Clearing Assessment Report – CPS 818

We're working for Western Australia.

Erskine to Blina SLK 2381-2394
Great Northern Highway H006
Kimberley
2552

D25#141798
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Document Control

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1 PROPOSAL

1.1 Purpose and Justification

Main Roads Western Australia proposes to upgrade the Great Northern Highway (GNH) between Straight Line Kilometre (SLK) 2381 to 2394 near the Camballin floodplain, referred to as the "Erskine to Blina" section. The proposed works will reduce the frequency of road closures due to seasonal flooding events, increasing haulage connectivity throughout the wet season and improving the safety of the infrastructure.

The current seal is 7.5 m in width, with sections of poor rideability. The proposed works include widening the road seal from 7.5 m to 11 m, upgrades to culverts, additional culverts and increased floodway capacity, which will improve road safety for motorists. Increased seal widths are required to meet the regional improvement strategy and Road Safety Management System (ROSMA) interim safety standards.

1.1.1 Main Roads Approach to Road Safety and the Environment

Main Roads is committed to minimising the environmental impacts of all of its activities and manages the State Road network to achieve balanced economic, social, safety and environmental benefits for the community. Main Roads recognises that Western Australia's environment is significant from a global perspective and the unique conservation values that are contained within its road reserve. Main Roads' road network often adjoins natural areas, and, in some locations, the reserve itself hosts remnant vegetation with high environmental values. Although the reserves were not established for this purpose, Main Roads recognises that it has a responsibility to conserve the environmental values that occur within the State's road network and minimise the impact its proposals have on the environment. In addition to providing a safe and efficient road network for all people using the roads under its control, Main Roads is also committed to protecting the natural environment.

In accordance with National and State Government road safety policies, Main Roads is also committed to substantially reducing road trauma on the road network through Safe System principles. The Safe System approach acknowledges that more than two thirds of all serious crashes are due to human error rather than deliberate risk taking (e.g. speeding or drink driving) and seeks to improve behaviour through education and enforcement while managing the safety of vehicles, speeds and the road and road infrastructure. It is shown that improving sub-optimal road formation will substantially reduce the likelihood and severity of road crashes. For example, according to the Road Safety Management Guideline, increasing the sealed shoulder from 0.5 m to 2 m will reduce Killed and Seriously Injured numbers by more than 50%.

As the statutory authority responsible for providing and managing a safe and efficient main road network in Western Australia, Main Roads focuses on improving road safety by thoroughly considering all environmental, economic and community benefits and impacts. It operates on a hierarchy of avoiding, minimising, reducing and then, if required, offsetting our environmental impacts. This has been achieved through changes in Proposal scope and design. Main Roads regularly reduces its clearing footprint by restricting earthworks limits for Proposals, steepening batters, installing barriers, establishing borrow pits in cleared paddocks and avoiding temporary clearing for storage, stockpiles and turn-around bays to avoid and minimise its impacts.

Further details on measures to avoid, minimise and reduce are provided in Section 1.5.

1.2 Proposal Scope

Main Roads proposes to upgrade a 13 km section of Great Northern Highway (GNH). In relation to the proposed native vegetation clearing, the upgrade will comprise the following components:

1) Material investigation and extraction;
2) Widening and sealing the existing road formation and shoulders;
3) Road drainage upgrades; and
4) Additional supporting infrastructure as required.

1.3 Proposal Location

The Development Envelope is located on Great Northern Highway (H006), SLK 2381 to 2394, Shire of Derby / West Kimberley, as shown in Figure 1. The central coordinate of the Proposal is -17.8455012, 124.4319423 (latitude, longitude).

1.4 Clearing Details

Proposed Clearing to be undertaken using CPS 818:
50.6 ha.

Areas of Native Vegetation Clearing:
The areas of native vegetation to be cleared are shown in Figure 1 and detailed in Figure 2 to Figure 12.

Type of Native Vegetation:
The type of vegetation to be cleared under this Proposal consists of six vegetation types (D1, D2, P1, P2, P4, P5) and one mosaic type (H1/P2) as described by Biota (2023a) and shown in Figure 13.

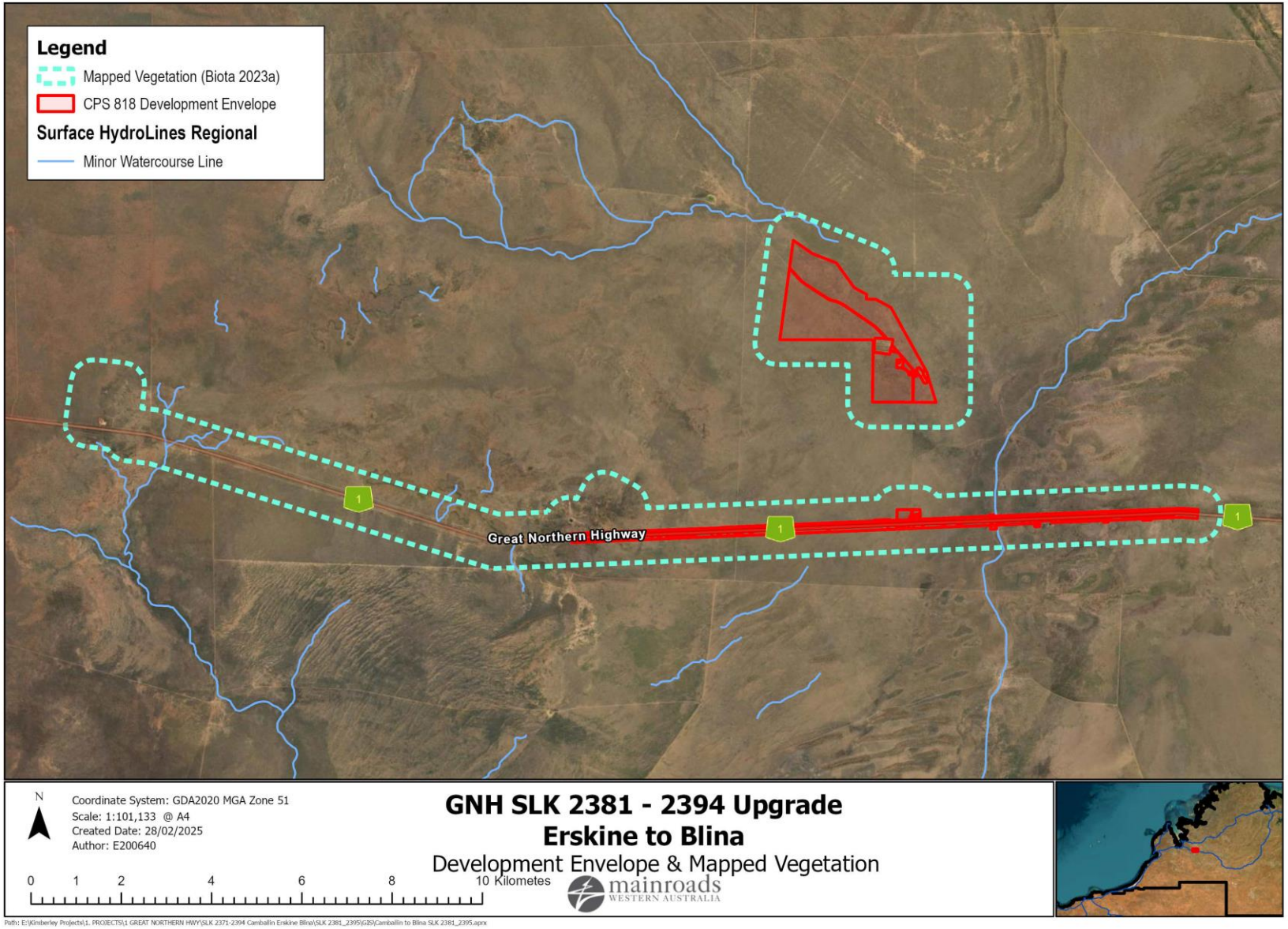


Figure 1. Great Northern Highway Erskine to Blina SLK 2381 – 2394 Development Envelope and Mapped Vegetation (Biota 2023a).

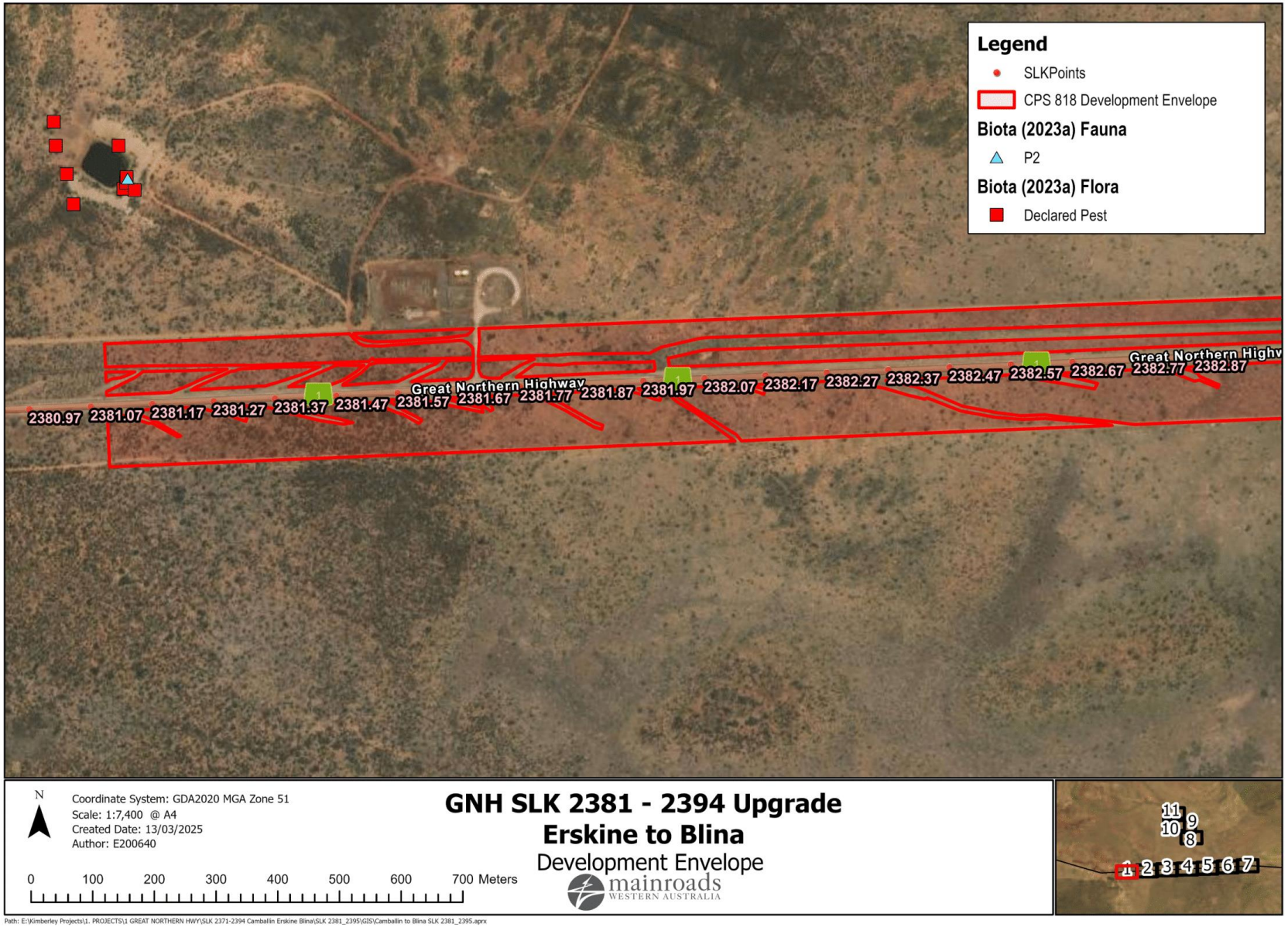


Figure 2. Map 1 of 11 GNH SLK 2381 – 2394 Upgrade Development Envelope.

