Report

Victorian Murray Floodplain Restoration Project – 2025 Regent Parrot Monitoring Reporting

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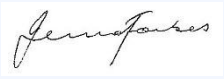
Signature	

Cover Image: Female Regent Parrot, feeding on *Maireana pyramidata* in Hattah Kulkyne National Park. Dan Weller, 2025.

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1. Introduction

SMEC Australia Pty Ltd (SMEC) is supporting Arup and the Victorian Murray Floodplain Restoration Project (VMFRP) by undertaking the required pre-construction monitoring for Regent Parrot (*Polytelis anthopeplus monarchoides*) for the VMFRP Hattah Lakes North, Vinifera and Nyah project sites (the Projects). The three project sites have been the subject of detailed assessments and assessment under both the Victorian *Environment Effects Act 1988* (EE Act) and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Referral information can be found under each project on the Department of Climate Change, Energy, the Environment and Water's (DCCEEW) EPBC Act Public Notices Portal using the following information;

- Hattah Lakes North (EPBC: 2020/8632);
- Nyah (EPBC: 2020/8648); and
- Vinifera (EPBC: 2020/8647).

Prior to commencing surveys, a detailed survey methodology was developed and submitted to DCCEEW, which was formally endorsed prior to commencement. To comply with Approval Condition 5 under the various project sites' EPBC Act approvals, the methods included:

- Mapping showing the location of proposed survey sites overlayed with information showing the presence of suitable Ecological Vegetation Classes (EVCs) for Regent Parrot across the project;
- Details on the survey methods including approximate timing of survey (month), duration and time of day;
- Survey approach for transects and targeted surveys;
- Survey justification to comply with species survey guidelines under the EPBC Act and Environmental Management Framework for the Project; and
- Details of proposed survey sites including area (ha), classification of habitat availability, proximity to the Disturbance Footprint, major waterways, and past records for Regent Parrot.

2. Scope of Works

SMEC undertook a desktop assessment, methodology development, targeted field surveys and reporting to support Regent Parrot nesting site and flyway usage investigations across the Hattah Lakes North, Nyah and Vinifera project areas (Figure 1). The scope was designed to ensure a safe, systematic and regulator-endorsed approach to survey delivery, with outputs suitable to inform construction programming, pre-clearance surveys (where necessary), and compliance with relevant EPBC Act approval conditions.

The scope included:

- Desktop review of available spatial and ecological information to identify priority survey areas, including disturbance footprints and buffers, hollow-bearing trees, existing Regent Parrot records (Birdata, eBird and Victorian Biodiversity Atlas (VBA) database records), relevant River Red Gum *Eucalyptus camaldulensis* and Black Box *Eucalyptus largiflorens* EVCs, and site access constraints;
- Preparation of a detailed Regent Parrot survey methodology, which was submitted to DCCEEW for review and endorsement prior to fieldwork;
- Implementation of targeted field surveys in accordance with the approved methodology, including assessment of breeding habitat, identification of hollow-bearing and active nesting trees, observation of movements and identification of likely flyways, and collection of spatial data;
- Preparation of a technical report documenting survey methods, effort, results and limitations, including mapping of survey coverage, nesting trees and likely flyways; and
- Provision of all spatial data collected during surveys to VMFRP.

3. Approval conditions

Relevant approval conditions for each of the three project sites are outlined in their respective EPBC Act referrals.

The EPBC Act approval Condition 5 for each of these project sites requires pre-construction monitoring for Regent Parrot at Hattah Lakes North, Nyah, Vinifera, as follows:

> *5. To minimise the risk or injury or death of protected matters from clearing or construction, the approval holder must:*
>
> *a) not undertake any construction until a suitably qualified field ecologist has undertaken surveys during the nesting and breeding season, in accordance with the Survey Guidelines or another survey methodology endorsed by the department in writing, of hollows in trees within 350 metres of the disturbance footprint to identify the presence and location of any nest that may be used by Regent Parrot and identify the location of any Regent Parrot active flyways.*
>
> *b) have a suitably qualified field ecologist undertake surveys during the nesting and breeding season, in accordance with the Survey Guidelines or another survey methodology endorsed by the department in writing, of tree hollows in trees to be cleared within the disturbance footprint where clearing is due to start within 48 hours to identify the presence and location of any Regent Parrot prior to the commencement of clearing.*
>
> *c) in those areas of the disturbance footprint where Regent Parrot is or has been previously identified as being present within 350 metres, not undertake clearing or construction during nesting or breeding season*
>
> ...
>
> *e) publish the results of each survey undertaken by the suitably qualified field ecologist on the website within 3 months of its completion, notify the department within five business days of its publication and retain it on the website until the expiry of this approval.*

EPBC Act approval Condition 5b specifies Regent Parrot pre-construction monitoring be undertaken within 48 hours of removal of known nest trees, although this was not part of this scope of works. The survey program described herein informs the requirements of this condition, and will fall under the responsibility of the contractor at the commencement of construction stage in 2026.

The proposed Regent Parrot monitoring effort undertaken as part of this scope addresses the monitoring requirements of the Environmental Delivery Standard (EDS) for each of the project areas, which requires monitoring to identify active nesting trees within 350 m of each Project's disturbance footprint during the species breeding season (August to December inclusive).

A summary of the relevant EDS conditions are summarised below.

Site specific additional measures for Regent Parrot within the Environmental Delivery Standard (EDS) for Hattah Lakes North and Belsar-Yungera E2g, states:

- Where construction occurs within 350 metres of an active nesting tree during the Regent Parrot breeding season (August to December inclusive), undertake monitoring in accordance with the Native Flora and Fauna Management Sub-Plan; and
- Active nesting trees are to be determined with reference to potential nesting locations identified in Regent Parrot habitat maps in Appendix I to Specialist B of the EES.

In order to satisfy this condition, Regent Parrot nest sites and flyways must be identified during the active breeding season within the aforementioned project areas.

Site specific additional measures for Regent Parrot within the Environmental Delivery Standard (EDS) for Vinifera and Nyah E2h, states:

- Where construction occurs within 350 metres of an active nesting tree during the Regent Parrot breeding season (August to December inclusive), undertake monitoring, consistent with Table 13-5 of the Specialist Assessment B to the ER, in accordance with the Native Flora and Fauna Management Sub-Plan; and
- Active nesting trees are to be determined with reference to potential nesting locations identified in Regent Parrot habitat maps in Appendix I to Specialist Assessment B of the Environment Report (ER).

4. Relevant survey guidelines

Methodology was designed based on the relevant species survey guidelines where applicable, and compliance with the EPBC Act approval conditions and EDSs:

- Surveys were undertaken in general accordance with the EPBC Act survey guidelines for Regent Parrot[1] and additional measures as required to fulfil the surveys requirements of Condition 5a. A summary of the species survey guidelines are provided below (DEWHA 2010):
  - Regent Parrot typically breed between August to December annually;
  - Targeted surveys were completed mid-morning (sunrise and 10:00 am) or late-afternoon (16:00 pm and sunset);
  - Surveys effort occurred across ≥12 hours over four (4) separate days for both:
    - Area searches (< 50 ha)
    - Targeted searches (targeting areas of hollow-bearing trees during breeding season);
  - Surveys were completed between August and December when the species is known to be breeding.

In addition to the survey effort required for Regent Parrot as per DEWHA (2010), the EPBC Act approval conditions and EDS required nest trees and flyways to be identified within 350 m of the respective Project Disturbance Footprints. This requirement therefore required additional survey effort to that identified in the survey guidelines for the following reasons:

- The EPBC Act survey guidelines are intended to survey for birds and habitat use in areas where previous surveys have not been completed (i.e. presence/absence surveys);
- A total of ≥12 hours over four (4) days survey effort at each project site to meet Condition 5a was considered to be an inadequate level of survey effort, based on the large extent of areas (ha) to be surveyed in the Disturbance Footprints; and
- While the EPBC Act guideline suggests ≥12 hours over four (4) days for presence–absence detection, this was not sufficient to reliably detect active nests within the Disturbance Footprints and to account for temporal variation in breeding season/activity.

Accordingly, a targeted survey design was developed which incorporated *up to* four independent survey rounds across the species' documented breeding season (August–December). That is, the level of survey effort and timing of searches was allocated based on results of the breeding observations recorded during each survey round. To capture this variability, survey events were undertaken approximately 3-4 weeks apart to maximise detectability of the species' peak breeding activity by recording direct and incidental observations of nest occupancy, breeding behaviour and hollow use.

[1] DEWHA 2010. Survey guidelines for Australia's threatened birds. Department of Environment, Water, Heritage and the Arts, Canberra.

5. Project sites

5.1 Hattah Lakes North (EPBC: 2020/8632)

The Hattah Lakes North Project site is located within the Hattah–Kulkyne/Murray–Kulkyne floodplain complex in north-west Victoria. It proposes works to reinstate more natural inundation regimes across approximately 1,130 ha of River Red Gum-dominated floodplain and associated wetland complexes. The site lies within the Hattah Lakes Icon Site and Hattah-Kulkyne National Park, and supports hollow-bearing River Red-gums (*Eucalyptus camaldulensis*) important for hollow-dependent fauna, including Regent Parrots.

Outside the river/floodplain zone the surrounding landscape is typical Mallee dominated or associated landscapes, dominated by mallee and chenopod EVCs (e.g. Loamy Sands/Woorinen Sands Mallee EVCs 91 and 86, respectively, Semi-arid Woodland EVC 97, and associated saline/chenopod shrublands). These mallee/chenopod communities provide extensive foraging habitat for Regent Parrots beyond the Murray River riparian corridor and nesting habitat areas.

The Hattah Lakes North Project site is approximately 69 km south-east of Mildura, 417 km north-west of Melbourne.

Within the Hattah Lakes North Project site, there are six sub-sites as follows (Figure 2);

- Subsite 1 - K10 Regulator. Regulator structure on River Track;
- Subsite 2 - K10 Causeway Regulator. Associated causeway and control structure;
- Subsite 3 - Bitterang Regulator. Regulator on Eagles Nest Track;
- Subsite 4 - Kulkyne Station Claypit / Borrow Pit. Borrow material source;
- Subsite 5 - Small area in northern Hattah-Kulkyne National Park, on Mournpall Track; and
- Subsite 6 - Sexton's Temporary Pump / Water Extraction - water extraction for construction support (no longer being used).

5.2 Nyah (EPBC: 2020/8648)

The Nyah Project site is located on the Nyah–Vinifera reach of the Murray River floodplain and targets restoration of approximately 475 ha of high-value riverine floodplain, characterised by River Red-gum forest and lagoons.

Nyah lies at the eastern / south-eastern extremity of the Regent Parrot's documented Victorian range, where Murray-floodplain River Redgum colonies interface with mallee and agricultural foraging areas; the species' Victorian distribution is generally concentrated along the Murray River corridor and has contracted in recent decades.

Nyah is approximately 30 km north of Swan Hill and 325 km north-west of Melbourne.

Within the Nyah Project site, there are three sub-sites as follows (Figure 3):

- Subsite 1, Borrow Site (no longer used) - former borrow area intended to supply material for levees/containment works; this site is now not being used.
- Subsite 2, Main Central Project Site. This site includes the core floodplain management infrastructure and associated access/containment works as follows:
  - N2 Regulator - primary flood regulator to manage water delivery onto the Nyah floodplain.
  - N1a and N1b Regulators - smaller regulators supporting N2 operations.
  - Containment banks (~1.6 km) - to retain environmental water and manage flow levels.
  - Drop structure – controlling erosion where water returns to the Murray River.
  - Access track upgrades and new tracks (~3.1 km) - upgrades to ~0.3 km of existing tracks and construction of ~2.8 km of new tracks.

  - Decommissioning of redundant structures - including N4 Bank, N6 Regulator and a block bank on Parnee Malloo Creek.
- Subsite 3, N5/N7 Project Subsite. This southern site comprises:
  - N5 Regulator - minor regulator within the floodplain system.
  - N5 Hardstand - permanent hardstand area for temporary pumping during construction or managed inundation.
  - N7 Regulator - minor regulator located nearby.

5.3 Vinifera (EPBC: 2020/8647)

The Vinifera Project site occurs south/southeast of Nyah on the same lower Murray River floodplain corridor and proposes restoration of riverine forest and wetlands (approx. 350 ha at Vinifera). Referral and assessment materials record targeted habitat and fauna surveys (hollow-tree searches, breeding season checks and flyway observations) to inform impact assessment and the environmental delivery standards required to manage MNES.

Like Nyah, Vinifera is located at the eastern / south-eastern edge of the species' known Victorian range.

Vinifera is approximately 25 km north of Swan Hill and 320 km north-west of Melbourne.

Within the Vinifera Project site, there are two sub-sites as follows (Figure 4):

- Subsite 1 – Main Regulator Cluster. This site includes the central floodplain management infrastructure and supporting containment/track works:
  - V1 Regulator - downstream regulator to manage water delivery into the floodplain.
  - V2 Regulator - main downstream regulator on Vinifera Creek to control flows in and out of the floodplain.
  - Main Bank - water retaining embankment with overflow sills at the northern end of the floodplain.
  - Drop Structure - erosion control structure at the confluence of Vinifera Creek and the Murray River.
  - Forest Track Bank North and South - containment banks between regulators to separate inundated forest from private land.
  - Seven minor works sites (block banks / overflow sills) - small containment works between the Murray River and the forest.
  - Access and track upgrades - ~1 km of existing track upgrades and ~2 km of new tracks to support construction and future maintenance.
  - Temporary hardstand for pumps - permanent hardstand area for temporary pumping equipment when required (pumps not permanently installed).
- Subsite 2 – V3 / V4 Cluster. This separate site to the east includes:
  - V3 Regulator - upstream regulator controlling flows into the northern floodplain.
  - V3 Spillway - associated spillway for controlled overflow.
  - V4 Regulator - upstream regulator preventing backflow into the Murray River.
  - V4 Spillway - associated spillway for managed water release.
  - V4 Hardstand - permanent hardstand for placement of temporary pumping equipment when required.

6. Methods

The following survey design was developed in order to adequately inform and satisfy approval conditions 5a, b and c. Given the application of condition 5b is dependent on the outcomes of 5a, surveys for nesting behaviour, hollow use, and flyway identification were undertaken over the course of the species' known breeding season as per the methods outlined below. If nest sites or flyways were identified within any disturbance footprint buffer area, they were marked using GPS to enable them to be revisited and re-surveyed prior to any required clearance and removal works.

As per Condition 5c, no clearing or construction is permitted to occur during nesting or breeding season in areas within 350 metres of a disturbance footprint where Regent Parrot:

- Is or has been previously observed to be actively nesting, or
- Have been observed to be routinely moving and a flyway has been identified.

The survey design also allows for effort to be reduced or concluded early at sites where:

- Breeding activity has been clearly established, monitored and noted to be concluding (i.e., fledglings having left nest sites);
- Sufficient observational data collected at that given project site and a reference site(s) with confirmed nesting indicates a low likelihood of breeding activity; or,
- No observations of Regent Parrot have been made over the course of preceding survey rounds.

This conditional progression of survey rounds allowed for the implementation of adaptive methodology using direct observations, site-specific conditions and information collected at offsite reference areas where historical breeding has occurred (i.e. Hattah Lakes North and Belsar-Yungera).

6.1 Desktop assessment

A desktop assessment was completed using all available information to understand potential areas requiring survey coverage, including:

- Disturbance Footprints for Hattah Lakes North, Vinifera and Nyah projects (+ 350 m buffer);
- Hollow-bearing trees identified within the Disturbance Footprint at each project site, using GIS shapefile data of the proposed project designs provided by VMFRP;
- Database records for Regent Parrot, using;
  - BirdLife Australia's Birdata database
  - Cornell Lab of Ornithology eBird database;
  - Naturekit and Victorian Biodiversity Atlas (VBA); and
  - Atas of Living Australia
- EVCs associated with Regent Parrot breeding habitat that support an overstorey of River Redgum or Black Box; and
- Roads and access tracks (to assist with accessing the site).

6.2 Regent Parrot nesting habitat

Regent Parrot have well documented specific breeding habitat requirements, comprising various ecological vegetation classes (EVCs) supporting River Red Gum and sometimes Black Box as the dominant overstorey tree species. Nest trees are usually located in proximity to water but can be up to 200 m from water (GHD 2009). Nest trees are typically mature, senescent or dead with a height of 30 m, and Diameter at Breast Height (DBH) of over 1.6 m. Hollows used for nesting average about 21 m above the ground (Burbidge 1985; Webster 1991).

Characteristic measurements are small diameter openings averaging 10 cm high x 9 cm wide and deep hollows to nest chamber averaging 1 m deep (Hurley 2010).

The Environmental Effects Statement (EES) (R8, 2021) identified potential nesting habitat as comprising:

- EVC 106 - Grassy Riverine Forest;
- EVC 295 - Riverine Grassy Woodland;
- EVC 811 - Grassy Riverine Forest/Floodway Pond Herbland Complex; and
- EVC 823 - Lignum Swampy Woodland.

Additional EVCs in the Murray Mallee and Robinvale Plains bioregions characterised by River Red Gum or Black Box as overstorey species include:

- EVC 813 - Intermittent Swampy Woodland; and
- EVC 818 - Shrubby Riverine Woodland.

All of the above EVCs were targeted for Regent Parrot nesting activity, especially areas within 200 m of water.

6.3 Regent Parrot Flyways

Regent Parrot flyways refer to repeated and predictable movement corridors that the species uses to travel between nesting colonies in mature River Red Gums along the Murray River, and feeding areas in surrounding mallee, chenopod, and Black Box woodlands, orchards, or croplands. These flyways are typically direct, relatively narrow corridors (often 200–500 m wide) that extend up to 10–15 km from nest colonies, and are used consistently on a daily basis throughout the breeding season as birds commute at dawn and dusk.

During breeding season, birds are anchored to nest colonies. They are known to follow predictable routes along rivers, floodplains, woodlands, or open paddocks, to access reliable feeding habitat areas.

All surveys recorded Regent Parrot flight data in order to identify any repeatable flight patterns and indicative flyways that may be apparent.

6.4 Survey team

SMEC assembled a suitably qualified Regent Parrot survey team led by experienced avian ecologists, and therefore met the requirements of Condition 5a.

Survey rounds one and two had two teams of two personnel undertaking the required surveys, each team with a designated team lead with at least 15 years' experience in avian/ornithological monitoring practises. Survey Rounds 3 and 4 had a single team of two personnel, due to only Hattah Lakes North project site requiring further surveys to be completed.

Survey team members are presented in Table 1.

Table 1: Survey team members

Team Member	Title	Organisation	Project Role
Dan Weller [2345]	Senior Associate Ecologist	SMEC	Project Manager and Survey Lead/Team Lead
Jenna Forbes [4]	Senior Associate Ecologist / Manager Environment Victoria	SMEC	Field Ecologist
Andrew Taylor	Senior Associate Ecologist	SMEC	Project Director/ Methodology development and Reporting QA

[2] Survey Round 1
[3] Survey Round 2
[4] Survey Round 3
[5] Survey Round 4

Team Member	Title	Organisation	Project Role
Brigette Gwynne [5]	Senior Ecologist		Field Ecologist
Scott Rolph [2]	Ecologist	SMEC	Field Ecologist and Team Lead
Dr. Nicholas Carter [3]	Experienced Ecologist	SMEC	Field Ecologist and Team Lead
Madeleine Cicchelli [2]	Graduate Ecologist	SMEC	Field Ecologist
Dr. Jose Ramos Avila [2]	Consultant Ecologist	Arup	Field Ecologist
Kim Kaufmann [3]	Ecologist	Arup	Field Ecologist
Laura Solly [3]	Environmental Engineer	Arup	Field Ecologist

6.5 Survey Areas

Survey areas within each project subsite were calculated by the application of a 350 m buffer around the disturbance footprint, and omitting areas within this buffer which provide no obvious suitable habitat (e.g., cleared or agricultural land). Where the 350 m buffer extended across the Murray River and into neighbouring riparian woodland habitat areas in NSW, no surveys were undertaken. The extent of the 350 m buffer that extends into NSW at each project site can be seen on Figures 2-4. SMEC considered the natural buffer of the Murray River at the three Project site locations as providing an adequate buffer to potential nest sites located on the NSW bank margins and beyond. Further to this, VMFRP committed to undertaking no construction works within the Regent Parrot breeding season at locations within the Hattah Lakes North project site (Survey area 6; Figure 1) at which the 350 m buffer extends into NSW – one of the only Project subsites that supported indicative Regent Parrot breeding behaviour.

At the Vinifera and Nyah project sites, where the 350 m buffer from the respective disturbance footprints extends into NSW, a conditional approach was implemented. Parts of the Nyah and Vinifera buffer areas extended across the Murray River and into NSW. The endorsed methodology outlined a conditional approach to completing surveys on the NSW side of the Murray River, i.e., they were only to be undertaken where presence of Regent Parrot was confirmed within the adjacent Victorian sections during the initial survey rounds.

This was informed by:

- Vinifera and Nyah project sites being situated at the far south-eastern extent of the typical species range;
- Historical database records indicating presence of birds in these areas being incidental, infrequent or sporadic;
- Lack of previous breeding or nesting records from the Vinifera and Nyah regions; and
- Access and safety constraints.

