree species as Mugga Ironbark (*E. sideroxylon*), White Box (*E. albens*), Yellow Box (*E. melliodora*), Yellow Gum (*E. leucoxylon*), Swamp Mahogany (*E. robusta*) and Spotted Gum (*Corymbia maculata*).	Significant impact not likely

Significant Impact Criteria	Assessment	Impact
	The site contains one (1) of the six (6) preferred foraging species (Corymbia citriodora/C. maculata). While habitat clearing for development is identified as a threat to the species (DoE 2016), it is not known the extent to which this process in Queensland contributes to the decline of the species or its relative abundance within the Queensland range. Queensland does not contain any key areas for the species with critical areas for the species located within New South Wales and Victoria only. The site also contains only one (1) of the six (6) preferred foraging species (DoE 2016)and large areas of potential foraging resources are highly abundant within the landscape including the Greenbank Military Training Area, Flinders-Karawatha Bioregional Corridor and White Rock Conservation Park (refer **Plan A13**), therefore the removal of vegetation on-site is not considered to impede foraging potential at the local or landscape scale. It is considered unlikely that the proposed development will result in a decline of the species.	
Reduce the area of occupancy of the species	The proposed development will result in the removal of potential foraging habitat including winter flowering eucalypt species including key species *Corymbia citriodora* and *Eucalyptus fibrosa*. While regent honeyeaters were not recorded on-site despite extensive surveys, the presence of foraging habitat and recent evidence of foraging activity in the locality, it is considered that the removal of potential habitat may reduce the area of potential occupancy for the species.	**Potential for significant impact**
Fragment an existing population into two or more populations	The regent honeyeater is highly mobile and foraging habits of the species are difficult to predict. Due to the highly mobile nature of the species, the dispersal capability and population dynamics are unlikely to be impacted by the removal of potential foraging habitat.	Significant impact not likely
Adversely affect habitat critical to the survival of a species	The *National Recovery Plan for the Regent Honeyeater (Anthochaera phrygia)* (DoE, 2016) defines habitat critical to the survival as: • Any breeding or foraging habitat in areas where the species is likely to occur; and • Any newly discovered breeding or foraging locations.	**Potential for significant impact**

Significant Impact Criteria	Assessment	Impact
	The site is located within the defined range of foraging habitat where the species is 'likely to occur' under the Recovery Plan. The site also contains potential foraging resources and foraging activity was recorded within Springfield Lakes in 2019. The removal of habitat is considered to adversely affect habitat critical to the survival of the regent honeyeater.	
Disrupt the breeding cycle of a population	The regent honeyeater has a patchy distribution of known breeding areas which are located in New South Wales and Victoria. The proposed development is not located within the breeding range therefore will not an impact on the breeding cycle of the regent honeyeater.	Significant impact not likely
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The proposed development will remove a portion potential foraging habitat for the regent honeyeater in the form of winter flowering eucalypt trees containing preferred foraging species *C. citriodora*. However, the locality contains larger, more contiguous areas of vegetation commnities within White Rock Conservation Park and the Flinders-Karawatha Bioregional Corridor containing vegetation communities more suitable for the species such as RE12.9-10.2 which contains *C. citriodora* as the dominant species that may be used preferentially to the vegetation on-site. Additionally, aggressive native bird species *Manorina melanocephala* (noisy miner) and *Philemon corniculatus* (noisy friarbird) which are known to use the vegetation and are likely to outcompete vagrant regent honeyeater individuals. Due to the abundance of resources within the broader landscape and SEQ generally, it is unlikely that the removal of vegetation on-site will contribute to the decline of the regent honeyeater.	Significant impact not likely
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	Regent honeyeaters are known to experience competition from other nectivorous birds and the feral honeybee (*Apis mellifera*). Native nectivorous bird species including *Manorina melanocephala* (noisy miner), *Philemon corniculatus* (noisy friarbird) and *Anthochaera carunculata* (red wattlebird) are documented to compete with the regent honeyeater. The proposed development is located in an area where these species are common on and surrounding the site in the fragmented urban environment therefore is unlikely to significantly increase as a result of the development as they will	Significant impact not likely

Significant Impact Criteria	Assessment	Impact
	continue to occupy the edge affected areas of retained habitat areas.	
Introduce disease that may cause the species to decline	There are no diseases known to affect the regent honeyeater. The proposed development is unlikely to introduce disease to the species.	Significant impact not likely
Interfere substantially with the recovery of the species	Long-term declines in the regent honeyeater population is attributed to broad-scale removal of preferred habitats (DoE 2016). As such, recovery objectives for the species have focused on identifying and protecting habitat where the species is known or likely to occur. The Recovery Plan highlights the importance of protecting high quality habitat and rehabilitating degraded habitats where the species is likely to occur. While the site is located within the foraging range for the species, it is also noted that only one (1) preferred foraging species (*Corymbia citriodora*) (DoE 2016) and regent honeyeaters prefer the wettest, most fertile sites within box-ironbark associations such as along creek flats, broad river valleys and foothills. Habitat which potentially meets this description is recorded in association with adjoining gully lines and sloping hillsides. Given the superior mobility capacity of the species and abundance of preferential habitat within close proximity of the referral area (Greenbank Military Training Area and White Rock Conservation Park located within the Flinders-Karawatha Corridor, refer **Plan A13**), the volume of clearing on-site is not considered of a scale that would impede the capacity for foraging within the locality. The removal of vegetation will reduce the extent of potential foraging resources, however, it is not considered that the development will interfere substantially with the recovery of the species as foraging needs can continue to be supported by the abundant foraging resources available in White Rock Conservation Park and the Flinders-Karawatha Bioregional Corridor.	Significant impact not likely
Conclusion	**Potential for significant impact**	

4.5 Greater glider

Potential habitat suitable for the greater glider located within the proposed action site considered in terms of the presence of remnant vegetation containing suitable regional ecosystems for the greater glider (refer **Plan A28**). However, it is noted that the actual area of potential habitat may be smaller as the structural attributes of the forest overstorey and foraging quality of a given habitat area vary within a given area (Eyre 2002, DCCEEW 2022).

Despite the presence of potentially suitable habitat, the broader vegetation patch where the proposed action site is located is relatively isolated within the landscape considered in terms of functional connectivity to larger, contiguous patches of White Rock Conservation Park, Greenbank Military Training Area and White-Rock Spring Mountain Conservation Estate. Connectivity to these areas is substantially compromised as a result of the conversion of the surrounding suburbs into urban development over the past 20 years and resulting form of the retained vegetation being predominantly narrow and linear with multiple physical barriers. The lack of connection to larger, contiguous patches presents a significant ecological barrier for any form of connectivity or population persistence within and surrounding the patch in which the proposed action site is located. Locally, the vegetation on-site retains a degree of landscape connection as set out in the open space provisions of the Springfield Structure Plan including areas like the Brookwater Golf Course and adjoining creek corridors including O'Dwyer's Gully, Opossum Creek and Woogaroo Creek. The connecting areas are predominantly comprised of lineal strands of retained vegetation, trees in parkland settings, newly rehabilitated vegetation which limit movement and persistence opportunities of the disturbance-sensitive greater glider.

Where connected lineal vegetation appears to occur within identified linkages to the proposed action site, area plans in this submission show corridors are a mix of non-remnant, regrowth or remnant vegetation mapped under the *Vegetation Management Act 1999* and vary in width from 15 m at the narrowest points up to 100 m in less disturbed areas (refer **Plan A25**). Corridor linkages are intersected and severed at multiple locations by major infrastructure including the Springfield Line rail corridor and major or minor roads, with the most significant of these being the Centenary Highway (refer **Plan A26**).

The Conservation Advice for the *Petauroides volans* (greater glider (southern and central) – July 5, 2022, notes that '*Greater gliders disperse poorly across vegetation that is not native forest and so do not readily recolonise isolated sites*.' The land on which the project occurs has been subjected to extensive ecological survey by numerous ecological experts and has not been recorded as supporting the greater glider species. Records of expanding development zones over the past 8 years in Springfield support this finding, with the land providing only marginal aspects of greater glider critical habitat definitions based on the premise of one day being considered suitable to support the species. For greater gliders to utilise the proposed action site it is considered that recolonisation would need to occur from nearby unconnected Protected Estates and National Parks which would require the species to navigate unconnected fragments of immature vegetation, cross multiple major infrastructure corridors, navigate narrow (15 m) compromised pinch points directly adjacent to housing and roads to ultimately persist in an environment of ever-expanding city infrastructure and housing.

The following provides an assessment against the Significant Impact Guidelines 1.1 for the greater glider as a result of the proposed action (refer **Table A53**).

Table A53: Significant impact assessment (SIG 1.1) – greater glider (vulnerable species)

Significant Impact Criteria	Assessment	Impact
An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:		
Lead to a long-term decrease in the size of an important population	The proposed action site is located on a fragmented patch of remnant eucalypt woodland. An important population is not considered to be present within the proposed action site or broader patch. While historical records are present surrounding the site, these pre-date the significant clearing and subsequent contraction of habitat areas that has occurred surrounding the site within the past 20 years. The nearest verifiable record within the past 20 years is located within the Greenbank Military Training Area vegetation areas 3 km east of the proposed action site (refer **Plan A26**). As a result of these cumulative and sequential impacts, the proposed action site is now located within a well-established residential landscape with compromised landscape-level connectivity to and from the site. This assessment is supported by ecological survey data and historical and contemporary public database records. Targeted ecological surveys completed across and adjoining the proposed action site have not detected the species. These surveys include spotlighting undertaken in accordance with the survey requirements in the *Survey Guidelines for Australia's Threatened Mammals* and *Terrestrial Vertebrate Fauna Survey Guidelines for Queensland* (2018) and UAV drone surveys. Additionally, fauna spotter catcher records collated from 2017 to 2026 within the suburbs of Spring Mountain and Brookwater have not detected greater glider (refer **Attachment A6**). While potential habitat attributes to support the greater glider are located on-site, it is unlikely that a population is located on or in the vicinity of the site presently or in the future. For the justification provided above, the proposed action is not likely to lead to a long-term decrease in the size of an important population.	Significant impact not likely
Reduce the area of occupancy of an	The proposed action site is located over remnant eucalypt woodland which despite containing both potential foraging and breeding resources shares limited landscape connectivity to	Significant impact not likely

Significant Impact Criteria	Assessment	Impact
important population of the species	contiguous habitat areas where greater glider are known to occur. As detailed above, a combination of public database records, ecological field surveys and fauna spotter catcher data collected over the past 10 years have been used to support the conclusion that an important population of greater glider has not been present within the proposed action site or adjoining areas for the past 20 years. Additionally, there is considered a low prospect of recolonisation of the proposed action site attributed to the compromised landscape-level connectivity. Residential areas and the location of significant infrastructure routes including the Centenary Highway and adjoining rail corridor which are located between the proposed action site and contiguous vegetation areas present a notable barrier for consistent population-level connectivity where gliding distances regularly exceed 100 m. It is unlikely that the proposed development will reduce the area of occupancy of the species.	
Fragment an existing important population into two or more populations	The proposed action site is located over remnant eucalypt woodland which despite containing both potential foraging and breeding resources shares limited landscape connectivity to contiguous habitat areas where greater glider are known to occur. As detailed above, a combination of public database records, ecological field surveys and fauna spotter catcher data collected over the past 10 years have been used to support the assessment that an important population of greater glider has not been present within the proposed action site or adjoining areas for the past 20 years. Additionally, there is considered a low prospect of recolonisation of the proposed action site attributed to the compromised landscape-level connectivity. Residential areas and the location of significant infrastructure routes including the Centenary Highway and adjoining rail corridor which are located between the proposed action site and contiguous vegetation areas present a notable barrier for consistent population-level connectivity where gliding distances regularly exceed 100 m. As a population of greater glider are confirmed within contiguous vegetation areas of Greenbank Military Training Area and White Rock Conservation Park (refer **Plan A13, Plan A26** and **Plan A30**), of which the proposed action site does not function as a habitat connection, the impact to vegetation	Significant impact not likely

Significant Impact Criteria	Assessment	Impact
	within the proposed action area is not anticipated to cause any level of fragmentation of a greater glider population. It is not considered that the development will fragment an existing importance population.	
Adversely affect habitat critical to the survival of a species	The *Petauroides volans (greater glider (southern and central) Conservation Advice* (DCCEEW, 2022) defines habitat critical to the survival of the greater glider as: • *large contiguous areas of eucalypt forest, which contain mature hollow-bearing trees and a diverse range of the species' preferred food species in a particular region; and* • *smaller or fragmented habitat patches connected to larger patches of habitat, that can facilitate dispersal of the species and/or that enable recolonisation; and* • *cool microclimate forest/woodland areas (e.g. protected gullies, sheltered high elevation areas, coastal lowland areas, southern slopes); and* • *areas identified as refuges under future climate changes scenarios; and* • *short-term or long-term post-fire refuges (i.e. unburnt habitat within or adjacent to recently burnt landscapes) that allow the species to persist, recover and recolonize burnt areas.* The proposed action site contains remnant eucalypt woodland containing a variety of eucalypt species and a reduced density of hollow-bearing trees (<2 per hectare). However, despite the presence of potential habitat, it is located within a fragmented patch with low recolonisation potential. A combination of public database records, ecological field surveys and fauna spotter catcher data collected over the past 10 years have been used to support the assessment that an important population of greater glider has not been present within the proposed action site or adjoining areas for the past 20 years. Despite the proximity of the proposed action site to known areas supporting greater glider (*i.e.,* White Rock Conservation Park and Greenbank Military Training Area), no records or greater glider have been recorded on or adjacent to the site within the past 20 years. It is considered that the capacity of the site to support greater glider is presently highly compromised due to the lack of suitable connecting vegetation and presence of substantial barriers and as a result, is unlikely to support a greater glider	Significant impact not likely

Significant Impact Criteria	Assessment	Impact
	population in the future particularly as urban infrastructure projects continue to progress.	
Disrupt the breeding cycle of an important population	As detailed above, a combination of public database records, ecological field surveys and fauna spotter catcher data collected over the past 10 years have been used to support the assessment that an important population of greater glider has not been present within the proposed action site or adjoining areas for the past 20 years. Additionally, there is considered a low prospect of recolonisation of the proposed action site attributed to the compromised landscape-level connectivity. Residential areas and the location of significant infrastructure routes including the Centenary Highway and adjoining rail corridor which are located between the proposed action site and contiguous vegetation areas present a notable barrier for consistent population-level connectivity where gliding distances regularly exceed 100 m. Breeding individuals are expected to occur within the contiguous vegetation areas of Greenbank Military Training Area and White Rock Conservation Park of which will not be impacted by the proposed action. It is not considered that the proposed action will disrupt the breeding cycle of an important population.	Significant impact not likely
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	As detailed above, a combination of public database records, ecological field surveys and fauna spotter catcher data collected over the past 10 years have been used to support the assessment that an important population of greater glider has not been present within the proposed action site or adjoining areas for the past 20 years. Despite the proximity of the proposed action site to known areas supporting greater glider, no records or greater glider have been recorded on or adjacent to the site within the past 20 years. It is considered that the capacity of the site to support greater glider is presently highly compromised due to the lack of suitable connecting vegetation and presence of substantial barriers and as a result, recolonisation of the patch of a greater glider population in the future particularly is highly unlikely as urban infrastructure projects continue to progress. The vegetation within the proposed action site is functionally isolated from the contiguous vegetation areas where greater glider are known to occur (*i.e.,* White Rock Conservation Park and Greenbank Military Training Area) and as such, it is unlikely that	Significant impact not likely

Significant Impact Criteria	Assessment	Impact
	impacts to habitat areas within the proposed action site will result in a decline of the species.	
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	Invasive species such the feral cat (*Felis catus*) and European red fox (*Vulpes vulpes*) are identified as threats to the species. The European red fox is confirmed to occur within the proposed action site. It is considered unlikely that the proposed action will result in the introduction or increased abundance of threatened species that may harm or displace the greater glider.	Significant impact not likely
Introduce disease that may cause the species to decline	It is unlikely that the proposed development will introduce disease that may harm the species.	Significant impact not likely
Interfere substantially with the recovery of the species	There is currently no recovery strategy available for the greater glider, however, conservation and recovery actions are listed in the *Petauroides volans (greater glider (southern and central) Conservation Advice* (DCCEEW, 2022). Management priorities involve limiting habitat loss and fragmentation, reducing mortality and removal of hollow-bearing trees and implementing measures to limit the occurrence of wildfire in greater glider habitat. The vegetation within the proposed action site is functionally isolated from the contiguous vegetation areas where greater glider are known to occur (*i.e.,* White Rock Conservation Park and Greenbank Military Training Area) and as such, no evidence of presence within the proposed action or surrounding habitat and urban dominated have been recorded within the past 20 years. It is anticipated that areas where greater glider are known to occur and that support a population of greater glider including White Rock Conservation Park and Greenbank Military Training Area will provide ongoing support for the greater glider population due to the high level of protection bestowed on these areas and high ecological and cultural value. These broad habitat areas constitute a substantial refuge area to buffer against potential climate change factors that may affect the greater glider population in the future and as a result, a scenario where the habitat on-site becomes critical for the recovery of the species is unlikely. Particularly as access to the site is presently compromised and anticipated to become further reduced as development and infrastructure projects progress within in the surrounding locality.	Significant impact not likely

Significant Impact Criteria	Assessment	Impact
	The proposed action is not suitable for the reintroduction of greater glider nor will it be able to aid in the recovery of the species.	
Conclusion	**Significant impact not likely** **The removal of vegetation located within the proposed action site is therefore not considered to have a significant residual impact on the greater glider, either through direct, indirect, facilitated or cumulative impacts.**	

4.6 White-throated Needletail

There is no adopted Recovery Plan for this species as the Conservation advice provides sufficient direction. In Australia population survival depends on the retention of habitat that provides foraging resources (aerial insects). Habitats include intact grassland, woodland and forest vegetation. The conservation advice prioritises the identification and protection of important habitat to the White-throated Needletail and invertebrate prey as well as minimising threats.

With reference to the information provided in **Section 2.3.7**, specifically the abundance, distribution, ecology and habitat preference, the proposed impact area, and off-site retention areas in the adjacent corridor that will remain into perpetuity and managed by Council, a significant residual impact on the White-throated Needletail resulting from this development is considered unlikely.

The following provides a significant impact assessment to understand the proposed actions potential impact on the White-throated Needletail. Refer to **Table A54** for assessment against the SIG 1.1.

Table A54: EPBC Act Significant impact criteria for vulnerable species – White-throated Needletail

Significant Impact Criteria	Assessment	Impact
An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:		
Lead to a long-term decrease in the size of an important population	Potential foraging habitat for the White-throated Needletail is located on-site in the form of remnant vegetation. White-throated Needletails being highly mobile and being almost exclusively aerial including while foraging, are unlikely to focus solely on one area of habitat. Large areas of potential foraging and roosting habitat are located within the nearby protected areas including White Rock Conservation Area, White Rock-Spring Mountain Conservation Estate and Greenbank Military Training Area. The proposed development is unlikely to have a significant impact on the ability of White-throated Needletails to forage or roost in the landscape and, therefore; is not anticipated to lead to a long-term decrease in the size of an important population.	Significant impact not likely
Reduce the area of occupancy of an important population of the species	White-throated Needletails are predominantly aerial, however, will roost in eucalypt woodland. White-throated needletails are known to occur within the locality with several records within the landscape, however, it is considered that the large areas of available habitat in the locality such as the contiguous, protected areas of vegetation located to the west, south and east of the site would be used preferentially to the vegetation on-site for foraging and roosting. The area of occupancy of the White-throated Needletail is not anticipated to be significantly reduced as a result of the proposal due to the highly mobile nature of the species and location of large areas of contiguous habitat within the locality.	Significant impact not likely
Fragment an existing important population into two or more populations	White-throated Needletails are highly mobile and therefore do not require connected vegetation for dispersal. The proposed development will not fragment an existing population.	Significant impact not likely
Adversely affect habitat critical to the survival of a species	The proposed development will remove potential foraging habitat for the White-throated Needletail, however, however, given the highly mobile nature of the species and presence of large areas of suitable habitat in the locality such as within White Rock Conservation Area, White Rock-Spring Mountain Conservation Estate and Greenbank Military Training Area, it is not considered that	Significant impact not likely

Significant Impact Criteria	Assessment	Impact
	the proposal will adversely affect habitat that is considered critical to the survival of the species.	
Disrupt the breeding cycle of an important population	The White-throated Needletail breeds in East Asia. Therefore, the proposed development will not affect the breeding cycle of the White-throated Needletail.	Significant impact not likely
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The White-throated Needletail is highly mobile and is able to forage over large expanses, thus reducing the individual importance of selected habitat fragments. The surrounding locality contains substantial habitat areas within protected estates which would adequately fulfil the foraging requirements of the species. As the proposed development proposes impacts to marginal vegetation that the species may forage over, it is unlikely that the species would decline as a result of the proposed development.	Significant impact not likely
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	It is unlikely the proposed development would introduce an invasive species that would harm or displace the White-throated Needletail.	Significant impact not likely
Introduce disease that may cause the species to decline	It is unlikely the proposed development would introduce disease that would harm the White-throated Needletail.	Significant impact not likely
Interfere substantially with the recovery of the species	According to the *Hirundapus caudacutus* Conservation Advice (TSSC, 2019), recovery actions within Australia focus on identifying areas of vegetation to protect that may provide important foraging and roosting habitat. The proposed development will remove an area of potential foraging habitat for the White-throated Needletail; however, it is unlikely to form important foraging and roosting habitat given the proximity to development and infrastructure. Due to the highly mobile nature of the species and the presence of large areas of protected and higher quality habitat areas in the locality such, it is not considered that the proposal will interfere substantially with the recovery of the species.	Significant impact not likely
Conclusion	**Significant impact not likely**	

4.7 Collared delma

The referral area contains macrohabitat in the form of open eucalypt woodland on Land Zones 3, 9 and 10 and scattered microhabitat for the collared delma, however, was found to vary in quality across the site. Large areas of the site are located on an unsuitable eastern slope aspect and contain an incomplete suite of microhabitat attributes or absent to scattered presence of *E. crebra*. Poorer quality sites are considered dominant within the referral area, characterised by a dominance of exposed bedrock, easterly slope aspect or reduced abundance of suitably sized habitat rocks which are a key sheltering resource.

This assessment also gives consideration to the definition of "important habitat" for the collared delma, as per Map 6 of the *Draft referral guidelines for the nationally listed Brigalow Belt reptiles* (DCCEEW, 2023). Important habitat for the collared delma is defined broadly as areas of suitable habitat and adjacent exposed rocky areas in Land Zones 3, 9 and 10 within the "known / likely to occur" distribution of the species on Map 6 of the Draft Referral Guidelines (DCCEEW, 2023). In the Brisbane-Ipswich region this range is indicatively mapped to encompass the western Brisbane suburbs of Mt Crosby, Karana Downs and surrounds which includes a number of known and well-documented populations. While the extent of "known / likely to occur" extends partially south of the Brisbane River within Ipswich suburbs such as Goodna, Collingwood Park and Riverview, occurrence in this area has not been documented and is considered to instead reflect a coarse buffer from the known western Brisbane populations which has not been refined to acknowledge the location of the Brisbane River as a barrier. Notably, the referral area is located outside of the "known / likely to occur" range therefore per this definition is not by default considered important habitat for the species.

The potential for a significant impact has been considered with reference to the impact area thresholds in the Draft Referral Guidelines. Based on the mapped extent of potential microhabitat (**Plan A35**), aligning to identified microhabitat sites, the proposed action will result in the impact to **0.77 ha** of predominantly low to moderate quality microhabitat and the retention and protection of **1.08 ha** of predominantly higher quality microhabitat, associated with western facing rocky slopes. Under the important habitat impact thresholds under the Draft Referral Guidelines, this is considered to align with a **low risk** of significant impact (i.e., impact to under 1 ha of habitat).

With reference to the information provided in **Section 2.3.8**, specifically the abundance, distribution, ecology and habitat preference and historical disturbance, and the proposed retention of potential microhabitat areas as part of the development, a significant residual impact on the collared delma resulting from this development is considered unlikely.

Table A55 includes a significant impact assessment against the SIG 1.1 to provide further clarity on the proposed action's potential impact on the collared delma.

Table A55: EPBC Act Significant impact criteria for vulnerable species – collared delma

Significant Impact Criteria	Assessment	Impact
An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:		
Lead to a long-term decrease in the size of an important population / **Reduce the area of occupancy of an important population of the species** / **Fragment an existing important population into two or more populations**	The Commonwealth identifies that an important population is difficult to identify due to low detectability of the species and therefore the definition is extended to include areas of important habitat (DCCEEW, 2026). Important habitat for the collared delma is defined broadly as areas of suitable habitat and adjacent exposed rocky areas in Land Zones 3, 9 and 10 within the "known / likely to occur" distribution of the species on Map 6 of the *Draft referral guidelines for the nationally listed Brigalow Belt reptiles* (DCCEEW, 2023). In the Brisbane-Ipswich region this range is indicatively mapped to encompass the western Brisbane suburbs of Mt Crosby, Karana Downs and surrounds which includes a number of known and well-documented populations. While the extent of "known / likely to occur" extends partially south of the Brisbane River within Ipswich suburbs such as Goodna, Collingwood Park and Riverview, occurrence in this area has not been documented and is considered to instead reflect a coarse buffer from the known western Brisbane populations which has not been refined to acknowledge the location of the Brisbane River as a barrier. Notably, the referral area is located outside of the "known / likely to occur" range therefore per this definition is not considered important habitat for the species. While the referral area contains broad vegetation communities and potential microhabitat for the species, there are key factors which are considered to reduce the potential for presence of a population on-site. Microhabitat is scattered across the site; however, key habitat attributes such as suitably sized surface rocks and an appropriate slope aspect are inconsistently present. Additionally, the site and broader locality has also been affected by historical disturbance including large, unplanned wildfires and fragmentation which degrade habitat and remove prey resources for the species. Additionally, the species has not been documented to occur within the locality despite the completion of targeted surveys within the referral area (Cardo, 2014) and Spring Mountain (Austecology, 2013). The sedentary nature of this species and its sensitivity to disturbance including inappropriate fire regimes suggest a level of confidence that can be applied to these findings combined with the contemporary site surveys. It is considered unlikely that a population of collared delma is present within the	Significant impact not likely

Significant Impact Criteria	Assessment	Impact
	referral area due to the historical disturbance and low level of documented occurrence within the locality. Notwithstanding the above factors, the potential for impacts on the collared delma has been considered with reference to the extent of potential microhabitat and proposed impacts. The proposed action will result in impacts to **0.77 ha** of potential microhabitat and the retention and protection of **1.08 ha** of potential microhabitat, which is considered to represent a low risk of significant impact per the Draft Referral Guidelines. Noting that a number of potential microhabitat sites will be retained and protected with connectivity to Woogaroo Creek and Opossum Creek, it is not considered that the action will decrease the size of an important population, reduce the area of occupancy of an important population or fragment an existing important population into two or more populations.	
Adversely affect habitat critical to the survival of a species	The referral area contains macrohabitat and areas of potential microhabitat of varying quality. Large areas of the site are located on an unsuitable eastern slope aspect and contain an incomplete suite of microhabitat attributes or absent to scattered presence of *E. crebra*. Poorer quality sites ranging from low to moderate quality are considered dominant within the referral area and are characterised by a dominance of exposed bedrock, easterly slope aspect or reduced abundance of suitably sized habitat rocks which are a key sheltering resource. While the site contains potential microhabitat areas, there is considered a reduced likelihood it is occupied by the species noting the historical inappropriate fire regimes within the referral area and broader parts of Greater Springfield, surrounding fragmentation effects and low incidence of occurrence within the Greater Springfield locality particularly due to the species' reduced capacity for dispersal and recolonisation. Additionally, the development will retain and protect higher quality areas of potential microhabitat within the 27.5 ha retention area. As a result of these factors, there is considered a reduced likelihood that the action will adversely affect habitat critical to the survival of the species.	Significant impact not likely
Disrupt the breeding cycle of an important population	While the site contains microhabitat areas, there is considered a reduced likelihood it is occupied by the species noting the historical inappropriate fire regimes, surrounding fragmentation effects and low incidence of occurrence within the Greater	Significant impact not likely

Significant Impact Criteria	Assessment	Impact
	Springfield locality, particularly due to the species' reduced capacity for dispersal and recolonisation. Additionally, the development will retain and protect higher quality areas of potential microhabitat within the 27.5 ha retention area. As a result of these factors, there is considered it is unlikely that the action will disrupt the breeding cycle of an important population.	
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The referral area contains areas of microhabitat of varying quality. Microhabitat recorded within the referral area varies from low to high quality with higher quality microhabitat areas primarily located within the predominantly western-facing 27.5 ha retention area. Construction works will involve the removal of predominantly low to moderate quality microhabitat areas with higher quality areas to be retained. While the action will result in impacts to potential microhabitat attributes for the species, it is not considered to be of a scale that would result in the decline of the species, particularly as the potential for occurrence on the site is considered reasonably low when considering the historic disturbance, surrounding fragmentation and low incidence of records.	Significant impact not likely
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	*Lantana montevidensis* which is documented to degrade microhabitat is present throughout the referral area at varying densities. Additionally, the species is known to be vulnerable to predation by European red foxes and feral cats. European red foxes have been confirmed within the referral area through previous surveys and feral cats are likely to be present due to the location in an urban area. Weed levels will be managed and monitored as part of a council approved Bushland Management Plan as part of approval requirements for the relevant staging phases. Through implementation of rehabilitation measures within retained vegetation areas including retained microhabitats, it is unlikely that the project will introduce or exacerbate weeds or pest levels beyond existing levels.	Significant impact not likely
Introduce disease that may cause the species to decline	There are no known diseases affecting the species. The project will follow appropriate biosecurity protocols during both construction and operation. The action is unlikely to introduce disease that may cause the species to decline.	Significant impact not likely

Significant Impact Criteria	Assessment	Impact
Interfere substantially with the recovery of the species	A recovery plan for the Queensland Brigalow Belt Reptiles, including the collared delma, has been drafted by WWF-Australia in 2006 (Richardson, 2006) as outlined by the SPRAT profile (DCCEEW, 2026). The recovery actions listed on the SPRAT include identification of threats and key habitat, research priorities, conservation and the establishment of reserves, monitoring programs and the development of management guidelines. It is unlikely that the action will impede the implementation of these actions.	Significant impact not likely
Conclusion	**Significant impact not likely**	

4.8 Lowland Rainforest of Subtropical Australia

4.8.1 Patch location

The location of the LRSA TEC on and adjoining the site is illustrated in **Plan A9**. There are two patches relevant to the proposed action site, with Patch 1 completely outside of the western boundary of the referral area within Opossum Creek and Patch 2 is located within the proposed vegetation retention area on a tributary of Opossum Creek.

During field survey effort, the two patches were delineated to understand the extent of each patch and subsequent impact potential resulting from the proposed development design. Patch 1 covers an area of 0.68 ha and was observed to consist largely of an area that has received revegetation and weed removal as part of past rehabilitation efforts. Patch 2 accounts for 0.17 ha – this patch is restricted to a gully line within the proposed vegetation retention area.

Both Patch 1 and Patch 2 are not proposed to be directly impacted as a result of the development *i.e.,* they are not within the development footprint and are to be retained *in situ* with buffers applied to development works.

4.8.2 Construction impacts

In accordance with the conservation advice, a minimum of 50 m buffer has been applied to each patch of LRSA TEC to establish a setback to proposed built environs. All development uses are to be excluded from the 50 m buffer including open space areas as demonstrated in **Plan A42.** The buffer areas contain existing vegetation which is to be retained as a result of the proposed action.

The strategic placement of land uses that do not consist of sealed surfaces (*i.e.,* concrete) adjacent to the ground-truthed LRSA TEC patches is proposed. The retention of vegetation *in situ* along the western boundary of the proposed action site will occur, providing continued movement opportunity for fauna in association with Woogaroo and Opossum Creeks. This retained corridor offers a vegetated buffer for protection and preservation of the LRSA TEC patches.

As the development is adequately setback from the ground-truthed LRSA TEC providing a minimum of 50 m buffer from the disturbance footprint, the proposed action is not considered to impact on the LRSA function or quality. Furthermore, with the implementation of mitigation measures detailed in **Section 5** the potential for indirect impacts will be avoided and/or minimised.

4.9 Indirect, facilitated and cumulative impacts

Item 4.6 of the PD Request asks to ***"provide an assessment of the direct, indirect, consequential and cumulative impacts, including:***

a) The nature of impacts, including timing and whether the impact is temporary or permanent.

b) Details of any policy guidelines, relevant studies, surveys or consultations with species experts/field specialists, which were not included in the referral or additional information provided in support of the referral.

c) A local and regional scale analysis of likely impacts, with reference to the project's potential contribution to cumulative impacts in the context of development patterns in the locality and region.

d) A risk assessment of potential impacts from the action that are likely to be unpredictable, severe, or irreversible."

The direct, indirect and facilitated impacts have been summarised in **Table A56**. **Section 4** above describes the direct impacts in detail.

Table A56: Direct, Indirect and Facilitated Impacts Summary

Construction Phase	Operational Phase (ongoing disturbance)
• Vegetation clearing • Habitat removal • Intensification of effects of fragmentation effects (*i.e.,* edge effect, habitat degradation, barrier effects) • Introduction or spread of harmful pathogens (*i.e., Phytophthora cinnamomi*) • Weed dispersal and establishment • Urban heat island effect • Vehicle movements • Earthworks • Light emissions during construction • Noise and vibration • Waste disposal • Hazardous and dangerous goods • Increased human presence	• Weed incursion • Vehicle strike • Increased predation by domestic animals • Noise and light pollution • Increased human presence • Urban heat island effect

4.9.1 Impacts summary

- Proposed impacts under EPBC 2019/8575 include a maximum of 128 ha remnant vegetation recognised as containing critical habitat for the koala, grey-headed flying-fox, swift parrot and regent honeyeater. It is noted a progressive clearing approach will be used whereby the total impact will not be realised until 7-10 years into the project in line with timeframes to obtain local clearing approvals. Clearing will be undertaken broadly in accordance with the staged clearing plan provided as **Plan A2**. Impacts of habitat loss will be mitigated as a result through reducing ecological shock, allowing fauna to disperse safely and maintaining temporary habitat continuity.
- The action site is located within the SSP which has been subject to progressive clearing over the past 20 years to facilitate the creation of the City of Greater Springfield. The SSP contains a number of EPBC approved and referred projects. Progressive habitat c such as within the areas of Springfield, Bellbird Park and Spring Mountain has resulted in the contraction of habitat areas to linear waterway corridors and the subject habitat patch associated with Woogaroo and Opossum Creek. The SSP contains multiple master-planned development areas (EPBC 2014/7306, EPBC 2016/7676, EPBC 2017/7875 and EPBC 2013/7057) which have been assessed and approved under the EPBC Act for impacts on MNES and have incorporated avoidance and mitigation measures targeted at MNES including the koala and grey-headed flying-fox. Notably, many of the planned corridors within master-planned development areas such as within EPBC 2013/7057 were planned with consideration to koala and fauna generally.
- The Springfield Residential Development and adjoining actions being the Scenic Precinct (EPBC 2020/8651) and Peninsula Precinct (EPBC 2020/8629) are being assessed separately under the EPBC Act and significant impacts on MNES will be compensated for in accordance with the EPBC Act Environmental Offsets Policy. The assessment of the proposed action is being undertaken in accordance with the requirements of the EPBC Act and the in effect regulatory documents. The EPBC Act reforms and a broader bioregional plan has not yet been legislated and therefore do not form part of the statutory assessment framework for this project. The action has been proposed in line with the planning and zoning requirements under the longstanding SSP whereby the proponent seeks to develop an area zoned as 'Community Residential' under the SSP and retain areas zoned as 'Creek Line Open Space' under the SSP. It is noted these areas have changed slightly over time as a result of detailed design and ground-truthing investigations. The actual location of the creek line open space areas has been refined through the local approval process based on verification of high-value ecological values and top of bank mapping (refer **Section 2.4.3.10**).
- While the action will reduce the amount of vegetation cover within a local and broader landscape context, cumulative development impacts on MNES within the SSP have been balanced with the retention of large environmental retention areas and riverine corridors delivered under other actions within the SSP. High value habitat areas such as those associated with Woogaroo Creek, Opossum Creek and O'Dwyer's Gully will be retained, protected and restored as part of the action to support the persistence of fauna and target MNES within the landscape, particularly those sensitive to disturbance such as the koala.
- No direct impact is proposed to the LRSA TEC as the two delineated patches are to be wholly retained and a minimum 50 m buffer will be delivered between the edge of the delineated areas

and development land uses including clearing and construction impacts. Indirect impacts have been considered in relation to the potential for *Phytophthora cinnamomi* induced dieback, discussed in **Table A57**.

- Direct and potential indirect impacts on MNES are to be managed through the implementation of stage-specific Vegetation Clearing and Fauna Management Plans (VCFMP) and the MNES Management Plan provided at **Attachment A8**. An overarching version of the VCFMP is provided at **Attachment A9** which will be followed by stage-specific VCFMPs linked to operational works phases of the project.
- 27.5 ha of remnant vegetation is proposed to be retained within the project area and rehabilitated. Refer to the Preliminary Bushland Management Plan (BMP) at **Attachment A10** for the location of broad areas to be subject to rehabilitation.
- the potential for UHI effects has been considered as part of the development design and broader precinct zoning. Urban heat island effects occur where the replacement of vegetated surfaces with buildings, roads and other hardstand areas results in increased absorption and retention of heat, leading to elevated local temperatures. In this case, the development is situated within a broader landscape that retains extensive vegetated areas, including surrounding open space and waterway corridors, which provide cooling benefits through shading, evapotranspiration and air movement. The retention of these landscape features combined with proposed landscaping and recreational open space areas such as sports fields and parks within the development, will assist in moderating local temperatures and reducing the potential for significant UHI effects (Lin & Li 2025). Given the scale of surrounding green infrastructure and the localised connectivity of vegetated corridors, the UHI effects will be buffered.

4.9.2 Additional consultations and findings

- The project area has been subject to rigorous investigation by multiple technical consultants to support the Precinct Plan approval and Area Development Applications for Village 2 and Village 3. This includes assessments of bushfire hazard and management, geomorphology, traffic impact, landslide hazard and stormwater and dispersive soils management. Assessments are publicly available at https://developmenti.ipswich.qld.gov.au/
- The following additional management plans have been developed in consultation with Ipswich City Council to support the proposal and illustrate mitigation methods to be implemented as part of the action:
    - Dispersive Soils Management Plan (DSMP), prepared by Gallagher Environmental, 4 March 2024 (refer **Attachment A11**)
    - Stormwater Management Plan, prepared by DesignFlow, dated July 2024 (refer **Attachment A12**)
    - Bushfire Management Plan, prepared by Land and Environment Consultants, dated 31 July 2024 (refer **Attachment A13**)
- The above management plans are a result of extensive consultation with Ipswich City Council to determine suitable mitigation measures and integration of best practice design principles.

- Construction-based management plans including a Construction Environmental Management Plan (CEMP) and Erosion and Sedimental Control Plan (ESCP) will be prepared in consultation with the site contractor prior to the clearing and construction phases commencing to suit the staging and construction requirements of the site.

4.9.3 Indirect impact analysis

A detailed description of potential indirect impacts and an analysis of their potential impacts to threatened species are included in **Table A57**.

Table A57: Indirect Impact Analysis – MNES

Indirect Impact	Koala	Grey-headed flying-fox	Swift parrot and regent honeyeater	LRSA TEC
a. Disturbance from increased noise, artificial light, dust, sediment generation and other relevant stressors during construction and operation of the residential development.	<u>Noise</u> Noise levels greater than existing ambient noise levels are expected during construction within the project area. Sources of noise are likely to consist of noise in short, intense pulses from mobile plant equipment, and more prolonged noise, with consistent vibration, pitch and volume from generators, excavators and pumps, in addition to noise from vehicles. Both steady continuous and single noise events have the potential to lead to ecological impacts. Construction noise is expected to elicit some avoidance response from fauna including the koala in the event they are to occur within the retained vegetation areas. Additionally, noise levels are anticipated to increase once the development is complete as there will be increased vehicular and pedestrian traffic. Road noise will be the primary source of noise impact. However, as habitat will be consolidated within the vegetation retention areas and will be buffered by soft development uses such as street planting lasting impacts of noise on koalas resulting from the development are considered to be mitigated. <u>Artificial Light</u> Artificial light can affect both nocturnal and diurnal animals by disrupting behavioural patterns, with quality of light (e.g. wavelength, colour), intensity and duration potentially evoking different faunal responses. Impacts from increased light levels include disorientation from, or attraction toward, artificial sources of light; mortality from collisions with structures; and effects on light-sensitive cycles of species (e.g. breeding and migration for fauna and flowering in plants). An increase in artificial lighting can also affect abundance of predators. The presence and intensity of artificial light in the project area may temporarily increase during the construction phase; however, construction is anticipated to be restricted to daytime hours. Where needed, lighting will be directed to construction areas within the project area. Some light spillage will be inevitable and is likely to be contained. Potential impacts associated with light emissions will be temporary and unlikely to be significant. With the implementation of standard mitigation measures (discussed in **Section 5**), the project is likely to result in a negligible impact to any koalas in the surrounding area due to the use of light pollution during construction. Additionally, light pollution during operation will also be mitigated through design and compliance with general standards in guidelines, particularly for light required within open space areas for safety. Lighting within open space areas is to face towards the urban development and away from conservation areas and vegetation within neighbouring allotments.	<u>Noise</u> Noise levels greater than existing ambient noise levels are expected during construction within the project area. Sources of noise are likely to consist of noise in short, intense pulses from mobile plant equipment, and more prolonged noise, with consistent vibration, pitch and volume from generators, excavators and pumps, in addition to noise from vehicles. Both steady continuous and single noise events have the potential to lead to ecological impacts. Construction noise is expected to elicit some avoidance response from fauna including the grey-headed flying-fox in the event they were to forage proximal to the project area. Additionally, noise levels are anticipated to increase upon completion of the development due to an increase in vehicular and pedestrian traffic. It is unlikely that the increase will be significant to what the current surrounding developments exude. Further, as the grey-headed flying-fox is a highly mobile species and the closest known active camp is approximately 1.3 km from the project area, the potential for impacts from noise on the species are considered reduced. <u>Artificial Light</u> Artificial light can affect both nocturnal and diurnal animals by disrupting behavioural patterns, with quality of light (e.g. wavelength, colour), intensity and duration potentially evoking different faunal responses. Impacts from increased light levels include disorientation from, or attraction toward, artificial sources of light; mortality from collisions with structures; and effects on light-sensitive cycles of species (e.g. breeding and migration for fauna and flowering in plants). An increase in artificial lighting can also affect abundance of predators. The presence and intensity of artificial light in the project area may temporarily increase during the construction phase; however, construction is anticipated to be restricted to daytime hours. Where needed, lighting will be directed to construction areas within the project area. Some light spillage will be inevitable and is likely to be contained. Potential impacts associated with light emissions will be temporary and unlikely to be significant. With the implementation of standard mitigation measures (discussed in **Section 5**), the project is likely to result in a negligible impact to any grey-headed flying-fox in the surrounding area due to the use of light pollution during construction. Additionally, light pollution during operation will also be mitigated through design and compliance with general standards in guidelines, particularly for light required within open space areas for safety. Lighting within open space areas is to face towards the urban development and	<u>Noise</u> Noise levels greater than existing ambient noise levels are expected during construction within the project area. Sources of noise are likely to consist of noise in short, intense pulses from mobile plant equipment, and more prolonged noise, with consistent vibration, pitch and volume from generators, excavators and pumps, in addition to noise from vehicles. Both steady continuous and single noise events have the potential to lead to ecological impacts. Construction noise is expected to elicit some avoidance response from fauna which may include swift parrot and regent honeyeater in the event they are to occur within the surrounding retained vegetation areas. Additionally, noise levels are anticipated to increase once the development is complete as there will be increased vehicular and pedestrian traffic. Road noise will be the primary source of noise impact. However, as habitat will be consolidated within the vegetation retention areas and will be buffered by soft development uses such as street planting lasting impacts of noise on swift parrot and regent honeyeater resulting from the development are considered to be mitigated. <u>Artificial Light</u> Artificial light can affect both nocturnal and diurnal animals by disrupting behavioural patterns, with quality of light (e.g. wavelength, colour), intensity and duration potentially evoking different faunal responses. Impacts from increased light levels include disorientation from, or attraction toward, artificial sources of light; mortality from collisions with structures; and effects on light-sensitive cycles of species (e.g. breeding and migration for fauna and flowering in plants). An increase in artificial lighting can also affect abundance of predators. The presence and intensity of artificial light in the project area may temporarily increase during the construction phase; however, construction is anticipated to be restricted to daytime hours. Where needed, lighting will be directed to construction areas within the project area. Some light spillage will be inevitable and is likely to be contained. Potential impacts associated with light emissions will be temporary and unlikely to be significant. With the implementation of standard mitigation measures (discussed in **Section 5** and briefly below), the project is likely to result in a negligible impact on regent honeyeater and swift parrot in the surrounding area due to the use of light pollution during construction. Light pollution during operation will be	<u>Noise</u> During construction noise levels are expected to be higher during construction. Noise levels will be increased for construction, and noises are likely to consist of short, intense pulses from mobile plant equipment. Additional noises from surrounding construction will likely be prolonged with consistent vibration, pitch and volume from generators, excavators and pumps, in addition to noise from vehicles. While the noise anticipated will not impact the flora species within the LRSA TEC, it may elicit some avoidance response from fauna that typically utilise the vegetation community, such as bird species which may be important for seed dispersal and pollination. It is understood construction adjoining the LRSA TEC within Village 3 will take relatively less time in comparison to the construction works for the balance of the site. The impact of noise is not considered to result in a lasting impact to LRSA TEC. <u>Artificial Light</u> The presence of artificial light in the project will temporarily increase during the construction phase. However, night works will not be common. Lighting will be directed to construction areas within the project, where needed. Artificial lighting may disrupt behavioural patterns of fauna utilising the LRSA TEC, where quality of light (e.g. wavelength, colour), intensity and duration potentially evoking different faunal responses. Impacts from increased light levels include disorientation from, or attraction toward, artificial sources of light; mortality from collisions with structures; and effects on light-sensitive cycles of species (e.g. breeding and migration for fauna and flowering in plants). With the implementation of standard mitigation measures as detailed in **Section 5**, negligible impacts to the ecosystem are anticipated as a result of artificial light. <u>Dust and Sediment Generation</u> Construction activities have the potential to generate dust emissions. Dust emissions during construction will be temporary. The main sources of dust will be generated via: • wheel-generated dust from the haul roads created for the construction phase; • dust lift-off from exposed surfaces (e.g. construction roads and pads);

Indirect Impact	Koala	Grey-headed flying-fox	Swift parrot and regent honeyeater	LRSA TEC
	The implementation of best practice lighting design will ensure that any long-term impacts on impact from development lighting infrastructure will be mitigated. <u>Dust and Sediment Generation</u> Construction activities have the potential to generate dust emissions. Dust emissions during construction will be temporary. The main sources of dust will be generated via: • wheel-generated dust from the haul roads created for the construction phase; • dust lift-off from exposed surfaces (e.g. construction roads and pads); • earthworks, including construction of the embankments, and moving, dumping and shaping material; and • vegetation and soil clearing of the land. Excessive deposition of dust on leaves of plants can suppress the growth and photosynthesis, resulting in reduced habitat quality for fauna. High levels of airborne dust can irritate the respiratory systems of fauna and potentially result in ingestion of dust-coated seeds and other foods. Excessive deposition of dust on open water bodies may also degrade water quality and overall habitat quality for fauna. With the implementation of standard mitigation measures (discussed in **Section 5**), the project is likely to result in a temporary and minor impact to any koalas utilising the local area due to the generation of dust.	away from conservation areas and vegetation within neighbouring allotments. The implementation of best practice lighting design will ensure that any long-term impacts on impact from development lighting infrastructure will be mitigated. <u>Dust and Sediment Generation</u> Construction activities have the potential to generate dust emissions. Dust emissions during construction will be temporary. The main sources of dust will be generated via: • wheel-generated dust from the haul roads created for the construction phase; • dust lift-off from exposed surfaces (e.g. construction roads and pads); • earthworks, including construction of the embankments, and moving, dumping and shaping material; and • vegetation and soil clearing of the land. Excessive deposition of dust on leaves of plants can suppress the growth and photosynthesis, resulting in reduced habitat quality for fauna. High levels of airborne dust can irritate the respiratory systems of fauna and potentially result in ingestion of dust-coated seeds and other foods. Excessive deposition of dust on open water bodies may also degrade water quality and overall habitat quality for fauna.	mitigated through design and compliance with general standards in guidelines, particularly for light required within open space areas for safety. Lighting within open space areas is to face towards the urban development and away from conservation areas and vegetation within neighbouring allotments. The implementation of best practice lighting design will ensure that any long-term impacts on impact from development lighting infrastructure will be mitigated. <u>Dust and Sediment Generation</u> Construction activities have the potential to generate dust emissions. Dust emissions during construction will be temporary. The main sources of dust will be generated via: • wheel-generated dust from the haul roads created for the construction phase; • dust lift-off from exposed surfaces (e.g. construction roads and pads); • earthworks, including construction of the embankments, and moving, dumping and shaping material; and • vegetation and soil clearing of the land. Excessive deposition of dust on leaves of plants can suppress the growth and photosynthesis, resulting in reduced habitat quality for fauna. High levels of airborne dust can irritate the respiratory systems of fauna and potentially result in ingestion of dust-coated seeds and other foods. Excessive deposition of dust on open water bodies may also degrade water quality and overall habitat quality for fauna. With the implementation of standard mitigation measures (discussed in **Section 5**), the project is likely to result in a temporary and minor impact to any swift parrot and regent honeyeaters utilising the local area due to the generation of dust.	• earthworks, including construction of the embankments, and moving, dumping and shaping material; and • vegetation and soil clearing of the land. Excessive deposition of dust on leaves of plants can suppress the growth and photosynthesis. This is largely expected to occur where works immediately adjoin the LRSA TEC within Village 3 which may have the potential to directly impact flora species. Dust suppression techniques will be implemented in accordance with best practice clearing and construction mitigation measures which may include use of dust collectors and water-based sprays to ensure dust emissions are reduced. Through the implementation of best practice clearing and construction mitigation measures, impacts will be managed. Additionally, erosion stabilisation controls and management measures will be implemented in accordance with a Dispersive Soils Management Plan developed for the site to protect creekline vegetation areas including the LRSA TEC. A Construction Environmental Management Plan will be developed and implemented for the proposed action to mitigate construction induced impacts on the LRSA TEC.
b. Increased vehicle strike from increased frequency of vehicle movements throughout construction and operation of the residential development.	Vehicles will be present during the construction phase and will include a mix of heavy and light vehicles. Temporary koala exclusion fencing will be constructed post-clearing and prior to construction commencing to prevent koalas from entering the construction site, reducing the potential for vehicle strike. Upon completion of the development, vehicle traffic in the area will increase compared to baseline conditions. A range of mitigation measures (discussed in detail in **Section 5**) including koala sensitive design will be implemented to reduce the likelihood of koala and vehicle interaction within the development. This will primarily be achieved through the installation of koala exclusion fencing along the edge of vegetation retention areas.	Grey-headed flying-foxes are not considered to be at increased risk of vehicular strike as they are not a ground-dwelling species.	Vehicle collision is a potential risk for the swift parrot and regent honeyeater. Swift parrot vehicle collisions are documented to be more frequent in the event where foraging resources are scarce, forcing foraging to occur in urban areas. While increased vehicle traffic is unavoidable as a result of the development, the development design avoids, where practical, roads traversing retained vegetation. This is considered to minimise the potential for vehicle collision with the threatened bird species.	This is indirect as vehicle strike is relevant to fauna that are commonly associated with the LRSA TEC. These fauna species with the potential to occur in LRSA TEC are listed in Appendix C of the LRSA TEC listing advice. It is noted the majority of these species are unlikely to occur in the patch on-site, and also in the wider area. Land uses proposed adjoining the LRSA TEC are predominantly open space areas or drainage and set back at least 50 metres from the development. As such it is unlikely vehicle strike potential will increase.

Indirect Impact	Koala	Grey-headed flying-fox	Swift parrot and regent honeyeater	LRSA TEC
c. Introduction to and /or proliferation of weeds and pathogens, in habitat for threatened species.	The creation of edge effects as a result of vegetation clearing and construction may result in an increase in the presence of weed species within and adjoining the project area. The potential for the spread of weeds will be managed through mitigation measures proposed in **Section 5** including the implementation of the MNES Management Plan (**Attachment A8**) and Rehabilitation Plan to be approved by Ipswich City Council which will simultaneously improve existing habitat quality through the removal of existing weeds. Standard construction practices such as vehicle washdown may be implemented to limit the spread of pathogens in the adjoining environment. It is noted that there are no known pathogens that affect koala that are spread via vehicles or construction. Through the implementation of mitigation measures targeting weeds, the development is unlikely to result in an increase in weeds.	The creation of edge effects as a result of vegetation clearing and construction may result in an increase in the presence of weed species within and adjoining the project area. The potential for the spread of weeds will be managed through mitigation measures proposed in **Section 5** including the implementation of the MNES Management Plan (**Attachment A8**) and Rehabilitation Plan to be approved by Ipswich City Council which will simultaneously improve existing habitat quality through the removal of existing weeds. Standard construction practices such as vehicle washdown may be implemented to limit the spread of pathogens in the adjoining environment. It is noted that there are no known pathogens that affect grey-headed flying-fox that are spread via vehicles or construction. Through the implementation of mitigation measures targeting weeds, the development is unlikely to result in an increase in weeds.	The creation of edge effects as a result of vegetation clearing and construction may result in an increase in the presence of weed species within and adjoining the project area. The potential for the spread of weeds will be managed through mitigation measures proposed in **Section 5** including the implementation of the MNES Management Plan (**Attachment A8**) and Rehabilitation Plan to be approved by Ipswich City Council which will simultaneously improve existing habitat quality through the removal of existing weeds. Standard construction practices such as vehicle washdown may be implemented to limit the spread of pathogens in the adjoining environment. It is noted that there are no known pathogens that affect the swift parrot and regent honeyeater that are spread via vehicles or construction. Through the implementation of mitigation measures targeting weeds, the development is unlikely to result in an increase in weeds.	<u>Weeds</u> Invasion by escaped garden plants, including aquatic plants, is identified as a key threatening process to the LRSA TEC that may result in the loss and degradation of native plant and animal habitat. Species listed as invasive include madeira vine (*Anredera cordifolia*), cats claw creeper (*Macfadyena unguis-cati*), morning glory (*Ipomoea spp.*), wandering jew (*Tradescantia fluminensis*), climbing asparagus (*Asparagus plumosus*), ochna (*Ochna serrulata*) and small-leaved privet (*Ligustrum sinense*). Of these, wandering jew, climbing asparagus fern and ochna were recorded on-site. Through the proposed extensive rehabilitation effort within vegetation retention areas, provision of significant buffer areas and revegetation within these buffers, it is unlikely the introduction of new or proliferation of existing species will occur. <u>Pathogens – *Phytophthora cinnamomi*</u> The *Threat Abatement Plan for disease in natural ecosystem caused by Phytophthora* (DoEE, 2018) (TAP) identifies the Lowland Rainforest of Subtropical Australia ecological community as a community that may be affected by Phytophthora induced dieback. *Phytophthora cinnamomi* is a microscopic soil-borne organism and spreads via soil, organic material or water. Phytophthora cinnamomi causes dieback within native flora through attacking the roots and collar of susceptible plants (DoE, 2014). Machinery and vehicles play a role in the spread of potentially infected soil and water; however, animals and humans may facilitate the spread of Phytophtora further and faster (DoEE, 2018). The spread and proliferation of this pathogen has the potential to directly impact the native plants that occur within the LRSA TEC. According to the Threat Abatement Plan (DoEE, 2018), once an area is infected with this pathogen, eradication is unlikely as there is no cure. Due to the variety of spreading agents, the risk of spreading the pathogen is particularly high during clearing and bulk earthworks. According to the Threat Abatement Plan (DoEE, 2018), potential consequences of infection include: • inability of infected plants to develop new shoots, flowers, fruit and seed • extinction of populations of some flora species • a dramatic modification of the native plant community's structure and composition • a significant reduction in primary productivity and functionality

Indirect Impact	Koala	Grey-headed flying-fox	Swift parrot and regent honeyeater	LRSA TEC
				• habitat loss and degradation of dependent flora and fauna; to date, these have been irreversible • local extirpation and a significant loss of genetic diversity • major declines in some animal species due to the loss of shelter and nesting sites or food Visual symptoms of *P. cinnamomi* infection may not manifest until years after initial infection (DoE, 2014). As Phytophthora is spread via soil, organic material or water, the capacity for the development works to facilitate the spread of Phytophthora should be considered, particularly during the bulk earthworks and construction. It is considered that indirect impacts via the introduction or spread of Phytophthora into the LRSA TEC can be managed through education and awareness, implementation of erosion and sediment control measures and ensuring vehicle and personal equipment washdown procedures are enforced before moving in and out of the site particularly where vehicles or personnel have been recorded near known or suspected *P. cinnamomi* infested areas. Proposed avoidance and mitigation measures for Phytophthora are summarised in **Section 5** with further details provided in the MNES Management Plan to be implemented during the clearing and construction phases of the project provided at **Attachment A8**.
d. The increased risk of entanglement in wire fencing or other infrastructure within, and adjacent to, the site.	Industry standard fauna friendly site design measures will be implemented across the proposed development to reduce any physical risk posed by an increase in infrastructure in this area.	Industry standard fauna friendly site design measures will be implemented across the proposed development to reduce any physical risk posed by an increase in infrastructure in this area. Existing barbed-wire fencing on-site will be removed as part of the development. Electrocution on powerlines where they occur is a risk, however, entanglement in netting and on barbed-wire is considered highly unlikely and can be managed through the implementation of mitigation measures and procedures outlined within future management documents including the Vegetation Clearing and Fauna Management Plan (VCFMP).	Industry standard fauna friendly site design measures will be implemented across the proposed development to reduce any physical risk posed by an increase in infrastructure in this area.	This is indirect as this risk is relevant to fauna that are commonly associated with the LRSA TEC rather than the TEC itself. These fauna species with the potential to occur in LRSA TEC are listed in Appendix C of the LRSA TEC listing advice. It is noted the majority of these species are unlikely to occur in the patch or broader vegetation areas on-site and wider area. Industry standard fauna friendly site design measures will be implemented across the proposed development to reduce any physical risk posed by an increase in infrastructure in this area.
e. Reduction in habitat connectivity to surrounding habitats, and any potential edge effects or disturbance to surrounding	<u>Habitat Connectivity</u> Habitat connectivity is present to the north, south and west of the subject site via retained corridors of vegetation associated with O'Dwyers Gully, Opossum Creek and Woogaroo Creek. Connectivity to the east is already highly limited by existing residential development. In the broader landscape habitat values are fragmented by residential development and major roads including the Centenary Highway to the south. The increasing residential development within the locality means habitat suitable to koala has contracted to primarily sit within retained riparian areas. The	<u>Habitat Connectivity</u> The proposed development is not expected to reduce connectivity of suitable habitat for the grey-headed flying-fox due to the highly mobile nature of the species and abundance of suitable habitat in the surrounding landscape. <u>Edge Effects and Disturbance</u> The proposed development is not anticipated to result in edge effects or disturbance to retained grey-headed flying-foxes habitat.	<u>Habitat Connectivity</u> Habitat connectivity is present to the north, south and west of the subject site via retained corridors of vegetation associated with O'Dwyers Gully, Opossum Creek and Woogaroo Creek. Connectivity to the east is already highly limited by existing residential development. In the broader landscape habitat values are fragmented by residential development and major roads including the Centenary Highway to the south. The increasing residential development within the locality means habitat potentially suitable for the swift parrot and regent	<u>Habitat Connectivity</u> As demonstrated in **Plan A42** the LRSA TEC patches will be wholly retained and a buffer of at least 50 metres is to be delivered between the edge of the LRSA TEC and all clearing, construction and development uses. No barriers will be created within or adjoining the LRSA TEC as the patches will remain *in situ* within the Opossum Creek corridor.

Indirect Impact	Koala	Grey-headed flying-fox	Swift parrot and regent honeyeater	LRSA TEC
habitats, including any adjacent conservation areas.	proposed development while decreasing the available area of habitat will not reduce connectivity potential for koala and fauna generally within retained riparian corridors. Edge Effects and Disturbance The proposed action area and adjoining areas have been subject to modification due to historical land uses and clearing. As a result, existing edge effects and disturbance in the form of weed invasion are present within gully lines, creeks and isolated areas over the balance of the site. These areas, where to be retained, will be rehabilitated post-construction.	Retained vegetation areas will be rehabilitated to remove weeds and plant with native species where required. Edge effects are unlikely to impact the suitability of retained vegetation for foraging purposes given their ability to utilise highly fragmented areas for incidental foraging. Notably, there are no grey-headed flying-fox roosts located within or adjoining the project area.	honeyeater has contracted to primarily sit within retained riparian areas. While the proposed development will decrease the available area of habitat it will not reduce connectivity potential for swift parrot and regent honeyeater via retained riparian corridors. Edge Effects and Disturbance The proposed action area and adjoining areas have been subject to modification due to historical land uses and clearing. As a result, existing edge effects and disturbance in the form of weed invasion are present within gully lines, creeks and isolated areas over the balance of the site and adjoining areas. These areas, where to be retained, will be rehabilitated post-construction.	Edge Effects and Disturbance Potential edge effects will be managed through the retention of significant buffer areas and the proposed rehabilitation measures in line with an approved Bushland Management Plan. Further detail and discussion on edge effects and rehabilitation is provided in **Section 5.5**.
f. Changes to hydrology and water quality within, and around, the site, including increased siltation.	Several ephemeral drainage lines are present across the referral area in the form of eroded gully lines formed by the natural sloping topography of the site. Woogaroo and Opossum Creeks (stream order 4 watercourses) are situated west and north-west of the project area, while a stream order 2 watercourse locally referred to as 'O'Dwyer's Gully' is present in the vegetated corridor east of the project area. Earthworks and construction disturbances are not proposed to occur within these waterways. Where earthworks are to occur proximal to waterways, the implementation of standard mitigation measures (discussed in **Section 5**) will reduce the potential for development to impact these areas. Standard mitigation measures include but are not limited to waterway setbacks and maintenance of creekline vegetation, implementation of site-based erosion and sediment control plan which will be prepared at operational works, and the location of stormwater detention technologies at various locations across the site to minimise the effects of excess rainwater flowing into catchments caused by the creation of hardstand areas including stormwater quality and quantity. A Stormwater Management Plan (SMP) has been prepared for Village 2 and Village 3 as part of the ADP approval process (provided at **Attachment A12**). The SMP provides a strategy to management stormwater runoff within the development areas using a series of bioretention systems. During clearing and construction, all work is to be undertaken in accordance with appropriate management plans including but not limited to, a Construction Environmental Management Plan (CEMP), Dispersive Soils Management Plan (DSMP) and Erosion and Sediment Control Plan (ESCP) to ensure the hydrological changes across the proposed action area do not impact on surrounding vegetation and waterways. The ESCP and CEMP will be prepared in consultation with the site contractor to suit the staging and construction requirements of the site.	Several ephemeral drainage lines are present across the referral area in the form of eroded gully lines formed by the natural sloping topography of the site. Woogaroo and Opossum Creeks (stream order 4 watercourses) are situated west and north-west of the project area, while a stream order 2 watercourse locally referred to as 'O'Dwyer's Gully' is present in the vegetated corridor east of the project area. Earthworks and construction disturbances are not proposed to occur within these waterways. Where earthworks are to occur proximal to waterways, the implementation of standard mitigation measures (discussed in **Section 5**) will reduce the potential for development to impact these areas. Standard mitigation measures include but are not limited to waterway setbacks and maintenance of creekline vegetation, implementation of site-based erosion and sediment control plan which will be prepared at operational works, and the location of stormwater detention technologies at various locations across the site to minimise the effects of excess rainwater flowing into catchments caused by the creation of hardstand areas including stormwater quality and quantity . A Stormwater Management Plan (SMP) has been prepared for Village 2 and Village 3 as part of the ADP approval process (provided at **Attachment A12**). The SMP provides a strategy to management stormwater runoff within the development areas using a series of bioretention systems. During clearing and construction, all work is to be undertaken in accordance with appropriate management plans including but not limited to, a Construction Environmental Management Plan (CEMP), Dispersive Soils Management Plan (DSMP) and Erosion and Sediment Control Plan (ESCP) to ensure the hydrological changes across the proposed action area do not impact on surrounding vegetation and waterways. The ESCP and CEMP will be prepared in consultation with the site contractor to suit the staging and construction requirements of the site.	Several ephemeral drainage lines are present across the referral area in the form of eroded gully lines formed by the natural sloping topography of the site. Woogaroo and Opossum Creeks (stream order 4 watercourses) are situated west and north-west of the project area, while a stream order 2 watercourse locally referred to as 'O'Dwyer's Gully' is present in the vegetated corridor east of the project area. Earthworks and construction disturbances are not proposed to occur within these waterways. Where earthworks are to occur proximal to waterways, the implementation of standard mitigation measures (discussed in **Section 5**) will reduce the potential for development to impact these areas. Standard mitigation measures include but are not limited to waterway setbacks and maintenance of creekline vegetation, implementation of site-based erosion and sediment control plan which will be prepared at operational works, and the location of stormwater detention technologies at various locations across the site to minimise the effects of excess rainwater flowing into catchments caused by the creation of hardstand areas including stormwater quality and quantity . A Stormwater Management Plan (SMP) has been prepared for Village 2 and Village 3 as part of the ADP approval process (provided at **Attachment A12**). The SMP provides a strategy to management stormwater runoff within the development areas using a series of bioretention systems. During clearing and construction, all work is to be undertaken in accordance with appropriate management plans including but not limited to, a Construction Environmental Management Plan (CEMP), Dispersive Soils Management Plan (DSMP) and Erosion and Sediment Control Plan (ESCP) to ensure the hydrological changes across the proposed action area do not impact on surrounding vegetation and waterways. The ESCP and CEMP will be prepared in consultation with the site	A Stormwater Management Plan (SMP) has been prepared for Village 2 and Village 3 as part of the ADP approval process (provided at **Attachment A12**). The SMP provides a strategy to management stormwater runoff within the development areas using a series of bioretention systems. During clearing and construction, all work is to be undertaken in accordance with appropriate management plans including but not limited to, a Construction Environmental Management Plan (CEMP), Dispersive Soils Management Plan (DSMP) and Erosion and Sediment Control Plan (ESCP) to ensure the hydrological changes across the proposed action area do not impact on surrounding vegetation and waterways. The ESCP and CEMP will be prepared in consultation with the site contractor to suit the staging and construction requirements of the site. With the above mitigation measures, potential indirect impacts resulting from modified hydrological regime are unlikely to impact on surrounding potential swift parrot and regent honeyeater foraging habitat.

Indirect Impact	Koala	Grey-headed flying-fox	Swift parrot and regent honeyeater	LRSA TEC
	With the above mitigation measures, potential indirect impacts resulting from modified hydrological regime are unlikely to impact on surrounding koala habitat.	With the above mitigation measures, potential indirect impacts resulting from modified hydrological regime are unlikely to impact on surrounding grey-headed flying-fox habitat.	contractor to suit the staging and construction requirements of the site. With the above mitigation measures, potential indirect impacts resulting from modified hydrological regime are unlikely to impact on surrounding potential swift parrot and regent honeyeater foraging habitat.	

5. Avoidance and Mitigation

This section responds to Item 5 of the PD request which requests the provision of a consolidated description of all proposed measures to avoid and mitigate impacts, including any additional to those described in the referral. The following subsections provide a response to Item 5.

The following comments are made in relation to the avoid and minimise provisions, noting the *Nature Positive Plan* (December 2022) is considered retrospectively to both the project and information formally requested by the Department on two occasions.

5.1 Site Selection

- The Springfield Residential Development is located in the City of Springfield and obtains development rights through the Springfield Structure Plan (SSP) which was approved in 1997, two years before the gazettal of the EPBC Act. The land is primary mapped for residential development under this structure plan. The Structure Plan was approved via the Queensland Governments Environmental Impact Study (EIS) process and resulted in a large portion (392 hectares (ha)) of land designated as Urban Footprint being committed to the Flinders-Karawatha Bioregional Corridor. Refer to **Figure A9**.
- The proposed action site is included within the Queensland Government's Regional Plan as 'Urban Footprint' and zoned within the Ipswich City Council for residential development. Refer to **Figure A10**.
- EPBC 2019/8575 represents Village 2 and 3 of the Kalina project, which is the completed Village 1 area authorised through EPBC 2014/7306. This EPBC Act approval includes clearing for a future major connection roads and sewer through the remaining villages making up EPBC 2019/8575. Refer to **Plan A7**.
- The proposed action site is surrounded by infrastructure and amenity designed to enable the land area to be developed for residential purposes as per the Structure Plan Approval and intended zoning. This includes road stubs at the entry to the site sized to enable bus routes which occur throughout Springfield. Sewer and water pipes running through and adjacent to the site mandated to be built to cater for the future capacity created by the Village 2 and 3 developments and gas and power infrastructure available and designed for the ultimate project.
- The proposed action site being located within the City of Springfield benefits by being in immediate proximity to critical community and city-based infrastructure not available in any other locations in Queensland. This includes:
    - Sharing a direct boundary with the Springfield Anglican College as well as being within walking distance to number of other schools.
    - Located 2 km north of the Springfield Rail Station and directly connected via existing pedestrian and cycles ways through the creek corridor.
    - Located 2.2 km from the major shopping and business hub of Springfield City
    - Located 3.1 km from the University of Southern Queensland
    - Located 3.5 km from the Mater Hospital
- The land is wholly owned by the proponent who is finalising all Local and State Government approvals to enable commencement.

The Springfield Residential Development has been planned for development since the 1997 Springfield Structure Plan approval and is surrounded by approval decisions, infrastructure and amenity which cannot be replicated in any other location in Queensland. Although large in scale, the land is very much an infill parcel for which a number of critical approvals and infrastructure are founded.

5.2 Design Minimisation

Cherish Enterprises Pty Ltd acquired the action site landholding in 1992. Since this time various development applications have been made and approved through the Local and State Government at which on all occasions environmental land has been dedicated for ecological purposes. The original allotment acquired was just over 250 ha in size and was wholly included within the South East Queensland Regional Plan Urban Footprint. The following land areas have already been dedicated with approvals occurring on the land to date:

- Approximately 32 ha of land dedicated to Ipswich City Council (ICC) in August 2017 for environmental purposes along the Opossum and Woogaroo Creek Corridors.
- 17.2 ha of land dedicated in 1998 along the O'Dwyers Gully area between the project and the existing housing of Springfield.
- 10.6 ha of land provided surrounding the Village 1 area for environmental corridors.

Refer to **Plan A43** for an overview of the proponent's original landholdings and above listed dedications.

Prior to EPBC Act Determination just under 60 ha of freehold land was already committed to resolving Local and State Government Environmental Approval requirements. With the lodgement of the Preliminary Documentation Version 1 in October 2021, an additional 18.7 ha was provided within the project design as buffers to the creek corridor. Critically, post the on-site meeting with the Department a further 9.2 ha as removed from the proposed development footprint and added to the creek corridor. With this change the proposed development footprint now occurs a minimum of 306 m of width from existing housing on the western side of the creek corridor and up to 800 m wide in other locations. Importantly existing housing on the western side of the creek corridor is as close as 40 m from the creek centreline and typically rarely wider than 80 m. The achievement of a 300 m minimum corridor is the result of the project providing setbacks up to 6 times the minimum width of the western side of the creek. The land developed on the western side of the creek corridor occurs through an older EPBC Act Approval and retains identical zoning, structure plan rights and approval process as the project highlighting how much more additional impact is being avoided by amendments to the project design.

From the original 250 ha allotment, just under 90 ha is now committed to environmental protection and enhancement leaving a development footprint (excluding drainage and internal open space requirements) of 128 ha or just under half the freehold land originally acquired for development.

Refer to **Plan A44** for a comparison of the development footprint from the Referral to the Preliminary Documentation proposed as part of this application indicating the increase in proposed retention areas.

5.3 Description of pre-clearance and clearance procedures

Item 5.1(a) of the PD Request asks for ***"details about pre-clearance and clearance procedures to ensure that species are detected and managed to minimise mortality, stress, injury, or introduction of disease."***

A range of mitigation measures are proposed to reduce identified potential direct and indirect impacts on habitat suitable for the identified MNES during the clearing and construction phases of the project. The mitigation measures are summarised below:

- Implementation of an MNES Management Plan to form a guide for management measures required to be implemented over the course of the project (draft plan provided as part of this PD).
- Preparation Vegetation Clearing and Fauna Management Plans (VCFMP) for specific clearing phases (overarching plan provided as part of this PD).
- Pre-clearance measures including installation of fauna friendly tree protection fencing around vegetation clearing areas.
- Engagement of a Department of Environment, Science, Tourism and Innovation (DETSI) registered fauna spotter catcher and AQF Level 5 Arborist to supervise clearing activities.
- Preparation of Environmental Pre-clearance Prestart Procedure.
    - Preparation of Environmental Pre-clearance Packages.
    - On-site environmental pre-start meeting
- Installation of temporary koala exclusion fencing around construction areas prior to construction commencing.
- Installation of temporary shade cloth fencing in works areas adjacent to the LRSA TEC to protect the LRSA TEC from excessive dust.
- Preparation of a Construction Environmental Management Plan(s) and Erosion and Sediment Control Plan in consultation with the civil contractor and inclusion of specific management measures to limit the introduction and spread of *Phytophthora cinnamomi* due to works.