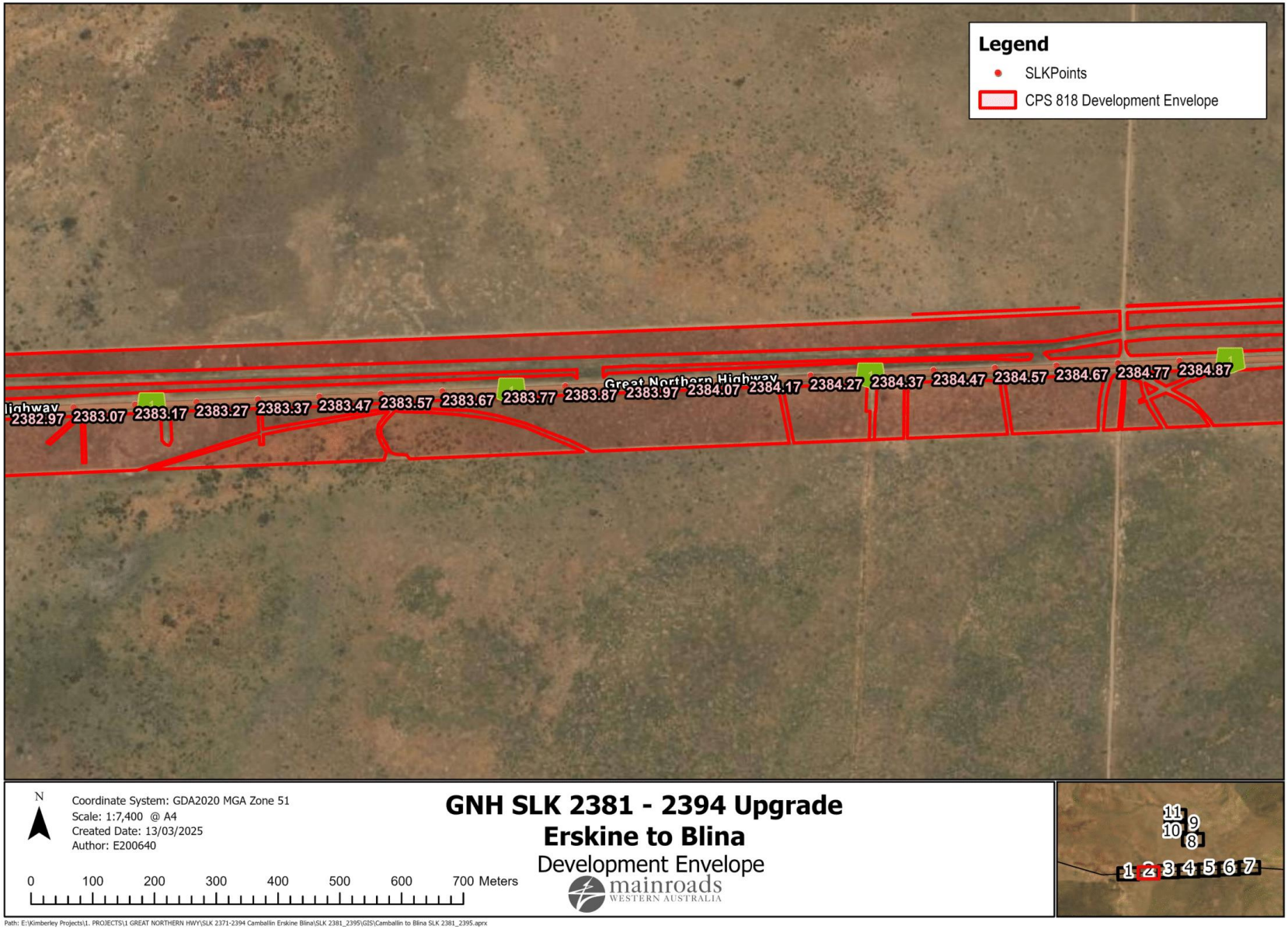


Figure 3. Map 2 of 11 GNH SLK 2381 – 2394 – 2394 Upgrade Development Envelope.

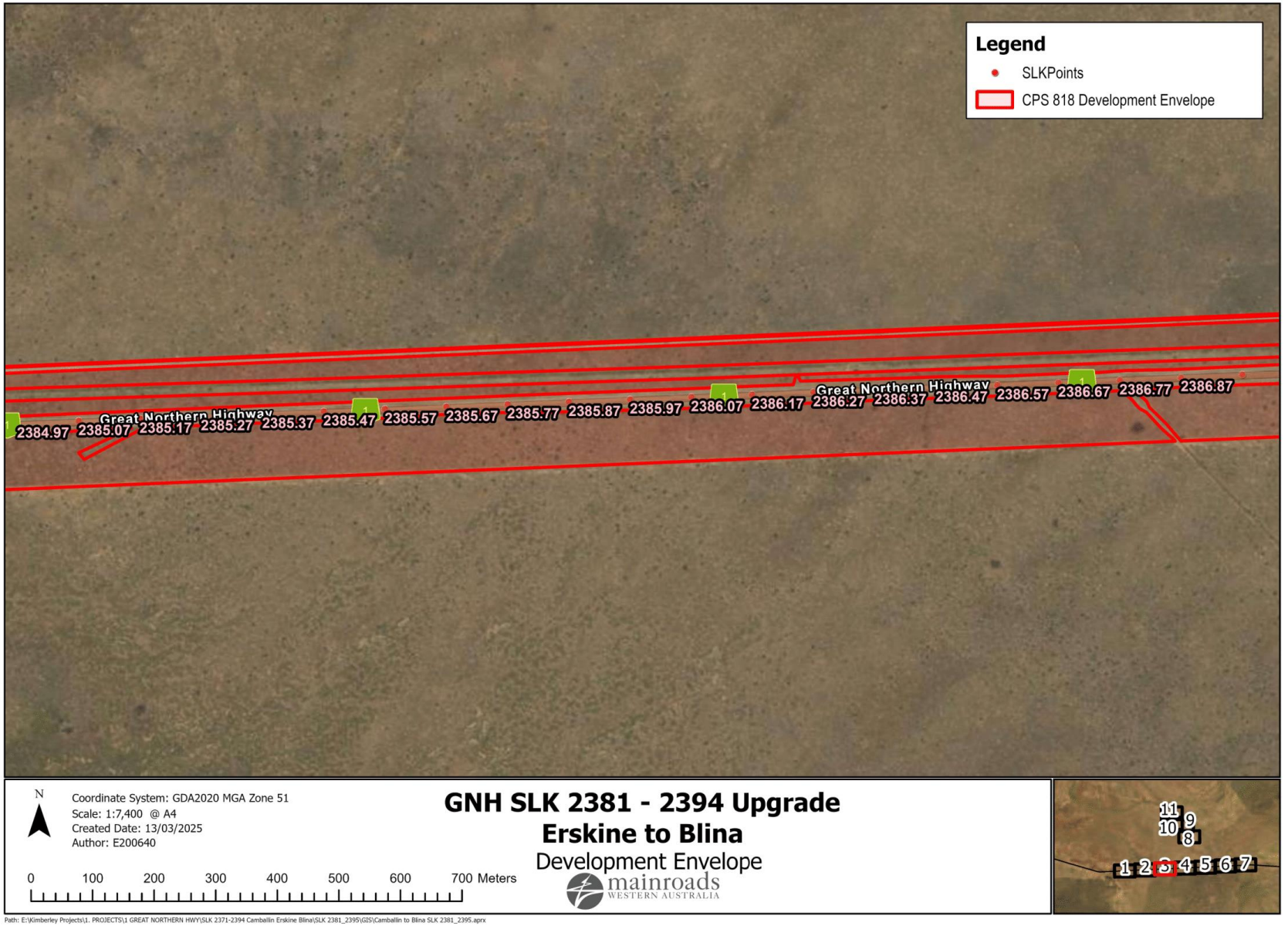


Figure 4. Map 3 of 11 GNH SLK 2381 – 2394 – 2394 Upgrade Development Envelope.