For all other Project sites, after intersecting the modelled EVC extent with the 350 m buffer around each project site's Disturbance Footprint, approximately 680 ha of suitable habitat was surveyed per survey round (as per Table 2). The total area of suitable habitat within each project site was estimated using aerial imagery and suitable habitat cover within the 350 m buffer area. Broadly, this resulted in surveys focusing on woodlands (treed cover), and dismissing areas used for grazing, cropping, urban infrastructure, and large waterways and wetlands (where no trees or stags were present).

Table 2: Project area size, estimated habitat suitability and resulting areas surveyed for Regent Parrot nesting activity.

Site	Total Disturbance Footprint Buffer Area (ha)	Estimated Suitable Habitat (ha)
Hattah Lakes North	437	205
Nyah	476	276

Site	Total Disturbance Footprint Buffer Area (ha)	Estimated Suitable Habitat (ha)
Vinifera	382	199
Total	**1,295**	**680**

6.6 Adaptive survey methodology

Surveys were conducted on four (4) separate survey rounds between August and November 2025, corresponding with the Regent Parrot's core breeding period at the Hattah Lakes North (Figure 2), Nyah (Figure 3), and Vinifera (Figure 4) project sites. Each survey round covered the full extent of the applied 350 m buffer area of the Disturbance Footprint where suitable habitat was present, as presented in Figures 2-4. The proposed four survey round approach was aimed at identifying new nesting activity and flyways in each consecutive survey round, and not revisiting trees within which nesting activity had already been recorded.

This approach drew upon previous survey results, available database records of confirmed Regent Parrot nesting, and used these as a foundation upon which to build an overview of active nesting sites and flyway locations across each of the project sites' respective 350 m buffer areas.

During survey rounds one and two, surveys were undertaken by two independent two-person teams (four observers total). Each team operated separately within delineated areas to maximise spatial coverage and minimise double-counting or overlap. Survey leads had extensive experience in detecting hollow-nesting birds and interpreting indicative active bird breeding behaviour. Survey Rounds three and four had a single team of two personnel, due to only Hattah Lakes North project site requiring further surveys to be completed.

Ecological Vegetation Classes that were targeted for assessment included; EVC 106 - Grassy Riverine Forest, EVC 295 - Riverine Grassy Woodland, EVC 811 - Grassy Riverine Forest/Floodway Pond Herbland Complex, and EVC 823 - Lignum Swampy Woodland as each of these EVCs contribute to potential primary nesting habitat. EVC 813 - Intermittent Swampy Woodland and EVC 818 - Shrubby Riverine Woodland, contribute to secondary nesting habitat. Within 350 m of the disturbance footprint at each project site, these EVCs were surveyed for Regent Parrot nesting activity. Surveys focused efforts within these areas, especially where there were permanent water sources within 200 m.

Nest surveys targeted large, mature River Red-gum and Black Box trees within each Disturbance Footprint, as above certain ages and size these species are known to contain hollows which act as suitable nesting habitat for the species. Flyway observation and identification was undertaken during all field survey rounds, by recording all observations of Regent Parrot in flight, origin and direction of travel. Survey areas were designated using recent aerial imagery, and focused on suitable habitat patches and areas likely to support hollow-bearing trees (Figures 2-4).

Survey effort was restricted to early-morning (sunrise to 11:00 am) or late-afternoon (15:00 pm to sunset) periods to coincide with peak Regent Parrot activity. At each site, teams completed systematic visual and auditory searches for Regent Parrots, noting any breeding behaviour indicators and active flyway usage.

No targeted surveys were undertaken on high rainfall days (i.e. ≥10mm in a 24 hr period), during excessively windy conditions or during total fire bans, when the species activity is likely to be lower, and relative chances of detection may be significantly reduced. Natural flooding events were also initially noted to potentially prevent, or delay survey rounds from being undertaken due to safety concerns and access limitations which may include but is not limited to uneven or unstable ground or surfaces which may increase the risk of injury (muddy terrain, lose rocks or fallen trees and debris). However, flooding was not an issue during the entire 2025 survey program.

All detections of Regent Parrots were entered into the ArcGIS Field Maps mobile device application, which is of standard GPS accuracy (~3 m). Locations of active nests, and parrot flyways were recorded. Surveyors recorded the number of individuals, behaviour (e.g., flying, feeding, vocalising, nesting), and tree or hollow characteristics where relevant. Photographic evidence, including site and habitat characteristics, was collected where feasible.

6.6.1 Survey Rounds 1 and 2

August and September

Survey effort initially focused on detecting Regent Parrot breeding activity during the core early nesting period (August–September), when birds are most likely to be commencing nesting.

The approach for Survey Rounds 1 and 2 was as follows:

- All project sites were surveyed twice during this early breeding window (August to September), targeting both known and potential nesting habitat within each Disturbance Footprint (Figures 2–4).
- These initial rounds were expected to capture peak breeding activity.
- Regent Parrot flight behaviour/characteristics were also noted in order to identify any patterns and potential flyways.

6.6.2 Survey Review Point: September

Following completion of Rounds 1 and 2, survey results from each site were reviewed to determine whether additional surveys were warranted.

Further survey rounds proceeded if:

- Regent Parrots were observed, but breeding activity was not yet confirmed;
  - Direct observation of adults inspecting, entering, or exiting hollows
  - Courtship or territorial displays and vocalisations
  - Physical signs of recent nesting (e.g., feather debris, chewed hollow edges, faecal staining);

No further surveys were to be conducted at a site if:

- Supporting desktop data indicates low breeding likelihood, including:
  - No historical or recent breeding records at the site
  - Site located outside areas of known or predicted high-use breeding habitat
  - Habitat characteristics unsuitable or marginal (e.g., lacking large hollow-bearing trees or proximity to watercourses);
- Observations of vacated nests or fledglings by ecologists in Survey Rounds 1 or 2 (e.g., chicks observed, adults feeding or leading young outside of nest hollows); or
- No Regent Parrots were observed during either initial survey round, and presence and breeding behaviour was confirmed at other locations suggesting the site was not supporting the species, or any breeding activity.

6.6.3 Survey Rounds 3 and 4

Following the review of Survey Rounds 1 and 2, further survey effort was targeted and adaptive. Where active nesting had been confirmed, Survey Rounds 3 and 4 focused on identifying new nest sites (i.e., those not previously recorded in survey rounds 1 or 2) and Regent Parrot flyways. This ensured effort was concentrated where breeding activity was confirmed or likely to still be occurring and avoided unnecessary survey duplication.

October

A third Survey Round was undertaken at sites where:

- Breeding activity had only recently commenced or remains uncertain;
- Earlier surveys were hindered by weather, access, or other constraints;

Survey Round 3 targeted:

- Sites with ongoing or emerging breeding activity;

November

A fourth and final round was undertaken at sites where:

- Breeding activity had only recently commenced or remains uncertain;
- Earlier surveys were hindered by weather, access, or other constraints;

Survey Round 4 targeted:

- Sites with ongoing or emerging breeding activity;
- Noting presence of fledglings or juvenile birds outside of nesting locations, following adults to/from foraging sites or through riverine floodplain woodland environs.

7. Results

7.1 Weather conditions

Weather conditions across the four survey rounds in 2025 were generally consistent with seasonal expectations for north-western Victoria. Weather observations for each survey day were recorded from the nearest Bureau of Meteorology weather station; for Hattah Lakes North sites this was Mildura (Station #076031) and for Nyah and Vinifera, Swan Hill (Station #077094).

Round 1 (18–24 August) occurred during late winter, with predominantly cool minimum temperatures (-1–5°C) and mild to moderate maximums (15–19°C). Rainfall was minimal, and wind variation over the survey days was variable, creating largely dry conditions favourable for undertaking surveys. Late August conditions at Nyah and Vinifera mirrored those at Hattah Lakes North, with slight variations in daily maximum temperatures.

Round 2 (14–19 September) represented a clear transition to early spring conditions. Temperatures increased, with daily maximums ranging from 19 to 26°C and minimums from 3 to 9°C. The period remained largely dry, apart from one evening which saw around 5 mm of rain fall overnight. Wind was generally low to moderate, occasionally stronger on some days. These conditions generally supported active bird movement, although windy conditions may have influenced detectability in more open habitats.

Round 3 (19–22 October) experienced warm, dry, late-spring conditions, with temperatures consistently higher than previous rounds (maximums 25–36°C). Minimal rainfall and generally moderate winds predominated, although elevated gusts were recorded on the final day with a significant storm front passing through the state from around midday (after surveys had been completed).

Round 4 (17–19 November) coincided with late spring and a period of higher variability in weather. The warmest day of the survey program (36.4°C) was recorded at Hattah, accompanied by elevated wind gusts. The final survey day experienced a cooler front with moderate rainfall and very high gusts, reflecting transitional late-spring weather.

Overall, survey conditions were excellent for detection of Regent Parrots, with low rainfall and predominantly low-moderate wind speeds across most survey rounds.

Table 3: Weather conditions for survey round 1; 18 – 24 August

Date	Site Surveyed	Station Used	Min Temp (°C)	Max Temp (°C)	Rain (mm)	Max Wind Gust (km/h)	Notes
18 Aug 2025	Hattah Lakes North	Mildura	2.0	15.7	0.2	35	Cool, dry late winter.
19 Aug 2025	Hattah Lakes North	Mildura	-0.2	16.2	0.8	20	Cold morning but then clear, dry.
20 Aug 2025	Hattah Lakes North	Mildura	3.3	20.1	0.0	28	Clear, warm, dry.
21 Aug 2025	Hattah Lakes North (am) Nyah / Vinifera (pm)	Mildura / Swan Hill	4.1 2.3	20.5 20.5	0.0 0.0	31 35	Clear, warm, dry.
22 Aug 2025	Nyah / Vinifera	Swan Hill	7.1	18.9	0.0	24	Cold morning but then clear, dry.
23 Aug 2025	Nyah / Vinifera	Swan Hill	3.0	17.9	0.0	28	Cold morning but then clear, dry.

Date	Site Surveyed	Station Used	Min Temp (°C)	Max Temp (°C)	Rain (mm)	Max Wind Gust (km/h)	Notes
24 Aug 2025	Nyah / Vinifera	Swan Hil	1.2	17.2	0.0	26	Cold morning but then clear, dry.

Table 4: Weather conditions for survey round 2; 14 – 19 September

Date	Site Surveyed	Station Used	Min Temp (°C)	Max Temp (°C)	Rain (mm)	Max Wind Gust (km/h)	Notes
14 Sep 2025	Hattah Lakes North	Mildura	6.1	23.2	0.0	41	Warm, dry.
15 Sep 2025	Hattah Lakes North	Mildura	10.8	30	0.1	59	Warm, dry.
16 Sep 2025	Hattah Lakes North	Mildura	13.9	14.8	0.1	28	Overcast, light intermittent showers
17 Sep 2025	Nyah / Vinifera	Swan Hill	4.7	16.4	5.4	35	Rain overnight/early morning. Then clear mild day.
18 Sep 2025	Nyah / Vinifera	Swan Hill	3.1	22.2	0.0	56	Mild to warm day, cool morning.
19 Sep 2025	Nyah / Vinifera	Swan Hill	9.4	26.2	0.0	57	Warm with light breezes.

Table 5: Weather conditions for survey round 3; 19 – 22 October

Date	Site Surveyed	Station Used	Min Temp (°C)	Max Temp (°C)	Rain (mm)	Max Wind Gust (km/h)	Notes
19 Oct 2025	Hattah Lakes North	Mildura	14.0	34.4	0.0	41	Warm, dry.
20 Oct 2025	Hattah Lakes North	Mildura	17.4	34.9	0.0	50	Warm, dry.
21 Oct 2025	Hattah Lakes North	Mildura	15.6	23.1	0.0	31	Mild.
22 Oct 2025	Hattah Lakes North	Mildura	16.9	23.6	0.0	69	Storm front through Victoria from around midday onwards

Table 6: Weather conditions for survey round 4; 17 – 19 November

Date	Site Surveyed	Station Used	Min Temp (°C)	Max Temp (°C)	Rain (mm)	Max Wind Gust (km/h)	Notes
17 Nov 2025	Hattah Lakes North	Mildura	10.6	22.1	0.0	43	Warm late spring.
18 Nov 2025	Hattah Lakes North	Mildura	14.4	36.4	0.0	35	Hot, dry.

Date	Site Surveyed	Station Used	Min Temp (°C)	Max Temp (°C)	Rain (mm)	Max Wind Gust (km/h)	Notes
19 Nov 2025	Hattah Lakes North	Mildura	13.1	29.1	0.0	43	Cooler front; rain/gusty.

7.2 Overview

Regent Parrot nest and flyway monitoring was undertaken across four survey rounds between 18 August and 19 November 2025, encompassing the core breeding period for the species in north-western Victoria. Survey effort was initially applied to all disturbance footprint buffer areas (350 m) at Hattah Lakes North, Nyah and Vinifera, with subsequent survey rounds adaptively refined based on site-specific outcomes and observed breeding activity.

A reference site at Belsar-Yungera was visited opportunistically during rounds one and two to provide regional context regarding breeding season timing and progression but did not form part of the formal survey program in 2025.

7.3 Survey Effort and Coverage

Survey Rounds 1 and 2

Survey extent:
All 350 m disturbance footprint buffer areas were surveyed at:

- Hattah Lakes North;
- Nyah; and
- Vinifera.

Surveys were undertaken on foot during bird peak daily activity periods (dawn–mid-morning and late afternoon–dusk), consistent with accepted Regent Parrot survey guidelines.

Reference observations were undertaken at Belsar-Yungera during transit between Hattah Lakes North and Nyah.

Survey Rounds 3 and 4

Based on the absence of Regent Parrot detections at Nyah and Vinifera during the first two survey rounds, survey effort during Rounds 3 and 4 was restricted to Hattah Lakes North project site only.

This approach ensured continued monitoring of confirmed breeding activity while avoiding unnecessary survey effort in areas where repeated absence had been demonstrated under suitable conditions, and with breeding activity confirmed at other sites.

7.4 Regent Parrot Presence and Abundance

7.4.1 Hattah Lakes North

Regent Parrots were consistently recorded at Hattah Lakes North during all four survey rounds.

- **Round 1 (August):**
  High levels of activity were recorded, with widespread observations across all survey areas and buffers. Total observations were estimated at approximately 260 individuals, with frequent movements between riparian areas and surrounding woodland habitats.

- **Round 2 (September):**
  Total observations decreased to approximately 170 individuals. The majority of birds observed were males, interpreted as a result of females remaining within nest hollows during incubation or early brooding.
- **Round 3 (October):**
  Similar numbers to Round 2 were recorded (approximately 170 individuals), with continued high activity associated with provisioning behaviour at known nesting locations.
- **Round 4 (November):**
  A marked decline in observations was recorded (approximately 82 individuals). Regent Parrot activity was less widespread, and not all survey areas recorded detections for the first time during the monitoring program. This decline is consistent with post-breeding dispersal.

7.4.2 Nyah

Regent Parrots were not detected during any survey round.

No observations of individuals, pairs, or breeding behaviour were recorded despite repeated surveys under suitable conditions.

7.4.3 Vinifera

Regent Parrots were not detected during any survey round.

No observations of individuals, pairs, or breeding behaviour were recorded despite repeated surveys under suitable conditions.

7.4.4 Belsar-Yungera (Reference Site)

Regent Parrots were detected during survey rounds 1 and 2 only.

Abundance increased between rounds, from approximately 30 individuals in Round 1 to ~50 individuals in Round 2. Belsar-Yungera was not visited as part of Survey rounds 3 and 4 as it had been used as a reference site for the first two rounds. As Regent Parrot activity had been confirmed at Hattah Lakes North, and continued through all survey rounds, no further visits to Belsar-Yungera were considered necessary.

7.5 Nesting Activity and Breeding Progression

7.5.1 Hattah Lakes North

Round 1 (18–24 August)

Nesting activity was identified at multiple locations along the Murray River during access to survey subsites.

- At one project subsite (Site 6), six potential nesting hollows were identified, with pairs of Regent Parrots actively inspecting hollows and exhibiting repeated entry and exit behaviour.
- Substantial immigration and emigration of birds were observed, indicating territory establishment and early nesting activity.
- Additional nesting behaviour was noted at other locations outside of any of the project subsites:
  - Messengers Pump Station area
  - Messengers Mailbox Track / River Track convergence
- Low quality nesting habitat was identified at the eastern extremities of the 350 m buffer at Subsite 4 - Kulkyne Station, although no Regent Parrot observations or evidence of nesting behaviours was made.
- No nesting habitat was present within any of the other subsites.

Round 2 (14–19 September)

Clear progression to active nesting was documented:

- At Subsite 6, 20 or more nesting hollows were identified as being actively used by breeding pairs.
- Male birds were frequently observed provisioning females at hollow entrances, confirming incubation or early chick-rearing.
- Breeding activity was again observed at multiple locations along the Murray River corridor.

Nesting activity at Belsar-Yungera was present but appeared slightly delayed relative to Hattah Lakes North, with approximately 20 nest sites identified.

Round 3 (19–22 October)

Continued nesting activity was recorded at Hattah Lakes North.

- Additional nest sites were identified that had not been recorded in previous rounds, including single trees supporting up to eight breeding pairs occupying different hollows.
- Adult birds were observed provisioning nests, though no direct observations of chicks at hollow entrances or fledged juveniles were recorded during this round.
- Nesting habitat within the survey area remained confined to Subsite 6 and adjacent areas supporting similar riparian vegetation.

Round 4 (19–21 November)

No active nesting behaviour was observed.

- No new nest sites were identified.
- Several observations of juvenile Regent Parrots shadowing adults were recorded near Site 6, indicating fledging had occurred.

The low number of juveniles observed, combined with significantly reduced adult activity, suggests that breeding had largely concluded by this time.

7.5.2 Nyah and Vinifera

No Regent Parrot general sightings, nesting behaviour, hollow inspection, provisioning, or juvenile observations were recorded during any survey round.

Riverine and billabong habitats were dry during early rounds and did not support breeding activity during the monitoring period.

7.6 Other Listed Bird Species

The following listed threatened bird species were recorded opportunistically within survey buffers across the monitoring period:

- Hooded Robin (*Melanodryas cucullata*);
- Southern Whiteface (*Aphelocephala leucopsis*);
- Little Eagle (*Hieraaetus morphnoides*); and
- White-bellied Sea-Eagle (*Haliaeetus leucogaster*).

These observations were incidental and not the focus of targeted survey effort. Observations of these species are shown on the figure sets for each project area.

8. Discussion

8.1 Flyways

No flyway patterns, either persistent or resource-linked, were observed at Nyah or Vinifera across any survey round. Regent Parrots were not detected at these sites, and there was no evidence of presence or daily commuting or concentrated flight paths observed. As such, in-field flyway identification focused on Hattah Lakes North as in the current survey program, it was the only site (excluding Belsar-Yungera) at which Regent Parrot were routinely observed.

Movement patterns of Regent Parrots across the Hattah Lakes North landscape were systematically documented during four survey events (Rounds 1–4). Interpretation of these movements must be considered within the broader ecological context of the local vegetation communities and the temporal availability of key foraging resources. In the context of Hattah Lakes North project site, rather than discrete, fixed “flyways”, Regent Parrot movement throughout the season was best interpreted as dynamic, resource-driven patterns across a heterogeneous but largely contiguous landscape.

8.1.1 Ecological Drivers of Movement

Regent Parrots are primarily seed-eating granivores that opportunistically exploit a wide range of native plant species, including chenopods and mallee shrubs. Diet can often be supplemented by broad scale agricultural crops in neighbouring areas such as almonds. Their diet in native vegetation however includes seeds, buds and flowers of numerous chenopod and mallee species, including *Maireana* spp. (bluebushes), and other taxa within halophytic shrublands and grasslands typical of the Murray Mallee bioregion.

Maireana spp. in particular are well-represented within chenopod shrublands on saline or alkaline soils characteristic of the Hattah-Kulkyne/Murray Kulkyne region. These species (e.g. *Maireana sedifolia, M. pyramidata, M. gracilis*) produce aperiodic seed crops that are utilised by many parrot species as a key foraging resource when available.

The reproductive and seeding phenology of chenopods is inherently seasonal and opportunistic, influenced by rainfall patterns, soil moisture and temperature, resulting in a high degree of spatial and temporal variability in food resource availability.

This variation in resource availability drives short-term shifts in foraging locations and daily movements in Regent Parrot, as they transit between nesting sites along the Murray River and patches of favourable forage dispersed across chenopod shrubland, mallee woodland and other semi-arid plant communities in the broader region.

8.1.2 Survey Round Observations and Movement Patterns

Rounds 1–2 (August–September)

During Rounds 1 and 2, frequent observations at Hattah Lakes North demonstrated high numbers of Regent Parrots moving between riparian nesting areas and mallee foraging habitat further afield. Given the landscape and vegetation context, these movements were not constrained along narrow linear corridors, but were highly variable, consistent with birds returning to or seek out new ephemeral or spatially patchy foraging resources.

In this early breeding phase, birds were observed crossing buffer areas expected to be of low use, indicating that while no persistent flyways (i.e., fixed routes repeatedly used over multiple days) could be definitively mapped, daily movement paths were influenced strongly by the distribution of foraging resources available at that time. These included chenopod shrubland and mallee vegetation producing buds, flowers, and seeds and newly emerging seasonal food resources.

Reference observations at Belsar-Yungera similarly recorded Regent Parrots engaging in exploratory movements and preliminary foraging, although at lower density than Hattah Lakes North during this period. This suggests that regional food resource pulses and delays in the phenological progression of key foraging plant species is a primary driver influencing short-term movement patterns.