These management measures are described in further detail in the below sub-sections. The implementation of management measures is proposed to be documented in annual compliance reporting to be conditioned for the project.

5.3.1 MNES Management Plan

In addition to mitigation outcomes incorporated in the design process, a number of management measures are proposed to ensure impacts are avoided and or minimised through the construction and operational phases.

To avoid and mitigate the direct and indirect impact associated with the proposed action on the MNES, an MNES Management Plan has been prepared. The MNES Management Plan will act as the Environmental Management Plan for the project.

Key outcomes within the MNES Management Plan include:

- MNES are protected on-site, where they are present.
- The abilities for MNES to move into, within and out of the site is maintained.
- Potential risks to species (e.g. vehicle strike, entanglement, fragmentation of habitat / becoming stranded, noise / light pollution, etc.) are identified and appropriately managed.
- All persons involved in construction and operation of the development are aware of the site values, their potential to impact on MNES and their habitats, and their responsibilities in regard to procedures and strategies as proposed by the plan.

The MNES Management Plan will outline construction measures to manage and mitigate impacts on native flora, and fauna, specifically the listed MNES and will include details on:

- Project description, site design and identification of conservation areas.
- Ecological values of the project area, including:
    - existing flora and fauna values on the subject site and in surrounding areas; and
    - key results from survey data, including koala, grey-headed flying-fox, swift parrot and regent honeyeater occurrence, and the availability and quality of habitat.
- Environmental management, including:
    - MNES Management Plan objectives.
    - Identification of key personnel.
    - Roles and responsibilities.
    - Environmental awareness and compliance training for all contractors and sub-contractors.
    - Adaptive management.
    - Statutory requirements.
- Pre-clearance requirements – fauna management, including:
    - Vegetation management (clearing and protection), including:
        - Objectives.
        - Management strategy.
        - Performance indicators.
        - Environmental outcomes.
        - Monitoring and adaptive management.
    - Protection of focal MNES (*i.e.,* koala, GHFF, swift parrot and regent honeyeater) and native wildlife, including:
        - Objectives.
        - Management strategy.

        - Performance indicators.
        - Environmental outcomes.
        - Monitoring and adaptive management.
        - Requirements of the DETSI approved Fauna Spotter / Catcher and adoption of the *Code of Practice for the Welfare of Animals Affected by Land Clearing and Other Habitat Impacts* in pre-clearance surveys, reporting and monitoring.
        - Sequential clearing plan and clearing restrictions.
        - Specifications and requirements for fauna exclusion fencing.
- Maintenance of safe wildlife movement opportunities (during construction) including:
        - Objectives.
        - Management strategy.
        - Performance indicators.
        - Environmental outcomes.
        - Details of temporary fencing.
        - Hours of operation.
        - Details of fauna awareness signage.
        - Details of vehicle movement controls.
- Fauna habitat rehabilitation, outlining:
    - Planting and rehabilitation.
    - Wildlife crossings, where required.
    - Reporting and monitoring.
- Education and Awareness.

5.3.2 Vegetation Clearing and Fauna Management Plan

The Vegetation Clearing and Fauna Management Plan (VCFMP) is a document that provides an overview of core retention and removal areas within the application site as well as potential impacts of the construction phase on fauna from the loss of vegetated areas, isolated trees and likely barriers and impediments to local dispersal.

The purpose of the VCFMP is to manage the vegetation removal process and protection of fauna species within the clearing area. An overarching VCFMP has been prepared for the project area, provided at **Attachment A10**. The Overarching VCFMP is a preliminary document and includes details of the proposed project clearing phasing, fauna management procedures and proposed tree retention and removal details along the boundary interface areas of Village 2 and Village 3. It is noted that tree retention and removal details will be subject to change based on detailed design changes associated with operational works approvals.

Stage-specific VCFMPs will be prepared in accordance with operational works approvals for the project. With each iteration of the VCFMP clearing mechanisms and management procedures will be specific to the relevant clearing area. The following detailed vegetation clearing information will be included in the stage-specific plans:

- Clearly show all trees to be removed and retained.
- Include details of all civil works likely to impact on existing vegetation.
- Temporary and permanent exclusion and protection fencing tor riparian corridors, significant habitat to retain, and parklands.
- Roles and responsibilities for site contractors, developer and the consultant group.
- Stockpiling and site access locations.
- A clearing sequencing plan showing the commencement of clearing and direction of removal (this should be in conjunction with the fauna management protocols to allow for the appropriate flushing of fauna towards surrounding safe haven areas.
- Links to weed management and revegetation proposals.
- The stock piling and reuse of cleared vegetation.
- Specific details on the removal of previously identified potential fauna habitat trees.
- Where trees are shown to be retained occur within disturbance zones they should be accompanied by necessary arborist specifications incorporated into the VCFMP.
- Designation of trees to be protected for the on-going life of the proposal which may require both immediate remedial works (Crown thinning, coppicing) and long-term monitoring for the potential of future works.

Under Queensland's *Nature Conservation Act 1992*, all native fauna are protected and as such the following activities are required to ensure that vegetation removal and construction does not adversely affect native fauna species:

- Immediately prior to the commencement of clearing of native vegetation, a daily visual inspection of the area must be carried out;
- In the event of an animal being located, an area of 5 metres radius should be established around the tree, excluding machinery from this area until the animal has relocated (usually overnight); or
- If an animal requires relocating, this must be undertaken by a suitable qualified fauna expert (e.g. fauna spotter-catcher) recognised by the Queensland Parks and Wildlife Service.
- Any native fauna orphaned or injured by the development process must be reported to the Queensland Parks and Wildlife Service.
- The site supervisor is responsible for the safe management of site fauna and implementation of these specific fauna requirements.

Fauna management information included in the Overarching VCFMP and subsequent stage-specific VCFMPs will include:

- Species surveyed as using the site with a focus on those most likely impacted by development works.
- A list of relevant State and Commonwealth legislation constraints and controls for the above listed fauna.
- A plan showing existing habitat opportunities and locations.
- Details of the threats to existing fauna species.
- Clearing sequence plan from the VCFMP.
- Management and mitigation measures *i.e.,* temporary use of fauna exclusion fencing.
- Fauna spotter role, contacts and certification.
- Specific fauna management procedures for potential or known habitat trees.

The VCFMP and fauna management protocols will be overseen by ICC and are required under State legislation. These documents will underpin operational works approvals sought by ICC.

5.3.3 Environmental pre-clearance package

Each clearing phase will be subject to issue of an Environmental Pre-Clearance Checklist and Environmental Pre-Clearance Package to ensure all approval requirements are met prior to vegetation clearing. Environmental Pre-Clearance Checklists are designed to easily show compliance for approval requirements, including EPBC approval requirements, in a format where they can be 'ticked off' prior to vegetation clearing.

The purpose of the checklist is to ensure:

- All required approvals are in place prior to clearing and all relevant documentation including approvals, approved plans and management documents are compiled and distributed to all relevant personnel.
- Threatened flora and fauna pre-clearance checks are undertaken of the clearing extent and appropriately documented so that:
    - Any threatened flora in the cleared area is identified and appropriate measures are in place.
    - Any threatened fauna and / or fauna habitat is identified and appropriately managed.
- Appropriate induction procedures are in place and environmental requirements are understood and complied with by all contractors and sub-contractors.

The Environmental Pre-Clearance Checklist is to be read in conjunction with the MNES Management Plan. Together the Environmental Pre-Clearance Checklist, associated attachments and the MNES Management Plan will form the Environmental Pre-Clearance Package for that scope of works. Environmental Pre-clearance Packages require all approval documentation, including EPBC approval requirements, relevant to that clearing stage to be prepared, compiled and distributed to all relevant parties prior to the commencement of clearing.

The Environmental Coordinator will be responsible for preparation of and the Environmental Pre-clearance Package.

All responsible parties (*i.e.,* civil contractor, clearing contractor, fauna spotter catcher, arborist (if required), environmental coordinator, superintendent and client) must sign the checklist prior to clearing, acknowledging that they have reviewed all, and will undertake the works in accordance with, approved procedures and reporting.
As way of acknowledgement, the Environmental Pre-Clearance Checklist will be run through at a project pre-start meeting with all personnel and relevant parties required to sign the checklist. No clearing can commence for a specific phase of works until the checklist has been completed and signed off by the Environmental Coordinator.

5.3.4 Fauna Spotter Catcher roles and reporting

A registered and suitability qualified fauna spotter catcher/ecologist will be employed for the construction phase of the proposed action to implement a protocol of best management practises as required under State legislation.

This role is mandated for any clearing of native vegetation in Queensland. The role of the fauna spotter catcher is to complete an assessment of the works area no more than 2 weeks prior to clearing and present a short report to the proponent on the findings and how the proposed clearing is to be managed. The Fauna Spotter Catcher is required at the pre-start meeting and be on-site during all times of construction. Under the *Nature Conservation Act 1992* registered fauna spotter catchers must complete a return of operations report to the Queensland State Government stating all fauna encountered and the specific management measures used to ensure the safety of native animals.

It is the role of the fauna spotter catcher to take all reasonable steps to protect wildlife that may be impacted by vegetation clearing. These steps include:

- Undertaking wildlife load reduction measures through the pre-clearing trapping and relocation of wildlife within 1-2 weeks prior to the approved clearing being conducted. Sequential clearing cannot be used as a primary fauna management measure;
- Clearly mark (flag) vegetation found to contain fauna or fauna habitat (such as tree hollows, arboreal termite mounds, stick nests or possum drays with flagging tape) and visually and verbally communicate this information to the tree feller to ensure flagged trees are not felled until authorised by the fauna manager;
- Manage any koalas identified on site in accordance with the *Nature Conservation (Koala) Conservation Plan 2006* and Management Program 2006-2016;
- Manage any grey-headed flying-foxes identified on site in accordance with the protocols discussed in the MNES Management Plan;
- Manage fauna habitat identified during the site inspection using the protocols discussed within the MNES Management Plan;
- Work in conjunction with a professional tree feller in the removal of any vegetation;

- Schedule vegetation clearing to ensure that the impacts on wildlife are minimised and the likelihood of detection and capture of wildlife is maximised and wildlife load reduction measures are productive;
- Ensuring vegetation and rubbish piles are not left to serve as refuge for displaced or roaming wildlife through the implementation of the following measures:
    - Immediately (within 12 hours) remove or destroy such material
    - Erect wildlife proof barriers. Fencing surrounding stockpiles to prevent wildlife use
    - Ensure old (>12 hours) piles of felled vegetation are treated as potential wildlife habitat and inspected by a wildlife spotter/catcher prior to removal or destruction
- Limiting the felling of habitat and hollow bearing trees to the following methods:
    - Segmental removal of tree, with hollow bearing limbs being checked by the fauna spotter catcher and cleared of fauna using a cherry picker or suitable means determined by the fauna spotter catcher
    - Segmental removal of the tree, with hollow bearing limbs plugged and lowered to the ground for inspection by fauna spotter catcher
    - Use of an excavator with vertical grab to lower the main trunk (only after the removal of lateral limbs)
    - A combination of the above methods

5.3.5 Adoption of the RSPCA / ESU of WW Draft Code for Fauna Spotting

The project will adopt the DRAFT Code of Practice for the welfare of animals affected by land-clearing and other habitat impacts (Draft Code) prepared by the Australia Zoo Wildlife Warriors and Voiceless. This Draft Code is not mandatory, however, is advocated by various environmental organisations as the leading practice method for minimising impacts of native wildlife during construction processes.

The Draft Code will be adopted to ensure that fair, reasonable and appropriate measures are undertaken to minimise the adverse impacts on wildlife as a result of vegetation clearing. The code provides standards and guidelines for the humane treatment of wild animals affected by land clearing by detailing the general responsibilities of people involved in land clearing and the specific roles of wildlife spotter/catchers. As emphasised within the Draft Code, it will be the responsibility of all relevant parties to:

- Take all reasonable steps necessary to prevent cruelty or suffering to animals;
- Minimise the loss of wildlife caused directly or indirectly by development or land clearing; and
- Conserve, as much as possible, the ecological values of the development site and their surrounding natural environment (Draft Code, p.5)

The following components of the code are to be adopted as the following actions for any clearing works:

Action 1 – Developer to Engage Fauna Spotter Catcher

This action requires that the developer engage a Fauna Spotter Catcher with full registrations and licences provided in accordance with **DETSI**.

Action 2 – Fauna Spotter to Prepare a Wildlife Protection and Management Plan (WPMP)

The WPMP should include the following information:

- Description of the project with reference to impacts on wildlife or wildlife habitat;
- Pre-development plan of the site showing habitat areas, features, corridors, riparian habitats and adjacent areas;
- Results of any fauna surveys including pre-clearance surveys; and
- A wildlife and habitat impact assessment based on the proposed development works.

Action 3 – Prepare a Wildlife and Habitat Impact Mitigation Plan (WHIMP)

Following completion and of the WPMP the Fauna Spotter Catcher should prepare a more specific Wildlife and Habitat Impact Mitigation Plan (WHIMP), which will include details on:

- Measures required to be completed to minimise wildlife and habitat impacts during operational works;
- Wildlife capture and removal plan;
- Contingency plan for wildlife requiring euthanasia, other veterinary procedures or captive care;
- Wildlife storage and housing plan;
- Wildlife release and disposal plan; and
- Post works measures to minimise impacts on wildlife.

Action 4 – Fauna Spotter Catcher Role at Pre-Start Meeting

Prior to the commencement of any construction works, a pre-start meeting is to be held between the project manager, site foreperson, plant operators and Local Government representatives. At the pre-start meeting, the Fauna Spotter Catcher is to outline the clearing process and the requirements listed in the MNES Management Plan.

Action 5 – During Construction

The Fauna Spotter Catcher is to be on-site during all phases of construction which involve potential impacts on wildlife or habitat. This will enable to the Fauna Spotter Catcher to make any necessary adjustments to cater for any specific issues encountered during the clearing works.

Action 6 – Post Works Reporting (Wildlife Management Report)

During the course of all site works, including the pre-clearance surveys, the Fauna Spotter Catcher is to keep an accurate record of all animals encountered, captured, incidents and disposals for each stage of the project. The records should form part of the Wildlife Management Report to be issued under licence requirements to the State Government. The Wildlife Management Report should consist of the following 3 sections:

1. Wildlife Habitat Management Plan – Aspects of the planning, design, construction and ongoing operation of the project in which risks to wildlife have been identified. This plan should also include recommendations and outline the type, frequency and timeframes for monitoring.
2. Wildlife Capture and Disposal Plan – Should contain the following details for each captured animals:

a. Species
b. Identification name or number
c. Sex (M, F or unknown)
d. Approximate Age or Age Class (neonate, juvenile, sub-adult, adult)
e. Time and date of capture
f. Method of capture
g. Exact point of capture (GPS coordinates)
h. State of health
i. Incidents associated with capture likely to affect health
j. Veterinary intervention or treatments
k. Time held in captivity
l. Disposal method (euthanasia, translocation, re-release)
m. Date and time of disposal
n. Detailed of disposal (GPS points of release)
o. For released animals, location relative to point of capture

3. Animal Injury and Euthanasia Report – similar details for the Wildlife Capture and Disposal Plan should be included in this report.

5.3.6 *Phytophthora cinnamomi* management

Management actions proposed to be implemented to prevent the introduction and spread of *Phytophthora cinnamomi* are developed in accordance with the Threat Abatement Plan (DoEE, 2018). Reducing the risk of *Phytophtora cinnamomi* infection to the surrounding native bushland and LRSA TEC areas is to be managed through strategic planning, education, hygiene protocols, improving drainage and restricting access (DoEE, 2018). Any soil, organic material or water movement into retained native vegetation has the potential to introduce this pathogen into the area which can be facilitated through machinery and animal vectors and inappropriate drainage. Additionally, *P. cinnamomi* sporulation, movement and growth within plant tissue favours warm, wet soils, especially those with impeded drainage (DoE, 2014).

An assessment of proposed management actions for *P. cinnamomi* and their effectiveness are provided in **Table A58**. Management actions that focus on the prevention of the introduction and spread of *P. cinnamomi*, particularly through humans as a vector for spread, are highlighted as the most important for implementation.

More intensive hygiene procedures are generally prescribed where working in and adjoining areas of known *P. cinnamomi* infestation. As there are no known *P. cinnamomi* infestations on or adjoining the proposed action site, management measures will focus on vehicles coming and going from the site with regular hygiene protocols proposed for personnel for additional risk mitigation.

Table A58: Proposed management actions for *P. cinnamomi*

Management action	Description
Construction Environmental Management Plan (CEMP)	The CEMP produced prior to works commencing for the relevant stage in consultation with the civil contractor is to include the following: • Checklist item to identify whether any personnel or vehicles have been working within 500 m of locations with confirmed or suspected Phytophthora infections prior to entering the site. If yes, vehicle and personal equipment washdown and disinfection is required at designated clean down points. • Details on the location of designated clean down points for vehicles, machinery and personnel. • Requirement to provide awareness material at the site office so that all site personnel are aware of their ability to spread this pathogen. Use of clear messaging to promote safe hygiene practices such as 'Arrive clean, leave clean' and 'Check, Clean, Disinfect, Dry.'
Clean equipment and machinery	• Use wash-down stations for vehicles when available, especially at boundaries between infested and uninfested areas. • At a minimum, vehicle cleaning procedure must be implemented when the vehicle has been in contact with soil (not a public road surface) within 500 m of locations with confirmed or suspected Phytophthora infections. • Vehicle cleaning procedure does not need to be implemented when travel only involves driving on public roads (sealed and unsealed).
Personal hygiene protocols	• Personal items, particularly boots, must be washed down at designated clean down points if selecting 'yes' against the checklist item. • Personal cleaning procedure for footwear, tools and other equipment must be implemented when departing a property/site/location that is within 500 m of a confirmed or suspected Phytophthora infection (DPIR, 2021).
Limit access	• Avoid driving, riding, or walking in areas when soils are wet and sticky, and stay on designated roads and tracks.
Stormwater management and erosion and sediment control plans for relevant phasing areas to consider risk of *P. cinnamomi* spread	• Appropriate sediment control and stormwater runoff measures for clearing and construction phase to consider the potential spread via soil deposition and stormwater runoff and the potential need for additional protection measures in works areas located adjacent to the LRSA TEC patches.

Detection and monitoring

Currently positive identification of Phytophthora requires laboratory analysis of soil samples collected from around the roots of affected plants, by qualified scientists. However, some highly susceptible plant species do display obvious signs of infection. The presence of Phytophthora should always be suspected when a number of adjacently located individuals of a susceptible species are displaying visual symptoms of infection. As Phytophthora is a water borne organism, individuals of a susceptible species displaying symptoms of infection will usually follow drainage lines and surface water flow paths (DPIR, 2021). However, as visual symptoms of *P. cinnamomi* infection may not manifest until years after initial infection (DoE, 2014), absence of visual symptoms cannot provide assurance that Phytophtora is not present.

Annual inspection of the LRSA TEC is recommended to be completed by suitably qualified ecologists after commencement of clearing and construction phases in phasing areas adjoining the LRSA TEC patches to detect any evidence of dieback. Corrective actions are triggered where *P. cinnamomi* is suspected or confirmed and are listed in **Table A59**.

Table A59: *P. cinnamomi* corrective actions

Management action	Description
Soil sampling	• Where dieback is observed or presence of *P. cinnamomi* is suspected, a suitably qualified individual or 'interpreter' is engaged by the proponent to assess the signs and symptoms of dieback in the landscape and for known susceptible (or indicator) species and undertake targeted sampling of soil and plant tissues to support their assessment. Samples are sent for analysis to the Vegetation Health Service (VHS).
Development of Dieback Management Plan	• Where *P. cinnamomi* is confirmed to be present within the LRSA TEC, a suitably qualified individual or 'interpreter' is engaged by the Proponent to develop a Dieback Management Plan to reduce the risk of dieback introduction and spread associated with disturbance activities (e.g., earthworks, road construction and maintenance).
Systemic fungicide phosphite application	• Biodegradable, systemic fungicide phosphite is recommended as an additional treatment measure for protection of susceptible vegetation communities. The strategic application of phosphite has been shown to reduce the rate of autonomous spread of the pathogen, enhance the survival of susceptible species and ameliorate impacts on plant community structure (DoEE, 2018). • May be used following confirmed or suspected identification of *P. cinnamomi* within LRSA TEC in accordance with a Dieback Management Plan.

5.4 Description of buffers or proposed exclusion zones

Item 5.1(b) of the PD Request asks for ***"a description (including maps and imagery) of the location, boundaries and size of buffer areas or proposed exclusion zones, and details on how these areas will be enhanced, protected and maintained. Also include a description of any fences or barriers which may be installed around areas where impacts will be avoided."***

5.4.1 Fauna friendly tree protection fencing

Clearing and construction works associated with the development impacts will be limited to a maximum of 128 ha (refer **Plan A1**). Vegetation and development will occur progressively and in a staged fashion in line with operational works approval, starting with Village 2. Refer to **Plan A4** for the indicative location of project phasing.

Prior to clearing of each stage, temporary fauna friendly tree protection fencing and in the form of orange bunting and temporary signage will be installed around each staged clearing impact area (refer **Photo set 9** for example). The presence of tree protection fencing will ensure that no authorised clearing impacts occur outside of the staged clearing footprint and to allow any fauna present within the clearing footprint to disperse retained habitat areas.

Photo set 9: Fauna friendly tree protection fencing and signage to be installed around tree protection zone during clearing.

5.4.2 Temporary fauna exclusion fencing

Following the completion of vegetation clearing for the relevant phase and prior to construction commencing, temporary Koala exclusion fencing will be installed around the perimeter of the works footprint to prevent fauna from entering the construction footprint. Temporary koala exclusion fencing may use different designs including chainwire floppy-top fencing or construction fencing fitted with a panel of unclimbable material with the top of the sheeting 1.5 m from the ground as per the *Koala Sensitive Design Guideline* (DES, 2022) and *Fauna Sensitive Transport Infrastructure Delivery manual* (DTMR, 2024). Refer to **Table A60** for temporary fauna exclusion fencing options that may be utilised at the completion of clearing and to enable the construction of permanent fencing where proposed. A discussion of fencing type suitability is provided below.

Standard construction fencing has a high structural integrity making it suitable for long-term placement and for discouraging unauthorised access. By comparison, floppy-top fencing is identified as a koala exclusion fence type in the *Koala Sensitive Design Guideline* (DES, 2022) and is widely used design in construction management. Floppy-top fencing is generally considered effective for ensuring wildlife safety as it has a lower risk of entrapment and is effective as an anti-climb measure for koala exclusion due to the collapsible top. Other benefits of floppy-top fence include faster installation and greater flexibility in locating on uneven terrain. Due to its lower cost to install compared to standard construction fencing and effectiveness as a fauna exclusion measure, it has been broadly used in construction mitigation practices. Any fencing installed will be subject to regular maintenance checks to ensure damage is detected and rectified.

Table A60: Temporary exclusion fencing options

Type	Specifications	Image
Chain wire and picket fence with floppy top	• Chain wire • Star pickets • install star pickets on construction area side of fence	
Chain wire panel fencing with exclusion elements	• Chain wire panels • Plastic footings • 600 mm sheet metal/Perspex top	Source: DTMR (2024) ***Figure 5.3.3(c) – Plant-hire fencing with panel at top to inhibit climbing by koala***

Construction impacts are not to occur within Opossum and Woogaroo Creeks. Some minor clearing to facilitate stormwater outlets within the adjoining O'Dwyer's Gully to the east is proposed and has been discussed with ICC as part of the ADP and operational works application process as the asset holder of the land and infrastructure. An overarching Vegetation Clearing and Fauna Management Plan has been prepared

delineating the proposed impact areas and fauna management measures to be implemented during clearing. Erosion stabilisation controls and management measures are to be implemented in accordance with a Dispersive Soils Management Plan developed for the site to protect creekline vegetation areas. This will include establishment of tree protection fencing as described above and 'no-go' areas to protect those areas to be retained.

5.4.3 LRSA TEC shade cloth fencing

As illustrated in **Plan A42**, a buffer of 50 m between the edge of ground-truthed LRSA TEC and the edge of disturbance footprint and ultimate development uses will be implemented. This will be managed as part of Stage 2 – Village 3 clearing and construction works.

The use of fencing, particularly retrofitted with shade cloth, can act as a windbreak which reduces wind speeds and prevents dust particles from being carried. Temporary shade cloth fencing and sediment control fencing will be installed in works areas located adjacent to the TEC. The fencing will be installed outside of the 50 m buffer area of the LRSA TEC and will function to supress dust and prevent stormwater and sediment runoff into the LRSA TEC. The fence will be installed post-clearing and prior to construction occurring in the relevant phasing area. Refer to **Plan A45** for the proposed location of shade cloth fencing.

5.4.4 Other barriers/fencing

To separate the retained vegetation areas and development land uses during operation, a barrier which may include fencing or other type such as bollards is proposed to be installed along vegetation retention interface areas subject to approval by ICC. Barrier fencing including timber railing has been discussed with ICC as a potential option; however, a functional concept and design is yet be developed and will be explored in collaboration with ICC. The form of barrier chosen and approved will be designed to limit unauthorised vehicle and pedestrian access into the vegetation retention and Council linear open spaces areas and prevent interaction of native fauna with the development land uses. The location and design of fencing or other type of barrier will be finalised through detailed design and the operational works approval process.

5.5 Details on rehabilitation measures

Item 5.1(c) of the PD Request asks for *"**details of any rehabilitation measures to be implemented for disturbed areas, including rehabilitation objectives, target species, timing of rehabilitation stages, methodology, maintenance measures, schedules, and monitoring.**"*

Rehabilitation actions will occur where weed species are present, typically in association with gully lines in the area to be retained. In addition, revegetation of stormwater basins and park areas across the site are proposed to occur following construction. Rehabilitation is proposed to improve *in situ* ecological values and function as a fauna movement corridor, whilst enhancing flora structure and diversity. Rehabilitation works will involve the removal of introduced flora species from vegetation retention areas on-site.

It is noted that rehabilitation of open space areas is conditioned as part of the Village 3 ADP approval (ref 5547/2020/ADP) which requires a Bushland Management Plan to be submitted for approval as part of the operational works associated with the approval.

A Preliminary Bushland Management Plan (BMP) has been prepared as part of the PD and will form part of the broader management document submitted as part of the operational works drawings for the project. The Preliminary BMP is provided at **Attachment A9**. A detailed BMP will be prepared and submitted to Ipswich City Council for approval and will be prepared in accordance with the South East Queensland Ecological Restoration Framework (SEQERF) (Chenoweth EPLA, 2012) and ADP approval requirements. The detailed BMP will generally include information on:

- Rehabilitation details of species' specific habitat.
- Detailed plans of the riparian areas to be rehabilitated and stabilised in accordance with the Ipswich City Council Riparian Corridor Revegetation Guideline.
- Details of proposed rehabilitation works including proposed species and planting palette.
- Planting modules to demonstrate planting densities.
- All weeding works required, including a full list of known weeds on site and how each weed can adequately be managed.
- The required ongoing management / maintenance regimes, including:
    - Plans indicating maintenance areas / zones.
    - Schedules of works including frequency and tasks.
    - Allocation of labour and resources to perform tasks.
    - Nomination of key performance indications / criteria for monitoring purposes (e.g. all revegetation areas, minimum 90% weed free etc.).
    - Time allocated to performance various tasks (e.g. top up mulch, pruning, topdressing etc).
    - Defects liability for materials such as replacement of dead plant species of equivalent species and vigour.
    - Coordination of services such as irrigation repair or civil infrastructure maintenance (such as stormwater) that may impact on the landscape establishment and maintenance periods.
    - Management of bushfire hazard (where approved).
    - Management of domestic farm / feral animals (if appropriate).
    - Management of public access and / or restricted access areas.
    - Tree management procedures.
    - Management and maintenance of regimes for sediment and erosion control devices, and irrigation.
    - Proposed future need for infrastructure, including public facilities.
    - Management and control of declared plants and recognised environmental weeds.

Post-construction of the relevant phase, rehabilitation of the LRSA TEC and buffer area will occur in accordance with an approved Bushland Management Plan. This will include weed management and planting of flora species consistent with the LRSA TEC (refer **Section 5.5** for details on Preliminary BMP inclusions).

5.5.1 Mitigation Plantings – Opossum Creek

Additional to rehabilitation works that will occur within the retained vegetation areas within the proposed action area as conditioned under the Village 3 ADP approval (ref 5547/2020/ADP), approximately 4.85 ha of land west of Opossum Creek adjoining the proposed action site is also proposed to be reinstated with native plantings (refer **Plan A46**). The proposal planting area is located within previously disturbed areas which were cleared for lineal infrastructure construction for adjoining developments. The land is located within Council-owned land and will be subject to Council approval.

5.6 Details of the proposed ongoing management activity

Item 5.1(d) of the PD Request asks for ***"details of any ongoing mitigation and management measures during the operation of the facility."***

A range of mitigation measures are proposed to be implemented as part of the operational phase of the project including:

- Implementation of fauna friendly road design, fauna road crossing infrastructure and koala awareness signage along vegetation interface areas.
- Rehabilitation of vegetation retention areas in accordance with an approved Bushland Management Plan to be approved as part of operational works (discussed in **Section 5.5**).
- Fauna movement infrastructure installed where roads intersect retained habitat areas including at the proposed crossing at Mur Boulevard.
- Fencing adjoining development interface areas to prevent access into vegetation retention areas and Council land (design to be determined in collaboration with ICC, refer **Section 5.4.4**).
- Landscape species selection to include non-foraging tree species to discourage koalas and other native fauna from entering the development area.

The following sub-sections detail the ongoing mitigation and management measures during the operation of the development.

5.6.1 Safe Passage Road Fauna Movement Solutions

Roads intersecting retained habitat corridors across the site will be designed in accordance with the Queensland *Fauna Sensitive Transport Infrastructure Delivery* manual prepared by the Queensland Department of Transport and Main Roads (DTMR, 2024) the Queensland Government Koala Sensitive Design Guidelines to accommodate safe passage fauna movement solutions. As the project progresses through detailed design for each staging area, the design may be subject to minor changes to road locations, setbacks and earthworks. In all cases environmental values are protected and enhanced.

Within the project area, Mur Boulevard is proposed to be extended through the proposed action site to the west, intersecting vegetation areas within O'Dwyer's Gully. Refer to **Plan A47** for the location of proposed fauna movement solution. A road is also proposed to be delivered from the south extending from Panorama Drive to the north through the proposed action area, however, is located outside of the proposed action area and will be delivered under Kalina Village 1 (EPBC 2014/7306).

At the proposed Mur Boulevard road crossing, specific wildlife movement infrastructure will be delivered in accordance with the Queensland *Fauna Sensitive Transport Infrastructure Delivery* manual prepared by the Queensland Department of Transport and Main Roads (DTMR, 2024) and the Queensland *Koala Sensitive Design Guidelines* (DES, 2022) to allow for continued connectivity along O'Dwyer's Gully. The fauna movement crossing will include design elements that are specifically selected, designed, and sized to cater for the movement of native fauna anticipated to utilise the corridors. The safe crossing movement design will be supported by directional fauna exclusion fencing to ensure animals are funnelled away from vehicle conflicts and into the safe passage areas.

Fauna friendly crossings must include the following:

- Minimum fauna culvert sizes to suit a full suite of species on-site;
- Incorporate the use of fauna furniture such as free-standing log rails;
- Directional koala exclusion fencing to funnel koalas and other fauna towards the crossing (refer **Plan A47**).
- Provide crossing opportunities for arboreal animals via the use of retained canopy cover, rope bridges and glider poles, for example;
- Demonstrate that the type and dimension of the fauna crossing ensures that during low flow events, one dry culvert exists to facilitate fauna movement;
- Incorporate the installation of slow traffic areas and/ or safe fauna crossing areas, including but not limited to, appropriate fauna signage, maximum 50 km/hr and speed humps; and
- Ensure fauna crossing details are determined in consultation with a hydraulic engineer.

5.6.2 Fauna awareness signage

Where the proposed development includes esplanade roads running adjacent to the open space area, the design will adopt traffic calming and reduced speed signage to control vehicles adjoining sensitive areas.

A combination of koala awareness signage, environmental awareness (e.g. Ecological significance of Opossum Creek, Woogaroo Creek and associated vegetation) and reduced speed signage will be installed along esplanade roads located adjacent to the vegetation retention areas, interface areas of O'Dwyer's Gully and Woogaroo Creek and dedicated road crossings (refer **Plan A47**). The project will adopt the *Fauna Sensitive Transport Infrastructure Delivery* manual (Chapters 7 and 13) and *Draft Technical Note Wildlife Signage Guidelines* developed by DTMR to ensure best practice fauna management is incorporated into the design of wildlife movement solutions (where considered appropriate) or slow down points). The posted vehicle speed limit will be subject to ICC approval; however, it will not exceed 50 km/h and may be reduced at road crossing areas.

5.6.3 Lighting

Fauna sensitive lighting design will be utilised along esplanade roads adjoining the vegetation retention areas and natural areas associated with O'Dwyer's Gully, Opossum Creek and Woogaroo Creek. This includes installing shielded light fittings to minimise light spill into the natural areas and use of appropriate luminaire type identified as suitable for terrestrial mammal habitat under the Commonwealth *National Light Pollution*

Guidelines for Wildlife (DCCEEW, 2023). Fauna sensitive lighting will be installed in accordance with recommendations under the Guideline and in accordance with industry standards *i.e., AS/NZS 1158 Set: 2010: Lighting for roads and public spaces* and *AS/NZS 4282:2019 Control of the obtrusive effects of outdoor lighting*.

5.6.4 Landscaping

A non-eucalypt tree landscape mix to be used in estate landscaping. Ensure street and park trees while being planted out with non-invasive native trees don't specifically include any primary or secondary Koala food trees. The goal of this approach is to minimise the attraction for koalas or grey-headed flying-fox to enter the development area. The vegetation retention area will retain koala habitat trees. General maintenance management in the form of weed removal and litter removal will occur within the retained areas on-site and across the planned parks. The riparian corridor adjacent to the referral area to the west is to be managed ongoing by ICC.

5.6.5 Education and awareness

The action includes mitigation measures and awareness measures to manage potential impacts on koala and other fauna including koala awareness signage along the vegetation retention areas and at the proposed road crossing at Mur Boulevard (refer **Plan A47**).

5.6.6 Dog control measures

Restrictions will manage pets throughout the development, through fences around dwellings and mandates on leash when in common areas. No off-leash dog areas are included as part of the proposed action. Dog controls will be enforced and maintained by Council under local regulations.

Vegetation retention areas will be handed over to Council on completion as per standard practice and Council approval. These areas will become part of their ongoing open space and reserve management areas administered by the dedicated parks management team.

5.6.7 Stormwater management

A Stormwater Management Plan (SMP) has been developed by DesignFlow to manage stormwater treatment and flows for the proposed development (refer **Attachment A12**). The SMP has been designed to demonstrate how the proposed development will meet the stormwater management obligations established in the overarching Precinct Plan document, "Springview Village 2 & 3 – Stormwater Precinct Plan V2" (ICC ref: 6243/2023/LAP).

Additionally, hydrological impacts specifically will be managed during clearing and operation in accordance with the SMP and conditions of the Area Development Approvals for Village 2 and Village 3 (ref: 4272/2020/ADP and 5547/2020/ADP). This includes developing and implementing stage-specific Erosion and Sediment Control Plans and designing stormwater detention technologies to minimise the effects of excess rainwater flowing into catchments caused by the creation of hardstand areas including stormwater quality and quantity. The waterway stability strategy is provided at Section 5.0 of the latest version of the SMP which has been reviewed by Ipswich City Council and approved under the Village 3 ADP (ref: 5547/2020/ADP). Under the conditions for the ADP the following are required:

- Internal and external stormwater drainage infrastructure caters for a storm event with an Annual Exceedance Probability (AEP) of 1%.
- Provide a detailed inter-allotment drainage system designed in accordance with Queensland urban drainage manual.
- Submission of a Stormwater Quality Management Plan for approval which demonstrates stormwater runoff associated with the development achieves the water quality objectives outlined in Table 2.3.1 of Planning Scheme Policy 3 General Works of the Ipswich Planning Scheme prior to discharge from the site and is supported by MUSIC modelling where appropriate and details of the ongoing maintenance activities.
- Operational works drawings of final locations and cross sections of stormwater infrastructure in accordance with the approved SQMP and Section 2.3.5 of Planning scheme Policy 3 General Works of the Ipswich Planning Scheme.
- Maintenance period of all stormwater infrastructure for a minimum of 24 months.

The stormwater management strategy under the SMP involves treating stormwater runoff from the development areas via a series of sediment basins and bioretention systems located around the edge of the development (refer **Attachment A12 – Figure 4**). Peak discharges from two drainage discharges at the northern boundary of Village 3 that discharge to private properties will be retained below pre-developed levels by managing post developed catchments to avoid increases in peak flows at these locations.

In regard to proposed external stormwater infrastructure within the adjoining gully lines (as shown in **Plan A3**), the stormwater drainage infrastructure will be designed with consideration to the geomorphic characteristics of the site to ensure the ongoing protection and stability of adjoining creekline areas. The locations of stormwater outfalls and discharges to unlined gullies and waterways from the development will be carefully considered to avoid local scour of the bank and bed of adjoining waterways. The design and installation locations of new stormwater outlets along both the creeks and gullies will be informed by the following factors:

- Where stormwater outlets are within gullies, flow should be dissipated with appropriate stabilisation measures. This includes implementation of appropriate flow diversion and energy dissipation measures in accordance with *Queensland Urban Drainage Manual* (IPWEA, 2016).
- Discharge pipes should be aligned as close as feasibly possible to the direction of flow. This will minimise scour of the bed and adjacent bank.
- Where possible, pipes should outlet into the waterway just above the channel invert. Consideration of mobile bed depths should be considered to ensure pipes remain as low as possible while remaining free from blockage due to natural sedimentation and variations in bed level.
- Appropriate rock protection and/or rock chute provided at the stormwater outfall to provide protection against modelled stream powers. Where possible, discharge to exposed bedrock locations in gullies.
- Co-locate the stormwater outfalls within existing tributaries or scour points in the waterway meaning the stabilisation of these tributaries and the stormwater outfalls can be provided in a single location (dual use of rock protection).

5.7 Further details of measures proposed

Item 5.2 of the PD Request asks ***"for each measure proposed, indicate the:***

a) Responsible party

b) Environmental outcomes to be achieved

c) Milestones / performance / completion criteria

d) Proposed monitoring and evaluation program."

See **Sections 5.3** to **5.6** for the requested further details.

Item 5.3 of the PD Request asks to ***"provide an assessment of the predicted effectiveness of each proposed avoidance or mitigation measure, noting that the effectiveness of a particular measure is a reflection of confidence in the ability of the measure to reduce the risk of a threat. The assessment of effectiveness should be evidence based and include examples of demonstrated success of a particular measure to achieve the desired avoidance/mitigation outcome."***

Please refer to **Table A55** and **Table A56** for an assessment of mitigation measures effectiveness.

5.7.1 Clearing and construction impacts

Table A61: Clearing and construction Impacts

Impact	Avoidance and Mitigation Measures	Evaluation of the Effectiveness of Measures	Mitigation measure item	Timeline for delivery	Risk Assessment	Milestone	Responsible Party	Monitoring Program	Environmental Outcome
Loss of a maximum of 128 ha of critical habitat for the koala and grey-headed flying -fox, 9,983 habitat features for the swift parrot and 9,868 habitat features for the regent honeyeater	Habitat to be cleared on site is regrowth and remnant vegetation that has been subjected to historical modification. Endangered Regional Ecosystems are proposed to be retained within open space where vegetated buffers between the development and riparian corridor are to be retained, minimising potential impacts to ecosystem function. No more than 128 hectares of vegetation will be removed to facilitate the development.	Ecological surveys and habitat assessment conducted across the site led to the precise spatial analysis of vegetation and habitat qualities. The project will result in the unavoidable loss of not more than 128 hectares of vegetation containing critical habitat for the koala, grey-headed flying-fox, swift parrot and regent honeyeater.	Avoiding high value areas at development design	Works complete	The field survey applied has accurately mapped the features that are to be avoided and retained within the vegetation retention area.	The ecological retention area is intact at completion of works, with mitigating factors outlined below effectively applied. The development area is cleared and developed.	Civil contractor as appointed by the proponent.	Annual Compliance Report completed by an engaged suitably qualified professional as appointed by the proponent.	**Loss of critical habitat for the koala, grey-headed flying-fox, swift parrot and regent honeyeater.**
Risk of injury or mortality to koalas, grey-headed flying-fox, swift parrot and regent honeyeater from vegetation clearing and construction	All clearing will be undertaken in accordance with the MNES Management Plan. This will include: • Provisions for the proponent to engage a qualified Fauna Spotter Catcher to participate in all stages of vegetation clearing. The Fauna Spotter Catcher will be required to adopt elements of the Draft Code of Practice endorsed by the Australia Zoo Wildlife Warriors and Voiceless (The Draft Code). The role of the Fauna Spotter Catcher is to ensure that no injury or deaths occur to Koalas or other fauna species. • Vegetation will be cleared sequentially. Clearing will be conducted so that fauna are flushed into safe, vegetated areas and it will avoid pushing fauna into fragmented areas. • Temporary fauna friendly fencing will allow fauna to safely disperse into vegetated areas away from construction, • Temporary fauna exclusion fencing will then be erected to prevent fauna dispersing into construction areas. • Restricted construction hours (i.e. daylight 6am -6pm) • Prohibition of companion /security animals (e.g. dogs).	The use of a Fauna Spotter Catcher throughout clearing is an effective tool to: 1. Identify they types of species on site prior to clearing; and 2. Identify and flag habitat features that require thorough examination before clearing. Fauna Spotter Catchers have a primary role to ensure no fauna are in vegetation before it is cleared. Given the size of koalas and their utilisation of tree branches, they can quite easily be observed from the ground. As such, it is extremely unlikely that a koala will be killed or injured during vegetation clearing, particularly given the onerous and thorough procedures set out The Draft Code. Given grey-headed flying-foxes are nocturnal, there is minimal risk of mortality from vehicle collision. Restricted operation hours (*i.e.,* daylight hours) is considered an effective mitigation measure to minimise this risk. The sequential clearing of vegetation will allow for the gradual loss of vegetation, giving fauna time to naturally disperse away from the disturbance. The use of fauna exclusion fencing around construction areas will ensure fauna do not disperse into unsafe, hostile areas,	Fauna Spotter	Present at all times during clearing works	Fauna Spotter not present and Koala injured or killed	No injury or death to Koalas during clearing	Civil contractor as appointed by the proponent and DETSI certified Fauna spotter catcher as appointed by the civil contractor.	Post-services Wildlife Report completed after each clearing event by the appointed fauna spotter catcher.	The use of a Fauna Spotter is mandated **No residual impact**
			Sequential Clearing	At all times during clearing	Sequential clearing not undertaken and fragmentation induced	Clearing completed as per sequential clearing	Civil contractor as appointed by the proponent and DETSI certified Fauna spotter catcher as appointed by the civil contractor.	Post-services Wildlife Report completed after each clearing event by the appointed fauna spotter catcher.	Sequential clearing is mandated and guided by VCFMP and pre-clearance checklists and pre-starts **No residual impact**
			Temporary fauna friendly tree protection fencing to allow fauna to escape into refuges during clearing	At all times during clearing	Temporary fencing not installed and koala or other fauna are injured or killed	Temporary fencing utilised at all times during the clearing process	Civil contractor as appointed by the proponent.	Pre-start checklist and inspection, sign-off by environmental coordinator prior to clearing and monthly contractor reports prepared by the civil contractor.	Temporary fauna fencing is mandated and guided by the MNES Management Plan and pre-clearance checklists and pre-starts **No residual impact**
			Restricted construction hours	At all times during construction	Works outside of hours	Works area completed within mandated hours	Civil contractor as appointed by the proponent.	Monthly contractor reports prepared by the civil contractor.	Works hours are mandated and guided by the MNES Management Plan. **No residual impact**
			Dog prohibitions	At all times during construction	No companion and security dogs on-site	Construction completed without dogs on-site	Civil contractor as appointed by the proponent.	Monthly contractor reports prepared by the civil contractor.	Dog controls are mandated and guided

Impact	Avoidance and Mitigation Measures	Evaluation of the Effectiveness of Measures	Mitigation measure item	Timeline for delivery	Risk Assessment	Milestone	Responsible Party	Monitoring Program	Environmental Outcome
	• Restricted vehicle speeds (e.g. max 40 km) within construction areas. In addition to this, all construction personnel shall attend environmental training as part of the site induction process prior to entering the work site. As part of this training all personnel will be instructed on their obligations in regard to vehicle movement and construction speed limits.	again minimising the risk of injury of death. Each of these measures will ensure that the risk of injury or death to koalas or grey-headed flying-foxes as a result of construction are avoided and mitigated. The aim of these procedures is to support **zero injuries or death to identified MNES threatened species** as a result of construction.							by the MNES Management Plan. **No residual impact**
			Low vehicle speeds	At all times during construction	Speeds are exceeded resulting in fauna strike	Construction completed without vehicle strike	Civil contractor as appointed by the proponent.	Monthly contractor reports prepared by the civil contractor.	Speed limits are mandated and guided by the MNES Management Plan. **No residual impact**
			Site inductions	At all times during construction	Induction avoided	Construction completed without inductions being breached	Civil contractor as appointed by the proponent.	Monthly contractor reports prepared by the civil contractor.	Inductions are mandated and guided by the MNES Management Plan. **No residual impact**
Fragmentation of habitat for koala, grey-headed flying-fox, swift parrot and regent honeyeater during construction	Vegetation clearing has the risk of fragmenting habitat areas during the construction phase. To avoid this impact, vegetation will be undertaken sequentially to allow fauna to disperse from construction areas. Clearing procedures that avoid the fragmentation of vegetation will be adopted within the MNES Management Plan and informed by the Fauna Spotter Cather WHIMPs. Clearing will be undertaken in a way that flushes fauna into connected areas of habitat and will avoid flushing fauna into fragmented or hostile areas. Specifically: • Fauna are not required to cross roads or move through developed or disturbed areas, such as residential areas of areas that require movement greater than 100 m over cleared ground to reach suitable habitat; • Fauna are not left occupying an 'island' of habitat between hostile environments, such as road and cleared areas; • Fauna can safely leave the site of clearing and relocate to adjacent habitat; • Demarcation fencing will be fauna friendly to ensure fauna are	Habitat isolation and fragmentation is a primary concern due to its impacts on fauna. Koalas, GHFF, swift parrot and regent honeyeater are able to disperse through a variety of environs, including bushland and cleared areas. The direction of clearing of vegetation in accordance with the MNES Management Plan (informed by WHIMPs) will ensure that clearing does not create fragmented habitat islands that could trap fauna. Rather, procedures will be in place to ensure clearing flushes fauna away from construction areas into surrounding habitat areas that are connected to the wider landscape. Adjoining areas are permanently designated as Council open space and thus will not be subject to fragmentation in the future. As such. No residual impacts are anticipated.	Fauna not fragmented from adjoining habitat during clearing	Fauna are not fragmented from habitat during clearing. Sequential clearing is undertaken at all times during clearing.	Fauna are fragmented by clearing	Clearing completed without fauna being fragmented	Civil contractor as appointed by the proponent.	Post-services Wildlife Report completed after each clearing event by the appointed fauna spotter catcher.	Sequential clearing is mandated and guided by the MNES Management Plan and pre-clearance checklists and pre-starts **No residual impact**
			Temporary fauna exclusion fencing prevent fauna from moving into construction areas	At all times during construction	Temporary fauna exclusion fences are not installed	Temporary fencing utilised at all times during construction	Civil contractor as appointed by the proponent.	Annual Compliance Report completed by an engaged suitably qualified professional as appointed by the proponent and monthly contractor reports prepared by the civil contractor.	Temporary fauna fencing is mandated and guided by the MNES Management Plan and pre-clearance checklists and pre-starts **No residual impact**
			Stockpiling of cleared vegetation ensures safe fauna movement	At all times during clearing	Stockpiling creates a barrier to fauna	Stockpiling is undertaken as per the VCFMPs and MNES Management Plan	Civil contractor as appointed by the proponent.	Monthly contractor reports prepared by the civil contractor.	Safe stockpiling is mandated and guided by the MNES Management Plan and pre-clearance checklists and pre-starts **No residual impact**
			Safe fauna crossings during construction	At all times during construction	Fauna strike occurs at crossing location	No fauna strikes during construction	Civil contractor as appointed by the proponent.	Annual Compliance Report completed by an engaged suitably qualified professional	Fauna go-slow and fencing measures are applied at corridor crossings as per the

Impact	Avoidance and Mitigation Measures	Evaluation of the Effectiveness of Measures	Mitigation measure item	Timeline for delivery	Risk Assessment	Milestone	Responsible Party	Monitoring Program	Environmental Outcome
	not trapped within the proposed cleared extent; and • Cleared vegetation is to be stockpiled as to not impede fauna movement. Additionally, proposed construction roads will be subject to design treatments to ensure safe fauna crossing opportunities are maintained to vegetated areas and impose low vehicle speeds within construction areas.							as appointed by the proponent and monthly contractor reports prepared by the civil contractor.	MNES Management Plan and pre-clearance checklists and pre-starts **No residual impact**
			Low vehicle speeds	At all times during construction	Speed limits are breached resulting in fauna strike	No speed limit breaches during construction	Civil contractor as appointed by the proponent.	Annual Compliance Report completed by an engaged suitably qualified professional as appointed by the proponent and monthly contractor reports prepared by the civil contractor.	Speed limits are mandated and guided by the MNES Management Plan **No residual impact**
Disturbance to koala, grey-headed flying-fox, swift parrot and regent honeyeater during construction	The MNES Management Plan will include controls to avoid, minimise and mitigate risk of disturbance to MNES habitat during construction, specifically: <u>Light and noise disturbance</u> Construction of the project will result in increased noise and light disturbance. These impacts may disturb fauna and disrupt foraging, reproduction or movement behaviours. Restricted construction hours (e.g. 6am-6pm) will limit disruption from light and noise impacts, as well as allow a 12 hour period for fauna to disperse and forage. <u>Contamination, weeds and pathogens</u> Construction activities increase the risk of weeds, pathogens and contamination into the site. To manage these impacts, a Weed and Pathogen Management Plan will be prepared to identify potential weed species, and include appropriate controls for weed and pathogen management, disposal and monitoring. Weeds will be actively managed within the construction footprint and disposed of appropriately. No companion animals (e.g. dogs) will be allowed within construction areas. <u>Vehicle disturbance</u>	Construction management and clearing controls implemented by the MNES Management Plan are considered to be able to effectively avoid, minimise and mitigate risk of disturbance to koala and other MNES species activities during construction, and allow for adaptive management where required. Limiting hours of construction and clearing to daylight hours, allows a 12 hour period for safe dispersal. With appropriate monitoring, pre, during and post construction by the Fauna Spotter Catcher, no residual impacts area expected to occur.	Minimise light and noise disturbance	At all times during construction	Light and noise impacts on fauna	Light and noise disturbance is limited to daylight hours	Civil contractor as appointed by the proponent.	Monthly contractor reports prepared by the civil contractor.	Light and noise restrictions mandate works between 6 am and 6 pm in the MNES Management Plan. **No residual impact**
			The risk of contamination and exacerbating weeds and pathogens is minimised	At all times during construction	Contamination, weed and pathogen incursion	Contamination and weed and pathogen incursions do not occur	Civil contractor as appointed by the proponent.	Monthly contractor reports prepared by the civil contractor.	The MNES Management Plan and VCFMP will mitigate the risk of contamination and weed and pathogen incursion **No residual impact**
			Vehicle disturbance minimised- reduce number of access tracks and/or haul roads	At all times during construction	As Fauna disturbance, Injury or mortality from vehicles	Fauna disturbance, Injury or mortality from vehicles does not occur	Civil contractor as appointed by the proponent.	Monthly contractor reports prepared by the civil contractor.	As above **No residual impact**
			Barriers to dispersal are not created	At all times during construction	Vegetation clearing and stockpiling creates a barrier to fauna	Vegetation clearing and stockpiling is undertaken as guided by the VCFMP	Civil contractor as appointed by the proponent and DETSI certified Fauna spotter catcher as appointed by the civil contractor.	Monthly contractor reports prepared by the civil contractor.	As above **No residual impact**
			Inductions and training	At all times during construction	Inductions avoided	All inductions are completed and records maintained	Civil contractor as appointed by the proponent.	Monthly contractor reports prepared by the civil contractor.	Site induction mandatory **No residual impact**

Impact	Avoidance and Mitigation Measures	Evaluation of the Effectiveness of Measures	Mitigation measure item	Timeline for delivery	Risk Assessment	Milestone	Responsible Party	Monitoring Program	Environmental Outcome
	Reduced vehicle speeds will be implemented throughout the construction area to minimise vehicle disturbances. Further, proposed construction roads will be subject to design treatments to ensure safe fauna crossing opportunities are maintained to vegetated areas and impose low vehicle speeds within construction areas. <u>Barriers to dispersal</u> Vegetation will be cleared sequentially. Clearing will be conducted so that fauna are flushed into safe, vegetated areas and it will avoid pushing fauna into fragmented areas. Temporary fauna friendly fencing will allow fauna to safely disperse into vegetated areas while clearing. Temporary fauna exclusion fencing will then be erected to prevent fauna dispersing into construction areas. <u>Contractor management</u> All construction personnel will attend environmental training as part of the site induction process prior to entering the work site. As part of this training, all personnel will be instructed on their obligations in regard to vegetation clearing protocols and to protect native fauna. Additional controls for koala and grey-headed flying-fox will be presented in a toolbox talk.		Adaptive management	At all times during construction	Adaptive management not applied	Adaptive management utilised if required	Civil contractor as appointed by the proponent.	Monthly contractor reports prepared by the civil contractor.	The MNES Management Plan will include adaptive management strategies to avoid recurrence of adverse incidents should they occur. **No residual impact**
Indirect impacts on the LRSA TEC through generation of dust, sediment or stormwater runoff	<u>Temporary shade cloth fencing</u> Mitigation of potential impacts to the LRSA TEC patches will be achieved through the installation of temporary shade cloth fencing and sediment control fencing in works areas located adjacent to the TEC. The fencing will be installed outside of the 50 m buffer area of the LRSA TEC and will function to supress dust and prevent stormwater and sediment runoff into the LRSA TEC. The fence will be installed post-clearing and prior to construction occurring in the relevant phasing area.	Construction management and clearing controls implemented (detailed further in the MNES Management Plan) are considered to be able to effectively avoid, minimise and mitigate risk of indirect impacts to the LRSA TEC. The use of fencing, particularly retrofitted with shade cloth, can act as a windbreak which reduces wind speeds and prevents dust particles from being carried. Wetting soil during earthworks and construction is a standard construction	Installation of temporary shade cloth and erosion and sediment control fencing	Post-clearing and prior to construction in works areas adjacent to the LRSA TEC	Fence is not installed prior to bulk earthworks or construction leading to potential disturbance within the LRSA TEC	Fencing is installed post-clearing and maintained during works	Civil contractor as appointed by the proponent.	Annual Compliance Report completed by an engaged suitably qualified professional as appointed by the proponent and monthly contractor reports prepared by the civil contractor.	No evidence of indirect impacts to LRSA TEC through proper implementation of exclusion fencing. **No residual impact**
			Water spraying	During bulk earthworks and construction in accordance with construction practices	Soil is not wetted as required by standard construction practice	Dust is supressed during earthworks and construction	Civil contractor as appointed by the proponent.	Monthly contractor reports prepared by the civil contractor.	No evidence of indirect impacts to LRSA TEC through proper implementation of

Impact	Avoidance and Mitigation Measures	Evaluation of the Effectiveness of Measures	Mitigation measure item	Timeline for delivery	Risk Assessment	Milestone	Responsible Party	Monitoring Program	Environmental Outcome
	In areas where the fencing is used, it will also function as a fauna exclusion fencing and will prevent works from encroaching on the buffer area. <u>Water spraying</u> As part of standard construction practice and standards, soil will be regularly sprayed with water on dust-generating surfaces to prevents dust from becoming airborne.	practice which is implemented to control dust generation.							dust suppression techniques. **No residual impact**
Introduction or spread of *Phytophthora cinnamomi*	<u>CEMP</u> Controls are proposed to be included in a Construction Environmental Management Plan(s) (CEMPs) to be produced in consultation with the civil contractor which will include education material, details of the location of clean down points and enforce vehicle and equipment wash down procedures and personal hygiene protocols. <u>ESCP</u> Erosion and Sediment Control Plans (ESCP) produced in consultation with the civil contractor will include measures where suitable to mitigate the potential spread of *P. cinnamomi* via soil deposition and stormwater runoff and the potential need for additional protection measures in works areas located adjacent to the LRSA TEC patches.	Management actions that focus on the prevention of the introduction and spread of *P. cinnamomi*, particularly through humans as a vector for spread, are highlighted as the most important for implementation as once an area is infected with this pathogen, eradication is unlikely as there is no cure. Any measures that reduce and control the spread of soils, organic matter and water into adjoining bushland areas and the LRSA TEC will be effective in controlling the introduction or spread of *P. cinnamomi*. Additionally, the risk of introducing foreign matter which may potentially contain *P. cinnamomi* will be reduced through implementation of the CEMP checklist item and enforcement of education and awareness material.	CEMP(s) produced for the works areas located adjacent to the LRSA TEC includes details on *P. cinnamomi* management	Prior to works occurring in the relevant phasing area	CEMP(s) does not include the required measures therefore risking potential introduction of *P. cinnamomi*	CEMP(s) produced for works areas located adjacent to the LRSA TEC provide at a minimum, the details provided in this PD and MNES Management Plan	Civil contractor as appointed by the proponent.	Annual Compliance Report completed by an engaged suitably qualified professional as appointed by the proponent and monthly contractor reports prepared by the civil contractor.	Management measures for *P. cinnamomi* are implemented for the project. **No residual impact**
			Checklist item included in daily check ins to ask whether any personnel or vehicles have been working within 500 m of locations with confirmed or suspected Phytophthora infections prior to entering the site	Prior to works occurring in the relevant phasing area	Vehicle and personal item cleaning requirements not triggered	Daily checklist item is included and required to be completed prior to personnel or vehicles working on site	Civil contractor as appointed by the proponent.	Monthly contractor reports prepared by the civil contractor.	Appropriate cleaning protocols are implemented where required to limit the spread and introduction of *P. cinnamomi* **No residual impact**
			Education and awareness material promoting safe hygiene practices is provided at site office	Establishment of site office	Personnel are not educated to the risks of *P. cinnamomi*	Education material and protocols is provided at the site office including safe hygiene practices such as 'Arrive clean, leave clean' and 'Check, Clean, Disinfect, Dry.'	Civil contractor as appointed by the proponent.	Monthly contractor reports prepared by the civil contractor.	Behaviours to limit the spread and introduction of *P. cinnamomi* are displayed by personnel. **No residual impact**
			Clean down points are established for works areas located adjacent to the LRSA TEC as required by the CEMP(s)	Prior to vehicles and personnel working within works area adjacent to LRSA TEC	Vehicles, equipment and personal items are not washed down where required	Clean down point established and protocols for cleaning and disinfecting are implemented	Civil contractor as appointed by the proponent.	Monthly contractor reports prepared by the civil contractor.	Clean down procedures are followed, limiting risk of spread of *P. cinnamomi* **No residual impact**

Impact	Avoidance and Mitigation Measures	Evaluation of the Effectiveness of Measures	Mitigation measure item	Timeline for delivery	Risk Assessment	Milestone	Responsible Party	Monitoring Program	Environmental Outcome
			ESCP(s) produced for the works areas located adjacent to the LRSA TEC provide details on measures to avoid sediment runoff into LRSA TEC	Prior to works occurring in the relevant phasing area	Appropriate sediment control measures for the LRSA TEC are not considered or implemented	ESCP(s) include specific measures for LRSA TEC protection and are carried through to implementation	Civil contractor as appointed by the proponent in consultation with the project engineer.	Monthly contractor reports prepared by the civil contractor.	Sediment runoff into LRSA TEC is avoided. **No residual impact**
			Corrective actions	Where *P. cinnamomi* is suspected or confirmed within LRSA TEC	*P. cinnamomi* is not detected where present, leaving it to remain potentially untreated – corrective actions not applied	Corrective actions implemented	Suitably qualified ecologist and suitably qualified professional / 'interpreter' as appointed by the proponent	Annual monitoring in LRSA TEC upon works starting in areas adjacent to LRSA TEC, documented in Annual Compliance Report	*P. cinnamomi* induced dieback and spread is managed through corrective action.
Hydrological changes	• Stormwater detention technologies will be utilised to minimise the effects of excess rainwater flowing into catchments caused by the creation of hardstand areas. • All work will be undertaken in accordance with appropriate management plans to ensure the hydrological changes across the site do not impact on surrounding vegetation.	The implementation of a project wide Stormwater Management Plan as designed by certified engineers ensures that hydrological change area appropriately accounted for and managed. These management measures will reduce impacts from higher levels of surface water flow caused by hardstand areas and ensures natural drainage lines continue to function as they naturally would have. Stormwater detention basins prevent localised flooding of drainage lines and waterways caused by increased runoff over hardstand areas and also contribute to maintaining water quality levels.	Hydraulic and Stormwater Management Plan	To be approved prior to works	Unforeseen hydrological changes	No worsening of hydrological impacts as a result of the development	Hydraulic engineer as appointed by the proponent.	Monthly contractor reports prepared by the civil contractor.	Stage-specific Stormwater Management Plans may be prepared where required as part of OPW approvals which will be prepared by the engaged hydraulic engineers for operational works phases of the project. The overarching Stormwater Management Plan for Village 2 and Village 3 prepared by DesignFlow is provided at **Attachment A12.** **No residual impact**

5.7.2 Operational impacts

Table A62: Operational impacts

Impact	Avoidance and Mitigation Measures	Evaluation of the Effectiveness of Measures	Mitigation measure item	Timeline for delivery	Risk Assessment	Milestone	Responsible Party	Monitoring Program	Environmental Outcome
Risk of injury of death to MNES from vehicle strike	A number of measures will be imposed to avoid and mitigate the risk of koalas being hit by vehicles. Although the risk to vehicle strike is low, these measures will be concurrent for grey-headed flying-fox, swift parrot and regent honeyeater. These measures include: • MNES food trees will not form part of the primary landscaping of the development footprint so that koalas, grey-headed flying-fox, swift parrot and regent honeyeater are not enticed to enter residential areas. • Imposition of low vehicle speeds to reduce the risk of collisions. Vehicle speed limits are restricted to 50km/h on built up residential roads. • Installation of traffic calming devices, fauna movement infrastructure and wildlife crossing awareness signage at Mur Boulevard road crossing. • Installation of koala awareness signage along esplanade roads to raise awareness of the species' presence in the area.	The purpose of these avoidance and mitigation measures is to minimise the risk of injury or death to koalas from vehicle strike. These measures will also mitigate risks for grey-headed flying-fox, swift parrot and regent honeyeater. It will be important to minimise the incentive for these species to enter residential areas by restricting the availability of habitat in these areas. As such, street scaping will not be planted with suitable habitat, which will in turn encourage koalas to stay away from the development area. Importantly, low vehicle speeds will be imposed along residential roads, minimising the risk of high-speed vehicle strikes which were identified in the literature review as accounting for a large proportion of vehicle related deaths. In addition, awareness signage will ensure motorists are aware that koalas have potential to occur in the area, making them more conscious of potentially dispersing koalas and encouraging them to maintain a low vehicle speed. The purpose of these measures is to enable the objective of no injury or death to koalas as a result of vehicle strike. No residual impacts can be identified.	Provision of open space buffer adjoining vegetation retention area	To be delivered with adjoining urban development	Open space buffer not delivered	Open space buffer delivered	Urban designer and landscape contractor as appointed by the proponent.	Annual Compliance Report completed by an engaged suitably qualified professional.	**No residual impact**
			Permanent speed limit signage and reduced speeds	During construction of roads	Vehicles speeding	No koala deaths from vehicle strike	Landscape architect and civil contractor as appointed by the proponent.	Annual Compliance Report completed by an engaged suitably qualified professional.	Low vehicle speeds will be signed and enforced as for public roads **No residual impact**
			Koala awareness signage installed adjoining vegetation retentions areas and Mur Boulevard road crossing	At construction of roads and Council on-maintenance phase	Signs not installed	Signs installed progressively with construction of development	Landscape architect and civil contractor as appointed by the proponent.	Annual Compliance Report completed by an engaged suitably qualified professional.	Koala awareness signage will be delivered under the MNES Management Plan. **No residual impact**
			Fauna crossing infrastructure installed at Mur Boulevard road crossing	At construction of Mur Boulevard prior to opening of the road to the public	Crossing not operation prior to public use of the road	Design of crossing completed and crossing installed, on-maintenance certification provided by Ipswich City Council	Engineer as appointed by the proponent responsible for design. Civil contractor responsible for installation.	Annual Compliance Report completed by an engaged suitably qualified professional, on-maintenance certification by Ipswich City Council.	**No residual impact**
			Fauna awareness road markings at Mur Boulevard road crossing	At construction of Mur Boulevard prior to opening of the road to the public	Markings not installed prior to public use of the road	Design of crossing completed and crossing installed	Engineer as appointed by the proponent responsible for design. Civil contractor responsible for installation.	Annual Compliance Report completed by an engaged suitably qualified professional.	**No residual impact**
			Urban landscaping avoids use of MNES species foraging trees	Landscape design phase and planting during construction	Koala trees inadvertently utilised in urban areas	Urban landscape planting palette designed during operational works phase. Planting delivered with non-Koala native species during construction.	Landscape architect and landscape contractor as appointed by the proponent.	Annual Compliance Report completed by an engaged suitably qualified professional.	**No residual impact**

Impact	Avoidance and Mitigation Measures	Evaluation of the Effectiveness of Measures	Mitigation measure item	Timeline for delivery	Risk Assessment	Milestone	Responsible Party	Monitoring Program	Environmental Outcome
Risk of injury or death from dog attack	Dogs will be restricted from entering the vegetation retention area. Fauna awareness will be promoted through the installation of fauna awareness signage.	While dogs already occur within the local area, and wild dogs are known to occur on the site, the project will result in an increase in dog ownership numbers in the area. As such, the education of residents has been identified as a key management tool in reducing the risk or injury of dog attacks on koalas. Again, while the risk to grey-headed flying-fox is low, these measures will also be effective to reduce risk of dog attack on the species.	Dog restrictions including appropriate signage to promote responsible pet ownership including "dogs on leads at all times" and "dogs prohibited in vegetation areas."	At delivery of open space buffer areas during construction	Dogs are let off their leads by residents and access vegetation retention areas	Dog signage is designed and delivered. Council controls on dog ownership imposed.	Landscape architect and civil contractor as appointed by the proponent.	Annual Compliance Report completed by an engaged suitably qualified professional.	Dogs will be managed to Council specifications and prohibited from entering the vegetation retention areas **No residual impact**
			Installation of outlook fencing and retaining walls along vegetation retention areas.	At delivery of open space buffer areas during construction.	Fencing does not prevent easy access of residents and dogs into vegetation areas.	Fencing is installed progressively with construction phasing of residential areas and adequately prevents access into vegetation retention areas.	Landscape architect and civil contractor as appointed by the proponent.	Annual Compliance Report completed by an engaged suitably qualified professional.	**No residual impact**
Creation of barriers to dispersal / fragmentation of habitat	To mitigate these associated with the development, the 27.5 ha vegetation retention area will retain existing vegetation for koala, grey-headed flying-fox, swift parrot and regent honeyeater. Native fauna will largely be excluded from the proposed development and associated threats. Highly mobile fauna are not considered to be impacted by the creation of physical barriers created through the development of the referral area. Fauna movement infrastructure will be installed at the Mur Boulevard road crossing and be designed to accommodate a full suite of fauna to allow unimpeded movement of fauna along O'Dwyer's Gully. The crossing will include appropriate structures to enable movement such as fauna log rails, glider poles and koala exclusion fencing to funnel koalas and other fauna toward the crossing.	The development of residential areas across the estate will create barriers to movement in the form of houses, roads, fences and other infrastructure. However, as mentioned, the surrounding area is subject to ongoing development. While the expanse of areas suited for movement are to be reduced through residential development they are to be substantially improved in functionality through weed removal, replanting, fencing, signage and land tenure changes.	Provision of 27.5 ha of vegetation retention area adjoining Council open space areas to allow continue dispersal within the landscape.	During clearing and construction no impacts are to occur within vegetation retention area. Edge of vegetation area to be delineated by the location of outlook fencing installed during construction.	Construction mitigation measures (*i.e.,* fauna spotter catcher, sequential clearing, tree protection fencing) not implemented. Development timeline and sequence not followed.	No koalas within the impact area at construction completion.	Landscape architect and civil contractor as appointed by the proponent.	Annual Compliance Report completed by an engaged suitably qualified professional.	Fauna usage occurs within the vegetation retention areas and facilitates landscape connectivity. **No residual impact**
			Fauna crossing infrastructure installed at Mur Boulevard road crossing to allow unimpeded movement within O'Dwyer's Gully.	At construction of Mur Boulevard prior to opening of the road to the public	Crossing not operation prior to public use of the road	Design of crossing completed and crossing installed, on-maintenance certification provided by Ipswich City Council	Engineer as appointed by the proponent responsible for design of the culvert. Civil contractor responsible for installation.	Camera monitoring at fauna culvert completed upon it becoming operational to be completed by suitably qualified ecologist. Findings to be documented in an Annual Compliance Report completed by an engaged suitably qualified professional.	Fauna movement is facilitated by the road crossing infrastructure. **No residual impact**
Indirect impacts on adjoining habitat including edge effects and weed invasion	The retained vegetation areas will be managed for MNES habitat value. Active management will occur in these areas including rehabilitation and weed management to be carried out in	Active management will ensure no reduction in habitat quality within retained vegetation areas as a result of the project.	Weed management and infill planting	Post-construction and during the operational phase	Weeds increase in cover and infill planting not completed leading to same or reduced habitat quality	Establishment and on-maintenance achieved with ICC	Landscape architect and landscape contractor as appointed by the proponent.	Baseline weed cover and photo monitoring (refer **MNES Management Plan – Attachment A9**)	Management of edge effects and improvement to natural areas **No residual impact**

Impact	Avoidance and Mitigation Measures	Evaluation of the Effectiveness of Measures	Mitigation measure item	Timeline for delivery	Risk Assessment	Milestone	Responsible Party	Monitoring Program	Environmental Outcome
	accordance with an approved Bushland Management Plan (BMP). Management will aim to ensure these areas of habitat are retained and continue to support the species and habitat quality is not degraded over time.								
Light spill into adjacent habitat	<u>Installation of fauna sensitive light design</u> Fauna sensitive lighting design will be utilised along esplanade roads adjoining the vegetation retention areas and natural areas associated with O'Dwyer's Gully, Opossum Creek and Woogaroo Creek. This includes installing shielded light fittings to minimise light spill into the natural areas and use of appropriate luminaire type identified as suitable for terrestrial mammal habitat under the *Commonwealth National Light Pollution Guidelines for Wildlife* (DCCEEW, 2023). Fauna sensitive lighting will be installed in accordance with recommendations under the Guideline and in accordance with industry standards *i.e., AS/NZS 1158 Set: 2010: Lighting for roads and public spaces* and *AS/NZS 4282:2019 Control of the obtrusive effects of outdoor lighting*.	Shielded light fittings and luminaire types that comply with AS/NZS 1158 and AS/NZS 4282:2019 – Control of the obtrusive effects of outdoor lighting is likely to be effective in limiting disturbance to MNES.	Installation of shielded light fittings and appropriate luminaire type	During construction of roads / infrastructure	Obtrusive lighting design is implemented, causing detrimental effects to native wildlife	N/A	Landscape architect and civil contractor as appointed by the proponent.	Annual Compliance Report completed by an engaged suitably qualified professional.	Effects to MNES and native fauna through light pollution are mitigated through successful implementation of fauna sensitive light design **No residual impact**
Soil and water runoff into retained vegetation	The stormwater management strategy involves treating stormwater runoff from the development areas via a series of sediment basins and bioretention systems located around the edge of the development	The stormwater management system has been designed using hydraulic modelling to ensure stormwater treatment and flows are effectively manage during the operation of the development.	Install bioretention system and sediment basins in accordance with SMP	Progressive – during construction of relevant development phase	Sedimentation and untreated water flow into adjoining creekline areas	N/A	Hydraulic engineer and civil contractor as appointed by the proponent.	Annual Compliance Report completed by an engaged suitably qualified professional.	Stormwater management occurs in accordance with the site-specific Stormwater Management Plan **No residual impact**

6. Proposed offsets

The Department state in the event that there are significant impacts that cannot be avoided or mitigated, an offset to compensate for any predicted or potential residual significant impacts on threatened species and ecological communities must be provided for each protected matter.