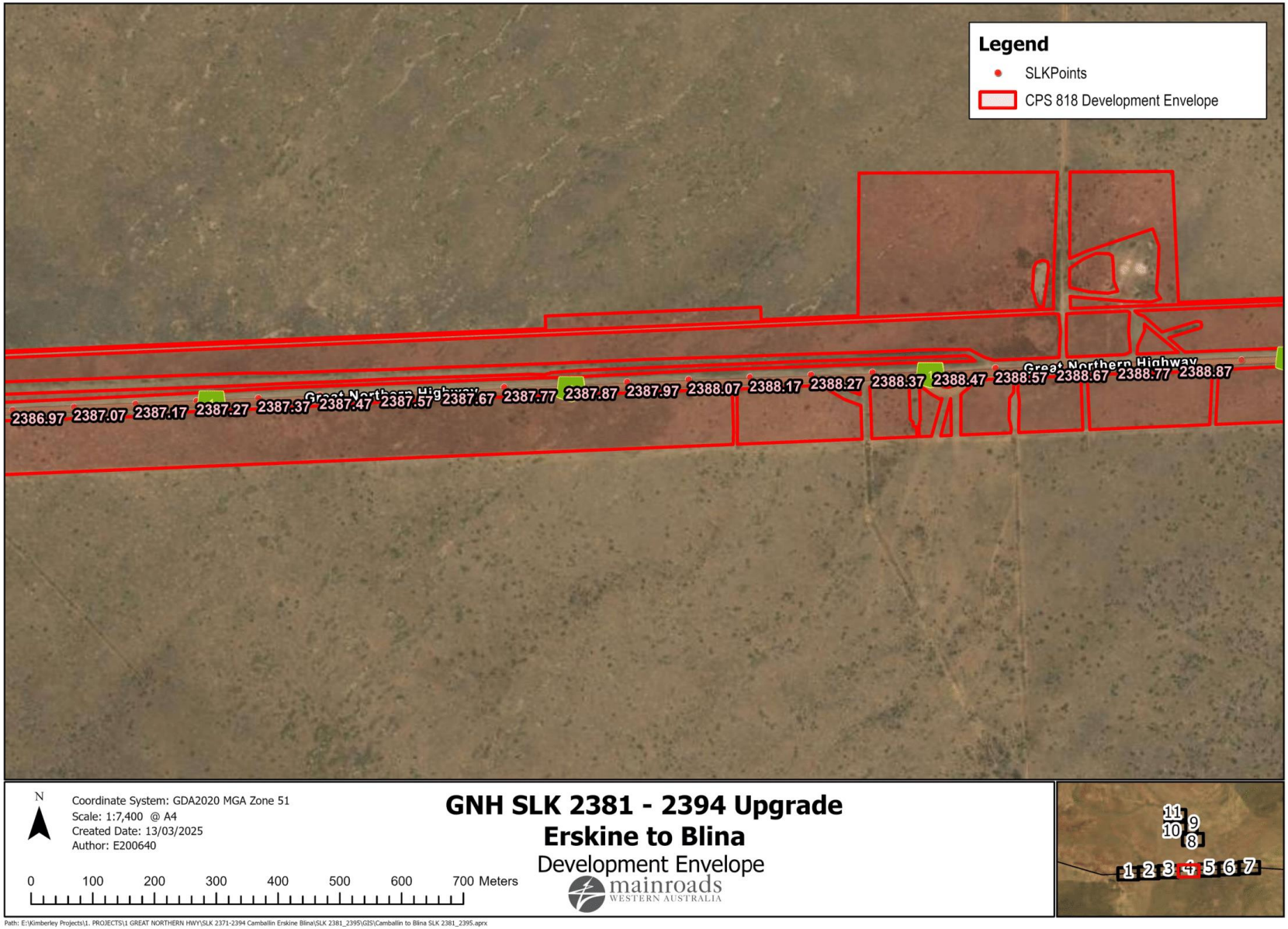


Figure 5. Map 4 of 11 GNH SLK 2381 – 2394 – 2394 Upgrade Development Envelope.

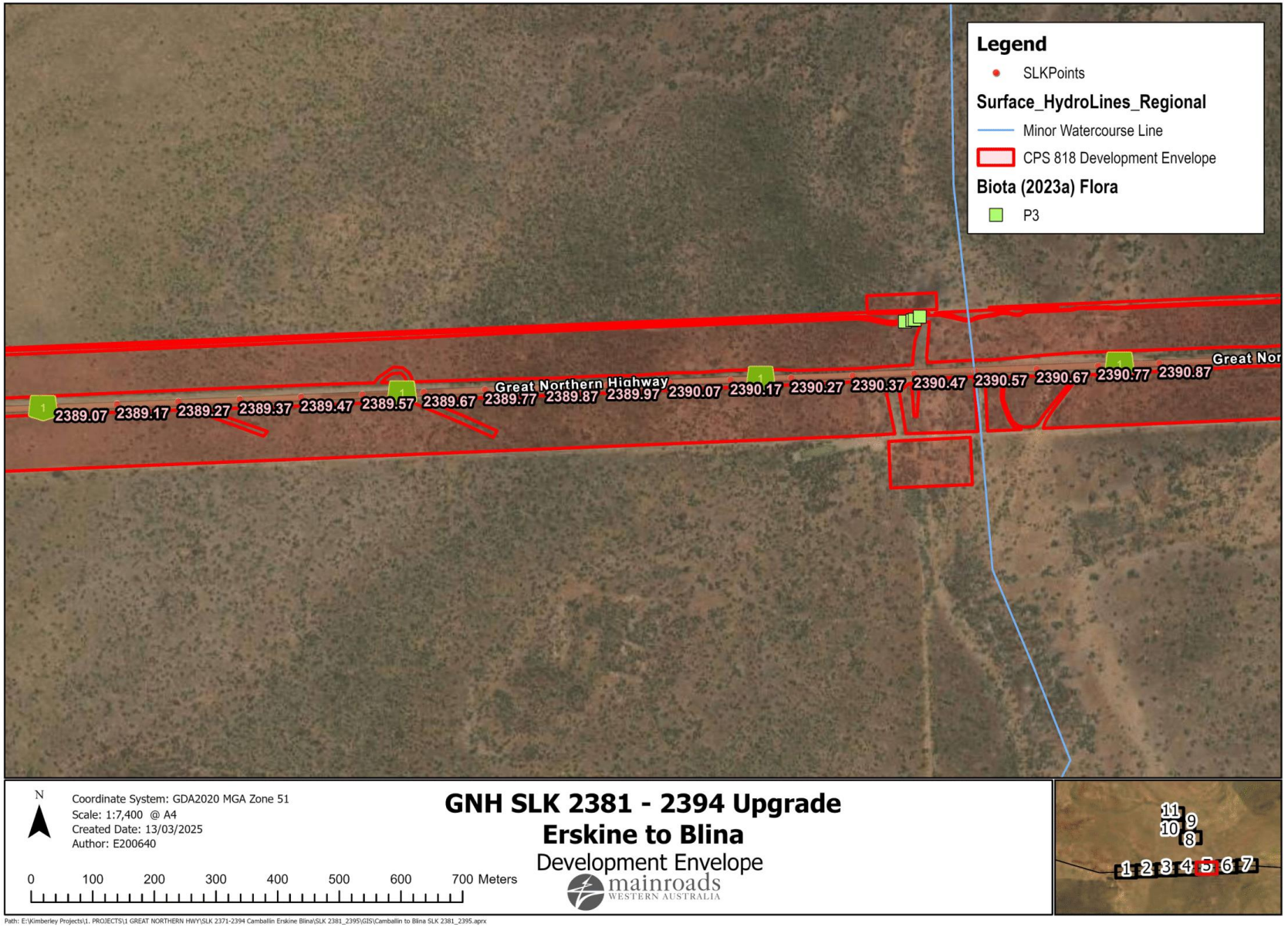


Figure 6. Map 5 of 11 GNH SLK 2381 – 2394 – 2394 Upgrade Development Envelope.

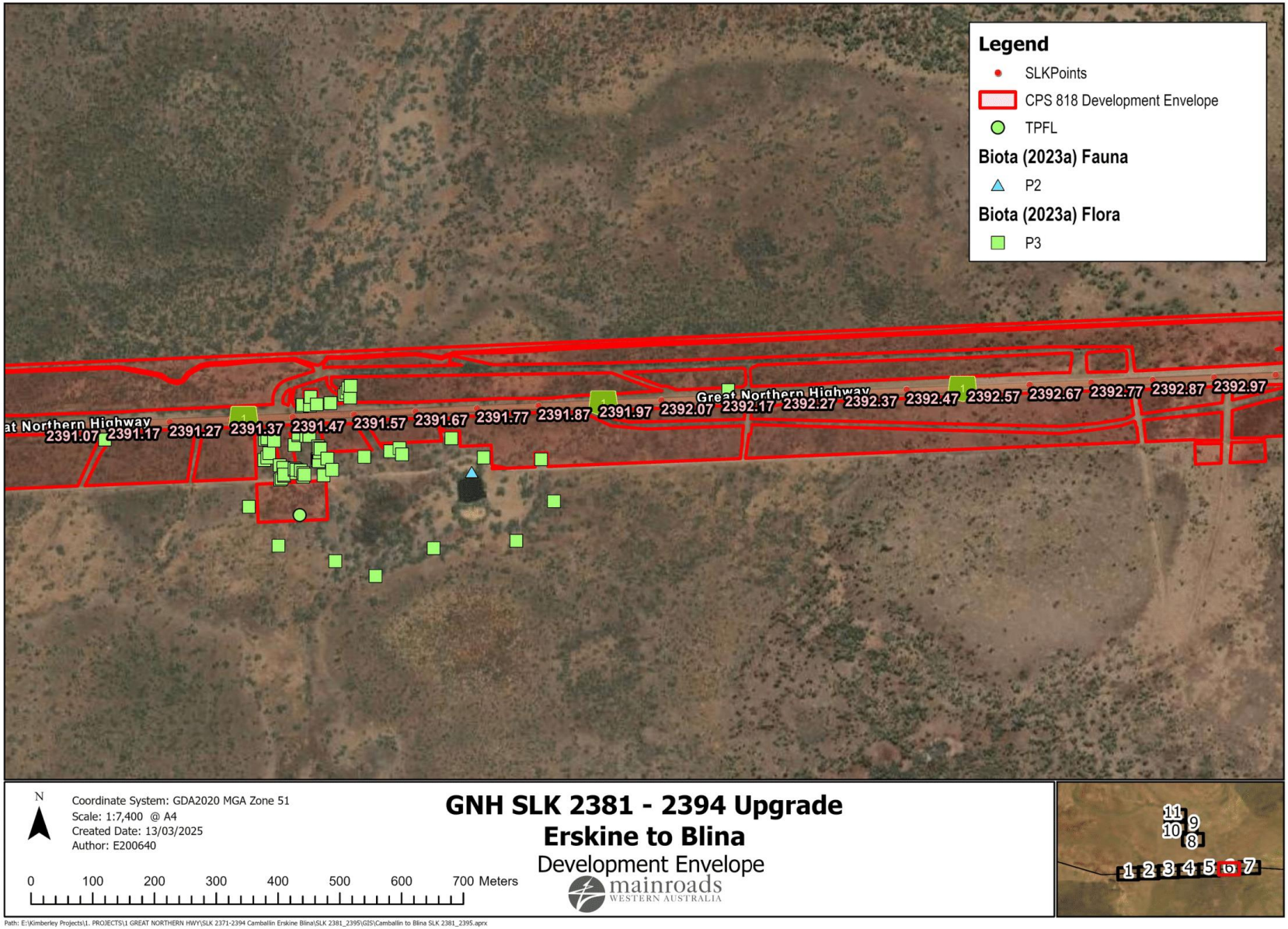


Figure 7. Map 6 of 11 GNH SLK 2381 – 2394 – 2394 Upgrade Development Envelope.