Rounds 3–4 (October–November)

By Rounds 3 and 4, the dataset of bird movements was sufficient to reassess early apparent 'flyway' behaviour. Rather than representing persistent, structured flyways, the routes used by Regent Parrots were better interpreted as dynamic but direct movement between resource patches and identified active nesting areas.

This interpretation is consistent with ecological understanding of Regent Parrot foraging ecology: individuals, pairs and small groups repeatedly move across a wide spatial range (often up to tens of kilometres) to exploit localised foraging resources, rather than adhering to fixed aerial corridors. Breeding male Regent Parrots exhibit landscape-scale movements between riverine nesting habitat and distant mallee foraging areas, with telemetry and observational studies documenting regular foraging excursions in excess of 12 km and substantial variability in movement patterns in response to changing food availability (Baker-Gabb and Hurley, 2011; Department for Environment and Water, 2022). In the Hattah Lakes North context, the contiguous vegetation cover of the national park, Murray River corridor and associated woodland and shrubland habitats provides a continuous matrix of potential foraging opportunities, such that parrot movements within and between survey rounds manifested as variable flight paths rather than clear flyways or movement corridors. These movements likely reflect shifting local resource availability (e.g., chenopod bud and seed availability, grass seeding), rather than the presence of defined flyways anchored by landscape structure.

8.1.3 Hattah Lakes North Regent Parrot Movement

While discrete flyways could not be meaningfully mapped as fixed features, the Murray River corridor and its immediate floodplain vegetation represent a well-documented key area for Regent Parrot breeding and departure point. In the Hattah region during the nesting season, the Murray River corridor does not function as a narrow aerial "flyway" in the conventional sense but serves as a base from which parrots initiate daily foraging movements into adjacent vegetation patches to wherever seeding or budding plants or other foraging resources are available.

Observations from the survey program indicate that Regent Parrot movement patterns at Hattah Lakes North were:

- Diffuse and responsive to resource availability, rather than channelled through fixed linear corridors;
- Driven in the short term by availability of key foraging resources, including seeds and reproductive structures of chenopods (e.g. *Maireana* spp.), grasses, saltbushes and other shrubland species that flower and seed at different times through spring; and
- Flexible across the landscape matrix, reflecting opportunistic exploitation of patchy resources embedded within a largely continuous habitat.

Consequently, the interpretation of 'flyways' at this site should emphasise seasonally dynamic movement paths tied to food availability and nesting phenology, rather than discrete, definable, more permanent aerial flyways. On the basis of the survey outcomes and the ecological context of the landscapes surveyed, the identification and protection of discrete Regent Parrot "flyways" through fixed spatial buffers is not considered warranted. The largely contiguous vegetation matrix within Hattah-Kulkyne National Park and Murray-Kulkyne Park enables birds to move freely across broad areas, reducing the likelihood that such movements are confined to linear flyways. Observed movement paths shifted between survey rounds and also within days, reflecting the seasonal and patchy availability of foraging resources, rather than any structural confinement of movement by landscape or habitat conditions. In such contexts, applying buffers to inferred flyways would be arbitrary, difficult to confidently define, and unlikely to provide meaningful additional protection beyond that afforded by managing core nesting habitat areas and the broader surrounding foraging landscape.

9. Implications for Survey Design and Buffer Application

The outcomes of the Regent Parrot monitoring program demonstrate that survey design, effort, and the application of buffers and approval conditions should be site-specific, proportionate, and evidence-based, rather than uniformly applied across all disturbance footprints irrespective of habitat suitability, evidence of nesting, or the nature of proposed works (Table 7).

Table 7: Summary of buffer application validity for sites surveyed during the 2025 season

	350 m Buffer required	Justification
Hattah Lakes North		
Subsite 1 - K10 Regulator. Regulator structure on River Track	No	No suitable nesting habitat present
Subsite 2 - K10 Causeway Regulator. Associated causeway and control structure	No	No suitable nesting habitat present
Subsite 3 - Bitterang Regulator. Regulator on Eagles Nest Track	No	No suitable nesting habitat present
Subsite 4 - Kulkyne Station Claypit / Borrow Pit. Borrow material source	No	No suitable nesting habitat present
Subsite 5 - Small area in northern Hattah-Kulkyne National Park, on Mournpall Track	No	No suitable nesting habitat present
Subsite 6 - Sexton's Temporary Pump / Water Extraction - water extraction for construction support (No longer being used)	Yes	Regent Parrot nesting habitat present and nesting activity observed
Nyah		
Subsite 1, Borrow Site (No longer used) - Former borrow area intended to supply material for levees/containment works; this site is now not being used	No	No Regent Parrot observed during survey program Scarce previous records of species in available databases Limited suitable nesting habitat present
Subsite 2, Main Central Project Site. This site includes the core floodplain management infrastructure and associated access/containment works	No	No Regent Parrot observed during survey program Scarce previous records of species in available databases Limited suitable nesting habitat present
Subsite 3, N5/N7 Project Subsite	No	No Regent Parrot observed during survey program Scarce previous records of species in available databases Limited suitable nesting habitat present

	350 m Buffer required	Justification
Vinifera		
Subsite 1 – Main Regulator Cluster. This site includes the central floodplain management infrastructure and supporting containment/track works	No	No Regent Parrot observed during survey program Scarce previous records of species in available databases Limited suitable nesting habitat present
Subsite 2 – V3 / V4 Cluster.	No	No Regent Parrot observed during survey program Scarce previous records of species in available databases Limited suitable nesting habitat present

9.1 Hattah Lakes North

In contrast, Regent Parrot breeding activity was clearly present at Hattah Lakes North (and also Belsar-Yungera, used a reference site) and repeatedly confirmed across survey rounds. Nesting activity was spatially constrained, being associated with discrete areas containing mature hollow-bearing River Red Gums along the Murray River corridor. Extensive areas within surveyed buffers, including multiple proposed infrastructure sub-sites, were found to lack any potential nesting habitat and did not support nesting activity despite repeated targeted survey effort.

This pattern aligns with the well-documented breeding ecology of the species. Regent Parrots are known to nest almost exclusively in large, mature River Red-gums (and occasionally Black Box) with deep hollows, typically within riparian woodland or floodplain forest (Higgins 1999; DCCEEW Conservation Advice; Saunders et al. 2013). Nesting is strongly constrained by hollow availability, and suitable trees can be unevenly distributed across the floodplain landscape, even within otherwise intact woodland systems.

Temporal patterns observed across survey rounds further indicate that breeding at Hattah Lakes North was well advanced by September, with incubation and chick provisioning occurring through October, and that fledging was largely complete by November. The decline in adult activity, reduced overall numbers, and observations of juveniles accompanying adults during the final survey round are consistent with the completion of the breeding cycle. This temporal resolution provides confidence regarding the timing of breeding cessation at the site for the 2025 season.

9.2 Nyah and Vinifera

The absence of Regent Parrot detections at Nyah and Vinifera across two complete early-season survey rounds (August and September), undertaken during periods considered most likely to detect breeding activity, provides a high level of confidence that breeding did not occur at these sites during the 2025 season. Surveys targeted all suitable habitat within the 350 m buffers under appropriate weather conditions, and no individuals, behaviours, or habitat use indicative of nesting were recorded.

Given the conspicuous nature of Regent Parrot breeding behaviour - including repeated site attendance, vocalisations, male provisioning flights, and activity around nesting hollows - repeated non-detection across multiple visits is considered a robust indicator of parrot absence rather than a limitation of detectability. This interpretation is consistent with published accounts of the species' breeding ecology, which emphasise strong fidelity to suitable nesting areas once breeding has commenced (Higgins 1999; DCCEEW Conservation Advice).

9.3 Nuanced Application of Buffers

The application of a uniform 350 m buffer around all disturbance footprints at Hattah Lakes North does not adequately reflect the significant variability in breeding habitat suitability, observed use, or proposed construction disturbance intensity across the six discrete infrastructure sub-sites.

While some sub-sites intersect or occur proximate to high-quality breeding habitat - characterised by mature River Red-gums with multiple suitable hollows and confirmed nesting activity - other sub-sites support no River Red-gum or Black Box trees, lack hollow-bearing structures entirely, are located too far from permanent water sources and are demonstrably unsuitable for Regent Parrot nesting. These findings are consistent with regional research showing that breeding habitat availability for the species is highly localised and not evenly distributed across riparian or floodplain landscapes (Higgins 1999; Saunders & Ingram 1995).

In addition, the nature and intensity of proposed works varies substantially between sub-sites. For example, some footprints are associated with limited or intermittent activities (such as water extraction for construction use elsewhere), while others involve more substantial or prolonged infrastructure development. The likelihood, intensity, and duration of disturbance therefore differs markedly between locations.

From an ecological perspective, buffers are intended to mitigate disturbance impacts on active breeding, particularly noise, vibration, visual disturbance, and habitat modification. Where no suitable nesting habitat exists, and where repeated surveys have failed to detect breeding activity, the application of a fixed 350 m buffer offers limited if any conservation benefit and imposes constructability constraints that are not commensurate with actual risk. Contemporary conservation guidance increasingly recognises that buffers should be functionally linked to habitat values and species behaviour, rather than applied as arbitrary distances with no consideration of local individual site contexts or differences in impact intensity and duration.

9.4 Implications for future surveys

Taken together, the survey outcomes support a risk-based, site- and sub-site-specific application of both the four-round survey framework and the 350 m buffer requirement, consistent with the intent and objectives of the relevant EE Act and EPBC Act approval conditions.

At Hattah Lakes North, survey effort confirmed that Regent Parrot breeding activity was present but spatially constrained to discrete areas associated with the Murray River corridor and specific clusters of large hollow-bearing River Red-gums (e.g., Subsite 6). In these locations, the application of the four-round survey framework and the 350 m buffer was ecologically justified and necessary to identify and manage potential impacts to active nests and breeding habitat, noting that at this location no works or associated disturbance are now proposed.

Hattah Lakes North comprises six separate proposed infrastructure sub-sites, each differing markedly in habitat suitability, ecological function and impact disturbance characteristics. Several sub-sites were demonstrated through the survey program to lack key nesting habitat attributes (including large hollow-bearing trees and access to permanent water) and consistently showed no evidence of Regent Parrot nesting activity despite targeted survey effort undertaken during peak breeding periods. In addition, the nature, intensity and duration of proposed works varies substantially between sub-sites, ranging from temporary water extraction for construction use elsewhere, to permanent infrastructure with more extensive ground disturbance.

In this context, the uniform application of a 350 m buffer and repeated survey effort across all subsites, irrespective of habitat quality, observed use or disturbance magnitude, is not supported by the findings of this survey program. Regent Parrot breeding ecology is closely linked to the presence of suitable nesting hollows, permanent water sources and adjacent foraging resources, and the likelihood of impact is therefore strongly dependent on both habitat condition and the nature of the proposed activity.

The results from the survey program support a targeted and proportionate interpretation of approval conditions, whereby buffers and additional survey effort are applied only where there is a demonstrable risk of impact to breeding Regent Parrots or their nesting habitat.

This approach ensures that the intent of the approval conditions, namely the identification and protection of nesting areas and active nests is met, while avoiding unnecessary constraints or survey effort in areas where the risk of impact has been shown to be negligible.

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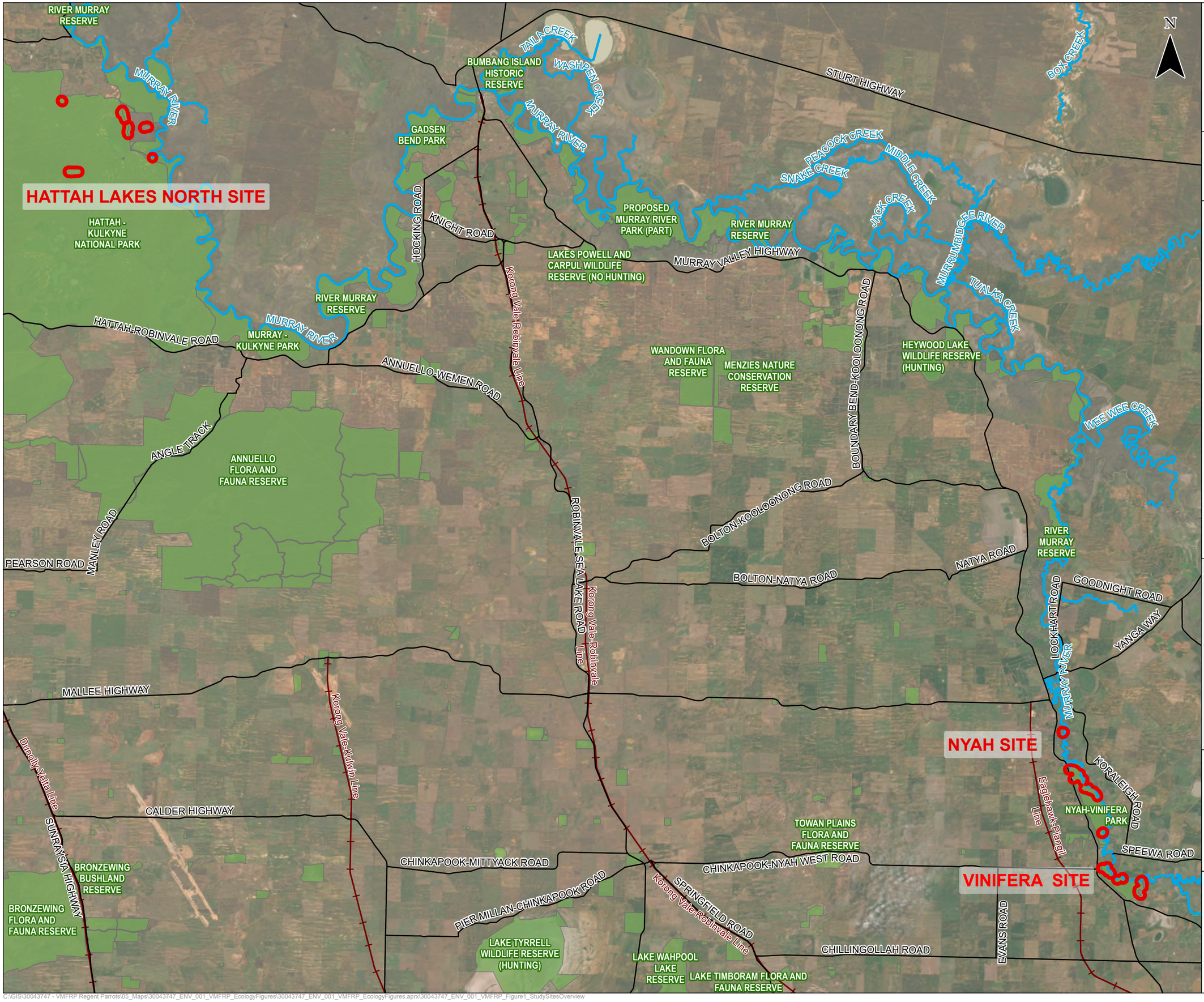
Figures



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LEGEND

- Study Site
- Parks And Conservation Reserves
- Rail line
- Major road
- River

KEY MAP
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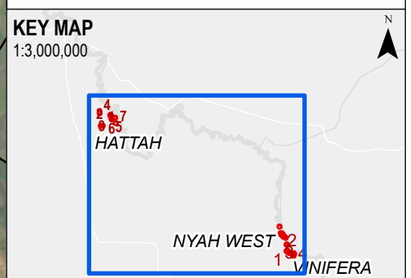

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PROJECT NO:	30043747
FIGURE NO:	1
FIGURE TITLE:	Study Sites Overview
CREATED BY:	MD17519
DATE:	18/12/2025
VERSION:	1

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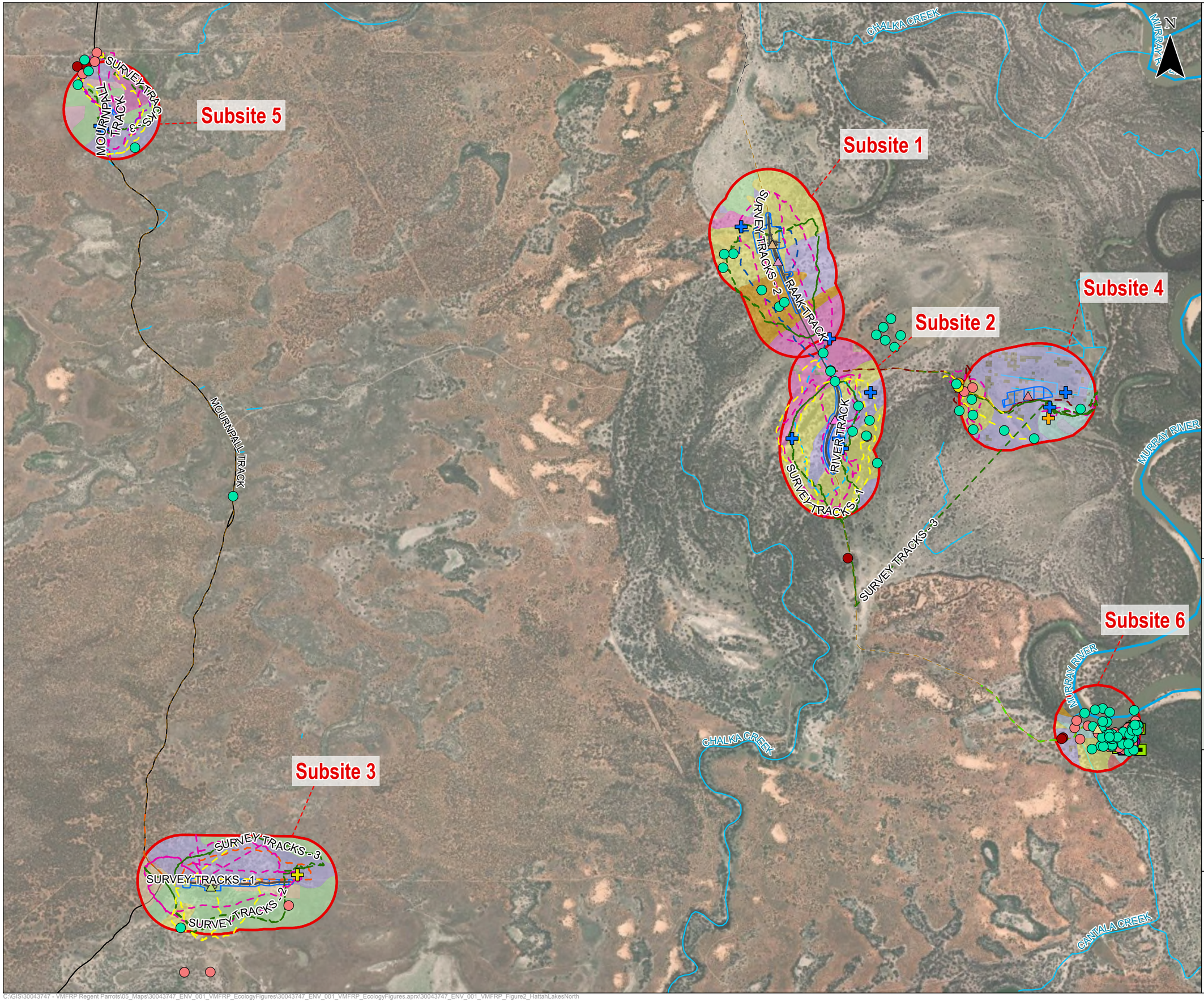

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0 300 600 900 1200
Metres

Scale:1:28,000 @ A3
GDA2020 MGA Zone 54

LEGEND

- Study Site
- Disturbance footprint

Ecological Value Classes

- Woorinen Sands Mallee (86)
- Semi-arid Woodland (97)
- Riverine Chenopod Woodland (103)
- Grassy Riverine Forest (106)
- Chenopod Mallee (158)
- Riverine Grassy Woodland (295)
- Floodway Pond Herbland (810)
- Intermittent Swampy Woodland (813)
- Shrubby Riverine Woodland (818)
- Lignum Swampy Woodland (823)
- Woorinen Mallee (824)
- Design
- Track Road

SurveyTracks

- Survey Tracks - 1
- Survey Tracks - 2
- Survey Tracks - 3
- Survey Tracks - Kulkyne Station Grave (18 Nov 2025)
- Survey Tracks - Mournpall Track, Kulkyne NP (18 Nov 2025)
- Survey Tracks - Mournpall Track, Hattah-Kulkyne (19 Nov 2025)
- Survey Tracks - Raak Track, Hattah (19 Nov 2025)
- Survey Tracks - River Track, Hattah (19 Nov 2025)
- Survey Tracks - Hattah (18 Nov 2025)

Threatened Species Sightings

- Hooded Robin
- Little Eagle
- Southern Whiteface

Regent Parrot Sighting

- Flying/fly through
- Foraging/birds on ground
- Indicative breeding behaviour
- Perched/loafing
- Foraging/Flying
- Perched/Flying
- Regent Parrot Nest

Structure

- Borrow
- Regulator - Bitterang
- Regulator - K10
- Regulator - K10 Causeway
- Spillway - K10
- Water Supply
- Major road
- Minor road
- River
- Stream

KEY MAP
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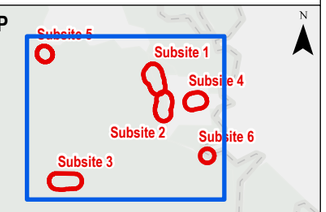