This section responds to Item 6 of the PD request which insists ***"the preliminary documentation must demonstrate how the offset proposal:***

- ***a. Meets the principles specified in the Environment Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy.***
- ***b. Directly contributes to the ongoing viability of the EPBC listed species or ecological community and will deliver an overall conservation outcome that improves or maintains the viability of the protected matter in the region, as compared to what is likely to have occurred under the status quo, i.e. if neither the action nor the offset had taken place.***
- ***c. Compensates for the impact over the entire duration of the impact (i.e. should impacts be in perpetuity, the offset must also be delivered in perpetuity).***

Note: while the offsets do not need to be secured before the decision on whether to approve the proposed action, should the proposed action be approved, conditions of an approval are likely to require that offsets are secured, and management measures are in place, before commencement of the proposed action."

A significant impact is an impact which is important, notable, or of consequence, having regard to its context or intensity. Whether or not an action is likely to have a significant impact depends upon the sensitivity, value, and quality of the environment that is to be impacted, and upon the intensity, duration, magnitude and geographic extent of the impacts.

Overall, the proposed residential development will see the direct removal of critical habitat for the koala, grey-headed flying-fox, regent honeyeater and swift parrot. It is noted an area of the proposed action site of approximately 7.6 ha on-site has been approved to be impacted as part of EPBC 2014/7306 therefore has not been included in the residual impacts. The residual impacts are summarised below.

6.1 Significant Residual Impact Summary

The assessment of construction and operational impacts in **Section 5** shows that residual impacts on approximately 128 ha of critical habitat will occur from the direct clearing associated with the proposed action. The management measures described throughout this PD submission sufficiently mitigate the risk of increased injury or mortality to MNES.

Koala:	**Removal of 128 hectares of critical habitat at a MHQA score of 6.78 (rounded to 7.00)**
Grey-headed flying-fox:	**Removal of 128 hectares of foraging habitat at a GHFF FHA score of 7.47 (rounded to a 7.00)**
Swift parrot:	**Removal of 9,983 habitat features.**
Regent honeyeater:	**Removal of 9,868 habitat features.**

6.2 Offset Proposal

Significant residual impacts on the identified MNES being koala, grey-headed flying-fox, swift parrot and regent honeyeater, are proposed to be wholly acquitted over three offset areas, located within the Somerset Regional Council (SRC) LGA and Ipswich City Council LGA, detailed provided below:

- The Esk Landholdings offset area is owned by the proponent and is 280.2 ha of partially cleared rural land located 4 km south-east of Esk (refer **Figure A11** and **Figure A12**).
- The Avonvale offset area sourced from the third-party provider One Environment (trading name Somerset Offset Solutions (Avonvale) Pty Ltd) is approximately 168 ha and comprised of open grazing paddock with remnant and regrowth vegetation values and is located outside of the township of Toogoolawah (refer **Figure A13** and **Figure A14**).
- The Mount Walker West offset area is owned by the proponent and comprises a mix of open grazing land with remnant and regrowth vegetation values, located within the Ipswich City Council LGA. (refer **Figure A15** and **Figure A16**).

To support the response to Item 6 of the PD Request, an Offset Area Management Plan (OAMP) has been prepared for each proposed offset area:

- The Esk Landholdings offset area OAMP is provided at **Attachment A14**.
- The Avonvale Offset Area OAMP is provided at **Attachment A15**.
- The Mount Walker West OAMP is provided at **Attachment A16**.

The OAMP for each offset area is proposed to function as a standalone document which includes the following details:

- Offset suitability analysis for each MNES and assessment against the Environmental Offsets Policy.
- Baseline survey methodologies and results including habitat quality for each MNES and threats being feral animal abundance and weeds (particularly Weeds of National Significance).
- Detailed management actions and justification for each management action designed to achieve the targets stipulated. Includes maps and plans where applicable demonstrate implementation of management actions.
- Completion criteria and interim milestone targets to achieve the impact compensation detailed in **Table A63**.
- Monitoring and reporting mechanisms to track against the interim milestone targets and completion criteria.

It is considered that both offset areas are considered to meet the requirements of a suitable offset. Broadly, each offset area provides substantial opportunities for planting due to the presence of disturbed and highly degraded land as well as connecting to existing habitat areas within and adjoining the respective offset areas. Both offset areas adjoin a regional biodiversity corridor which enables valuable connection, mitigating long-term detrimental effects of habitat fragmentation and contributing to the future protection and persistence of the species. It is noted that both offset areas share a similar regional context to the impact area being located within the same regional biodiversity corridor and adjacent sub-bioregions.

Upon EPBC Act Approval, the offset area will be legally secured by Voluntary Declaration (VDEC) under the Queensland *Vegetation Management Act 1999* initially, followed by a covenant under the *Land Act 1994* or *Land Titles Act 1994*.

Each OAMP identifies outcome focused management actions pursuant the EPBC Act, for the provision of koala (*Phascolarctos cinereus*), GHFF (*Pteropus poliocephalus*), swift parrot (*Lathamus discolor*) and regent honeyeater (*Anthochaera phrygia*) habitat offset. Considering both offset areas in tandem, the management objectives are in alignment with the Environmental Offsets Policy (EOP) will:

- Deliver an overall conservation outcome that improves the viability of habitat for the koala, GHFF, swift parrot and regent honeyeater.
- Provide a direct offset that is in proportion to the level of statutory protection that applies to habitat for the koala and foraging habitat for the GHFF, swift parrot and regent honeyeater.
- Be of a size and scale proportionate to the residual impacts on habitat for the koala and greater glider and foraging habitat for the GHFF, swift parrot and regent honeyeater.
- Effectively account for and manage the risks of the offset not being successful within the required management timeframe.
- Provide a conservation gain additional to what is already required by a duty of care or to any environmental planning laws at any level of Government.

- Be efficient, effective, timely, transparent, scientifically robust and reasonable with appropriate transparent governance arrangements in place for measuring, monitoring, auditing and enforcing the management of the offset area.

An assessment of the offset site suitability is provided in the following subsections and detailed OAMPs – refer to **Section 7.2 of the Esk OAMP** (refer **Attachment A14**), **Section 3.6, Table 4 of Avonvale OAMP** (refer **Attachment A15**) and **Section 4 of the Mount Walker West OAMP** (refer **Attachment A16**).

A summary of the amount of quantum impact that each offset acquits is provided in **Table A63** below.

Table A63: MNES impact compensation summary

Quantum impact Area / Features impacted		Impact compensation (%)			Total % (offset areas combined)
		Esk Landholdings offset area	Avonvale offset area	MWW offset area	
Koala	89.60 ha	27.06	32.14	50.02	**109.22**
Grey-headed flying-fox	89.60 ha	63.44	60.81	66.89	**191.14**
Swift parrot	9,983 habitat features	54.58	54.57	91.92	**201.07**
Regent honeyeater	9,868 habitat features	54.95	11.42	37.40	**103.77**

6.3 Esk Landholdings offset area

Cherish Enterprises Pty Ltd are the owner of 300.3 ha of partially cleared rural land located within the Somerset Regional Council LGA approximately 4 km South East of the town of Esk (Refer **Figure A11** and **Figure A12**). The landholding is made up of all or part of the following titles:

- L125/CA31385 (45.52 ha)
- L60/CA31149 (161.77 ha)
- L147/CA31617 (92.67 ha)

The offset area is located approximately 56.5 km north-west of the proposed action site (refer **Plan A48**). The portion of the landholdings proposed to be dedicated as offset area is 280.2 ha and excludes three areas proposed to be used as Building Location Envelopes (BLEs) for the establishment for rural acreages (refer **Plan A49**).

In order to establish the quantum impact on habitat critical to the survival of the target MNES, SHG and BAAM Ecological Consultants completed detailed ecological surveys of the offset area utilising the same methodologies used for the proposed action site with additional steps for the regent honeyeater and swift parrot methodologies to understand the planting capacity of the offset area for a feature-based calculation. The methodologies utilised and habitat quality assessment results for each MNES are included in **Attachment A14 Esk OAMP – Section 5**. This data was collated and utilised to calculate the habitat value and improvement opportunities. An assessment of value for koala, grey-headed flying-fox, swift parrot and regent honeyeater and proposed offset gains for these species is discussed in **Section 6.4.2 to 6.4.5**.

6.3.1 Offset area values

The offset area is located adjoining a regional corridor under the SEQ Regional Plan (refer **Plan A48**). The offset area is comprised of a mix of open grazing paddock, juvenile and advanced regrowth and contains a variety of landforms and drainage lines. The prevailing vegetation communities within the offset area based on regional ecosystem and pre-clear mapping including RE12.9-10.2 and RE12.3.7, the latter of which aligns with the primary waterways. These regional ecosystems are described in **Table A64**.

Table A64: Esk offset area Queensland Herbarium RE Descriptions

Regional Ecosystem	Queensland Herbarium RE Description
Non-remnant RE 12.9-10.2	*Corymbia citriodora* subsp. *variegata* open forest or woodland usually with *Eucalyptus crebra*. Other species such as *Eucalyptus tereticornis*, *E. moluccana*, *E. acmenoides* and *E. siderophloia* may be present in scattered patches or in low densities. Understorey can be grassy or shrubby. Shrubby understorey of *Lophostemon confertus* (whipstick form) often present in northern parts of bioregion. Occurs on Cainozoic and Mesozoic sediments. Not a Wetland. (BVG1M: 10b).

Regional Ecosystem	Queensland Herbarium RE Description
Remnant RE 12.3.7	Narrow fringing woodland of *Eucalyptus tereticornis, Casuarina cunninghamiana* subsp. *cunninghamiana* +/- *Melaleuca viminalis*. Other species associated with this RE include *Melaleuca bracteata, M. trichostachya, M. linariifolia*. North of Brisbane *Waterhousea floribunda* commonly occurs and may at times dominate this RE. *Melaleuca fluviatilis* occurs in this RE in the north of the bioregion. *Lomandra hystrix* often present in stream beds. Occurs on fringing levees and banks of rivers and drainage lines of alluvial plains throughout the region. Riverine. (BVG1M: 16a).

The proposed offset area includes four (4) assessment units as outlined in **Plan A50** and **Attachment A14 - OAMP**. These are summarised below in **Table A65** and photos. An assessment of value for koala, grey-headed flying-fox, swift parrot and regent honeyeater and proposed offset gains for these species is discussed in **Sections 6.3.3 to 6.3.6**.

Table A65: Esk offset area Assessment Unit Descriptions

Assessment Unit		Area (ha)	Description
AU1	Juvenile patchy regrowth (non-remnant) RE 12.9-10.2	150.1	The regrowth native vegetation areas are predominantly located over the western aspect of the site covering 160.74 ha of the total land holding (refer **Plan A52**). This vegetation community is characterised by regrowth *Corymbia citriodora, Eucalyptus tereticornis* with *Eucalyptus siderophloia, Eucalyptus crebra* and *Corymbia tessellaris*. The regrowth vegetation is approximately 3-7 m in height, indicating its juvenile status, and more recent growth (approximately 5 years old). The regrowth native vegetation areas predominantly meet the definition of koala habitat given the juvenile trees meet the definition of a 'non-juvenile koala habitat tree.'
AU2	Open grazing paddock (non-remnant) RE 12.9-10.2	44.8	Predominantly cleared pastoral grazing areas dominated by exotic grass species. The edge of these areas are dominated by barbed wire fencing.
AU3	Remnant RE 12.9-10.2	75.9	Mapped remnant under the VMA, however, large areas of the AU contain vegetation structure and age resembling advanced regrowth. Large areas of cleared paddock are present with opportunities for infill planting. The majority of the remnant native vegetation areas are predominantly located over the eastern aspect of the site (refer **Plan A60**), with a smaller patch located along the western boundary. The vegetation characteristics in these areas is by dominated by either *Corymbia citriodora*, *Eucalyptus crebra* or *Eucalyptus microcorys*. Subcanopy, shrub and ground layer vegetated varies greatly along with weed cover and grazing grass cover through this zone. Within the larger patch of the vegetation in the east, where adjoining offset intact areas of vegetation full ecosystem species can be observed

Assessment Unit		Area (ha)	Description
			mixed with tracks, lineal clearing zones and lower foothill weeds. The western patch is significantly more modified through the vegetation community with greater areas containing a monoculture of grazing grasses in the understorey and greater cattle impacts evident.
AU4	Remnant riverine RE 12.3.7	9.4	Two (2) incised dry natural drainage courses are present where the land zones and geology include a greater volume of alluvial soils mixed with rock outcrops. The gully lines vary substantially in value with areas of wholesale erosion, bedrock billabongs and increases in species diversity providing lineal strands of mesic habitat. A high abundance of *Eucalyptus tereticornis* is noted in this vegetation type.

Assessment Unit 1 – Juvenile patchy regrowth RE12.9-10.2

Assessment Unit 2 – Open grazing land RE12.9-10.2

Assessment Unit 3 – Advanced regrowth RE12.9-10.2

Assessment Unit 4 – Remnant waterway RE12.3.7

6.3.2 Current Management and Threats to MNES

The land is currently managed for rural pursuits with an agistment agreement with the adjoining neighbour to hold and breed horses. Large parts of the land holding have not been managed in recent times evidenced by the immature regrowth native saplings regrowing in several under utilised paddocks. There has a been a spike in rural land values in the immediate area, due to the nexus to the Wivenhoe Dam catchment and the richer alluvial soils and deep increased soil moisture created up creeks and drainage lines directly linked to the dam water body. Without offset this land will be sold to a more active rural business, who will remove large areas of the regrowth, currently unprotected by Local and State Legislation and return the area to more productive cropping fields and paddocks.

An additional future risk is the land's short distance from the town of Esk which is easily accessible from a serviced sealed road and immediately adjacent to and existing rural residential land use and subdivision to the west. Future development of the land for rural residential uses was the reason for the original purchasing of the land.

Detailed surveys completed by SHG ecologists documented dog tracks through a number of the creek and billabong areas. Additionally baited motion sensor cameras recorded wild dogs and European red foxes on the property (refer **Photo set 10**). The Department of Agriculture and Fisheries (DAF) lists feral dogs as abundant and widespread throughout the Somerset Regional Council LGA. Wild dogs (*Canis familiaris dingo*, *Canis familiaris dingo* X *Canis familiaris, Canis familiaris*) are listed as a 'class 2' pest in the Somerset Regional Council Pest Management Plan and noted within many contemporary newspaper articles and Council meeting minutes as increasing in population since 2013.

Photo set 10: Wild dog and European red fox detected in the offset area.

6.3.3 Koala offset score

A review of publicly available data (ALA) indicate that there are numerous historical and recent koala sightings surrounding the offset area (refer **Plan A53**). A relatively high number of records is noted for such a rural locality, with both high and regular koala species identified within the Rural Residential Estate to the west. Evidence of koala, via indirect scat collection, was found consistently over the site and in all assessment units with retained native trees species. It is noted that AU2 which is more degraded and less treed than the balance of the offset area is considered to provide functionality primarily as dispersal habitat between areas of the site with higher cover of foraging habitat. SAT surveys returned 'low' usage results with the SAT Survey Methodology (East Coast (medium-high)). Refer to **Plan A53** for the location of suitable habitat and revegetation locations for koalas and public database records.

Detailed baseline MHQA survey methods and results are included in **Section 5.2 of the Esk OAMP** (**Attachment A14**). The proposed Environmental Outcomes which includes proposed habitat improvement scores, completion criteria, interim milestone targets, adaptive management strategies and management actions are provided in **Attachment A14 Esk OAMP – Appendix H**.

The summary of the proposed conservation gain and acquittal of impacts is presented in **Table A66**, below. Offset acquittal is taken from the OAG calculator outputs presented in **Attachment A14 Esk OAMP – Appendix I**. The proposed offset will acquit **27.06%** of the quantum impact.

Table A66: Esk Offset Area – Koala proposed offset gain

Assessment Unit	Area (ha)	Habitat Quality Score		Offset Acquittal
		Baseline score) (rounded	Future score) (rounded	
AU1	150.1	5.93 (6)	7.13 (7)	12.07%
AU2	44.8	5.26 (5)	7.13 (7)	7.21%
AU3	75.9	6.46 (6)	7.28 (7)	6.92%
AU4	9.4	6.41 (6)	7.28 (7)	0.86%

Assessment Unit	Area (ha)	Habitat Quality Score		Offset Acquittal
		Baseline score) (rounded	Future score) (rounded	
Totals	**280.2**			**27.06%**

6.3.4 Grey-headed flying-fox offset score

The offset area is located 6.3 km from the Esk (156) Camp Site, which on the CSIRO Data Access Portal (McKeown and Vanderduys, 2024) retains one of the larger and consistently recorded colonies of grey-headed flying-fox in South East Queensland, and is located approximately 13 km from Nationally Important Camp Atkinsons Dam (985).This proposed offset will result in the legally securing of large tracts of foraging habitat listed as habitat critical to the survival within close proximity to a major known camp site. Additionally, the site already provides winter and spring flowering trees, which will be increased and expanded through rehabilitation and revegetation works. As noted under the koala values, the offset area also occurs contextually amongst a large bioregional corridor where existing tracts of like habitat have been mapped. Refer to **Plan A54** for the location of records, camps and potential habitat within the broader landscape.

Detailed baseline GHFF FHA survey methods and results are included in **Section 5.3 of the Esk OAMP (Attachment A14**). The proposed Environmental Outcomes which includes proposed habitat improvement scores, completion criteria, interim milestone targets, adaptive management strategies and management actions are provided in **Attachment A14 Esk OAMP – Appendix H**.

The summary of the proposed conservation gain and acquittal of impacts is presented in **Table A67**, below. Offset acquittal is taken from the OAG calculator outputs presented in **Attachment A14 OAMP – Appendix I**. The proposed offset will acquit **63.44%** of the quantum impact.

Table A67: Esk Offset Area – GHFF proposed offset gain

Assessment Unit	Area (ha)	Habitat Quality Score		Offset Acquittal
		Baseline score) (rounded	Future score) (rounded	
AU1	150.1	4.95 (5)	7.72 (8)	36.22%
AU2	44.8	4.34 (4)	7.72 (8)	10.81%
AU3	75.9	6.03 (6)	8.32 (8)	13.84%
AU4	9.4	5.26 (5)	7.72 (8)	2.57%
Totals	**280.2**			**63.44%**

6.3.5 Swift parrot offset value

Records of swift parrots within Queensland are limited, particularly within rural areas. A review of ALA records indicate three (3) records from 1980 to 2000 are present within 20 km of the offset area with one (1)

record dated August 2010 located approximately 30 km south-west of the offset area within Lockyer National Park. The record is located within the same regional corridor network adjoining the offset area. Revegetation of the offset area is anticipated to supplement and expand available foraging land from this corridor. Refer to **Plan A55** for the location of potential foraging habitat within the broader landscape for swift parrots and public database records.

Approximately 280.2 ha of remnant, regrowth and grassland areas will be legally secured and rehabilitated to protect and enhance the quality of foraging habitat available for the swift parrot. Notably, at least two (2) preferred foraging tree species on which the swift parrot feeds, *Corymbia citriodora* (Spotted Gum) and *Eucalyptus tereticornis* (Forest Red Gum), are endemic to and currently growing within the offset area.

Detailed baseline swift parrot FHA survey methods and results are included in **Section 5.4 of the Esk OAMP** (**Attachment A14**). The proposed Environmental Outcomes which includes proposed habitat improvement scores, completion criteria, interim milestone targets, adaptive management strategies and management actions are provided in **Attachment A14 Esk OAMP – Section 6**.

The summary of the proposed conservation gain and acquittal of impacts is presented in **Table A68**, below to be achieved through the planting of preferred foraging tree species *Corymbia citriodora* (Spotted Gum) and *Eucalyptus tereticornis* (Forest Red Gum). Offset acquittal is taken from the OAG calculator outputs presented in **Attachment A14 OAMP – Appendix I**. The proposed offset will acquit **54.58%** of the quantum impact.

Table A68: Esk Offset Area – Swift parrot proposed offset gain

Assessment Unit	Area (ha)	Start value	Future value without offset	Future value with offset	Impact compensation
AU1	150.01	8,899	8,899	23,407	29.24%
AU2	47.72	523	523	11,255	21.63%
AU3	75.9	9108	9108	10930	3.67%
AU4	9.4	423	423	442	0.04%
Total	**280.03**				**54.58%**

OAG Note:
Start value inputted as the existing number of non-juvenile preferred foraging trees
Future value without offset inputted as the existing number of non-juvenile preferred foraging trees
Future value with offset inputted as net total of preferred foraging trees (*i.e.,* number to be planted + number of existing inclusive of an 80% survival rate)

6.3.6 Regent honeyeater offset value

Rehabilitation of degraded areas within the offset area where foraging habitat was once present as indicated by surrounding habitat and pre-clear vegetation, will improve regent honeyeater foraging values within the offset area. Notably, at one (1) preferring foraging tree species on which the regent honeyeater feeds

(*Corymbia citriodora*) is endemic to, and currently growing within the offset area. The offset area also supports a variety of mistletoe species on remnant eucalypt vegetation, of which regent honeyeater feed on both nectar and fruit including needle-leaved mistletoe on sheoak *Casuarina cunninghamiana*.

Records of regent honeyeaters within Queensland are limited, particularly within rural areas, however, one (1) record dated June 2024 is located approximately 28 km west of the offset area within Crows Nest National Park. The record is located within the same regional corridor network adjoining the offset area. Revegetation of the offset area is anticipated to supplement and expand available foraging land from this corridor. Refer to **Plan A63** for the location of potential foraging habitat within the broader landscape for regent honeyeaters and public database records.

Detailed baseline swift parrot FHA survey methods and results are included in **Section 5.5 of the Esk OAMP** (**Attachment A14**). The proposed Environmental Outcomes which includes proposed habitat improvement scores, completion criteria, interim milestone targets, adaptive management strategies and management actions are provided in **Attachment A14 Esk OAMP – Section 6**.

The summary of the proposed conservation gain and acquittal of impacts is presented in **Table A68**, below to be achieved through the planting of preferred foraging tree species *Corymbia citriodora* (Spotted Gum). Offset acquittal is taken from the OAG calculator outputs presented in **Attachment A14 OAMP – Appendix I**. The proposed offset will acquit **54.95%** of the quantum impact.

Table A69: Esk Offset Area – Regent honeyeater proposed offset gain

Assessment Unit	Area (ha)	Start value	Future value without offset	Future value with offset	Impact compensation
AU1	150.01	214	214	14,615	29.36%
AU2	47.72	149	149	10,882	21.88%
AU3	75.9	8918	8918	10,740	3.71%
AU4	9.4	94	94	94	0%
Total	**280.03**				**54.95%**

OAG Note:
Start value inputted as the existing number of non-juvenile preferred foraging trees
Future value without offset inputted as the existing number of non-juvenile preferred foraging trees
Future value with offset inputted as net total of preferred foraging trees (*i.e.,* number to be planted + number of existing inclusive of an 80% survival rate)

6.3.7 General Suitability EPBC Offset Policy Criteria

The following Table outlines the general suitability of the offset site relative to EPBC Act Offset Policy criteria.

Table A70: Esk Landholdings Offset Area (General Suitability)

No.	Offset Suitability Criteria	Delivery
1	*Deliver an overall conservation outcome that improves or maintains the viability of the aspect of the environment that is protected by national environment law*	The offset area will deliver a conservation gain for the koala, grey-headed flying-fox, swift parrot and regent honeyeater through: a) Committing to a partial offset area of 280.2 ha for 128 ha of clearing to critical habitat. This offset will: 1. Transition 45 ha of open paddocks to remnant for the koala, grey-headed flying-fox, swift parrot and regent honeyeater habitat with foraging and breeding resources. 2. Prevent the clearing of 150.1 ha of immature regrowth and expand this large area with intensive revegetation and assisted natural regeneration. 3. Retain, de-weed and expand the flora species occurring along the alluvial soils of the creeks and drainage lines. 4. Protect and improve species diversity and ecosystem integrity through existing remnant vegetation areas. b) Lock in a large area of remnant vegetation which adjoins mapped areas to the south and east, forming a large-scale patch in an area known to support koala populations. c) Prepare and fund an Offset Area Management Plan with actions to reduce and manage threats to koala, grey-headed flying-fox, swift parrot and regent honeyeater in protected and created habitat areas. d) Averting the direct and indirect losses of large areas of unprotected habitat via declaring the land a Voluntary Declaration area for High Value Conservation under the *Vegetation Management Act 1999*. This removes future wholesale and selective clearing rights.
2	*Be built around direct offsets but can include other compensatory measures*	The offset area includes legally securing the land area and undertaking necessary improvements to contribute part of the overall offset outcome for impacts for the koala, grey-headed flying-fox, swift parrot and regent honeyeater habitat. Combined with the Avonvale offset and Mount Walker West offset this will equate to greater than 100% for each matter. The offset area is wholly achieved through direct delivery to land and, importantly, is owned and controlled by the proponent, who will also be the approval holder. This provides a direct link between the Department and the offset land rather than through a third-party commercial agreement.
3	*Be in proportion to the level of statutory protection that applies to the protected matter*	At the time of referral, koala and grey-headed flying-fox were scheduled within the EPBC Act as 'Vulnerable', and the swift parrot and regent honeyeater were scheduled as 'Critically Endangered'. Under the International Union for Conservation of Nature data the probability of annual extinction is 0.2% and 6.8%, respectively. This factor applies through the meta data of the Offset Guide assessment calculation sheets for which each

No.	Offset Suitability Criteria	Delivery
		species has been assessed as achieving a portion of the required offset through the proposed offset area.
4	*Be of a size and scale proportionate to the residual impacts on the protected matter*	Direct and indirect impacts for the protected matters have been calculated at the impact site using the Modified Habitat Quality Assessment (MHQA) for the koala and the Foraging Habitat Assessment methods for grey-headed flying-fox, swift parrot and regent honeyeater. Within the Assessment Guide calculator, the Quantum Impact for the Springfield Residential Development Project's Villages 2 and 3 area of each species is listed as: • Koala (89.60 QI ha) • Grey-headed Flying-fox (89.60 QI ha) • Swift Parrot (9,983 habitat features) • Regent Honeyeater (9,868 habitat features) To achieve part of the required offset for each matter, the offset area provides a direct land-based outcome of 280.2 ha, combing both the reinstatement of new habitat with the strong regrowth and remnant values already supporting existing and emerging levels of habitat. Management actions outlined within this OAMP aim to protect and enhance koala, grey-headed flying-fox, swift parrot and regent honeyeater habitat, compensating for and exceeding the habitat quality of the impact area. The offset and management actions will provide: • Legally secured and long-term protection of 280.2 ha of koala, grey-headed flying-fox, swift parrot and regent honeyeater habitat. • Improvement of habitat through revegetation and natural regeneration of food and foraging trees, supporting large tree growth, and removal of weeds. • Contribution to a large contiguous protected habitat with reduced threats. • Long-term reduction in threats, through the removal of incompatible land uses, such as ongoing high density grazing, inappropriate fencing, unregulated fire regimes and landscape wide targeted pest suppression. • Reduced risk of fauna mortality or injury through control of non-native predators. • Reduced risk to fauna through retro-fitted fencing. • Reduced risk of high intensity fire through management of fuel loads. • Reduced risk of the spread of diseases and/or pathogens. The proposed offset is projected to a portion of the required offsets for koala and grey-headed flying-fox and provide part of the overall required offset obligations for the swift parrot and regent honeyeater, as determined by the Commonwealth's offset assessment guide.

No.	Offset Suitability Criteria	Delivery
5	*Effectively account for and manage the risks of the offset not succeeding*	Confidence in the success of the offset is high (≥75%) given the detail and intensity of the management actions outlined within this OAMP. The confidence is supported by the offset area selection, design of management actions, and recommended monitoring and reporting procedures. Non-remnant vegetation areas across the offset areas are considered to have a lower confidence level than remnant and high value regrowth areas, reflecting the potential risks relating to higher levels of disturbance, revegetation processes and plant stock success/failure rates, and natural events. Risks associated with the offset delivery will be mitigated and managed through the detailed management actions outlined in **Attachment A14 OAMP – Section 6**. Management actions have been drawn from offset targets which aim to protect and conserve large, connected areas of koala, grey-headed flying-fox, swift parrot and regent honeyeater habitat to support viable populations. Potential risks are assessed in **Attachment A14 OAMP – Section 8.** Importantly, the Esk Landholdings offset area is owned by Cherish Enterprises Pty Ltd: the proponent for EPBC 2019/8575 and the ultimate Approval holder. The conditions of approval relating to the Esk Landholdings Offset area will directly link the Department to the land via the mutually complimentary offset and development landowner. This removes risks associated with third party commercial agreements and or disagreements with commercial terms.
6	*Be additional to what is already required, determined by law or planning regulations, or agreed to under other schemes or programs*	The Cherish Enterprises Springfield Residential Development Project is located within the Greater Springfield Master Planned Area. There are few environmental controls at the impact site, with the Queensland Government's *Environmental Offset Act 2014* not being applicable. The offset land is owned in freehold by Cherish Enterprises in a high productive rural land area. Approximately 65% of the landholding contains no Local or State Government controls for the ongoing clearing of vegetation. The land is currently under agistment for horse paddocks by the adjoining land holder. Cherish Enterprises has received offers to purchase the land by adjoining rural land holders who maintain their land in a cleared state. The offset area will be secured via a VDEC under the Queensland *Vegetation Management Act 1999* initially, followed by a covenant under the *Land Act 1994* or *Land Titles Act 1994*. Legally securing the offset areas via for the duration of the impact will ensure existing and future owners are prohibited from conflicting land uses, including clearing and high-density grazing. Management beyond minimum legislative requirements is proposed across the whole area to ensure loss of habitat values does not occur through

No.	Offset Suitability Criteria	Delivery
		intensification of weeds causing loss of connectivity, destruction of habitat via hot intensive fires, increased risk of mortality or injury by predators and inappropriate fencing. Without the triggering of the EPBC Act and the Controlled Action Assessment, no offsets would be required for the Springfield Residential Development Project and, importantly, no VDEC or offset works would occur at the Esk offset area.
7	*Be efficient, effective, timely, transparent, scientifically robust and reasonable*	Efficient and Effective: • The offset area is large and located within a contiguous landscape of connected Koala, Grey-headed Flying-fox, Swift Parrot and Regent Honeyeater habitat. Management actions will ensure efficient delivery of outcomes over the offset area and proactive management, monitoring and reporting will ensure response/corrective actions are timely and focused. • Prior to the EPBC Act process, the offset area was not protected or managed for conservation outcomes. Protection and management of the offset area in accordance with this OAMP aims to deliver an overall improved conservation outcome and net gain in koala, grey-headed flying-fox, swift parrot and regent honeyeater habitat. Timely: • The Cherish Esk offset area will be legally secured prior to the commencement of any works at the proposed action site. Offset works will be programmed to commence upon legally securing the offset land. As the project is large and multi-staged, offset actions will be occurring well in advance of the majority of the impact. • The mix of remnant, regrowth and non-remnant vegetation provided within the offset areas allows for the achievement of immediate and long-term conservation outcomes. The offset areas are to be legally secured prior to the commencement of the action, and this will remove the risk of conflicting land uses occurring on the sites. Following the approval of this OAMP and approval of the action, management actions outlined within **Section 6** will commence. Adaptive management processes will ensure management actions respond to technology improvements, natural events and potential risks identified in the risk assessment. Transparent: • The baseline surveys established the survey methodology to be used for the monitoring and reporting required for the lifetime of the approval. A clear monitoring and reporting framework is established within this OAMP (refer to **Section 6.6**). Monitoring and reporting of the offset areas will be summarised within the Annual Compliance Reports for the impact action. Scientifically robust: • The proposed offset area was assessed by qualified and experienced Ecologists. Ongoing management and monitoring actions will be conducted in collaboration with other qualified Ecologists and regeneration specialists to achieve the outcomes specified within the EPBC Act approval and this OAMP.

No.	Offset Suitability Criteria	Delivery
		• The baseline surveys conducted for the offset areas are scientifically robust, reliable and repeatable, ensuring the monitoring and compliance reporting are consistent and relate back to the overall outcomes specified within the EPBC Act approval. Reasonable: • The offset is considered reasonable as the offset areas are greater than the significant residual impact on koala, grey-headed flying-fox, swift parrot and regent honeyeater habitat and compensate for a portion of required offset for the koala and grey-headed flying-fox being: o 27.06% of the quantum impact for the Koala and o 63.44% of the quantum impact for Grey-headed Flying-fox. • The offset area will deliver more than the required offset for swift parrot and regent honeyeater being: o 54.58% of the impact for the Swift Parrot and o 54.95% of the impact for the Regent Honeyeater. • This OAMP outlines appropriate management actions to achieve the offset outcomes specified within the EPBC Act approval and an overall improved conservation outcome and net gain in koala, grey-headed flying-fox, swift parrot and regent honeyeater habitat, ensuring the long-term viability of the protected matters.
8	*Have transparent governance arrangements including being able to be readily measured, monitored, audited and enforced*	This OAMP provides a detailed monitoring and reporting framework (refer **Attachment A14 OAMP – Section 6.6**), performance criteria and corrective actions. These provide minimum requirements for success/failure of management actions and triggers for corrective actions. The Proponent will engage qualified and experienced consultants and specialists throughout the offset delivery to ensure the offset outcomes are achieved. Section 491 of the EPBC Act makes it an offence in certain circumstances to knowingly provide false or misleading information or documents to specified persons who are known to be performing a duty or carrying out a function under the EPBC Act or the *Environment Protection and Biodiversity Conservation Regulations 2000* (Cth). The offence is punishable on conviction by imprisonment or a fine, or both. As such, engaged consultants and specialists are required to complete a declaration of accuracy in reports provided to the Department, acknowledging their responsibility and accountability for information provided to the Department. The approved Offset Area Management Plan will be retained on the proponent's website, available for public access. Achievement of the OAMP will be measured through the Annual Compliance Reports which must be published on the Proponent's website in accordance with an EPBC Act approval and may be subject to audit by the Department by an independent auditor in accordance with section 458 of the EPBC Act, and/or used to verify compliance with the conditions. Summaries of the result of an audit may be published on the Department's website or through the general media.

6.4 Avonvale offset area

Cherish Enterprises Pty Ltd have entered into a legal agreement with One Environment (Offset Provider) for the delivery of environmental offsets for impacts on koala, grey-headed flying-fox, swift parrot and regent honeyeater critical habitat. One Environment is a joint venture between a land acquisition company and a bushland regenerator business and the custodian of multiple large offset for multiple MNES including the koala and grey-headed flying-fox approved under EPBC 2015/7530, EPBC 2015/7609, EPBC 2018/8347 and EPBC 2021/8975 on the same landholding.

The Avonvale offset area is 168 ha in size and forms part of the Avonvale Station Offset Property managed by third-party offset provider One Environment. The property is within the SRC LGA and is approximately 5.8 km west of the Toogoolawah township, located at Littles Road, Toogoolawah (refer **Figure A13**and **Figure A14**). The offset area is located over all or part of the following land parcels:

- Lot 2 on SP330365
- Lot 3 on SP327519
- Lot 1 on RP75222
- Lot 98 on CA31786
- Lot 61 on CA31716

The offset area is located on balance land within the cadastral boundaries of the Avonvale Station and adjacent to the EPBC Act offset approved to compensate for the significant residual impacts associated with EPBC 2015/7530, EPBC 2015/7609, EPBC 2018/8347 and EPBC 2021/8975. The land tenure is freehold, where it retains a rural land use zoning under the Somerset Regional Council Planning Scheme. The offset area is located approximately 84.3 km north-west of the proposed action site (refer **Plan A57**).

In order to establish the quantum impact on habitat critical to the survival of the target MNES, SHG undertook detailed ecological surveys of the offset area utilising the same methodologies used for the proposed action site with additional steps for the regent honeyeater and swift parrot methodologies to understand the planting capacity of the offset area for a feature-based calculation. The methodologies utilised and habitat quality assessment results for each MNES are included in **Attachment A15 Avonvale OAMP – Section 6.1 and 6.2**. This data was collated and utilised to calculate the habitat value and improvement opportunities. An assessment of value for koala, grey-headed flying-fox, swift parrot and regent honeyeater and proposed offset gains for these species is discussed in **Section 6.4.2 to 6.4.5**.

6.4.1 Offset area values

The Avonvale Station property is almost completely located within the *South East Queensland Regional Plan – Regional Biodiversity Corridor and the State-wide Regional Terrestrial Corridor #29* (Emu Creek to Mount Lawson Terrestrial Corridor) (refer **Plan A58**). The State-wide Regional Terrestrial Corridor #29 extends south from Emu Creek to Mount Lawson capturing Deongwar State Forest, Ravensbourne National Park and Lockyer National Park (DEHP 2016). The State-wide Regional Terrestrial Corridor #29 is significant as it links one (1) State and one (1) regional terrestrial corridor, intersects with riparian corridors, intersects and maintains the connectivity of large remnant tracts in its southern extent and fragmented patches of

remnant vegetation in its northern extent, incorporates altitudinal gradients, links protected area estates and contains significant flora and fauna values.

The offset area is predominantly cleared grazing land with regrowth and remnant vegetation values. Within cleared paddock portions of the site are a number of retained mature eucalypt trees. The topography within the offset area is gently undulating and includes low-lying drainage areas and a waterway (refer **Plan A59**). The elevation increases to the west where it adjoins the remnant mountain areas.

The proposed offset area includes a variety of vegetation types and landforms mapped under the Queensland *Vegetation Management Act 1999*, summarised in **Table A71**, below.

Table A71: Avonvale offset area Queensland Herbarium RE Descriptions

Regional Ecosystem (Qld)	Queensland Herbarium RE Description
Non-remnant/Remnant RE12.11.14	*Eucalyptus crebra, E. tereticornis, Corymbia intermedia* grassy woodland. Other species including *Eucalyptus melanophloia, Corymbia clarksoniana, C. erythrophloia, C. tessellaris, E. siderophloia, Angophora* spp. May be present in low densities or in patches. Mid-layer generally sparse but can include low trees such as *Vachellia bidwillii, Capparis* spp., *Dodonaea triquetra, Alphitonia excelsa* and *Xanthorrhoea* spp. Occurs on mid and lower slopes on Palaeozoic and older moderately to strongly deformed and metamorphosed sediments and interbedded volcanics. Not a Wetland. (BVG1M: 13c).
Non-remnant RE 12.3.3	*Eucalyptus tereticornis* woodland. *Eucalyptus crebra* and *E. moluccana* are sometimes present and may be relatively abundant in places, especially on edges of plains and higher level alluvium. Other species that may be present as scattered individuals or clumps include *Angophora subvelutina* or *A. floribunda, Corymbia clarksoniana, C. intermedia, C. tessellaris, Lophostemon suaveolens* and *E. melanophloia.* Occurs on Quaternary alluvial plains, terraces and fans where rainfall is usually less than 1000mm/y. Not a Wetland. (BVG1M: 16c).
Remnant RE 12.3.7	Narrow fringing woodland of *Eucalyptus tereticornis, Casuarina cunninghamiana* subsp. *cunninghamiana* +/- *Melaleuca viminalis*. Other species associated with this RE include *Melaleuca bracteata, M. trichostachya, M. linariifolia*. North of Brisbane *Waterhousea floribunda* commonly occurs and may at times dominate this RE. *Melaleuca fluviatilis* occurs in this RE in the north of the bioregion. *Lomandra hystrix* often present in stream beds. Occurs on fringing levees and banks of rivers and drainage lines of alluvial plains throughout the region. Riverine. (BVG1M: 16a).
RE 12.9-10.7	*Eucalyptus crebra* +/- *E. tereticornis, Corymbia tessellaris, Angophora leiocarpa, E. melanophloia* woodland. Occurs on Cainozoic and Mesozoic sediments. Not a Wetland. (BVG1M: 13c).

The offset area was delineated into six (6) assessment units based on the prevailing regional ecosystems and observed structural vegetation differences. These are shown on **Plan A60**, **Table A71** and photos.

Table A72: Avonvale offset area Assessment Unit Description

Assessment Unit		Area (ha)	Description
AU1	Non-remnant RE12.11.14	49.3	Partially cleared open grazing paddock with a mix of retained and young regrowth with large areas of open paddock dominated by pasture grasses. Lineal stands of eucalypt vegetation are present with regrowth values containing *Acacia* sp. and *Allocasuarina littoralis* (Black She-oak).
AU2	Non-remnant RE 12.3.3	15.2	Wholly cleared paddock dominated by a mix of native and exotic pasture grasses and herbaceous weeds, located in a an alluvial floodplain, indicative of Land Zone 3 (Wilson and Taylor, 2012).
AU3	Remnant RE 12.3.7	2	A small area of remnant riverine habitat located on an incised waterway. The banks are frequently dominated by herbaceous weeds with scattered *Lantana camara*. Large, mature *Eucalyptus tereticornis* (Forest Red Gum) are scattered throughout the area with *Casuarina cunninghamiana* (River She-oak) with a sparse understorey indicative of edge effects and adjoining disturbance.
AU4	Non-remnant RE 12.9-10.7	86.8	Partially cleared open grazing land dominated by native and exotic pasture grasses. Scattered mature and regrowth trees including *Corymbia citriodora* (Spotted Gum), *Eucalyptus crebra* (Narrow-leaved Ironbark) and *Corymbia erythrophloia* (Variable-barked Bloodwood) are scattered throughout the landscape.
AU5	Regrowth RE 12.9-10.7	11	Regrowth dominated by *Eucalyptus crebra* (Narrow-leaved Ironbark) and *Corymbia citriodora* (Spotted Gum). Contains large open areas with limited natural regeneration. The shrub layer is sparse and the groundcover layer is dominated by pasture grasses.
AU6	Remnant RE12.11.14	3.7	Remnant habitat with signs of historical thinning. Contains a mix of mature and juvenile trees (eucalypts and *Acacia* sp. and *Allocasuarina littoralis)* with small clearings.

Assessment Unit 1 – Cleared grazing paddock RE12.11.14

Assessment Unit 2 – Cleared grazing paddock RE12.3.3

Assessment Unit 3 – Disturbed remnant waterway RE12.3.7

Assessment Unit 4 – Cleared grazing paddock containing scattered mature eucalypts RE12.9-10.7

Assessment Unit 5 – Regrowth RE12.9-10.7 with open paddock

Assessment Unit 6 – Remnant RE12.11.14

6.4.2 Koala offset value

The Offset Area is located within South East Queensland and in the same Bioregional Zone as the proposed action site. By comparison, the offset area includes substantially Land Zones, Broad Vegetation Groups and species mix listed as "Highly Suitable" for the Koala (Rhodes et al. 2015) than the proposed action site. The broader Avonvale Station is known to be utilised by koalas, with several observation confirmed over the offset property and offset area. Additionally, direct observations of koalas were recorded during the most recent surveys completed in February 2024 as well as evidence of usage in the form of scats throughout the offset area. Refer to **Plan A61** for the location of suitable habitat and revegetation locations for koalas and public database records.

Detailed baseline MHQA survey methods and results are included in **Section 6.1 and 6.2 of the Avonvale OAMP (Attachment A15**). The proposed Environmental Outcomes which includes proposed habitat improvement scores, completion criteria, interim milestone targets, adaptive management strategies and management actions are provided in **Attachment A15 Avonvale OAMP – Appendix A**.

The summary of the proposed conservation gain and acquittal of impacts is presented in **Table A73**, below, with detailed offset OAG calculator outputs located at **Attachment A15 Avonvale OAMP – Appendix B** with parameters defined in Section 4.2 of the OAMP. The proposed offset will acquit **32.14%** of the quantum impact for koala.

Table A73: Avonvale – Koala MHQA proposed offset gain

Assessment Unit	Area (ha)	Habitat Quality Score		Offset Acquittal
		Baseline score) (rounded	Future score) (rounded	
AU1	46.6	4.33 (4)	7.16 (7)	11.9%
AU2	17.9	3.30 (3)	6.95 (7)	5.76%
AU3	2	5.70 (6)	7.16 (7)	0.18%
AU4	86.8	4.96 (5)	7.16 (7)	13.96%
AU5	11	6.79 (7)	7.31 (7)	0%
AU6	3.7	6.17 (6)	7.16 (7)	0.34
Total	**168**			**32.14%**

6.4.3 Grey-headed flying-fox offset value

The offset area is located 16.6 km from the Esk (156) Camp Site, which on the CSIRO Data Access Portal (McKeown and Vanderduys, 2024) retains one of the larger and consistently recorded colonies of grey-headed flying-fox in South East Queensland. The Avonvale offset area will result in the legally securing of large tracts of foraging habitat listed as habitat critical to the survival within close proximity to a major known camp site. Additionally, the site already provides winter and spring flowering trees, which will be increased and expanded through rehabilitation and revegetation works. The offset area also occurs

contextually amongst a large bioregional corridor where existing tracts of like habitat have been mapped. Refer to **Plan A62** for grey-headed flying-fox Regional Ecosystems, the Esk (156) Camp site and corridor mapping around the offset area. The proposed Environmental Outcomes which includes proposed habitat improvement scores, completion criteria, interim milestone targets, adaptive management strategies and management actions are provided in **Attachment A15 Avonvale OAMP – Appendix A**.

The summary of the proposed conservation gain and acquittal of impacts is presented in **Table A74**, below, with detailed offset OAG calculator outputs in **Attachment A15 Avonvale OAMP – Appendix B** with parameters defined in Section 4.2 of the OAMP. The proposed offset will acquit **60.81%** of the quantum impact for grey-headed flying-fox.

Table A74: Avonvale – GHFF FHA proposed offset gain

Assessment Unit	Area (ha)	Habitat Quality Score		Offset Acquittal
		Baseline score) (rounded	Future score) (rounded	
AU1	46.6	3.27 (3)	7.32 (7)	14.99%
AU2	17.9	2.52 (3)	7.12 (7)	7.20%
AU3	2	4.10 (4)	6.32 (6)	0.36%
AU4	86.8	3.20 (3)	7.52 (8)	34.91%
AU5	11	4.60 (5)	7.52 (8)	3.01%
AU6	3.7	6.32 (6)	7.32 (7)	0.34%
Total	**168**			**60.81%**

6.4.4 Swift parrot offset value

The Regional Ecosystems containing preferred swift parrot forage tree species have been mapped and overlaid for the recorded areas of swift parrots in Queensland. A review of State vegetation mapping and ecological field surveys indicates that the pre-clear Regional Ecosystems mapped within the offset area are dominated by preferred foraging species for the swift parrot *Eucalyptus tereticornis* (Forest Red Gum). Due to historical clearing for agriculture activities, mature eucalypts are currently sparse within the Category X (non-remnant) vegetation areas located within the offset area.

No swift parrot populations or individuals have been recorded within 10 km of the offset area. A search of the Queensland Government WildNet and Atlas of Living Australia using a 10 km search radius from the referral area returned no records for the species. A review of Queensland Government WildNet records for the species identified four (4) records for the species within 50 km of the offset area. A habitat analysis combining potential habitat and records of this species is shown on **Plan A55**.

The summary of the proposed conservation gain and acquittal of impacts is presented in **Table A75**, below to be achieved through the planting of preferred foraging trees *Eucalyptus tereticornis* (Forest Red Gum) and *Eucalyptus sideroxylon* (Mugga Ironbark). Detailed offset OAG calculator outputs are located at **Attachment**

A15 Avonvale OAMP – Appendix B with parameters defined in Section 4.2 of the OAMP. The proposed offset will acquit **54.57%** of the quantum impact.

Table A75: Avonvale – Swift parrot proposed offset gain

Assessment Unit	Area (ha)	Start value	Future value without offset	Future value with offset	Impact compensation
AU1	46.6	0	0	9,860	18.78%
AU2	17.9	0	0	6,080	14.43%
AU3	2	30	30	34	0.01%
AU4	86.8	109	109	10,441	20.82%
AU5	11	0	0	264	0.53%
AU6	3.7	0	0	7	0.01
Total	**168**				**54.57%**

OAG Note:
Start value inputted as the existing number of non-juvenile preferred foraging trees
Future value without offset inputted as the existing number of non-juvenile preferred foraging trees
Future value with offset inputted as net total of preferred foraging trees (*i.e.,* number to be planted + number of existing inclusive of an 80% survival rate)

6.4.5 Regent honeyeater offset value

The Regional Ecosystems containing preferred regent honeyeater forage tree species have been mapped and overlaid for the recorded areas of swift parrots in Queensland. A review of State vegetation mapping indicates that the pre-clear Regional Ecosystems mapped for the offset area have limited capacity to support preferred foraging species for the regent honeyeater listed (DoE, 2016), however, have may support the occurrence of foraging species needle-leaved mistletoe via the protection and reinstatement of sheoak species *Casuarina cunninghamiana* within riverine areas. Due to historical clearing for agriculture activities, mature eucalypts are currently sparse within the Category X (non-remnant) vegetation areas located within the offset area.

No regent honeyeater populations or individuals have been recorded within 10 km of the offset area. However, a review of Queensland Government WildNet records for the species identified four (4) records for the species within 50 km of the offset area indicating broader foraging patterns. A habitat analysis combining potential habitat and records of this species is shown on **Plan A64**.

The summary of the proposed conservation gain and acquittal of impacts is presented in **Table A75,** below to be achieved through the planting of preferred species *Eucalyptus sideroxylon* (Mugga Ironbark) within AU1 which is identified by the offset provider as a compatible species within the RE12.11.14 planting areas and has been successfully established within other parts of the offset property. Detailed offset OAG calculator outputs are located at **Attachment A15 Avonvale OAMP – Appendix B** with parameters defined in Section 4.2 of the OAMP. The proposed offset will acquit **11.42%** of the quantum impact.

Table A76: Avonvale – Regent honeyeater proposed offset gain

Assessment Unit	Area (ha)	Start value	Future value without offset	Future value with offset	Impact compensation
AU1	46.6	0	0	5,916	11.41%
AU2	17.9	0	0	0	0%
AU3	2	0	0	0	0%
AU4	86.8	0	0	0	0%
AU5	11	0	0	0	0%
AU6	3.7	0	0	4	0.01%
Total	**168**				**11.42%**

OAG Note:
Start value inputted as the existing number of non-juvenile preferred foraging trees
Future value without offset inputted as the existing number of non-juvenile preferred foraging trees
Future value with offset inputted as net total of preferred foraging trees (*i.e.,* number to be planted + number of existing inclusive of an 80% survival rate)

6.4.6 General Suitability EPBC Offset Policy Criteria

The following Table outlines the general suitability of the offset site relative to EPBC Act Offset Policy criteria.

Table A77: Avonvale Offset Area (General Suitability)

No.	Offset Suitability Criteria	Delivery
1	*Deliver an overall conservation outcome that improves or maintains the viability of the aspect of the environment that is protected by national environment law and affected by the proposed action*	The offset area delivers a conservation gain for the koala, grey-headed flying-fox, swift parrot and regent honeyeater through: a) The creation of new habitat for both protected matters through the revegetation of 168 ha. The revegetation is to consist of a variety of foraging species known to be utilised by the targeted species including preferred foraging tree species for the swift parrot and regent honeyeater (*Eucalyptus tereticornis* and *Eucalyptus sideroxylon*), along with other endemic species occurring on-site and consistent with the pre-clear Regional Ecosystem. Combined with the adjoining approved offset area on the land holding to form a total conservation area of 1,359.30 ha of land. b) Providing new connectivity with surrounding habitat for the protected matters. c) Providing new connectivity to the approved EPBC 2015/7530, EPBC 2015/7609, EPBC 2018/8347 and EPBC 2021/8975 offsets. d) Introducing, funding and continually improving Offset Area Management Actions to reduce and manage threats (non-native feral animals, weeds) in protected and created habitat areas. e) Averting the direct and indirect losses via legally securing the land via a suitable mechanism being a Voluntary Declaration area under the

No.	Offset Suitability Criteria	Delivery
		Vegetation Management Act 1999 followed by a covenant under the *Land Act 1994* or *Land Titles Act 1994*. This removes future wholesale and selective clearing opportunities and through the management plan removes ongoing impacts caused by livestock intrusion into habitat areas. f) Provides a 168 ha environmental offset within a regional mapped biodiversity conservation corridor. Through the achievement of the above, the proposed offset meets the conservation gains listed in the relevant conservation advices and recovery plans for each MNES.
2	*be built around direct offsets but may include other compensatory measures*	The offset area includes legally securing the land area and undertaking necessary improvements to achieve the balance offset requirements calculated for the Springfield Residential Development. This offset relates to impacts to the koala, grey-headed flying-fox, swift parrot and regent honeyeater habitat. This portion of the project's offset area is wholly achieved through direct delivery to land.
3	*be in proportion to the level of statutory protection that applies to the protected matter*	At the time of the EPBC referral, the koala and grey-headed flying-fox were listed under the EPBC Act as 'Vulnerable.' Under the International Union for Conservation of Nature data the probability of annual extinction is 0.2. The swift parrot and regent honeyeater are listed under the EPBC Act as Critically Endangered. Under the International Union for Conservation of Nature data the probability of annual extinction is 0.2 for Vulnerable species and 6.8 for Critically Endangered species. These factors apply through the meta data of the Offset Guide assessment calculation sheets for which each species has been assessed as achieving a portion of the required offset.
4	*be of a size and scale proportionate to the residual impacts on the protected matter*	Direct and indirect impacts for the protected matters have been calculated at the impacts site using the Modified Habitat Quality Assessment (MHQA) for the Koala and the Foraging Habitat Assessment (FHA) methods for Grey-headed Flying-fox, Swift Parrot and Regent Honeyeater. Within the Assessment Guide calculator the Quantum Impact for each species is listed as: • Koala (89.60 QI ha) • Grey-headed Flying-fox (89.60 QI ha) • Swift Parrot (9,983 habitat features impacted) • Regent Honeyeater (9,868 habitat features impacted) To achieve the balance offset required for these impacts, the offset area provides a direct land-based outcome over 168 ha entirely through habitat recreation activities on historically cleared land devoid of native vegetation. The percentage of the impacts acquitted through this offset is:

No.	Offset Suitability Criteria	Delivery
		• Koala – 31.27% • Grey-headed Flying-fox – 60.59% • Swift Parrot – 53.49% • Regent Honeyeater – 12.07%
5	*effectively account for and manage the risks of the offset not succeeding*	The offset area forms part of the balance land of the approved EPBC 2015/7530, EPBC 2015/7609, EPBC 2018/8347 and EPBC 2021/8975 offset solutions, which comprises a direct large singular land-based outcome in a strategic location known to support habitat for animals from the impacted protected matters. This Offset Area Management Plan identifies 8 key risks to some or all of the offset principles and outcomes not being achieved. Each of these risks have influenced the specific management actions proposed in the relevant Environmental Management Zone where the risk may occur and more importantly the monitoring, measuring of success and adaptive management for the offset succeeding. Further, the offset provider has engaged third party, suitably qualified professionals to ensure that the management outcomes of the offset land are achieved and risk of the offset not succeeding is mitigated. Repetitive monitoring and survey replication is a feature of the Offset Area Management Plan to ensure adaptive management changes are made as soon as identified and throughout the life of the offset.
6	*be additional to what is already required, determined by law or planning regulations or agreed to under other schemes or programs*	From the information provided by the proponent the Springfield Residential Development is not required under State or Local Government Approvals to deliver environmental offsets for the removal of koala, grey-headed flying-fox, swift parrot and regent honeyeater habitat. Therefore, without the triggering of the EPBC Act and subsequent requirement to obtain approval, the offset as proposed in the Offset Area Management Plan is not required for any of the protected matters under State or Local legislation. Additionally, the offset area would not be protected in perpetuity for conservation purposes.
7	*be efficient, effective, timely, transparent, scientifically*	The commercial agreement between the Proponent and Offset Provider ensures the offset area will be legally secured prior to the commencement of any clearing on the Impact site. The offset area will be legally secured through a suitable mechanism being a VDEC under the Queensland *Vegetation Management Act 1999* followed by a covenant under the *Land Act 1994* or *Land Titles Act 1994*. The means of legally securing the land protects the land and values and is binding on future owners. The declaration and management plan will be noted on the land title, which informs prospective buyers of current declarations and management plans and where copies are available. This information is important to the property market as future owners will be bound by the plan and declaration. The legally securing of the land will be made through declaring the area as having High Nature Conservation Values. The VDEC and covenant will be lodged and legally secured by evidence of

No.	Offset Suitability Criteria	Delivery
		encumbrance on Registered Land Title prior to the commencement of any clearing works at the proposed action site. Four offset areas secured via a VDEC are already existing within the broader offset landholding attributed to the approved EPBC offsets, and are searchable on title and through the Queensland Government's spatial databases. The OAMP schedules a list of existing or specifically designed scientific methodologies for the measuring of base line and improved outcomes for the protected matters. Detailed baseline studies have been occurring over the approved offset areas and are used to inform the outcomes of this version of the OAMP. The OAMP also requires the use of tertiary trained and experienced experts along with appropriately certified and experienced contractors for the implementation of a host of actions.
8	*have transparent governance arrangements including being able to be readily measured, monitored, audited and enforced*	The Offset Area is owned by the Offset Provider and while small areas are currently retained for cattle grazing the majority of the land holding is transitioning to habitat offsets and conservation outcomes. Clearly articulated goals are set within the Offset Area Management Plan for each proposed action within each Assessment Unit or Environmental Management Zone. Collectively, these goals link directly to the achievement of the overall conservation gain for the protected matters as designed, assessed and calculated through the selection and delivery of the Offset Area. The Offset Land Management Actions located at **Attachment A15 – Avonvale AOMP Section 8.0** of the OAMP are designed to be measured, monitored, audited and enforced year upon year during the life of the offset.

6.5 Mount Walker West offset area

Cherish Enterprises Pty Ltd are the owner of 227.6 ha of partially cleared rural land located within the Ipswich City Council LGA approximately 31 km south-west of the Ipswich Town Centre in the suburb of Mount Walker West (MWW). The landholding is made up of the following titles:

- 87/CH31962 (129.5 ha)
- 111/CH311417 (64.75 ha)
- 28/CH311940 (32.58 ha)

The aerial and context figures are provided as **Figure A15** and **Figure A16**.

The MWW offset area is located approximately 42 km north-west of the Springfield Residential Development project area and is located within the same LGA (refer **Plan A65**). While located within the ICC LGA, the southern and eastern boundary of the offset area adjoins the Scenic Rim Regional Council (SRRC) LGA.

The portion of the 227.6 ha landholdings proposed to be dedicated as offset area is 225.6 ha as it excludes 2.0 ha area proposed to be establish a Building Location Envelope (BLE) for the creation of a rural acreage. This includes a designated bushfire management zone where revegetation is not permitted (refer **Plan A66**). The offset area contains a constructed farm dam which will be retained and utilised as part of the management of the offset.

The MWW offset area is accessible from the south-west via Tralee Road.

In order to establish the quantum impact on habitat critical to the survival of the target MNES, SHG completed detailed ecological surveys of the offset area utilising the same methodologies used for the proposed action site with additional steps for the regent honeyeater and swift parrot methodologies to understand the planting capacity of the offset area for a feature-based calculation. The methodologies utilised and habitat quality assessment results for each MNES are included in **Attachment A16 MWW OAMP – Section 6**. This data was collated and utilised to calculate the habitat value and improvement opportunities. An assessment of value for koala, grey-headed flying-fox, swift parrot and regent honeyeater and proposed offset gains for these species is discussed in **Section 6.5.5 to 6.5.6**.

6.5.1 Offset area values

The Mount Walker West offset area represents a unique opportunity to recreate habitat within the same local government area as the impact area, sharing many of the same contextual and population-level factors as the impact area for the subject MNES, particularly the koala and grey-headed flying-fox.

The offset area, which heavily focuses on replanting and habitat creation as the primary objective, will build off an existing vegetation patch (>200 ha) to create a large stepping-stone patch within an established rural landscape. The increased patch size and connectivity will primarily assist in bridging gaps between the Bremer River Corridor and Regional Corridor to the west and also create important refuge habitat for transient and resident koala individuals within the surrounding landscape.

6.5.1.1 Regional Connectivity

It is noted the offset area is not located within a corridor identified by the Biodiversity Planning Assessment or *South East Queensland Regional Plan 2023* ('ShapingSEQ 2023'), however, the site maintains landscape and population-level connectivity to these corridors via the Little Liverpool Range (LLR) which adjoins the site to the west (refer **Plan A67**).

The LLR is a non-regulatory corridor which extends from Main Range National Park to the Great Eastern Ranges including D'Aguilar National Park and is considered an important wildlife corridor within the region. The LLR encompasses large areas of privately owned land including those used presently for pastoral practices and is also home to conservation parks and nature refuges. The LLR was formed and managed by the Little Liverpool Range Initiative (LLRI) in 2016 as a way of linking important habitats therefore providing wildlife with corridors to support dispersal and provide refuge from the threats associated with urban development and climate change. The LLR supports habitat for a wide variety of species and ecological communities with significant species including glossy black-cockatoo, powerful owl, brush-tailed rock wallaby, little pied bat, slender milk vine and swamp tea-tree.

The offset area provides opportunities for improved landscape connectivity to nearby nature refuges, conservation parks and established offsets for the koala and grey-headed flying-fox (refer **Plan A67**). This includes:

- Old Hiddenvalue Nature Refuge located 3.5 km north-west of the offset area.
- Aroona Nature Reserve managed by QTFN, located over two properties situated approximately 4.9 km and 5.7 km south-west of the offset area.
- Mount Beau Brummell Conservation Park located approximately 7.4 km south-west of the offset area.

6.5.1.2 Vegetation and environmental values

The offset area contains waterways mapped under the Queensland *Fisheries Act 1994* which form two primary flow paths throughout the offset area (refer **Plan A68**). These are characterised as upper catchment tributaries which ultimately provide drainage flows north-east of the offset area and feed into the Bremer River approximately 4 km and 6 km downstream of the offset area.

The vegetation within the offset area is heavily degraded as a result of historical clearing and management as a grazing property. As a result, a large portion (80%) of the offset area has been subject to either broadscale clearing or thinning. Approximately 70% of the offset area or 155.4 ha is identified as purely habitat creation involving the planting of habitat trees to support the koala, grey-headed flying-fox, swift parrot and regent honeyeater

The land within the offset area is predominantly reflective of open paddock and has been maintained for use as a pastoral grazing property. Scattered mature trees are present within the offset area within historically cleared areas used for grazing, presumably for the purpose of providing shade for livestock.

Under the VMA, the offset area is mapped mostly as Category X (non-remnant) within open grazing paddock with a large patch relatively high value vegetation in the western portion of the offset area mapped as Category C (high value regrowth) with a small area of Category B (remnant) vegetation. Scattered retained

tree canopy species within open grazing areas are dominated by *Eucalyptus crebra* (Narrow-leaved Ironbark) and *Eucalyptus tereticornis* (Forest Red Gum). Retained vegetation areas are comprised of open eucalypt woodland dominated by *E. crebra* and *Corymbia intermedia* (Pink Bloodwood) with several other eucalypt species indicative of RE12.8.17 and RE12.8.16. RE12.8.17 is identified as the dominant RE with elements of RE12.8.16 such as *Eucalyptus melliodora* (Yellow Box) present throughout the vegetated areas of the offset area. Queensland Herbarium Regional Ecosystem descriptions are provided in **Table A78**.

Table A78: Queensland Herbarium Regional Ecosystem Descriptions

Regional Ecosystem	Queensland Herbarium RE Description
Least Concern 12.8.17	Mixed woodland with combinations of *Eucalyptus crebra, E. melanophloia, E. tereticornis, Corymbia tessellaris, C. intermedia*, and commonly containing *Angophora subvelutina* and *E. melliodora*, with a grassy ground layer. Usually occurs on mid and lower slopes of hills on Cainozoic igneous rocks, especially basalt. Not a Wetland. (BVG1M: 11a).
Of Concern 12.8.16	*Eucalyptus crebra*, generally with *E. melliodora* and *E. tereticornis* subsp. *basaltica* grassy woodland. *Eucalyptus albens* may occur on the western edge of the bioregion. Usually occurs on dry mid and upper slopes and crests on Cainozoic igneous rocks, especially basalt. Not a Wetland. (BVG1M: 11a).
Endangered 12.3.3	*Eucalyptus tereticornis* woodland. *Eucalyptus crebra* and *E. moluccana* are sometimes present and may be relatively abundant in places, especially on edges of plains and higher level alluvium. Other species that may be present as scattered individuals or clumps include *Angophora subvelutina* or *A. floribunda, Corymbia clarksoniana, C. intermedia, C. tessellaris, Lophostemon suaveolens* and *E. melanophloia*. Occurs on Quaternary alluvial plains, terraces and fans where rainfall is usually less than 1000mm/y. Not a Wetland. (BVG1M: 16c).

The offset area was delineated into four (4) distinct units using a combination of desktop review of State regulated vegetation mapping and ground-truthing delineation of land zones (Wilson and Taylor, 2012) and vegetation characteristics. AU delineation was determined using the method prescribed in the Queensland State Government's *Guide to determining terrestrial habitat quality: A toolkit for assessing land based offsets under the Queensland Environmental Offsets Policy* (Version 1.2 April 2017). While the majority of the offset area is mapped as composite RE12.8.17/12.8.16, these were delineated into areas characterised as non-remnant, regrowth and remnant. The AUs are described below and shown on **Plan A69**.

Table A79: MWW offset area Assessment Unit Descriptions

Assessment Unit		Area (ha)	Description
AU1	Open Paddock RE12.3.3	50.8	cleared open grazing paddocks encompassing low-lying areas of the site characterised as land zone 3 *i.e.,* alluvial river and creek flats (Wilson and Taylor, 2012). The area of pre-clear RE12.3.3 was ground-truthed to be larger than suggested from the pre-clear mapping. This AU is characterised by its lack of structural complexity with a generally absent native tree, shrub and forb species presence and is dominated by a mix of exotic pasture grasses and native grass species such as *Cynodon dactylon* (Queensland couch) and *Heteropogon*

Assessment Unit		Area (ha)	Description
			refractus (barbed wire grass) with exotic herbaceous and leguminous weeds. This AU contains sporadic weed infestations with Lantana camara infestations observed throughout the area. AU1 retains scattered large eucalypt trees used as shade for livestock and otherwise contains limited habitat values for MNES.
AU2	Open paddock RE12.8.17/12.8.16	104.7	cleared open grazing paddocks encompassing undulating foothills and plains characterised as land zone 8 *i.e.,* basalt plains and hills (Wilson and Taylor, 2012). This AU is characterised by its lack of structural complexity with a generally absent native tree, shrub and forb species presence and is dominated by a mix of exotic pasture grasses and native grass species such as *Cynodon dactylon* (Queensland couch) and *Heteropogon refractus* (barbed wire grass) with exotic herbaceous and leguminous weeds. This AU contains sporadic weed infestations with Lantana camara infestations observed throughout the area. AU2 retains scattered large trees used as shade for livestock and otherwise contains limited habitat values for MNES.
AU3	Regrowth RE12.8.17/12.8.16	62	Native regrowth vegetation encompassing undulating foothills and plains characterised as land zone 8 *i.e.,* basalt plains and hills (Wilson and Taylor, 2012). This AU is comprised of native vegetation consistent with composite RE12.8.17/12.8.16. Observed characterises align with its mapped status as regrowth vegetation with canopy heights typically less than 10 m. Native shrub and groundcover species are consistent throughout the AU with tree species regeneration occurring. This AU contains sporadic weed infestations of Lantana camara and areas historically thinned where canopy cover is reduced.
AU4	Remnant RE12.8.17/12.8.16	10.4	Native remnant vegetation encompassing undulating foothills and plains characterised as land zone 8 i.e., basalt plains and hills (Wilson and Taylor, 2012). This AU is comprised of remnant vegetation consistent with composite RE12.8.17/12.8.16. This AU areas of moderate to dense sporadic weed infestations of *Lantana camara* and areas and cleared patches where infill planting will be required.

Assessment Unit 1 – Non-remnant RE12.3.3.

Assessment Unit 2 – Non-remnant RE12.8.17/12.8.16

Assessment Unit 3 – Regrowth RE12.8.17/12.8.16

Assessment Unit 4 – Remnant RE12.8.17/12.8.16

6.5.2 Current Management and Threats to MNES

A large portion of the offset area is currently intensively grazed with slashing and burning utilised to promote pasture grasses across the parts of the property used for pastoral grazing. Much of the area is highly disturbed by grazing activities and is dominated by cleared paddock. Scattered mature trees are present within the historically cleared areas used for grazing, presumably for the purpose of providing shade for livestock.

The offset area is actively utilised for cattle grazing which involves the use of the following degrading management activities:

- Intensive grazing to ensure ground cover levels are maintained, subsoil moisture is retained, and pasture growth is encouraged.
- Targeted spraying/slashing of regrowth and weeds to encourage spread of pasture grass.
- Controlled burns to remove weeds and regrowth to promote pasture grass.
- Utilisation of fencing and gates for cattle control.

Existing infrastructure to support cattle grazing (*i.e.,* cattle yards and barbed wire fencing) will be removed and/or retrofitted where appropriate.

As a result of slashing and grazing activities, incidence of woody weeds and WONS is relatively low within active grazing areas, however, cleared areas contain a mix of exotic pastoral grasses and leguminous and herbaceous weeds.

The use of the property for pastoral practices attracts threats to both livestock and native wildlife. Non-native vertebrate pests including predator and herbivore species are known to occur within the local region and have been confirmed on-site through baseline camera monitoring (refer **Photo set 11**). Within a 20 km radius of the offset area the Queensland WildNet database identifies three (3) *Canis familiaris* (wild dog) records, three (3) *Vulpes vulpes* (European red fox) records, one (1) *Felis catus* (feral cat), and three (3) *Lepus europaeus* (European brown hare). Notably, wild dogs are known to travel up to 20 km seeking prey, with home ranges of individuals likely to overlap with the offset area.

Photo set 11: Wild dogs recorded within MWW offset area.

6.5.3 Koala offset value

The MWW offset area is an ideal location for koala focused rehabilitation activities for a number of reasons:

- The Ipswich LGA is home to a genetically distinct koala population (Kjelsden et al. 2015).

- Mount Walker, located adjoining Mount Walker West, is identified as a 'priority rehabilitation area' (PRA) under the KCHMP. PRAs are defined as rural areas where there is a high level of threat from high-speed roads and clearing for grazing, with the aim of increasing vegetation cover and connectivity as well as active conservation management (ICC, 2017).
- At the State level, the offset area is mapped as containing koala habitat area, the location of which is based on the State regulated vegetation mapping, and outside of these areas is identified as a koala habitat restoration area.
- There are a high number of records within 20 km of the offset area as well as evidence of use detected on-site. Records are present within 5 km of the and adjoining the offset area with the majority located within urban hubs associated with the City of Greater Springfield and adjoining suburbs (refer **Plan A70**). It is noted in the KCHMP (ICC, 2017) that while the suburb of Mount Walker, located adjoining Mount Walker West, has relatively few koala records, it contains suitable koala habitat and areas ideal for rehabilitation. Mount Walker has fewer people per hectare compared to more populated suburbs, so it is expected that this is one of the primary reasons for a lack of sightings.

Detailed baseline MHQA survey methods and results are included in **Section 6.1.2 and 6.2.1 of the MWW OAMP (Attachment A16**). The proposed Environmental Outcomes which includes proposed habitat improvement scores, completion criteria, interim milestone targets, adaptive management strategies and management actions are provided in **Attachment A16 MWW OAMP – Appendix A**.

The summary of the proposed conservation gain and acquittal of impacts is presented in **Table A80**, below, with detailed offset OAG calculator outputs located at **Attachment A16 MWW OAMP – Appendix B** with parameters defined in Section 5.1.1 of the OAMP. The proposed offset will acquit **50.02%** of the quantum impact for koala.

Table A80: MWW – Koala MHQA proposed offset gain

Assessment Unit	Area (ha)	Habitat Quality Score		Offset Acquittal
		Baseline (rounded score)	Future (rounded score)	
AU1	50.8	3.40 (3)	6.86 (7)	16.34%
AU2	104.7	3.44 (3)	6.71 (7)	33.68%
AU3	62	6.51 (7)	7.10 (7)	0%
AU4	8.1	6.71 (7)	7.10 (7)	0%
Total	**225.6**			**50.02%**

6.5.4 Grey-headed flying-fox offset value

A review of the grey-headed flying-fox population data available through the CSIRO Data Access Portal (McKeown and Vanderduys, 2024) identifies several known roosts (active and inactive) within 20 km and 40

km of the offset area of which there are a number of shared roosts between the impact and offset area within a 40 km buffer providing opportunity for GHFF foraging individuals which forage at the impact site to forage within the offset area (refer **Plan A71**).

In addition to contextual factors, the offset area will provide substantial revegetation opportunity which includes planting of several winter and spring foraging species *E. crebra, E. melanophloia, E. melliodora*, *Corymbia tessellaris* and *E. tereticornis*. In addition, *C. clarksoniana* is proposed as part of the planting palette for broadscale revegetation of RE12.3.3. Existing cleared areas are mapped with pre-clear RE12.8.17/12.8.16 and RE12.3.3 which will be restored full-strata as part of rehabilitation activities to increase the volume of winter and spring foraging resources.