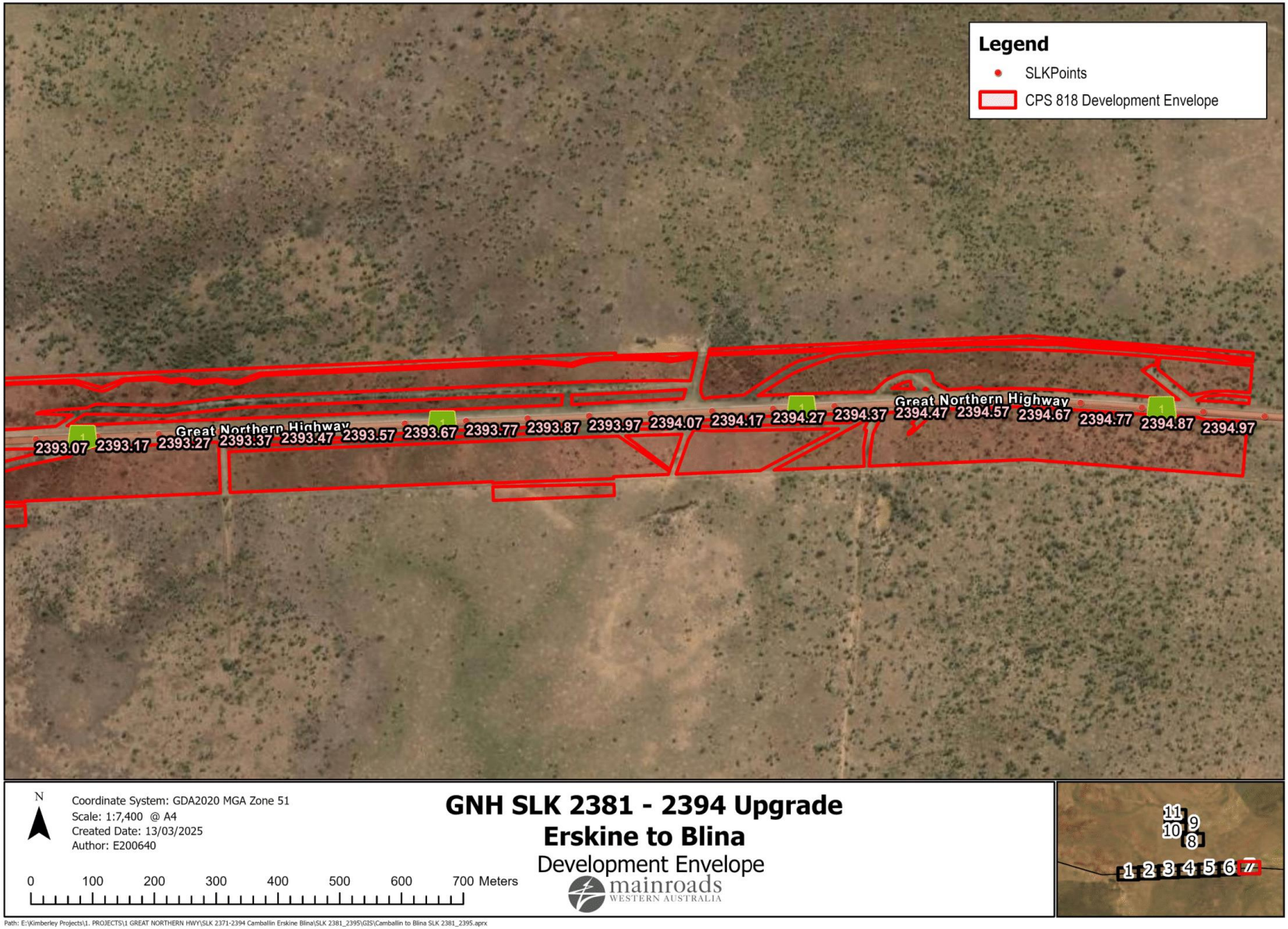


Figure 8. Map 7 of 11 GNH SLK 2381 – 2394 – 2394 Upgrade Development Envelope.

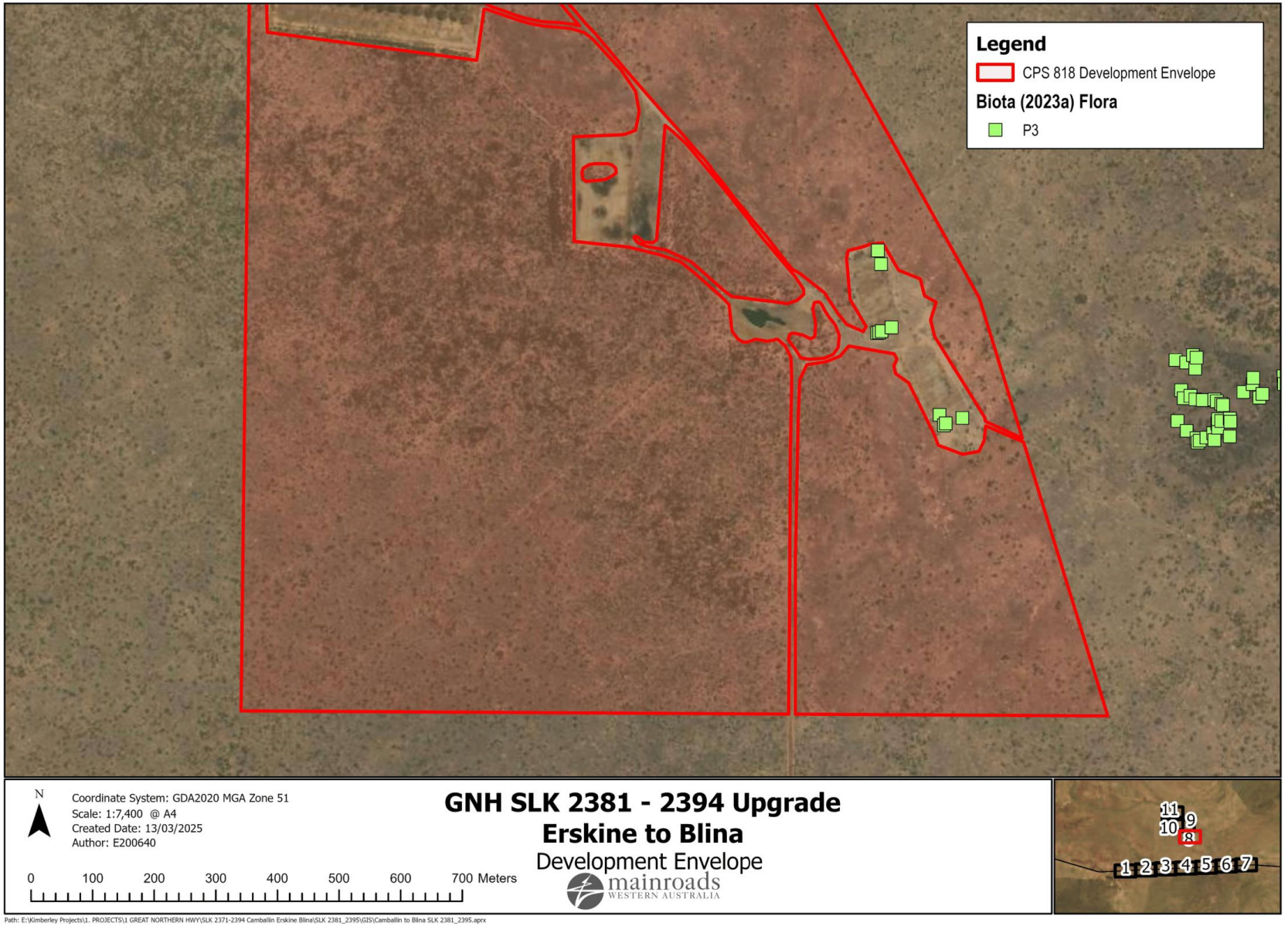


Figure 9. Map 8 of 11 GNH SLK 2381 – 2394 – 2394 Upgrade Development Envelope.

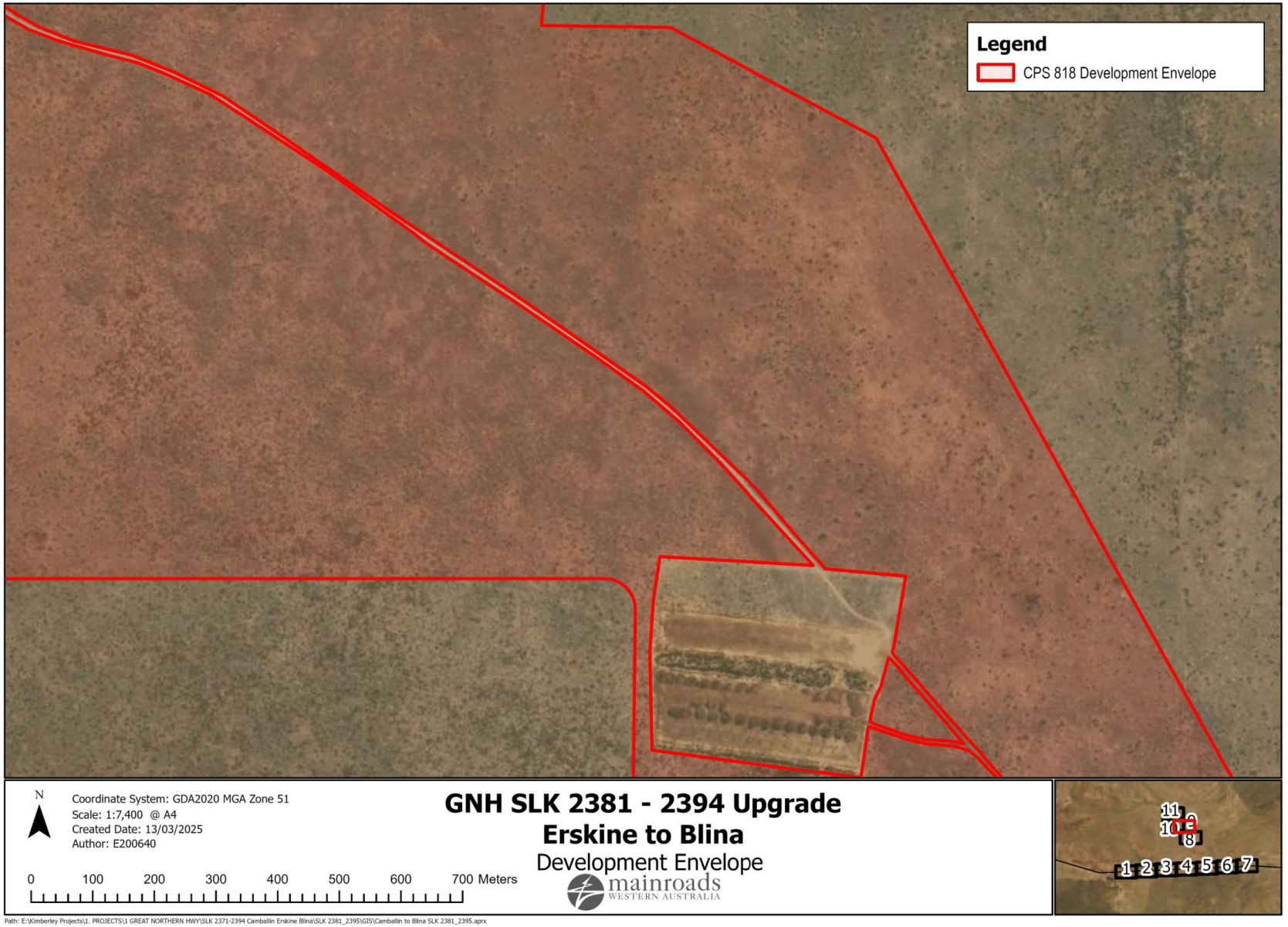


Figure 10. Map 9 of 11 GNH SLK 2381 – 2394 – 2394 Upgrade Development Envelope.