PROJECT:	ARUP-VMFRP Regent Parrot Pre-Clearance Surveys
PROJECT NO:	30043747
FIGURE NO:	2 - 1
FIGURE TITLE:	Hattah Lakes North
CREATED BY:	MD17519
DATE:	9/02/2026
VERSION:	2

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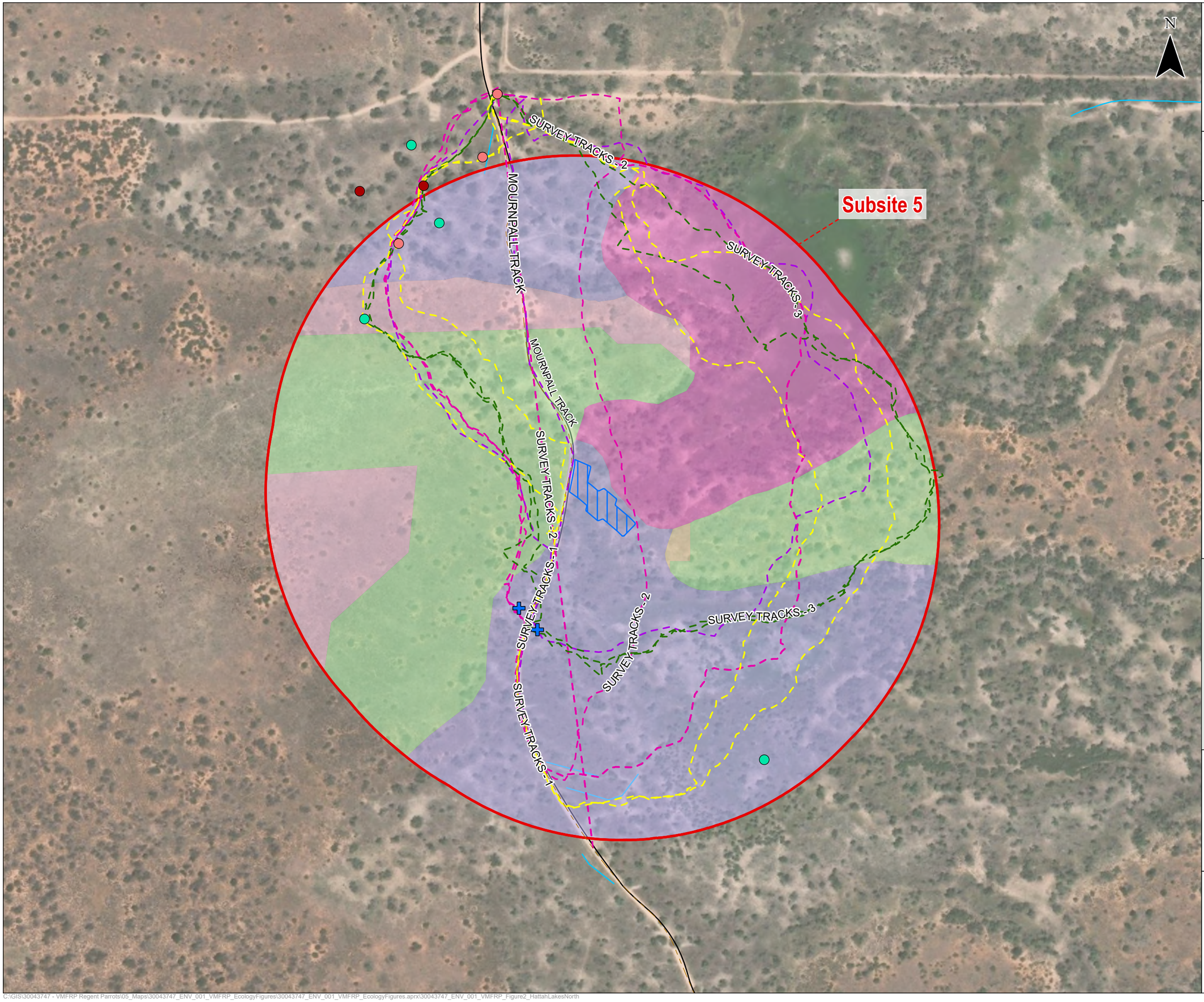

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Metres

Scale:1:4,000 @ A3
GDA2020 MGA Zone 54

LEGEND

- Study Site
- Disturbance footprint

Ecological Value Classes

- Woorinen Sands Mallee (86)
- Semi-arid Woodland (97)
- Riverine Chenopod Woodland (103)
- Intermittent Swampy Woodland (813)
- Woorinen Mallee (824)
- Track Road

SurveyTracks

- Survey Tracks - 1
- Survey Tracks - 2
- Survey Tracks - 3
- Survey Tracks - Mournpall Track, Hattah-Kulkyne (19 Nov 2025)

Threatened Species Sightings

- Southern Whiteface

Regent Parrot Sighting

- Flying/fly through
- Foraging/birds on ground
- Perched/loafing
- Major road
- Stream

KEY MAP
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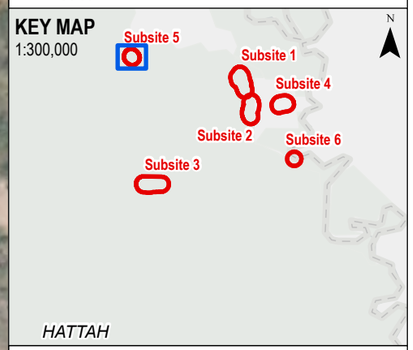

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PROJECT NO:	30043747
FIGURE NO:	2 - 2
FIGURE TITLE:	Hattah Lakes North
CREATED BY:	MD17519
DATE:	9/02/2026
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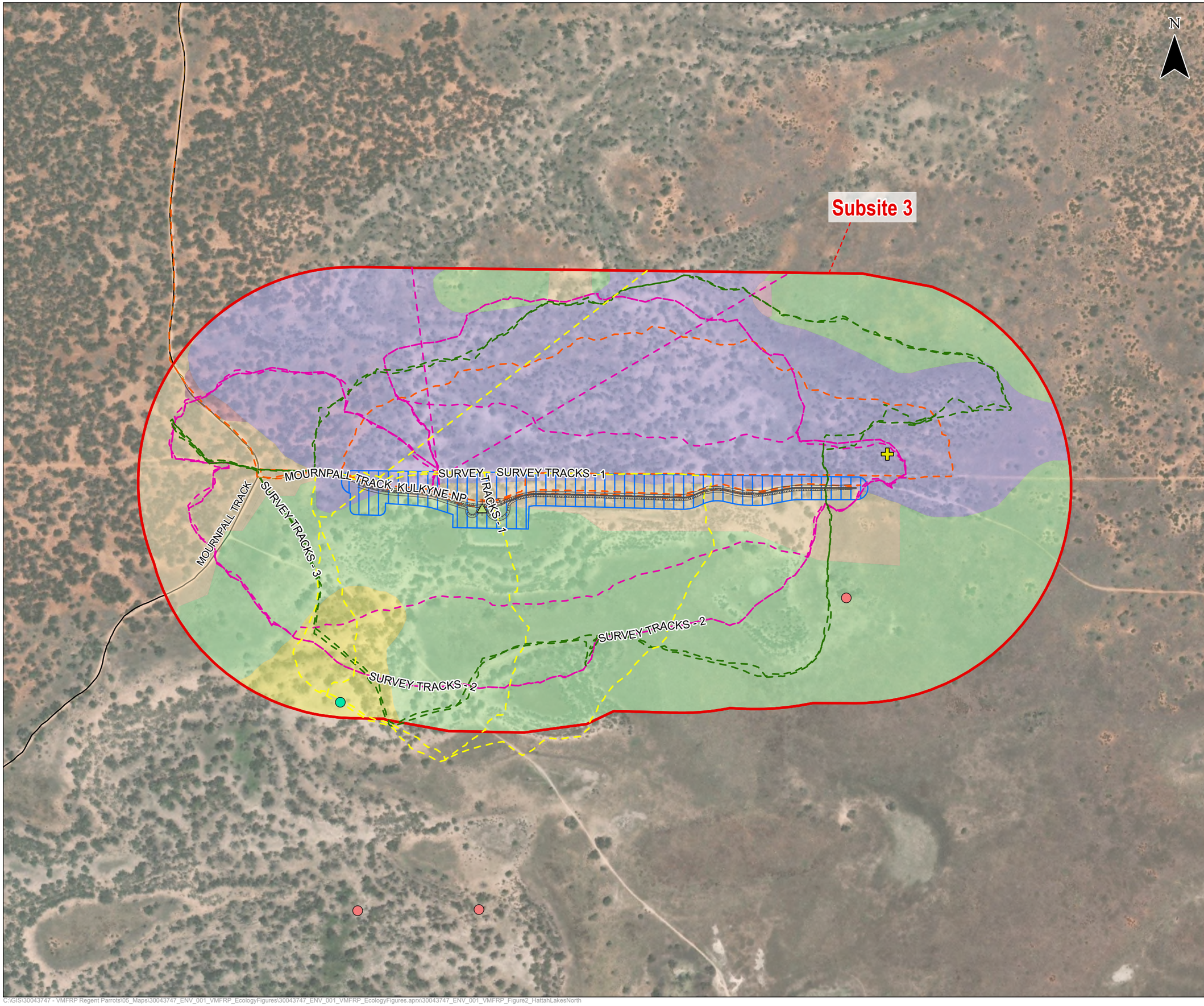

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Metres

Scale:1:6,000 @ A3
GDA2020 MGA Zone 54

LEGEND

- Study Site
- Disturbance footprint

Ecological Value Classes

- Woorinen Sands Mallee (86)
- Semi-arid Woodland (97)
- Riverine Chenopod Woodland (103)
- Chenopod Mallee (158)
- Riverine Grassy Woodland (295)
- Woorinen Mallee (824)
- Design
- Track Road

SurveyTracks

- Survey Tracks - 1
- Survey Tracks - 2
- Survey Tracks - 3
- Survey Tracks - Mournpall Track, Kulkyne NP (18 Nov 2025)

Threatened Species Sightings

- Little Eagle

Regent Parrot Sighting

- Flying/fly through
- Perched/loafing

Structure

- Regulator - Bitterang
- Major road

KEY MAP
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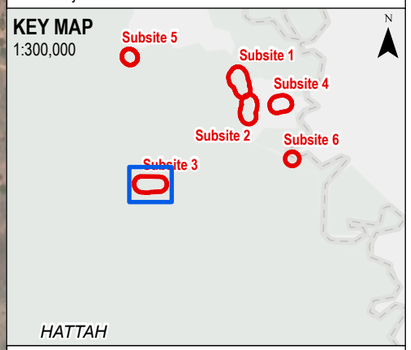

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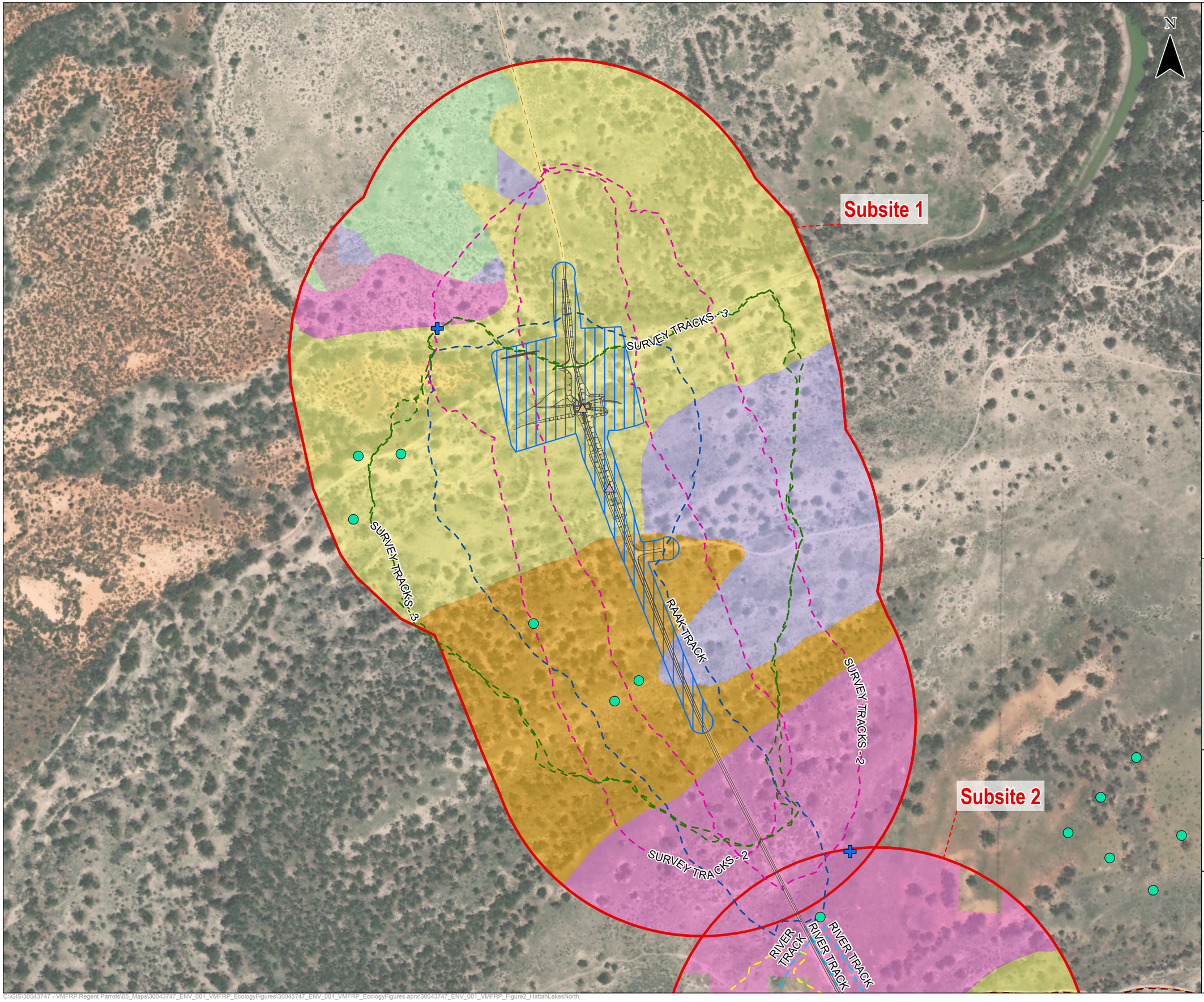
PROJECT NO:	30043747
FIGURE NO:	2 - 3
FIGURE TITLE:	Hattah Lakes North
CREATED BY:	MD17519
DATE:	9/02/2026
VERSION:	2



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LEGEND

- Study Site
- Disturbance footprint

Ecological Value Classes

- Semi-arid Woodland (97)
- Riverine Chenopod Woodland (103)
- Chenopod Mallee (158)
- Riverine Grassy Woodland (295)
- Intermittent Swampy Woodland (813)
- Shrubby Riverine Woodland (818)
- Design
- Track Road

SurveyTracks

- Survey Tracks - 1
- Survey Tracks - 2
- Survey Tracks - 3
- Survey Tracks - Raak Track, Hattah (19 Nov 2025)
- Survey Tracks - River Track, Hattah (19 Nov 2025)
- Survey Tracks - Hattah (18 Nov 2025)

Threatened Species Sightings

- Southern Whiteface

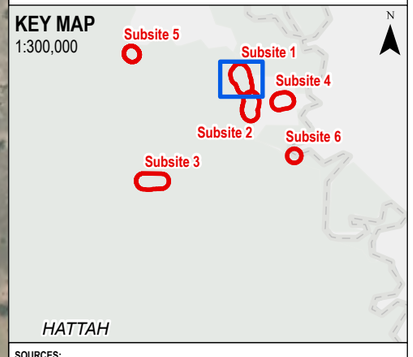
Regent Parrot Sighting

- Flying/fly through

Structure

- Regulator - K10
- Spillway - K10

KEY MAP
1:300,000



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Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community

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PROJECT:	ARUP-VMFRP Regent Parrot Pre-Clearance Surveys
PROJECT NO:	30043747
FIGURE NO:	2 - 4
FIGURE TITLE:	Hattah Lakes North
CREATED BY:	MD17519
DATE:	9/02/2026
VERSION:	2

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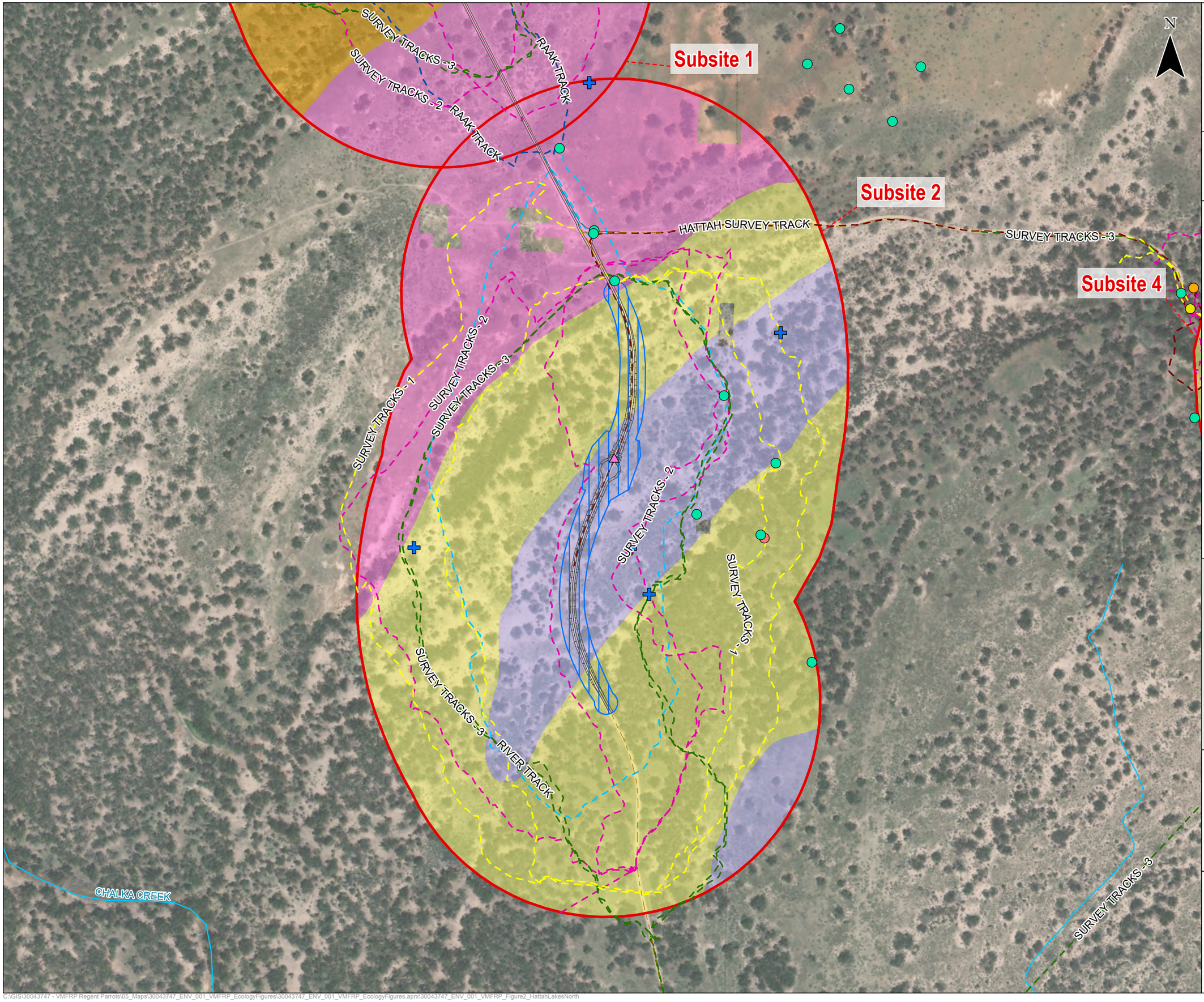

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Metres

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LEGEND

- Study Site
- Disturbance footprint

Ecological Value Classes

- Riverine Chenopod Woodland (103)
- Riverine Grassy Woodland (295)
- Intermittent Swampy Woodland (813)
- Shrubby Riverine Woodland (818)
- Design
- Track Road

SurveyTracks

- Survey Tracks - 1
- Survey Tracks - 2
- Survey Tracks - 3
- Survey Tracks - Raak Track, Hattah (19 Nov 2025)
- Survey Tracks - River Track, Hattah (19 Nov 2025)
- Survey Tracks - Hattah (18 Nov 2025)

Threatened Species Sightings

- Southern Whiteface

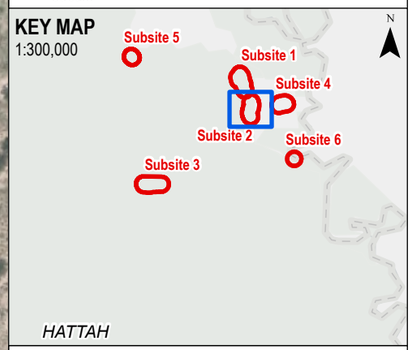
Regent Parrot Sighting

- Flying/fly through
- Perched/loafing
- Foraging/Flying
- Perched/Flying

Structure

- Regulator - K10 Causeway
- Stream

KEY MAP
1:300,000



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PROJECT NO:	30043747
FIGURE NO:	2 - 5
FIGURE TITLE:	Hattah Lakes North
CREATED BY:	MD17519
DATE:	9/02/2026
VERSION:	2