The proposed Environmental Outcomes which includes proposed habitat improvement scores, completion criteria, interim milestone targets, adaptive management strategies and management actions are provided in **Attachment A16 MWW OAMP – Appendix A**.

The summary of the proposed conservation gain and acquittal of impacts is presented in **Table A81**, below, with detailed offset OAG calculator outputs in **Attachment A16 MWW OAMP – Appendix B** with parameters defined in Section 5.1.2of the OAMP. The proposed offset will acquit **66.89%** of the quantum impact for grey-headed flying-fox.

Table A81: MWW – GHFF FHA proposed offset gain

Assessment Unit	Area (ha)	Habitat Quality Score		Offset Acquittal
		Baseline (rounded score)	Future (rounded score)	
AU1	50.8	2.33 (2)	7.17 (7)	20.43%
AU2	104.7	3.03 (3)	7.17 (7)	33.68%
AU3	62	4.52 (5)	7.17 (7)	11.3%
AU4	8.1	4.80 (5)	7.17 (7)	1.48%
Total	**225.6**			**66.89%**

6.5.5 Swift parrot offset value

The offset area contains existing patches of RE12.8.17/12.8.16 and pre-clear RE12.3.3 which are vegetation communities known to contain preferred foraging species for the swift parrot including *E. melliodora*, *E. tereticornis* confirmed through ground-truthing assessment. Existing cleared areas are mapped as pre-clear RE12.8.17/12.8.16 and RE12.3.3 and will be restored full-strata as part of rehabilitation activities to increase the volume of preferred foraging resources.

A review of ALA public database records indicates several records within 20 km of the offset area. It is noted that these records have been generalised within a 0.2 x 0.2 degree cell (29 km area), however, the presence of these records confirms broader usage patterns within the landscape. A habitat analysis combining potential habitat and records of this species is shown on **Plan A72**.

The summary of the proposed conservation gain and acquittal of impacts is presented in **Table A82**, below to be achieved through the planting of preferred foraging trees *E. tereticornis* (Forest Red Gum) and *E. melliodora* (Yellow Box). Detailed offset OAG calculator outputs are located at **Attachment A16 MWW OAMP – Appendix B** with parameters defined in Section 5.1.3 of the OAMP. The proposed offset will acquit **91.92%** of the quantum impact.

Table A82: MWW – Swift parrot proposed offset gain

Assessment Unit	Area (ha)	Start value	Future value without offset	Future value with offset	Impact compensation
AU1	50.8	0	0	16256	32.76%
AU2	104.7	0	0	26752	53.92%
AU3	62	207	30	2708	5.04%
AU4	8.1	20	109	117	0.20%
Total	**225.6**				**91.92%**

OAG Note:
Start value inputted as the existing number of non-juvenile preferred foraging trees
Future value without offset inputted as the existing number of non-juvenile preferred foraging trees
Future value with offset inputted as net total of preferred foraging trees (*i.e.,* number to be planted + number of existing inclusive of an 80% survival rate)

6.5.6 Regent honeyeater offset value

The offset area contains existing patches of RE12.8.17/12.8.16 which are vegetation communities known to contain preferred foraging species for the regent honeyeater including *E. melliodora*, confirmed through ground-truthing assessment. Existing cleared areas are mapped as pre-clear RE12.8.17/12.8.16 and will be restored full-strata as part of rehabilitation activities to increase the volume of preferred foraging resources.

A review of public database records (ALA) indicates several records within 20 km of the offset area. It is noted that these records have been generalised within a 0.2 x 0.2 degree cell (29 km area), however, the presence of these records confirms broader usage patterns within the landscape. A habitat analysis combining potential habitat and records of this species is shown on **Plan A73**.

The summary of the proposed conservation gain and acquittal of impacts is presented in **Table A83,** below to be achieved through the planting of preferred species *Eucalyptus sideroxylon* (Mugga Ironbark) within AU1 which is identified by the offset provider as a compatible species within the RE12.11.14 planting areas and has been successfully established within other parts of the offset property. Detailed offset OAG calculator outputs are located at **Attachment A16 MWW OAMP – Appendix B** with parameters defined in Section 5.1.4 of the OAMP. The proposed offset will acquit **37.40%** of the quantum impact.

Table A83: MWW – Regent honeyeater proposed offset gain

Assessment Unit	Area (ha)	Start value	Future value without offset	Future value with offset	Impact compensation
AU1	50.8	0	0	0	0%
AU2	104.7	0	0	16720	34.09%
AU3	62	103	103	1667	3.19%
AU4	8.1	0	0	60	0.12%
Total	**225.6**				**37.40%**

OAG Note:
Start value inputted as the existing number of non-juvenile preferred foraging trees
Future value without offset inputted as the existing number of non-juvenile preferred foraging trees
Future value with offset inputted as net total of preferred foraging trees (*i.e.,* number to be planted + number of existing inclusive of an 80% survival rate)

6.5.7 General suitability EPBC Offset Policy Criteria

The following Table outlines the general suitability of the MWW offset area relative to EPBC Act Offset Policy criteria.

Table A84: MWW Offset Area (General Suitability)

No.	Offset Suitability Criteria	Delivery
1	*Deliver an overall conservation outcome that improves or maintains the viability of the aspect of the protected matter*	The offset area program will deliver a conservation gain for the koala, grey-headed flying-fox, swift parrot and regent honeyeater through: a) The creation of new habitat for both protected matters through the revegetation of 155.4 ha of degraded grazing land and assisted natural regeneration to 70.2 ha of regrowth and remnant vegetation. The revegetation is to consist of a variety of foraging species known to be utilised by the targeted species including preferred foraging tree species for the swift parrot and regent honeyeater (*Eucalyptus tereticornis* and *Eucalyptus melliodora*), along with other endemic species occurring on-site and consistent with the pre-clear Regional Ecosystems. b) Locating adjacent to the LLR to provide mutual conservation benefits through overlapping population processes, bolstered stepping-stone connectivity to nearby nature refuges and opportunity for stakeholder engagement. c) Creating important habitat node and enhanced landscape connectivity for the protected matters within an established rural landscape, enabled through connection to the Little Liverpool Range corridor.

No.	Offset Suitability Criteria	Delivery
		d) Introducing, funding and continually improving offset area management actions to reduce and manage threats (non-native feral animals, weeds) in protected and created habitat areas. e) Averting potential direct and indirect losses of 225.6 ha of offset land enabled through rural zoning via legally securing the land in perpetuity via a suitable mechanism being a Voluntary Declaration area under the *Vegetation Management Act 1999* and a covenant under the *Land Act 1994* or *Land Titles Act 1994*. This removes future wholesale and selective clearing opportunities and through the management plan removes ongoing impacts caused by livestock intrusion into habitat areas. f) Aligning with Queensland Government's and Ipswich City Council's vision for koala targeted restoration areas within a rural dominated landscape. Through the achievement of the above, the proposed offset meets the conservation gains listed in the relevant conservation advices and recovery plans for each MNES.
2	*Be built around direct offsets but may include other compensatory measures*	The offset area includes legally securing the land area and undertaking necessary improvements to achieve a portion of offset requirements calculated for the Springfield Residential Development. This offset relates will partially acquit impacts to the koala, grey-headed flying-fox, swift parrot and regent honeyeater habitat through direct offsets with the balance of offset requirement to be delivered across two additional land-based offsets (Esk Landholdings Offset Area and Avonvale Offset Area).
3	*Be in proportion to the level of statutory protection that applies to the protected matter*	At the time of the EPBC referral, the koala and grey-headed flying-fox were listed under the EPBC Act as 'Vulnerable.' Under the International Union for Conservation of Nature data the probability of annual extinction is 0.2. The swift parrot and regent honeyeater are listed under the EPBC Act as 'Critically Endangered.' Under the International Union for Conservation of Nature data the probability of annual extinction is 0.2 for Vulnerable species and 6.8 for Critically Endangered species. These factors apply through the metadata of the Offset Assessment Guide calculator sheets for which each species has been assessed as achieving part of overall offset requirements for each MNES.
4	*Be of a size and scale proportionate to the residual impacts on the protected matter*	Direct and indirect impacts for the protected matters have been calculated at the impact site using the Modified Habitat Quality Assessment (MHQA) for the koala and the Foraging Habitat Assessment (FHA) methods for grey-headed flying-fox, swift parrot and regent honeyeater. The Quantum Impact (QI) for each species is listed as: • Koala (89.60 QI ha) • Grey-headed Flying-fox (89.60 QI ha) • Swift Parrot (9,983 habitat features impacted) • Regent Honeyeater (9,868 habitat features impacted)

No.	Offset Suitability Criteria	Delivery
		To achieve part of the offset requirements for these impacts, a direct land-based outcome is proposed over 225.6 ha which includes 155.4 ha of entirely through habitat recreation activities on cleared grazing land. The percentage of the overall impacts acquitted through this direct offset is: • Koala – 50.02% • Grey-headed Flying-fox – 66.89% • Swift Parrot – 91.92% • Regent Honeyeater – 37.40% The balance of offset requirements will be delivered across two additional land-based offsets (Esk Landholdings Offset Area and Avonvale Offset Area).
5	*Effectively account for and manage the risks of the offset not succeeding*	This OAMP identifies 8 key risks to some or all of the offset principles and outcomes not being achieved. Each of these risks have influenced the specific management actions proposed in the relevant Environmental Management Zone where the risk may occur and more importantly the monitoring, measuring of success and adaptive management for the offset succeeding. Suitably qualified professionals and rehabilitation contractors will be engaged to ensure that the management outcomes of the offset land are implemented as proposed and the risk of the offset not succeeding is reduced. Reasonable and achievable completion criteria have been developed such as an 80% survival rate for plantings so not to over-estimate the potential conservation benefits of the offset program. Rehabilitation and revegetation activities will be guided by a site-specific Rehabilitation Management Plan which includes a built-in monitoring program to enable adaptive management where required. Repetitive monitoring, survey replication and an adaptive management framework will be implemented under this OAMP to ensure any corrective actions are identified and implemented for the life of the offset.
6	*Be additional to what is already required, determined by law or planning regulations, or agreed to under other schemes or programs*	The Springfield Residential Development is located within the Springfield Structure Plan area declared by the State Government as a priority area for development therefore offsets under the Queensland Government's *Environmental Offset Act 2014* are not applicable. Therefore, without the triggering of the EPBC Act and subsequent requirement to obtain approval, the offset as proposed in the OAMP is not required for any of the protected matters under State or Local legislation. Additionally, the offset area would not be protected in perpetuity for conservation purposes otherwise due to the zoning as 'rural' under the *Ipswich City Plan 2025*.

No.	Offset Suitability Criteria	Delivery
7	*Be efficient, effective, timely, transparent, scientifically robust, and reasonable*	Through conditions of approval the offset area will be legally secured prior to the commencement of any clearing on the impact site. The offset area will be legally secured via a VDEC under the Queensland *Vegetation Management Act 1999* followed by a covenant under the *Land Act 1994* or *Land Titles Act 1994*. The means of legally securing the land protects the land and values and is binding on future owners. The declaration and management plan will be noted on the land title, which informs prospective buyers of current declarations and management plans and where copies are available. This information is important to the property market as future owners will be bound by the plan and declaration. The legally securing of the land will be made through declaring the area as having High Nature Conservation Values. The VDEC and covenant will be lodged and legally secured by evidence of encumbrance on Registered Land Title prior to the commencement of any clearing works at the proposed action site. Four offset areas secured via a VDEC are already existing within the broader offset landholding attributed to the approved EPBC offsets and are searchable on title and through the Queensland Government's spatial databases. The OAMP schedules a list of existing or specifically designed scientific methodologies for the measuring of base line and improved outcomes for the protected matters. Detailed baseline studies have been completed over the approved offset area and are used to inform the outcomes of this version of the OAMP. The OAMP also requires the use of tertiary trained and experienced experts along with appropriately certified and experienced contractors for the implementation of the proposed management actions.
8	*Have transparent governance arrangements including being able to be readily measures, monitored, audited and enforced*	This OAMP provides a detailed monitoring and reporting framework, performance criteria, and corrective actions (Sections 7 and 8). These provide minimum requirements for success/failure of management actions and triggers for corrective actions. The approval holder will engage qualified and experienced consultants and specialists periodically throughout the offset delivery to ensure the offset outcomes are achieved. Section 491 of the EPBC Act makes it an offence in certain circumstances to knowingly provide false or misleading information or documents to specified persons who are known to be performing a duty or carrying out a function under the EPBC Act or the *Environment Protection and Biodiversity Conservation Regulations 2000* (Cth). The offence is punishable on conviction by imprisonment or a fine, or both. As such, engaged consultants and specialists are required to complete a declaration of accuracy in reports provided to the Department, acknowledging their responsibility and accountability for information provided to the Department. Clearly articulated goals are set within this OAMP for each proposed action within each Assessment Unit or Environmental Management Zone. Collectively, these goals link directly to the achievement of the overall

No.	Offset Suitability Criteria	Delivery
		conservation gain for the protected matters as designed, assessed and calculated through the selection and delivery of the offset. The management actions and implementation schedule to be included in the offset management plan are designed to be measured, monitored, audited and enforced year upon year during the life of the offset.

7. Economic and social matters

This section responds to Item 7 of the PD request which requests further details on economic and social matters, including:

a. ***Provide details on the social and economic costs and / or benefits of undertaking the proposed action, including the basis for any estimations of costs and / or benefits.***

b. ***Identify if economic benefits and employment opportunities are in addition to what would have been expected if the action were not to take place.***

c. ***Provide details of any public stakeholder consultation activities, including the outcomes of those consultations.***

d. ***Provide details of any consultation with Indigenous stakeholders.***

7.1 Economic costs and / or benefits

The proposed development will result in the creation of 1,860 residential allotments, with a sports field, parks and retained significant vegetation. The construction and operation of the project will provide a number of economic benefits to the local and regional community. Firstly, the construction is expected to take approximately 10 years. This will allow for the engagement of a number of trades and services from the local area to participate in the construction of the community. Not only will this provide employment opportunities to the community, but it will provide an economic boost to local retailers and suppliers who are engaged to supply materials and goods for the project.

Due to the scale of the project and situation within the expanding Springfield City community, the economic impact on the local community will include direct and indirect employment starting with the current planning and design phase, then civil and building construction. Ongoing employment associated with the retail and commercial uses will also occur. The increased economic activity generated by the development will therefore flow into the local and broader community.

7.2 Social costs and / or benefits

Social impacts have been a key consideration in the design and planning of the project and more broadly the Ipswich Planning Scheme. Under the provisions of the Planning Scheme, guidelines are set out for proposed developments to deliver suitably designated neighbourhoods, centres, housing diversity and affordability, employment opportunities, movement networks, community greenspace networks, community facilities, natural and cultural values, community safety and development constraints, service infrastructure and other general requirements.

The action will impact 128 ha of vegetation to facilitate the construction of the staged development which will notably result in a loss of greenspace in the local landscape. The retention and delivery of green space areas has been an integral part of the delivery of the Springfield City master plan with the key purpose of promoting physical health, improved mental wellbeing and socialisation through creating access to

bushwalking opportunities, cycling, sports facilities among other outdoor activities – an aspect which has carried through to the Springfield Residential Development.

The project facilitates an integrated residential community that promotes a variety of housing options and will provide a range of lot sizes to meet the diverse needs of different community members. The project will balance the needs and requirements of the community by providing:

- Open space and recreational areas, including linear parks, local park pockets and a sports field.
- Retention and rehabilitation of significant vegetation communities associated with the LRSA TEC, situated along the western portion of the referral area.
- Pedestrian and bike paths networks to encourage an active lifestyle connected across the referral area, promoting general health and mental wellbeing.
- Network of connectivity areas to protect significant vegetation communities and the ecological functionality of the site, with a focus of connecting areas associated with the waterways (Woogaroo Creek, Opossum Creek and drainage line adjacent to the site).

The retention of the open space and significant vegetation community areas will retain visual amenity, ensuring this is maintained as part of the built form of the project. This will in turn promote a sense of community amongst residents. The availability of parks throughout the project site development area will promote equitable access to open space areas and will encourage active lifestyles. The variety of housing types and densities will ensure the diverse needs of different community members are met.

Public consultation was sought during the development assessment process at the local level, and will again be sought through this EPBC Act assessment. All public submission will be taken into account when finalising the design and operation of the project.

7.3 Stakeholder engagement and consultation activities

The overarching Springfield Structure Plan was adopted as part of the *Ipswich Planning Scheme 2006* and was subject to extensive public consultation during its design phase in accordance with the *Integrated Planning Act 1997*. The development intent of Greater Springfield has incorporated public opinions and addressed public concerns.

7.4 Cultural Heritage Considerations

As part of the Springfield Open Space Master Plan, consultation was undertaken with indigenous stakeholders and cultural heritage experts. On 25th June 1999, a Cultural Heritage Conservation Plan (CHCP) for the Springfield Structure Plan was approved by the former State Government Environmental Protection Agency (EPA). The CHCP is provided in the **PD Part A as Attachment A17**.

The CHCP identifies known or potential areas of Aboriginal cultural heritage sensitivity across the Springfield development area and establishes overarching management expectations for development with the purpose of assisting proponents in informing preliminary risk assessments and avoiding obviously sensitive areas during planning and design. The CHCP is recognised as a supporting planning and management

document, but it does not replace or override obligations under the Aboriginal Cultural Heritage Act 2003 (ACHA).

The EPA categorised the artefact sites identified in the CHCP as:

- Not requiring further attention;
- Adequately protected; or
- Requiring additional protection.

Under the CHCP there are three identified sites within the Springfield Residential Development, being Sites E, DD and EE. As per the Local Area Plan approval documentation (6243/2023/LAP, available at https://developmenti.ipswich.qld.gov.au/), all three sites have been deemed to be in the "adequately protected" category, remaining partly within the public open space designation.

As noted above, a 'duty of care' in relation to Aboriginal culture heritage is established by the ACHA. The proponent will be responsible for enacting their 'duty of care' obligation under the Aboriginal Cultural Heritage Duty of Care Guidelines (Queensland) such as through incorporating cultural heritage awareness into site inductions and establishing clear "stop work" procedures in the event that artefacts or potential cultural heritage material are encountered.

It is noted the 'duty of care' obligation is also present in Section 10.2.3 of the SSP which states "A person must not remove, destroy or interfere with any identified cultural heritage resource of either aboriginal or European origin or item of the Queensland Estate" confirming the requirement that cultural heritage is to be identified and appropriately managed.

8. Ecologically sustainable development

This section responds to Item 8 of the PD request which asks the proponent to "***provide a description of how the proposed action meets the principles of ecologically sustainable development, as defined in section 3A of the EPBC Act.***"

The EPBC Act has a key objective to '*promote ecologically sustainable development through the conservation and ecologically sustainable use of natural resource,*' (EPBC Act section 3). Ecologically Sustainable Development (ESD) is defined within the Commonwealth Government's National Strategy for Ecologically Sustainable Development as *'using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased'.*

The goal of the National Strategy for Ecologically Sustainable Development is:

> *Development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends.*

The core objectives include:

1. To enhance individual and community well-being and welfare by following a path of economic development that safeguards the welfare of future generations;
2. To provide for equity within and between generations; and
3. To protect biological diversity and maintain essential ecological processes and life-support systems.

Table A85 assesses the capacity for this project to meet the principles of ESD, as defined in section 3A of the EPBC Act.

Table A85: ESD Principles defined under the EPBC Act, section 3A

Principles of ecologically sustainable development defined under Section 3A of the EPBC Act
a. Decision-making processes should effectively integrate both long-term and short-term economic, environmental, social and equitable considerations.
The design of the project has taken both long-term and short-term economic, environmental, social and equitable considerations into account. Local planning has identified the area as suitable for extensive residential development. The project will benefit individuals and the community by providing additional housing in an area earmarked for urban development to support ongoing population growth. Residential uses and resource extraction activities are dominant within the surrounding landscape, where the subject site contains varying levels of modified vegetation values. A variety of housing types and densities will be made available in accordance with local planning intent,

Principles of ecologically sustainable development defined under Section 3A of the EPBC Act

ensuring that a diverse range of people will have access to appropriate housing that suits their needs and preferences.

Retained, open space areas will be made available to the public within the project area, ensuring equitable access of open space areas to all community members. T**he proposed 27.5 ha vegetation retention area is** situated in the western extent of the referral area and expands on the creek line and associated vegetation areas of Woogaroo Creek and Opossum Creek. This retention is strategic for retaining the quality, character, resilience and ecosystem functionality of natural areas adjoining the action site for the persistence of local wildlife and for enjoyment by the local community.

In addition, the implementation of broad rehabilitation efforts including weed management and infill planting where required, will benefit and support connectivity of environmental values across the wider landscape via the riparian corridor whilst allowing continued usage of the proposed action site.

The vegetation retention area will ensure short- and long-term protection of environmental values. Vegetation retention areas will enhance the visual amenity of the development area, whilst facilitating dispersal of wildlife and provide habitat to a range of fauna species. The retention of conservation areas will contribute to the retention of biodiversity in the local area.

b. If there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.

The implementation of precautionary measures in decision making is used where there is a threat of serious or irreversible harm and where there is scientific uncertainty as to the extent of possible environmental damage. There are a number of factors which help determine whether or not an action might cause serious or irreversible environmental damage, including:

I. The spatial scale;
II. The magnitude of possible impacts;
III. The perceived value of the threatened environment;
IV. The complexity and connectivity of possible impacts;
V. The manageability of possible impacts;
VI. The level of public concern and the rationality or scientific basis for the concern; and
VII. Reversibility of possible impacts.

Impacts to the koala and associated habitat have been identified as the primary environmental concern on a level of National Environmental Significance. The site's utilisation and potential utilisation by koala, GHFF, swift parrot and regent honeyeater and its ability to provide critical habitat for these species has been discussed in detail throughout this report. The site has been recognised to support low level koala activity and an area of 128 hectares has been identified as containing habitat critical to the survival of the koala and GHFF containing 9,983 habitat features for the swift parrot and 9,868 habitat features for the regent honeyeater.

A number of potential facilitated and cumulative impacts associated with the action have been identified; however, these are all considered to be localised impacts. The magnitude of impacts is restricted to the referral site and immediately adjoining areas. Potential indirect impacts can be summarised as those arising from the loss of habitat, barriers to movement, injury or death from vehicle strike or dog attack and dispersal into residential areas. A number

Principles of ecologically sustainable development defined under Section 3A of the EPBC Act

of mitigation measures will be imposed during the clearing and construction and operational phases of the action to avoid and mitigate these impacts. In addition, vegetation areas in the western portion of the site will be rehabilitated (*i.e.,* weed removal and infill planting in degraded areas) to mitigate the potential for degrading processes to be introduced on retained vegetation areas. This will increase the ecological functions of currently degraded areas while mitigating the potential for development-induced degradation and will improve the overall value of the retained corridor associated with Woogaroo and Opossum Creeks. The identified indirect impacts will also be managed through the imposition of low vehicle speeds, fauna sensitive design and through the education of new residents about local wildlife management. The impacts from the project have been identified and management measures have been subsequently developed.

The proposed action is not considered to pose a threat of serious or irreversible damage to the local koala population or the broader environment, with vegetation retention areas providing ongoing linkages and area for koalas to persist. A detailed koala population study was commissioned by the Proponent on the ability of the koala population to persist under the proposed impacts. Potential impacts have been considered and a number of management plans will be implemented to ensure that any impacts are minimised and offset.

c. The principle of inter-generational equity—that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations.

A total of 27.5 ha of vegetation will be retained in the western part of the referral area, expanding on the creek line and associated vegetation areas of Woogaroo Creek and Opossum Creek. This retention is strategic for retaining the quality, character, resilience and ecosystem functionality of natural areas adjoining the action site for the persistence of local wildlife and for enjoyment by the local community. Building off these creek line areas will create a larger patch of vegetation retention that will be more resilient to climate change, degrading influences such as weed incursion and retain the natural ecosystem function and wildlife connectivity which already exists.

Notably, retention areas will retain and buffer high value ecological areas including two ground-truthed patches of LRSA TEC and will retain a mix of vegetation types that will retain the character of the site. Ecosystem health, diversity and productivity that currently exists will continue and maintenance of edge effects will occur to support ecosystem function for future generations.

d. The conservation of biological diversity and ecological integrity should be a fundamental consideration in decision-making.

The proponent is committed to retaining and promoting biological diversity and ecological integrity alongside the provision of urban land uses. The proponent has worked collaboratively with ICC and the DCCEEW over several years to achieve an outcome that balances environmental retention with the proposed land uses envisaged under the SSP. Direct impacts are proposed to an area of 128 ha with 27.5 ha proposed as vegetation retention area adjoining Woogaroo Creek and Opossum Creek. The retention area proposed is above what was initially proposed under the SSP with additional interface areas of Woogaroo Creek now set aside for permanent protection to add additional corridor buffering to high value creek line areas.

It is noted the proponent has previously dedicated 49.2 ha of their broader landholdings to ICC **within the Opossum and Woogaroo Creek corridors resulting in a total 76.7 ha retention area attributed to the Springfield Residential Development. Of the broader landholdings this is reflective of a retention strategy of**

Principles of ecologically sustainable development defined under Section 3A of the EPBC Act

approximately 90 ha combining adjoining areas of O'Dwyer's Creek tributaries and environmental retention areas of Kalina Village 1 (EPBC 2014/7306).

Additionally, the action proposes three (3) land based offsets, totalling a combined offset area of 675.8 ha to compensate for direct impacts on MNES. **This includes 355.2 ha of revegetation focused management which will create habitat in areas containing little or no value for the targeted MNES and expand on existing habitat areas. Notably, the Mount Walker West Offset Area is located within the Ipswich region which will provide more localised benefit to the koala population of Ipswich.**

The proposed offset will compensate for impacts for the koala, grey-headed flying-fox, swift parrot and regent honeyeater. Management of each offset will be delivered in accordance with the site-specific Offset Area Management Plan included at Attachments A14 – A16. The proposal to offset impacts as a result of the action will provide measurable value to the MNES being impacted during the course of the offset program implementation and is considered in keeping with the intent of the EPBC Act Environmental Offsets Policy.

e. Improved valuation, pricing and incentive mechanisms should be promoted.

The proposed action is consistent with the principle that improved valuation, pricing and incentive mechanisms should be promoted. Environmental values have been identified and assessed during project planning and environmental assessment. Measures to avoid, minimise and manage impacts have been incorporated into the project design, and the costs of implementing these measures will be undertaken by the proponent. Accordingly, the environmental costs associated with the action are recognised and managed as part of the project.

9. Conclusion

The *Environmental Management Division* of Saunders Havill Group were commissioned to develop Preliminary Documentation to support assessment of the proposed action (the Mur Boulevard, Springfield residential development), under the EPBC Act. The proposed action is a residential development at Mur Boulevard, Springfield, in South East Queensland. A Controlled Action assessment through Preliminary Documentation was determined for the development on 9th April 2020 (2019/8575), in response to the submitted Referral on behalf of the proponent, Cherish Enterprises Pty Ltd. The decision was based on:

- Listed threatened species and communities (sections 18 & 18A).

This Preliminary Documentation Report provides information requested by the Department to assist the assessment manager in determining whether or not the development should be approved. As detailed in previous referral documentation and this report, the proposal will result in clearing of approximately 128 ha of habitat critical to the survival of the koala and grey-headed flying-fox and 9,983 habitat features for the swift parrot and 9,868 habitat features for the regent honeyeater. The proposal has been deemed to impose a significant impact on critical habitat for the koala, grey-headed flying-fox, swift parrot and regent honeyeater and therefore an offset is required. The Proponent will provide an offset in accordance with the EPBC Act Environmental Offsets Policy.

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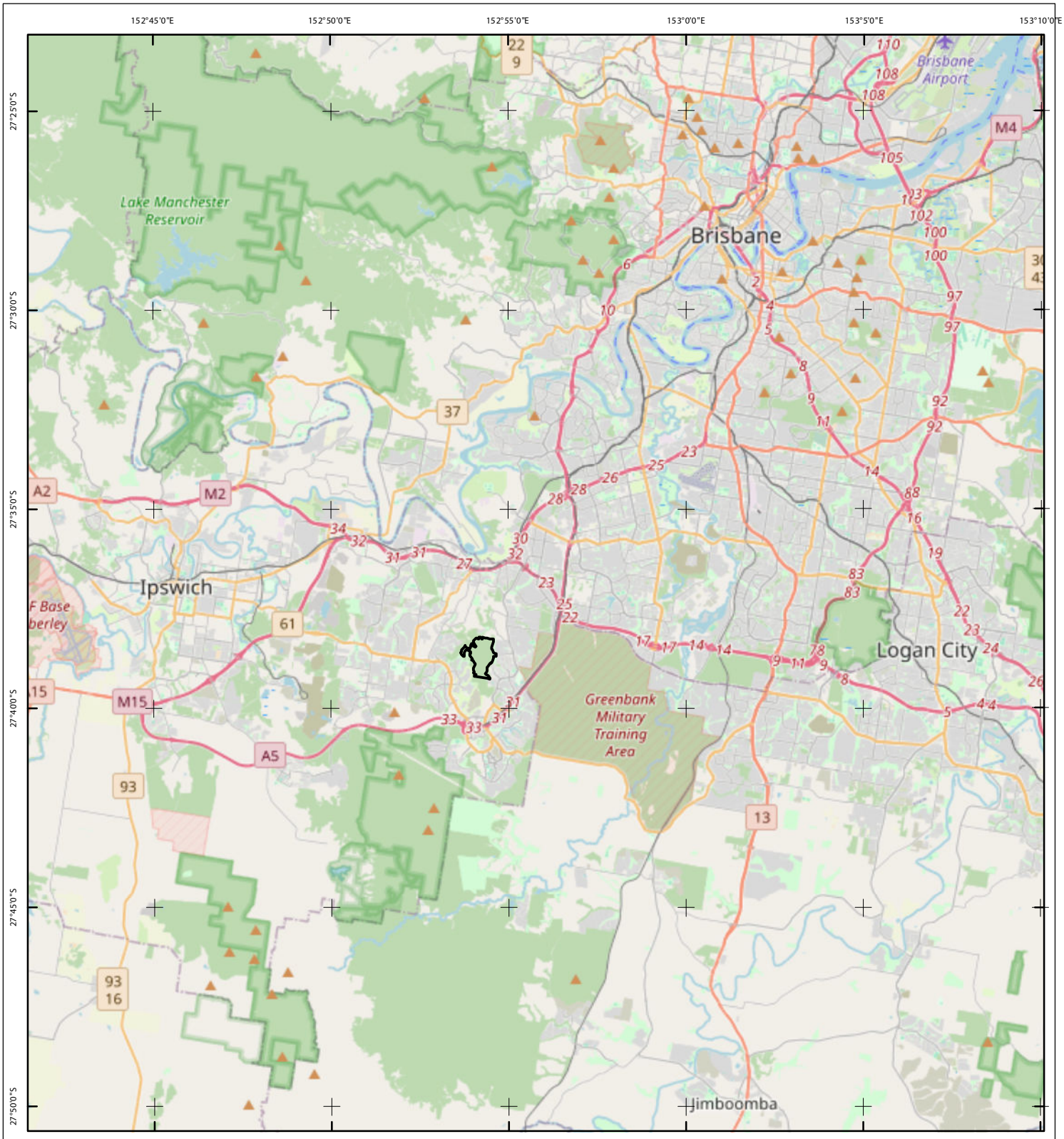
11. Figures and Plans



Legend

Referral Area

Figure A1

Site Context

Cherish Enterprises Pty Ltd

File ref. 9612 E Figure A1 Site Context A
Date 8/04/2025
Project Springview Village Residential Development

0 2 4 6 8 10 km

N

Scale (A4): 1:250,000 [GDA 1994 MGA Z56]

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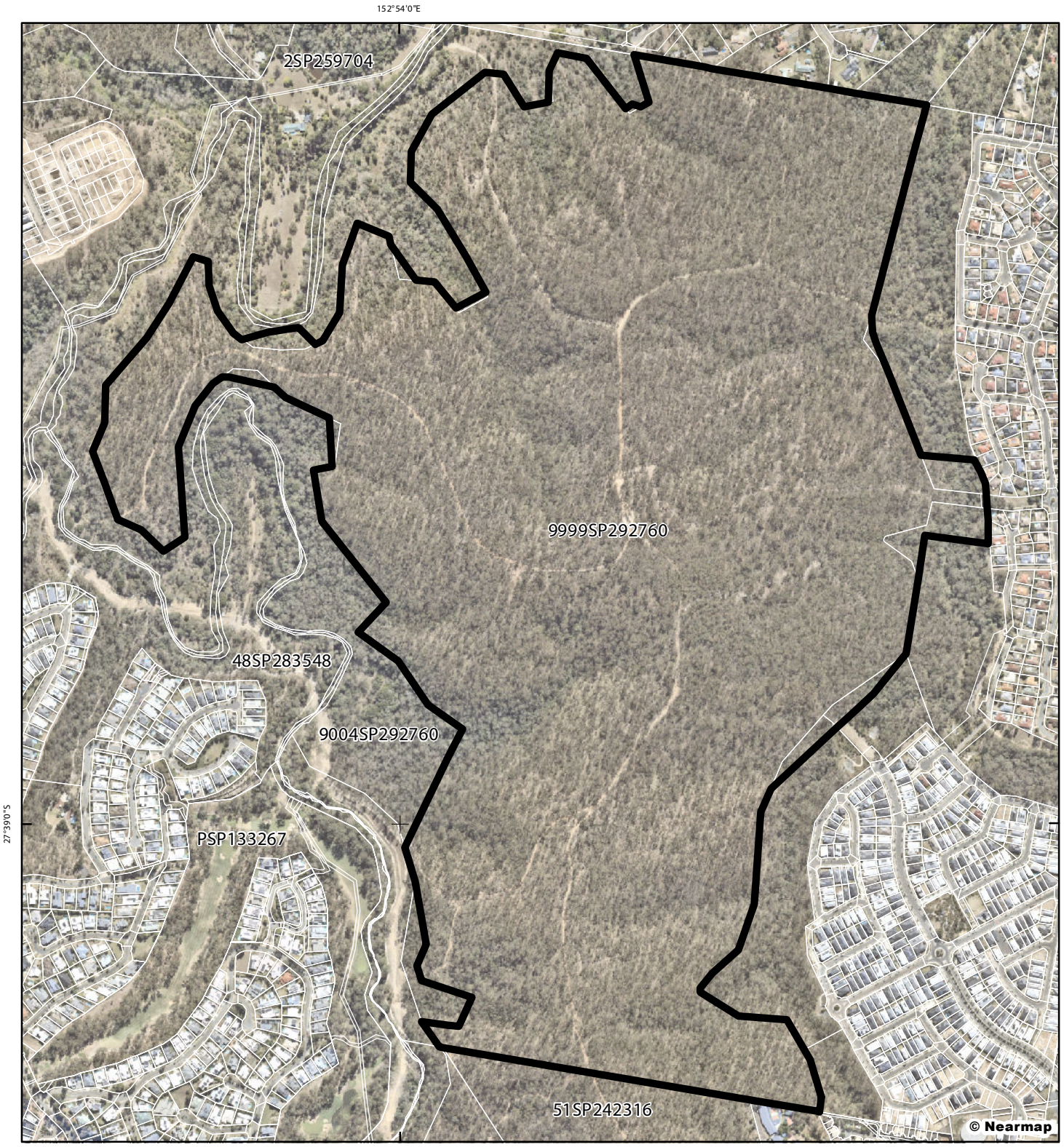

Legend

- Qld DCDB
- Referral Area

Figure A2

Site Aerial

Cherish Enterprises

File ref. 9612 E Figure A2 Site Aerial A
Date 8/04/2025
Project Mur Boulevard, Springfield

0 100 200 300 400 m

N

Scale (A4): 1:10,000 [GDA 1994 MGA Z56]

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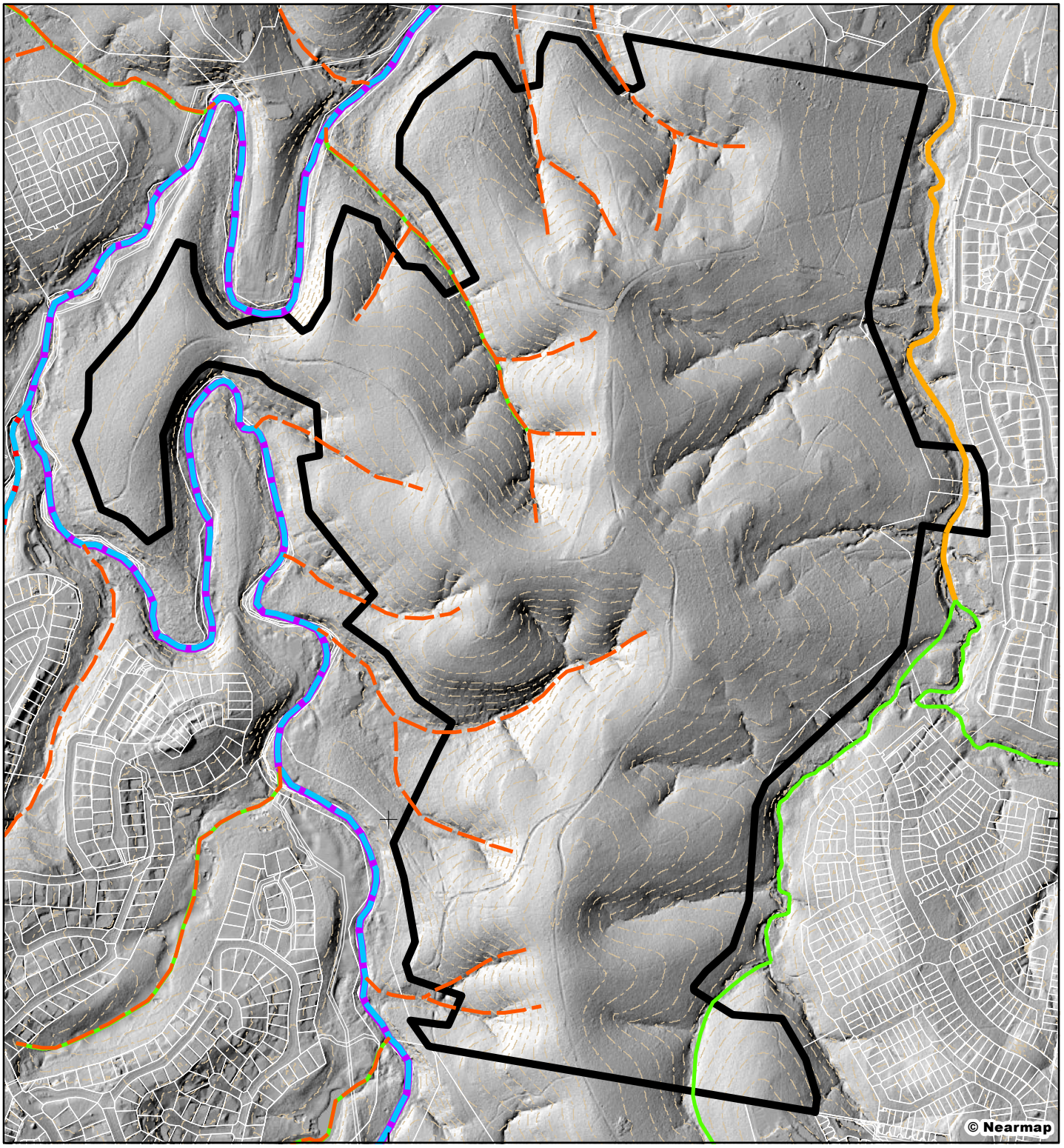

Legend

- Qld DCDB
- Referral Area
- 5 Metre Contours
- Water Act 2000 - Watercourses
- Water Act 2000 - Drainage Features

Waterways (QLD)

Risk of Impact

- 1 - Low
- 2 - Moderate
- 3 - High
- 4 - Major
- 5 - Major (Tidal)

Figure A3

Site Topography and Water Resources

Cherish Enterprises Pty Ltd

File ref. 9612 E Figure A3 Topography and Water A
Date 8/04/2025
Project Springview Village Residential Development

0 100 200 300 400 m

N

Scale (A4): 1:10,000 [GDA 1994 MGA Z56]

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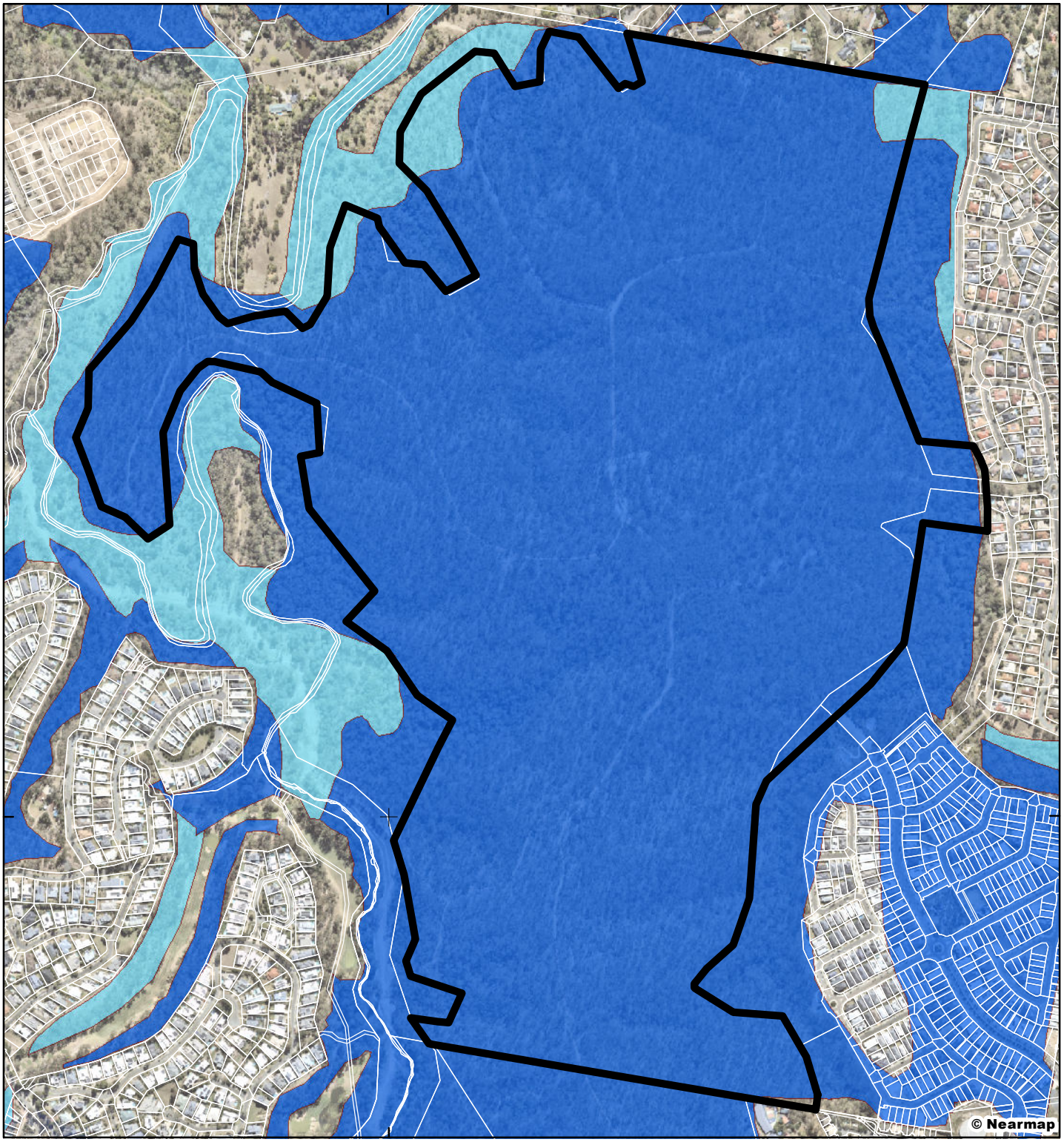

Legend

- Qld DCDB
- Referral Area

Regulated Vegetation

- Category A area - Vegetation Offset/Compliance notices/VDecs
- Category B area - Remnant vegetation
- Category C area - High value regrowth vegetation
- Category R area - Reef regrowth watercourse vegetation
- Category X area
- Water
- Area not categorised

Figure A4

Regulated Vegetation Management Map

Cherish Enterprises Pty Ltd

File ref. 9612 E Figure A4 RVM A
Date 8/04/2025
Project Springview Village Residential Development

0 100 200 300 400 m

N

Scale (A4): 1:10,000 [GDA 2020 MGA Z56]

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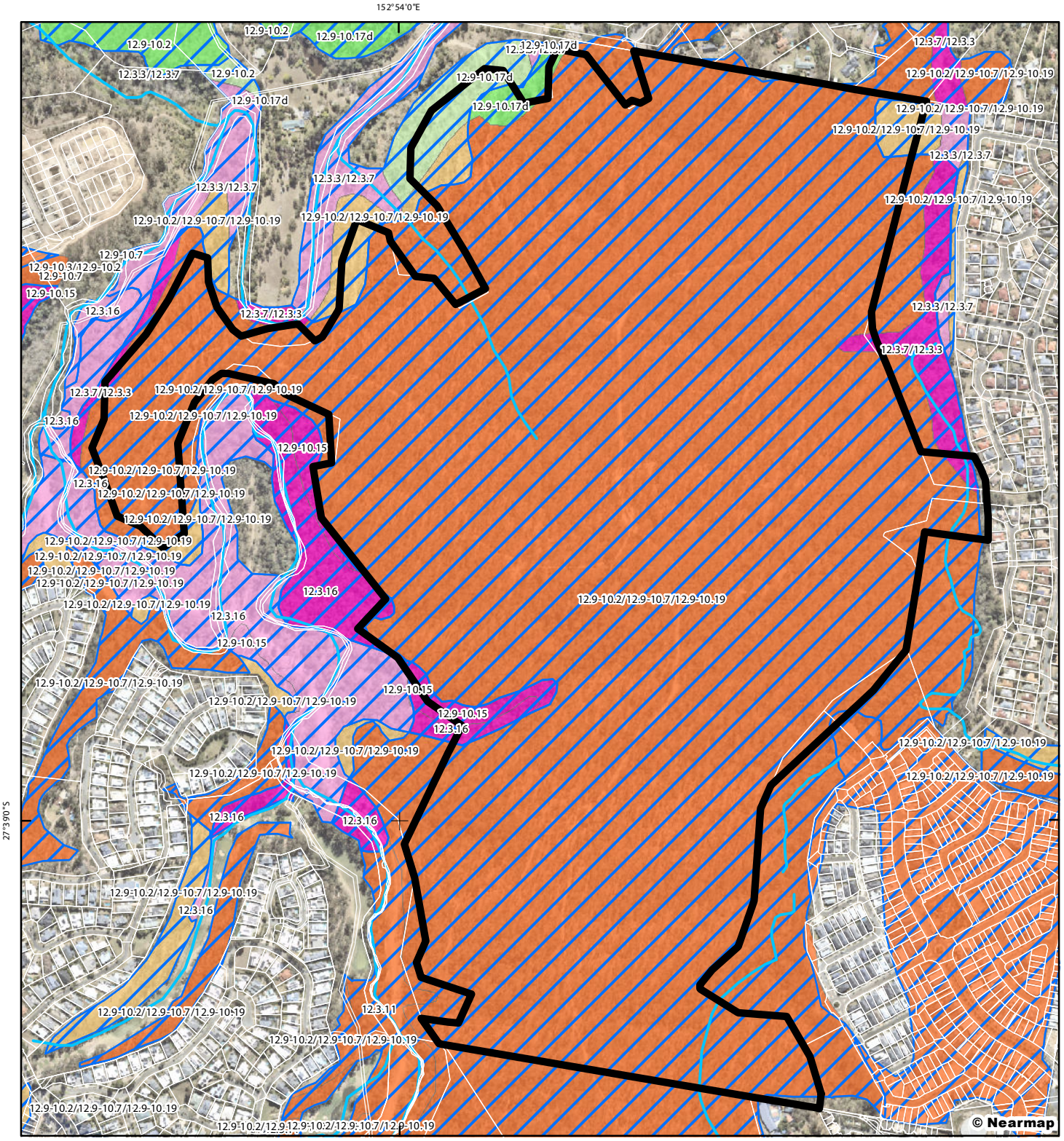

Legend

- Qld DCDB
- Referral Area
- VM Watercourses
- VM Essential Habitat
- VM Wetland

Vegetation Management Regional Ecosystems Map

- Category A or B area containing endangered regional ecosystems
- Category A or B area containing of concern regional ecosystems
- Category A or B area that is a least concern regional ecosystem
- Category C area containing endangered regional ecosystems
- Category C area containing of concern regional ecosystems
- Category C area that is a least concern regional ecosystem

Figure A5

Vegetation Management Regional Ecosystem Map

Cherish Enterprises Pty Ltd

File ref. 9612 E Figure A5 VMRE A
Date 8/04/2025
Project Springview Village Residential Development

0 100 200 300 400 m

Scale (A4): 1:10,000 [GDA 2020 MGA Z56]

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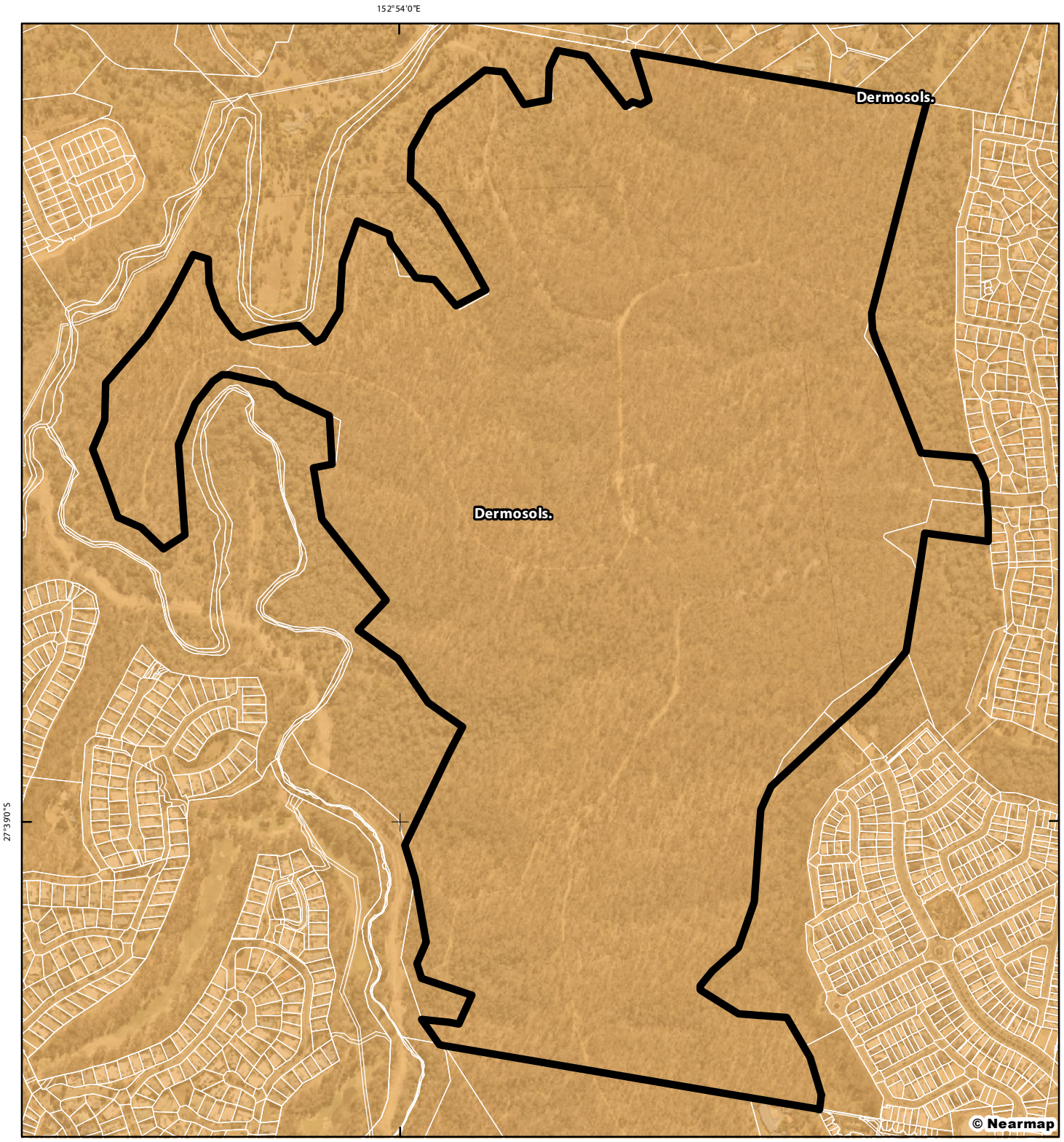

Legend

- Qld DCDB
- Referral Area

Australian Soil Classification

- Anthroposols
- Calcarosols
- Chromosols
- Dermosols
- Ferrosols
- Hydrosols
- Kandosols
- Kurosols
- Organosols
- Podosols
- Rudosols
- Sodosols
- Tenosols
- Vertosols

Figure A6

ASIRIS Soil Classification
(Level 5)

Cherish Enterprises Pty Ltd

File ref. 9612 E Figure A6 ASIRIS A
Date 8/04/2025
Project Springview Village Residential Development

0 100 200 300 400 m

Scale (A4): 1:10,000 [GDA 2020 MGA Z56]

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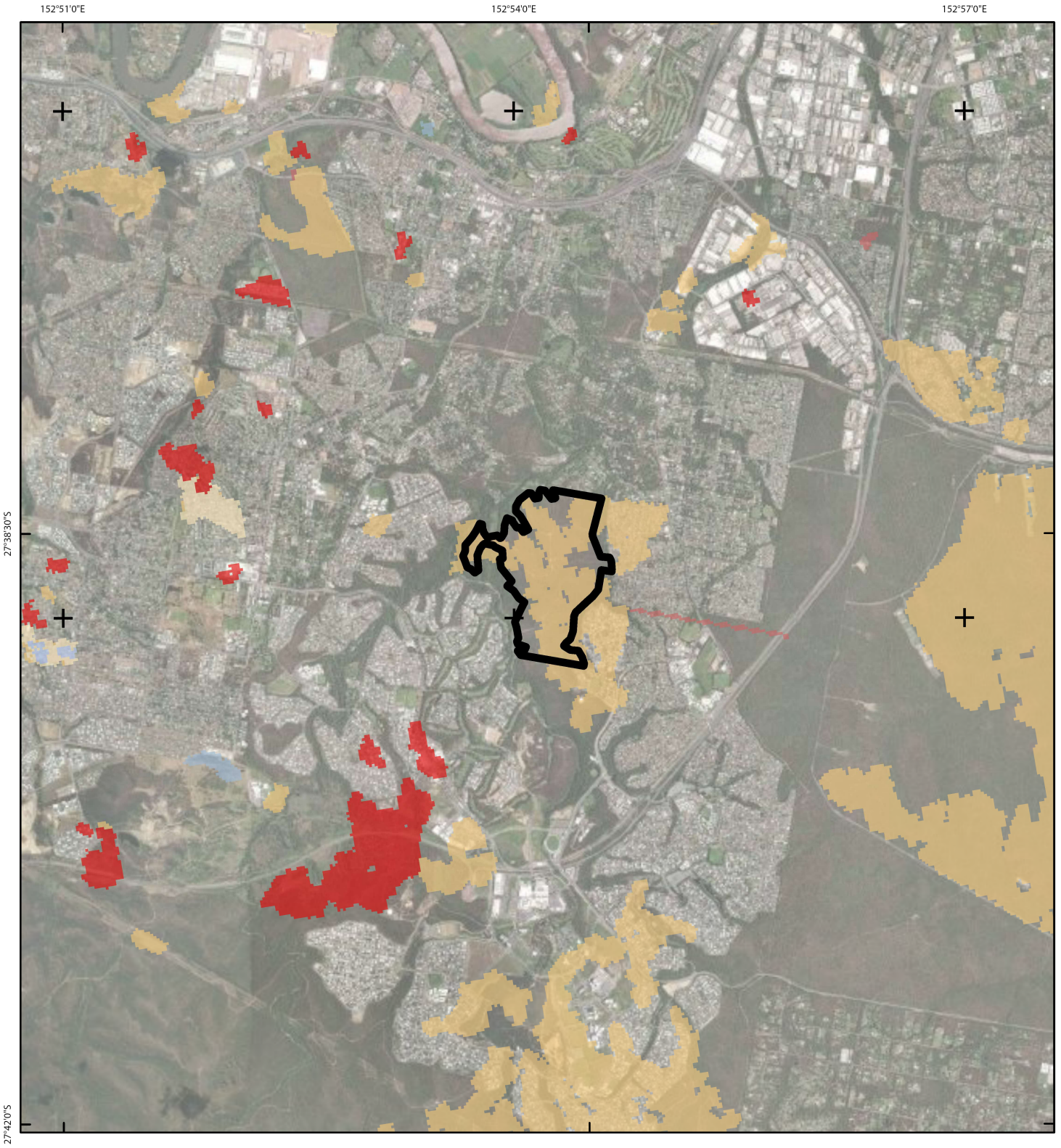

Legend

- Referral Area
- **1994 Fire scar mapping Queensland**
- January
- February
- March
- April
- May
- June
- July
- August
- September
- October
- November
- December

Figure A7

Fire Scar Mapping
Queensland 1994

Cherish
Enterprises
Pty Ltd

File ref. 2026_Collared Delma
Date 3/07/2026
Project Springview Village Residential Development

0 1 2 km

Scale (A4): 1:60,000 [GDA 2020 MGA Z56]

N

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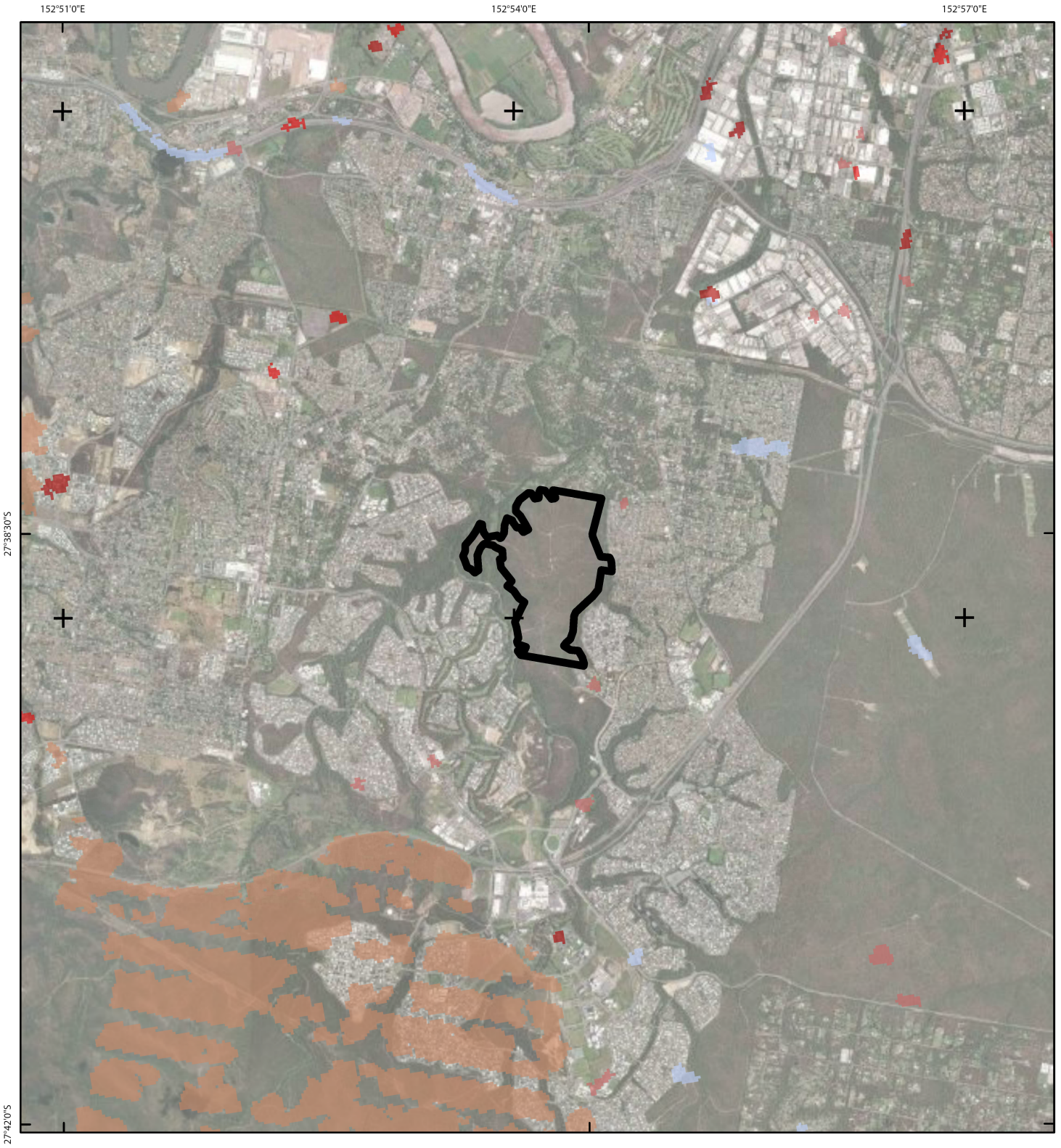

Legend

- Referral Area
- **2012 Fire scar mapping Queensland**
- January
- February
- March
- April
- May
- June
- July
- August
- September
- October
- November
- December

Figure A8

Fire Scar Mapping
Queensland 2012

Cherish
Enterprises
Pty Ltd

File ref. 2026_Collared Delma
Date 3/07/2026
Project Springview Village Residential Development

0 1 2 km

Scale (A4): 1:60,000 [GDA 2020 MGA Z56]

N

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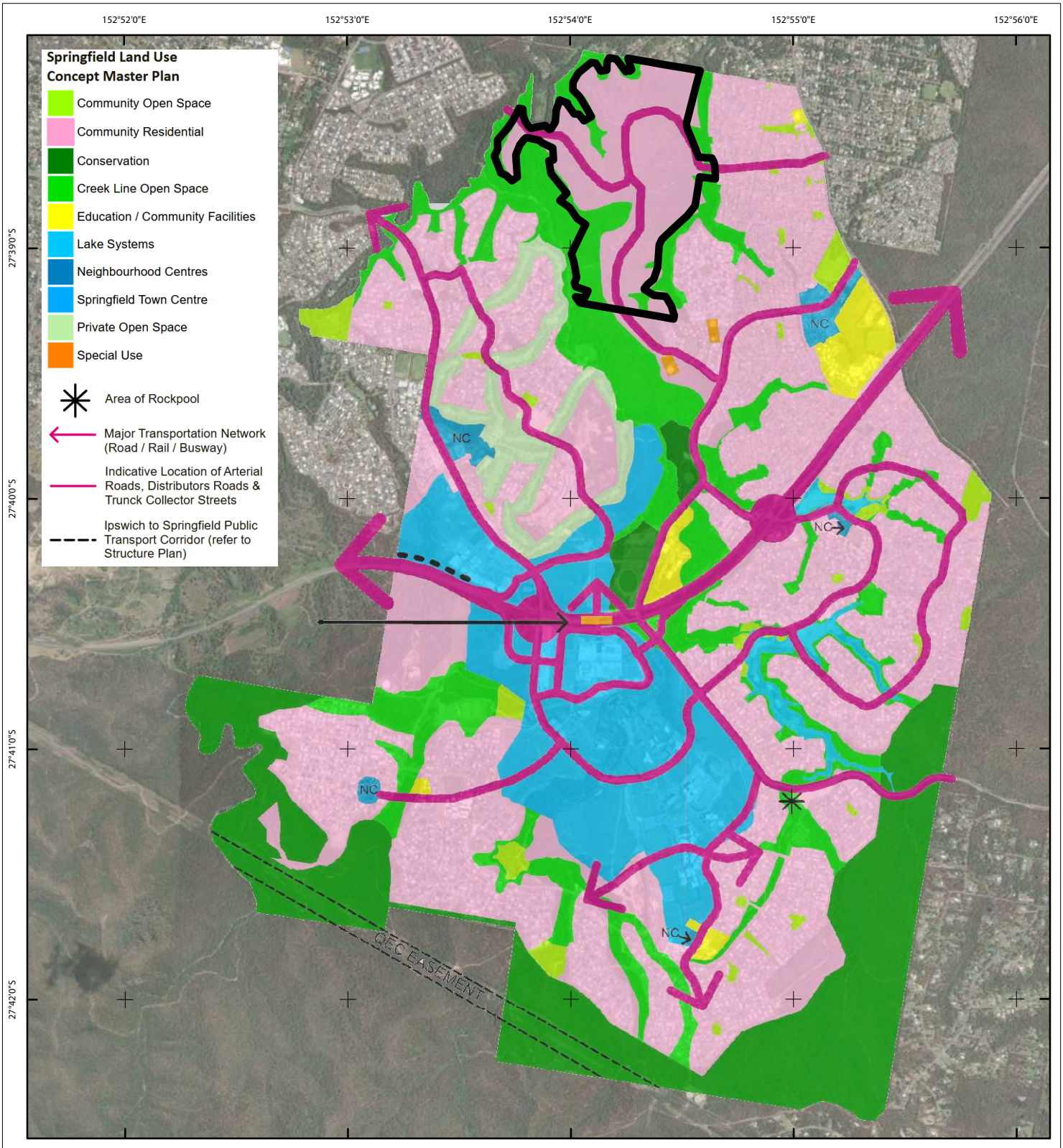

Legend

Referral Area

Figure A9

Springfield Structure Plan

Cherish Enterprises Pty Ltd

File ref. 9612 E Figure A9 SSP A
Date 3/07/2026
Project Springview Village Residential Development

0 1 2 km

N

Scale (A4): 1:40,000 [GDA 2020 MGA Z56]

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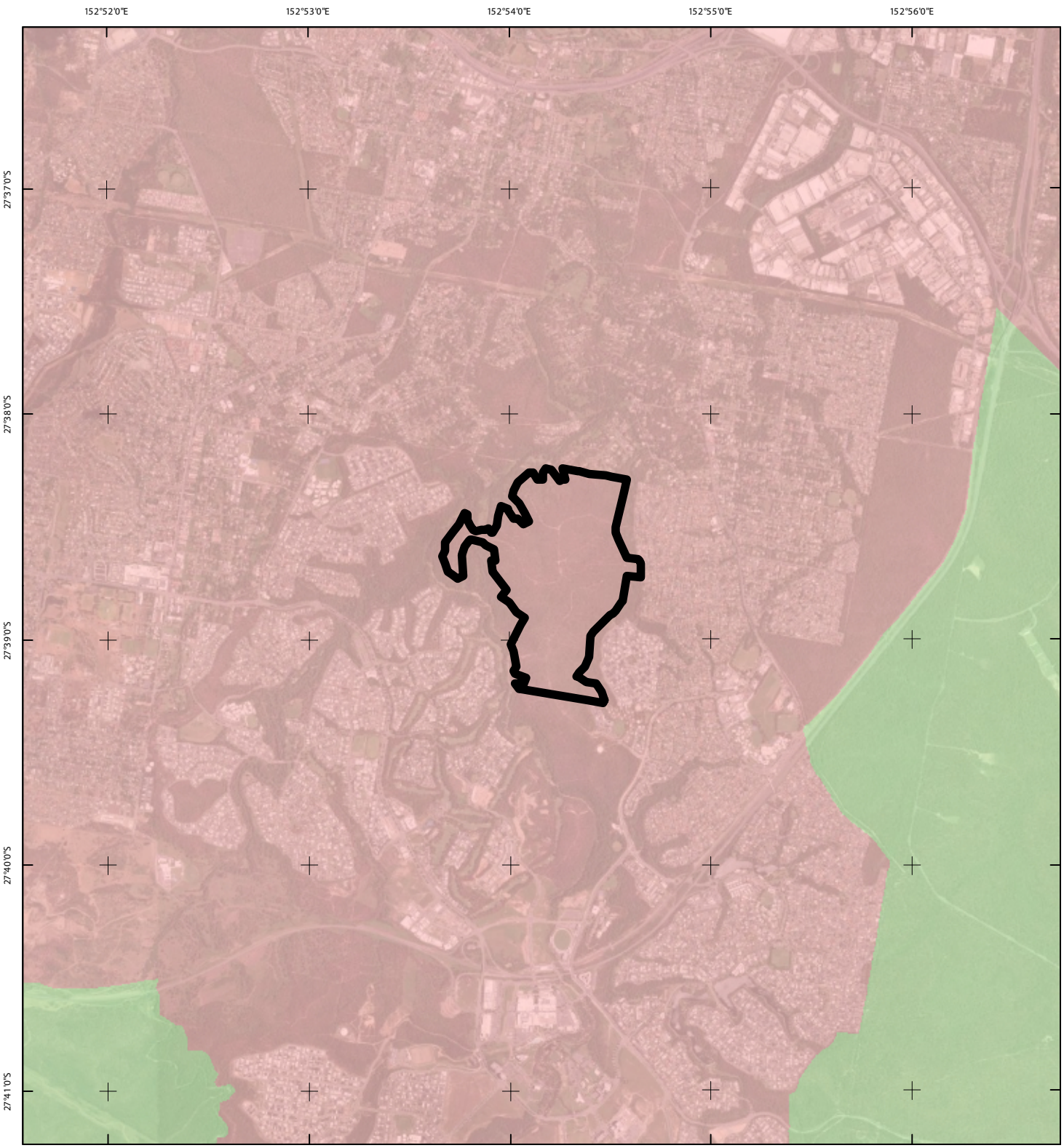

Legend

Referral Area

Regional Land Use Categories

Urban Footprint

Rural Living Area

Regional Landscape and Rural Production Area

Figure A10

South East Queensland Regional Plan

Cherish Enterprises Pty Ltd

File ref. 9612 E Figure A10 SEQ RP A
Date 3/07/2026
Project Springview Village Residential Development

0 1 2 km

N

Scale (A4): 1:45,000 [GDA 2020 MGA Z56]

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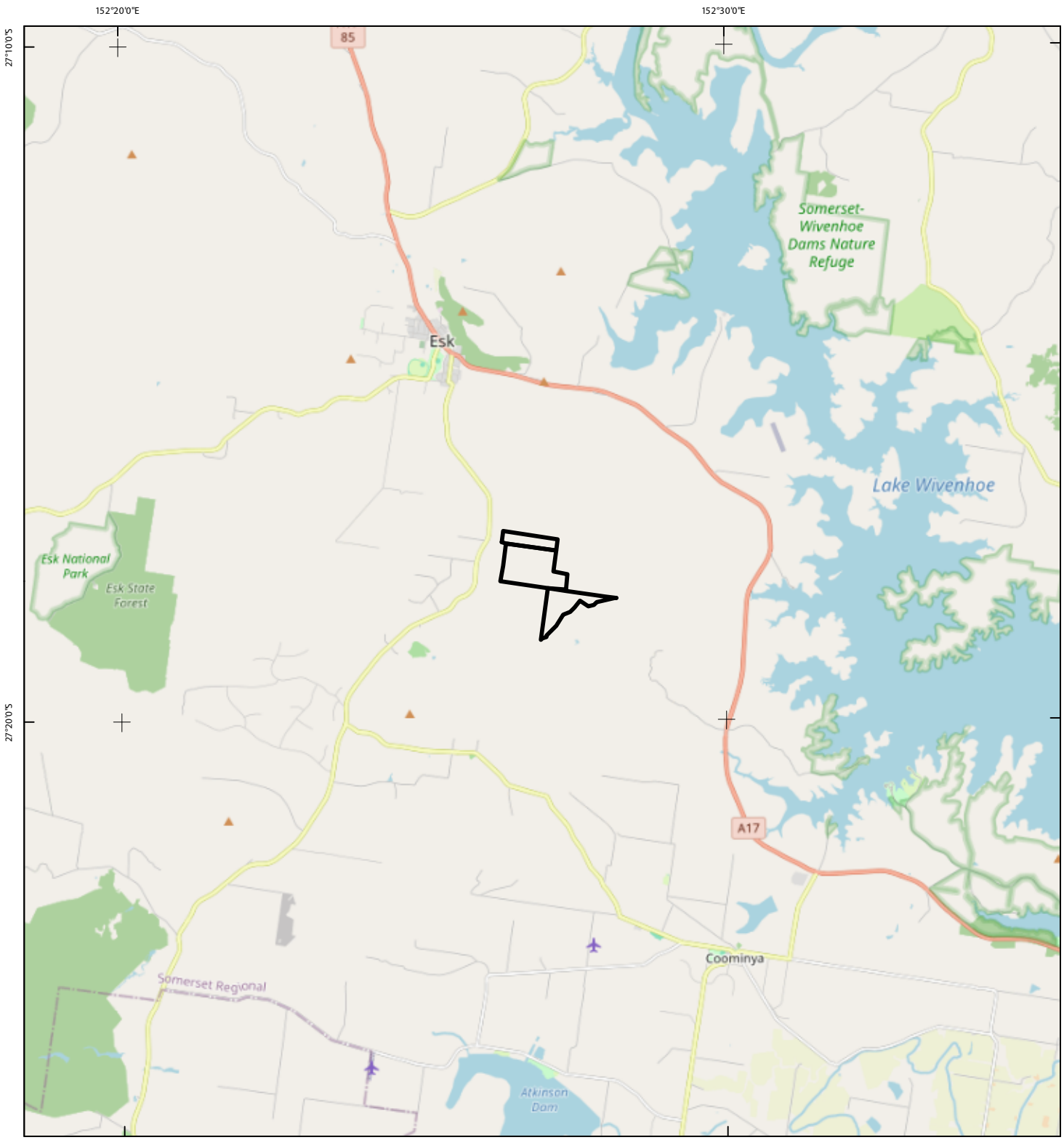