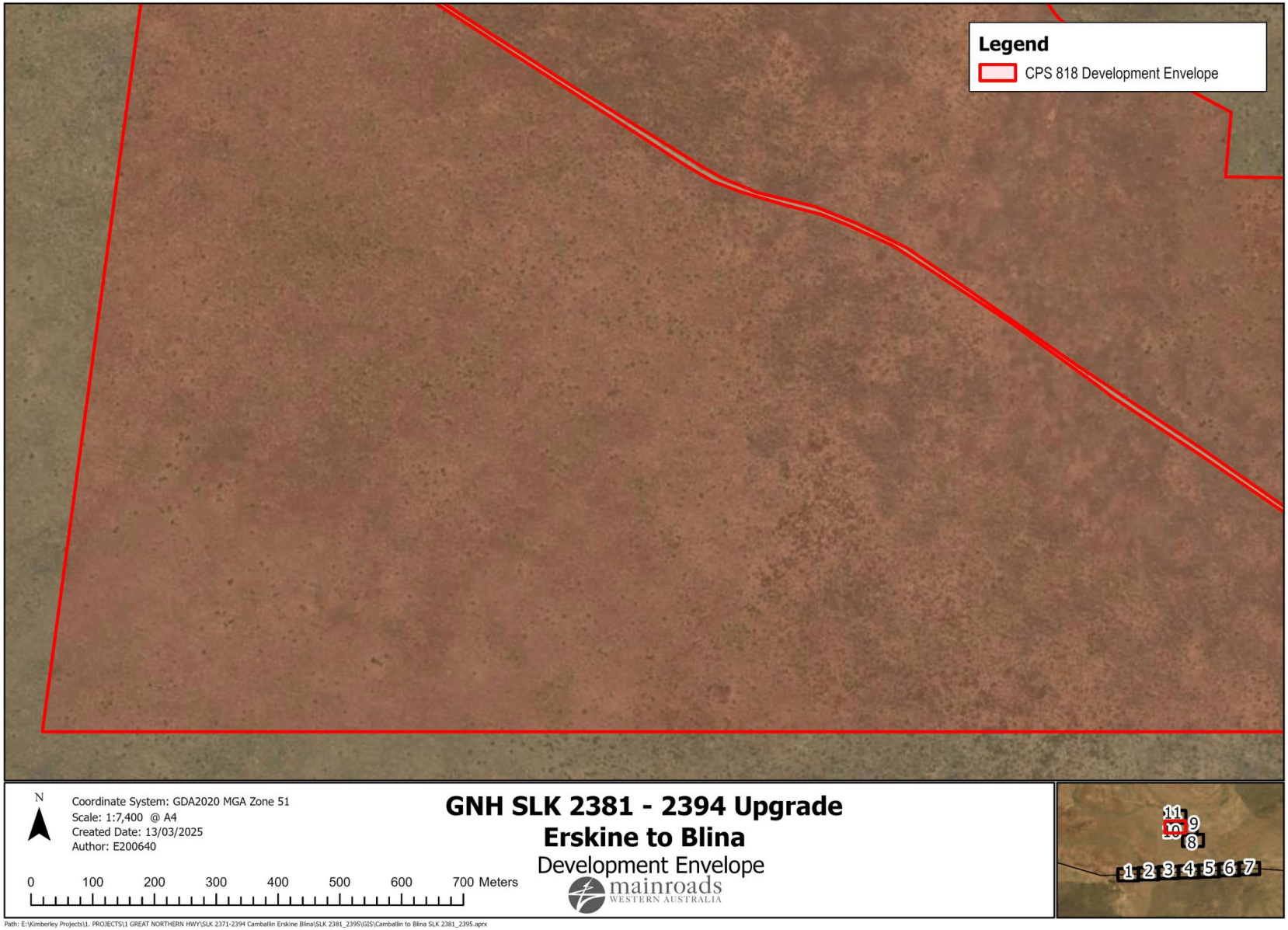


Figure 11. Map 10 of 11 GNH SLK 2381 – 2394 – 2394 Upgrade Development Envelope.

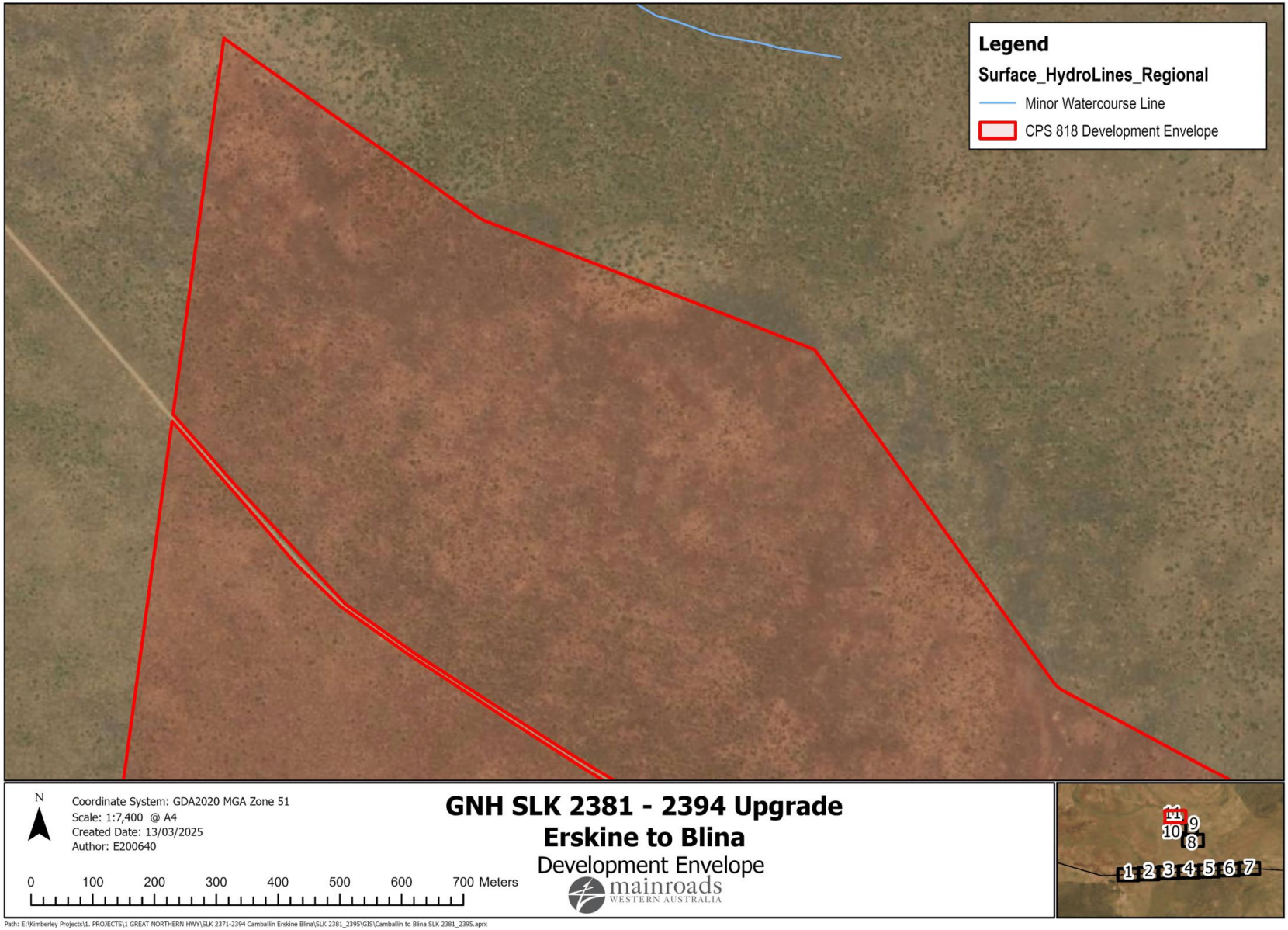


Figure 12. Map 11 of 11 GNH SLK 2381 – 2394 – 2394 Upgrade Development Envelope.