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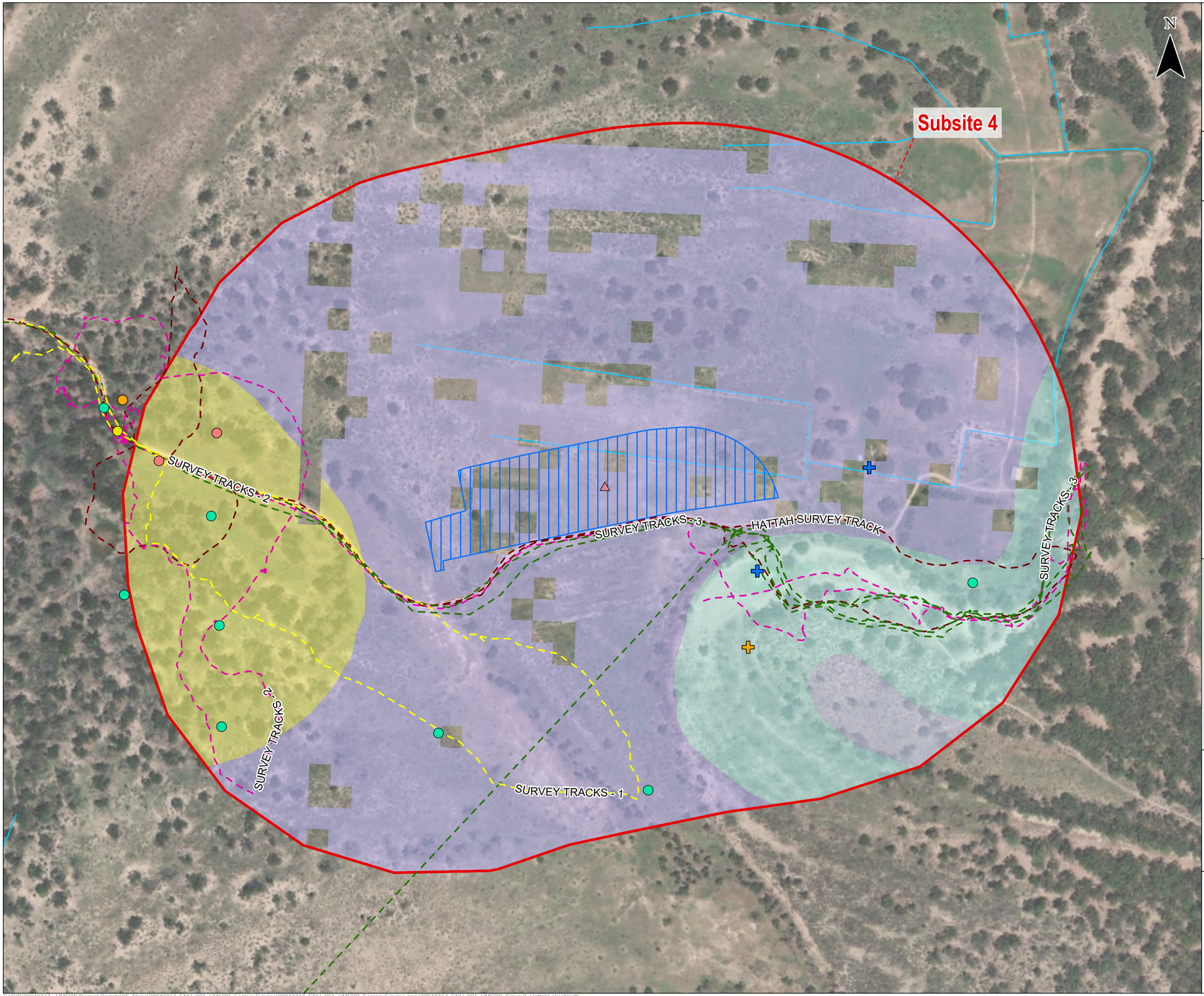

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Metres

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LEGEND

- Study Site
- Disturbance footprint

Ecological Value Classes

- Riverine Chenopod Woodland (103)
- Grassy Riverine Forest (106)
- Riverine Grassy Woodland (295)
- Floodway Pond Herbland (810)
- Track Road

SurveyTracks

- Survey Tracks - 1
- Survey Tracks - 2
- Survey Tracks - 3
- Survey Tracks - Hattah (18 Nov 2025)

Threatened Species Sightings

- Hooded Robin
- Southern Whiteface

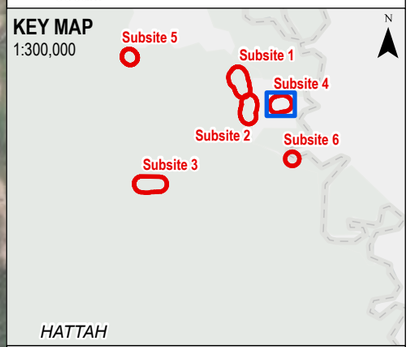
Regent Parrot Sighting

- Flying/fly through
- Perched/loafing
- Foraging/Flying
- Perched/Flying

Structure

- Borrow
- Stream

KEY MAP
1:300,000



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PROJECT NO:	30043747
FIGURE NO:	2 - 6
FIGURE TITLE:	Hattah Lakes North
CREATED BY:	MD17519
DATE:	9/02/2026
VERSION:	2

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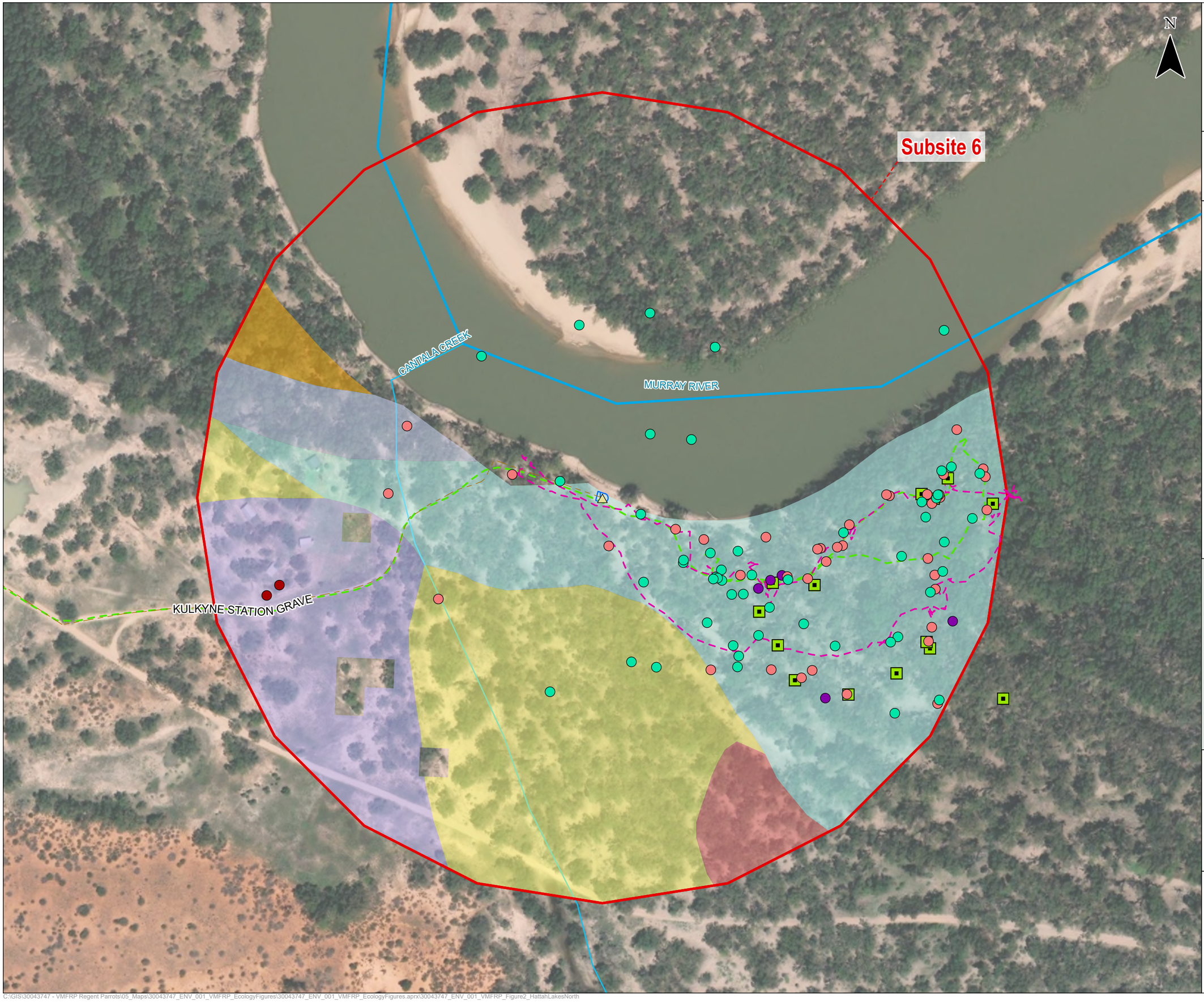

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Metres

Scale:1:3,000 @ A3
GDA2020 MGA Zone 54

LEGEND

- Study Site
- Disturbance footprint

Ecological Value Classes

- Riverine Chenopod Woodland (103)
- Grassy Riverine Forest (106)
- Riverine Grassy Woodland (295)
- Floodway Pond Herbland (810)
- Shrubby Riverine Woodland (818)
- Lignum Swampy Woodland (823)
- Track Road

SurveyTracks

- Survey Tracks - 2
- Survey Tracks - Kulkyne Station Grave (18 Nov 2025)

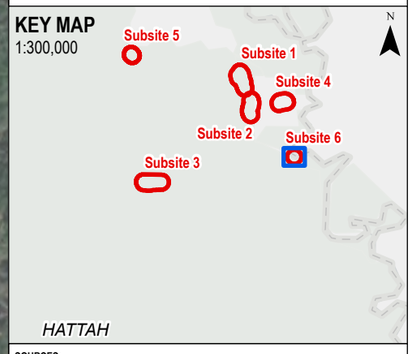
Regent Parrot Sighting

- Flying/fly through
- Foraging/birds on ground
- Indicative breeding behaviour
- Perched/loafing
- Regent Parrot Nest

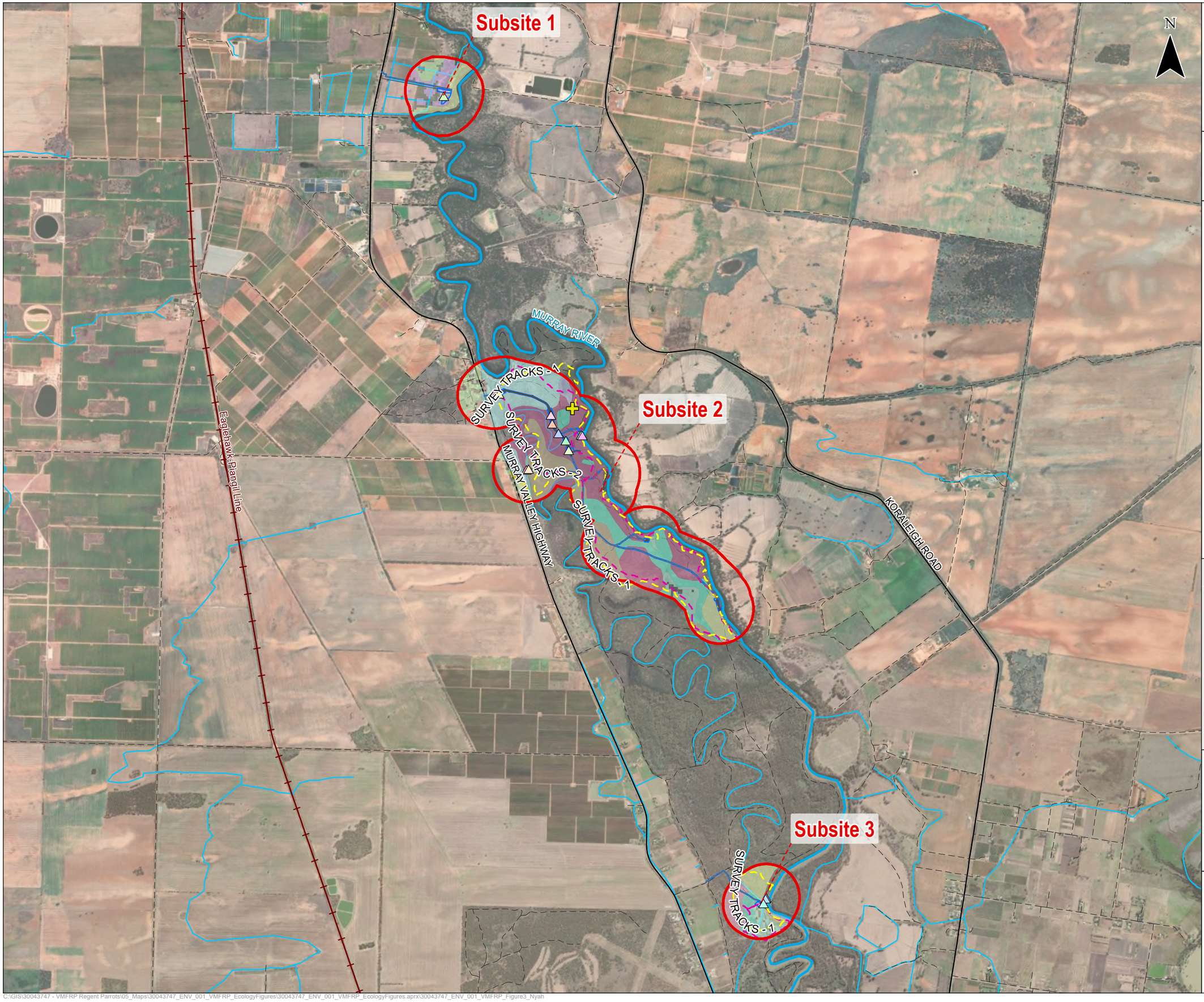
Structure

- Water Supply
- River
- Stream

KEY MAP
1:300,000



PROJECT:	ARUP-VMFRP Regent Parrot Pre-Clearance Surveys
PROJECT NO:	30043747
FIGURE NO:	2 - 7
FIGURE TITLE:	Hattah Lakes North
CREATED BY:	MD17519
DATE:	9/02/2026
VERSION:	2



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Metres

Scale:1:38,000 @ A3
GDA2020 MGA Zone 54

LEGEND
- Study Site
- Construction Footprint

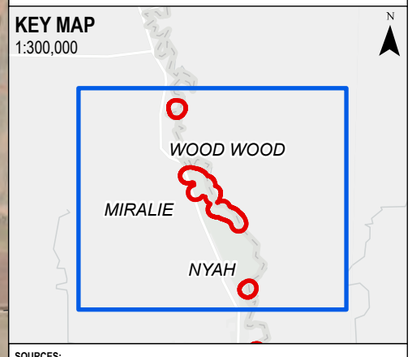
Ecological Value Classes
- Low Rises Woodland (66)
- Ridged Plains Mallee (96)
- Semi-arid Woodland (97)
- Grassy Riverine Forest (106)
- Riverine Grassy Woodland (295)
- Floodway Pond Herbland (810)
- Grassy Riverine Forest/Floodway Pond Herbland Complex (811)
- Grassy Riverine Forest/Riverine Swamp Forest Complex (812)
- Riverine Swamp Forest (814)
- Sedgy Riverine Forest (816)
- Sedgy Riverine Forest/Riverine Swamp Forest Complex (817)
- Spike-sedge Wetland (819)
- Water Body - Fresh (922)
- Design
- Track Road

SurveyTracks
- Survey Tracks - 1
- Survey Tracks - 2

Threatened Species Sightings
- Little Eagle

Structure
- Drop Structure
- Murray River Water Supply
- N1 Spillway
- N1A Regulator
- N1B Regulator
- N2 Regulator
- N2 Spillway
- N3 Spillway
- N4 Bank and Pipe
- N5 Hardstand
- N5 Regulator
- N6 Decommissioned Regulator
- N7 Regulator
- Nyah Vinifera Borrow
- Major road
- Minor road
- Rail line
- River
- Stream

KEY MAP
1:300,000



PROJECT:	ARUP-VMFRP Regent Parrot Pre-Clearance Surveys
PROJECT NO:	30043747
FIGURE NO:	3 - 1
FIGURE TITLE:	Nyah
CREATED BY:	MD17519
DATE:	9/02/2026
VERSION:	2

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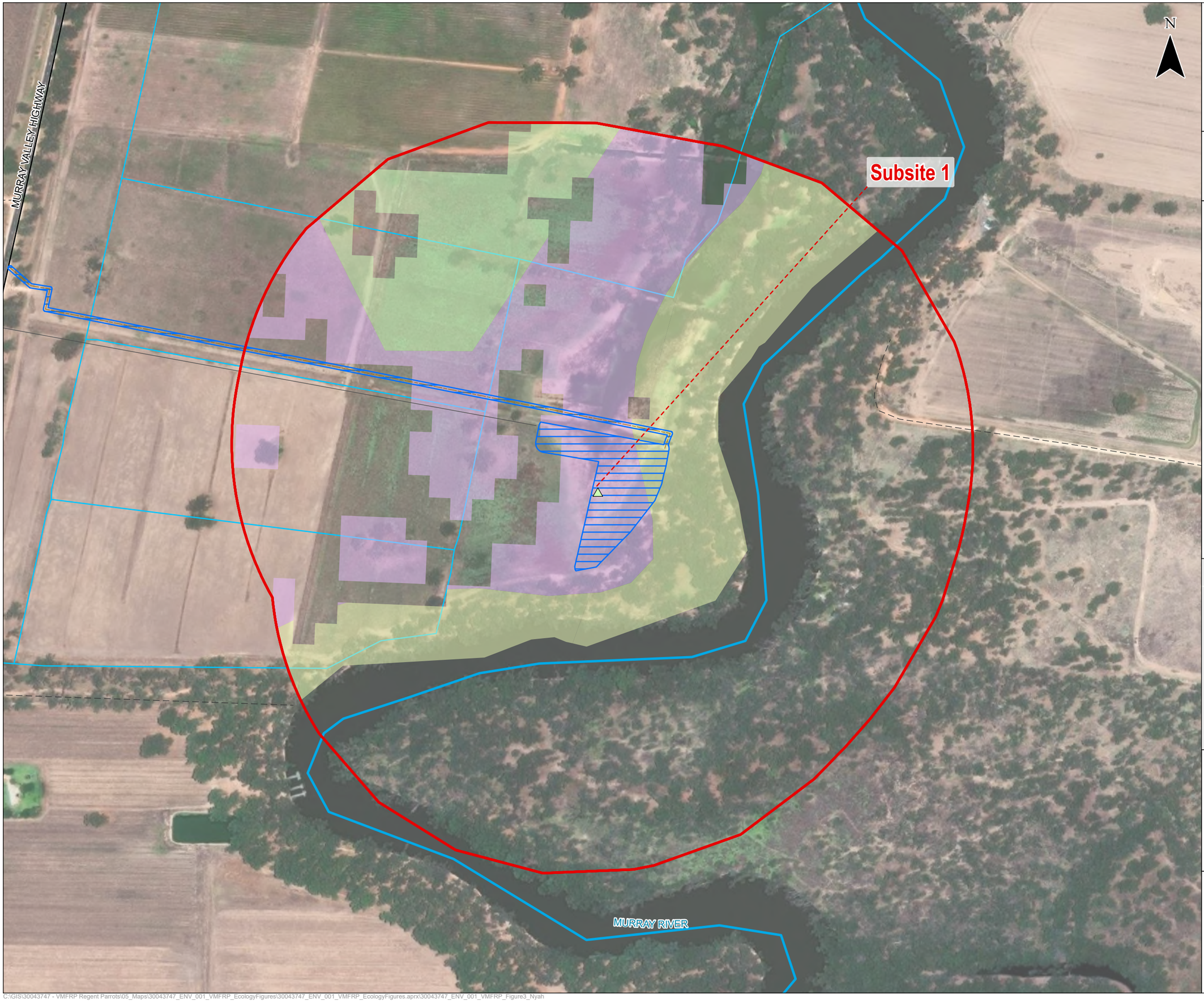

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Metres

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GDA2020 MGA Zone 54

LEGEND
- Study Site
- Construction Footprint

Ecological Value Classes
- Ridged Plains Mallee (96)
- Semi-arid Woodland (97)
- Sedgy Riverine Forest (816)
- Design
- Track Road

Structure
- Nyah Vinifera Borrow
- Major road
- Minor road
- River
- Stream

KEY MAP
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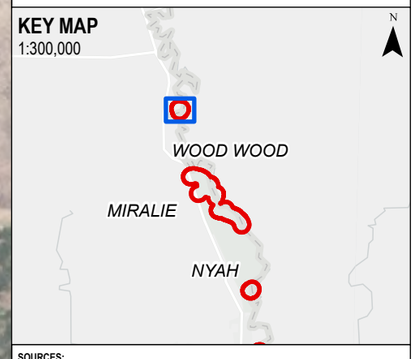

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PROJECT NO:	30043747
FIGURE NO:	3 - 2
FIGURE TITLE:	Nyah
CREATED BY:	MD17519
DATE:	9/02/2026
VERSION:	2