Legend

Esk Offset Site

Figure A11

Esk Offset Site Context

Cherish Enterprises Pty Ltd

File ref. 9612 E Figure A11 Esk Offset Site Context A
Date 3/07/2026
Project Esk Landholdings Offset Area

0 1 2 3 4 5 km

N

Scale (A4): 1:150,000 [GDA 1994 MGA Z56]

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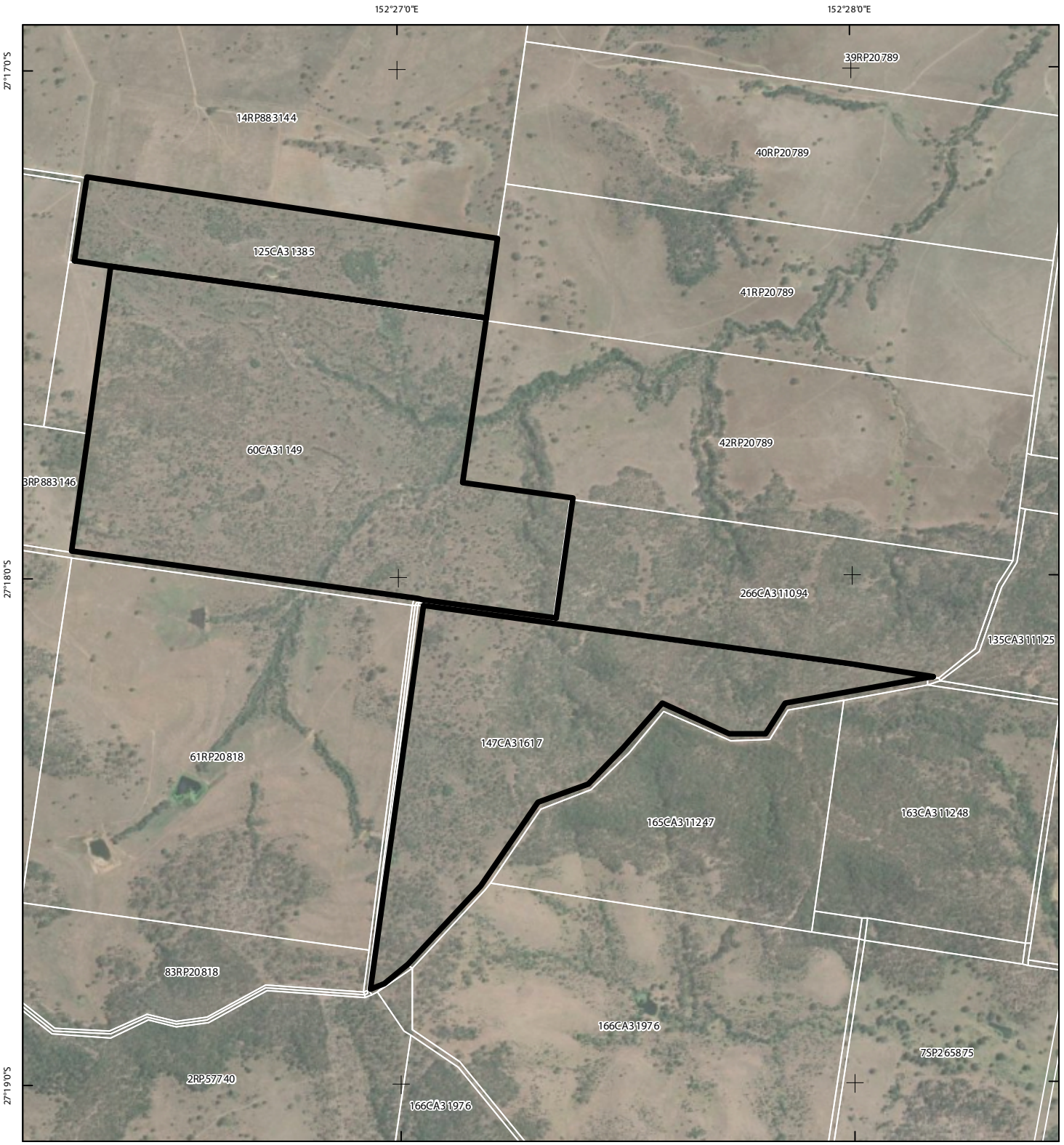

Legend

- Qld DCDB
- Esk Offset Site

Figure A12

Esk Offset Site Aerial

Cherish Enterprises Pty Ltd

File ref. 9612 E Figure A12 Esk Offset Site Aerial A
Date 3/07/2026
Project Esk Landholdings Offset Area

0 100 200 300 400 500 m

N

Scale (A4): 1:20,000 [GDA 1994 MGA Z56]

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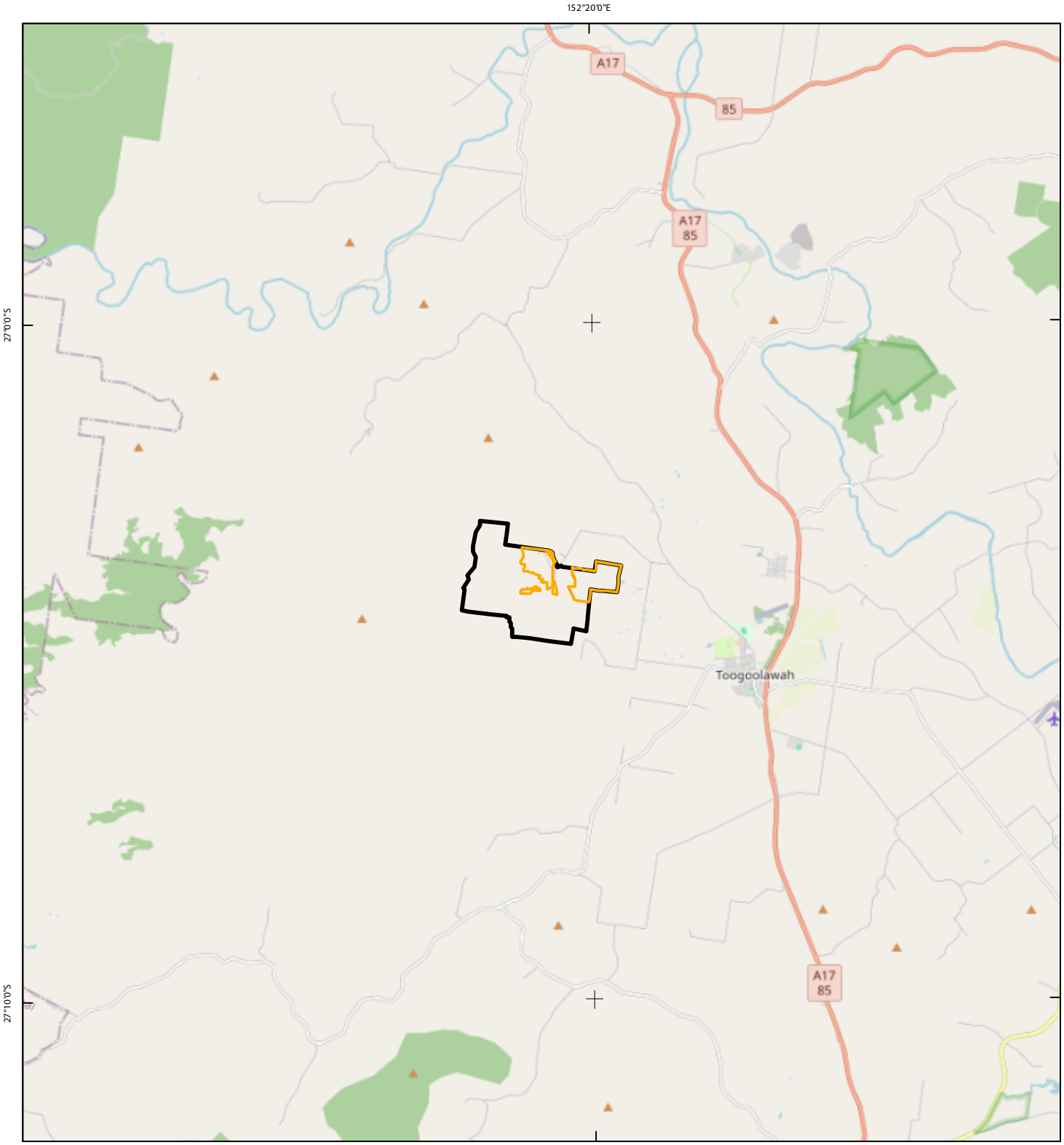

Legend

- Avonvale Station
- Avonvale Offset Site

Figure A13

Avonvale Offset Site Context

Cherish Enterprises Pty Ltd

File ref. 9612 E Figure A13 Avonvale Offset Site Context A
Date 3/07/2026
Project Avonvale Station

0 1 2 3 4 5 km

N

Scale (A4): 1:150,000 [GDA 1994 MGA Z56]

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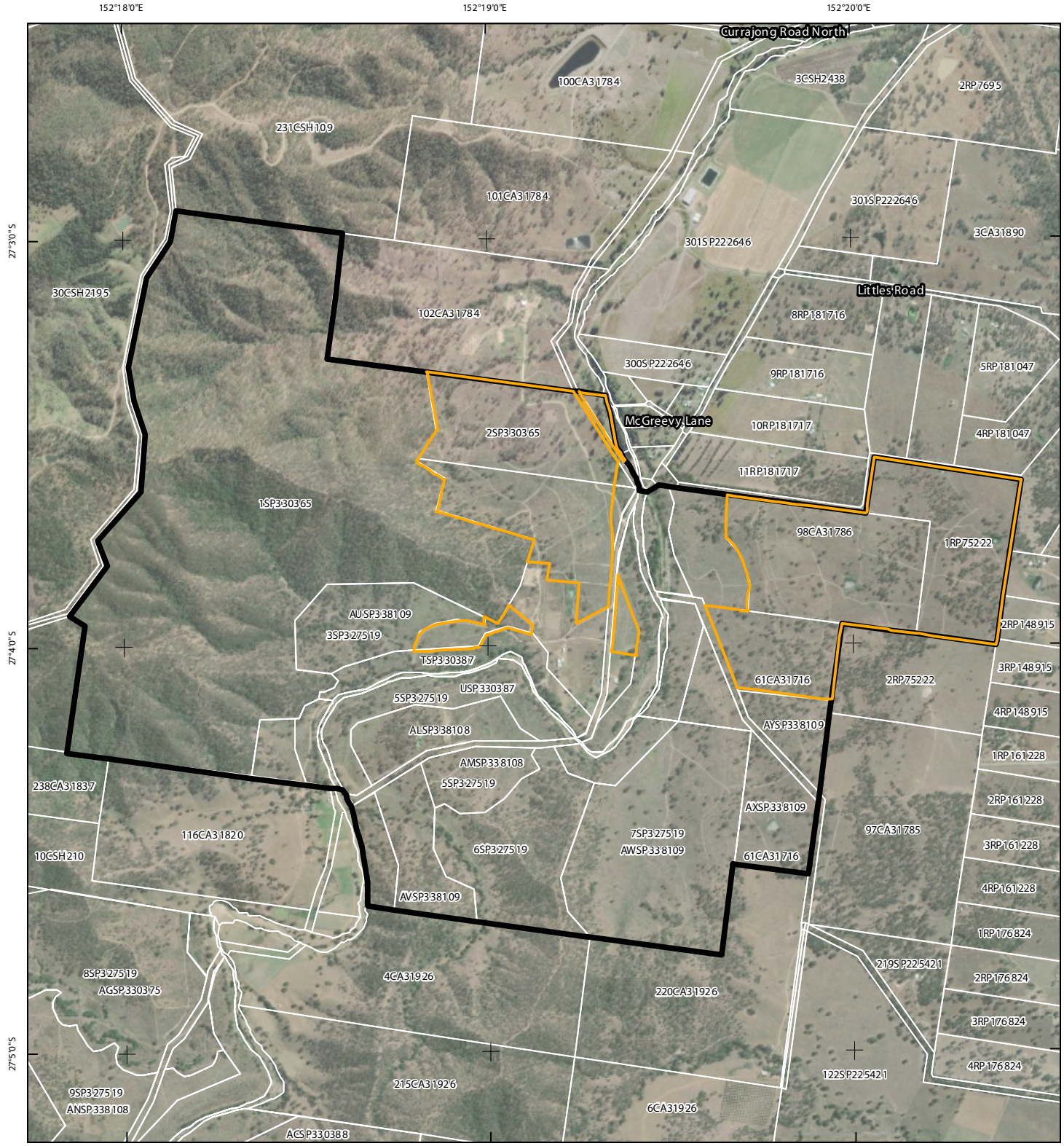

Legend

- Qld DCDB
- Avonvale Station
- Avonvale Offset Site

Figure 14

Avonvale Offset Site Aerial

Cherish Enterprises Pty Ltd

File ref. 9612 E Figure A14 Avonvale Offset Site Aerial A
Date 3/07/2026
Project Avonvale Station

0 200 400 600 800 1,000 m

N

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

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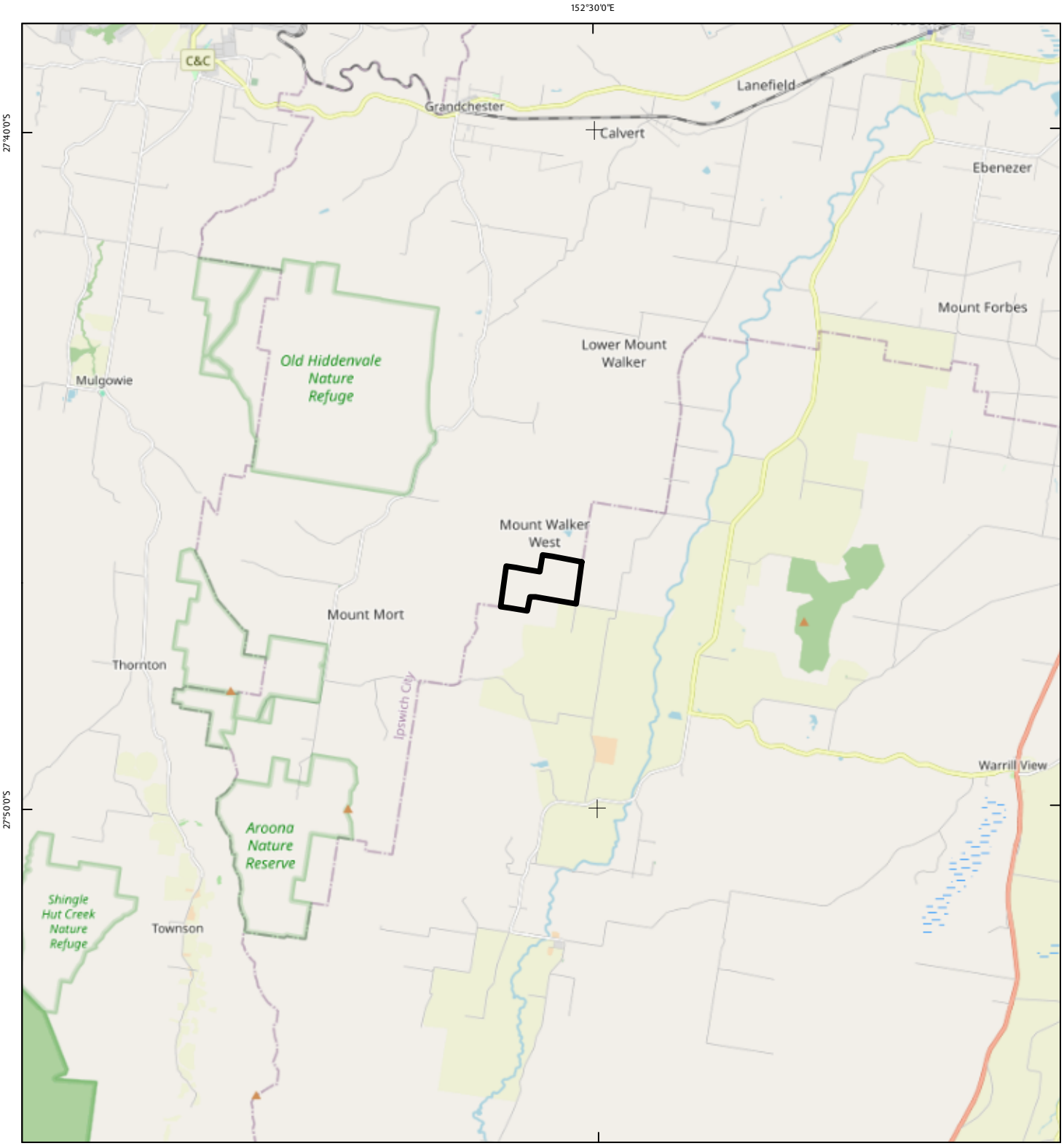

Legend

Mount Walker West Offset Area

Figure A15

Mount Walker West Offset Site Context

Cherish Enterprises Pty Ltd

File ref. 9612 E Figure A15 MWW Offset Site Context A
Date 3/07/2026
Project Mount Walker West

0 1 2 3 4 5 km

N

Scale (A4): 1:150,000 [GDA 1994 MGA Z56]

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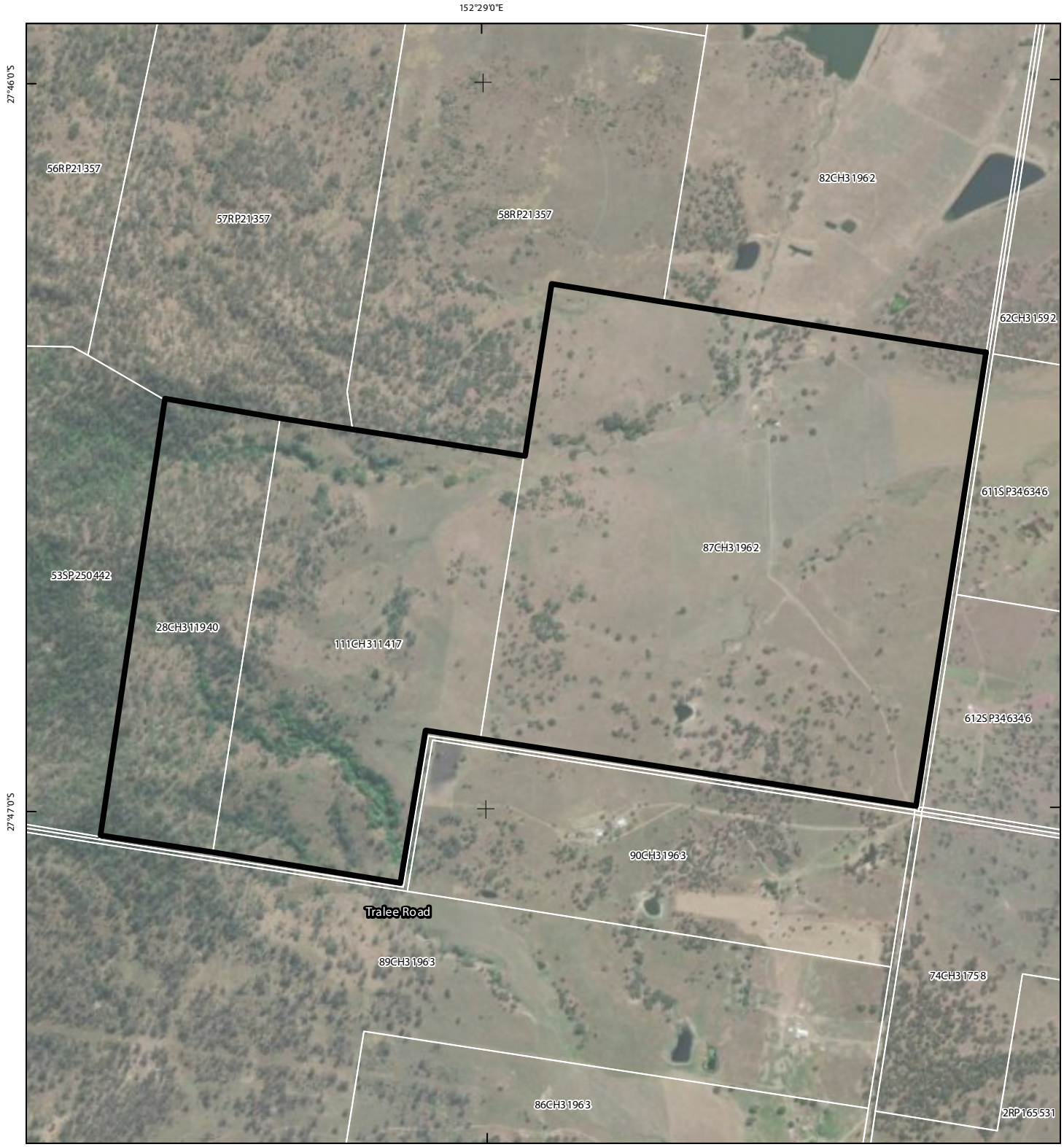

Legend

- Qld DCDB
- Mount Walker West Offset Area

Figure A16

Mount Walker West
Offset Site Aerial

Cherish
Enterprises
Pty Ltd

File ref. 9612 E Figure A16 MWW Offset Site Aerial A
Date 3/07/2026
Project Mount Walker West

0 100 200 300 400 500 m

N

Scale (A4): 1:14,000 [GDA 1994 MGA Z56]

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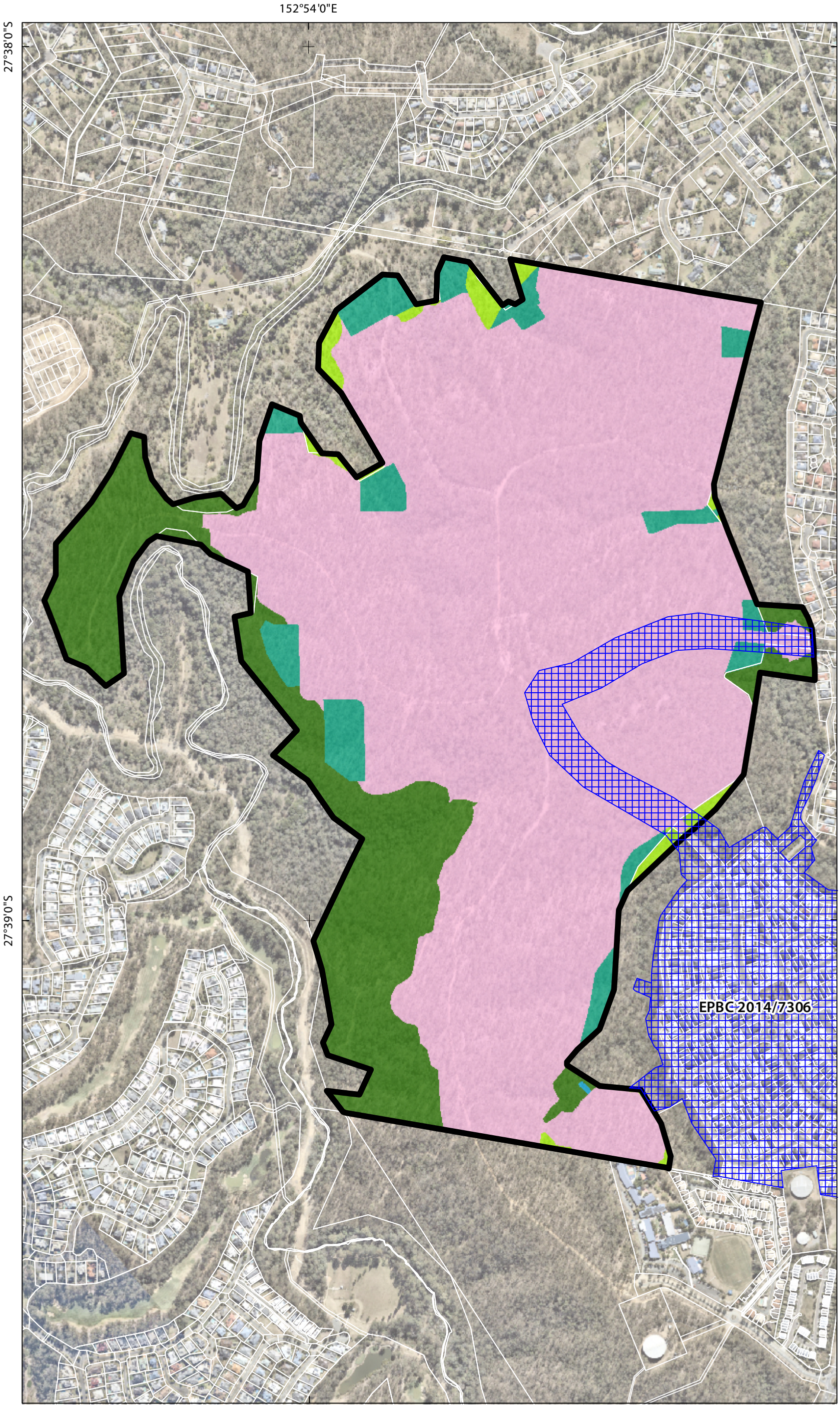
Plan A1. Development footprint and rehabilitation



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Legend

- Qld DCDB
- Referral Area [161.4 ha]
- EPBC 2014/7306 Referral Area [7.6 ha overlap with Referral Area]

Development Footprint

- Proposed urban [123 ha]
- Bioretention/drainage basins [8.2 ha]
- Indicative location of external stormwater infrastructure as approved by Council [0.1 ha]
- Temporary Impacts (rehabilitation) - includes additional minor clearing for batters [2.6 ha]

No Impacts

- Vegetation retention [27.5 ha]

Issue	Date	Description	Drawn	Checked
A	24/11/2025	Preliminary	TF	AW

0 100 200 300 m

Transverse Mercator | GDA 1994 | Zone 56 | 1:8,000 @ A3

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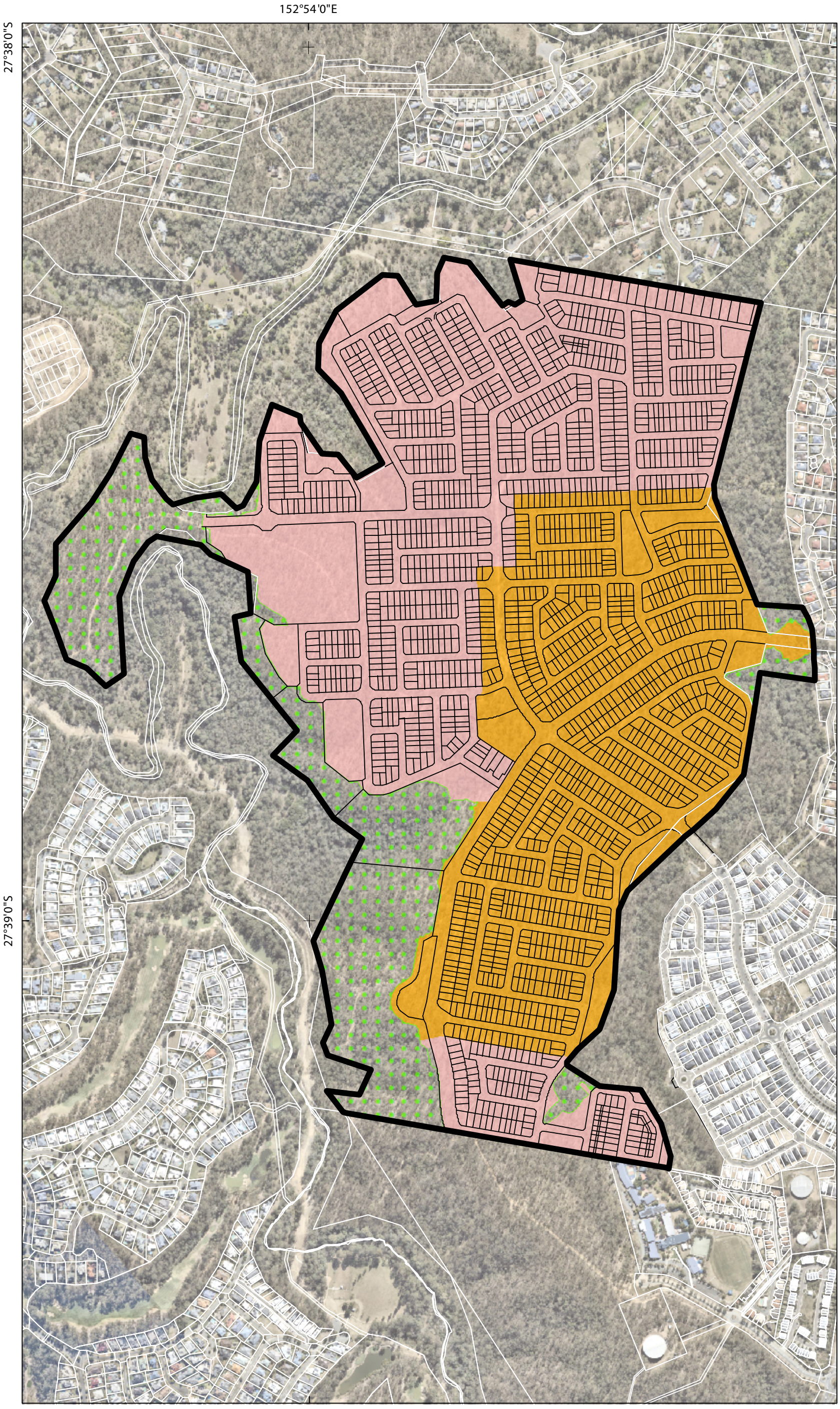
Cherish Enterprises Pty Ltd

Springfield
Residential Development

Address / RPD: 9999SP292760

24/11/2025 | 9612 E 01 PD Footprint and Rehab A

Plan A2. Development Layout



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Legend

- Qld DCDB
- Referral Area [161.4 ha]

Village Areas

- Stage 1 - Village 2 [57.9 ha]
- Stage 2 - Village 3 [76.0 ha]
- Proposed Lot Layout (indicative)

No Impacts

- Vegetation retention [27.5 ha]

Issue	Date	Description	Drawn	Checked
A	24/11/2025	Preliminary	TF	AW

0 100 200 300 m

Transverse Mercator | GDA 1994 | Zone 56 | 1:8,000 @ A3

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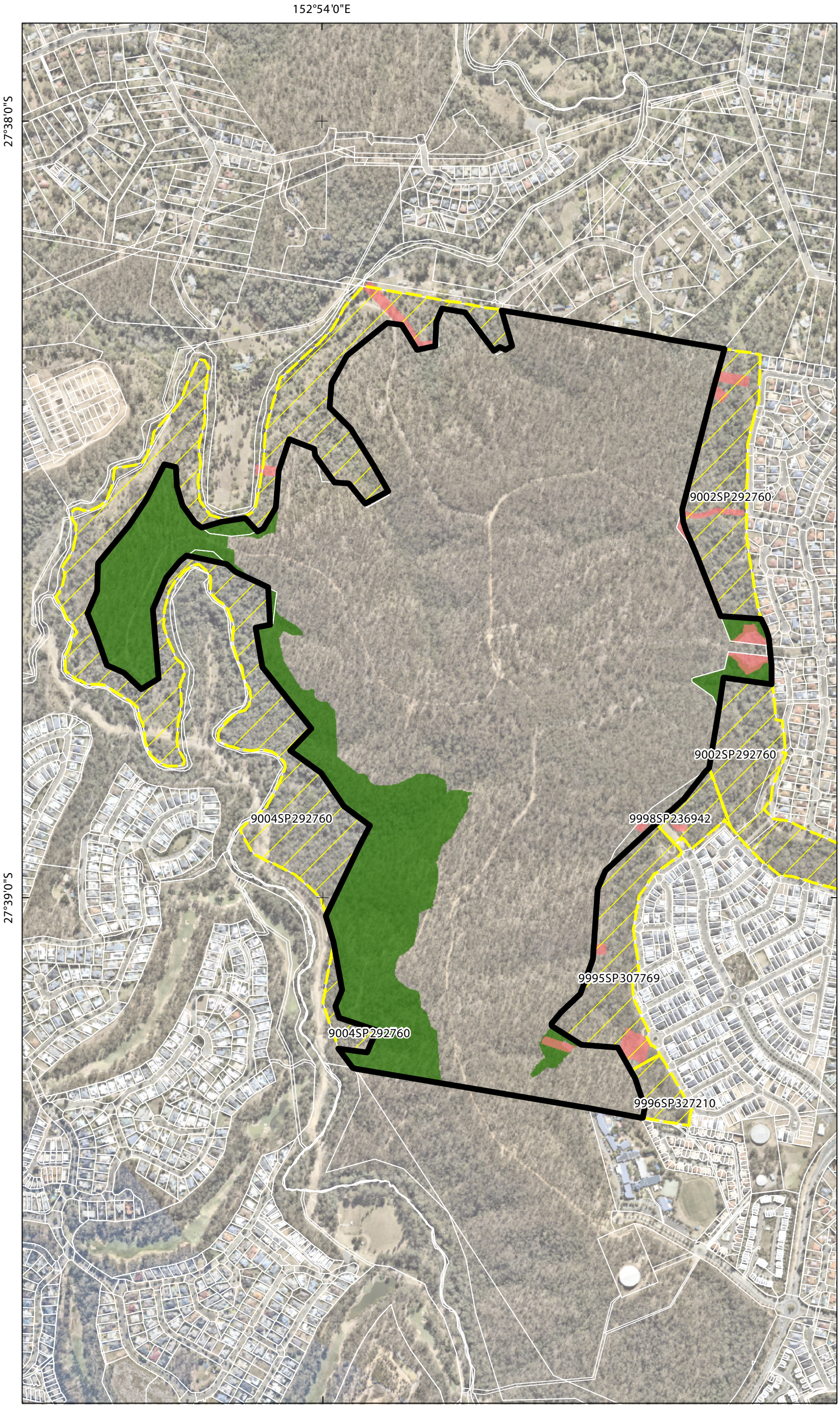
Springfield Residential Development

Address / RPD: 9999SP292760

24/11/2025 | 9612E 02 PDDevelopment Layout A

Plan A3. Indicative location of external infrastructure



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Legend

- Qld DCDB
- Referral Area [161.4 ha]
- Council Landholdings
- Vegetation retention [27.5 ha]
- External infrastructure works [2.6 ha]

Issue	Date	Description	Drawn	Checked
A	8/04/2025	Preliminary	TF	AW
B	24/11/2025	Amendments	TF	AW

0 100 200 300 m

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

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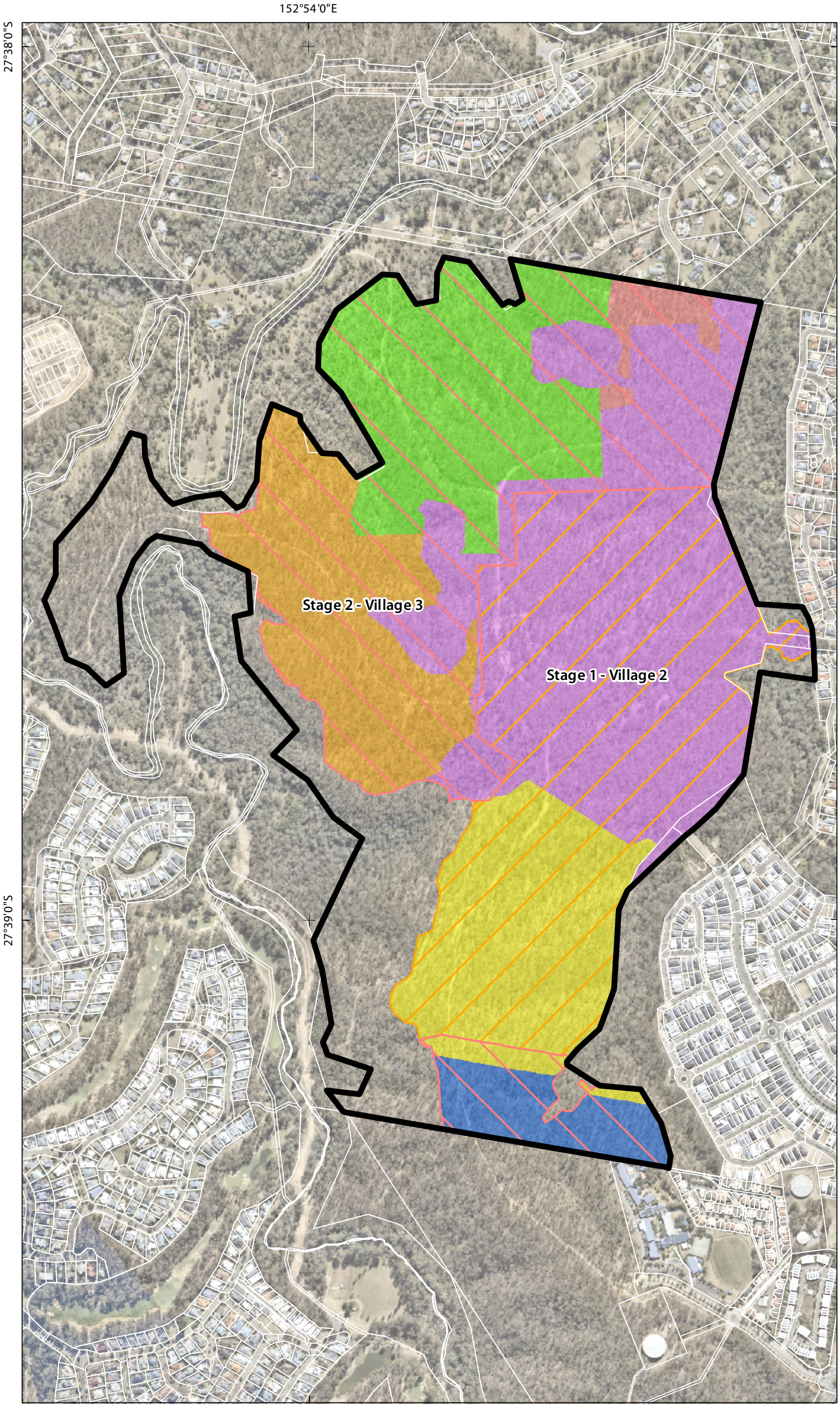
Springfield
Residential Development

Address / RPD: 9999SP292760

24/11/2025 | 9612 E 03 PD External Infrastructure B

Plan A4. Indicative Project Phasing



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Legend

- Qld DCDB
- Referral Area

Village Areas

- Stage 1 - Village 2 [57.9 ha]
- Stage 2 - Village 3 [76.0 ha]

Phasing Areas

- **Phase One:** Village 2 (Stages 1-16) [56.1 ha]
- **Phase Two:** Remaining Catchments (O'Dwyers Sewer) [2.6 ha]
- **Phase Three:** Village 2 (Remaining Stages - inc. Bushfire Hazard Buffer) [22.1 ha]
- **Phase Four:** Village 3 (Stages 35-51) [24.5 ha]
- **Phase Five:** Village 3 (Stages 27-36, 52) [22.1 ha]
- **Phase Six:** Village 3 (Southern Stages) [6.5 ha]

Issue	Date	Description	Drawn	Checked
A	24/11/2025	Preliminary	TF	AW

0 100 200 300 m

Transverse Mercator | GDA 1994 | Zone 56 | 1:8,000 @ A3

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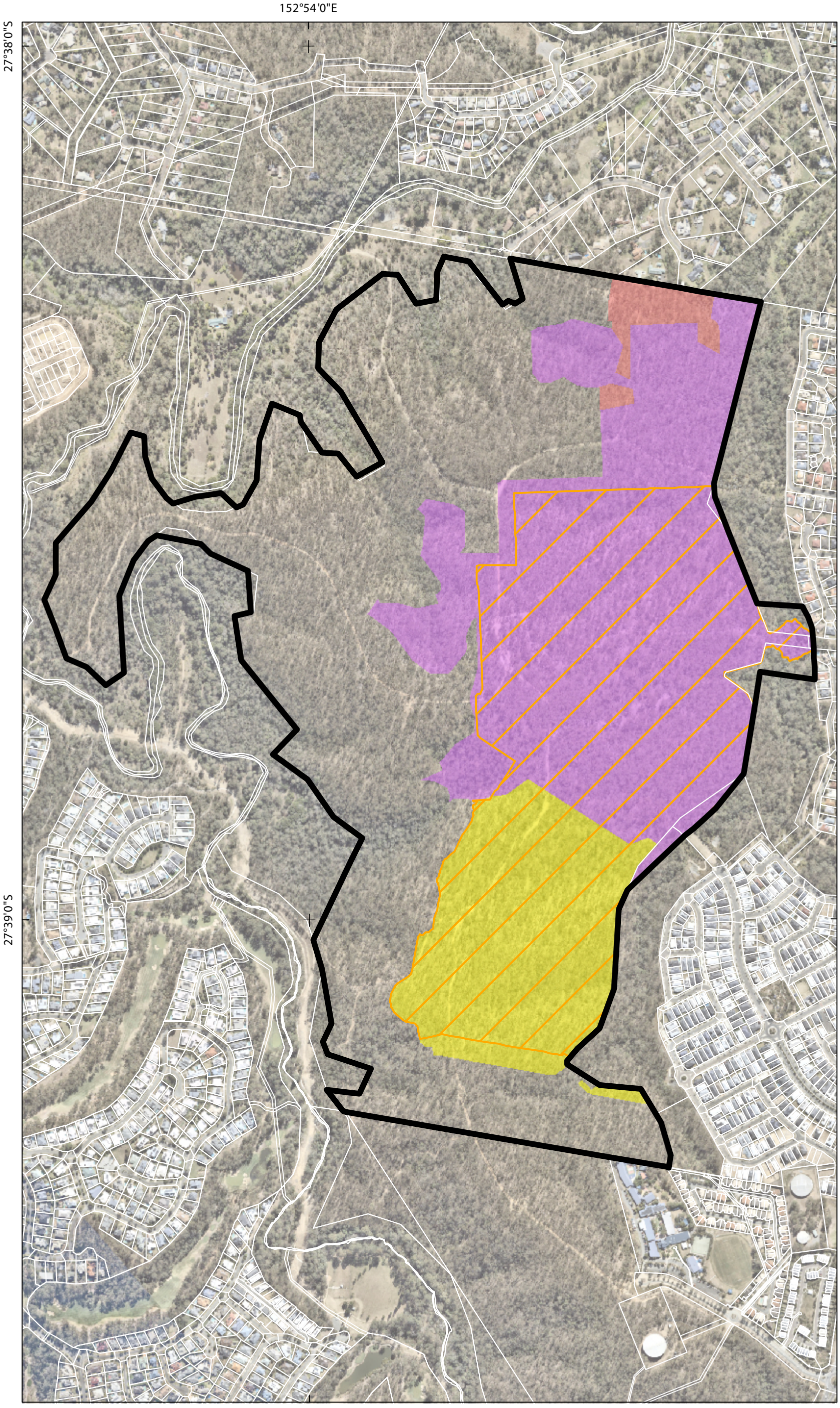
Springfield
Residential Development

Address / RPD: 9999SP292760

24/11/2025 | 9612 E 04 PD Indicative Phasing A

Plan A5. Stage 1 - Village 2 Phasing



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Legend

- Qld DCDB
- Referral Area
- Stage 1 - Village 2 [57.9 ha]

Phasing Areas

- **Phase One:** Village 2 (Stages 1-16) [56.1 ha]
- **Phase Two:** Remaining Catchments (O'Dwyers Sewer) [2.6 ha]
- **Phase Three:** Village 2 (Remaining Stages - inc. Bushfire Hazard Buffer) [22.1 ha]

Issue	Date	Description	Drawn	Checked
A	24/11/2025	Preliminary	TF	AW

0 100 200 300 m

Transverse Mercator | GDA 1994 | Zone 56 | 1:8,000 @ A3

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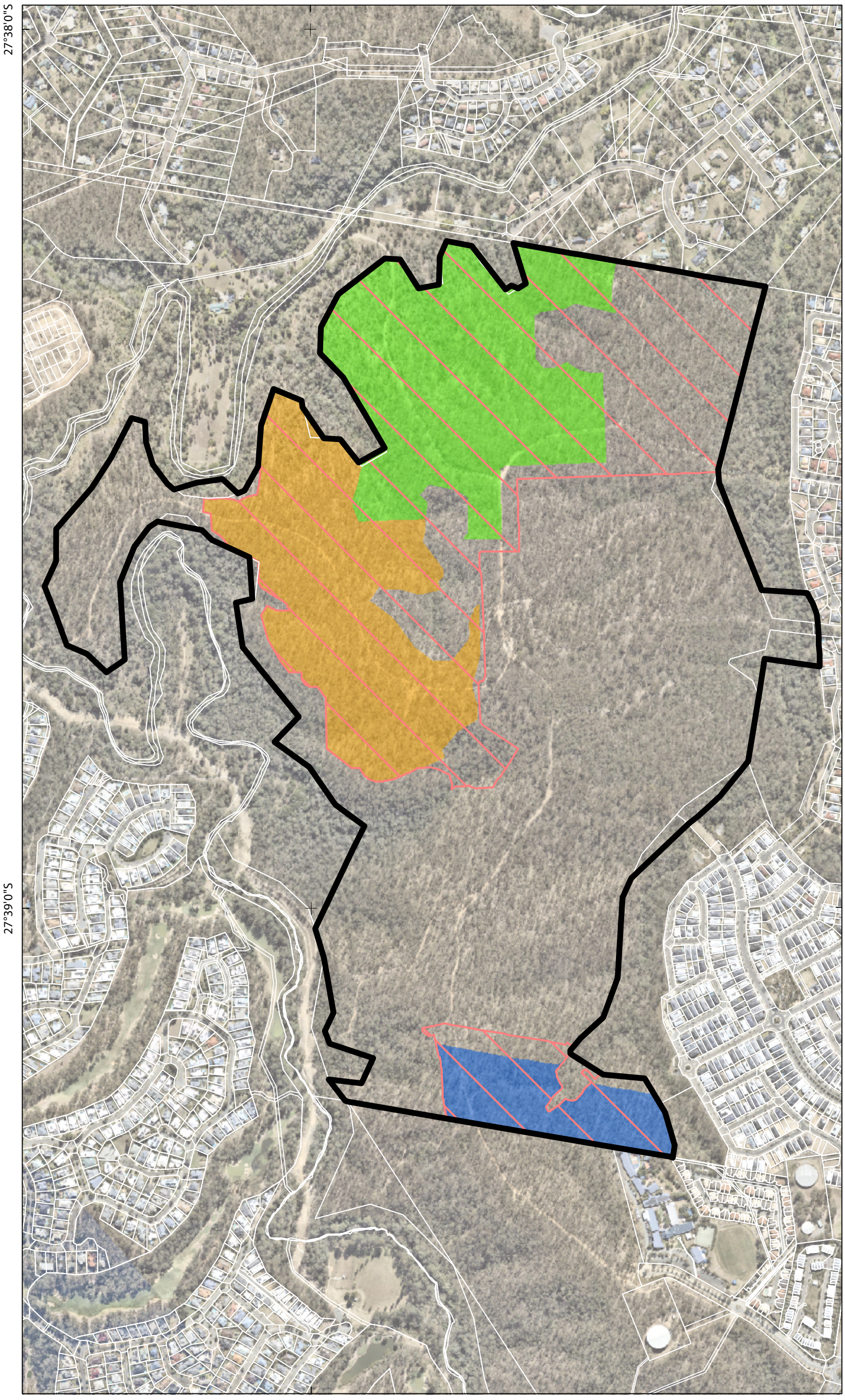
Springfield Residential Development

Address / RPD: 9999SP292760

24/11/2025 | 9612E 05 PDV2 Phasing A

Plan A5. Stage 2 - Village 3 Phasing



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Legend

- Qld DCDB
- Referral Area
- Stage 2 - Village 3 [76.0 ha]

Phasing Areas

- **Phase Four:** Village 3 (Stages 35-51) [24.5 ha]
- **Phase Five:** Village 3 (Stages 27-36, 52) [22.1 ha]
- **Phase Six:** Village 3 (Southern Stages) [6.5 ha]

Issue	Date	Description	Drawn	Checked
A	24/11/2025	Preliminary	TF	AW

0 100 200 300 m

Transverse Mercator | GDA 1994 | Zone 56 | 1:8,000 @ A3

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Springfield
Residential Development

Address / RPD: 9999SP292760

24/11/2025 | 9612E 06 PDV3 Phasing A

Plan A7. Surrounding EPBC projects

152°53'0"E

152°54'0"E

27°38'0"S

27°39'0"S

27°40'0"S

Residential subdivision, Lot 901 and 902 Eugene St, Bellbird Park, Qld (EPBC 2018/8350)

Brentwood Residential Estate, Bellbird Park, Ipswich, QLD (EPBC 2013/7074)

Springview Village One, Springfield, Ipswich City, QLD (EPBC 2014/7306)

Scenic Precinct Residential Development (EPBC 2020/8651)

First Nine Master planned residential development, Brookwater, Qld (EPBC 2016/7676)

Peninsula Precinct, Springfield, Queensland (EPBC 2020/8629)

First Nine Master planned residential development, Brookwater, Qld (EPBC 2016/7676)

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Legend

- Qld DCDB
- Referral Area

Surrounding EPBC Projects

- EPBC Projects (Decision Made)
- EPBC Projects (Decision Pending)

Site Location

SEQ
CABOOLTURE
BRISBANE
TOOWOOMBA
IPSWICH
GOLD COAST
BEAUDESERT
QLD State Border
0 20 40 60 80 100 km

Issue	Date	Description	Drawn	Checked
A	24/11/2025	Preliminary	TF	AW

0 100 200 300 m

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

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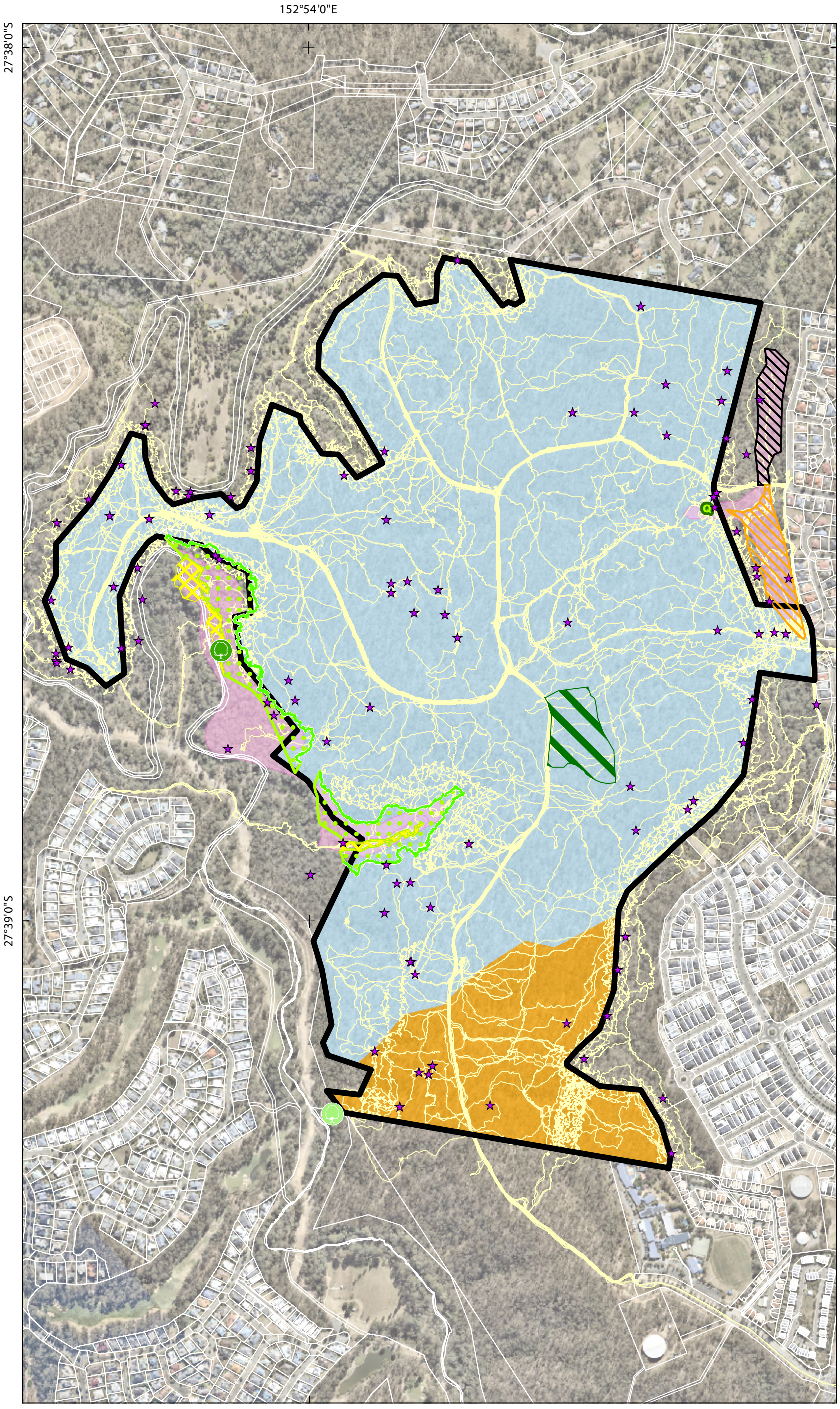
Springfield Residential Development

Address / RPD: 9999SP292760

24/11/2025 | 9612 E 07 PD Surrounding EPBC A

Plan A8. Field survey effort - vegetation



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Legend

- Qld DCDB
- Referral Area
- *Eucalyptus cloeziana* plantation
- Endangered RE mapping

Field Survey Effort

- GPS track logs
- Quaternary survey location
- *Macadamia integrifolia* specimen
- *Coleus habrophyllus* specimen
- Hollow bearing trees

Ground-truthed Endangered Vegetation

- Ground-truthed Edge of RE 12.9-10.15
- Ground-truthed RE 12.3.16 (LRSA TEC Indicator)
- Ground-truthed Endangered RE 12.3.3
- RE section not surveyed
- Ground-truthed edge of RE 12.9-10.5

Ground-truthed Vegetation Communities

- *Eucalyptus fibrosa* and *Corymbia citriodora* dominated open woodland (RE12.9-10.19)
- *Eucalyptus moluccana* dominated area with *Eucalyptus fibrosa* and *Corymbia citriodora* (RE12.9-10.3)

Issue	Date	Description	Drawn	Checked
A	24/11/2025	Preliminary	TF	AW

0 100 200 300 m

Transverse Mercator | GDA 1994 | Zone 56 | 1:8,000 @ A3

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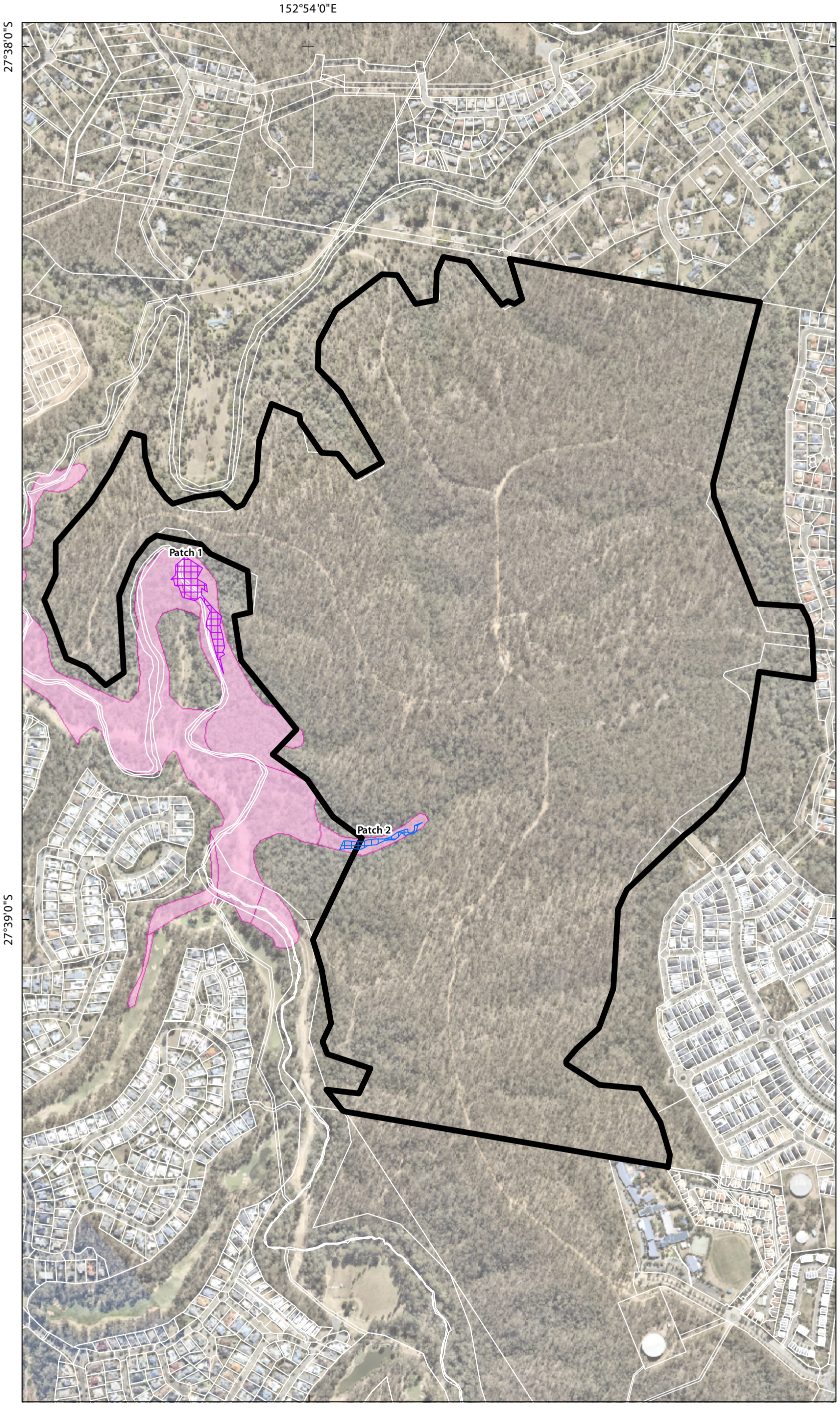
Springfield Residential Development

Address / RPD: 9999SP292760

24/11/2025 | 9612 E 08 PD Field Survey A

Plan A9. Lowland Rainforest of Subtropical Australia Threatened Ecological Community ground-truthed extent



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Legend

- Qld DCDB
- Referral Area
- Lowland rainforest of subtropical Australia suitable habitat - Qld RE: 12.3.16
- Confirmed location of lowland rainforest of subtropical Australia (Patch 1)
- Confirmed location of lowland rainforest of subtropical Australia (Patch 2)

Issue	Date	Description	Drawn	Checked
A	24/11/2025	Preliminary	TF	AW

0 100 200 300 m

Transverse Mercator | GDA 1994 | Zone 56 | 1:8,000 @ A3

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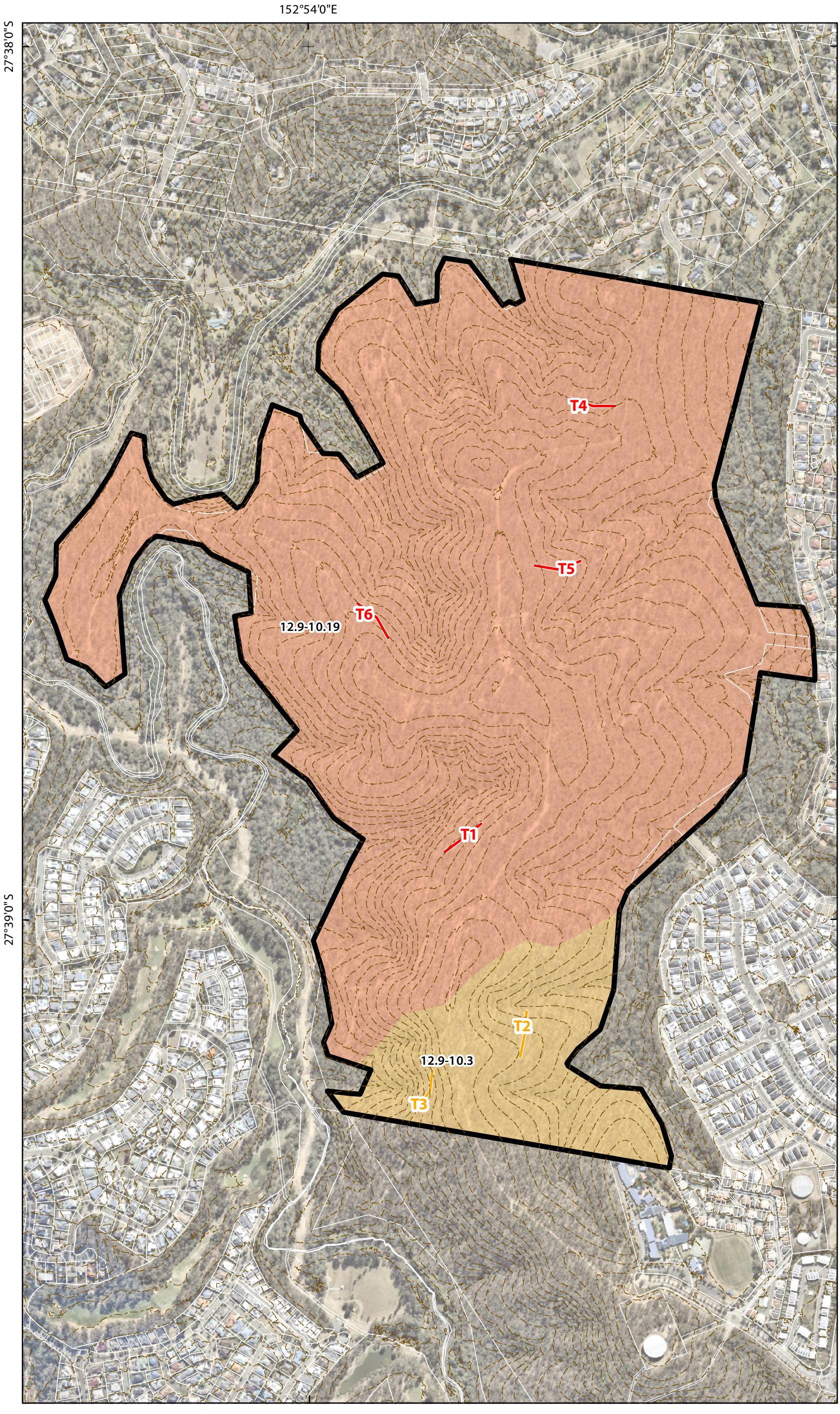
Springfield Residential Development

Address / RPD: 9999SP292760

24/11/2025 | 9612E 09 PDLRSA TEC A

Plan A10. Assessment units and habitat quality transects



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Legend

Qld DCDB

Referral Area

5 Metre Contours

Vegetation Assessment Units

AU-1:12.9-10.19 [142.1 ha]

AU-2:12.9-10.3 [19.3 ha]

Habitat Quality Transects

Assessment Unit 1 Transect

Assessment Unit 2 Transect

Issue	Date	Description	Drawn	Checked
A	12/01/2026	Preliminary	TF	AW

0 100 200 300 m

Transverse Mercator | GDA 1994 | Zone 56 | 1:8,000 @ A3

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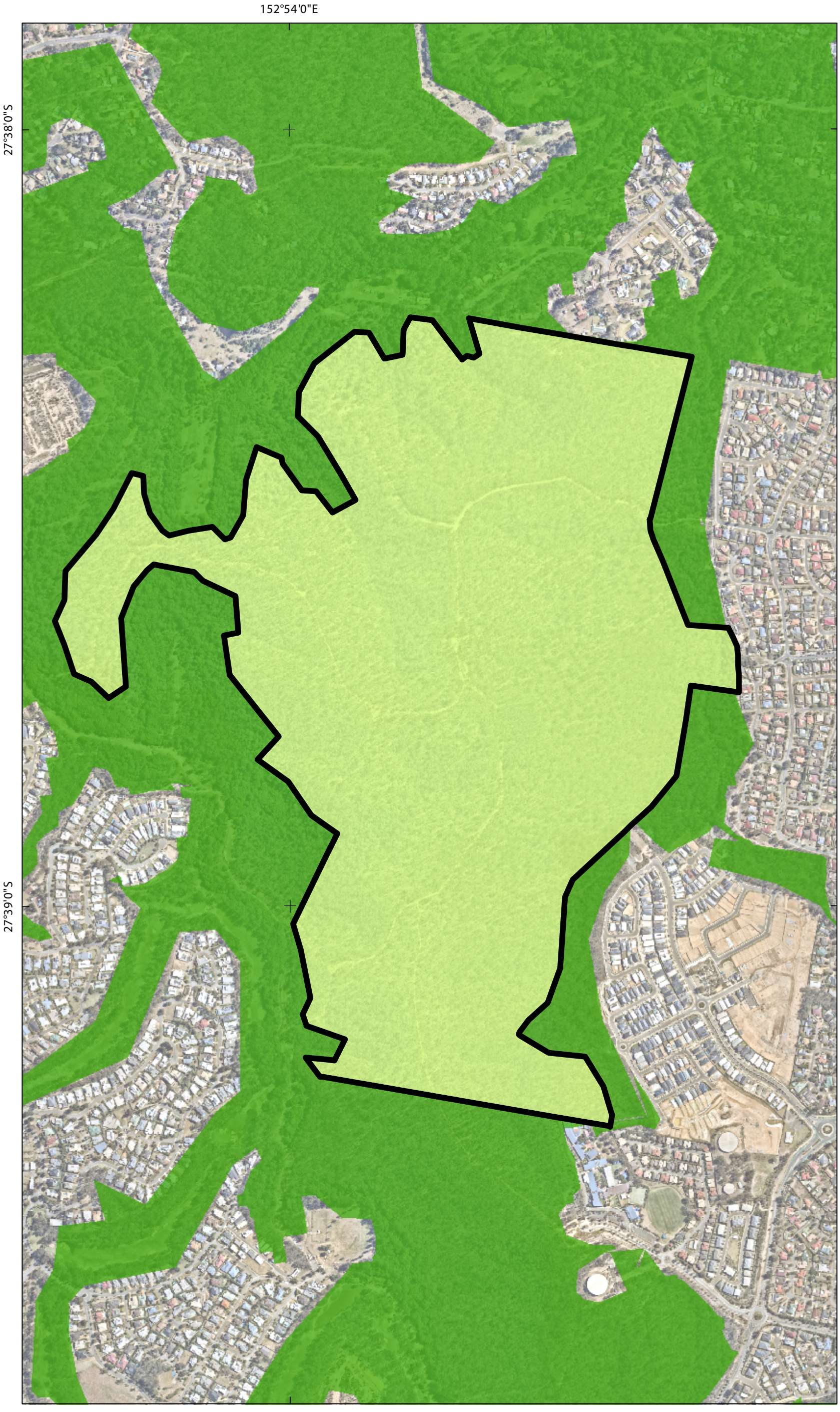
Cherish Enterprises Pty Ltd

Springfield
Residential Development

Address / RPD: 9999SP292760

12/01/2026 | 9612 E 10 PD Assessment Units A

Plan A11. Critical Habitat - Koala



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Legend

- Referral Area
- Koala Critical Habitat
- Koala Critical Habitat within Referral Area - 161.4 ha

Issue	Date	Description	Drawn	Checked
A	24/11/2025	Preliminary	TF	AW

0 100 200 300 m

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

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Cherish Enterprises Pty Ltd

Springfield
Residential Development

Address / RPD: 9999SP292760

24/11/2025 | 9612E 11 PDKoala Critical Habitat A

Plan A12. Koala records and potential habitat

152°55'0"E

27°35'0"S

27°40'0"S

Notes:
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Legend

- Referral Area
- 5km Referral area buffer

Koala Records (ALA, 2025)

- Koala Sighting recorded within the past 20 years within 5km of site [278]
- Koala Hospital Record recorded within the past 20 years within 5km of site [47]
- Potential and Known Koala Habitat - 33%

Issue	Date	Description	Drawn	Checked
A	25/11/2025	Preliminary	TF	AW

0 1 2 km

Transverse Mercator | GDA 1994 | Zone 56 | 1:55,000 @ A3

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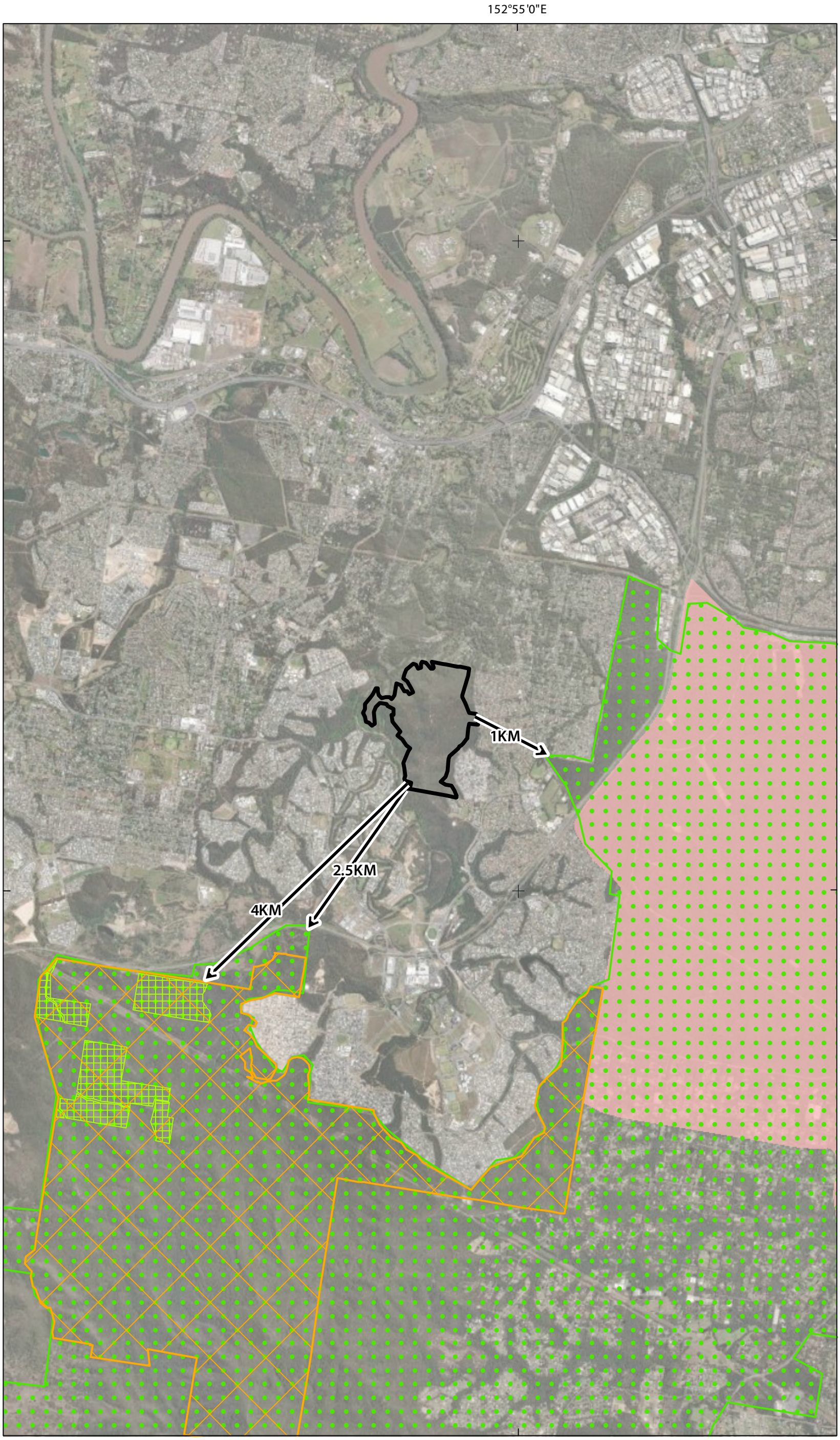
25/11/2025 | 9612E 12 PDKoala Records Hab A