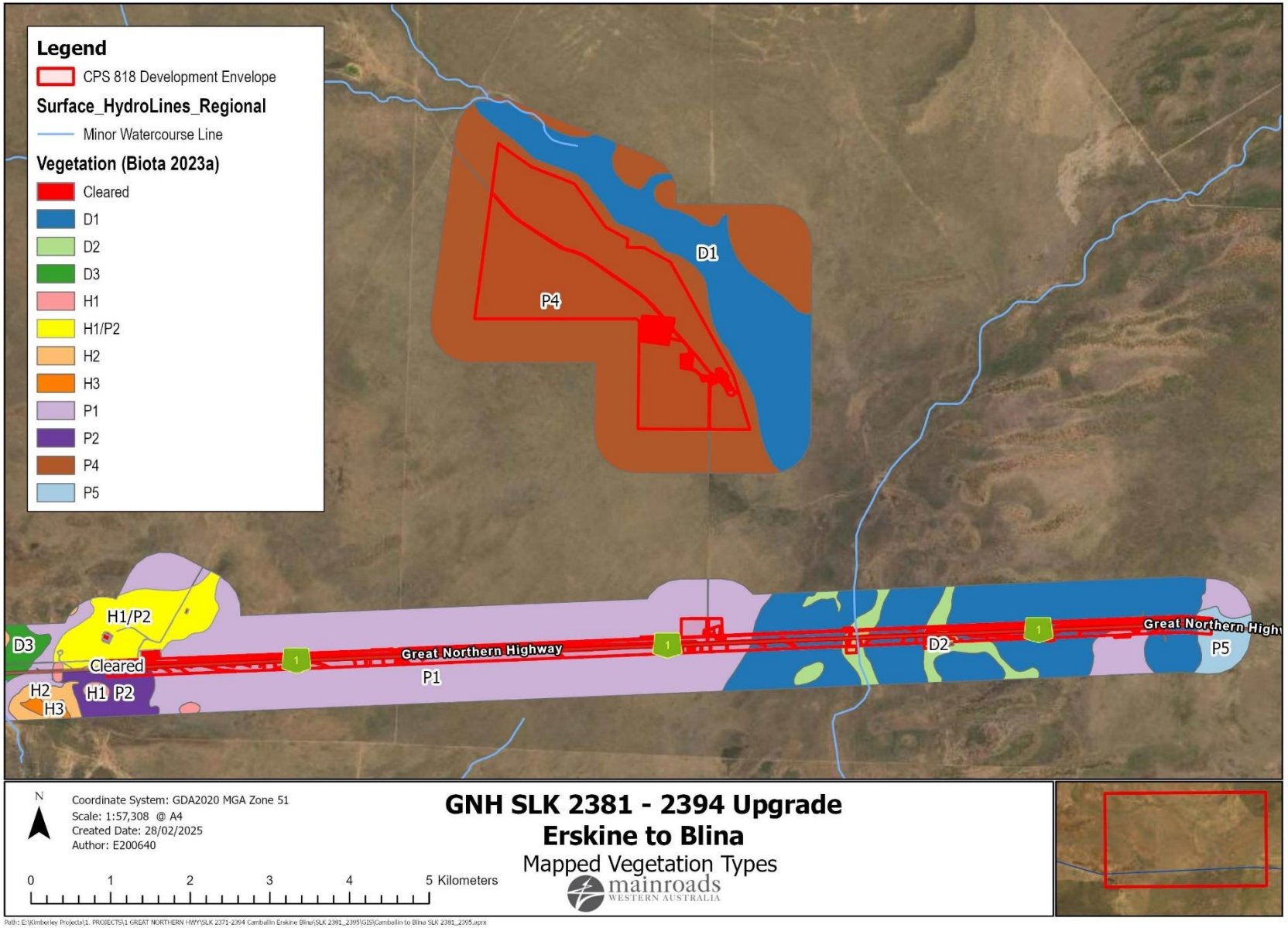


Figure 13. Mapped Vegetation types by Biota (2023a) in relation to the Development Envelope

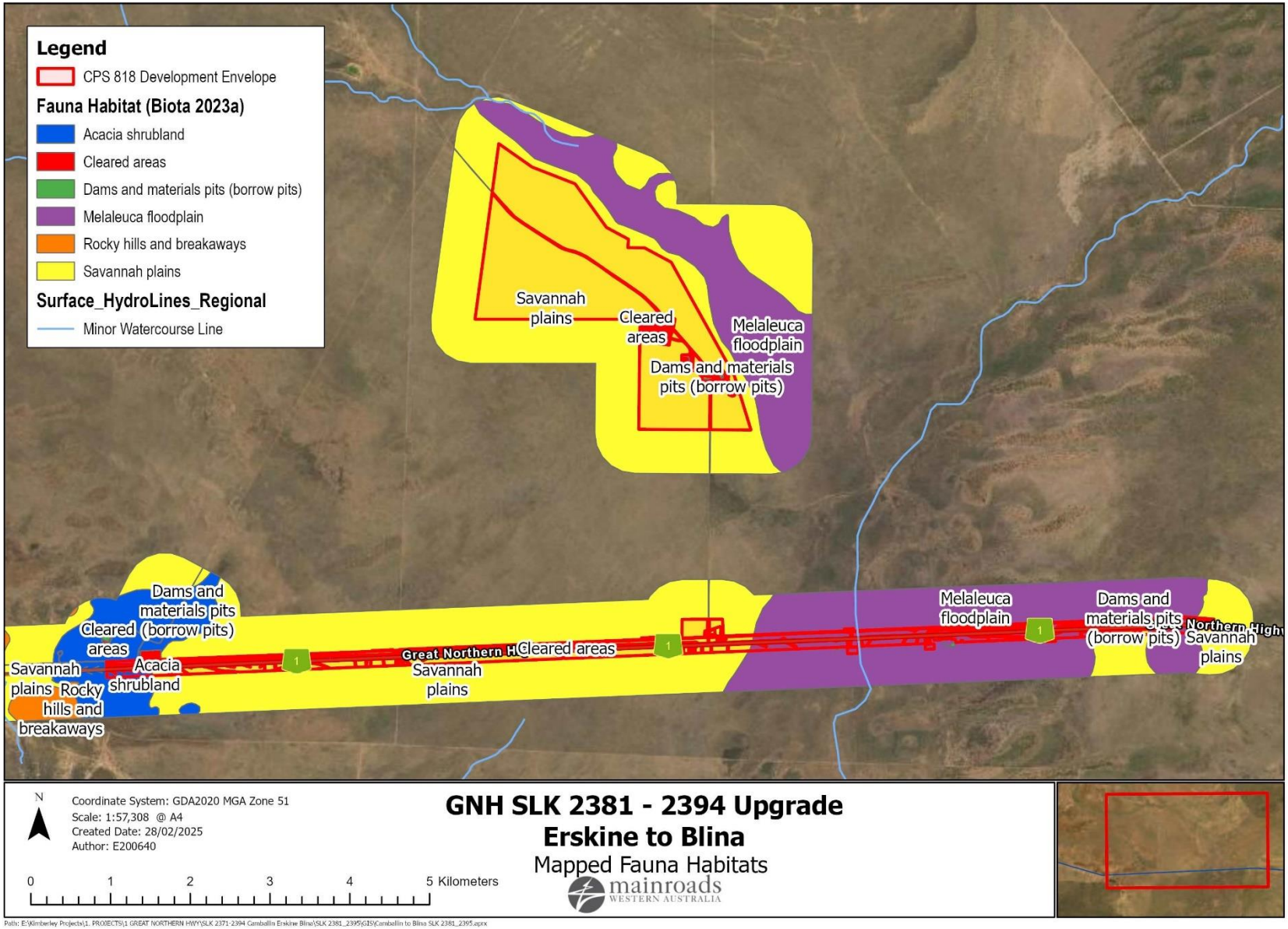


Figure 14. Mapped Fauna Habitats by Biota (2023a) in relation to the Development Envelope

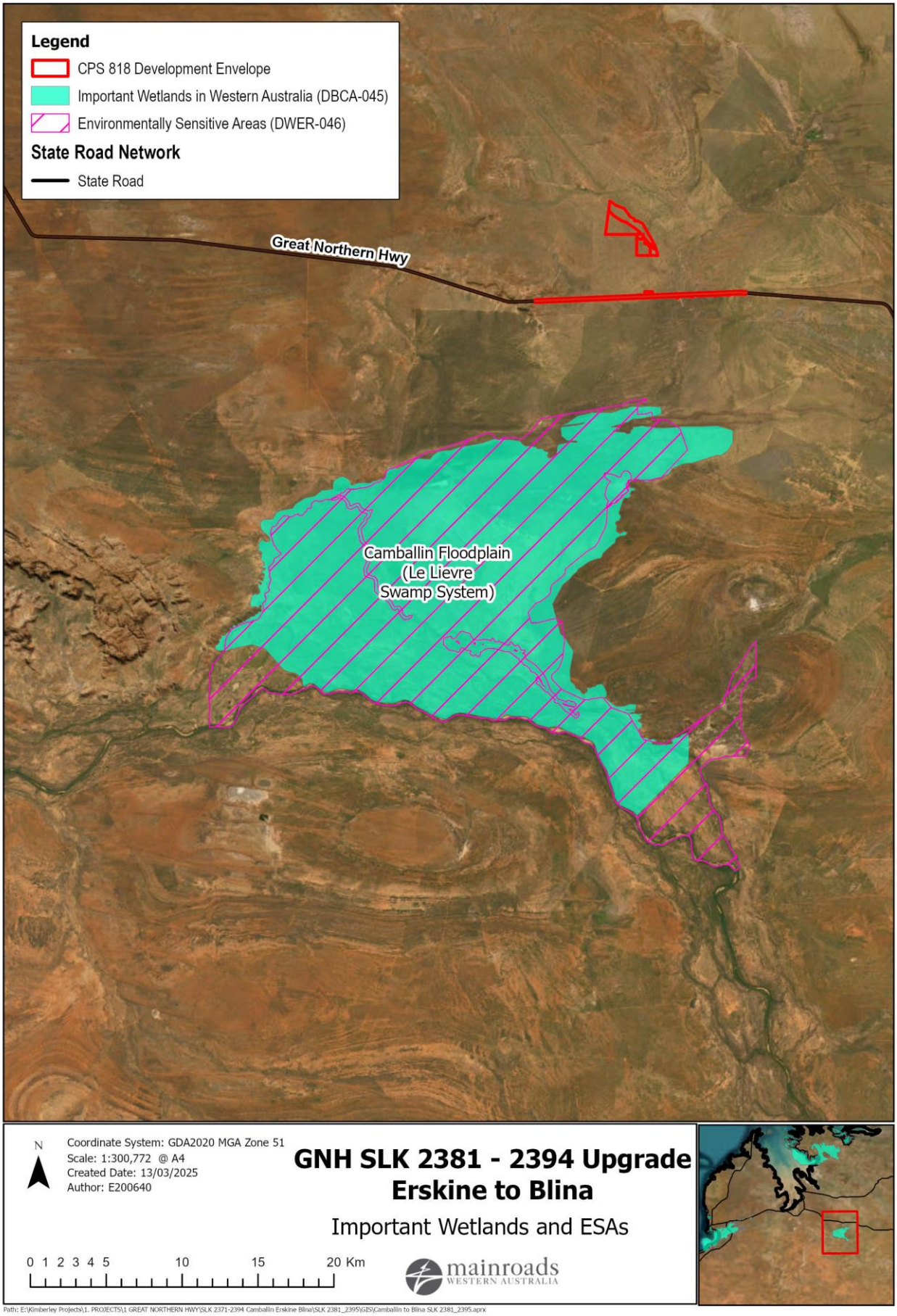


Figure 15. Development Envelope in relation to mapped Environmentally Sensitive Areas (ESAs) and Important Wetlands in Western Australia.