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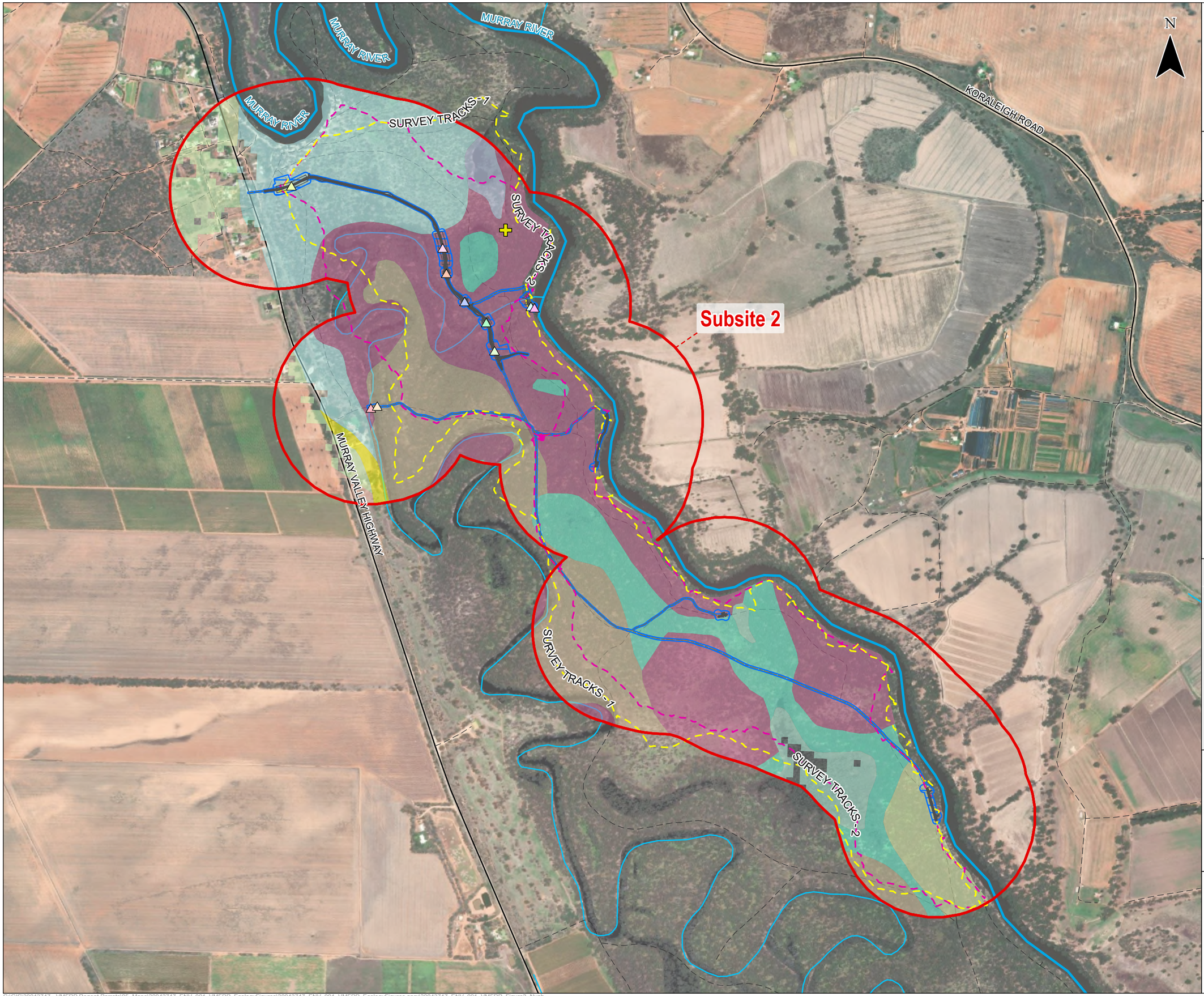

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Metres

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LEGEND

Sub Site 2

1. N2 Regulator – primary flood regulator to manage water delivery onto the Nyah floodplain.
2. N1a and N1b Regulators – smaller regulators supporting N2 operations.
3. Containment banks (~1.6 km) – to retain environmental water and manage flow levels.
4. Drop structure – controlling erosion where water returns to the Murray River.
5. Access track upgrades and new tracks (~3.1 km) – upgrades to ~0.3 km of existing tracks and construction of ~2.8 km of new tracks.
6. Decommissioning of redundant structures – including N4 Bank, N6 Regulator and a block bank on Parnee Malloo Creek.

Construction Footprint

Ecological Value Classes

- Low Rises Woodland (66)
- Semi-arid Woodland (97)
- Grassy Riverine Forest (106)
- Riverine Grassy Woodland (295)
- Floodway Pond Herbland (810)
- Grassy Riverine Forest/Riverine Swamp Forest Complex (812)
- Riverine Swamp Forest (814)
- Sedgy Riverine Forest (816)
- Sedgy Riverine Forest/Riverine Swamp Forest Complex (817)
- Spike-sedge Wetland (819)
- Design
- Track Road

SurveyTracks

- Survey Tracks - 1
- Survey Tracks - 2

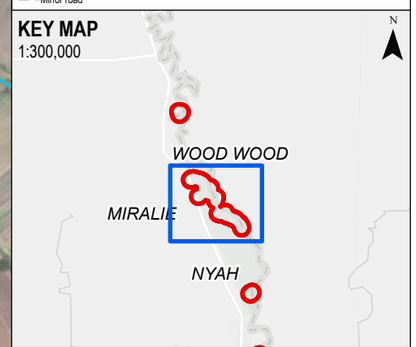
Threatened Species Sightings

- Little Eagle

Structure

- Drop Structure
- Murray River Water Supply
- N1 Spillway
- N1A Regulator
- N1B Regulator
- N2 Regulator
- N2 Spillway
- N3 Spillway
- N4 Bank and Pipe
- N6 Decommissioned Regulator
- Major road
- Minor road

KEY MAP
1:300,000



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1. Basemap © World Imagery: Vantor
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PROJECT:	ARUP-VMFRP Regent Parrot Pre-Clearance Surveys
PROJECT NO:	30043747
FIGURE NO:	3 - 3
FIGURE TITLE:	Nyah
CREATED BY:	MD17519
DATE:	9/02/2026
VERSION:	2

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0 40 80 120 160
Metres

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LEGEND

Sub Site 3
- 1. N5 Regulator – minor regulator within the floodplain system.
- 2. N5 Hardstand – permanent hardstand area for temporary pumping during construction or managed inundation.
- 3. N7 Regulator – minor regulator located nearby.
- Construction Footprint

Ecological Value Classes
- Riverine Grassy Woodland (295)
- Grassy Riverine Forest/Floodway Pond Herbland Complex (811)
- Grassy Riverine Forest/Riverine Swamp Forest Complex (812)
- Riverine Swamp Forest (814)
- Sedgy Riverine Forest (816)
- Spike-sedge Wetland (819)
- Water Body - Fresh (922)
- Design
- Track Road

SurveyTracks
- Survey Tracks - 1
- Survey Tracks - 2

Structure
- N5 Hardstand
- N5 Regulator
- N7 Regulator
- Minor road
- River
- Stream

KEY MAP
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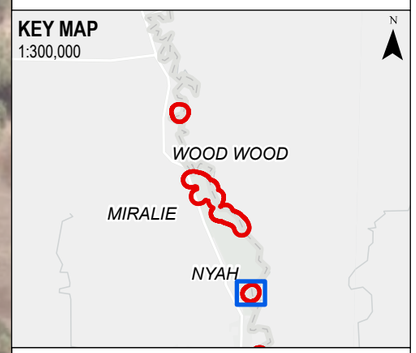

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PROJECT:	ARUP-VMFRP Regent Parrot Pre-Clearance Surveys
PROJECT NO:	30043747
FIGURE NO:	3 - 4
FIGURE TITLE:	Nyah
CREATED BY:	MD17519
DATE:	9/02/2026
VERSION:	2

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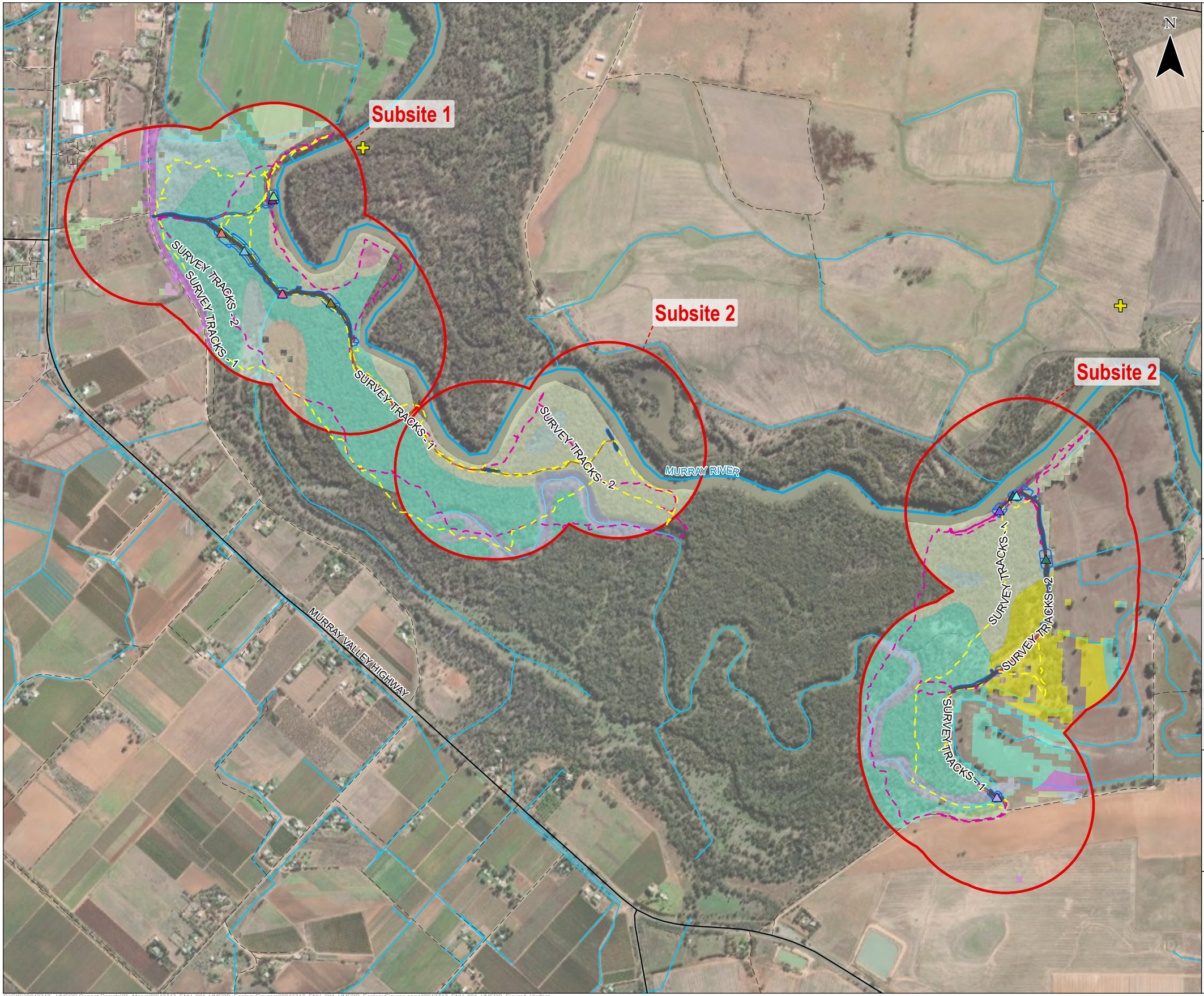

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GDA2020 MGA Zone 54

LEGEND
- Study Area
- Disturbance Footprint

Ecological Value Classes
- Semi-arid Woodland (97)
- Semi-arid Chenopod Woodland (98)
- Low Chenopod Shrubland ((102)
- Riverine Chenopod Woodland (103)
- Grassy Riverine Forest (106)
- Riverine Grassy Woodland (295)
- Floodway Pond Herbland (810)
- Grassy Riverine Forest/Floodway Pond Herbland Complex (811)
- Riverine Swamp Forest (814)
- Sedgy Riverine Forest (816)
- Spike-sedge Wetland (819)
- Tall Marsh (821)
- Design
- Track Road

SurveyTracks
- Survey Tracks - 1
- Survey Tracks - 2

Threatened Species Sightings
- Little Eagle

Structure
- Drop Structure
- Murray River Water Supply
- V1 Regulator
- V1 Spillway
- V2 Regulator
- V2 Spillway
- V3 Regulator
- V3 Spillway
- V4 Hardstand
- V4 Regulator
- V4 Spillway
- Major road
- Minor road
- River
- Stream

KEY MAP
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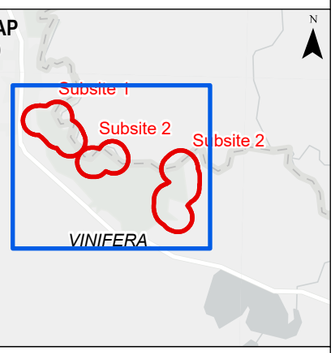

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PROJECT:	ARUP-VMFRP Regent Parrot Pre-Clearance Surveys
PROJECT NO:	30043747
FIGURE NO:	4 - 1
FIGURE TITLE:	Vinifera
CREATED BY:	MD17519
DATE:	9/02/2026
VERSION:	2

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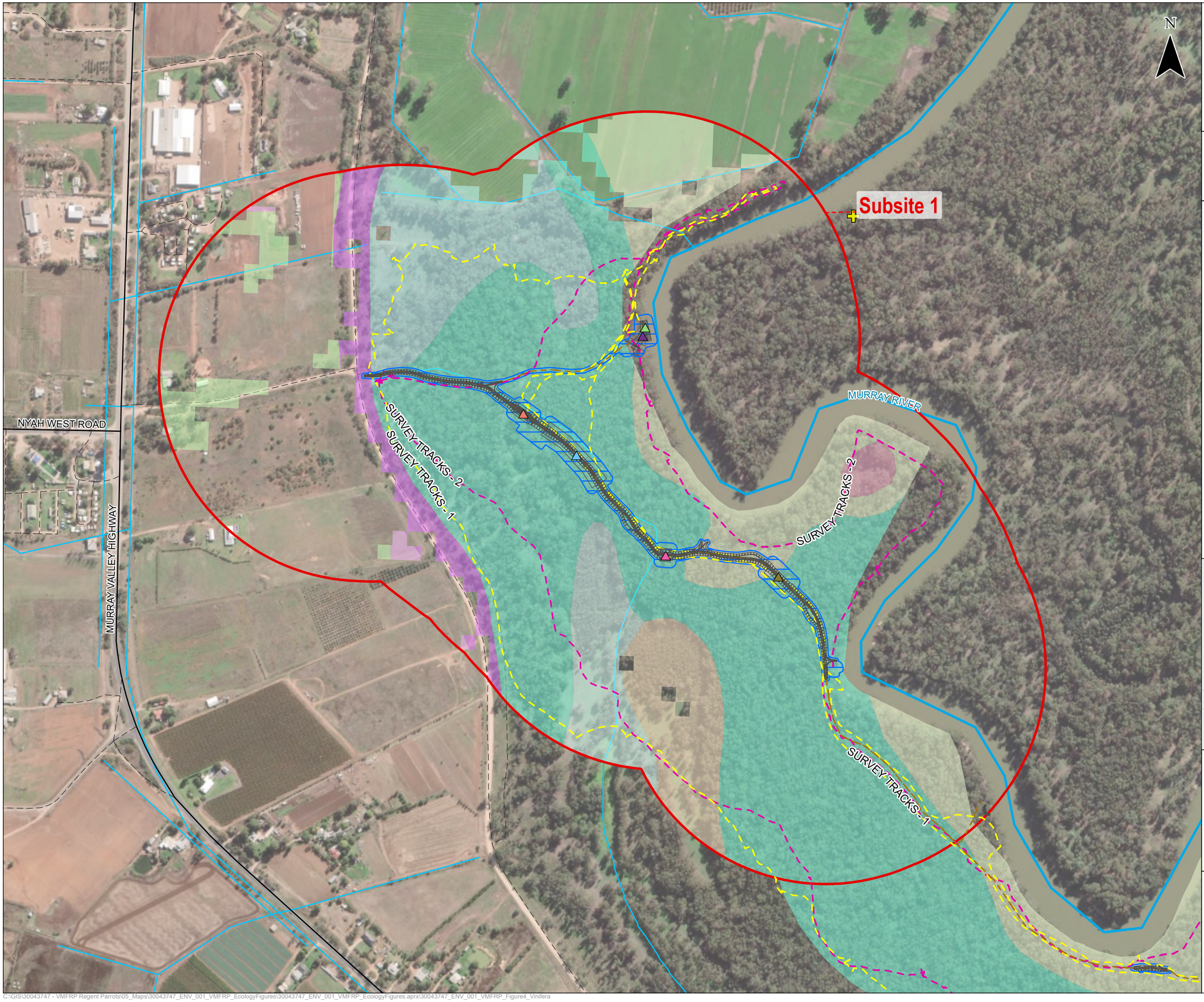

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LEGEND

Subsite 1

1. V1 Regulator - downstream regulator to manage water delivery into the floodplain.
2. V2 Regulator - main downstream regulator on Vinifera Creek to control flows in and out of the floodplain.
3. Main Bank - water retaining embankment with overflow sills at the northern end of the floodplain.
4. Drop Structure - erosion control structure at the confluence of Vinifera Creek and the Murray River.
5. Forest Track Bank North and South - containment banks between regulators to separate inundated forest from private land.
6. Seven minor works sites (block banks / overflow sills) - small containment works between the Murray River and the forest.
7. Access and track upgrades - ~1 km of existing track upgrades and ~2 km of new tracks to support construction and future maintenance.
8. Temporary hardstand for pumps - permanent hardstand area for temporary pumping equipment when required (pumps not permanently installed).

Disturbance Footprint

Ecological Value Classes

Semi-arid Woodland (97)
Semi-arid Chenopod Woodland (98)
Riverine Chenopod Woodland (103)
Grassy Riverine Forest (106)
Grassy Riverine Forest/Floodway Pond Herbland Complex (811)
Riverine Swamp Forest (814)
Sedgy Riverine Forest (816)
Spike-sedge Wetland (819)
Tall Marsh (821)

Design
Track Road

SurveyTracks

Survey Tracks - 1
Survey Tracks - 2

Threatened Species Sightings

Little Eagle

Structure

Drop Structure
Murray River Water Supply
V1 Regulator
V1 Spillway
V2 Regulator
V2 Spillway

Major road
Minor road
River
Stream

KEY MAP
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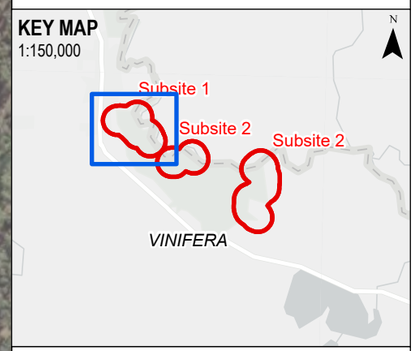

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PROJECT NO:	30043747
FIGURE NO:	4 - 2
FIGURE TITLE:	Vinifera
CREATED BY:	MD17519
DATE:	9/02/2026
VERSION:	2

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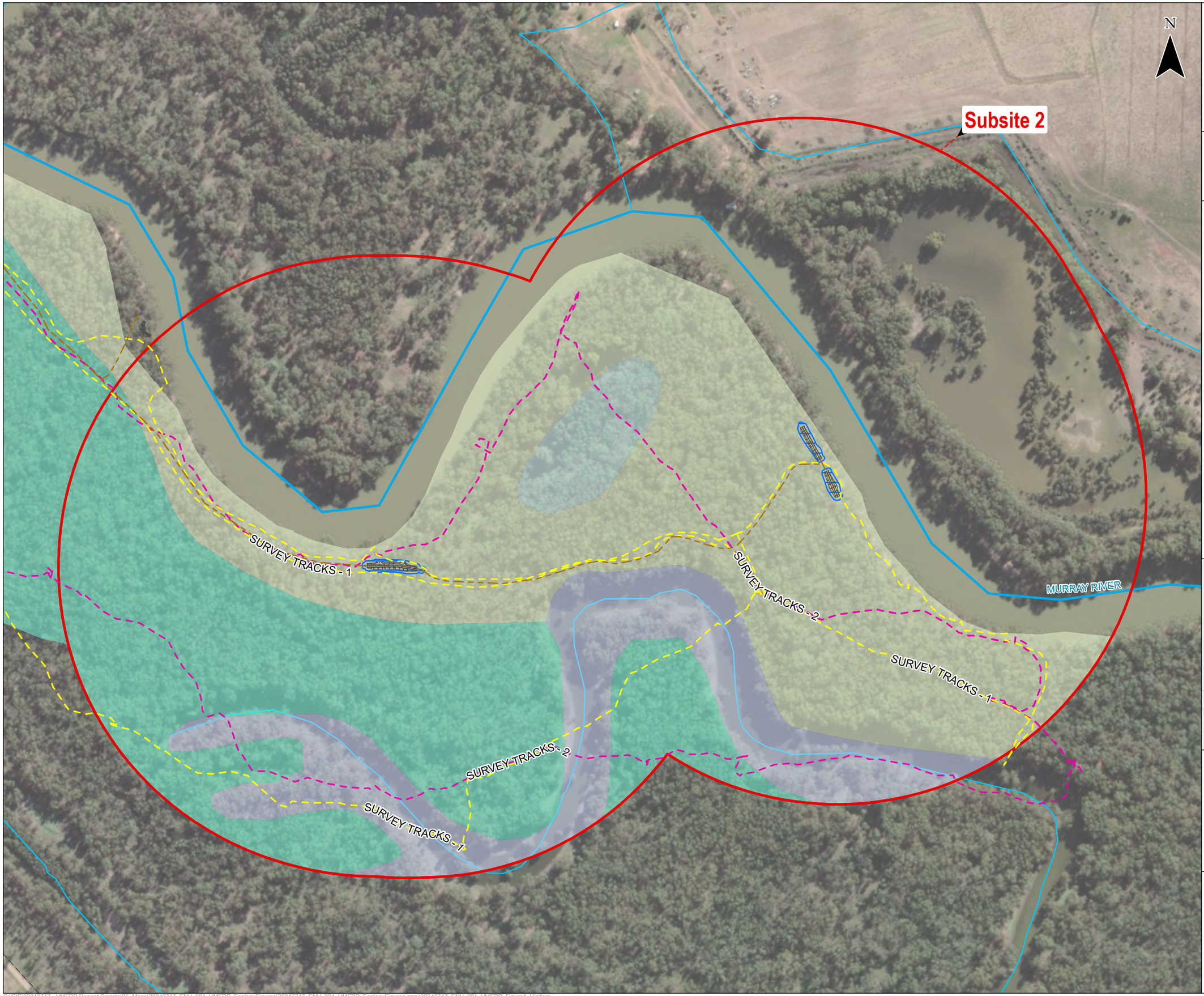