Plan A13. Surrounding conservation areas



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Legend

Referral Area

Protected areas, nature refuges and heritage areas

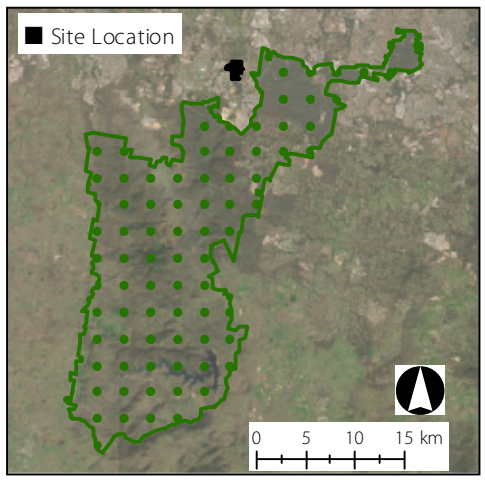
White Rock Conservation Park

Greenbank Military Training Area

Flinders-Karawatha Bioregional Corridor

Ipswich LGA Conservation Areas

White Rock-Spring Mountain Conservation Estate



Issue	Date	Description	Drawn	Checked
A	24/11/2025	Preliminary	TF	AW

0 1 2 km

Transverse Mercator | GDA 1994 | Zone 56 | 1:55,000 @ A3

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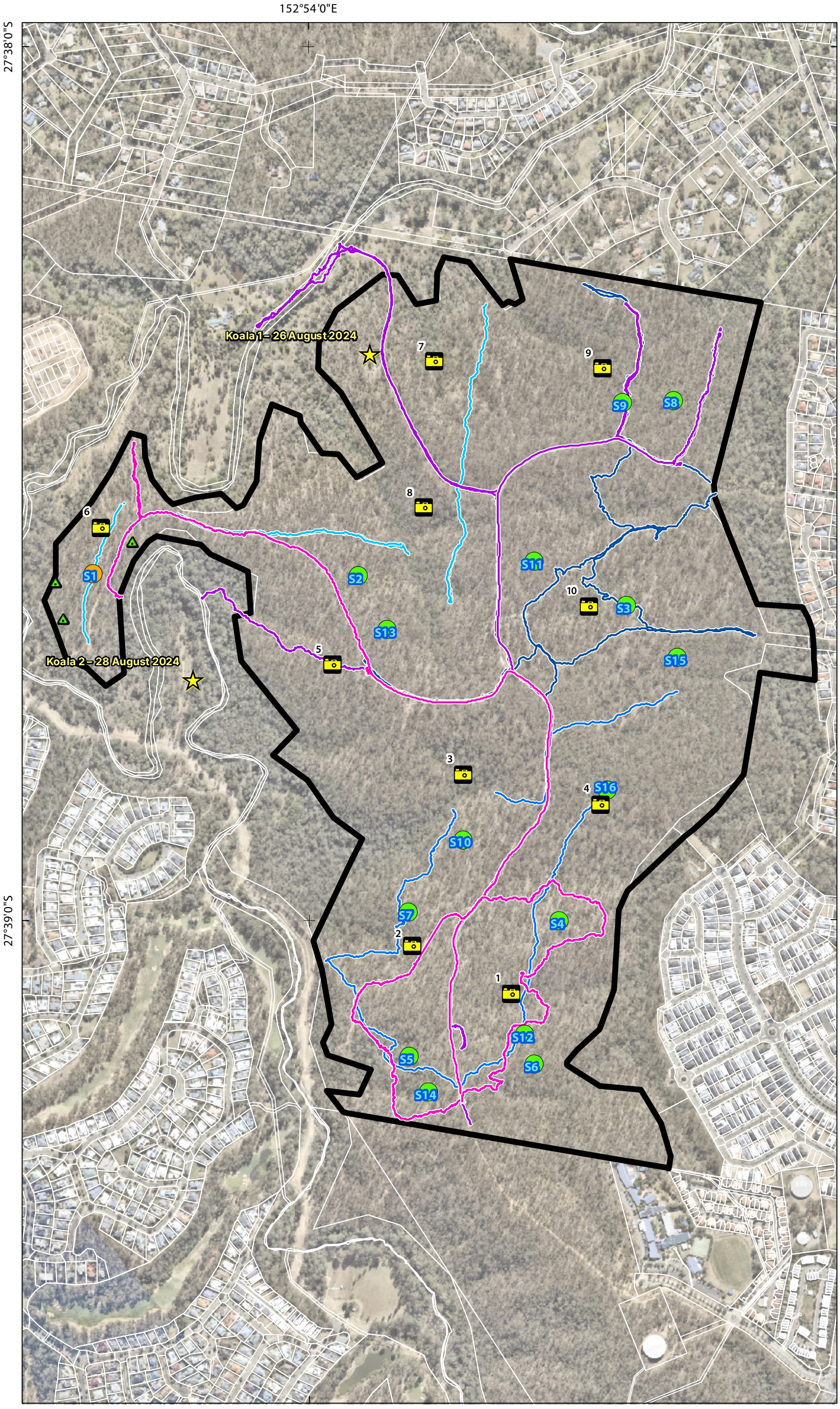
24/11/2025 | 9612 E 13 PD Surrounding Conservation A

Plan A14. Field survey effort - Koala



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Legend

- Qld DCDB
- Referral Area
- Camera Traps
- Koala SAT Survey Locations
- High activity level per East Coast (Med-high) Population Category
- Low activity level per East Coast (Med-high) Population Category
- Koala Scats
- Koalas detected as part of 2024 drone surveys
- Spotlighting Meander 1 (2019)
- Spotlighting Meander 2 (2019)
- Spotlighting Meander 1 (2023)
- Spotlighting Meander 2 (2023)
- Spotlighting Meander 3 (2023)

Issue	Date	Description	Drawn	Checked
A	30/04/2026	Preliminary	TF	AW

0 100 200 300 m

Transverse Mercator | GDA 1994 | Zone 56 | 1:8,000 @ A3

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30/04/2026 | 9612 E 14 PD Koala Field Survey A

Plan A15. Critical habitat - Grey-headed Flying-fox

Notes:
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Legend

- Referral Area
- Grey-headed Flying-fox Critical Habitat (based on regional ecosystems)
- Grey-headed Flying-fox Critical Habitat within Referral Area (based on regional ecosystems) - 161.4 ha

Issue	Date	Description	Drawn	Checked
A	24/11/2025	Preliminary	TF	AW

0 100 200 300 m

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

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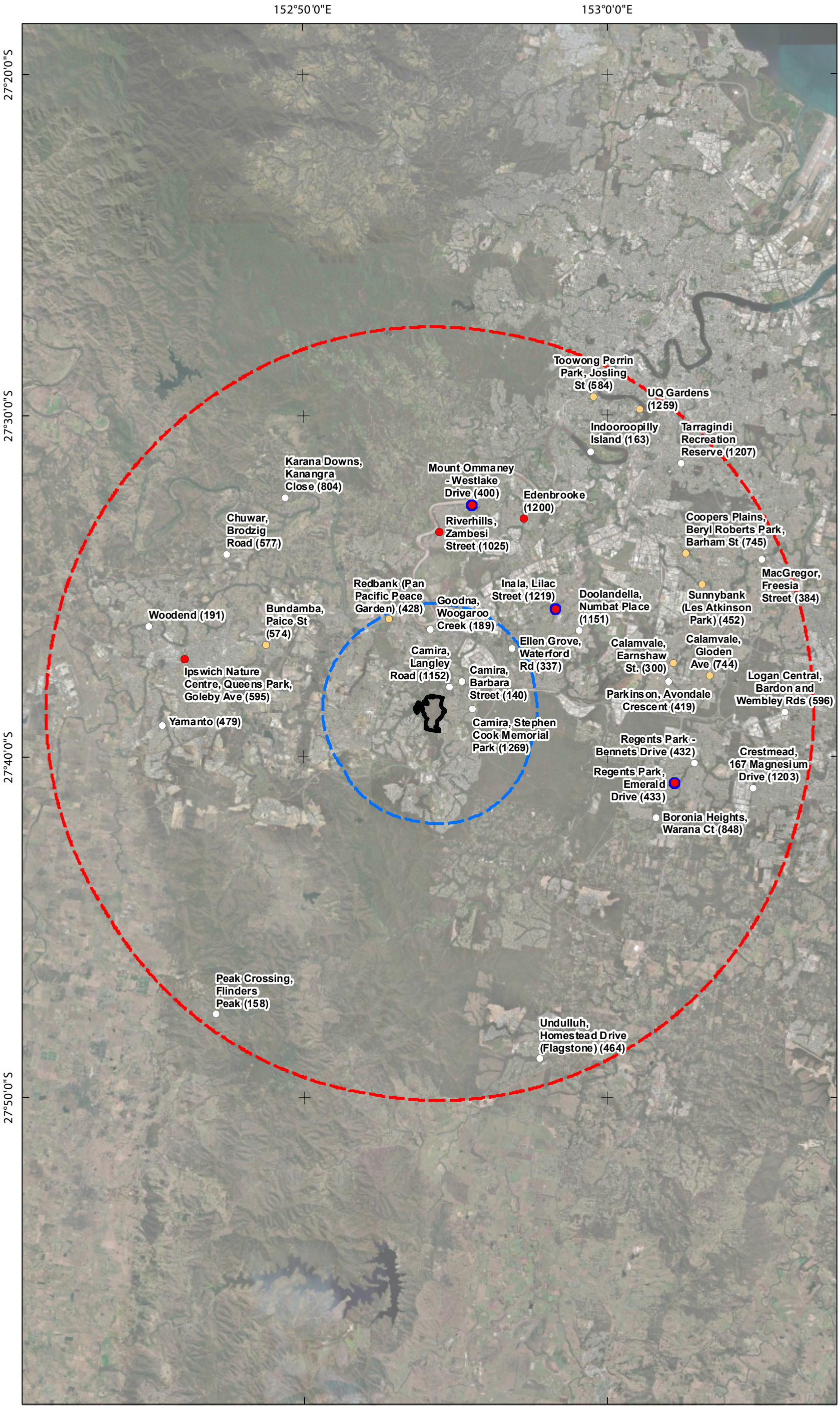
Address / RPD: 9999SP292760

24/11/2025 | 9612E 15 PDGHFF Critical Habitat A

Plan A16. Grey-headed Flying-fox Roosts



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Legend

- Qld DCDB
- Referral Area
- 5km Referral area buffer
- 20km Referral area buffer

Grey-headed Flying-fox Roosts (Fed. Gov. 2024)

- Grey-headed Flying Fox roost inactive within recent surveys [20]
- Grey-headed Flying Fox roost active within recent surveys [8]
- Grey-headed Flying Fox roost active within recent surveys with a population level of 3 or above [3]
- Nationally significant Grey-headed Flying Fox roost active within recent surveys [0]
- Nationally significant Grey-headed Flying Fox roost active within recent surveys with a population level of 3 or above [3]

Issue	Date	Description	Drawn	Checked
A	30/04/2026	Preliminary	TF	AW

0 1 2 3 4 5 km

Transverse Mercator | GDA 1994 | Zone 56 | 1:205,000 @ A3

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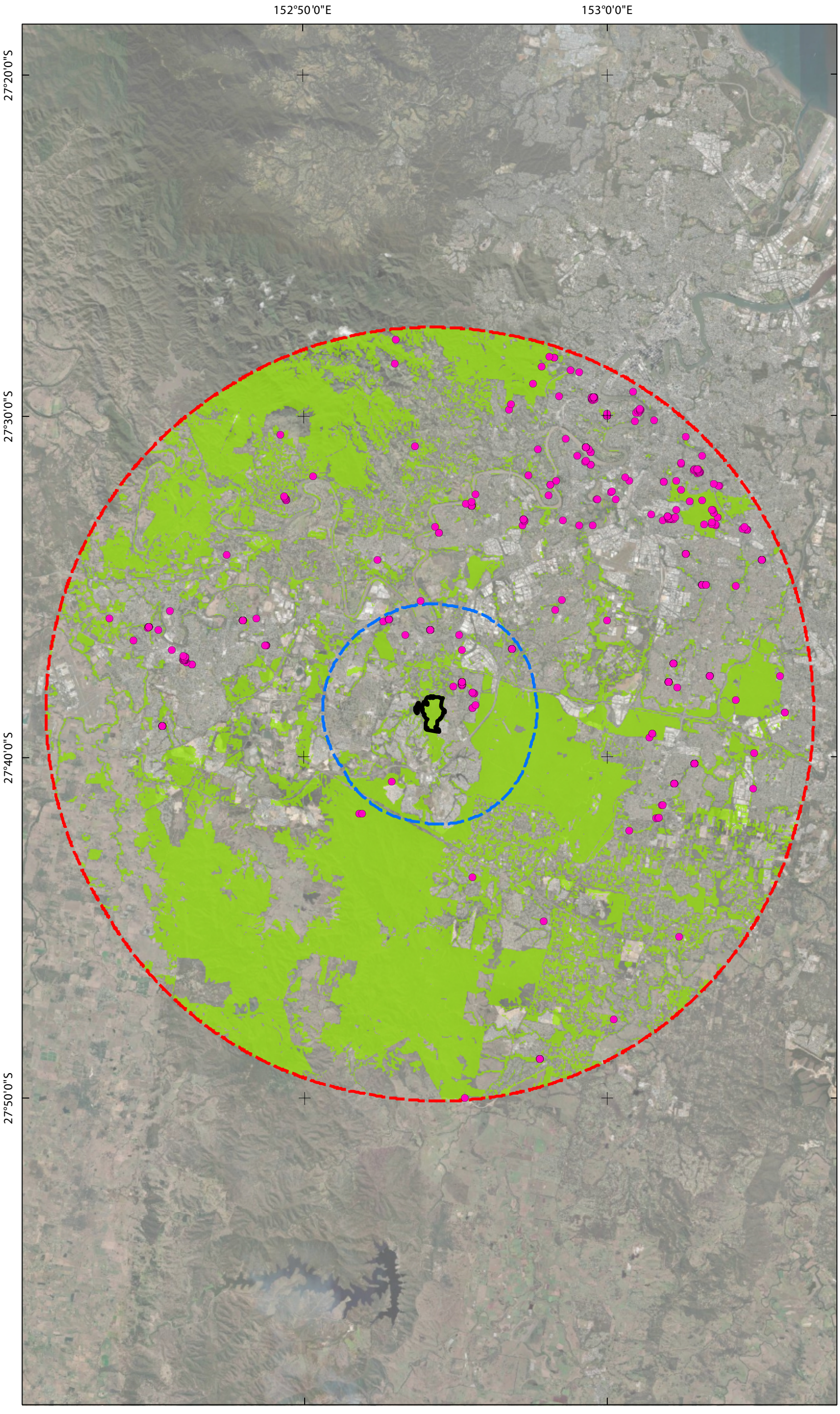
30/04/2026 | 9612 E 16 PDGHFF Roosts A

Plan A17. Grey-headed Flying-fox records and potential habitat



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Legend

- Referral Area
- 5km Referral area buffer
- 20km Referral area buffer
- Grey-headed Flying-fox Records (recorded within past 20 years within 20km of site) - ALA, 2025 [727]
- Potential and Known Grey-headed Flying-fox Foraging Habitat - 37%

Issue	Date	Description	Drawn	Checked
A	25/11/2025	Preliminary	TF	AW

0 1 2 3 4 5 km

Transverse Mercator | GDA 1994 | Zone 56 | 1:205,000 @ A3

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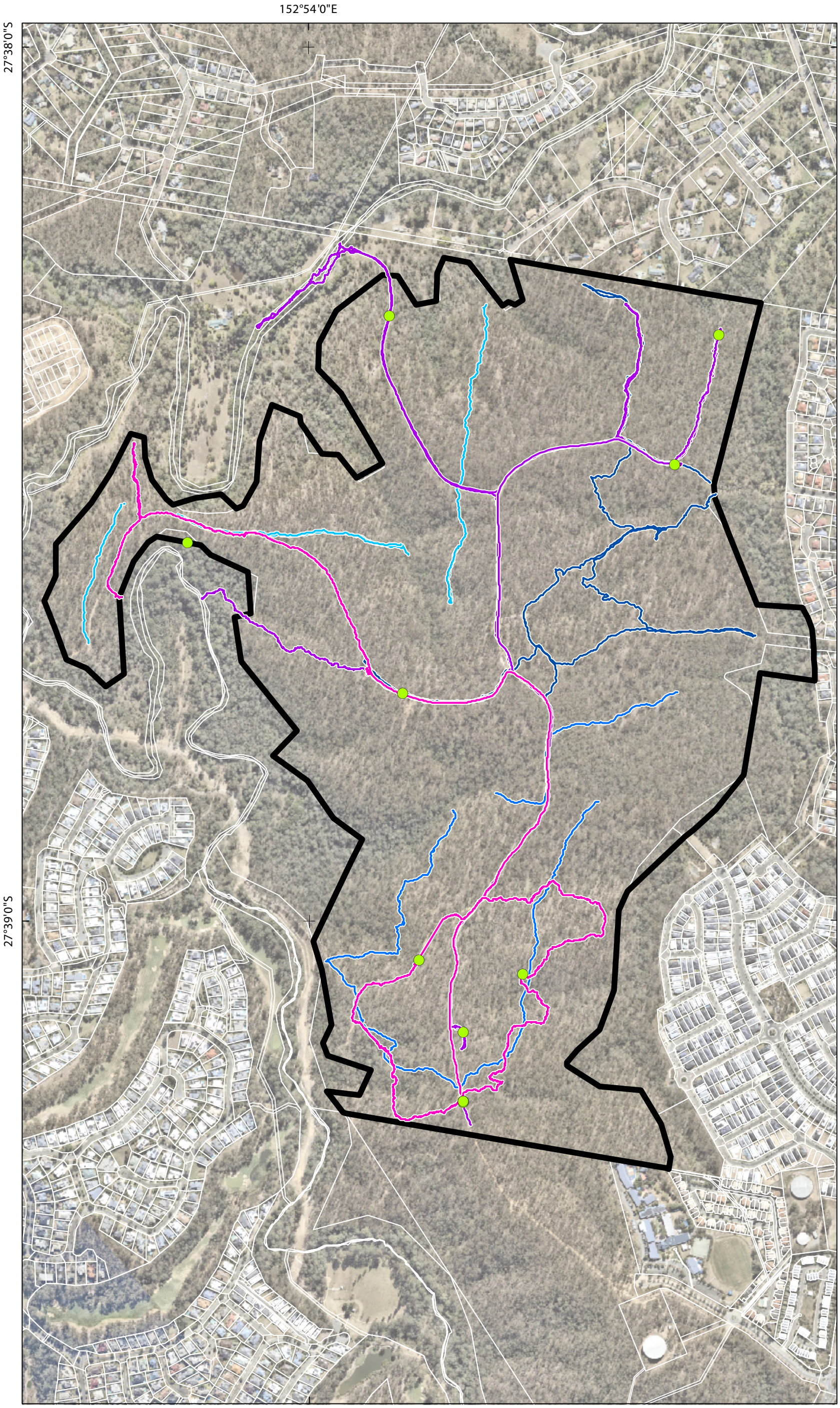
25/11/2025 | 9612 E 17 PDGHFF Records Hab A

Plan A18. Field survey effort - Grey-headed Flying-fox



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Legend

- Qld DCDB
- Referral Area

Field Survey Effort

- Spotlighting Meander 1 (2019)
- Spotlighting Meander 2 (2019)
- Spotlighting Meander 1 (2023)
- Spotlighting Meander 2 (2023)
- Spotlighting Meander 3 (2023)
- Anabat survey locations

Issue	Date	Description	Drawn	Checked
A	24/11/2025	Preliminary	TF	AW

0 100 200 300 m

Transverse Mercator | GDA 1994 | Zone 56 | 1:8,000 @ A3

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24/11/2025 | 9612 E 18 PDGHFF Field Survey A

Plan A19. Critical habitat - Swift Parrot

Notes:
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Legend

- Referral Area
- Regent Honeyeater/Swift Parrot Critical Habitat (based on regional ecosystems)
- Regent Honeyeater/Swift Parrot Critical Habitat within Referral Area (based on regional ecosystems) - 160.5 ha

Issue	Date	Description	Drawn	Checked
A	24/11/2025	Preliminary	TF	AW

0 100 200 300 m

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

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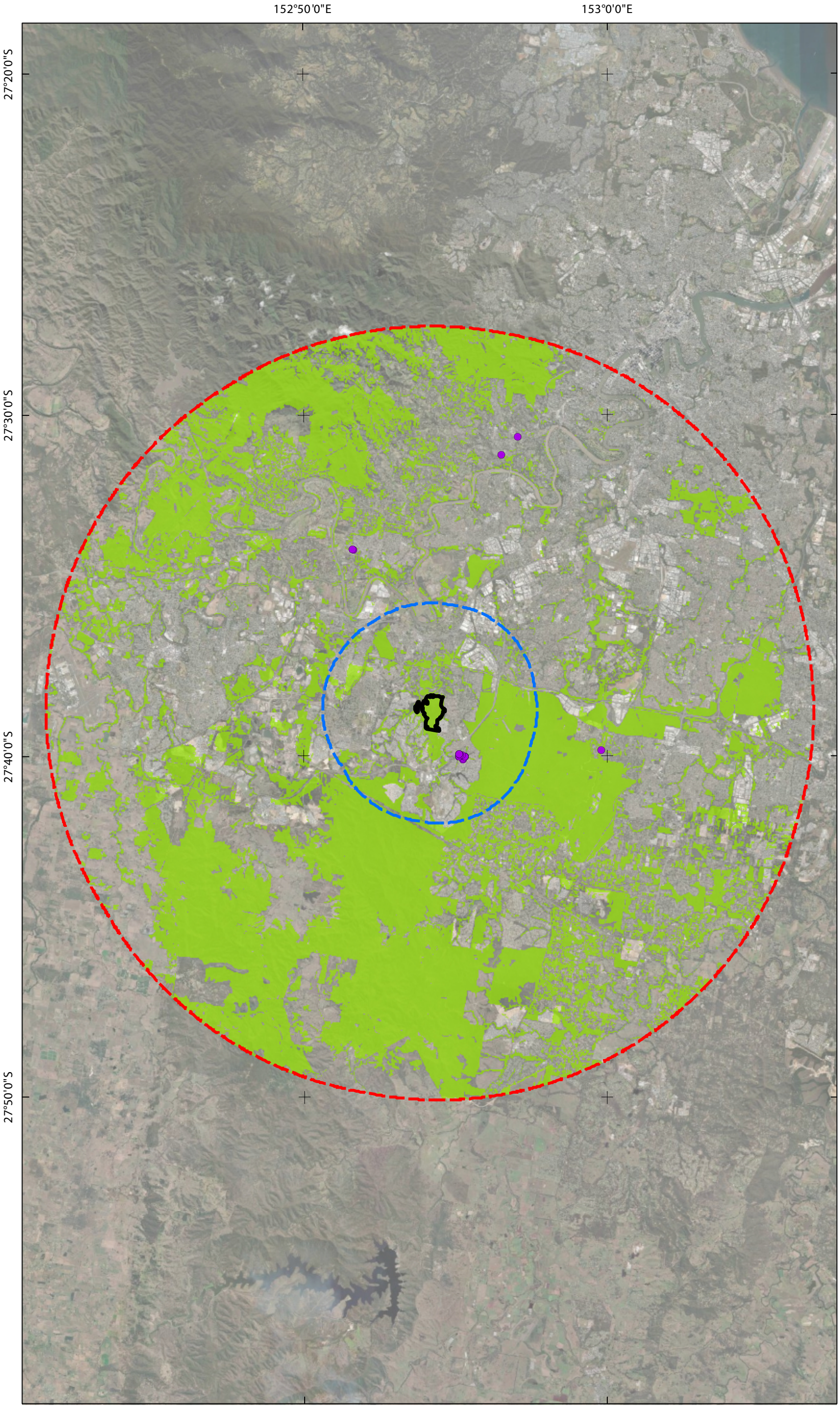
24/11/2025 | 9612E 19 PDSP Critical Habitat A

Plan A20. Swift Parrot records and potential habitat



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Legend

- Referral Area
- 5km Referral area buffer
- 20km Referral area buffer
- Swift Parrot Records (recorded within past 20 years within 20km of site) - ALA, 2025 [28]
- Potential and Known Swift Parrot Foraging Habitat - 37%

Issue	Date	Description	Drawn	Checked
A	25/11/2025	Preliminary	TF	AW

0 1 2 3 4 5 km

Transverse Mercator | GDA 1994 | Zone 56 | 1:205,000 @ A3

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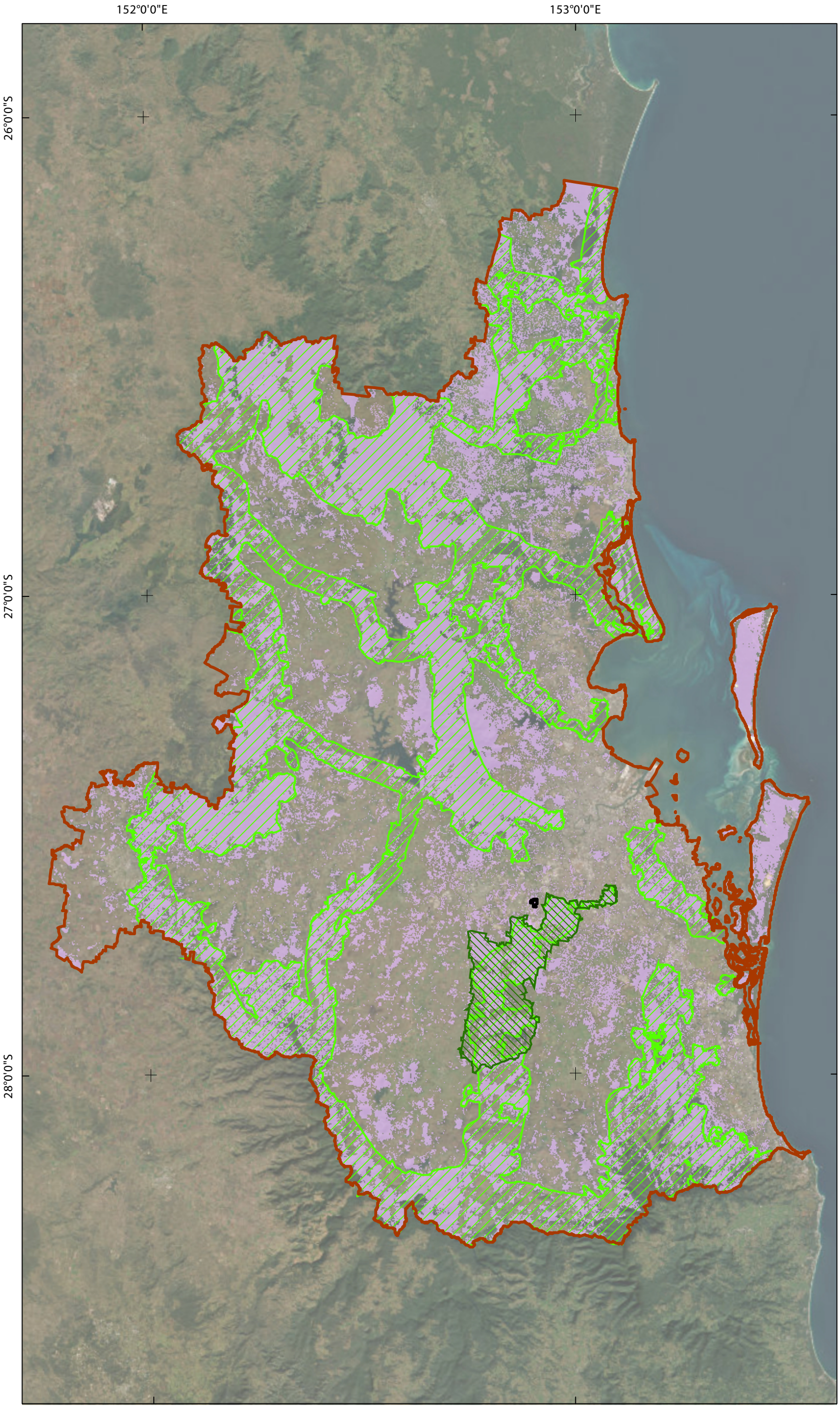
25/11/2025 | 9612 E 20 PDSP Records Hab A

Plan A21. Swift Parrot and Regent Honeyeater foraging habitat SEQ



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Legend

- South East Queensland Regional Plan boundary
- Referral Area
- Swift Parrot & Regent Honeyeater foraging habitat
- SEQ Regional Plan - Regional Biodiversity Corridor
- Flinders Karawatha Corridor

Issue	Date	Description	Drawn	Checked
A	24/11/2025	Preliminary	TF	AW

0 5 10 15 20 25 km

Transverse Mercator | GDA 1994 | Zone 56 | 1:875,000 @ A3

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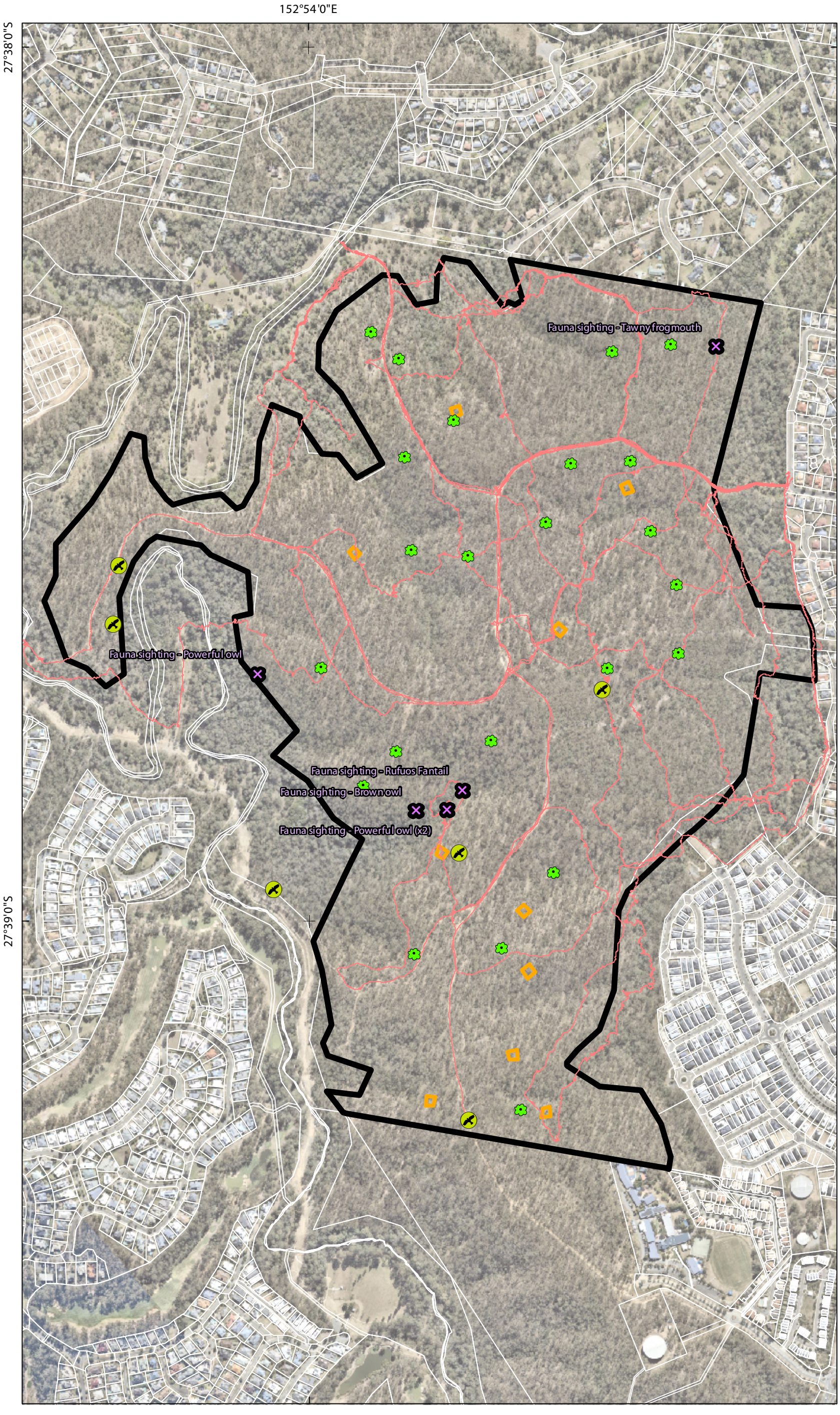
24/11/2025 | 9612E 21 PDSP RH Foraging SEQ A

Plan A22. Field survey effort - Swift Parrot and Regent Honeyeater



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Legend

- Qld DCDB
- Referral Area

Field survey locations

- Bird survey
- Fauna sighting locations
- 10 x 10 metre flowering Eucalypt assessment plots (July 2020)
- 20 x 20 metre flowering Eucalypt assessment plots (November 2022).
- Bird survey areas (June/July 2020)

Issue	Date	Description	Drawn	Checked
A	24/11/2025	Preliminary	TF	AW

0 100 200 300 m

Transverse Mercator | GDA 1994 | Zone 56 | 1:8,000 @ A3

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24/11/2025 | 9612E 22 PDRH SP Field Survey A

Plan A23. Critical habitat - Regent Honeyeater

Notes:
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Legend

- Referral Area
- Regent Honeyeater/Swift Parrot Critical Habitat (based on regional ecosystems)
- Regent Honeyeater/Swift Parrot Critical Habitat within Referral Area (based on regional ecosystems) - 160.5 ha

Issue	Date	Description	Drawn	Checked
A	24/11/2025	Preliminary	TF	AW

0 100 200 300 m

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

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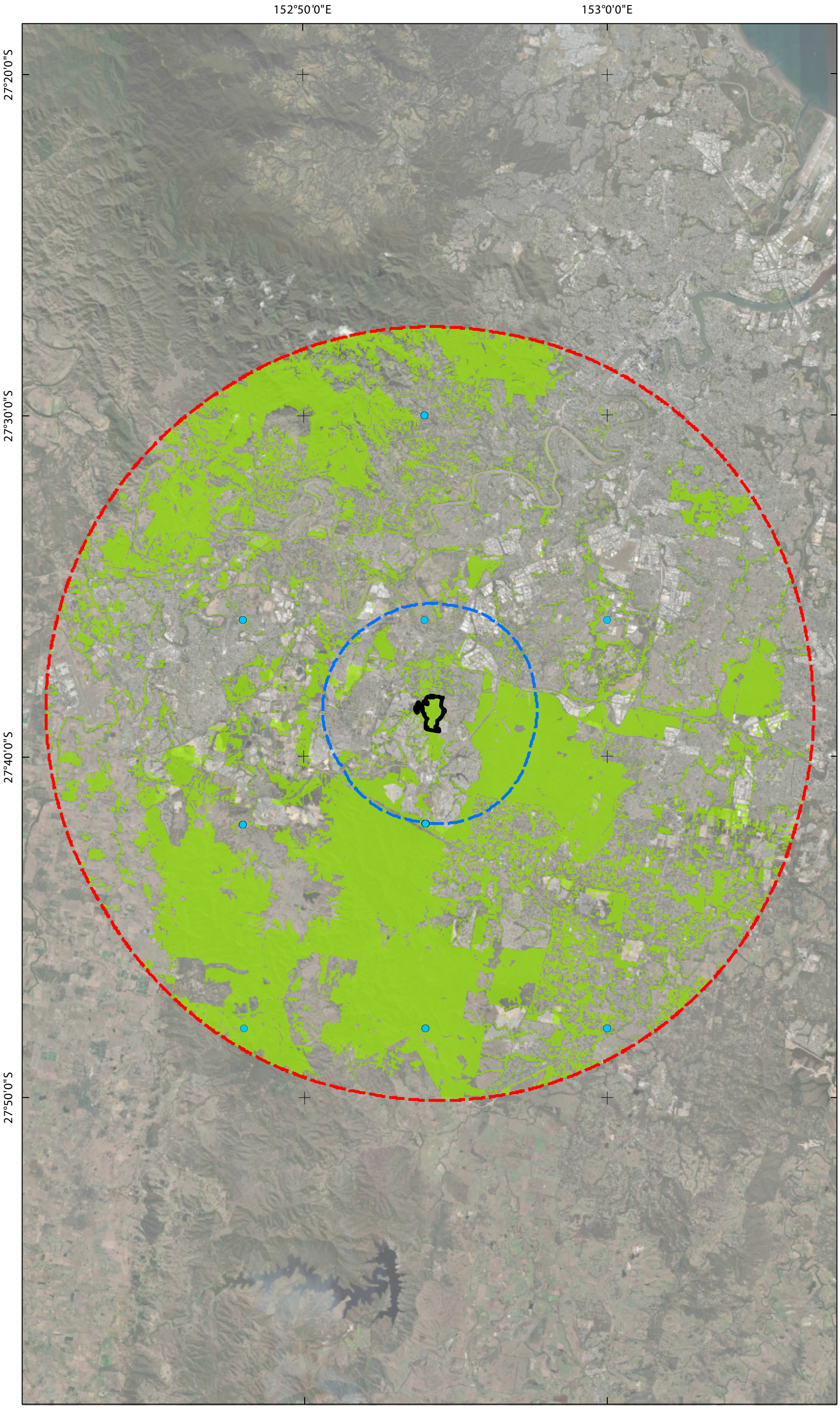
24/11/2025 | 9612E 23 PDRH Critical Habitat A

Plan A24. Regent Honeyeater records and potential habitat



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Legend

- Referral Area
- 5km Referral area buffer
- 20km Referral area buffer
- Potential and Known Swift Parrot Foraging Habitat - 37%
- Regent Honeyeater Records (recorded within past 20 years within 20km of site) - ALA, 2025 [191]

*Note: Species records are generalised using a grid system for the purposes of species protection.

Issue	Date	Description	Drawn	Checked
A	25/11/2025	Preliminary	TF	AW

0 1 2 3 4 5 km

Transverse Mercator | GDA 1994 | Zone 56 | 1:205,000 @ A3

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Springfield
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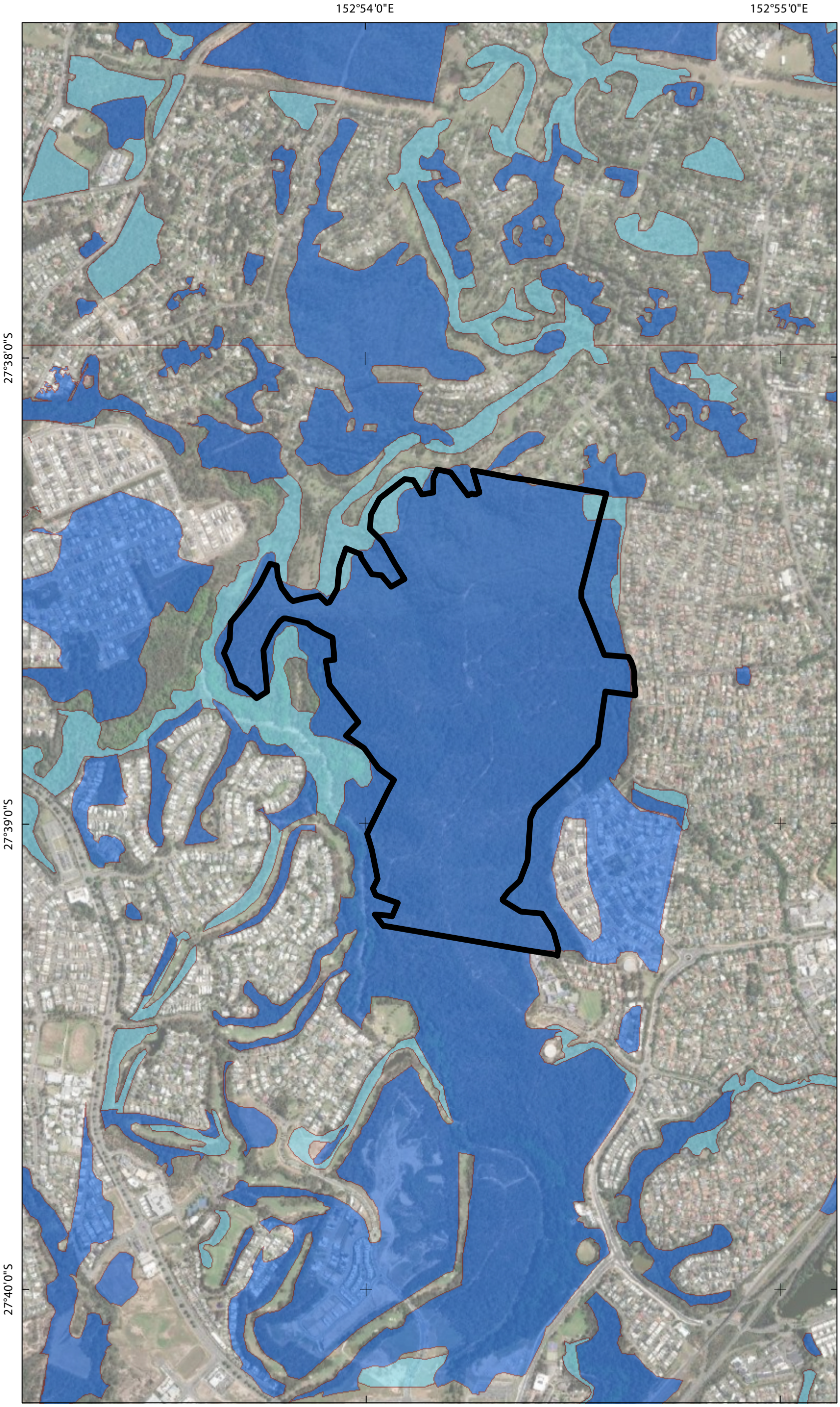
Address / RPD: 9999SP292760

25/11/2025 | 9612 E 24 PDRH Records Hab A

Plan A25. Queensland Vegetation Mapping



Notes:
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Legend

- Referral Area

Regulated Vegetation

- Category A area - *Vegetation Offset/Compliance notices/VDecs*
- Category B area - *Remnant vegetation*
- Category C area - *High value regrowth vegetation*
- Category R area - *Reef regrowth watercourse vegetation*
- Category X area - *Vegetation not regulated under the VMA*
- Water
- Area not categorised

Issue	Date	Description	Drawn	Checked
A	24/11/2025	Preliminary	TF	AW

0 100 200 300 400 500 m

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

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Cherish Enterprises Pty Ltd

Springfield
Residential Development

Address / RPD: 9999SP292760

24/11/2025 | 9612 E 25 PDGG VMA A

Plan A26. Greater Glider barrier analysis

152°52'0"E

152°54'0"E

27°36'0"S

27°38'0"S

27°40'0"S

27°42'0"S

FRANCIS STREET

MINE STREET

SMITHS ROAD

SMITHS ROAD

BRISBANE TERRACE

VIKING DRIVE

KRUGER PARADE

KRUGER PARADE

STUART STREET

STUART STREET

ALICE STREET

CHURCH STREET

BERTHA STREET

BERTHA STREET

ALICE STREET

FORMATION STREET

JONES ROAD

JONES ROAD

JONES ROAD

ADDISON ROAD ADDISON ROAD

CENTENARY HIGHWAY AUGUSTA PARKWAY

CENTENARY HIGHWAY AUGUSTA PARKWAY

EPBC 2019/8516

EPBC 2013/6866

EPBC 2018/8350

EPBC 2013/7074

EPBC 2014/7306

EPBC 2016/7676

EPBC 2017/7875

EPBC 2013/7057

EPBC 2020/8802

Notes:

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Legend

- Referral Area
- White Rock Conservation Park

Barriers

- EPBC Controlled Actions
- Greenbank Military Training Area
- Established residential/industrial uses
- Cleared land
- Rail network
- Highway or 4-lane arterial road
- Major roads

Site Location

SEQ

CABOOLTURE

BRISBANE

TOOWOOMBA

IPSWICH

GOLD COAST

BEAUDESERT

QLD State Border

0 20 40 60 80 100 km

Issue	Date	Description	Drawn	Checked
A	24/11/2025	Preliminary	TF	AW

0 500 1,000 m

Transverse Mercator | GDA 1994 | Zone 56 | 1:32,000 @ A3

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Springfield Residential Development

Address / RPD: 9999SP292760

24/11/2025 | 9612E 26 PDGG Barrier Analysis A

Plan A27. Greater Glider records

152°55'0"E

27°35'0"S

27°40'0"S

27°45'0"S

7.9km

3.3km

1.2km

9.1km

10.3km

7.4km

8.4km

8.3km

Notes:
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Legend

- Referral Area
- White Rock Conservation Park
- Greenbank Military Training Area

Greater Glider Records (ALA, 2025)

- Greater Glider records recorded 10-20 years ago (ALA, 2025) - 0
- Greater Glider records recorded 5-10 years ago (ALA, 2025) - 1
- Greater Glider records recorded within the past 5 years (ALA, 2025) - 9
- Greater glider record recorded in active construction site dated August 2023. The record was queried with ALA who confirmed the original record was obfuscated to the current position due to its sensitive nature.
- Distance to Greater Glider records

Issue	Date	Description	Drawn	Checked
A	25/11/2025	Preliminary	TF	AW

0 500 1,000 1,500 m

Transverse Mercator | GDA 1994 | Zone 56 | 1:65,000 @ A3

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Springfield
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Address / RPD: 9999SP292760

25/11/2025 | 9612E 27 PDGG Records A

Plan A28. Greater Glider suitable regional ecosystems

Notes:
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Legend

- Referral Area
- Greater Glider regional ecosystems with a known or possible association with Queensland greater gliders (Eyre et al. 2022).
- Greater Glider regional ecosystems with a known or possible association with Queensland greater gliders (Eyre et al. 2022) on-site - 160.3 ha

Citation: Eyre TJ., Smith G.C., Venz M.F., Mathieson M.T., Hogan L.D., Starr, C., Winter, J. and McDonald, K. 2022. Guide to greater glider habitat in Queensland, report prepared for the Department of Agriculture, Water and the Environment, Canberra. Department of Environment and Science, Queensland Government. Brisbane. Guide to greater glider habitat in Queensland – DCCEEW.

Issue	Date	Description	Drawn	Checked
A	25/11/2025	Preliminary	TF	AW

0 100 200 300 m

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

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Springfield
Residential Development

Address / RPD: 9999SP292760

25/11/2025 | 9612 E 28 PDGG Suitable REs A

Plan A29. Forest Maturity Map (Griffi th University)

152°54'0"E

27°38'0"S

27°40'0"S

Forest Maturity data obtained from:
https://sites.google.com/view/priority-areas-greater-gliders/home

Reference:
Norma, P. and Mackey, B. 2024. Priority areas for conserving greater gliders in Queensland, Australia. *Pacific Conservation Biology* 30, PC23018.

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Legend

- Referral Area

Forest Maturity Map

- Mature Vegetation
- Intermediate to Mature Aged Vegetation
- Intermediate Aged Vegetation
- Young to Intermediate Aged Vegetation
- Young Vegetation

Issue	Date	Description	Drawn	Checked
A	24/11/2025	Preliminary	TF	AW

0 100 200 300 400 500 m

Transverse Mercator | GDA 1994 | Zone 56 | 1:20,000 @ A3

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Springfield
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Address / RPD: 9999SP292760

24/11/2025 | 9612 E 29 PDGG Forest Maturity A

A30. Greater Glider Corridor Analysis

Notes:
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Legend

- EPBC Project Sites
- Greater Glider regional ecosystems with a known or possible association with Queensland greater gliders
- Major roads
- Rail network
- Highway or 4-lane arterial road

Corridors for Analysis

- Corridor 1
- Corridor 2
- Corridor 3
- Corridor 4
- Connectivity assessment location
- Connectivity barrier locations

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Springfield
Residential Development

0 200 400 600 m

Transverse Mercator
GDA 2020 | Zone 56

1:30,000
@ A3

Address: Springfield

9612 E 30_0 SFA GG Corridors A

Issue	Date	Drawn	Checked
A	24/11/2025	TF	AW

Plan A30.1.1 Greater Glider Corridor Analysis (Corridor 1)

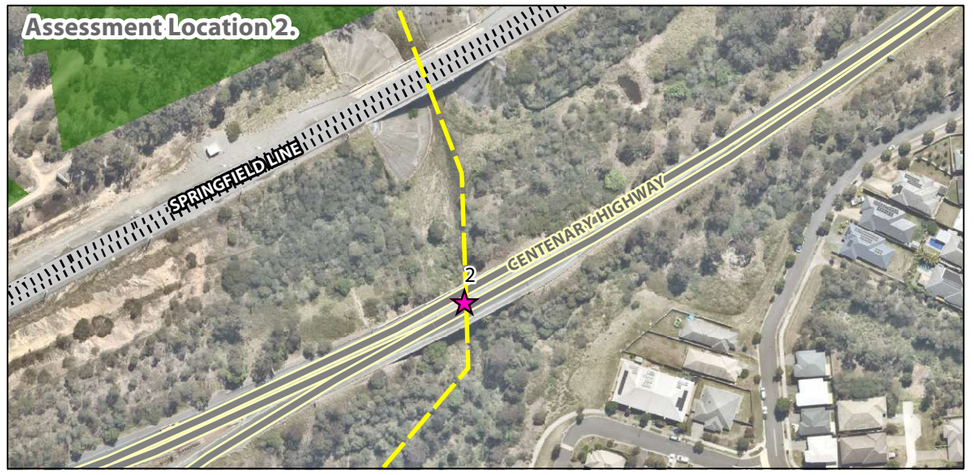
BARRIER ASSESSMENT

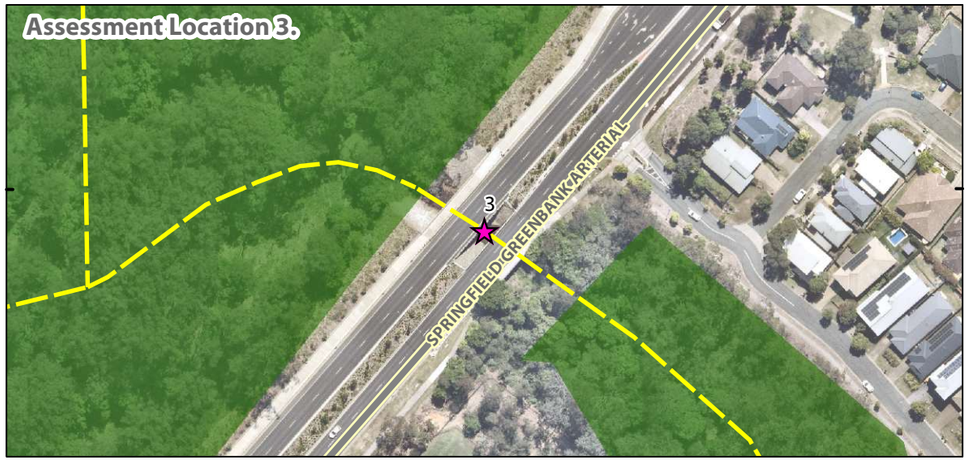
Photos are provided for the following locations:

1.Springfield Lakes Boulevard (-27.677007, 152.912897) –
Modified open parkland, street trees and detention basin adjoined by established residential communities.

2.Centenary Motorway and Rail Line (-27.673475, 152.908603) –
Two intersecting paths of major linear infrastructure. Vegetation between the Centenary Motorway and rail line is predominantly scattered regrowth with limited canopy coverage required for stepping stone connectivity. Approximate crossing distance from vegetation south of Centenary Motorway to north of the rail line is 135 metres.

3. Springfield Greenbank Arterial (-27.666898, 152.908576) –
Four-lane arterial road adjoined by non-remnant and remnant vegetation. Vegetation width approximately 100 metres at crossing location inclusive of regrowth and planted street tree vegetation. Approximate crossing distance is 60 metres. Vegetation broadens to the north-west of Springfield Greenbank Arterial.





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Legend

- EPBC Project Sites
- Greater Glider regional ecosystems with a known or possible association with Queensland greater gliders
- Major roads
- Rail network

Corridors for Analysis

- Corridor 1
- Corridors 2-4
- Connectivity assessment location
- Connectivity barrier locations
- Greater Glider suitable Regional Ecosystems widths

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Cherish Enterprises Pty Ltd

Springfield
Residential Development

0 200 400 600 m

Transverse Mercator
GDA 2020 | Zone 56

1:22,000
@ A3

Address: Springfield

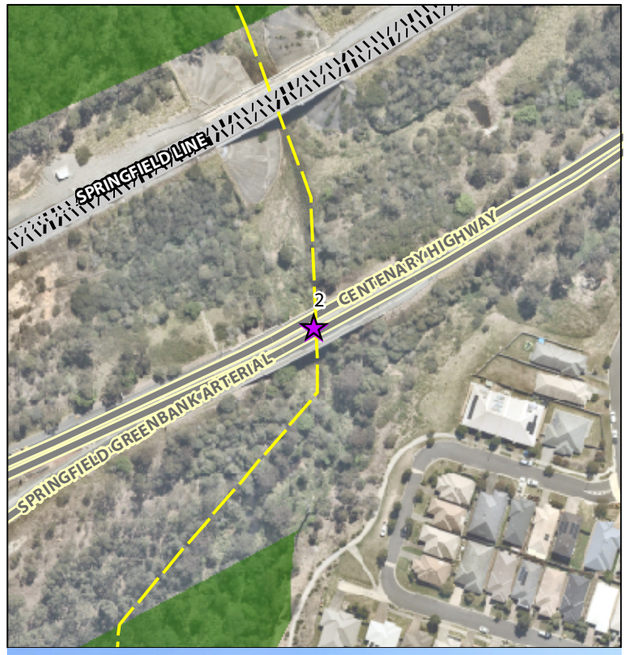
9612 E 30_1_1 SFA GG Corridors A

Issue	Date	Drawn	Checked
A	24/11/2025	TF	AW

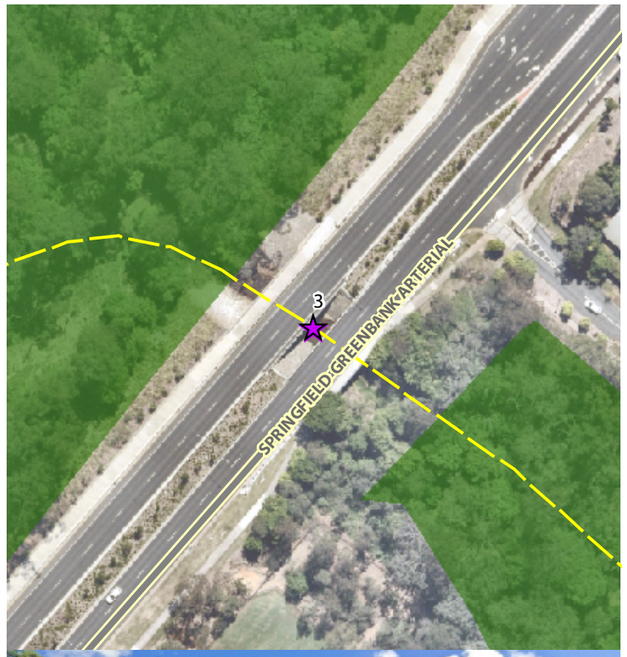
Plan A30.1.2 Greater Glider Corridor Analysis (Corridor 1)

Assessment Location 1.

Assessment Location 2.



Assessment Location 3.



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Legend

- EPBC Project Sites
- Greater Glider regional ecosystems with a known or possible association with Queensland greater gliders
- Major roads
- Rail network

Corridors for Analysis

- Corridor 1
- Corridors 2-4
- Connectivity assessment location
- Connectivity barrier locations

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Cherish Enterprises Pty Ltd

Springfield
Residential Development

0 10 20 30 40 50 m

Transverse Mercator
GDA 2020 | Zone 56

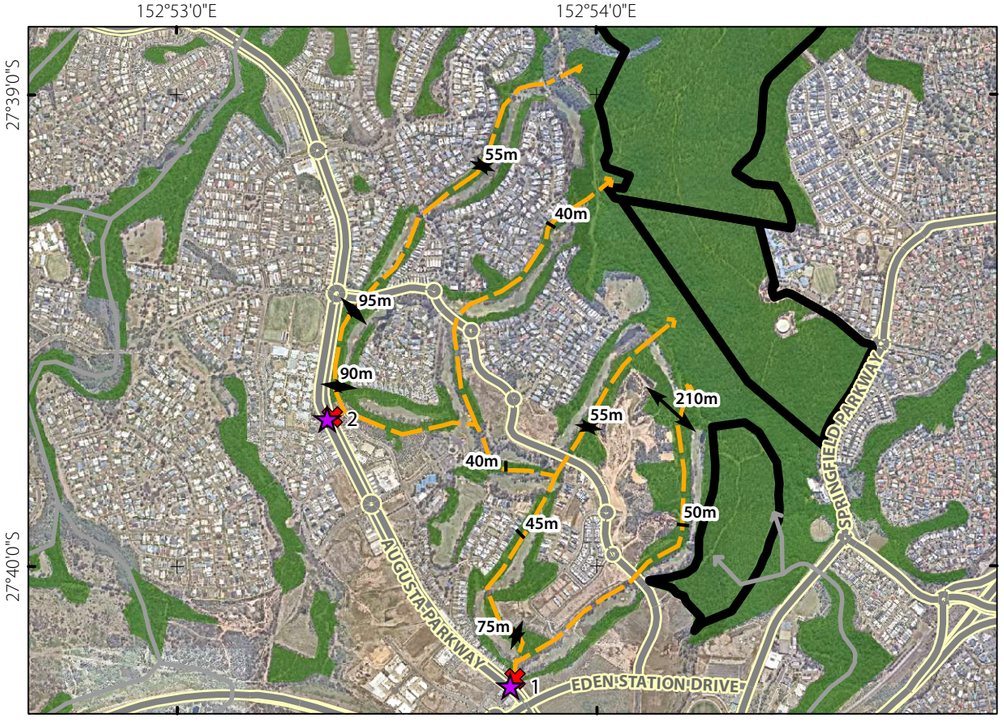
1:1,500 @ A3

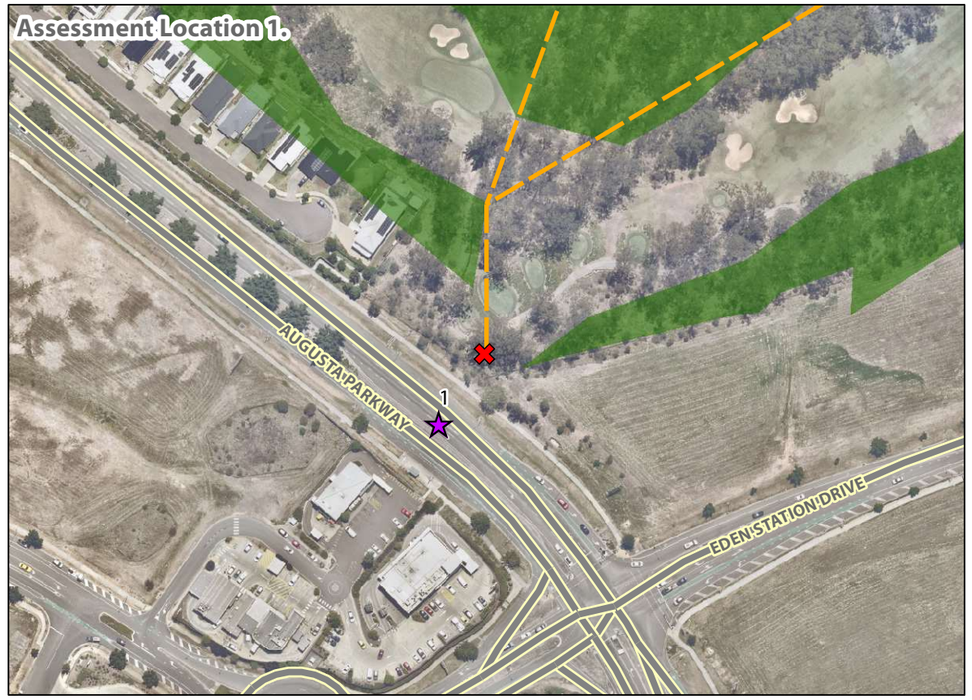
Address: Springfield

9612 E 30_1_2 SFA GG Corridors A

Issue	Date	Drawn	Checked
A	24/11/2025	TF	AW

Plan A30.2.1 Greater Glider Corridor Analysis (Corridor 2)





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Legend

- EPBC Project Sites
- Greater Glider regional ecosystems with a known or possible association with Queensland greater gliders
- Major roads

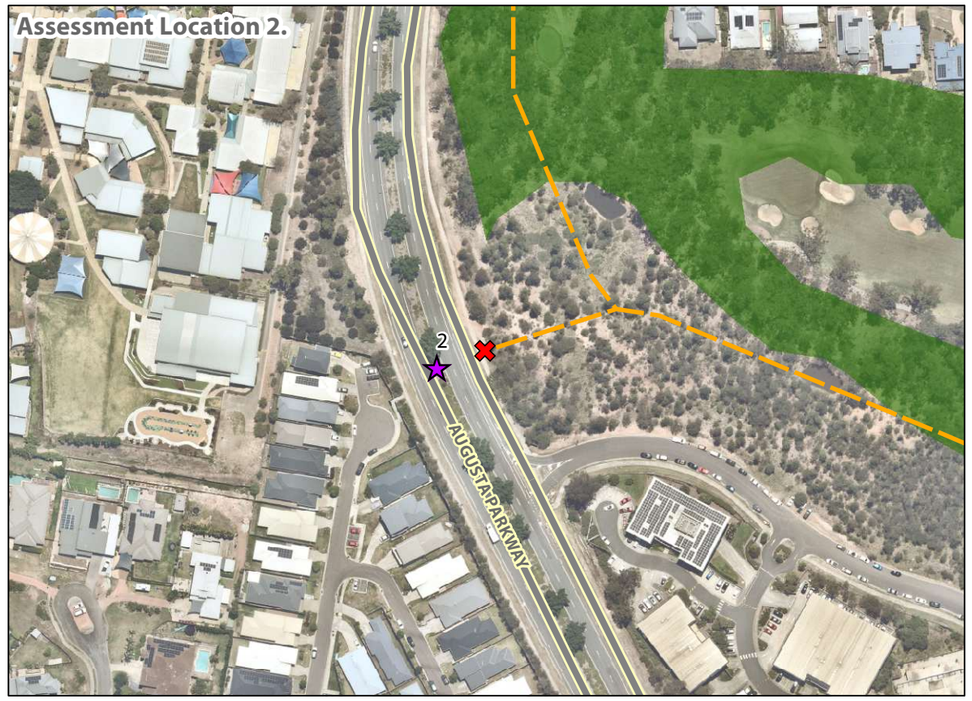
Corridors for Analysis

- Corridor 2
- Corridors 1 & 3-4
- Connectivity assessment location
- Connectivity barrier locations
- Greater Glider suitable Regional Ecosystems widths

BARRIER ASSESSMENT

Corridor 2 is entirely a minor internal corridor associated with the Brookwater Golf Course. The linkages are comprised of golf fairway which is skirted by narrow strips of remnant and regrowth vegetation. Corridors are intersected at multiple locations by residential roads including Brookwater Drive and Grangewood Avenue.

Corridor connections terminate at Augusta Parkway to the south-west. Identified locations highlighted as Assessment Locations 1 (-27.670685, 152.896264) and 2 (-27.660633, 152.889095). Augusta Parkway and surrounding development areas represent a major barrier due to the absence of vegetation to the immediate south-west and south-east thus disconnecting the minor golf course corridors from major habitat connections to the south-east or south-west.



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Cherish Enterprises Pty Ltd

Springfield
Residential Development

0 200 400 600 m

Transverse Mercator
GDA 2020 | Zone 56

1:24,000
@ A3

Address: Springfield

9612 E 30_2_1 SFA GG Corridors A

Issue	Date	Drawn	Checked
A	24/11/2025	TF	AW

Plan A30.2.2 Greater Glider Corridor Analysis (Corridor 2)

Assessment Location 1.

Image 1. Facing North

Image 2. Facing South

Assessment Location 2.

Image 1. Facing North

Image 2. Facing West

Notes:
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Legend

- EPBC Project Sites
- Greater Glider suitable Regional Ecosystems
- Major roads

Corridors for Analysis

- Corridor 2
- Corridors 1 & 3-4
- Connectivity assessment location - No connectivity
- Connectivity barrier locations

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Springfield
Residential Development

0 10 20 30 40 50 m

Transverse Mercator
GDA 2020 | Zone 56

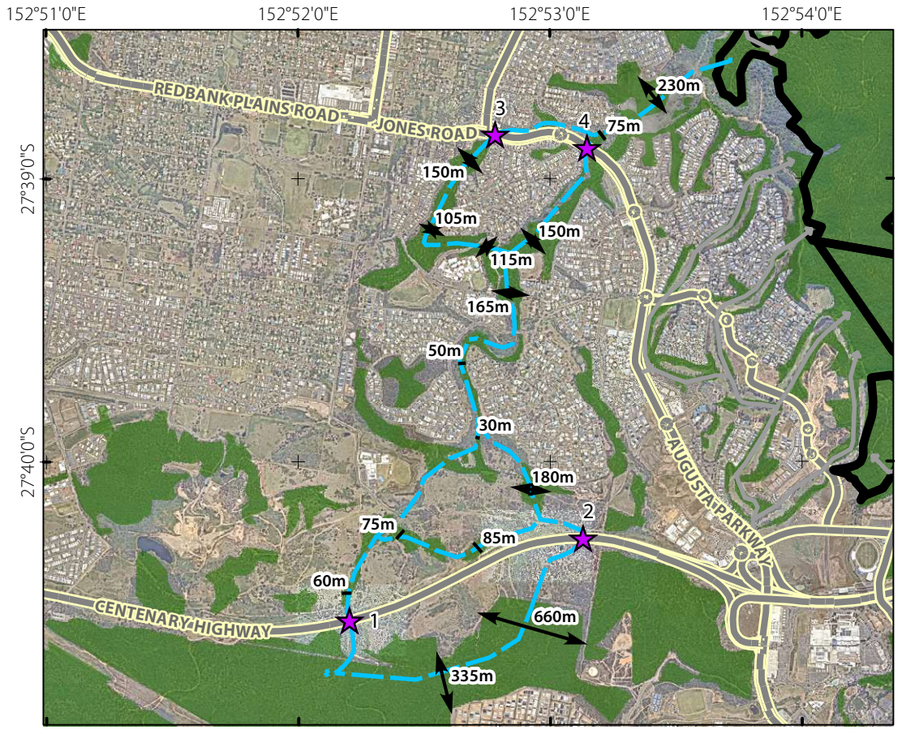
1:2,500 @ A3

Address: Springfield

9612 E 30_2_2 SFA GG Corridors A

Issue	Date	Drawn	Checked
A	24/11/2025	TF	AW

Plan A30.3.1 Greater Glider Corridor Analysis (Corridor 3)



BARRIER ASSESSMENT

Photos are provided for the following locations:

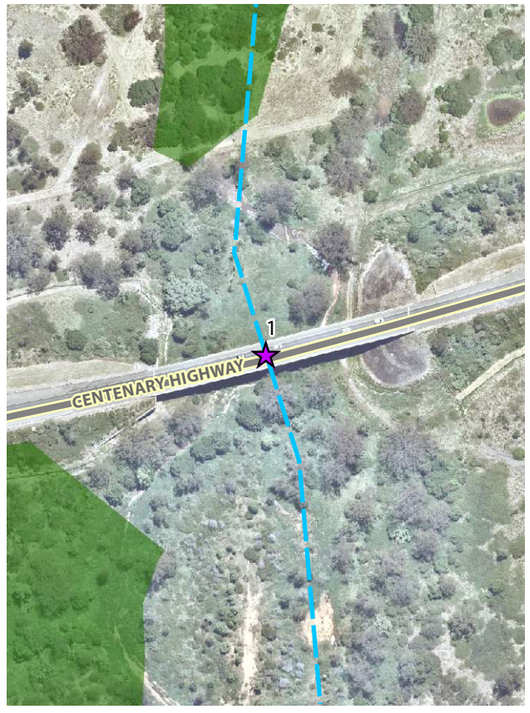
1. Centenary Highway (-27.675969, 152.870346) – Located at Woogaroo Creek bridge crossing. Scattered Eucalyptus tereticornis in floodplain gully area north and south of bridge may provide opportunity for refuge, however, limited canopy trees up to edge of bridge is likely to limit access due to compromised glide trajectories.

2. Centenary Highway (-27.671154, 152.885345) –
Non-remnant vegetation comprising fragmented weed and native trees. Limited mature canopy trees on either side of road.

3. Augusta Parkway (-27.647414, 152.879836) –
Retained eucalypt vegetation on southern side of road bisected by road with nearest vegetation located >100 m to the north-east of Augusta Parkway.

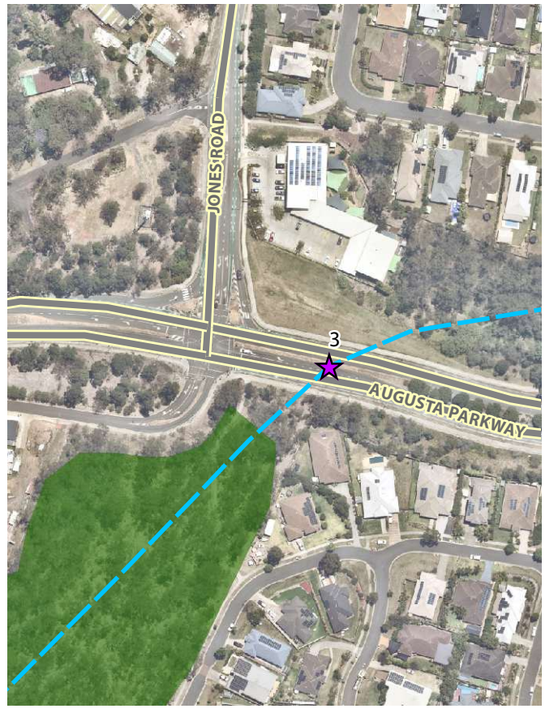
4. Augusta Parkway (-27.648425, 152.886188) –
Woogaroo Creek bridge crossing dominated by relatively young regrowth vegetation to the north and south of bridge with juvenile Ficus sp. street trees along centre island. Mature scattered eucalypts further south and north.

Assessment Location 1.

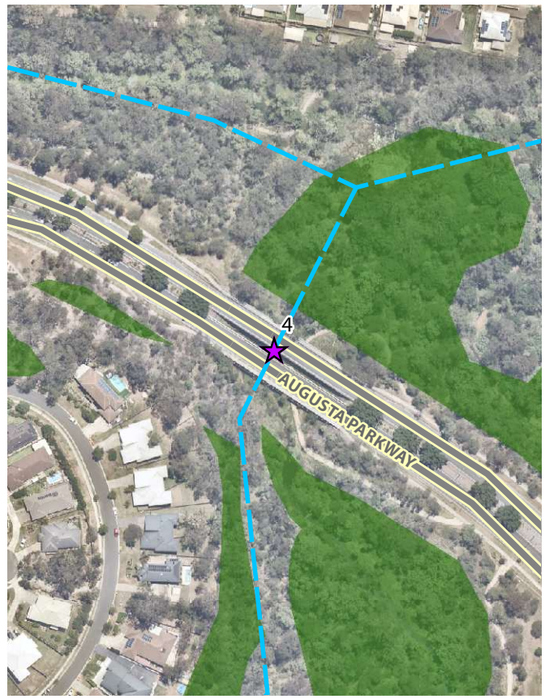


Assessment Location 2.

Assessment Location 3.



Assessment Location 4.



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Legend

- EPBC Project Sites
- Greater Glider regional ecosystems with a known or possible association with Queensland greater gliders
- Major roads

Corridors for Analysis

- Corridor 3
- Corridors 1-2 & 4
- Connectivity assessment location
- Connectivity barrier locations
- Greater Glider suitable Regional Ecosystems widths

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Cherish Enterprises Pty Ltd

Springfield
Residential Development

0 500 1,000 m
Transverse Mercator
GDA 2020 | Zone 56

1:40,000
@ A3

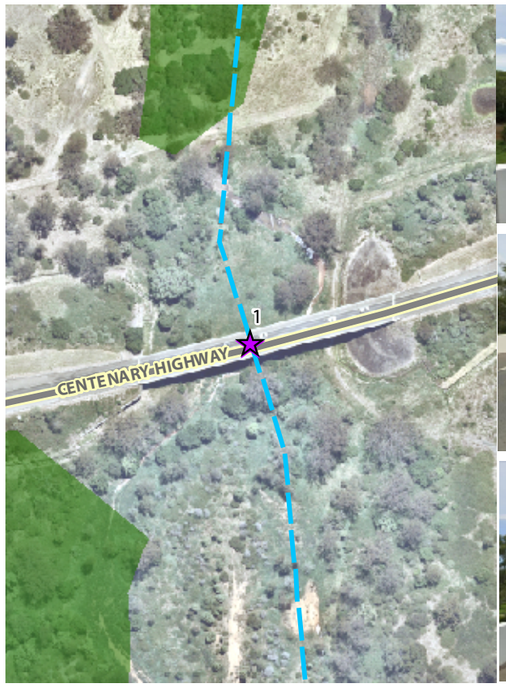
Address: Springfield

9612 E 30_3_1 SFA GG Corridors A

Issue	Date	Drawn	Checked
A	24/11/2025	TF	AW

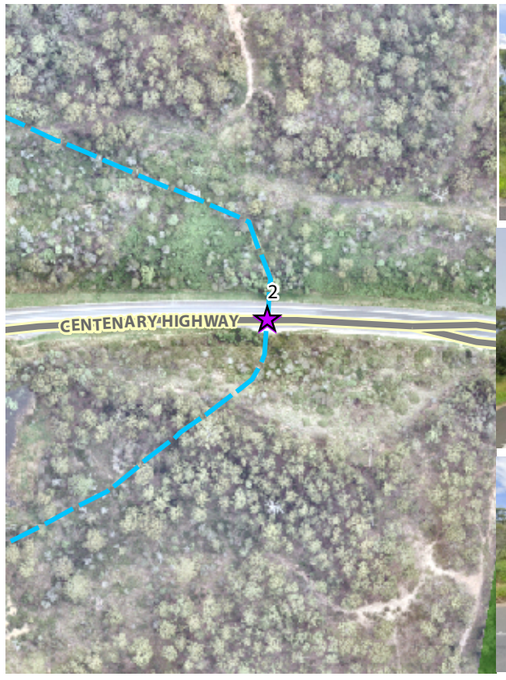
Plan A30.3.2 Greater Glider Corridor Analysis (Corridor 3)

Assessment Location 1.