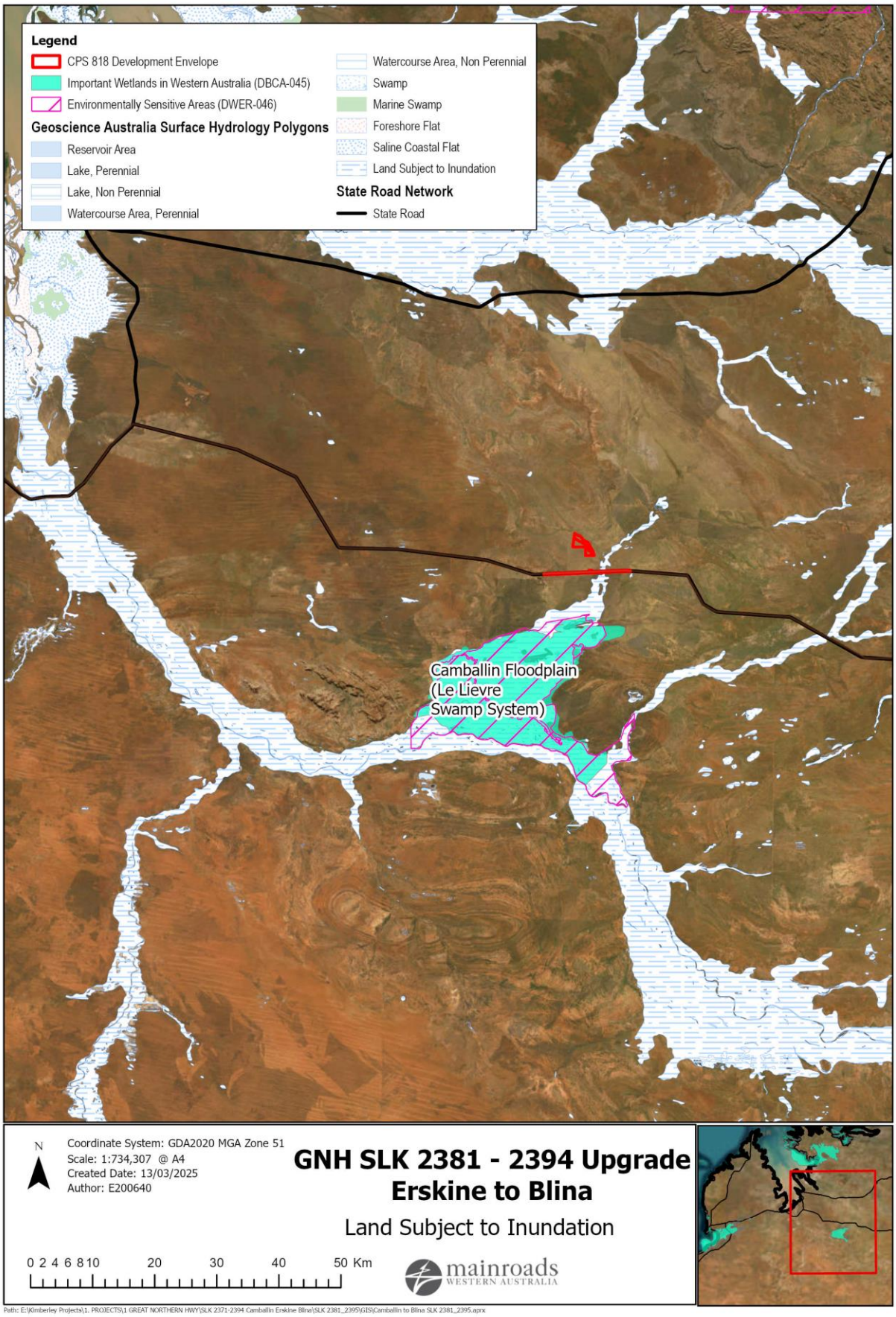


Figure 16. Development Envelope in relation to mapped Environmentally Sensitive Areas (ESAs), Important Wetlands in Western Australia and areas mapped as 'Land Subject to Inundation'.

1.5 Alternatives to Native Vegetation Clearing Considered During Proposal Development

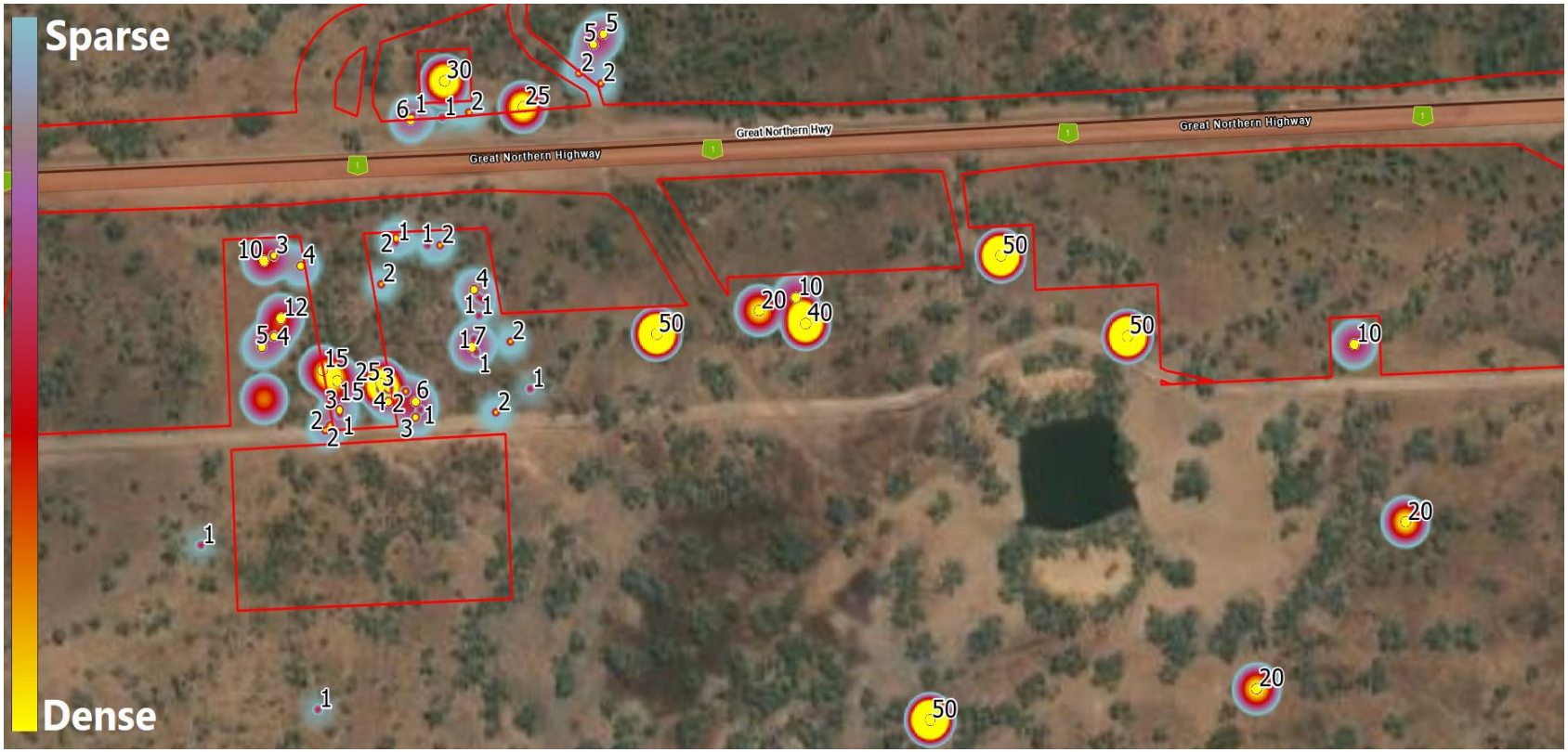
The following alternatives to clearing were considered during the development of the Proposal:

- Locating the upgraded road in pastoral land over the existing road reserve was not an option, as the adjacent vegetation to the road is native vegetation, and synonymous vegetation continues beyond the road reserve.
- Upgrading other alternative routes that are less vegetated and environmentally constrained; however, these are not realistic, with the existing road infrastructure the most disturbed location in the local area.
- Do not upgrade the road, however, this will result in a poorer safety outcome and may result in future fatalities or serious injuries, further degradation of the State Road asset, and continued isolation of communities during seasonal flooding events.
- Main Roads retains frangible vegetation where a clear zone is to be established for road projects. For this project, however, clearing will only be required to accommodate the road formation, with no clear zone being established. Accordingly, the retention of frangible vegetation does not apply to this Proposal.
- Sourcing road building materials from an existing commercial material pit such as Kimberley Quarries in Broome would meet construction criteria, however, the significant costs of carting these materials in addition to cost per tonne of material would not be economical, and the proposed works could not be delivered. Accordingly, a significant portion of the Development Envelope and Clearing footprint is dedicated to the exploration for, and extraction of, road building materials.
- Reducing the speed limit to minimise clearing requirements, while still balancing safety (driver fatigue) and freight efficiency. Speed Limits are an essential mechanism to ensure the safe and efficient operation of road networks. The application of appropriate speed limits and other traffic management measures is a key mechanism in managing vehicle speeds to achieve desired safety, mobility, traffic management, local amenity, and road user expectations. There are several factors involved in road safety, including road conditions, driver behaviour and overall road design. Except in special situations, reducing speed limits below national standards on state and national roads is not typically supported as it has the potential to contribute to driver frustration, impatience, tiredness and recklessness. The environmental values protected by reducing the speed limit, do not justify the impacts on freight efficiencies nor road user safety. Accordingly, the reduction of the speed limits to avoid clearing of native vegetation for this Proposal is not proposed.

1.6 Measures to Avoid, Minimise, Reduce and Manage Proposal Clearing Impacts

The design and management measures implemented to avoid and minimise the potential clearing impacts of the Proposal are provided in Table 1.

Table 1. Measures Undertaken to Avoid, Minimise, Reduce and Manage the Proposal Clearing Impacts

Design or Management Measure	Discussion and Justification
Avoiding Conservation Significant species	Locations where significant clusters of *Nymphoides beaglensis* (P3) individuals were recorded have been excised from the Development Envelope, where practicable. *Utricularia tubulata* (P1) was not recorded in the Development Envelope, and as such was not required to be excised. Other *Nymphoides beaglensis* (P3) clusters will be avoided where practicable on ground, minimising impacts to mapped occurrences of this species. See Plate 1 below for an example.  Plate 1. Examples of populations of *Nymphoides beaglensis* (Biota 2023a) avoided are illustrated by an ArcGIS Pro Heat Map weighted by the abundance of each record using a "constant" mapping method.

Design or Management Measure	Discussion and Justification
Preferentially working within historically areas	The Proposal will utilise existing cleared areas where practicable. To avoid unnecessary disturbance for material exploration, the proposed works include material investigations (using a backhoe and refilling holes once a sample is taken) around a historical material pit. Once suitable material is identified, this will be pushed up for project use. Ongoing use of this material will continue for maintenance on Great Northern Highway as required.
Use of existing cleared areas for access tracks, construction storage and stockpiling	Small side tracks are present throughout the road reserve, and, where practicable, will be used during the construction works to avoid the clearing of undisturbed vegetation. Minimal clearing for storage, stockpiles, and turn-around bays will occur, utilising existing disturbance or sections of the design that allow this (such as areas that widen for drainage infrastructure).
Drainage modification	Existing drainage infrastructure will be upgraded as required to maintain the safety and water-shedding capacity of the road infrastructure. Existing and new table drains will temporarily be used as side tracks where practicable to minimise additional clearing.

1.7 Approved Policies and Planning Instruments

The clearing of native vegetation in Western Australia is regulated under the EP Act and the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004* (Clearing Regulations).