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GDA2020 MGA Zone 54

LEGEND

Subsite 2

1. V3 Regulator - upstream regulator controlling flows into the northern floodplain.
2. V3 Spillway - associated spillway for controlled overflow.
3. V4 Regulator - upstream regulator preventing backflow into the Murray River.
4. V4 Spillway - associated spillway for managed water release.
5. V4 Hardstand - permanent hardstand for placement of temporary pumping equipment when required

Disturbance Footprint

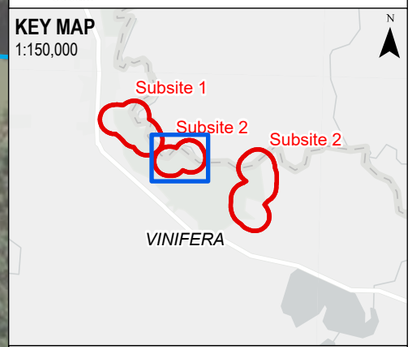
Ecological Value Classes

Floodway Pond Herbland (810)
Riverine Swamp Forest (814)
Sedgy Riverine Forest (816)
Spike-sedge Wetland (819)
Design
Track Road

SurveyTracks

Survey Tracks - 1
Survey Tracks - 2
Minor road
River
Stream

KEY MAP
1:150,000



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PROJECT NO:	30043747
FIGURE NO:	4 - 3
FIGURE TITLE:	Vinifera
CREATED BY:	MD17519
DATE:	9/02/2026
VERSION:	2

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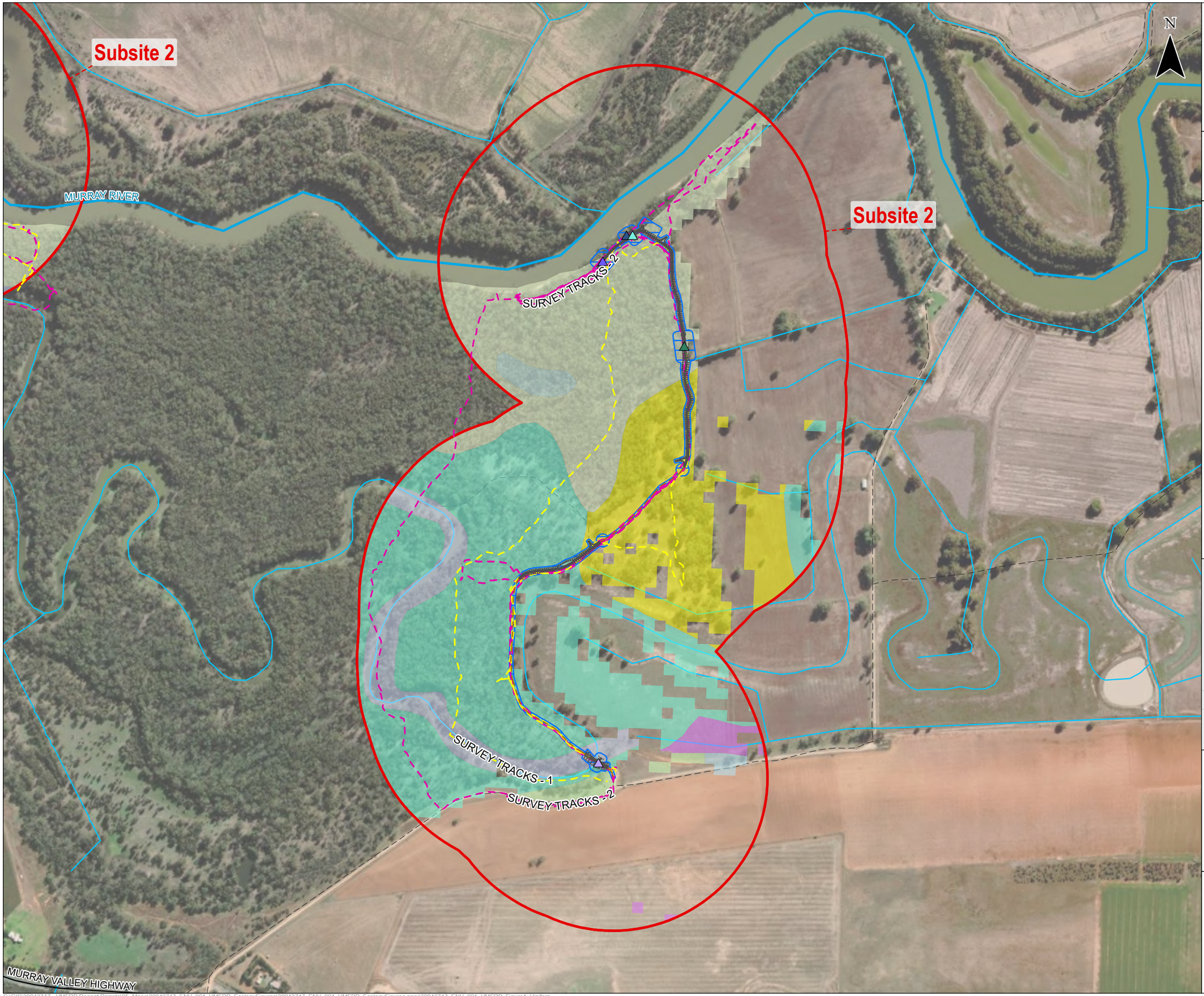

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0 80 160 240 320
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LEGEND

Subsite 2
1. V3 Regulator - upstream regulator controlling flows into the northern floodplain.
2. V3 Spillway - associated spillway for controlled overflow.
3. V4 Regulator - upstream regulator preventing backflow into the Murray River.
4. V4 Spillway - associated spillway for managed water release.
5. V4 Hardstand - permanent hardstand for placement of temporary pumping equipment when required

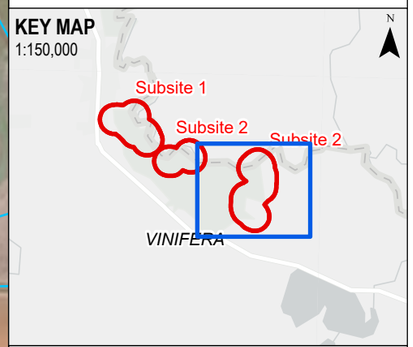
Disturbance Footprint

Ecological Value Classes
- Semi-arid Woodland (97)
- Low Chenopod Shrubland ((102)
- Riverine Chenopod Woodland (103)
- Riverine Grassy Woodland (295)
- Floodway Pond Herbland (810)
- Riverine Swamp Forest (814)
- Sedgy Riverine Forest (816)
- Spike-sedge Wetland (819)
- Design
- Track Road

SurveyTracks
- Survey Tracks - 1
- Survey Tracks - 2

Structure
- V3 Regulator
- V3 Spillway
- V4 Hardstand
- V4 Regulator
- V4 Spillway
- Major road
- Minor road
- River
- Stream

KEY MAP
1:150,000



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PROJECT:	ARUP-VMFRP Regent Parrot Pre-Clearance Surveys
PROJECT NO:	30043747
FIGURE NO:	4 - 4
FIGURE TITLE:	Vinifera
CREATED BY:	MD17519
DATE:	9/02/2026
VERSION:	2

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Appendices

A-1 Appendix A: Hattah Lakes North Image plates

Figure 5: Subsite 1 – K10 regulator representative habitat

Figure 6: Subsite 1 – K10 regulator representative habitat

Figure 7: Subsite 2 - K10 Causeway Regulator

Figure 8: Subsite 2 - K10 Causeway Regulator

Figure 9: Subsite 3 – Bitterang Regulator, representative habitat

Figure 10: Subsite 3 – Bitterang Regulator, representative habitat

Figure 11: Subsite 4 – Borrow Pit

Figure 12: Subsite 4 – Borrow Pit (eastern edge of 350 m buffer)

Figure 13: Subsite 5 – Dry Lakes regulator

Figure 14: Subsite 5 - Dry Lakes regulator

Figure 15: Subsite 6 - Temporary Pump / Water Extraction

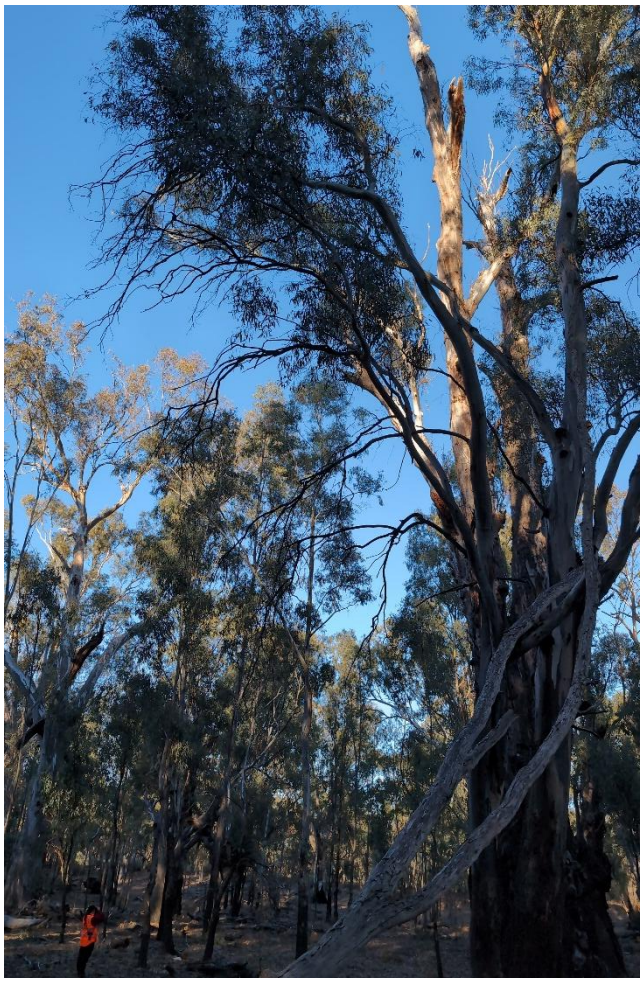

Figure 16: Subsite 6 - Temporary Pump / Water Extraction

Figure 17: Subsite 6 - Temporary Pump / Water Extraction

A-2 Appendix B: Nyah Image plates

Figure 18: Subsite 2 -Main Central Project Site, representative habitat

Figure 19: Subsite 3 - N5/N7 Regulator

Figure 20: Subsite 2 -Main Central Project Site, representative habitat

Figure 21: Subsite 3 - N5/N7 Regulator

Figure 22: Subsite 2 -Main Central Project Site, representative habitat

Figure 23: Subsite 2 - Main Central Project Site, representative habitat

Figure 24: Subsite 2 - Main Central Project Site, representative habitat

Figure 25: Subsite 2 - Main Central Project Site, representative habitat

Figure 26: Subsite 2 - Main Central Project Site, representative habitat

A-3 Appendix C: Vinifera Image Plates

Figure 27: Subsite 2 – V3 / V4 Cluster, representative habitat

Figure 28: Subsite 1 – Main Regulator Cluster

Figure 29: Subsite 1 – Main Regulator Cluster, representative habitat

Figure 30: Subsite 2 – V3 / V4 Cluster, representative habitat

Figure 31: Subsite 2 – V3 / V4 Cluster, representative habitat

Figure 32: Subsite 1 – Main Regulator Cluster, representative habitat

Figure 33: Subsite 1 – Main Regulator Cluster

Figure 34: Subsite 2 – V3 / V4 Cluster, representative habitat

Figure 35: Subsite 1 – Main Regulator Cluster, representative habitat

A-4 Appendix D: Survey round results

Survey Round 1 - Survey Summary

Table 8: Round 1 Survey summary

Project Site	Project Subsite	Survey Date	Duration	Distance	Party Size	Total Species
Hattah Lakes North						
	Dry Lakes Regulator	20 Aug 2025	2 h 09 min	3.11 km	4	40
	Bitterang Regulator	19 Aug 2025	1 h 22 min	2.01 km	4	23
	K10 Causeway and Regulator	19 Aug 2025	1 h 40 min	2.60 km	4	36
	Water Extraction Site	19 Aug 2025	2 h 21 min	1.202 km	4	33
	K10 Regulator	18 Aug 2025	1 h 02 min	2.749 km	2	34
	Kulkyne Station / Borrow Pit	20 Aug 2025	1 h 17 min	2.18 km	4	33
Nyah						
	Project Site 1 (Central)	22 Aug 2025	1 h 31 min	3.52 km	4	44
	Project Site 2 (South / N5–N7)	22 Aug 2025	50 min	1.44 km	4	33
Vinifera						
	Project Site 1 (Central)	23 Aug 2025	1 h 55 min	3.91 km	4	53
	Project Site 2 (V3 / V4 Cluster)	23 Aug 2025	1 h 39 min	3.30 km	4	33

Table 9: Round 1 Survey complete species list

Species	Hattah Lakes North						Nyah		Vinifera	
	K10 Regulator	Water Extraction Site	K10 Causeway and Regulator	Bitterang Regulator	Dry Lakes Regulator	Kulkyne Station / Borrow Pit	Site 1 (Central)	Project Site 2 (South / N5–N7)	Project Site 1 (Central)	Project Site 2 (V3 / V4 Cluster)
Apostlebird	14	0	0	8	9	0	0	0	0	0
Australasian Darter	0	0	0	0	0	0	0	0	1	0
Australian Magpie	4	0	0	0	0	0	0	0	0	0
Australian Magpie (Black-backed)	0	2	4	1	6	2	10	5	11	4
Australian Pelican	1	3	0	0	0	0	1	0	1	0
Australian Raven	5	4	8	2	15	3	10	1	3	1
Australian Ringneck	4	0	0	0	0	0	0	0	0	0
Australian Ringneck (Mallee)	0	3	6	5	11	4	0	0	0	0

Species	Hattah Lakes North					Nyah			Vinifera	
	K10 Regulator	Water Extraction Site	K10 Causeway and Regulator	Bitterang Regulator	Dry Lakes Regulator	Kulkyne Station / Borrow Pit	Site 1 (Central)	Project Site 2 (South / N5–N7)	Project Site 1 (Central)	Project Site 2 (V3 / V4 Cluster)
Australian Shelduck	0	2	0	0	2	0	6	0	4	0
Australian Wood Duck	0	4	0	0	0	2	16	8	4	0
Black Kite (Black)	0	0	0	0	0	0	2	0	1	3
Black-faced Cuckoo shrike	1	0	0	0	1	1	1	0	5	3
Blue-faced Honeyeater	0	3	0	0	0	0	0	0	0	0
Blue-faced Honeyeater (Blue-faced)	0	0	0	0	0	0	5	4	3	0
Brown Falcon	0	0	0	0	0	0	0	0	1	0
Brown Treecreeper	4	4	3	0	1	1	11	2	7	3
Brown-headed Honeyeater	0	0	10	0	0	2	4	0	0	0
Buff-rumped Thornbill	0	0	0	0	0	0	16	0	0	0
Chestnut Teal	0	0	0	0	0	0	0	0	1	0
Chestnut-crowned Babbler	0	0	0	0	7	0	0	0	0	0
Chestnut-rumped Thornbill	5	0	50	2	2	4	0	0	0	0
Common Bronzewing	0	1	0	0	4	14	7	6	8	4
Common Starling	0	0	0	0	0	0	0	0	3	0
Crested Bellbird	1	0	0	0	1	0	0	0	0	0
Crested Pigeon	4	1	2	2	6	35	0	6	1	8
Crimson Rosella	7	0	0	0	0	0	0	0	0	0
Crimson Rosella (Yellow)	0	6	0	2	5	1	14	2	7	7
Dusky Moorhen	0	0	0	0	0	0	0	1	1	0
Eastern Rosella	0	0	0	0	0	0	32	12	32	26
Emu	0	0	0	12	10	0	0	0	0	0
Eurasian Coot	0	0	0	0	0	0	0	0	1	0
Fan-tailed Cuckoo	0	0	0	0	0	0	0	0	0	2
Galah	8	8	0	15	19	0	48	8	25	10
Golden Whistler	0	1	0	0	0	0	3	0	0	1
Great Cormorant (Australasian)	0	0	0	0	0	0	1	0	0	0
Greater Bluebonnet (Yellow-vented)	0	0	0	0	6	4	0	0	0	0
Grey Butcherbird	1	2	2	0	4	2	0	0	0	0
Grey Currawong (Black-winged)	0	0	2	0	0	0	0	0	0	0
Grey Fantail	1	0	2	0	0	1	5	0	0	3
Grey Shrikethrush	1	3	2	0	3	0	6	1	3	3
Hooded Robin	0	0	0	0	0	2	0	0	0	0

Species	Hattah Lakes North					Nyah			Vinifera	
	K10 Regulator	Water Extraction Site	K10 Causeway and Regulator	Bitterang Regulator	Dry Lakes Regulator	Kulkyne Station / Borrow Pit	Site 1 (Central)	Project Site 2 (South / N5–N7)	Project Site 1 (Central)	Project Site 2 (V3 / V4 Cluster)
Horsfield's Bronze-Cuckoo	0	0	0	0	1	0	0	0	0	0
House Sparrow	0	0	0	0	0	0	0	0	4	0
Laughing Kookaburra	1	5	0	0	0	0	12	3	4	5
Little Black Cormorant	0	6	0	0	0	0	0	1	0	0
Little Corella	0	40	60	6	6	0	12	0	0	0
Little Crow	0	2	0	0	0	0	0	0	0	0
Little Eagle	0	0	0	0	0	0	0	0	0	1
Little Friarbird	0	0	0	0	0	0	1	1	1	0
Little Pied Cormorant	0	2	0	0	0	0	1	1	2	0
Little Raven	0	0	2	0	5	0	22	4	9	12
Magpie-lark	4	4	0	14	4	2	14	5	6	4
Masked Lapwing	0	2	0	0	0	0	0	0	0	0
Mistletoebird	0	0	2	0	2	0	0	0	1	0
Musk Lorikeet	0	0	0	0	0	0	0	21	38	0
Noisy Miner	12	15	30	18	8	3	28	16	30	40
Olive-backed Oriole	0	0	0	0	0	0	0	0	1	1
Pacific Black Duck	0	0	0	0	0	0	6	0	2	0
Peaceful Dove	0	5	8	4	0	2	7	3	3	7
Pied Butcherbird	1	1	1	1	2	1	4	3	3	5
Pied Currawong	0	0	0	0	0	0	0	0	1	0
Purple-backed Fairywren	0	0	8	0	0	0	0	0	0	0
Purple-backed Fairywren (Purple-backed)	0	0	0	0	0	12	0	0	0	0
Red Wattlebird	2	0	0	1	2	2	0	1	0	0
Red-capped Robin	2	0	9	0	0	2	0	0	0	0
Red-rumped Parrot	2	4	2	4	18	0	6	0	10	0
Regent Parrot	**21**	**95**	**18**	**2**	**16**	**10**	**0**	**0**	**0**	**0**
Restless Flycatcher	0	0	0	0	0	0	3	0	1	2
Rufous Whistler	1	0	3	0	1	0	3	0	0	1
Silvereye	0	0	2	0	0	0	0	0	0	0
Singing Honeyeater	0	0	8	0	1	1	0	0	0	0
Southern Whiteface	0	0	8	0	0	0	0	0	0	0
Spiny-cheeked Honeyeater	3	0	12	0	5	4	0	0	1	0
Splendid Fairywren	3	0	0	0	0	0	0	0	0	0
Spotted Dove	0	0	0	0	0	0	0	0	1	0
Spotted Pardalote (Yellow-rumped)	0	0	0	0	0	0	10	0	2	5