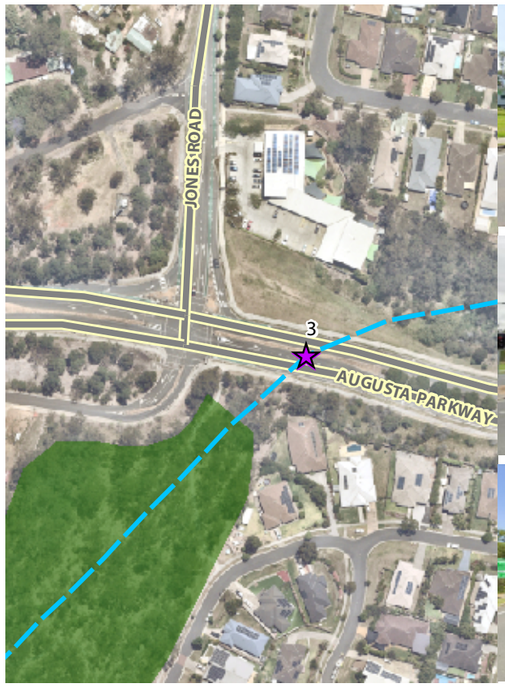
Images 1-3. North, Southwest, East

Assessment Location 2.



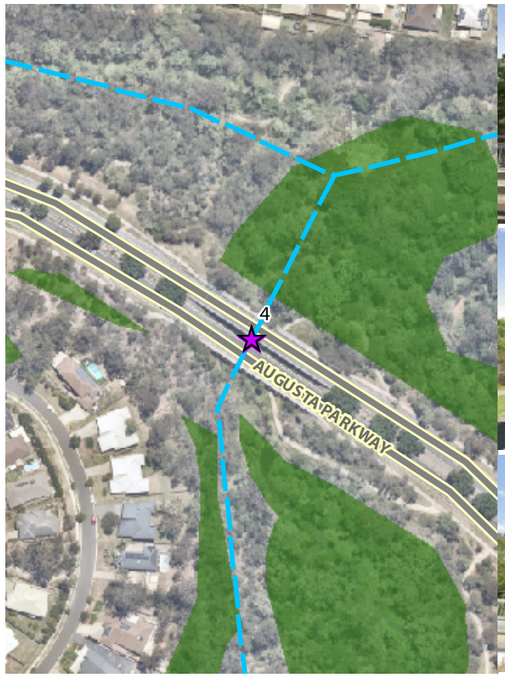
Images 1-3. North, East, South

Assessment Location 3.

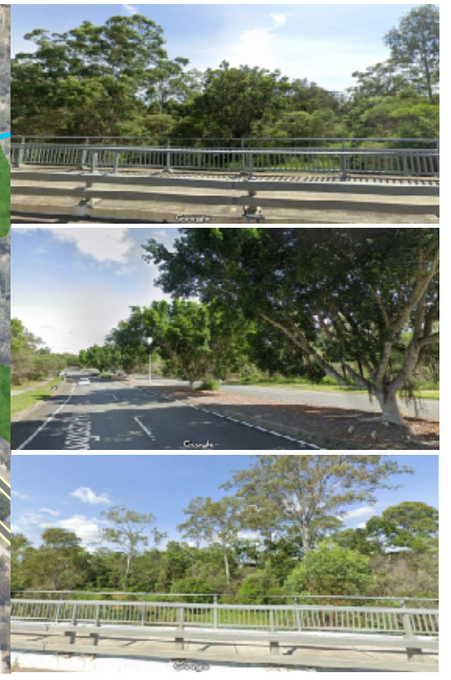


Images 1-3. Northeast, East, West

Assessment Location 4.



Images 1-3. North, Northwest, South



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Legend

- EPBC Project Sites
- Greater Glider regional ecosystems with a known or possible association with Queensland greater gliders
- Major roads

Corridors for Analysis

- Corridor 3
- Corridors 1-2 & 4
- Connectivity assessment location
- Connectivity barrier locations

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0 20 40 60 80 100 m

Transverse Mercator
GDA 2020 | Zone 56

1:3,000 @ A3

Address: Springfield

9612 E 30_3_2 SFA GG Corridors A

Issue	Date	Drawn	Checked
A	24/11/2025	TF	AW

Plan A30.4.1 Greater Glider Corridor Analysis (Corridor 4)

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Legend

- EPBC Project Sites
- Greater Glider suitable Regional Ecosystems
- Major roads

Corridors for Analysis

- Corridor 4
- Corridors 1-3
- Connectivity assessment location
- Connectivity barrier locations
- Greater Glider suitable Regional Ecosystems widths

BARRIER ASSESSMENT

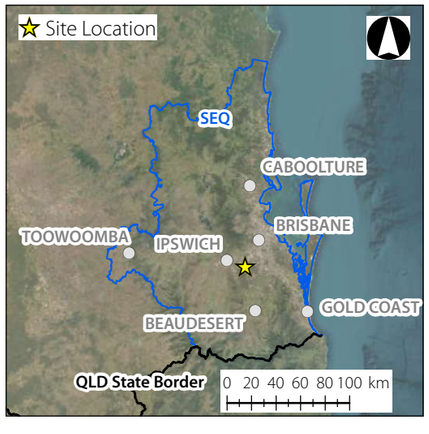
Rural residential properties dominate the landscape to the north while to the east, west and south is highly developed with medium to low density residential communities and major infrastructure. Fragmented vegetation patches are interspersed with modified planted vegetation typical of rural residential properties providing limited value for greater gliders and compromising dispersal. Lower scale roads are a minor barrier, however, vegetation patches diminish in size and become progressively fragmented and ultimately remain unconnected to tracts of land with Greater Glider records.

Photos are provided for the following locations:

1. Meier Road, Camira (-27.636109, 152.911590) –
Fragmented rural residential properties located to the south-west and north-east of Meier Road with a mix of retained eucalypt trees and planted ornamental trees and shrubs.

2. Cairns Avenue and Hayes Road, Camira (-27.629625, 152.908448) –
Fragmented rural residential properties located to the south-west and north-east of Meier Road with a mix of retained eucalypt trees and planted ornamental trees and shrubs.

3. Jones Road, Bellbird Park (-27.635855, 152.884409) –
Thin strip of vegetation located south-west of Jones Road surrounded by cleared areas and residential communities.



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Springfield
Residential Development

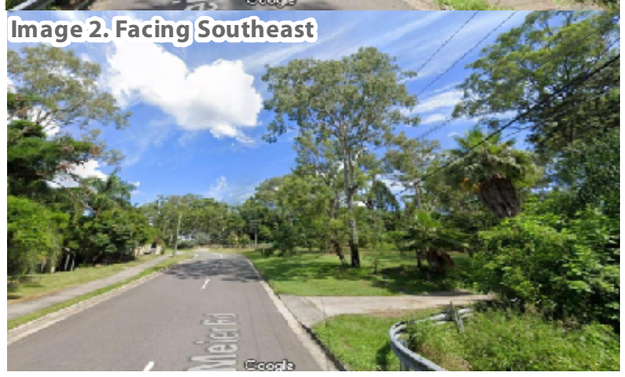
0 200 400 600 m
Transverse Mercator
GDA 2020 | Zone 56
1:20,000
@ A3

Address: Springfield
9612 E 30_4_1 SFA GG Corridors A

Issue	Date	Drawn	Checked
A	24/11/2025	TF	AW

Plan A30.4.2 Greater Glider Corridor Analysis (Corridor 4)

Assessment Location 1.



Assessment Location 2.

Assessment Location 3.

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Legend

- EPBC Project Sites
- Greater Glider regional ecosystems with a known or possible association with Queensland greater gliders
- Major roads

Corridors for Analysis

- Corridors 1-3
- Corridor 4
- Connectivity assessment location
- Connectivity barrier locations

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Springfield
Residential Development

0 10 20 30 40 50 m

Transverse Mercator
GDA 2020 | Zone 56

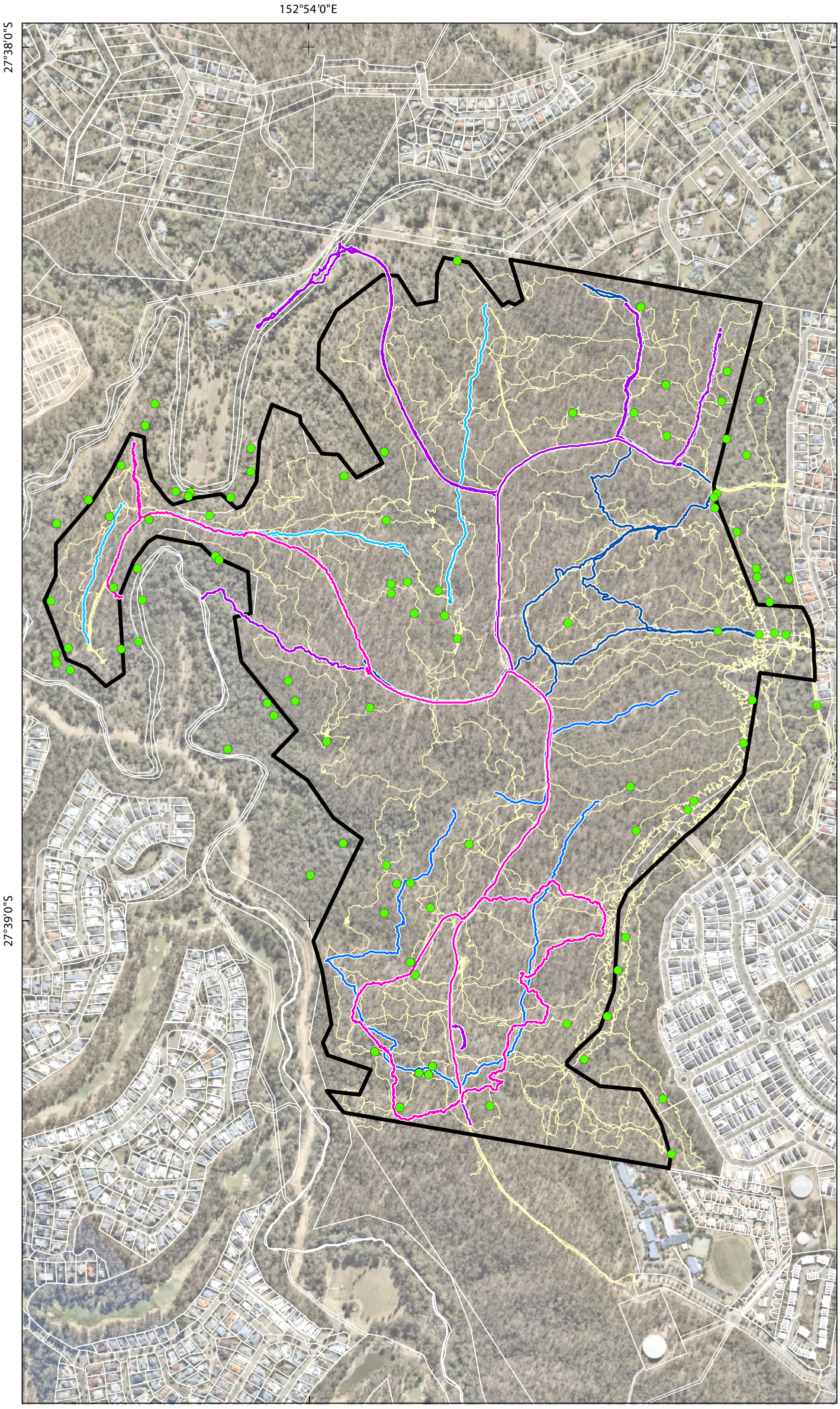
1:2,000 @ A3

Address: Springfield

9612 E 30_4_2 SFA GG Corridors A

Issue	Date	Drawn	Checked
A	24/11/2025	TF	AW

Plan A31. Field survey effort - Greater Glider



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Legend

- Qld DCDB
- Referral Area

Field Survey Effort

- GPS track logs
- Spotlighting Meander 1 (2019)
- Spotlighting Meander 2 (2019)
- Spotlighting Meander 1 (2023)
- Spotlighting Meander 2 (2023)
- Spotlighting Meander 3 (2023)
- Hollow bearing trees

Issue	Date	Description	Drawn	Checked
A	24/11/2025	Preliminary	TF	AW

0 100 200 300 m

Transverse Mercator | GDA 1994 | Zone 56 | 1:8,000 @ A3

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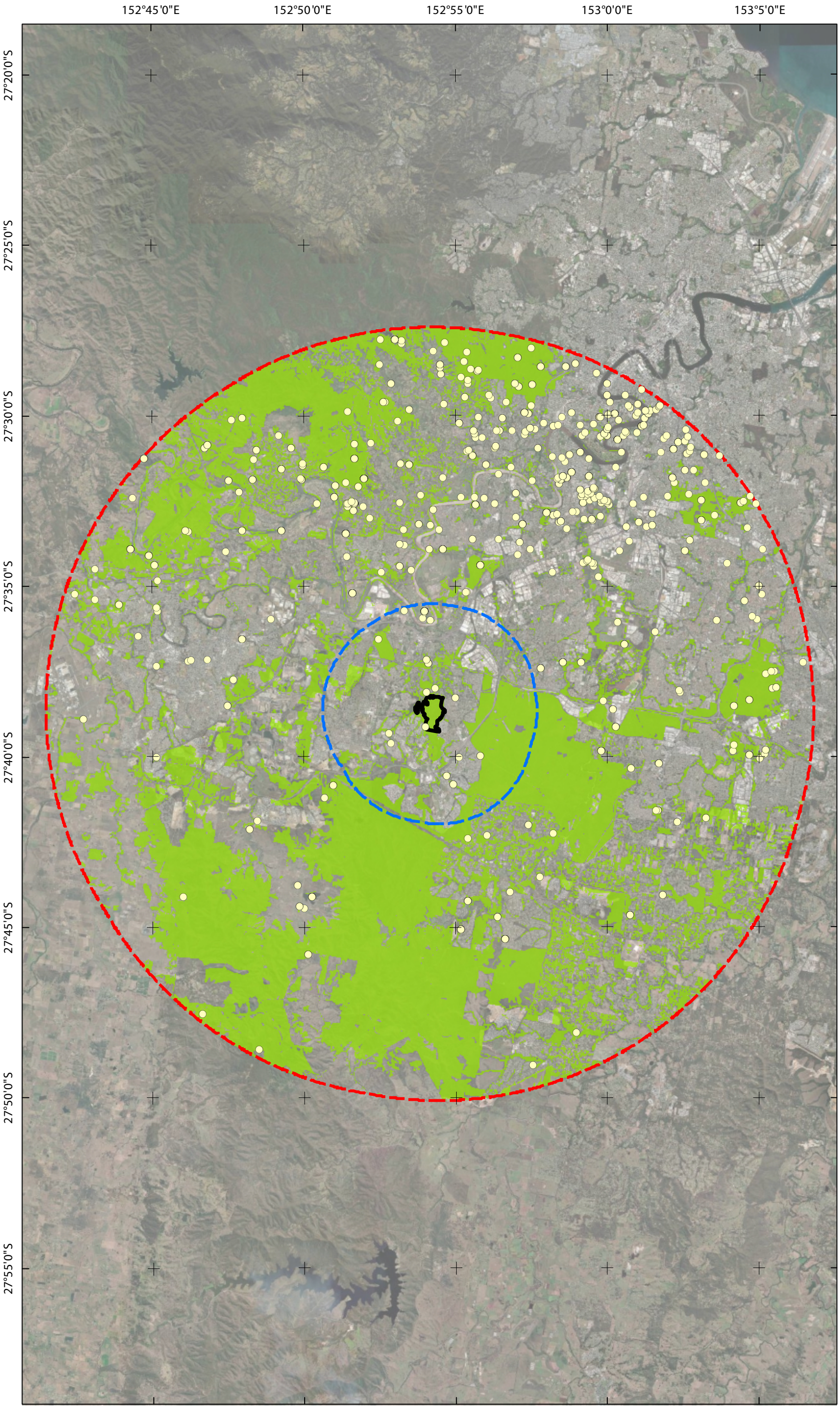
Springfield Residential Development

Address / RPD: 9999SP292760

24/11/2025 | 9612E 31 PDGG Field Survey A

Plan A32. White-throated needletail records



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Legend

- Referral Area
- 5km Referral area buffer
- 20km Referral area buffer
- White-throated Needletail Records (recorded within past 20 years within 20km of site) - ALA, 2025 [1,906]
- Potential and Known White-throated Needletail Foraging Habitat - 37%

Issue	Date	Description	Drawn	Checked
A	30/04/2026	Preliminary	TF	AW

0 1 2 3 4 5 km

Transverse Mercator | GDA 1994 | Zone 56 | 1:205,000 @ A3

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Springfield
Residential Development

Address / RPD: 9999SP292760

30/04/2026 | 9612 E 32 WTN Records A

Plan A33. Collared delma broad vegetation types – patch-level

152°55'0"E

27°40'0"S

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Legend

- Referral Area
- Impact Area
- Retention Area

Broad Vegetation Types

- Landzone 3 regional ecosystems
- Landzone 9-10 regional ecosystems

Issue	Date	Description	Drawn	Checked
A	24/06/2026	Preliminary	TF	AW

0 100 200 300 400 500 m

Transverse Mercator | GDA 1994 | Zone 56 | 1:14,000 @ A3

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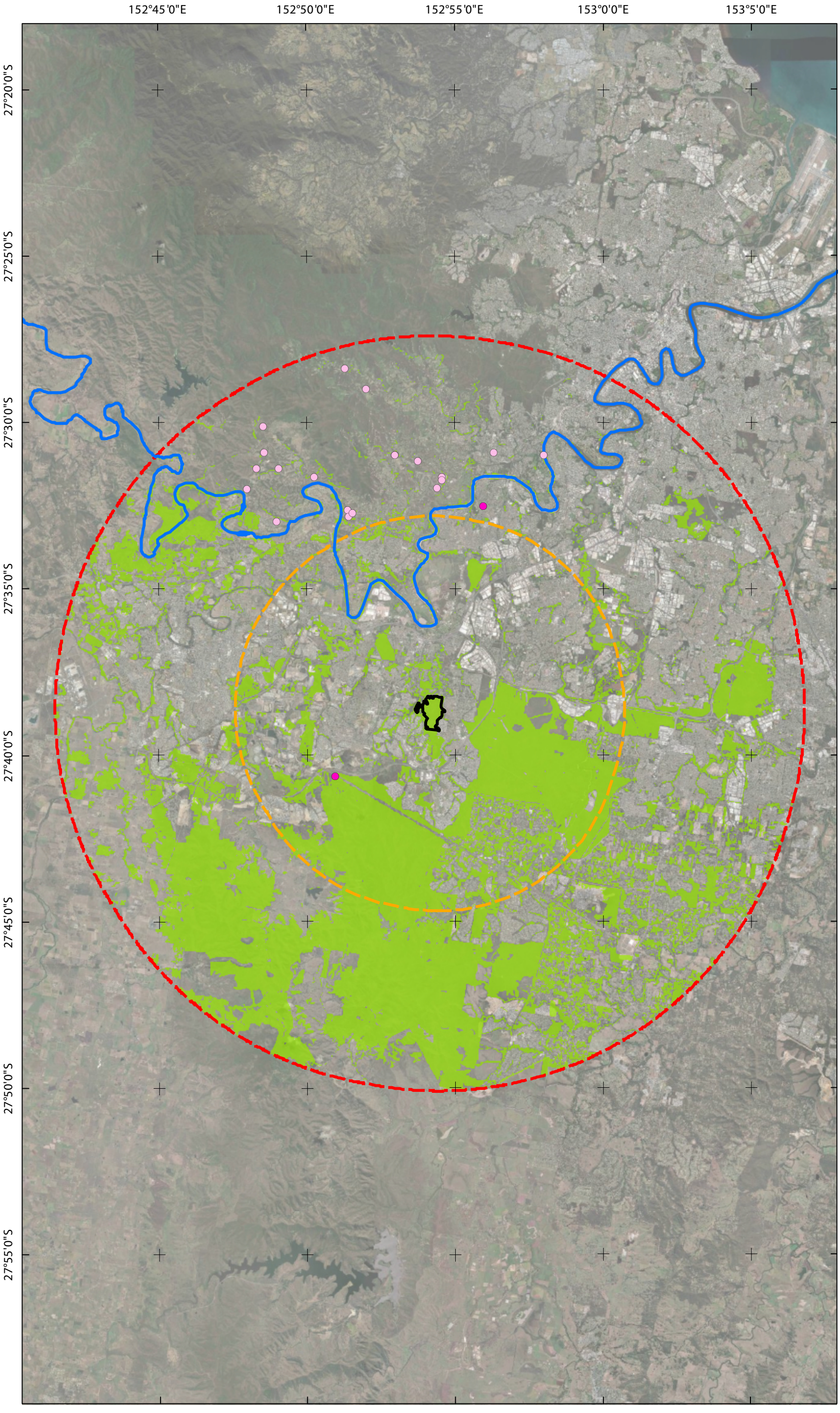
Address / RPD: 9999SP292760

24/06/2026 | 9612 E 33 CD Patch Level Vegetation A

Plan A34. Collared delma records and broad vegetation types – locality



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Legend

- Referral Area
- 10km Referral area buffer
- 20km Referral area buffer
- Brisbane River
- Collared Delma Broad Vegetation Types within 20km of Referral area - 29%
- Collared Delma records within 20km of referral area [20] * Species records are generalised on grid systems ranging from 5m to 4.5km.
- Collared Delma records within 20km of referral area [2] * Species records are generalised on a 29.7 km grid.

Issue	Date	Description	Drawn	Checked
A	25/06/2026	Preliminary	TF	AW

0 1 2 3 4 5 km

Transverse Mercator | GDA 1994 | Zone 56 | 1:210,000 @ A3

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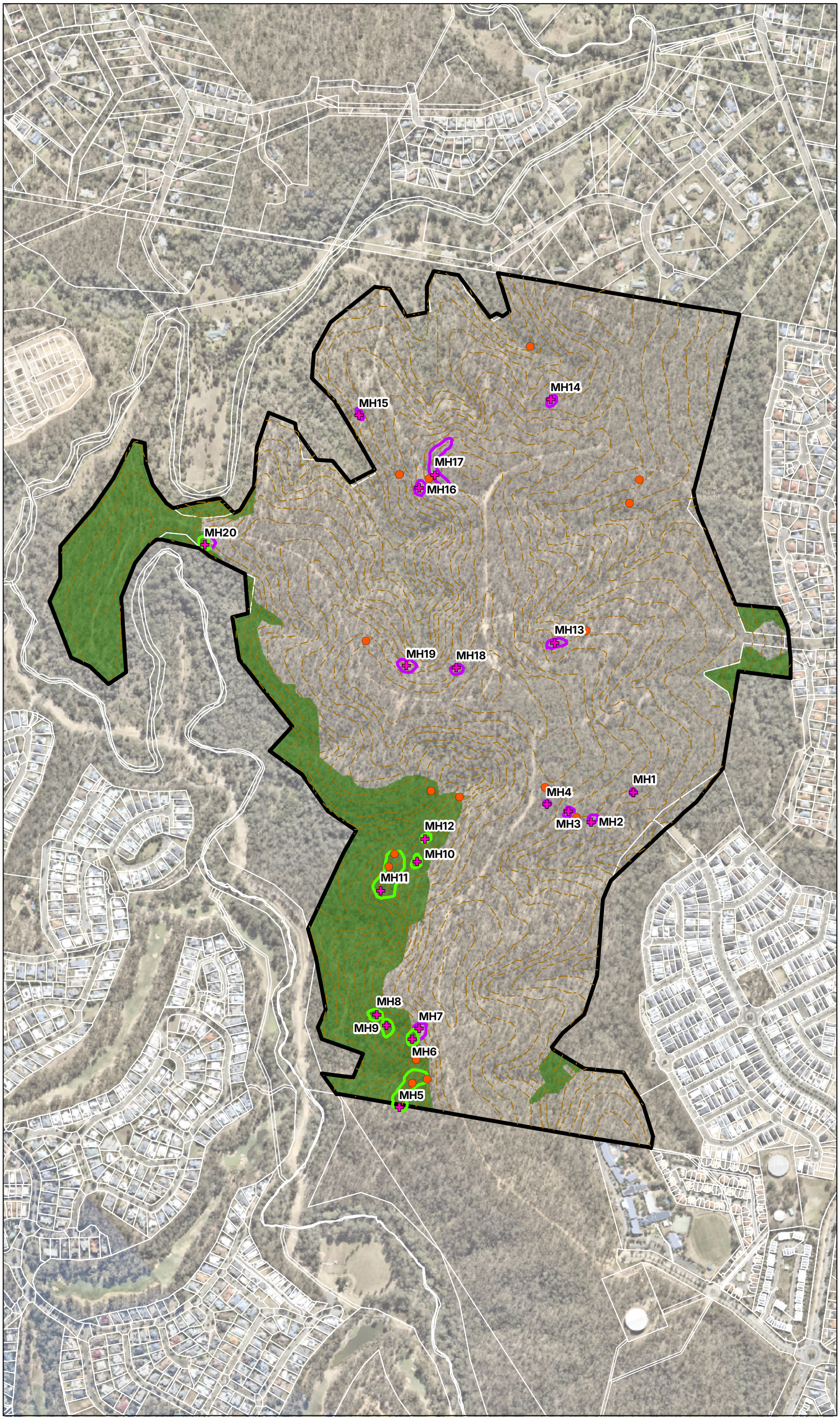
Springfield Residential Development

Address / RPD: 9999SP292760

25/06/2026 | 9612 E 34 CD Broad Level Vegetation A

Plan A35. Collared delma microhabitat survey



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Legend

- Qld DCDB
- Referral Area
- Site Contours (5m)
- Retention Area

Potential microhabitat

- Potential microhabitat impacted [0.77 ha]
- Potential microhabitat retained [1.08 ha]
- Potential microhabitat sites
- Isolated potential microhabitat attributes

Issue	Date	Description	Drawn	Checked
A	3/07/2026	Preliminary	TF	AW

0 50 100 150 200 250 m

Transverse Mercator | GDA 1994 | Zone 56 | 1:8,500 @ A3

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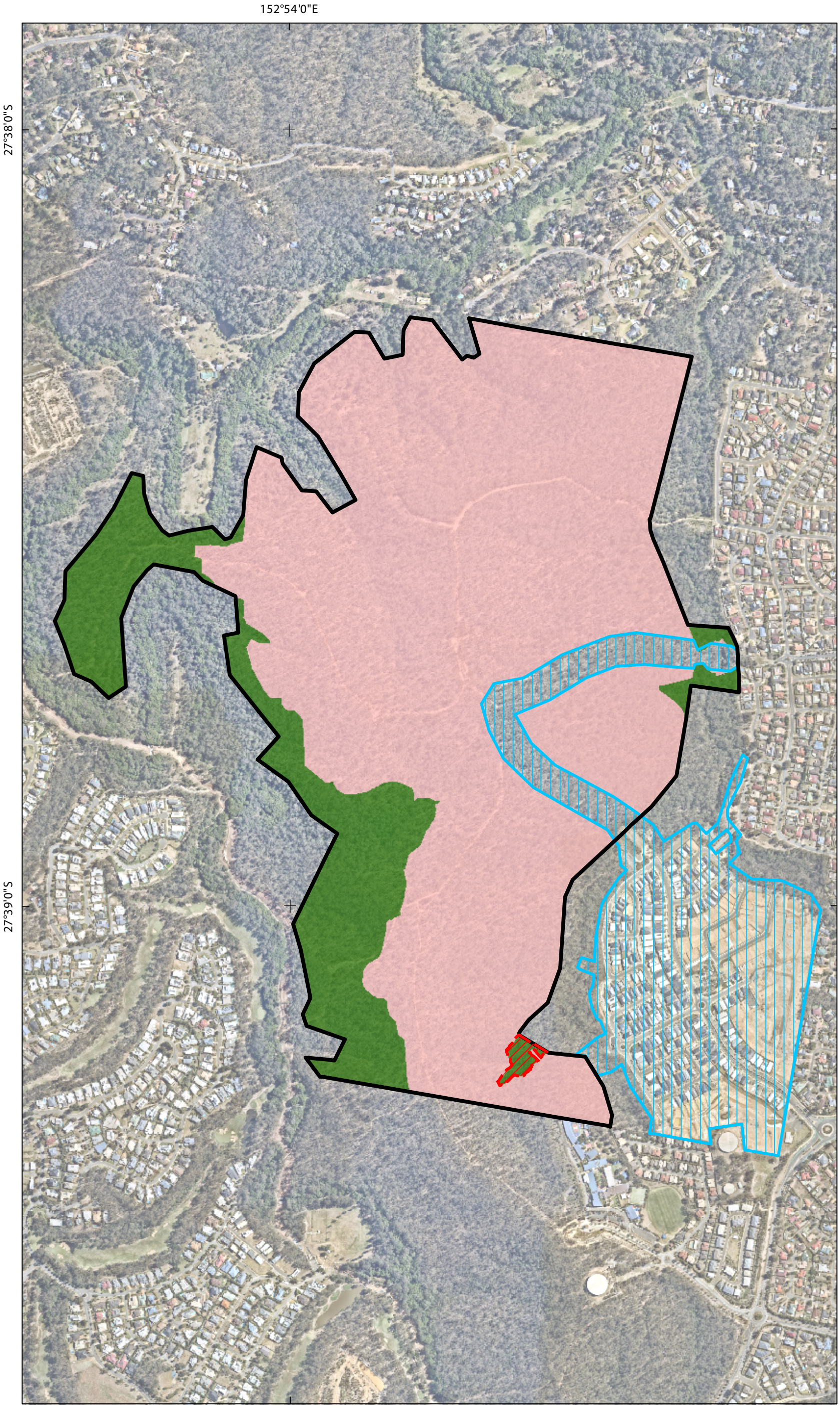
Springfield
Residential Development

Address / RPD: 9999SP292760

3/07/2026 | 9612 E 35 CD Potential Habitat A

Plan A36. MNES Impact Assessment - Koala



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Legend

- Referral Area
- Areas to be impacted under approval EPBC 2014/7306
- Retention Areas [27.5 ha]
- Koala critical habitat impacted [126.45 ha]
- Koala critical habitat functionally lost [0.57 ha]

Issue	Date	Description	Drawn	Checked
A	25/06/2026	Preliminary	TF	AW

0 100 200 300 m

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

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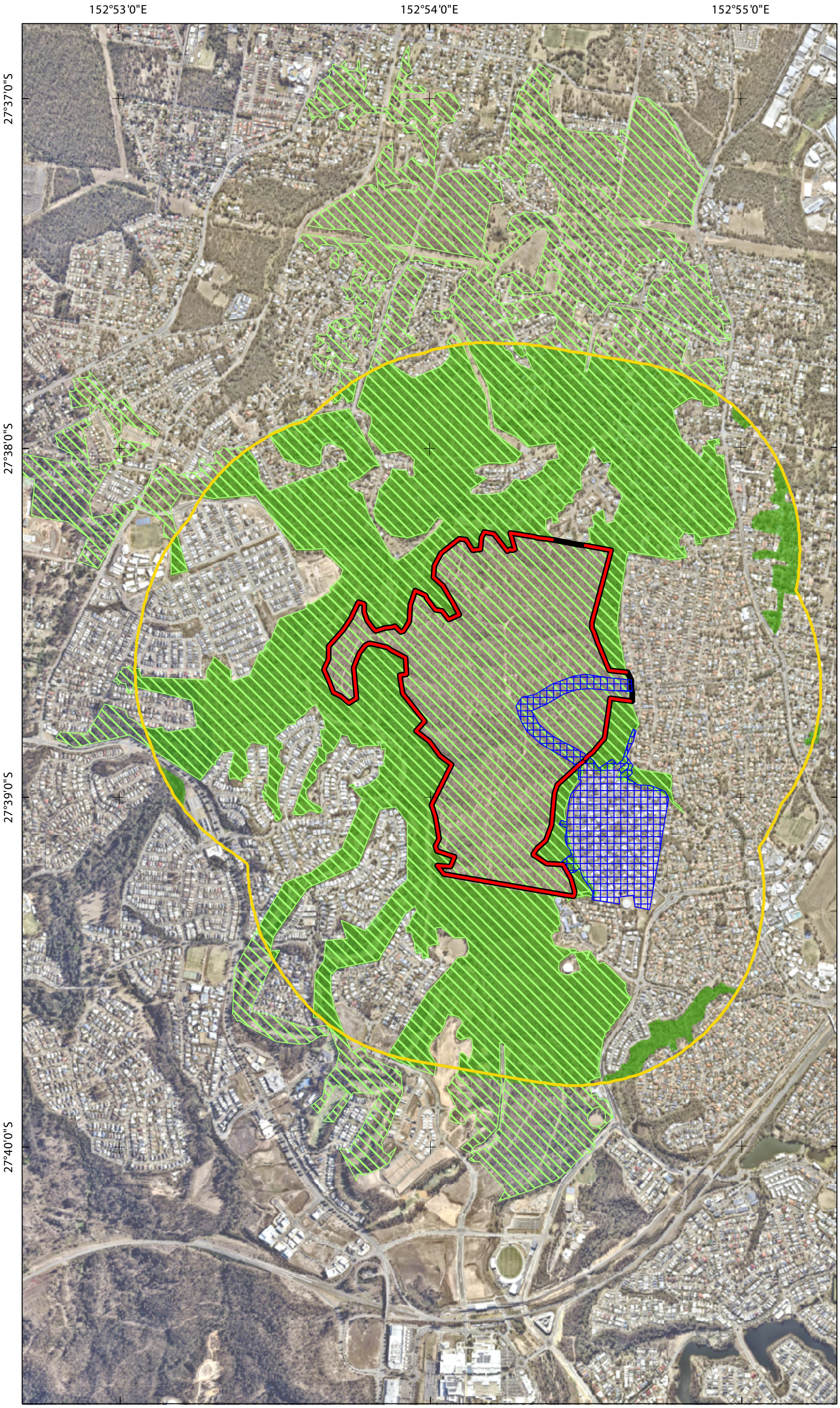
Address / RPD: 9999SP292760

25/06/2026 | 9612 E 36 PD Koala Habitat Impact A

Plan A37. Koala context assessment



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Legend

- Referral Area
- 1km buffer
- Percentage of Koala critical habitat within 1km of referral site (48%)
- Percentage of referral site boundary length supporting a connection off and on site to Koala critical habitat - 98%
- Size of Koala critical habitat patch > 500 ha
- EPBC 2014/7306 approval

Issue	Date	Description	Drawn	Checked
A	25/06/2026	Preliminary	TF	AW

0 100 200 300 400 500 m

Transverse Mercator | GDA 1994 | Zone 56 | 1:20,000 @ A3

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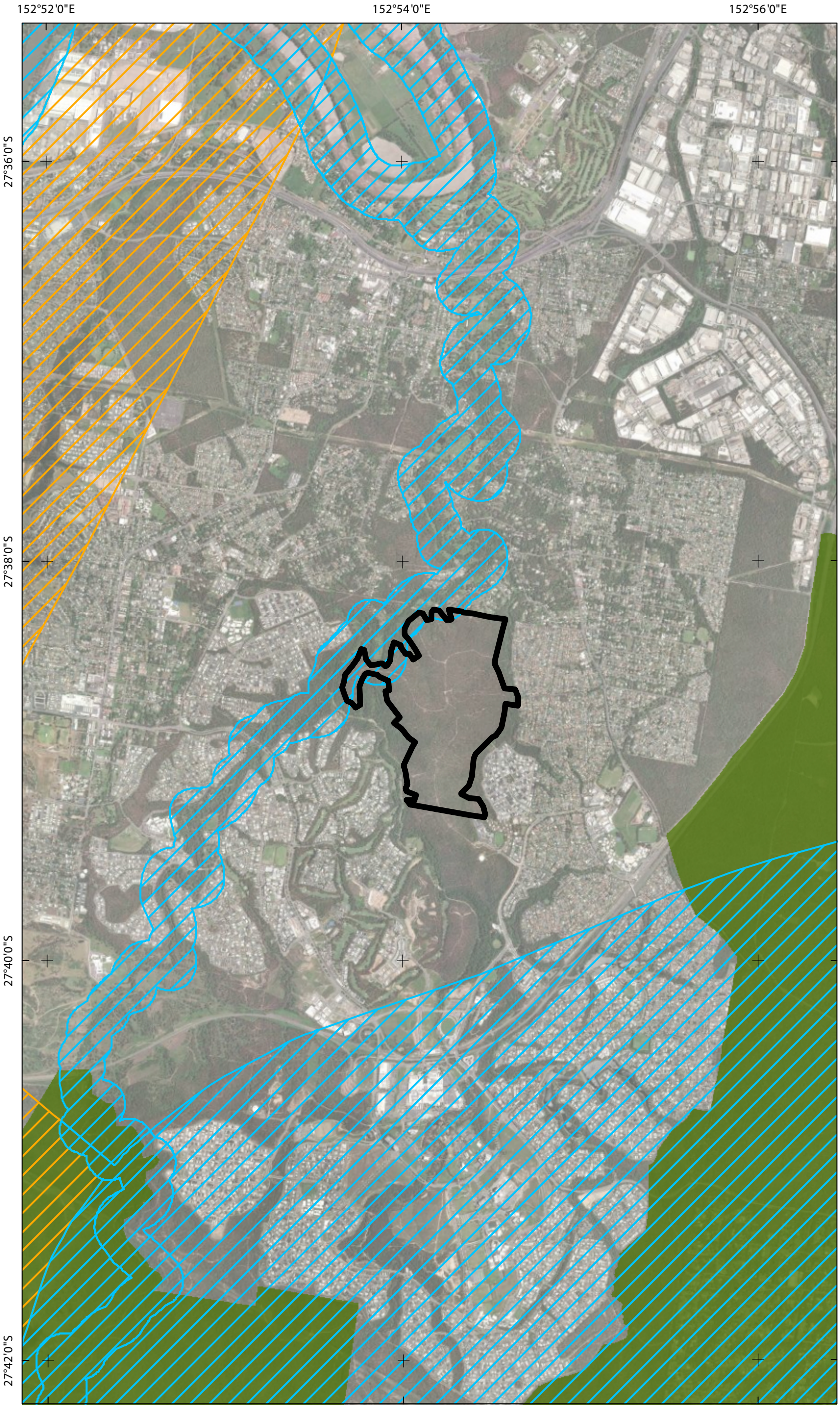
Address / RPD: 9999SP292760

25/06/2026 | 9612.E.37.PD.Koala Context Assessment A

Plan A38. Ecological corridors



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Legend

- Referral Area
- Regional biodiversity corridor
- Statewide Corridor
- Regional Corridor

Issue	Date	Description	Drawn	Checked
A	25/06/2026	Preliminary	TF	AW

0 200 400 600 800 1,000 m

Transverse Mercator | GDA 1994 | Zone 56 | 1:35,000 @ A3

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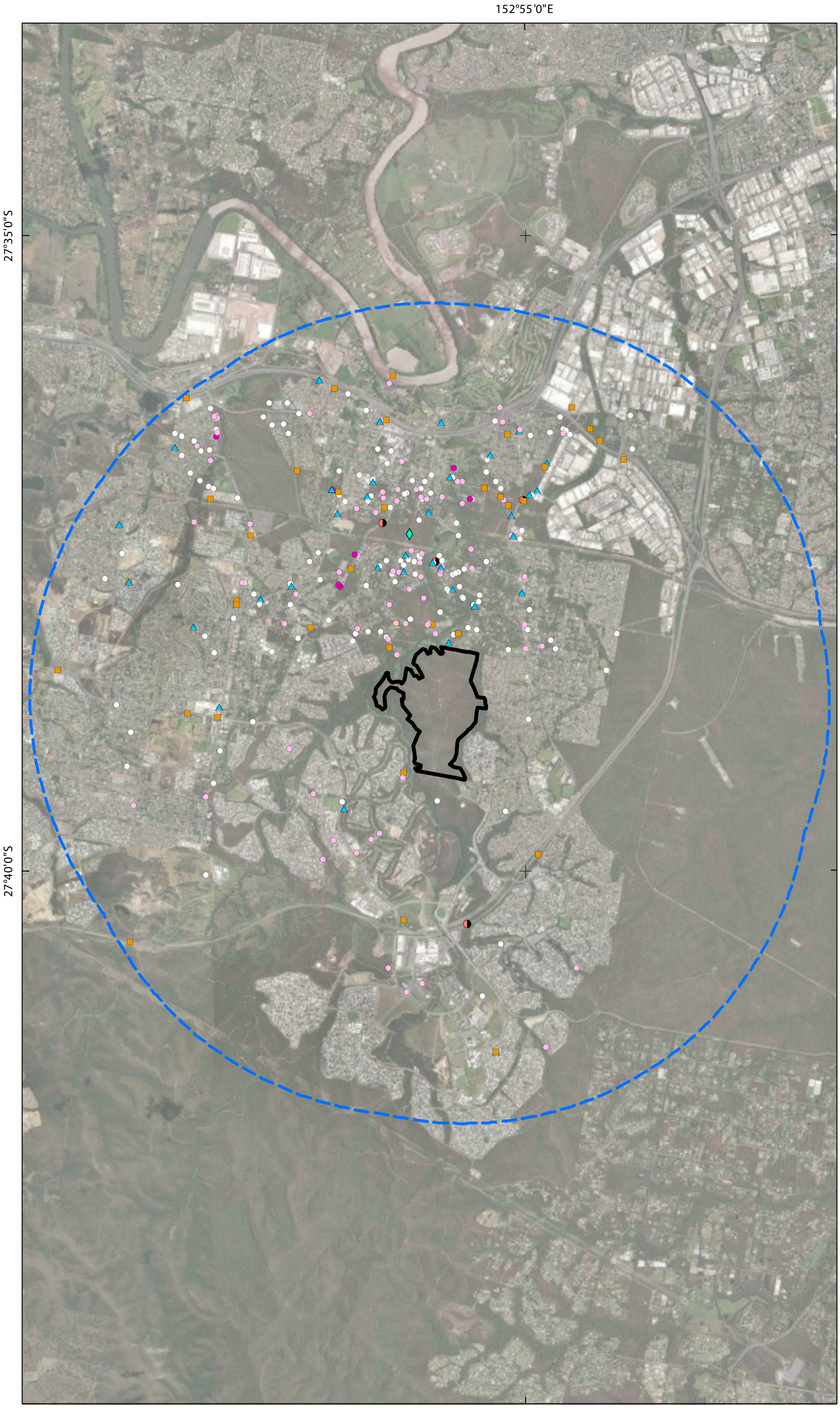
25/06/2026 | 9612 E 38 PD Ecological Corridors A

Plan A39. Koala hospital records



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Legend

- Referral Area
- 5km Referral area buffer

Qld Koala Hospital Records (DESI, 2016-2023)

- Deceased
- Injured
- Sick and/or wasted
- Sick & Injured
- Orphaned
- Vehicle hit
- Other incident type/ category not recorded

Issue	Date	Description	Drawn	Checked
A	25/06/2026	Preliminary	TF	AW

0 1 2 km

Transverse Mercator | GDA 1994 | Zone 56 | 1:55,000 @ A3

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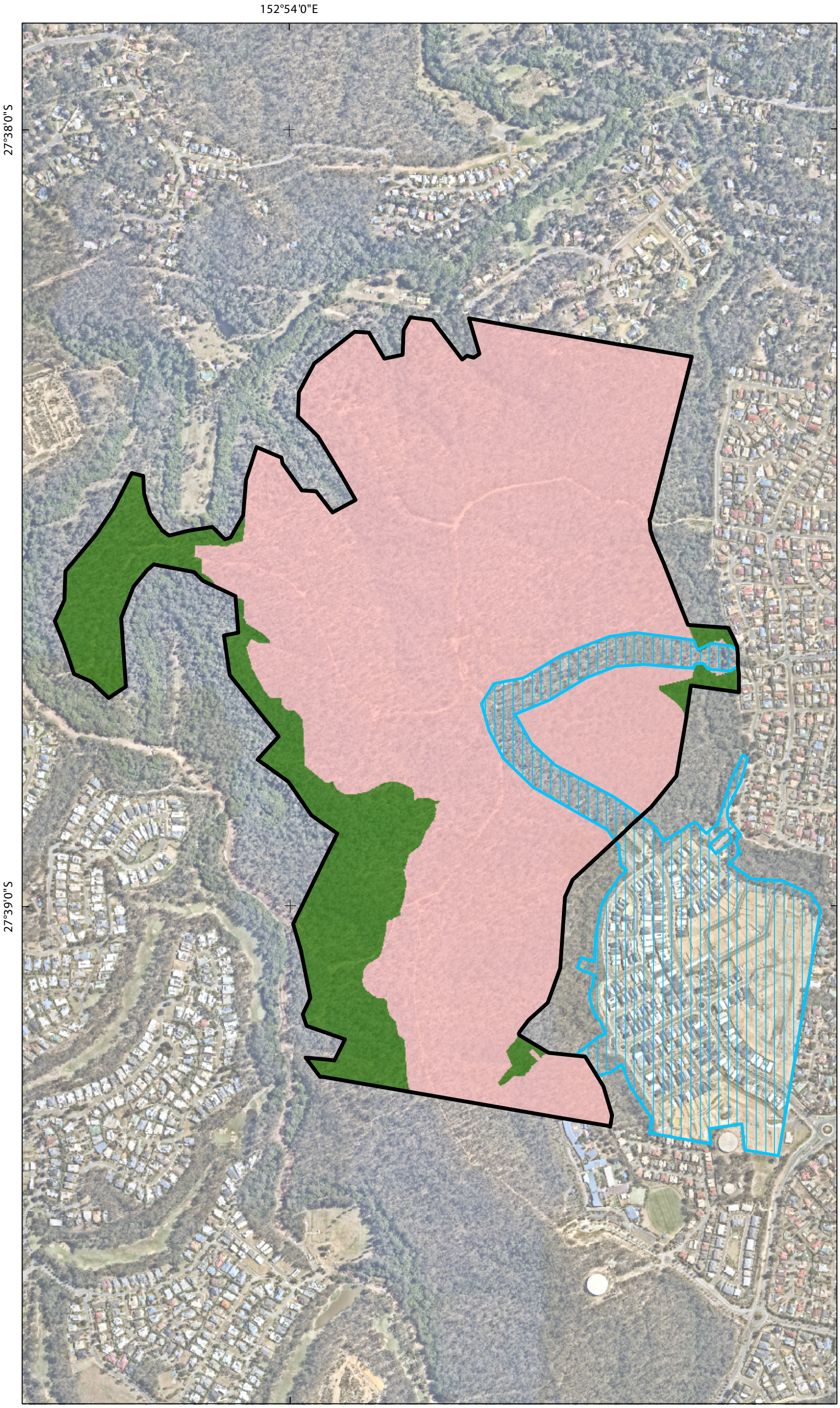
25/06/2026 | 9612 E 39 PD Koala Hospital A

Plan A40. MNES Impact Assessment - Grey-headed Flying-fox



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Legend

- Referral Area
- Areas to be impacted under approval EPBC 2014/7306
- Retention Areas [27.5 ha]
- Grey-headed Flying-fox foraging habitat impacted [126.45 ha]

Issue	Date	Description	Drawn	Checked
A	25/06/2026	Preliminary	TF	AW

0 100 200 300 m

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

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25/06/2026 | 9612 E 40 PDGHFF Habitat Impact A

Plan A41. Grey-headed Flying-fox context assessment

152°50'0"E
153°0'0"E
27°20'0"S
27°30'0"S
27°40'0"S
27°50'0"S

Toowong Perrin Park, Josling St (584)
UQ Gardens, Brisbane (1259)
Westlake Dr, Mount Ommaney (400)
Riverhills, Zambesi Street (1025)
Edenbrooke (1200)
Beryl Roberts Park, Coopers Plains (745)
Sunnybank (Les Atkinson Park) (452)
Pan Pacific Peace Garden, Redbank (428)
Lilac St, Inala (1219)
Woodend (191)
Goleby Av, Queens Park (595)
Paice St, Bundamba (574)
Barbara St, Camira (140)
Parkinson, Avondale Crescent (419)
Golden Av, Calamvale (744)
Redbank Plains, Phillip Street (878)
Yamanto (479)
Regents Park, Emerald Drive (433)
Magnesium Dr, Crestmead (1203)
Warana Ct, Boronia Heights (848)

Notes:
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Legend

- Referral Area
- 5km Referral area buffer
- 20km Referral area buffer
- Potential and Known Grey-headed Flying-fox Foraging Habitat - 37%

Grey-headed Flying-fox Roosts (Fed. Gov. 2024)

- Grey-headed Flying-fox Roost/Camp Active Within Recent Surveys
- Nationally Important Grey-headed Flying-fox Roost/Camp Active Within Recent Surveys
- Grey-headed Flying-fox Roost/Camp Active Within Recent Surveys With a Population Level of 3 or Higher
- Nationally Important Grey-headed Flying-fox Roost/Camp Active Within Recent Surveys With a Population Level 3 or Above

Issue	Date	Description	Drawn	Checked
A	25/06/2026	Preliminary	TF	AW

0 1 2 3 4 5 Kilometers

Transverse Mercator | GDA 1994 | Zone 56 | 1:200,000 @ A3

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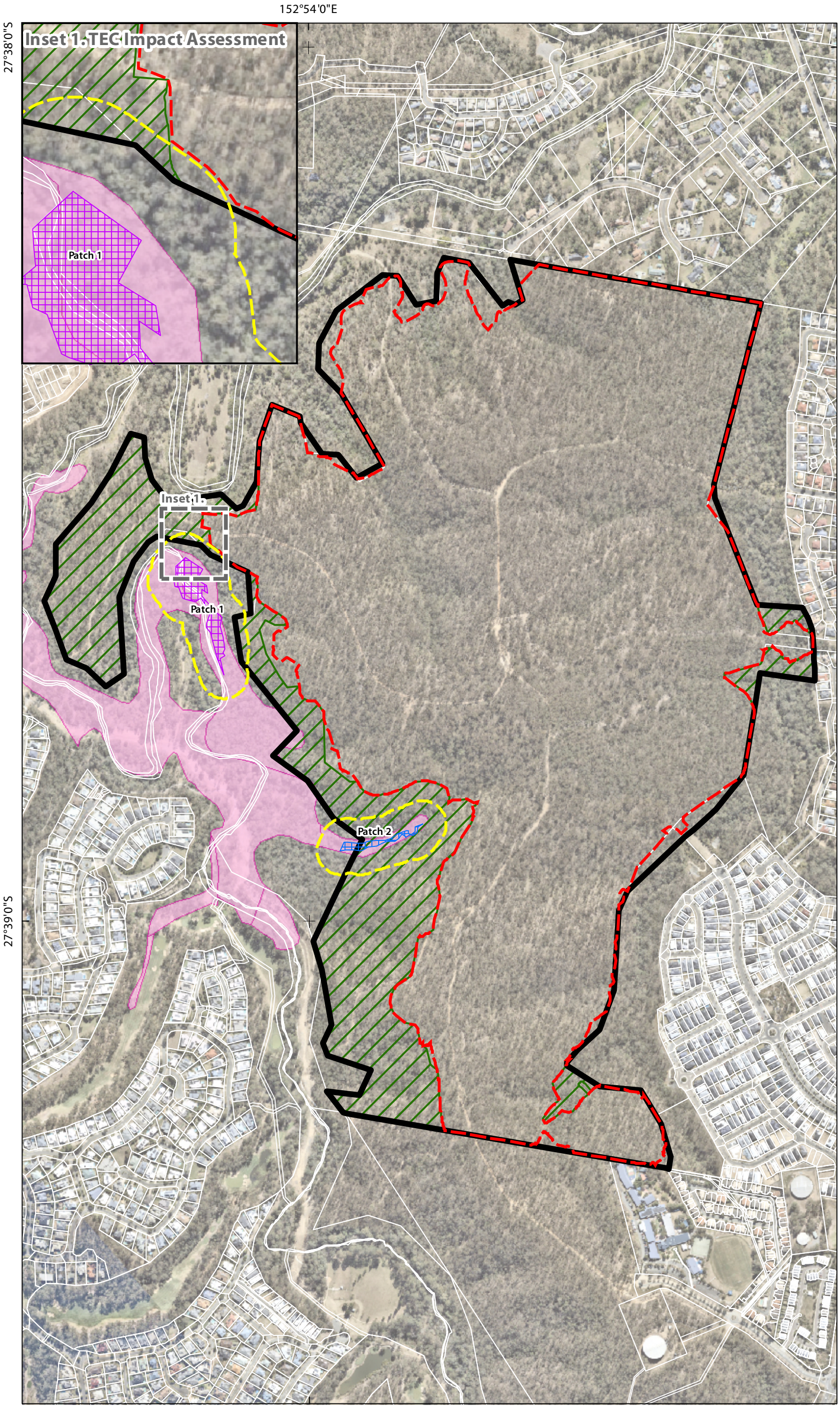
25/06/2026 | 9612E 41 PDGHFF Context Assessment A

A42. MNES Impact Assessment – Lowland Rainforest of Subtropical Australia TEC



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Legend

- Qld DCDB
- Referral Area
- Proposed Earthworks Extent
- Retention Areas
- Lowland rainforest of subtropical Australia suitable habitat - Qld RE: 12.3.16
- Confirmed location of lowland rainforest of subtropical Australia (Patch 1)
- Confirmed location of lowland rainforest of subtropical Australia (Patch 2)
- Ground-truthed RE 12.3.16 (LRSA TEC Indicator) 50m buffer

Issue	Date	Description	Drawn	Checked
A	25/06/2026	Preliminary	TF	AW

0 100 200 300 m

Transverse Mercator | GDA 1994 | Zone 56 | 1:8,000 @ A3

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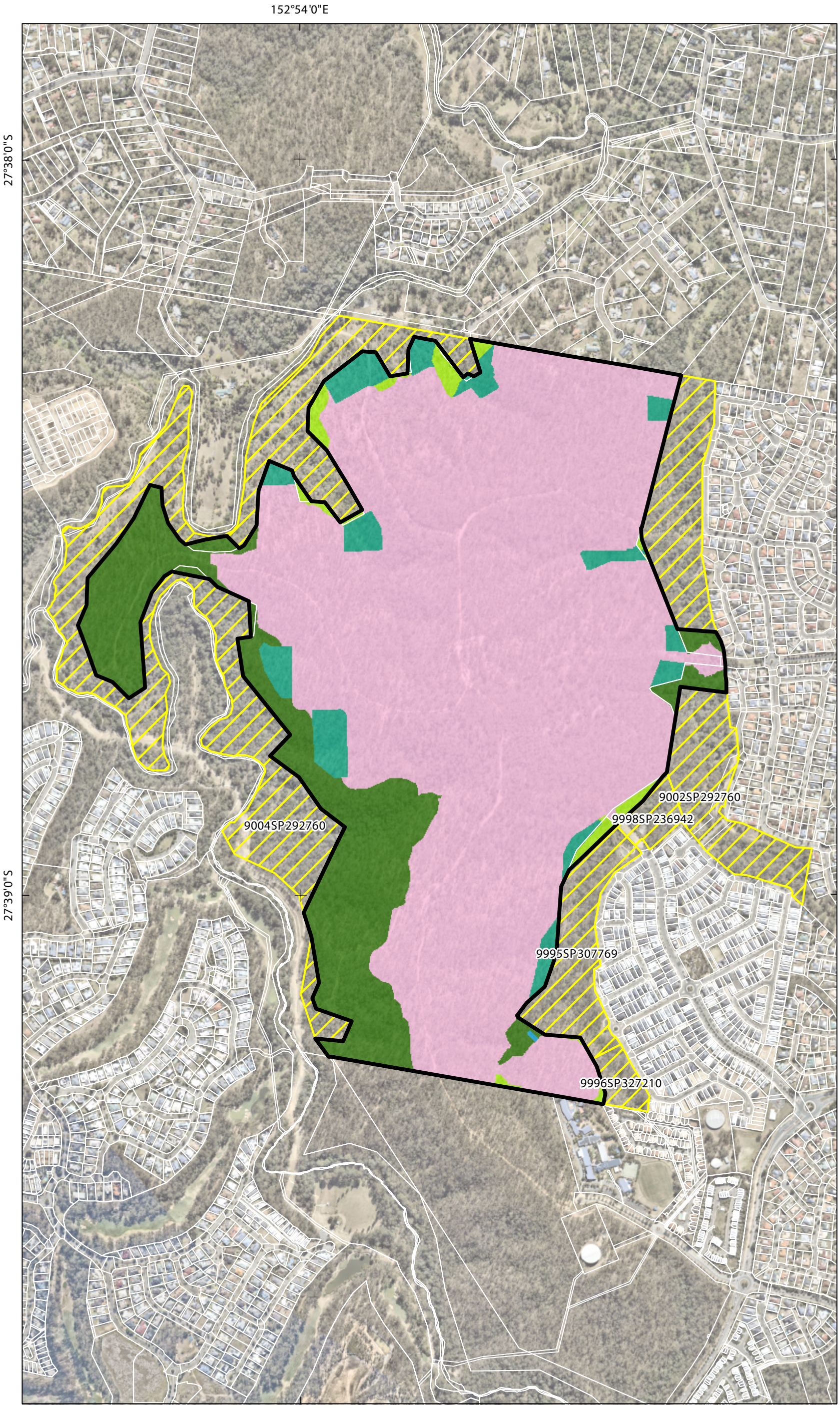
Address / RPD: 9999SP292760

25/06/2026 | 9612 E 42 PDMNES TEC Impact A

Plan A43. Historical landholdings and dedications



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Legend

- Qld DCDB
- Referral Area [161.4 ha]
- Original proponent landholding dedicated to Ipswich City Council (outside referral area) [56.4 ha]

Development Footprint

- Proposed urban [123 ha]
- Bioretention/drainage basins [8.2 ha]
- Indicative location of external stormwater infrastructure as approved by Council [0.1 ha]
- Temporary Impacts (rehabilitation) - includes additional minor clearing for batters [2.6 ha]

No Impacts

- Vegetation retention [27.5 ha]

Issue	Date	Description	Drawn	Checked
A	25/06/2026	Preliminary	TF	AW

0 100 200 300 m

Transverse Mercator | GDA 1994 | Zone 56 | 1:9,500 @ A3

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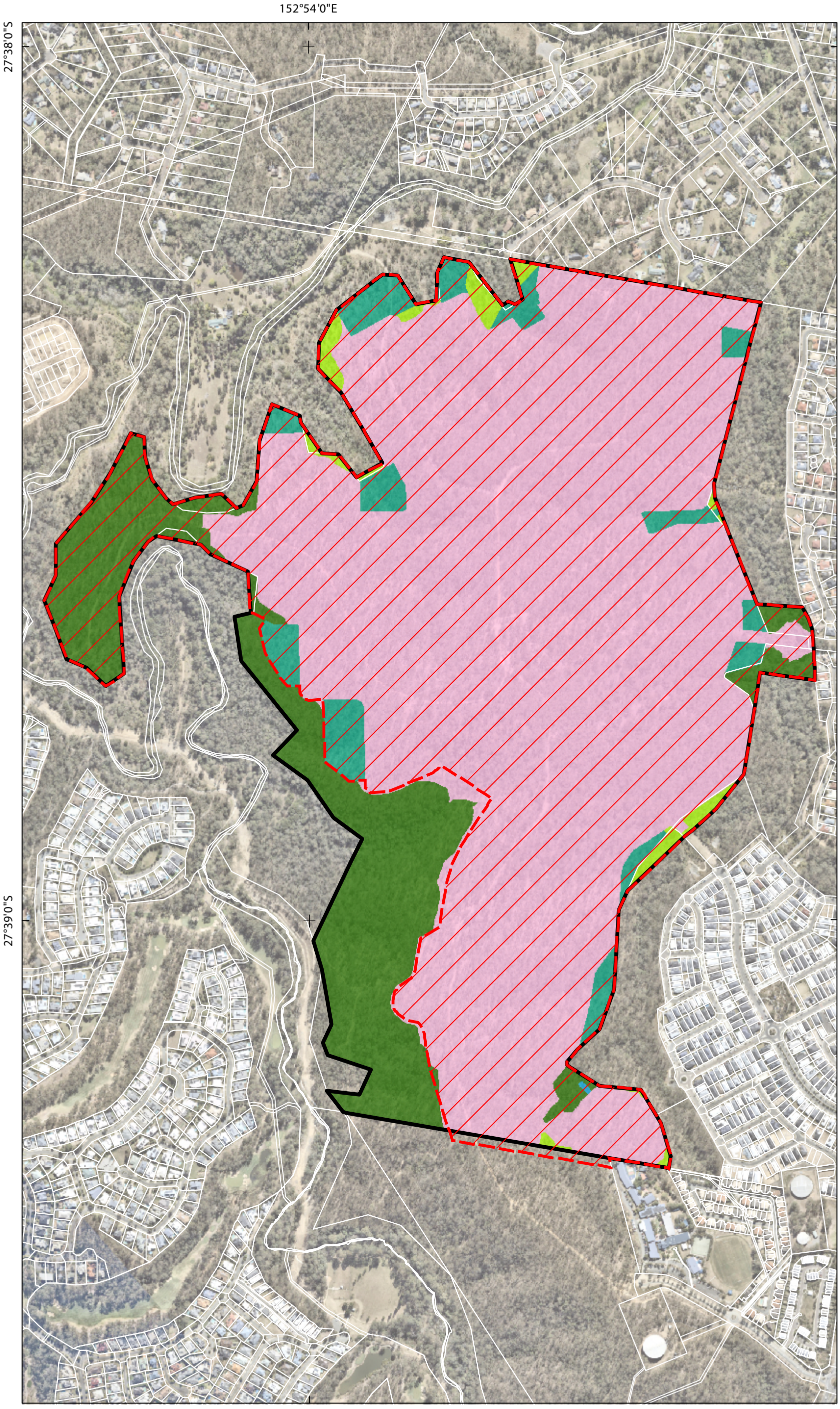
Springfield
Residential Development

Address / RPD: 9999SP292760

25/06/2026 | 9612 E 43 Historical Land Dedication A

Plan A44. Design minimisation



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Legend

- Qld DCDB
- Referral Area [161.4 ha]
- Original PD Impact Extent [143.7 ha]

Current Proposed Development Footprint

- Proposed urban [123 ha]
- Bioretention/drainage basins [8.2 ha]
- Indicative location of external stormwater infrastructure as approved by Council [0.1 ha]
- Temporary Impacts (rehabilitation) - includes additional minor clearing for batters [2.6 ha]

No Impacts

- Vegetation retention [27.5 ha]

Issue	Date	Description	Drawn	Checked
A	25/06/2026	Preliminary	TF	AW

0 100 200 300 m

Transverse Mercator | GDA 1994 | Zone 56 | 1:8,000 @ A3

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Springfield
Residential Development

Address / RPD: 9999SP292760

25/06/2026 | 9612E 44 Design Minimisation A

A45. Proposed shade cloth TEC fencing locations

152°54'0"E

27°38'0"S

27°39'0"S

Patch 1

Patch 2

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Legend

- Qld DCDB
- Referral Area
- Proposed Earthworks Extent
- Retention Areas
- Lowland rainforest of subtropical Australia suitable habitat - Qld RE: 12.3.16
- Confirmed location of lowland rainforest of subtropical Australia (Patch 1)
- Confirmed location of lowland rainforest of subtropical Australia (Patch 2)
- Ground-truthed RE 12.3.16 (LRSA TEC Indicator) 50m buffer
- Proposed location of temporary shade cloth TEC fencing during construction

Issue	Date	Description	Drawn	Checked
A	25/06/2026	Preliminary	TF	AW

0 100 200 300 m

Transverse Mercator | GDA 1994 | Zone 56 | 1:8,000 @ A3

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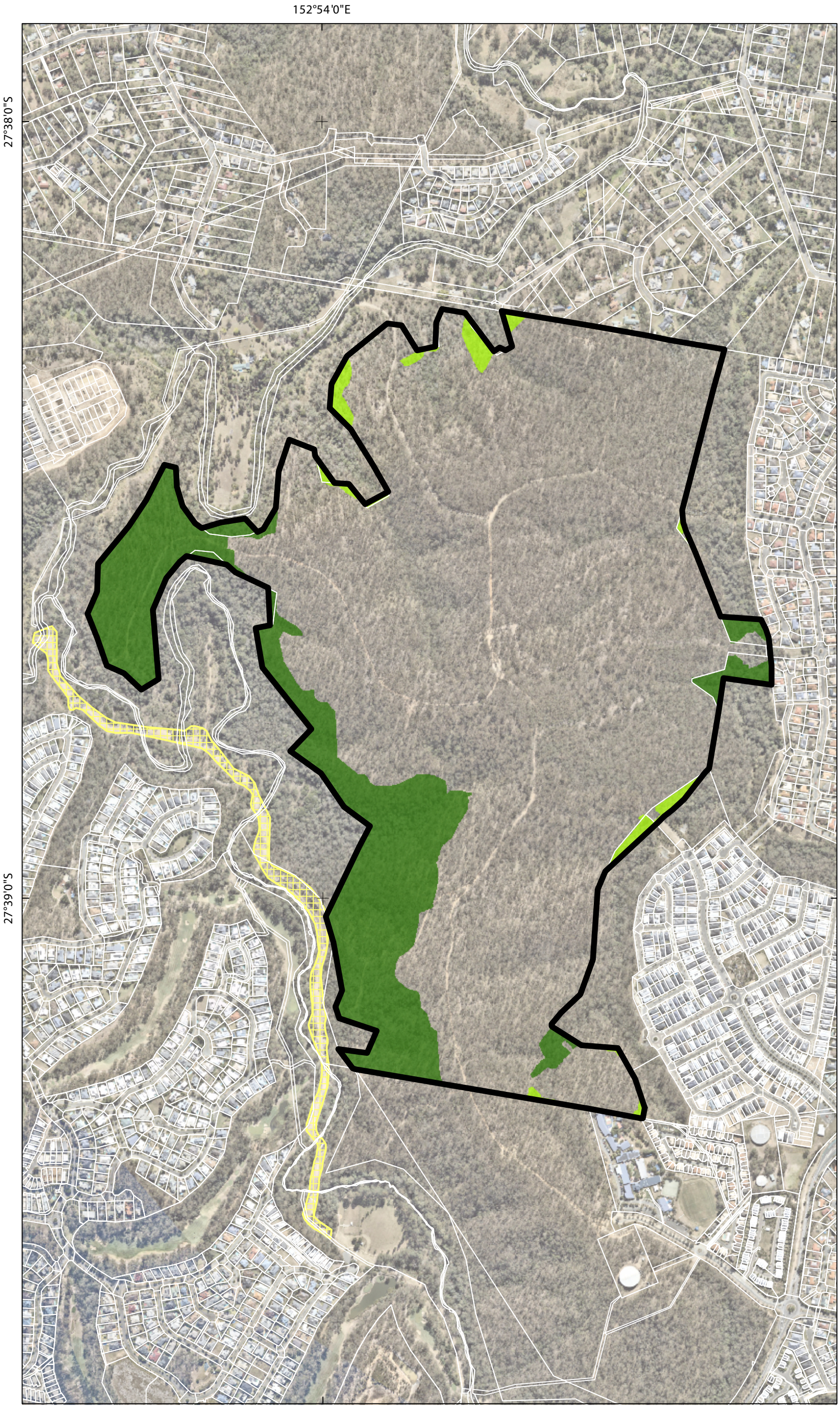
Address / RPD: 9999SP292760

25/06/2026 | 9612 E 45 PDTEC Fencing A

Plan A46. On-site rehabilitation areas



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Legend

- Qld DCDB
- Referral Area [161.4 ha]

Rehabilitation Areas

- Temporary impact areas subject to rehabilitation [2.6 ha]
- Vegetation retention area to be rehabilitated [27.5 ha]
- Proposed creek mitigation planting area subject to Council approval

Issue	Date	Description	Drawn	Checked
A	25/06/2026	Preliminary	TF	AW

0 100 200 300 m

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

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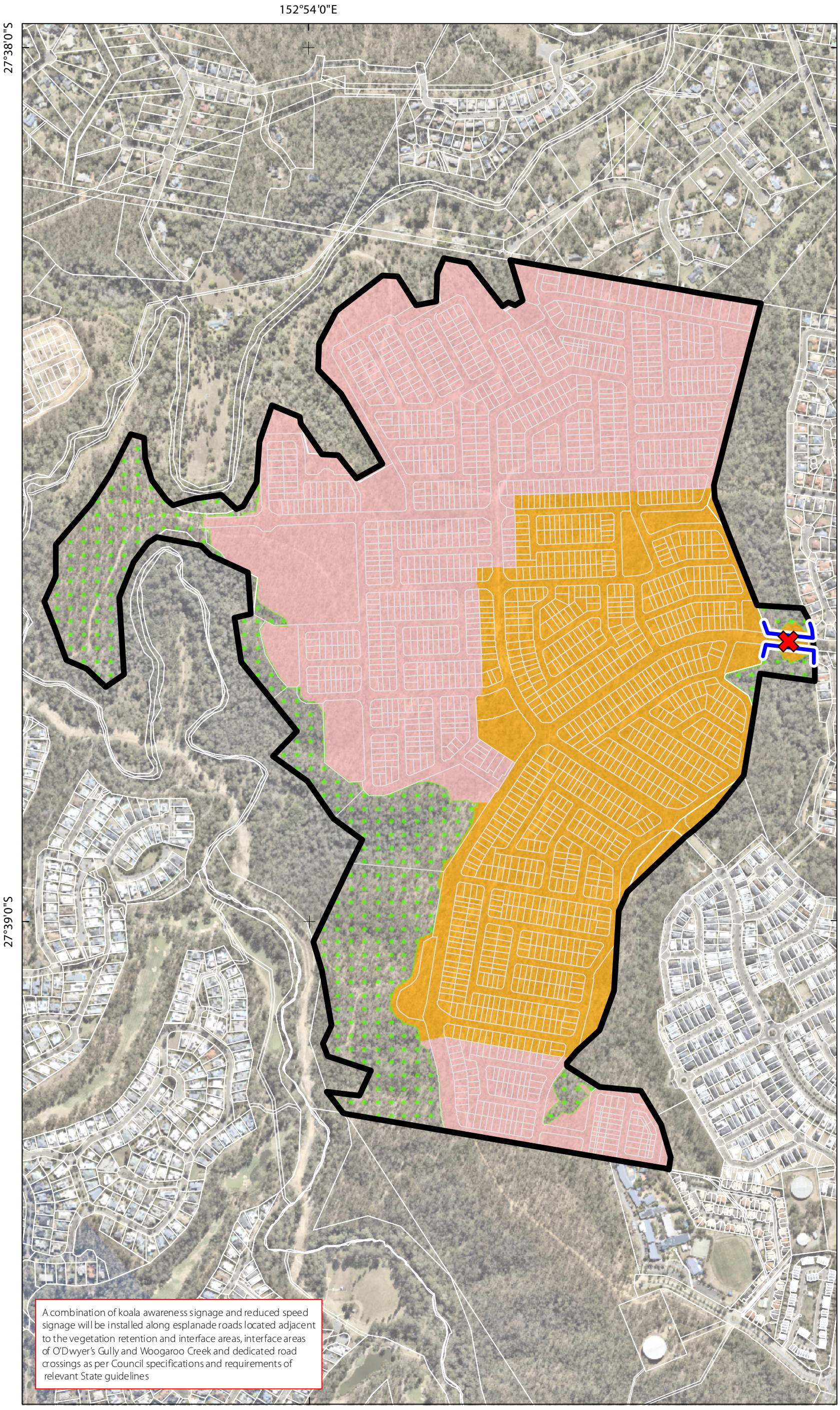
Address / RPD: 9999SP292760

25/06/2026 | 9612E 46 PDOnsite Rehab A

Plan A47. Fauna sensitive design measures



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Legend

- Qld DCDB
- Referral Area [161.4 ha]

Village Areas

- Stage 1 - Village 2 [57.9 ha]
- Stage 2 - Village 3 [76.0 ha]
- Proposed Lot Layout (indicative)

No Impacts

- Vegetation retention [27.5 ha]

Fauna Sensitive Design Measures

- Fauna movement infrastructure (design to be approved by Ipswich City Council)
- Directional Koala exclusion fencing

Issue	Date	Description	Drawn	Checked
A	8/04/2025	Preliminary	TF	AW
B	25/06/2026	Amendments	TF	AW

0 100 200 300 m

Transverse Mercator | GDA 1994 | Zone 56 | 1:8,000 @ A3

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Springfield
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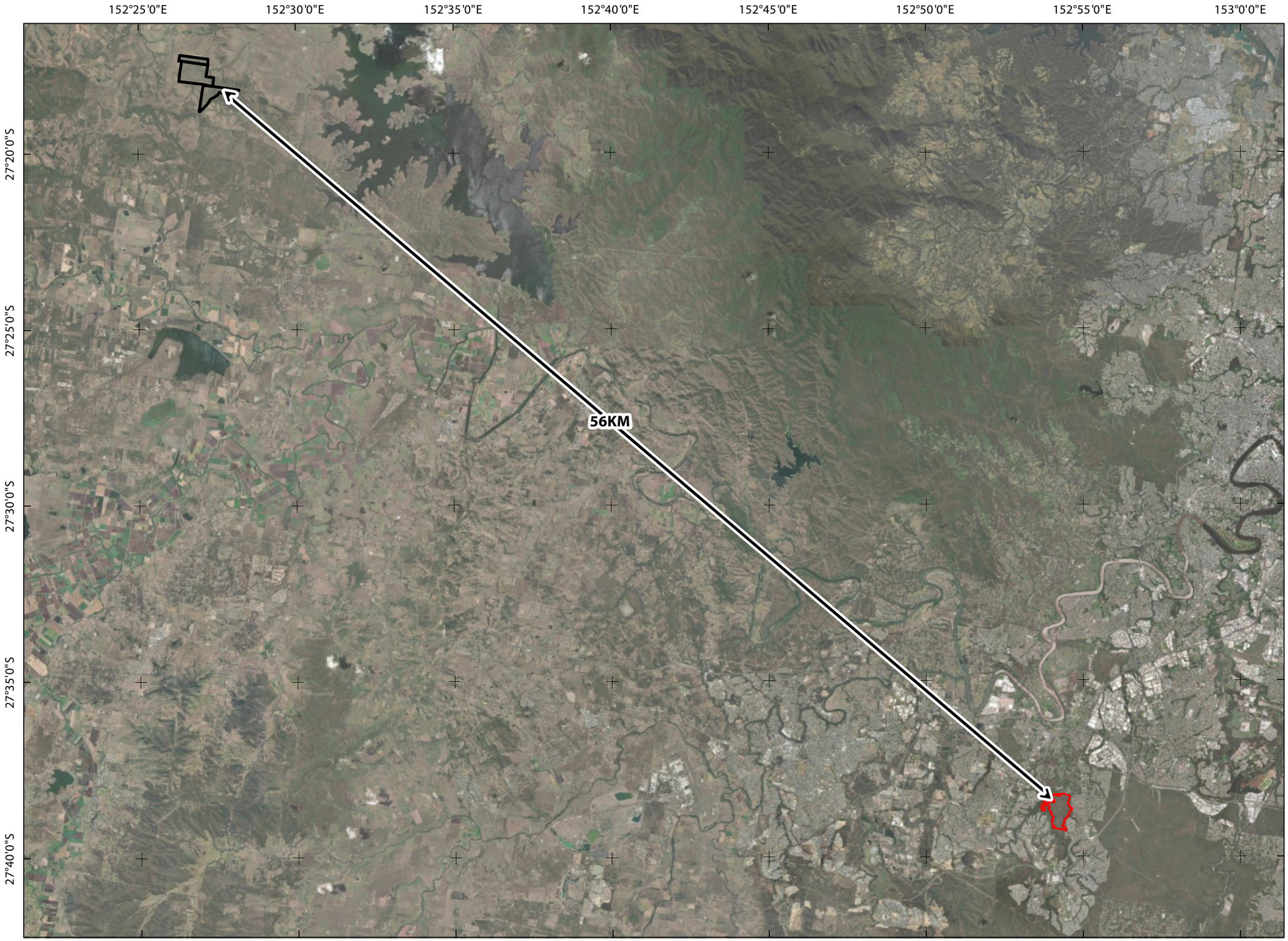
Address / RPD: 9999SP292760

25/06/2026 | 9612 E 47 Fauna Sensitive Design B

Plan A48. Esk Landholdings Offset Area – Context



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Legend

- Qld DCDB
- Esk Landholdings Offset Area
- Springfield Impact Site

Issue	Date	Description	Drawn	Checked
A	25/06/2026	Preliminary	TF	AW

0 1 2 3 4 5 km

Transverse Mercator | GDA 2020 | Zone 56 | 1:200,000 @ A3

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Cherish Enterprises Pty Ltd

Springfield
Residential Development

Address / RPD: Esk

25/06/2026 | 9612 E 48 PD Esk Offset Context A

Plan A49. Esk Landholdings Offset Area – Location of Offset Area and BLEs

152°27'0"E

152°28'0"E

27°18'0"S

Notes:
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Legend

- Esk Landholdings Offset Area [300.3 ha]
- Esk Offset Area [280.2 ha]
- Non-offset Land Use Area [20.1 ha]
- Building Location Envelopes (BLEs) - 9.5 ha
- Asset Protection Zone
  Bushfire Management Zone - 10.6 ha
- Indicative Access Track

Issue	Date	Description	Drawn	Checked
B	25/06/2026	Revised Area	TF	AW

0 100 200 300 400 m

Transverse Mercator | GDA 2020 | Zone 56 | 1:13,000 @ A3

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Cherish Enterprises Pty Ltd

Springfield
Residential Development

Address / RPD: Esk

25/06/2026 | 9612 E 49 PD Esk Offset and BLEs B

Plan A50. Esk Landholdings Offset Area – Ecological Corridors and Habitat Areas

152°25'0"E

152°30'0"E

27°15'0"S

27°20'0"S

Notes:
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Legend

- Qld DCDB
- Esk Landholdings Offset Area
- SEQ Regional Plan - Biodiversity Corridor
- Remnant and regrowth regional ecosystem mapping

Issue	Date	Description	Drawn	Checked
A	25/06/2026	Preliminary	TF	AW

0 1 2 km

Transverse Mercator | GDA 2020 | Zone 56 | 1:50,000 @ A3

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Springfield
Residential Development

Address / RPD: Esk

25/06/2026 | 9612 E 50 PD Esk Offset Eco Corridors A

Plan A51. Esk Landholdings Offset Area – Topography and Water Resources

152°27'0"E

152°28'0"E

27°18'0"S

Notes:

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Legend

- Esk Landholdings Offset Area
- Non-offset Land Use Area [20.1 ha]
- Building Location Envelopes (BLEs) - 9.5 ha
- Asset Protection Zone/ Bushfire Management Zone - 10.6 ha
- Contours (5m)

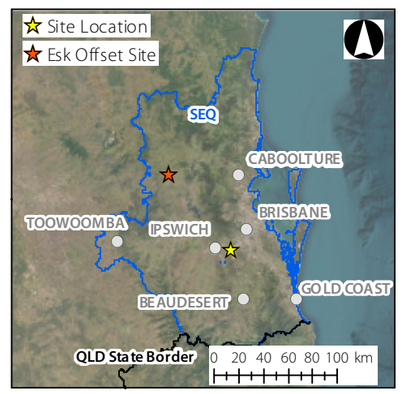
Waterways

- VMA Watercourses
- Water Act Drainage Features

Waterways (QLD)

Risk of Impact

- 1 - Low
- 2 - Moderate
- 3 - High
- 4 - Major
- 5 - Major (Tidal)



Issue	Date	Description	Drawn	Checked
A	25/06/2026	Preliminary	TF	AW

0 100 200 300 400 m

Transverse Mercator | GDA 2020 | Zone 56 | 1:13,000 @ A3

Address / RPD: Esk

25/06/2026 | 9612 E 51 PD Esk Topography Water A

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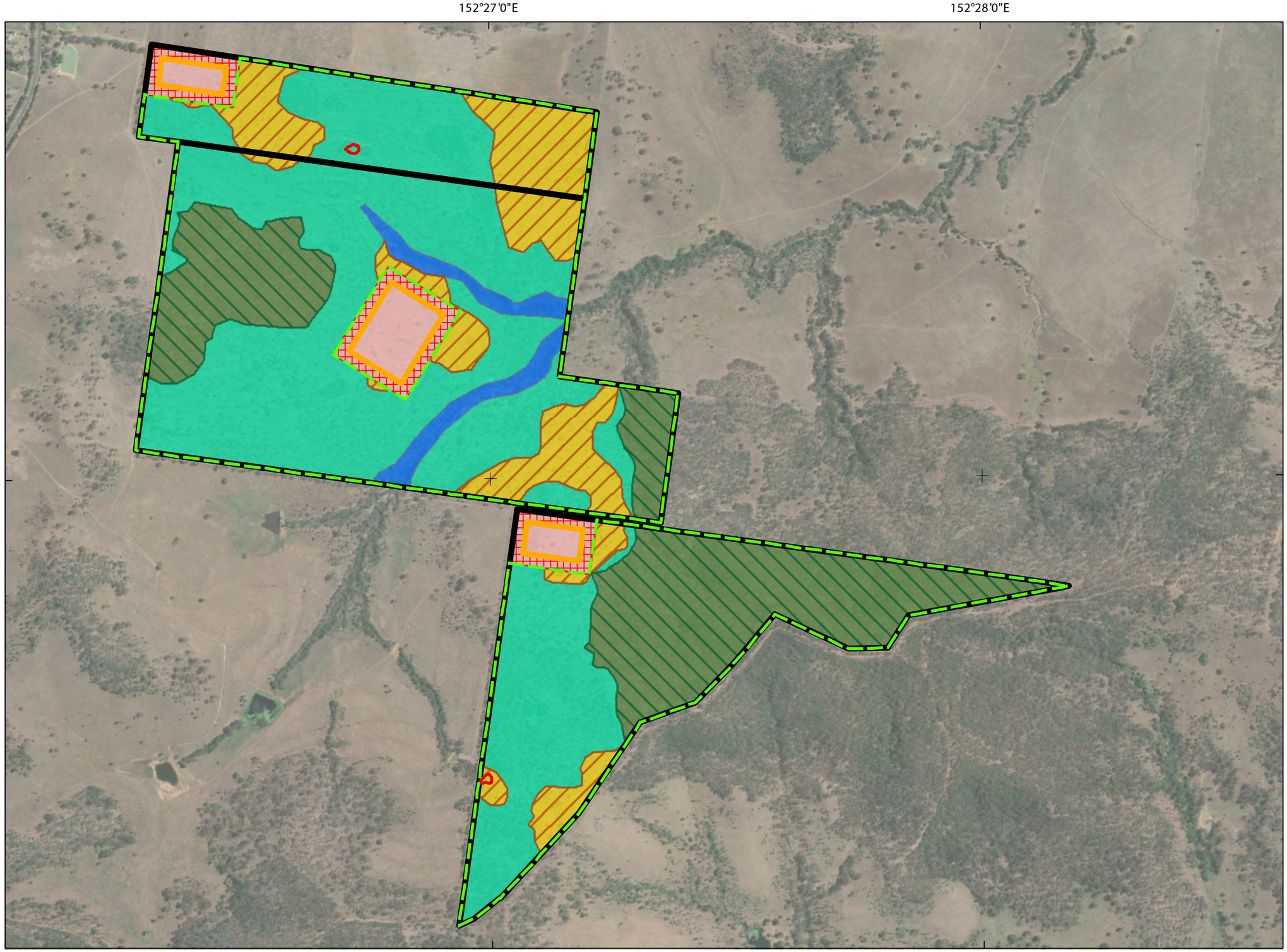
Springfield
Residential Development

Plan A52. Esk Landholdings Offset Area – Assessment units



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Legend

- Esk Landholdings Offset Area [300.3 ha]
- Esk Offset Area [280.2 ha]
- Waterbodies [0.17 ha]
- Non-offset Land Use Area [20.1 ha]
- Building Location Envelopes (BLEs) - 9.5 ha
- Asset Protection Zone/ Bushfire Management Zone - 10.6 ha

Assessment Units

- **AU 1 – RE12.9-10.2** Immature patchy regrowth to be protected and reinstated (150.1 ha)
- **AU 2 – RE12.9-10.2** Cleared land to be revegetated (44.8 ha)
- **AU 3 – RE12.9-10.2** Remnant vegetation (75.9 ha)
- **AU 4 – RE12.3.7** Waterway corridor (9.4 ha)

Issue	Date	Description	Drawn	Checked
B	25/06/2026	Preliminary	TF	AW

0 100 200 300 400 m

Transverse Mercator | GDA 2020 | Zone 56 | 1:13,000 @ A3

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Address / RPD: Esk

25/06/2026 | 9612 E 52 PD Esk Offset AUs B

Plan A53. Esk Landholdings Offset Area – Koala Records and Habitat

152°10'0"E 152°20'0"E 152°30'0"E 152°40'0"E

27°10'0"S 27°20'0"S 27°30'0"S

Notes:
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Legend

- Esk Landholdings Offset Area
- 20km Offset Area Buffer
- Koala records within 20km of offset site recorded within past 20 years (ALA, 2025) [940]
- Potential and known Koala habitat within 20km of offset area [33%]

Issue	Date	Description	Drawn	Checked
A	25/06/2026	Preliminary	TF	AW

0 1 2 3 4 5 km

Transverse Mercator | GDA 2020 | Zone 56 | 1:200,000 @ A3

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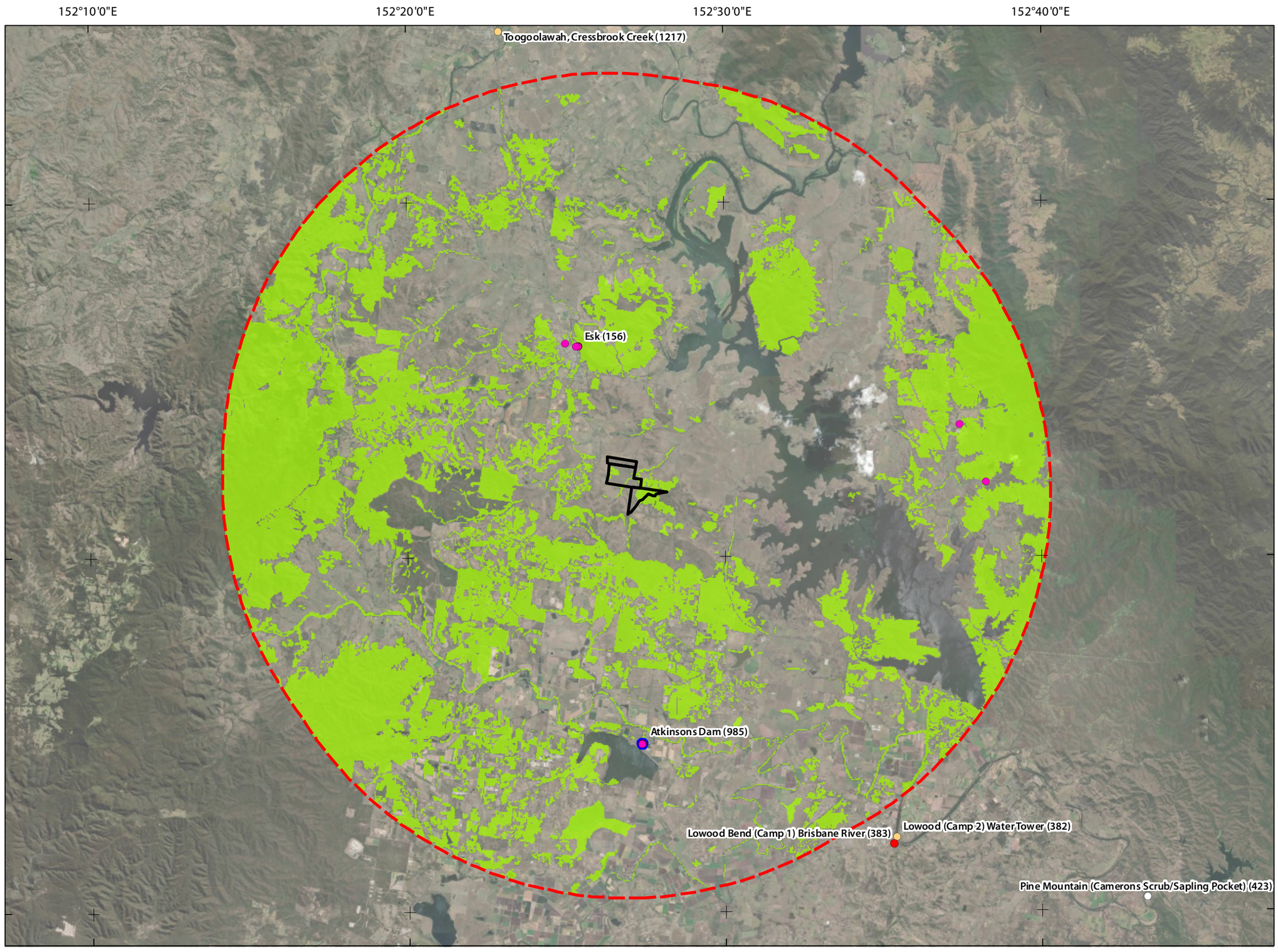
Address / RPD: Esk

25/06/2026 | 9612 E 53 PD Esk Koala Records Habitat A

Plan A54. Esk Landholdings Offset Area – Grey-headed Flying-Fox Records and Habitat



Notes:

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Legend

- Esk Landholdings Offset Area
- 20km Offset Area Buffer
- Grey-headed Flying-fox records within 20km of offset site recorded within past 20 years (ALA, 2025) [63]
- Potential and known Grey-headed Flying-fox foraging habitat within 20km of offset area [33%]

Grey-headed Flying-fox Roosts (Fed. Gov., 2025)

- Grey-headed Flying Fox roost inactive within recent surveys [0]
- Grey-headed Flying Fox roost active within recent surveys
- Grey-headed Flying Fox roost active within recent surveys with a population level of 3 or above [1]
- Nationally significant Grey-headed Flying Fox roost active within recent surveys
- Nationally significant Grey-headed Flying Fox roost active within recent surveys with a population level of 3 or above [1]

Issue	Date	Description	Drawn	Checked
A	25/06/2026	Preliminary	TF	AW

0 1 2 3 4 5 km

Transverse Mercator | GDA 2020 | Zone 56 | 1:200,000 @ A3

Address / RPD: Esk

25/06/2026 | 9612 E 54 PD Esk GHFF Records Habitat A

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Plan A55. Esk Landholdings Offset Area – Swift Parrot Records and Habitat

151°50'0"E 152°0'0"E 152°10'0"E 152°20'0"E 152°30'0"E 152°40'0"E 152°50'0"E 153°0'0"E 153°10'0"E

26°50'0"S 27°0'0"S 27°10'0"S 27°20'0"S 27°30'0"S 27°40'0"S

Notes:
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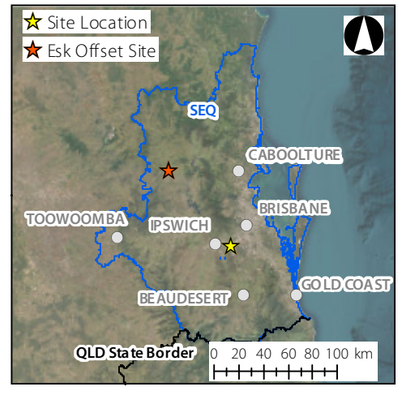
Legend

- Esk Landholdings Offset Area
- 20km Offset Area Buffer
- 50km Offset Area Buffer
- Swift Parrot records within 50km of offset site recorded within past 20 years (ALA, 2025) [22]
- Potential and known Swift Parrot habitat within 50km of offset area [38%]



Issue	Date	Description	Drawn	Checked
A	25/06/2026	Preliminary	TF	AW

0 2 4 6 8 10 km

Transverse Mercator | GDA 2020 | Zone 56 | 1:450,000 @ A3

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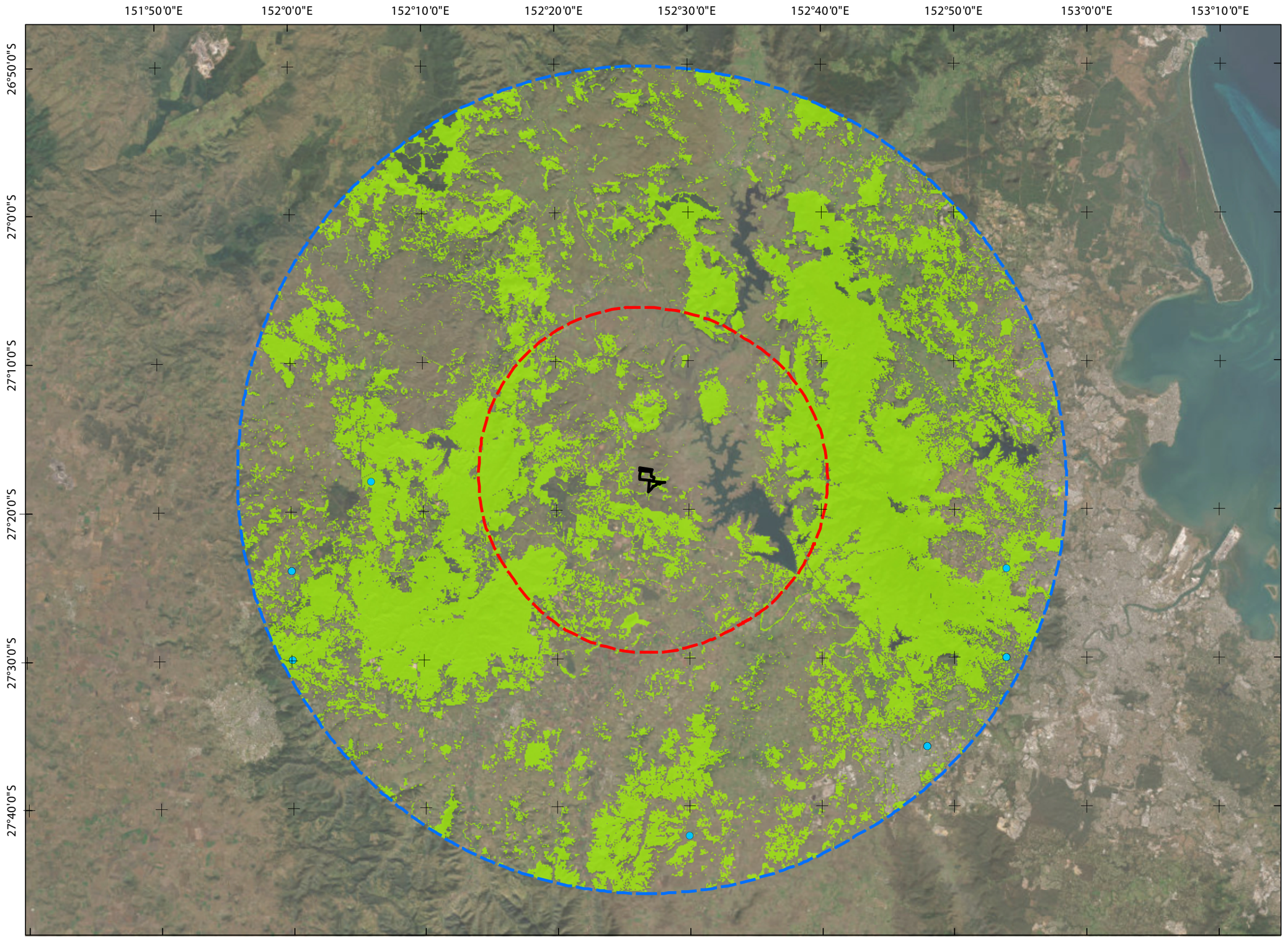
Residential Development

Address / RPD: Esk

25/06/2026 | 9612 E 55 PD Esk SP Records Habitat A

Plan A56. Esk Landholdings Offset Area – Regent Honeyeater Records and Habitat



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Legend

- Esk Landholdings Offset Area
- 20km Offset Area Buffer
- 50km Offset Area Buffer
- Regent Honeyeater records within 50km of offset site recorded within past 20 years (ALA, 2025)* [17]
- Potential and known Regent Honeyeater habitat within 50km of offset area [38%]

*Note: Records are generalised on a grid system for protection of the species.

Issue	Date	Description	Drawn	Checked
A	25/06/2026	Preliminary	TF	AW

0 2 4 6 8 10 km

Transverse Mercator | GDA 2020 | Zone 56 | 1:472,921 @ A3

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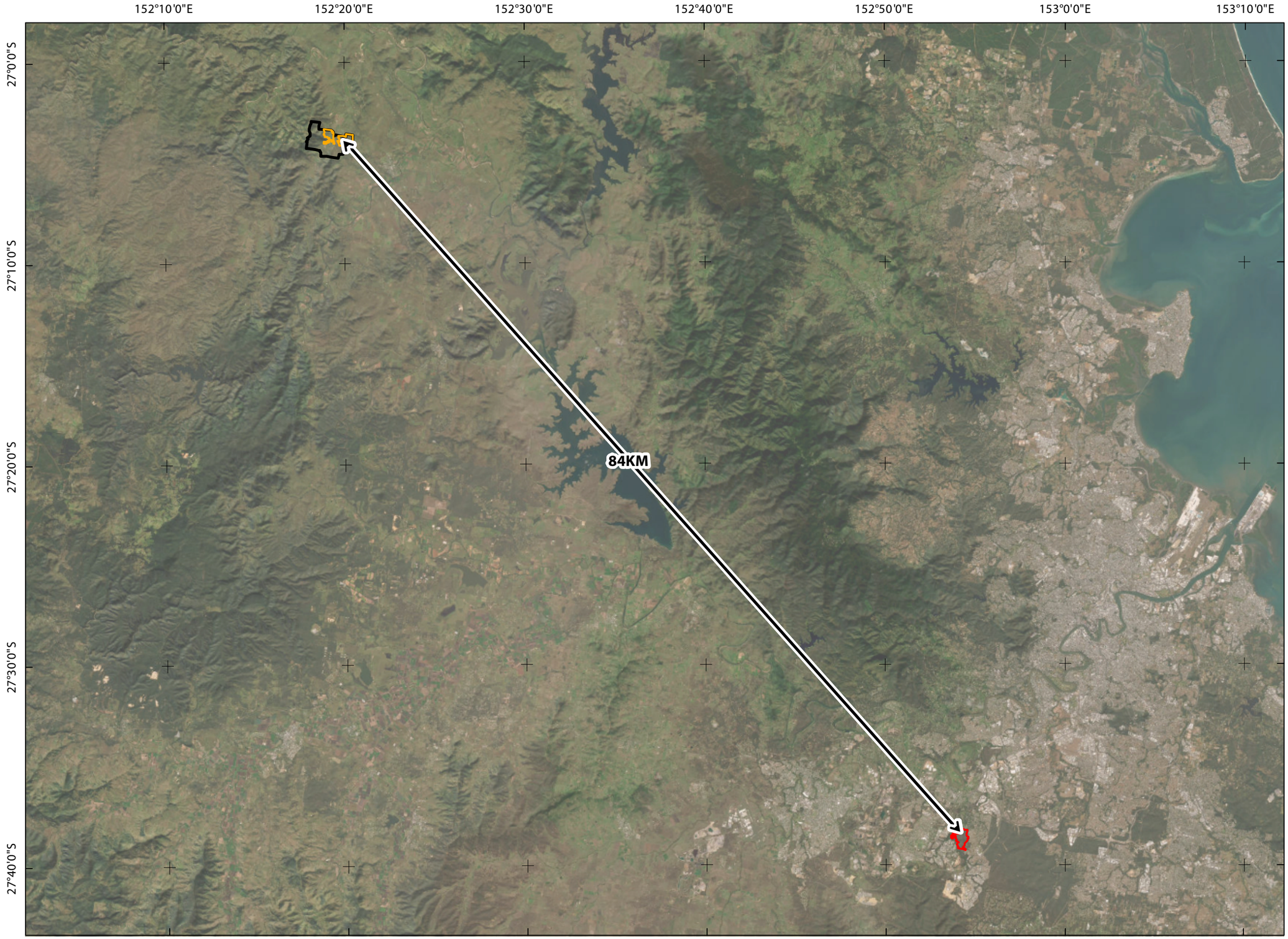
Springfield
Residential Development

Address / RPD: Esk

25/06/2026 | 9612 E 56 PD Esk RH Records Habitat A

Plan A57. Avonvale Offset Area – Context



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Legend

- Qld DCDB
- Avonvale Station
- Avonvale Offset Site
- Springview Impact Site

Issue	Date	Description	Drawn	Checked
B	25/06/2026	Offset area change	TC	AW

0 5 10 km

Transverse Mercator | GDA 2020 | Zone 56 | 1:350,000 @ A3

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Springfield
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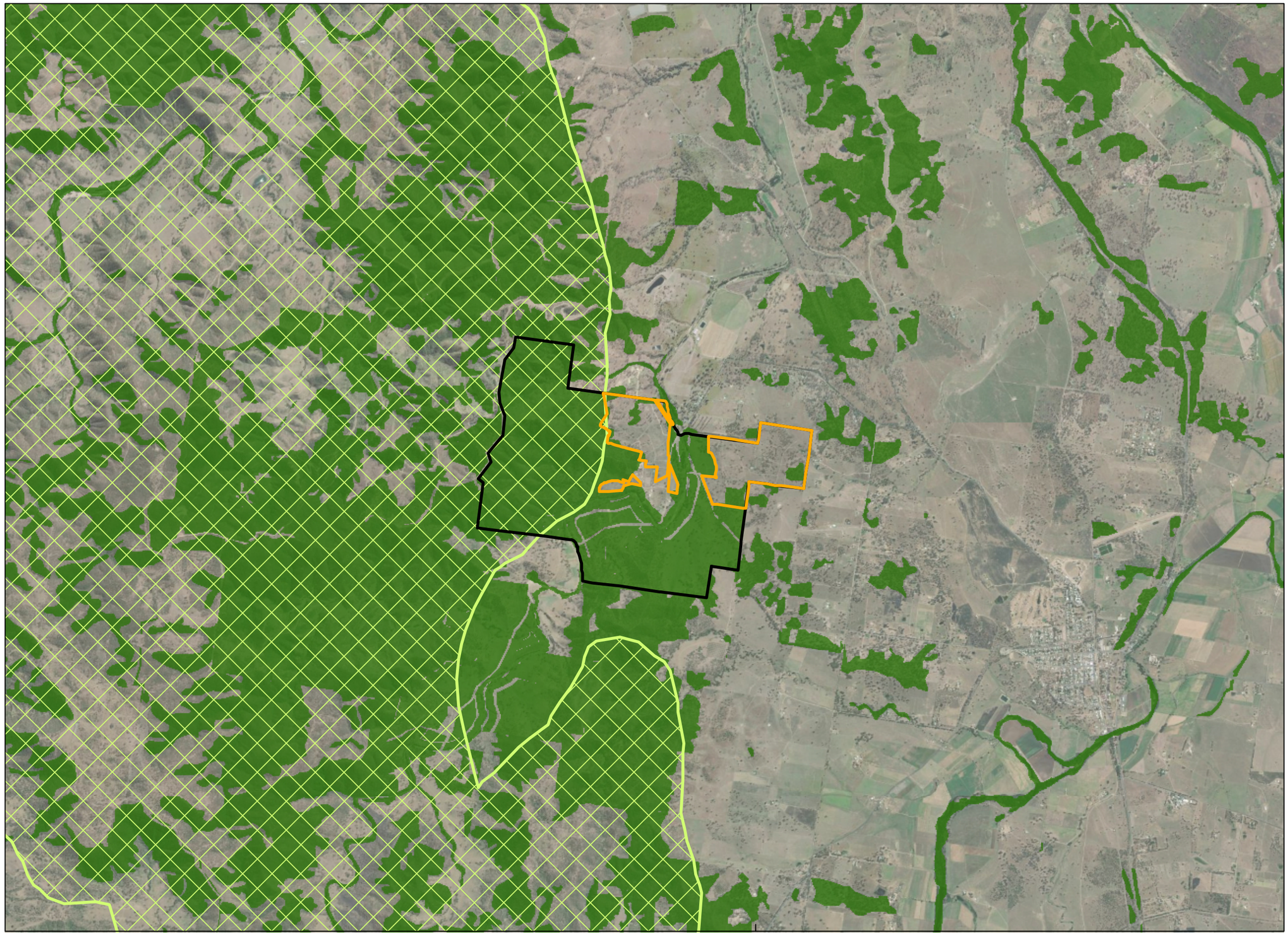
Address / RPD: Avonvale

25/06/2026 | 9612 E 57 PD Avonvale Offset Context B

Plan A58. Avonvale Offset Area – Ecological Corridors and Habitat Areas

152°20'0"E



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Legend

- Qld DCDB
- Avonvale Station
- Avonvale Offset Site
- SEQ Regional Plan - Biodiversity Corridor
- Remnant and regrowth regional ecosystem mapping

Issue	Date	Description	Drawn	Checked
B	25/06/2026	Offset area change	TC	AW

0 1 2 km

Transverse Mercator | GDA 2020 | Zone 56 | 1:50,000 @ A3

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Address / RPD: Avonvale

25/06/2026 | 9612 E 58 PD Avonvale Offset Eco Corridors B

Plan A59. Avonvale Offset Area – Topography and Water Resources

152°19'0"E

152°20'0"E

27°41'0"S

Notes:
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Legend

- Qld DCDB
- Avonvale Station
- Avonvale Offset Site
- Contours (5m)

Waterways

- VMA Watercourses
- Water Act Drainage Features

Waterways (QLD)

Risk of Impact

- 1 - Low
- 2 - Moderate
- 3 - High
- 4 - Major
- 5 - Major (Tidal)

Issue	Date	Description	Drawn	Checked
B	25/06/2026	Offset area change	TC	AW

0 50 100 150 200 m

Transverse Mercator | GDA 2020 | Zone 56 | 1:9,000 @ A3

Address / RPD: Avonvale

25/06/2026 | 9612 E 59 PD Avonvale Topography Water B

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Plan A60. Avonvale Offset Area – Assessment units

152°19'0"E

152°20'0"E

27°4'0"S

Notes:
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Legend

- Avonvale Station
- Avonvale Offset Site
- Waterbodies

Assessment Units

- Assessment Unit 1 (AU1) - Non-Remnant paddock: RE 12.11.14 [46.6 ha]
- Assessment Unit 2 (AU2) - Non-Remnant paddock: RE 12.3.3 [17.9 ha]
- Assessment Unit 3 (AU3) - Remnant: RE 12.3.7 [2 ha]
- Assessment Unit 4 (AU4) - Non-Remnant paddock with scattered trees: RE 12.9-10.7 [86.8 ha]
- Assessment Unit 5 (AU5) - Regrowth: RE 12.9-10.7 [11 ha]
- Assessment Unit 6 (AU6) - Remnant: RE 12.11.14 [3.7 ha]

Issue	Date	Description	Drawn	Checked
B	25/06/2026	Offset area change	TC	AW

0 50 100 150 200 m

Transverse Mercator | GDA 2020 | Zone 56 | 1:9,000 @ A3

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Address / RPD: Avonvale

25/06/2026 | 9612 E 60 PD Avonvale Offset AUs B

Plan A61. Avonvale Offset Area – Koala Records and Habitat

152°0'0"E 152°10'0"E 152°20'0"E 152°30'0"E

27°0'0"S

27°10'0"S

Notes:
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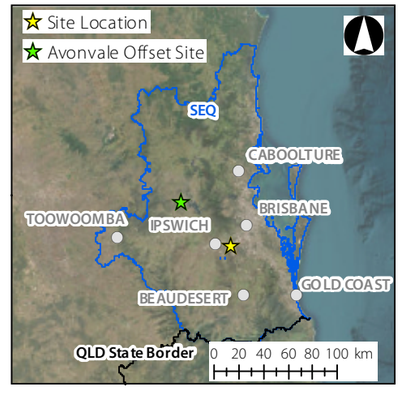
Legend

- Avonvale Station
- Avonvale Offset Site
- 20km Offset Area Buffer
- Koala records within 20km of offset site recorded within past 20 years (ALA, 2025) [178]
- Potential and known Koala habitat within 20km of offset area [26%]



Issue	Date	Description	Drawn	Checked
B	25/06/2026	Offset area change	TC	AW

0 1 2 3 4 5 km

Transverse Mercator | GDA 2020 | Zone 56 | 1:200,000 @ A3

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Springfield
Residential Development

Address / RPD: Avonvale

25/06/2026 | 9612 E 61 PD Avonvale Koala Records Habitat B

Plan A62. Avonvale Offset Area – Grey-headed Flying-Fox Records and Habitat

152°0'0"E 152°10'0"E 152°20'0"E 152°30'0"E

27°0'0"S

27°10'0"S

Blackbutt, Taromeo Creek (1211)

Kilcoy, Kilcoy Creek (Anzac Park) (368)

Toogoolawah, Cressbrook Creek (1217)

Esk (156)

Notes:
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Legend

- Avonvale Station
- Avonvale Offset Site
- 20km Offset Area Buffer
- Grey-headed Flying-Fox records within 20km of offset site recorded within past 20 years (ALA, 2025) [8]
- Potential and known Grey-headed Flying-Fox habitat within 20km of offset area [26%]

Grey-headed Flying-fox Roosts (Fed. Gov., 2025)

- Grey-headed Flying Fox roost inactive within recent surveys
- Grey-headed Flying Fox roost active within recent surveys [1]
- Grey-headed Flying Fox roost active within recent surveys with a population level of 3 or above
- Nationally significant Grey-headed Flying Fox roost active within recent surveys
- Nationally significant Grey-headed Flying Fox roost active within recent surveys with a population level of 3 or above

Issue	Date	Description	Drawn	Checked
B	25/06/2026	Offset area change	TC	AW

0 1 2 3 4 5 km

Transverse Mercator | GDA 2020 | Zone 56 | 1:200,000 @ A3

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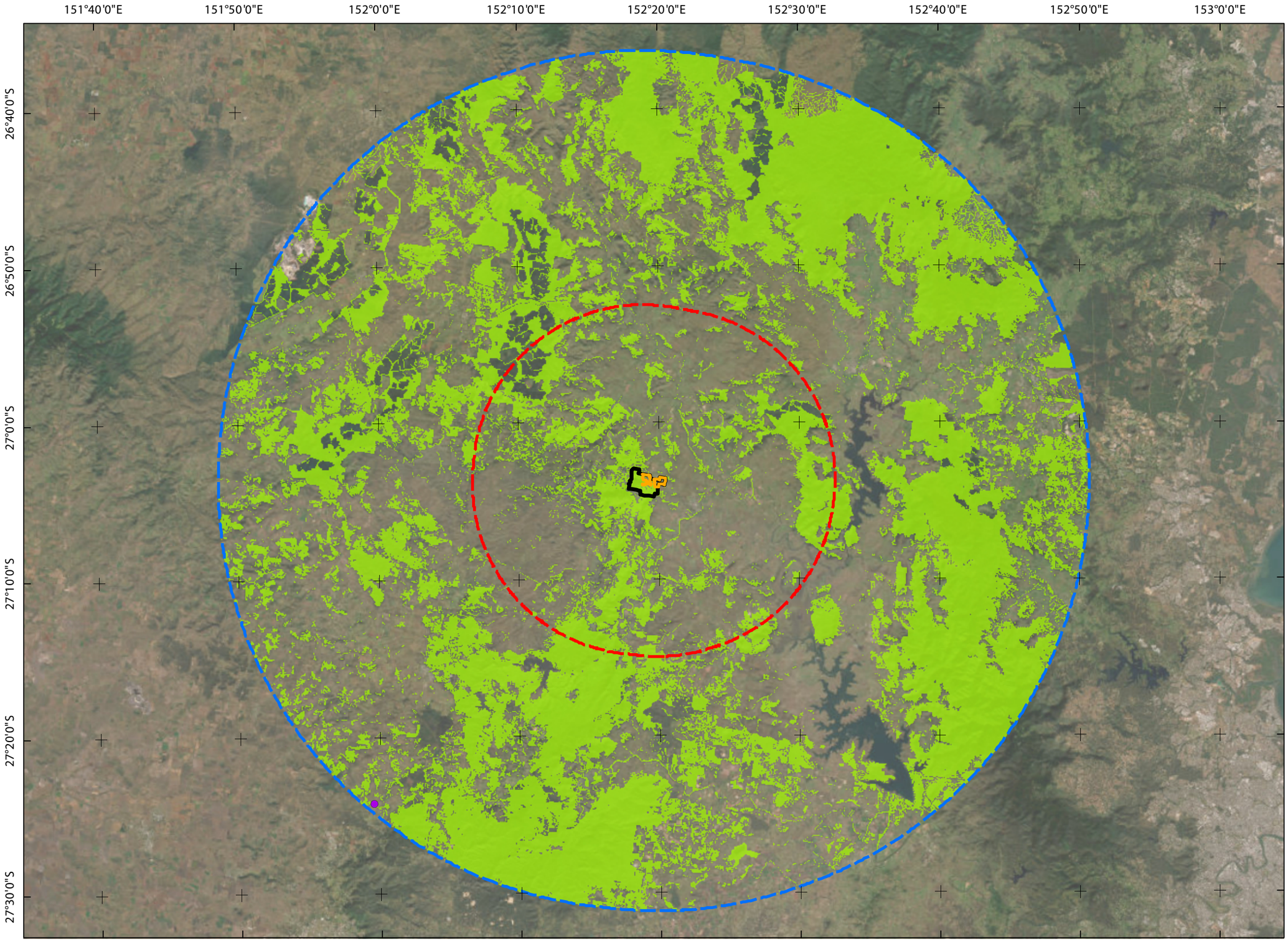
Springfield
Residential Development

Address / RPD: Avonvale

25/06/2026 | 9612 E 62 PD Avonvale GHFF Records Habitat B

Plan A63. Avonvale Offset Area – Swift Parrot Records and Habitat



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Legend

- Avonvale Station
- Avonvale Offset Site
- 20km Offset Area Buffer
- 50km Offset Area Buffer
- Swift Parrot records within 50km of offset site recorded within past 20 years (ALA, 2025) [1]
- Potential and known Swift Parrot habitat within 50km of offset area [42%]

Issue	Date	Description	Drawn	Checked
B	25/06/2026	Offset area change	TC	AW

0 2 4 6 8 10 km

Transverse Mercator | GDA 2020 | Zone 56 | 1:450,000 @ A3

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Cherish Enterprises Pty Ltd

Springfield
Residential Development

Address / RPD: Avonvale

25/06/2026 | 9612E 63 PD Avonvale SP Records Habitat B

Plan A64. Avonvale Offset Area – Regent Honeyeater Records and Habitat

151°40'0"E 151°50'0"E 152°0'0"E 152°10'0"E 152°20'0"E 152°30'0"E 152°40'0"E 152°50'0"E 153°0'0"E

26°40'0"S 26°50'0"S 27°0'0"S 27°10'0"S 27°20'0"S 27°30'0"S

Notes:
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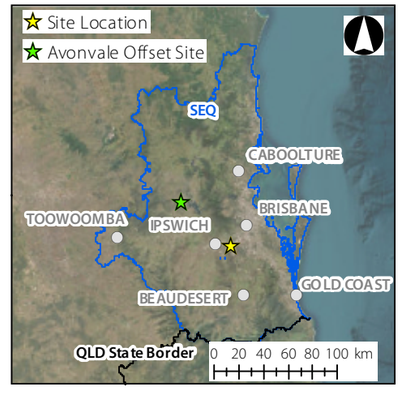
Legend

- Avonvale Station
- Avonvale Offset Site
- 20km Offset Area Buffer
- 50km Offset Area Buffer
- Regent Honeyeater records within 50km of offset site recorded within past 20 years (ALA, 2025)* [4]
- Potential and known Regent Honeyeater habitat within 50km of offset area [42%]

*Note: Records are generalised on a grid system for protection of the species.



Issue	Date	Description	Drawn	Checked
B	25/06/2026	Offset area change	TC	AW

0 2 4 6 8 10 km

Transverse Mercator | GDA 2020 | Zone 56 | 1:450,000 @ A3

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Address / RPD: Avonvale

25/06/2026 | 9612E 64 PD Avonvale RH Records Habitat B

Plan A65. Mount Walker West Offset Area – Context

152°30'0"E

152°40'0"E

152°50'0"E

27°40'0"S

27°50'0"S

Notes:

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Legend

- Qld DCDB
- Mount Walker West Offset Area
- Springview Impact Site

Issue	Date	Description	Drawn	Checked
A	25/06/2026	Preliminary	TF	AW

0 1 2 3 4 5 km

Transverse Mercator | GDA 2020 | Zone 56 | 1:150,000 @ A3

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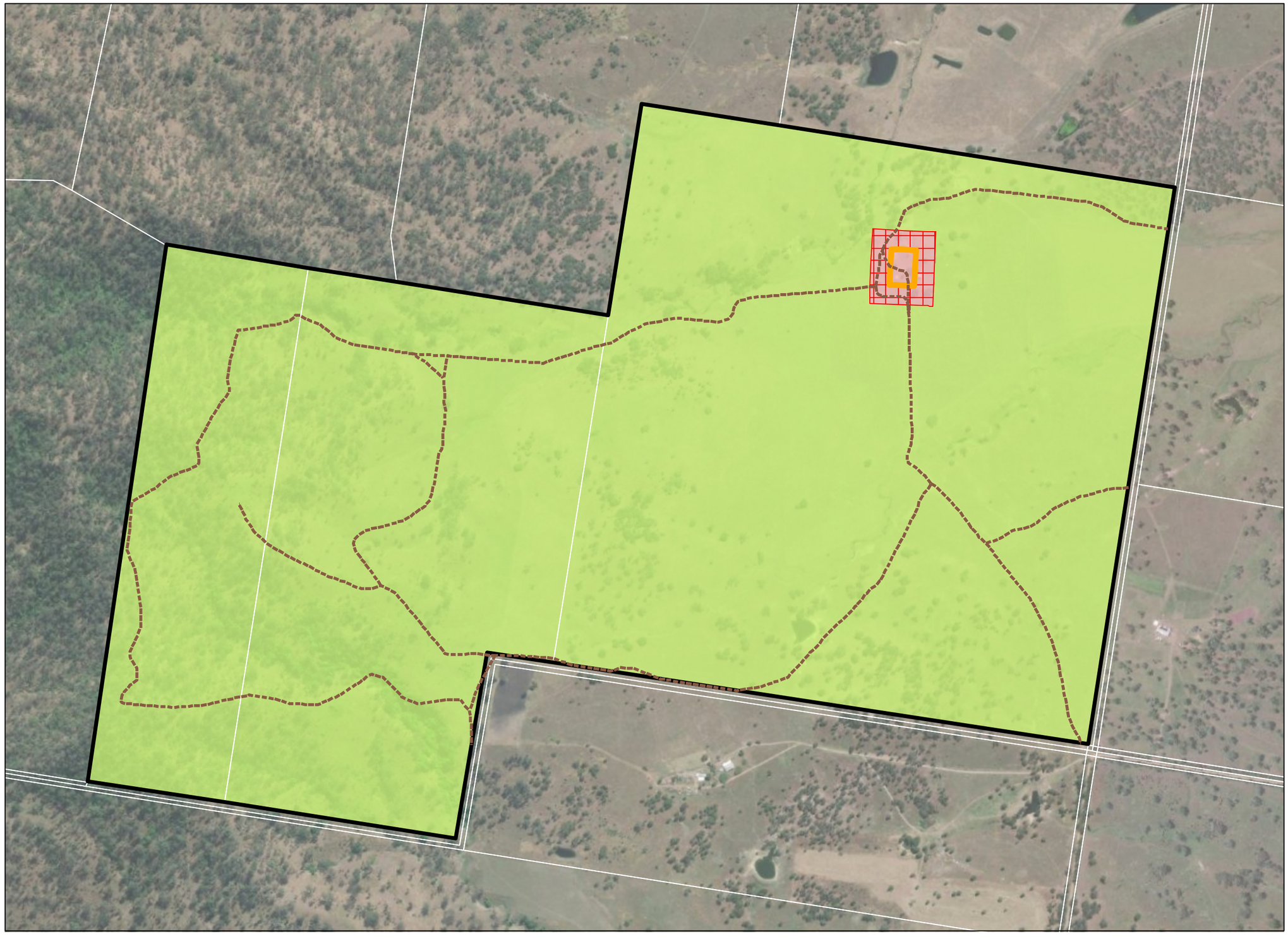
Cherish Enterprises Pty Ltd

Springfield
Residential Development

Address / RPD: Mount Walker West

25/06/2026 | 9612 E 65 PD MWW Offset Context B

Plan A66. Mount Walker West Offset Area – Location of Offset Area and BLE



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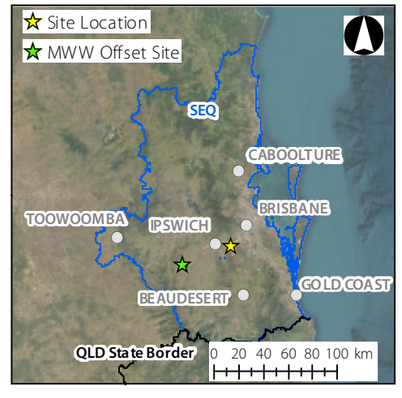
Legend

- Qld DCDB
- Mount Walker West Offset Area [227.6 ha]
- Offset Land Use Area [225.6 ha]
- Non-Offset Land Use Area [2 ha]
- Building Location Envelope - 0.4 ha
- Asset Protection Zone/ Bushfire Management Zone - 1.6 ha
- Access Tracks (indicative)



Issue	Date	Description	Drawn	Checked
A	25/06/2026	Preliminary	TF	AW

0 50 100 150 200 250 m

Transverse Mercator | GDA 2020 | Zone 56 | 1:8,000 @ A3

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Cherish Enterprises Pty Ltd

Springfield
Residential Development

Address / RPD: Mount Walker West

25/06/2026 | 9612 E 66 PD MWW BLE Location B

Plan A67. Mount Walker West Offset Area – Regional Connectivity Assessment

152°20'0"E

152°30'0"E

27°50'0"S

Old Hiddenvale Nature Refuge

Aroona Station

Mount Beau Brummel CP

Aroona Station

Notes:

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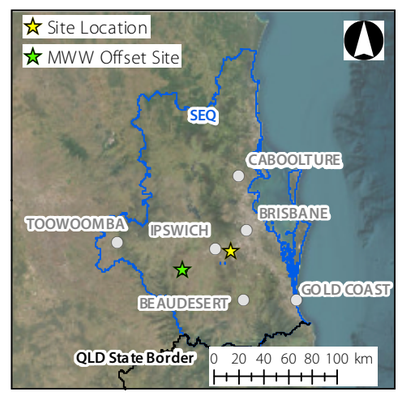
Legend

- Mount Walker West Offset Area
- SEQ Regional Plan 2017: Regional Biodiversity Corridor
- Biodiversity Planning Assessment: Regional Significance Corridor
- Biodiversity Planning Assessment: State Significance Corridor
- Nature Refuge - Old Hiddenvale
- Approved Offsets - Aroona Station
- Conservation Park – Mount Beau Brummel
- Little Liverpool Range Extent



Issue	Date	Description	Drawn	Checked
A	25/06/2026	Preliminary	TF	AW

0 1 2 3 4 km

Transverse Mercator | GDA 2020 | Zone 56 | 1:100,000 @ A3

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Cherish Enterprises Pty Ltd

Springfield
Residential Development

Address / RPD: Mount Walker West

25/06/2026 | 9612 E 67 PDMWW Nature Refuge B

Plan A68. Mount Walker West Offset Area – Topography and Water Resources

152°29'0"E

27°47'0"S

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Legend

- Qld DCDB
- Mount Walker West Offset Area
- Non-Offset Land Use Area [2 ha]
- Building Location Envelope - 0.4 ha
- Asset Protection Zone/ Bushfire Management Zone - 1.6 ha
- Contours (5m)

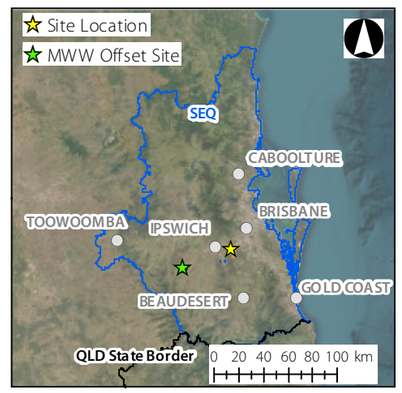
Waterways

- VMA Watercourses
- Water Act Drainage Features

Waterways (QLD)

Risk of Impact

- 1 - Low
- 2 - Moderate
- 3 - High
- 4 - Major
- 5 - Major (Tidal)



Issue	Date	Description	Drawn	Checked
A	25/06/2026	Preliminary	TF	AW

0 50 100 150 200 m

Transverse Mercator | GDA 2020 | Zone 56 | 1:8,000 @ A3

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Cherish Enterprises Pty Ltd

Springfield
Residential Development

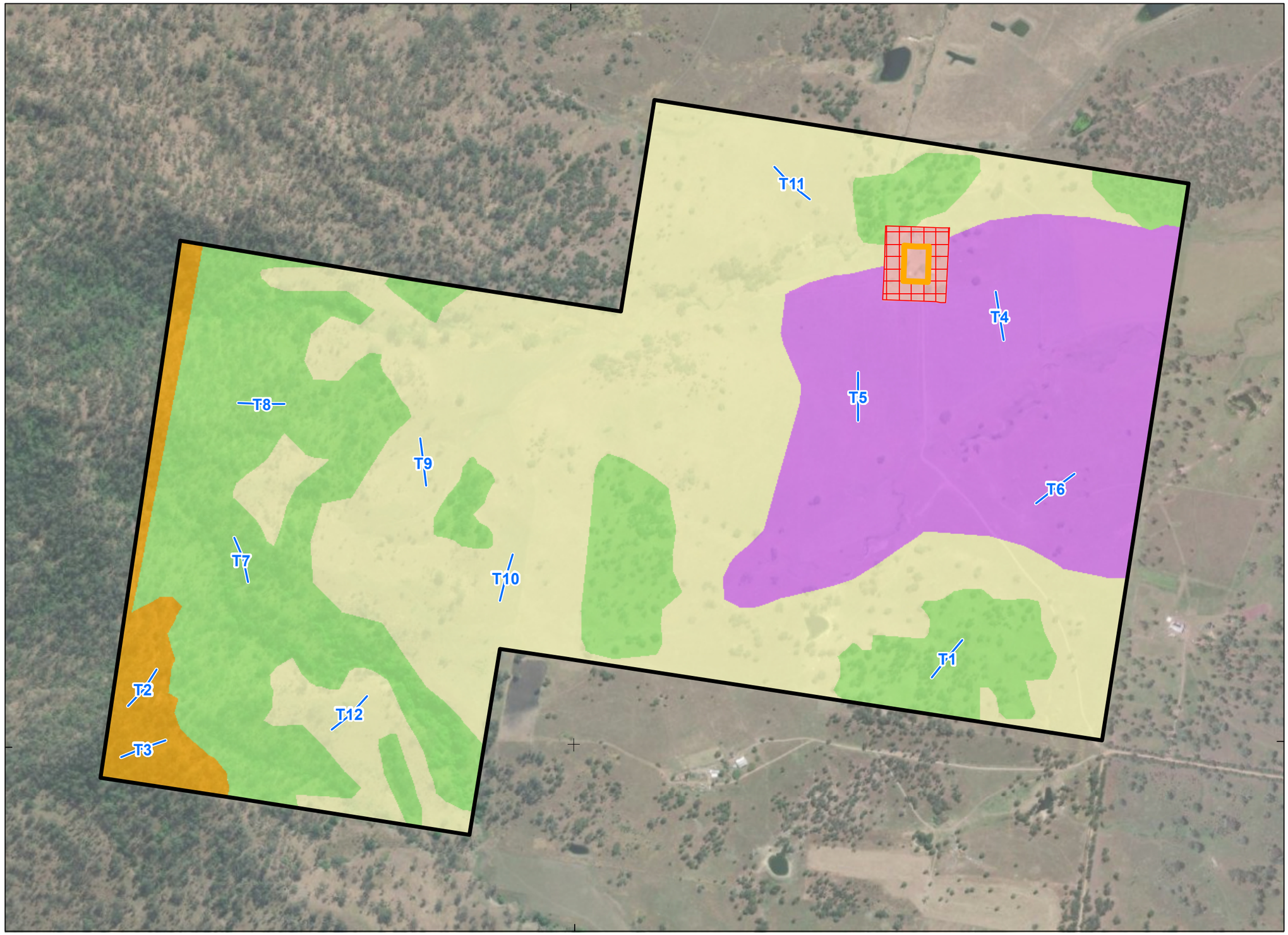
Address / RPD: Mount Walker West

25/06/2026 | 9612.E.68.PD.MWW.TopographyWaterB

Plan A69. Mount Walker West Offset Area – Assessment Units

152°29'0"E

27°47'0"S



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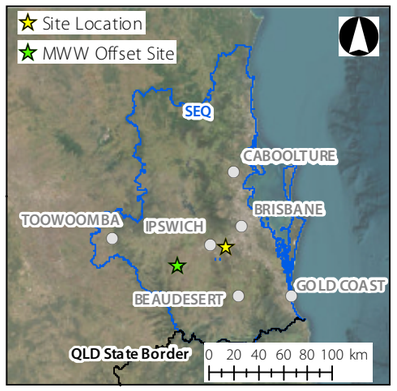
Legend

- Qld DCDB
- Mount Walker West Offset Area
- Non-Offset Land Use Area [2 ha]
- Building Location Envelope - 0.4 ha
- Asset Protection Zone/ Bushfire Management Zone - 1.6 ha
- MHQA Transects

Assessment Units

- *Assessment Unit 1:* Non-remnant RE 12.3.3 [50.8 ha]
- *Assessment Unit 2:* Non-remnant RE 12.8.17 [104.7 ha]
- *Assessment Unit 3:* Regrowth RE 12.8.17 [62 ha]
- *Assessment Unit 4:* Remnant RE 12.8.17 [8.1 ha]



Issue	Date	Description	Drawn	Checked
A	25/06/2026	Preliminary	TF	AW

0 50 100 150 200 m

Transverse Mercator | GDA 2020 | Zone 56 | 1:8,000 @ A3

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Springfield
Residential Development

Address / RPD: Mount Walker West

25/06/2026 | 9612 E 69 PD MWW AUs B

Plan A70. Mount Walker West Offset Area – Koala Records and Habitat

152°10'0"E 152°20'0"E 152°30'0"E 152°40'0"E

27°40'0"S

27°50'0"S

Notes:
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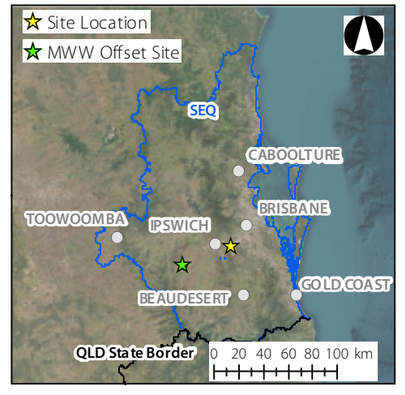
Legend

- Mount Walker West Offset Area
- 20km Offset Area Buffer
- Koala records within 20km of offset site recorded within past 20 years (ALA, 2025) [1,521]
- Potential and known Koala habitat within 20km of offset area [36%]



Issue	Date	Description	Drawn	Checked
A	25/06/2026	Preliminary	TF	AW

0 1 2 3 4 5 km

Transverse Mercator | GDA 2020 | Zone 56 | 1:200,000 @ A3

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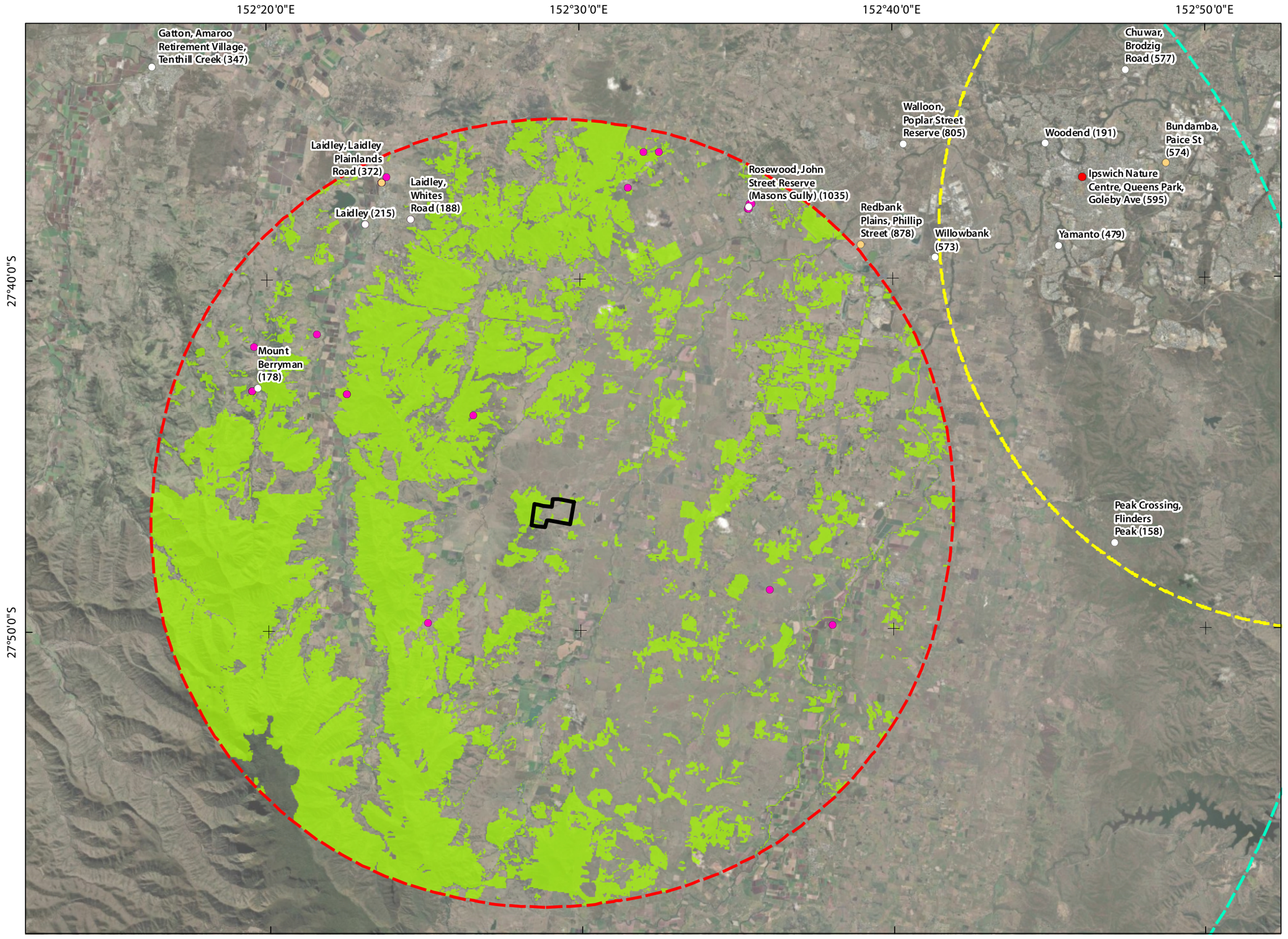
Cherish Enterprises Pty Ltd

Springfield
Residential Development

Address / RPD: Mount Walker West

25/06/2026 | 9612 E 70 PD MWW Koala Records Habitat B

Plan A71. Mount Walker West Offset Area – Grey-headed Flying-Fox Records and Habitat



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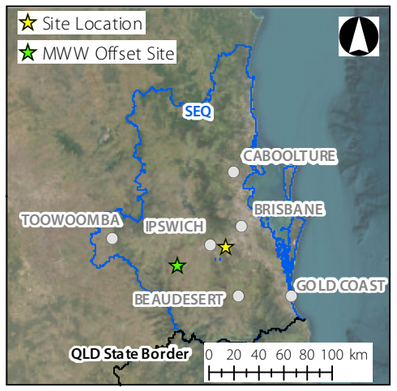
Legend

- Mount Walker West Offset Area
- 20km Impact Area Buffer
- 20km Offset Area Buffer
- 40km Offset Area Buffer
- Grey-headed Flying-Fox records within 20km of offset site recorded within past 20 years (ALA, 2025) [43]
- Potential and known Grey-headed Flying-Fox habitat within 20km of offset area [36%]

Grey-headed Flying-fox Roosts (Fed. Gov., 2025)

- Grey-headed Flying Fox roost inactive within recent surveys [4]
- Grey-headed Flying Fox roost active within recent surveys [1]
- Grey-headed Flying Fox roost active within recent surveys with a population level of 3 or above
- Nationally significant Grey-headed Flying Fox roost active within recent surveys
- Nationally significant Grey-headed Flying Fox roost active within recent surveys with a population level of 3 or above



Issue	Date	Description	Drawn	Checked
A	25/06/2026	Preliminary	TF	AW

0 1 2 3 4 5 km

Transverse Mercator | GDA 2020 | Zone 56 | 1:200,000 @ A3

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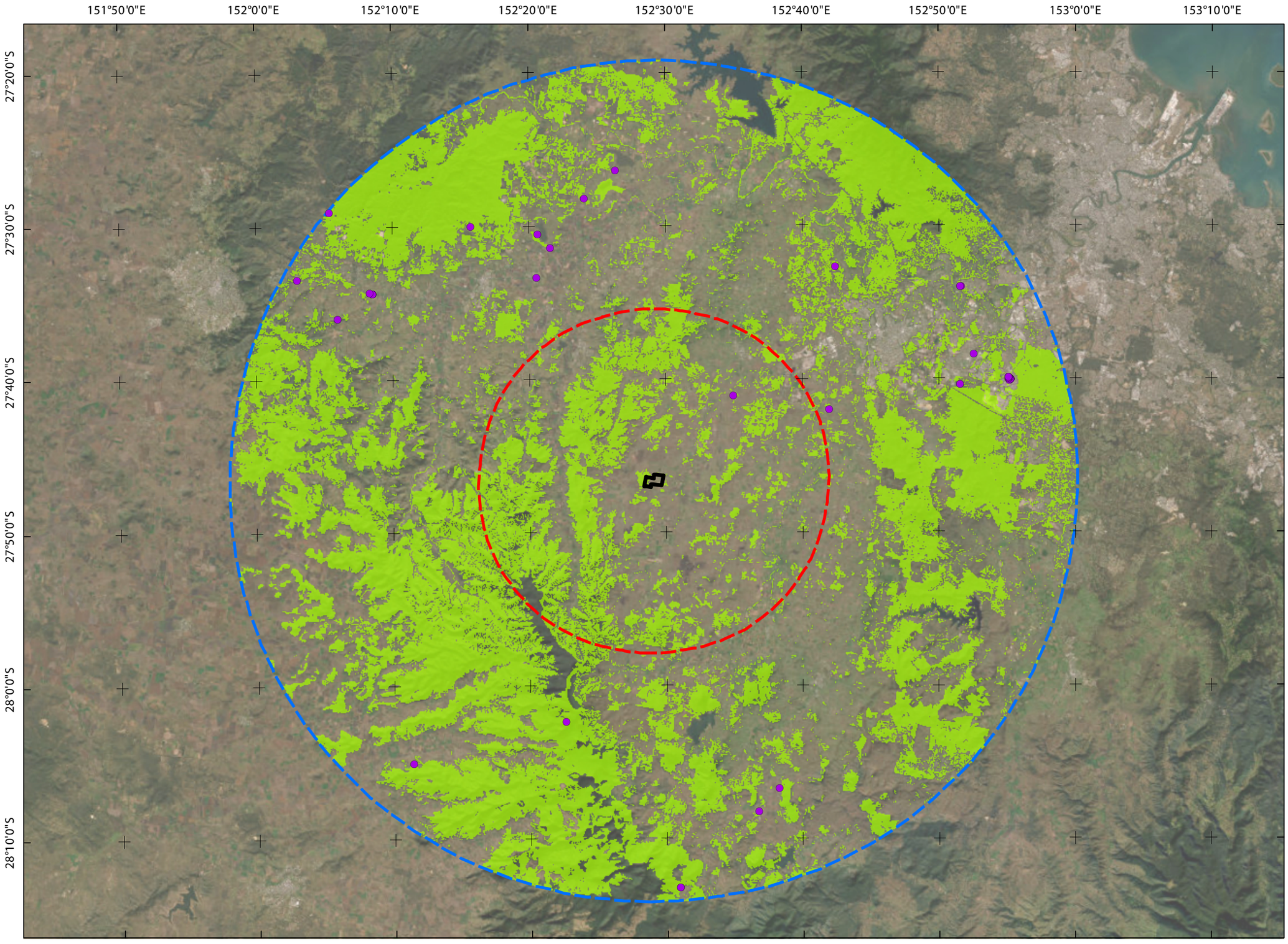
Cherish Enterprises Pty Ltd

Springfield
Residential Development

Address / RPD: Mount Walker West

25/06/2026 | 9612 E 71 PD MWW GHFF Records Habitat B

Plan A72. Mount Walker West Offset Area – Swift Parrot Records and Habitat



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Legend

- Mount Walker West Offset Area
- 20km Offset Area Buffer
- 50km Offset Area Buffer
- Swift Parrot records within 50km of offset site recorded within past 20 years (ALA, 2025) [51]
- Potential and known Swift Parrot habitat within 50km of offset area [40%]

Issue	Date	Description	Drawn	Checked
A	25/06/2026	Preliminary	TF	AW

0 2 4 6 8 10 km

Transverse Mercator | GDA 2020 | Zone 56 | 1:460,000 @ A3

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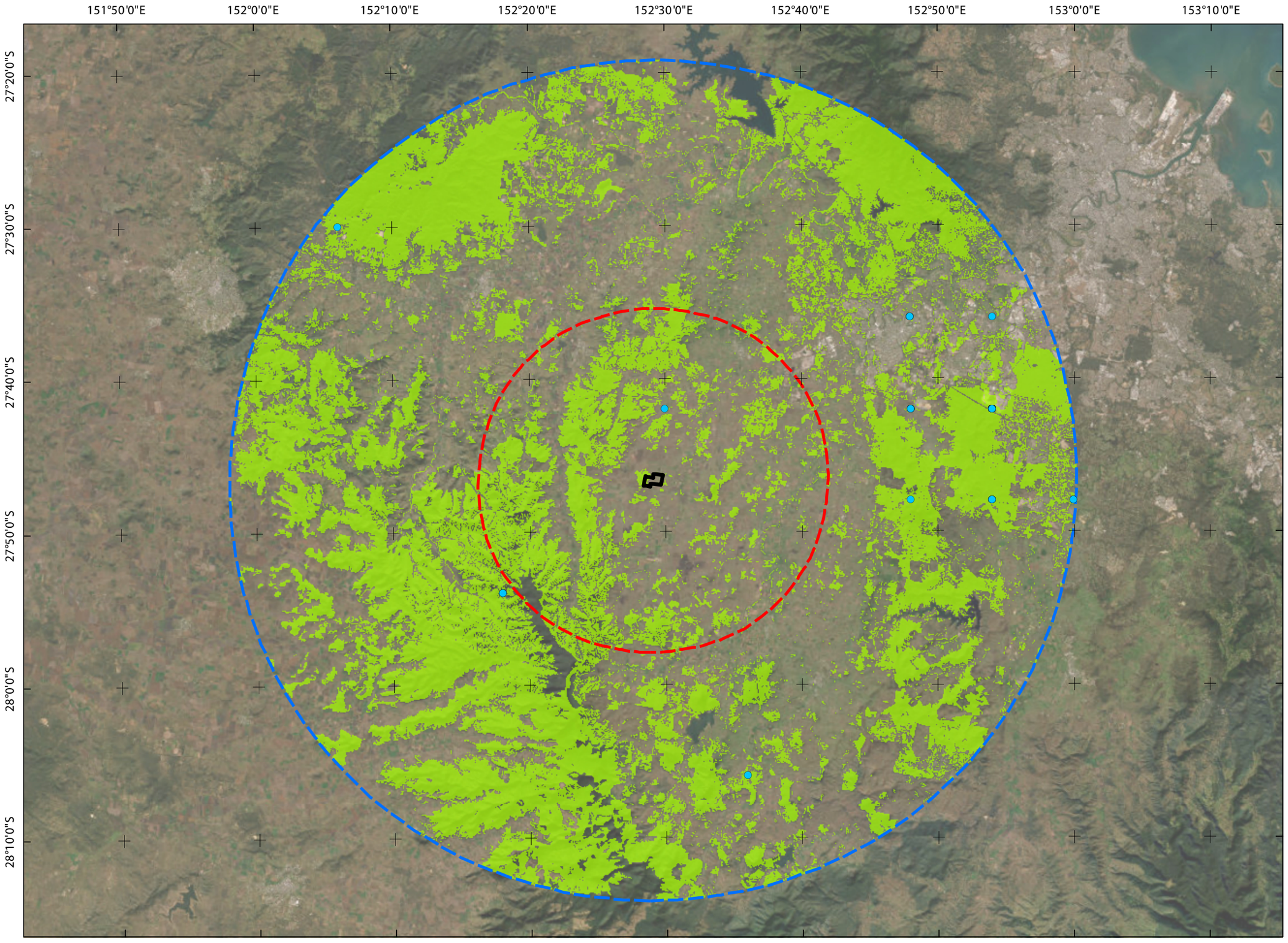
25/06/2026 | 9612.E.72.PD.MWW.SP.Records.Habitat.B

Plan A73. Mount Walker West Offset Area – Regent Honeyeater Records and Habitat



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

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Legend

- Mount Walker West Offset Area
- 20km Offset Area Buffer
- 50km Offset Area Buffer
- Regent Honeyeater records within 50km of offset site recorded within past 20 years (ALA, 2025)* [190]
- Potential and known Regent Honeyeater habitat within 50km of offset area [40%]

*Note: Records are generalised on a grid system for protection of the species.

Issue	Date	Description	Drawn	Checked
A	25/06/2026	Preliminary	TF	AW

0 2 4 6 8 10 km

Transverse Mercator | GDA 2020 | Zone 56 | 1:460,000 @ A3

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25/06/2026 | 9612 E 73 PD MWW RH Records Habitat B