Species	Hattah Lakes North					Nyah			Vinifera	
	K10 Regulator	Water Extraction Site	K10 Causeway and Regulator	Bitterang Regulator	Dry Lakes Regulator	Kulkyne Station / Borrow Pit	Site 1 (Central)	Project Site 2 (South / N5–N7)	Project Site 1 (Central)	Project Site 2 (V3 / V4 Cluster)
Straw-necked Ibis	0	0	0	0	0	0	0	0	3	0
Striated Pardalote	5	20	12	3	12	2	0	8	5	18
Striated Pardalote (Striated)	0	0	0	0	0	0	15	0	0	0
Striped Honeyeater	0	0	5	0	4	0	0	0	0	0
Sulphur-crested Cockatoo	2	30	8	0	3	2	12	9	6	0
Superb Fairywren	0	0	0	0	0	0	44	8	12	15
Tree Martin	0	20	0	0	40	0	0	2	2	0
Wedge-tailed Eagle	0	0	0	0	0	0	0	0	0	1
Weebill	3	0	30	5	10	7	12	2	4	13
Welcome Swallow	2	0	0	0	0	0	6	2	2	0
Western Gerygone	0	0	0	0	0	0	5	0	1	0
Whistling Kite	1	0	0	0	1	1	2	2	3	1
White-browed Babbler	8	0	3	0	3	0	0	0	0	0
White-faced Heron	0	0	0	0	0	0	0	0	1	0
White-plumed Honeyeater	6	12	6	4	0	4	54	5	50	60
White-winged Chough	0	15	0	20	0	0	30	12	26	38
White-winged Fairywren	0	0	10	0	0	12	0	0	0	0
Willie Wagtail	1	2	1	1	3	0	9	1	4	4
Yellow Thornbill	0	0	16	0	0	13	4	0	0	0
Yellow-rumped Thornbill	0	0	8	2	5	6	0	0	0	0

Survey Round 2 - Survey Summary

Table 10: Round 2 Survey summary

Project Area	Project Subsite	Survey Date	Duration	Distance	Party Size	Total Species
Hattah Lakes North						
	Dry Lakes Regulator	15 Sep 2025	1 h 20 min	2.643 km	4	35
	Bitterang Regulator	15 Sep 2025	2 h 06 min	3.778 km	4	29
	K10 Causeway and Regulator	15 Sep 2025	1 h 43 min	4.23 km	4	37
	Water Extraction Site	16 Sep 2025	1 h 51 min	0.973 km	4	34

Project Area	Project Subsite	Survey Date	Duration	Distance	Party Size	Total Species
	K10 Regulator	16 Sep 2025	1 h 39 min	9.528 km	4	37
	Kulkyne Station / Borrow Pit	17 Sep 2025	1 h 58 min	2.916 km	4	47
Nyah						
	Project Site 1 (Central)	18 Sep 2025	3 h 21 min	8.53 km	4	62
	Project Site 2 (South / N5–N7)	18 Sep 2025	1 h 13 min	2.55 km	4	34
Vinifera						
	Project Site 1 (Central)	19 Sep 2025	2 h 16 min	6.23 km	4	52
	Project Site 2 (V3 / V4 Cluster)	19 Sep 2025	1 h 57 min	3.63 km	4	43

Table 11: Round 2 Survey complete species list

Species	Hattah Lakes North						Nyah		Vinifera	
	Dry Lakes Regulator	Bitterang Regulator	K10 Causeway and Regulator	Water Extraction Site	K10 Regulator	Kulkyne Station / Borrow Pit	Project Site 1 (Central)	Project Site 2 (South / N5–N7)	Project Site 1 (Central)	Project Site 2 (V3/V4 East)
Apostlebird	0	38	0	0	0	0	0	0	0	0
Australasian Darter	0	0	0	1	0	0	1	0	1	0
Australian Hobby	0	0	0	0	0	0	1	0	0	0
Australian Magpie	4	5	4	2	3	3	41	11	13	13
Australian Pelican	0	0	0	0	0	0	0	0	4	1
Australian Raven	2	2	4	3	7	7	12	2	6	4
Australian Ringneck	2	3	5	2	5	5	0	0	2	0
Australian Shelduck	2	0	0	0	0	0	2	0	2	3
Australian White Ibis	0	0	0	0	0	0	0	0	92	0
Australian Wood Duck	0	0	0	5	0	4	19	2	11	6
Black Kite	0	0	2	0	0	1	7	19	4	2
Black-faced Cuckooshrike	5	2	3	2	1	4	4	6	2	5
Black-shouldered Kite	0	0	0	0	0	0	0	0	1	0
Blue-faced Honeyeater	0	0	0	12	4	4	23	2	2	0
Brown Falcon	0	0	0	0	0	0	1	0	0	0
Brown Goshawk	0	0	1	1	0	0	1	0	1	0
Brown Treecreeper	3	0	4	5	3	0	10	4	5	5

Species	Hattah Lakes North						Nyah		Vinifera	
	Dry Lakes Regulator	Bitterang Regulator	K10 Causeway and Regulator	Water Extraction Site	K10 Regulator	Kulkyne Station / Borrow Pit	Project Site 1 (Central)	Project Site 2 (South / N5–N7)	Project Site 1 (Central)	Project Site 2 (V3/V4 East)
Buff-rumped Thornbill	0	0	0	0	0	0	22	0	0	0
Chestnut-crowned Babbler	6	0	0	0	0	0	0	0	0	0
Chestnut-rumped Thornbill	6	6	7	0	0	14	0	0	0	0
Collared Sparrowhawk	0	0	0	0	0	0	1	0	0	0
Common Blackbird	0	0	0	0	0	0	0	0	1	1
Common Bronzewing	1	0	2	2	0	3	9	3	3	1
Common Starling	0	0	0	0	0	0	4	0	0	2
Crested Pigeon	3	2	1	2	14	16	14	4	3	8
Crimson Rosella	0	4	2	6	6	4	43	6	32	13
Dusky Moorhen	0	0	0	0	0	0	0	0	4	0
Dusky Woodswallow	0	0	0	0	0	0	2	0	0	0
Eastern Rosella	0	0	0	0	0	0	36	9	37	21
Eastern Shrike-tit	0	0	0	0	0	0	3	0	2	0
Emu	2	0	1	0	0	4	0	0	0	0
Galah	8	5	2	4	9	6	24	12	27	20
Great Cormorant	0	0	0	5	0	0	1	0	1	1
Greater Bluebonnet	1	2	0	0	4	3	0	0	0	0
Grey Butcherbird	1	2	1	2	3	0	1	0	0	0
Grey Currawong	0	1	0	0	0	1	0	0	0	0
Grey Fantail	0	0	0	0	0	0	3	0	0	0
Grey Shrikethrush	1	1	1	1	1	1	6	1	4	5
Grey Teal	0	0	0	0	0	0	19	0	8	2
House Sparrow	0	0	0	0	0	0	19	0	0	0
Inland Thornbill	0	0	13	0	5	0	0	0	0	0
Laughing Kookaburra	0	0	0	2	0	4	7	3	6	6
Little Black Cormorant	0	0	0	0	0	0	9	2	1	1
Little Corella	0	0	0	26	8	5	26	22	22	13
Little Eagle	0	1	0	0	0	0	0	0	1	0
Little Friarbird	0	0	0	0	1	0	17	9	7	7
Little Pied Cormorant	0	0	0	0	0	0	1	0	4	0
Little Raven	0	0	0	0	2	0	9	2	26	28
Magpie-lark	2	2	2	2	2	4	15	3	13	8
Masked Lapwing	0	0	0	0	0	0	2	0	0	0

Species	Hattah Lakes North					Nyah		Vinifera	
	Dry Lakes Regulator	Bitterang Regulator	K10 Causeway and Regulator	Water Extraction Site	K10 Regulator	Kulkyne Station / Borrow Pit	Project Site 1 (Central)	Project Site 2 (South / N5–N7)	Project Site 1 (Central)	Project Site 2 (V3/V4 East)
Mistletoebird	0	2	0	1	2	7	0	0	0	0
Mulga Parrot	0	2	0	0	0	0	0	0	0	0
Musk Lorikeet	0	0	0	0	0	0	19	18	86	12
Nankeen Kestrel	1	0	0	1	0	2	1	0	1	0
Noisy Miner	7	27	11	60	33	23	47	28	55	90
Pacific Black Duck	0	0	0	0	0	0	72	18	33	8
Pallid Cuckoo	2	0	0	0	0	0	0	0	0	0
Peaceful Dove	0	0	2	0	1	3	15	1	4	2
Pied Butcherbird	1	0	2	0	3	2	3	2	2	0
Pink Cockatoo	1	0	0	0	0	0	0	0	0	0
Rainbow Bee-eater	0	0	0	0	0	0	3	1	2	0
Red Wattlebird	1	0	0	0	0	0	0	0	0	0
Red-capped Robin	3	1	2	0	0	4	0	0	0	0
Red-rumped Parrot	4	8	8	12	9	6	2	0	12	5
Regent Parrot	**5**	**0**	**0**	**58**	**0**	**25**	**0**	**0**	**0**	**0**
Restless Flycatcher	0	0	0	1	0	1	4	0	0	2
Rufous Whistler	1	0	1	0	1	2	4	0	0	2
Sacred Kingfisher	0	0	0	0	0	0	13	0	7	2
Singing Honeyeater	4	0	5	0	8	5	2	0	0	0
Southern Whiteface	4	0	5	0	0	0	0	0	0	0
Spiny-cheeked Honeyeater	3	0	2	0	3	2	0	0	0	0
Spotted Harrier	0	0	1	0	0	0	0	0	0	0
Spotted Pardalote	0	0	0	0	0	0	3	0	0	0
Straw-necked Ibis	0	0	0	0	0	0	22	0	369	0
Striated Pardalote	16	13	3	16	7	16	34	8	44	31
Striped Honeyeater	0	2	0	0	1	2	0	0	0	0
Sulphur-crested Cockatoo	0	2	32	12	54	8	7	2	2	2
Superb Fairywren	0	0	0	0	0	0	66	4	25	28
Tree Martin	18	0	0	25	0	0	12	0	0	0
Wedge-tailed Eagle	0	1	0	0	0	1	0	0	0	0
Weebill	9	13	9	0	6	22	8	0	0	4
Welcome Swallow	0	2	2	5	3	3	14	6	4	4
Western Gerygone	0	0	0	0	0	0	4	0	0	2
Whistling Kite	0	0	2	2	2	1	5	1	3	4

Species	Hattah Lakes North						Nyah		Vinifera	
	Dry Lakes Regulator	Bitterang Regulator	K10 Causeway and Regulator	Water Extraction Site	K10 Regulator	Kulkyne Station / Borrow Pit	Project Site 1 (Central)	Project Site 2 (South / N5–N7)	Project Site 1 (Central)	Project Site 2 (V3/V4 East)
White-browed Babbler	0	0	4	0	0	0	0	0	0	0
White-faced Heron	0	0	0	1	0	1	1	2	5	0
White-plumed Honeyeater	0	6	0	22	3	8	78	15	22	40
White-winged Chough	0	44	11	18	11	0	86	28	93	72
White-winged Fairywren	0	0	6	0	12	0	0	0	0	0
White-winged Triller	3	0	0	0	0	0	0	0	0	0
Willie Wagtail	1	0	1	1	1	1	10	2	5	8
Yellow Thornbill	0	0	0	0	10	37	0	0	0	0
Yellow-rumped Thornbill	5	11	3	0	0	0	0	0	0	6
Yellow-throated Miner	0	0	0	0	8	0	0	0	0	0

Survey Round 3 – Survey Summary

Table 12: Round 3 Survey summary

Project Subsite	Survey Date	Duration	Distance	Party Size	Total Species
Hattah Lakes North					
K10 Causeway and Regulator	21 Oct 2025	1 h 16 min	3.22 km	2	35
Kulkyne Station / Borrow Pit	21 Oct 2025	1 h 39 min	3.44 km	2	24
Water Extraction Site	21 Oct 2025	1 h 48 min	0.99 km	2	37
K10 Regulator	20 Oct 2025	1 h 08 min	3.37 km	2	27
Bitterang Regulator	20 Oct 2025	1 h 49 min	4.65 km	2	36
Dry Lakes Regulator	20 Oct 2025	2 h 00 min	2.10 km	2	41

Table 13: Round 3 Survey complete species list

Species	Dry Lakes Regulator	Kulkyne Station / Borrow Pit	Water Extraction Site	K10 Causeway and Regulator	K10 Regulator	Bitterang Regulator
Apostlebird	0	0	0	3	24	0
Australian Boobook	0	0	1	0	0	0
Australian Hobby	0	0	1	0	0	0
Australian Magpie	3	3	2	5	5	6
Australian Pelican	0	0	1	0	0	0
Australian Raven	2	2	12	0	0	3
Australian Ringneck	2	2	2	2	9	5
Black-faced Cuckooshrike	0	1	0	1	1	3

Species	Dry Lakes Regulator	Kulkyne Station / Borrow Pit	Water Extraction Site	K10 Causeway and Regulator	K10 Regulator	Bitterang Regulator
Blue-faced Honeyeater	0	0	7	0	0	0
Brown Goshawk	0	0	0	1	1	0
Brown Treecreeper	2	0	3	0	1	3
Chestnut-rumped Thornbill	13	6	0	19	4	8
Common Bronzewing	2	0	2	0	0	1
Crested Pigeon	4	4	0	2	7	2
Crimson Rosella	6	0	8	10	0	3
Emu	6	0	0	0	9	2
Galah	0	0	7	4	19	28
Great Cormorant	0	0	1	0	0	0
Greater Bluebonnet	0	8	0	2	8	0
Grey Butcherbird	2	2	0	0	10	1
Grey Shrikethrush	2	0	1	0	3	2
Inland Thornbill	3	0	0	5	0	0
Laughing Kookaburra	3	0	1	0	0	2
Little Black Cormorant	0	0	2	0	0	0
Little Corella	4	0	60	0	0	0
Little Friarbird	16	2	2	0	0	0
Little Pied Cormorant	0	0	1	0	0	0
Little Raven	0	4	8	3	13	22
Magpie-lark	4	2	4	2	11	4
Masked Lapwing	0	0	2	0	0	0
Mulga Parrot	0	0	0	0	4	0
Nankeen Kestrel	0	0	0	0	1	1
Noisy Miner	23	5	14	12	26	14
Pacific Black Duck	0	0	2	0	0	0
Pallid Cuckoo	0	0	0	0	2	0
Peaceful Dove	2	1	2	0	0	0
Pied Butcherbird	1	0	1	2	2	4
Purple-backed Fairywren	5	0	0	3	0	0
Rainbow Bee-eater	0	2	0	0	1	6
Red-capped Robin	8	0	0	2	0	0
Red-rumped Parrot	0	0	33	0	12	8
Regent Parrot	**8**	**15**	**119**	**0**	**0**	**0**
Restless Flycatcher	0	0	2	0	0	0
Rufous Whistler	5	1	0	0	1	2
Sacred Kingfisher	0	1	2	0	2	7
Singing Honeyeater	3	2	0	6	1	3
Southern Whiteface	5	12	0	0	0	3
Spiny-cheeked Honeyeater	0	0	0	3	3	16

Species	Dry Lakes Regulator	Kulkyne Station / Borrow Pit	Water Extraction Site	K10 Causeway and Regulator	K10 Regulator	Bitterang Regulator
Splendid Fairywren	14	0	0	5	0	0
Striated Pardalote	0	9	4	5	6	20
Striped Honeyeater	2	0	0	0	4	5
Sulphur-crested Cockatoo	13	6	28	0	4	2
Tree Martin	0	0	44	0	0	12
Weebill	12	7	0	9	12	8
Welcome Swallow	5	0	9	6	5	3
Western Gerygone	1	1	0	0	0	0
Whistling Kite	0	0	1	1	0	1
White-browed Babbler	8	0	0	0	0	0
White-faced Heron	0	0	1	0	0	0
White-plumed Honeyeater	14	0	26	0	6	0
White-winged Chough	0	0	0	0	18	0
White-winged Fairywren	0	0	0	6	0	0
Willie Wagtail	2	0	1	1	2	2
Yellow Thornbill	0	20	0	0	0	0
Yellow-plumed Honeyeater	0	0	0	0	11	0
Yellow-rumped Thornbill	4	0	0	8	6	6

Survey Round 4 – Survey Summary

Table 14: Round 4 Survey summary

Subsite / Location	Survey Date	Duration	Distance	Party Size	Total Species
Hattah Lakes North					
Dry Lakes Regulator	19 Nov 2025	1 h 04 min	2.50 km	2	40
Bitterang Regulator	19 Nov 2025	1 h 22 min	2.87 km	2	43
Water Extraction Site	19 Nov 2025	58 min	2.05 km	2	38
K10 Causeway and Regulator	18 Nov 2025	1 h 09 min	2.31 km	2	41
K10 Regulator	18 Nov 2025	1 h 16 min	2.42 km	2	39
Kulkyne Station / Borrow Pit	18 Nov 2025	1 h 11 min	2.64 km	2	42

Table 15: Round 4 Survey complete species list

Species	Dry Lakes Regulator (Mournpall Track)	Bitterang Regulator	Water Extraction Site	K10 Causeway and Regulator	K10 Regulator	Kulkyne Station / Borrow Pit
Apostlebird	0	34	4	0	13	0
Australasian Darter	0	0	1	0	0	0
Australian Magpie	5	3	4	2	4	3
Australian Raven	0	2	4	2	2	8
Australian Ringneck	5	2	6	2	0	2

Species	Dry Lakes Regulator (Mournpall Track)	Bitterang Regulator	Water Extraction Site	K10 Causeway and Regulator	K10 Regulator	Kulkyne Station / Borrow Pit
Australian Wood Duck	0	0	5	0	0	0
Black Kite	0	0	0	0	1	0
Black-faced Cuckooshrike	1	0	1	1	1	2
Black-fronted Dotterel	0	0	2	0	0	0
Blue-faced Honeyeater	0	0	6	0	0	0
Brown Treecreeper	1	0	2	3	4	1
Brown-headed Honeyeater	0	0	0	12	0	0
Chestnut-crowned Babbler	9	0	0	0	0	0
Chestnut-rumped Thornbill	14	6	0	64	16	6
Common Bronzewing	1	0	2	0	1	4
Crested Pigeon	4	4	0	4	4	17
Crimson Rosella	2	4	10	6	0	4
Emu	1	3	0	4	2	2
Galah	2	4	0	2	0	2
Great Cormorant	0	0	1	0	0	0
Greater Bluebonnet	2	4	0	2	11	2
Grey Butcherbird	2	1	2	1	2	2
Grey Shrikethrush	2	2	0	2	1	0
Inland Thornbill	0	4	0	12	9	0
Laughing Kookaburra	0	0	0	1	1	1
Little Black Cormorant	0	0	1	0	0	0
Little Corella	0	0	79	0	0	8
Little Friarbird	0	0	3	8	4	5
Little Raven	4	0	0	0	0	2
Magpie-lark	2	2	2	0	3	2
Mistletoebird	0	1	0	1	0	0
Mulga Parrot	0	0	0	4	0	0
Nankeen Kestrel	0	0	0	0	1	1
Noisy Miner	8	24	22	12	23	9
Pacific Black Duck	0	0	1	0	0	0
Pallid Cuckoo	1	0	0	0	0	0
Peaceful Dove	0	0	0	4	1	2
Pied Butcherbird	1	2	0	2	4	1
Pink Cockatoo	0	0	0	0	0	1
Purple-backed Fairywren	0	4	0	3	0	13
Rainbow Bee-eater	3	2	4	0	0	0
Red Wattlebird	2	0	0	0	1	0
Red-capped Robin	0	0	0	6	2	0
Red-rumped Parrot	6	6	34	18	29	46
Regent Parrot	**2**	**0**	**64**	**0**	**0**	**0**

Species	Dry Lakes Regulator (Mournpall Track)	Bitterang Regulator	Water Extraction Site	K10 Causeway and Regulator	K10 Regulator	Kulkyne Station / Borrow Pit
Restless Flycatcher	0	0	1	0	1	0
Rufous Whistler	0	1	2	3	2	2
Sacred Kingfisher	4	2	3	5	3	5
Silvereye	0	0	0	0	2	7
Singing Honeyeater	2	0	0	6	3	1
Southern Whiteface	0	0	0	5	7	0
Spiny-cheeked Honeyeater	3	2	0	4	5	0
Splendid Fairywren	5	0	0	0	0	12
Square-tailed Kite	0	0	1	0	0	0
Striated Pardalote	7	8	8	9	13	8
Striped Honeyeater	3	3	0	4	3	1
Sulphur-crested Cockatoo	1	1	38	7	0	5
Superb Fairywren	0	0	0	0	0	4
Tawny Frogmouth	0	0	1	0	0	0
Tree Martin	16	0	18	0	0	0
Wedge-tailed Eagle	0	0	0	1	0	1
Weebill	5	16	2	18	5	10
Welcome Swallow	3	0	5	6	3	0
Whistling Kite	0	0	2	1	1	3
White-browed Babbler	5	0	0	6	4	0
White-plumed Honeyeater	0	4	13	11	0	0
White-winged Chough	0	47	12	0	0	0
White-winged Fairywren	0	0	0	0	24	3
Willie Wagtail	4	1	1	2	2	0
Yellow Thornbill	0	0	0	17	3	8
Yellow-rumped Thornbill	12	9	0	0	0	0

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