In addition to the matters considered in accordance with section 51O of the EP Act, Main Roads has also had regard to the below instruments where relevant.

Other Legislation potentially relevant for assessment of clearing and planning/other matters:

- *Biodiversity Conservation Act 2016* (WA) (BC Act)
- *Conservation and Land Management Act 1984* (WA) (CALM Act)
- *Country Areas Water Supply Act 1947* (WA) (CAWS Act)
- *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act)
- *Planning and Development Act 2005* (WA) (P and D Act)
- *Soil and Land Conservation Act 1945* (WA)
- *Rights in Water and Irrigation Act 1914* (WA) (RIWI Act)
- *Aboriginal Heritage Act 1972* (WA).

Environmental Protection Policies:

- Environmental Protection (Peel Inlet - Harvey Estuary) Policy 1992
- Environmental Protection (Western Swamp Tortoise Habitat) Policy 2011.

Other relevant policies and guidance documents:

- Environmental Offsets Policy (Government of Western Australia, 2011)
- A guide to the assessment of applications to clear native vegetation (DER, 2014)
- Procedure: Native vegetation clearing permits (Government of WA, October 2021)
- Environmental Offsets Guidelines (Government of Western Australia, 2014)
- Technical guidance – Flora and Vegetation Surveys for Environmental Impact Assessment (EPA, 2016)
- Technical guidance – Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment (EPA, 2020)
- Approved conservation advice under section 266B of the EPBC Act for threatened flora/fauna/vegetation communities.

2 SCOPE AND METHODOLOGY ASSESSMENT OF CLEARING

Native vegetation will be cleared to accommodate this Proposal. This clearing will be undertaken using the Main Roads Statewide Clearing Permit CPS 818.

To comply with CPS 818, Main Roads must prepare a Clearing Assessment Report (CAR).

The CAR outlines the key activities associated with the Proposal, the existing environment and an assessment of native vegetation clearing. This assessment provides an evaluation of the vegetation clearing impacts associated with the Proposal using the ten Clearing Principles listed under s51 of the *Environmental Protection Act 1986* (EP Act) and strategies used to manage vegetation clearing.

2.1 Report Terminology and Sources

The following terms are used in this Clearing Report:

- **Clearing Area** – The maximum amount of native vegetation to be cleared for the Proposal that will accommodate the designed earthworks and, typically, a nominal buffer to allow for the safe movement of machinery during construction. The Clearing Area for this Proposal is 50.6 ha.

- **Development Envelope** – The maximum extent within which the Clearing Area will be located. This envelope is larger than the Clearing Area to allow for minor changes to the Proposal footprint as the design process continues, and to account for minor and unexpected changes that may occur during construction, such as working to avoid a large tree or encountering buried boulders or services. This flexibility allows the site personnel to make modifications to the Proposal to avoid areas that may contain better environmental values. The CAR has assessed all environmental values within the Development Envelope as though all of these values will be impacted up to the amount specified within the Clearing Area. The Development Envelope for this Proposal is 705.6 ha.

- **Study Area** – Area covered by the Desktop Assessment. The Study Area for the Proposal is confined to a local area of a 40 km radius.

- **Survey Area** – Area covered by the Biota (2023a and 2023b) Biological Surveys.

- **Contextual Area** – A 500 m area around the Survey Area.

2.2 Desktop Assessment

A desktop assessment of the Development Envelope was undertaken by viewing internal datasets and other government agency-managed databases, and consulting with relevant stakeholders where necessary.

GIS layer viewing and mapping is done using ArcMap and/or Main Roads corporate mapping system known as iMaps. Referencing of the GIS layers accessed is done under the relevant methodology section of each clearing principle. Government-managed databases were searched to locate additional information, which are found under References in Section 9.

2.3 Surveys and Assessments

Biological and targeted surveys conducted for the Proposal are outlined in Table 2 and a summary of the findings in these reports are presented in Section 3.1

Table 2. Summary of Biological and Targeted Surveys Relevant to the Proposal

Consultant and Survey Name	Survey Details
Biota (2023a) Great Northern Highway Camballin to Blina Biological Survey and Targeted Flora Survey (November 2023)	**Survey Area:** The Survey Area comprised approximately 1,380 ha adjacent to GNH from SLK 2370 to 2394 (24 km section) with a buffered contextual area of 500 m around the Survey Area. **Type:** Targeted flora survey from 28 April – 3 May 2023. Opportunistic observations of fauna were taken as practicable and confirmed by a Senior Zoologist after the survey. **Timing:** 28 April – 3 May 2023. **Survey Results Shapefile TRIM Ref:** D23#689264 **Document TRIM Ref:** D23#689178
Biota (2023b) Great Northern Highway Camballin to Blina Vegetation, Flora and Fauna Survey (March 2023)	**Survey Area:** The Survey Area comprised approximately 1,380 ha adjacent to GNH from SLK 2370 to 2394 with a buffered contextual area of 500 m around the Survey Area. **Type:** Basic Fauna (incl. targeted searches) (September 2022), a Detailed Flora Survey (October 2022), and a Targeted Flora Survey (October 2022). **Timing:** Fieldwork consisted of two separate teams, with fauna occurring 14-17 September 2022, and vegetation and flora conducted 10-16 October 2022. Camera traps were collected at the end of the flora survey in October 2022. **Survey Results Shapefile TRIM Ref:** D23#302885 **Document TRIM Ref:** D23#216897

3 SURVEY RESULTS

In accordance with CPS 818 condition 8 (e) (iii), a copy of the relevant sections of the executive summary and report conclusions from the biological survey and/or field assessments are provided in Appendix 1 and a high-level summary below in Section 3.1.

3.1 Summary of Biota's 2022 and 2023 Surveys

Main Roads Western Australia is planning to raise, overlay and widen a 24 km section of the Great Northern Highway between SLK 2370 and 2394 (Camballin to Erskine to Blina), 85 km southeast of Derby in the Shire of Derby / West Kimberley. Specific project activities will include clearing of vegetation, stripping topsoil, and stockpiling of topsoil/overburden. An area of 1,380.3 ha was identified in which the proposed works will be undertaken (the 'Survey Area').

To identify biological features of significance in the Survey Area that may be impacted, Biota Environmental Sciences undertook:

- a desktop study to identify records of significant communities and species previously recorded from a 40 km radius of the Survey Area;
- a basic fauna survey in September 2022, focusing on description and mapping of fauna habitats, which was extended over the contextual area (a 500 m area surrounding the Survey Area);
- targeted searches for significant fauna in September 2022. This work included the deployment of motion cameras and electronic recording equipment, which remained on site until October 2022;

- a single-phase detailed flora and vegetation survey in October 2022. This included mapping of vegetation types and vegetation condition, which was extrapolated over the contextual area, and sampling of vegetation with 24 quadrats and eight relevés; and
- targeted surveys for significant flora in October 2022 (under dry conditions) and late April- early May 2023 (optimal timing following substantial rainfall). These involved targeted searches through the Survey Area for Threatened and Priority flora, and for serious weeds (Declared Plants and Weeds of National Significance). Some opportunistic fauna records were also made during the 2023 survey.

The survey identified six broad fauna habitats in the Survey Area: Savannah plains (67.1%); *Melaleuca* floodplain (17.8%); *Acacia* shrubland (7.7%); Rocky hills and breakaways (0.2%); Dams and materials pits (0.2%); and Cleared areas (7.0%). The habitats most likely to support significant fauna comprised the Rocky hills and breakaways habitats (particularly for the West Kimberley Rock-wallaby, Northern Brushtail Possum and significant bats); and the *Melaleuca* floodplain and Dams and materials pits (for significant birds and bats, particularly during the wet season).

The Yellow-lipped Cave-bat, *Vespadelus douglasorum* (Priority 2) was recorded in the Survey Area during the current survey. The West Kimberley Rock-wallaby, *Petrogale lateralis kimberleyensis* (Endangered) and the Northern Brushtail Possum, *Trichosurus vulpecula arnhemensis* (Vulnerable) were recorded in the contextual area immediately adjacent to the Survey Area, along with a possible call of the Ghost Bat, *Macroderma gigas* (Vulnerable). The Glossy Ibis, *Plegadis falcinellus* (Migratory), has been previously recorded in the Survey Area and a number of other significant species are either likely to occur, or may occur. No caves suitable for roosting by significant bats were found within the Survey Area.

Eleven vegetation types were identified for the Survey Area: three units associated with drainage areas, three units on low hills, and five units on plains. None of the vegetation types comprised listed Threatened Ecological Communities or Priority Ecological Communities; however, vegetation types D1 and D2 were associated with the Camballin Floodplain, which is a significant area containing a number of important wetlands. These vegetation types occurred in the eastern section of the Survey Area and totalled 245.8 ha, or 17.8% of the Survey Area. This vegetation occurs more extensively northeast towards Blina Swamp and southwest, towards Le Lievre Swamp.

A total of 99.4 ha or 7.2% of the Survey Area was mapped as Cleared, while a very small area (0.2 ha) was Completely Degraded, with minimal native vegetation. Most of the remainder of the Survey Area was in Good or Very Good condition (842.6 ha, or 61.0%). Typical disturbance factors comprised scattered weeds, particularly **Cenchrus setiger* and **Stylosanthes* spp., as well as grazing by cattle and minor ground disturbance. Areas in Good condition included historical materials pits, which had been cleared in the past but supported regenerating native vegetation. Approximately a third of the Survey Area (433.6 ha, 31.4%) was in Excellent condition, with no signs of disturbance. These areas were generally associated with hills, therefore less preferred for grazing and also less susceptible to weed invasion, or were distant from cleared areas, and therefore less exposed to edge effects. A total of 4.5 ha (just over 0.3%) was either Poor or Degraded, being heavily grazed, having considerable weed invasion, and/or considerable ground disturbance.

A total of 265 native flora species from 140 genera and 59 families have been recorded from the Survey Area. Two Priority species are known to occur in the Survey Area. The Priority 1 aquatic herb, *Utricularia tubulata,* was recorded from a single location in 2021 but was not recorded there despite intensive searches in May 2023. It was, however, recorded at a location to the north. The

Priority 3 water lily, *Nymphoides beaglensis,* was recorded from several locations within the Survey Area. Both species occur in vegetation type D2, and *Nymphoides beaglensis* was also recorded in D1.

Thirteen introduced flora species were recorded during the field survey, including one Declared Plant. Two individuals of Calotrope (**Calotropis procera*) were found near a dam in the contextual area in 2022; a total of 20 individuals were found near this dam in 2023, one of which was located in the Survey Area.

4 DESKTOP ASSESSMENT OF VEGETATION

4.1 Desktop Vegetation Description

Table 3 and Table 4 provides details of the vegetation types and their condition within the Development Envelope and the remaining extent of these associations. These are also visible in Figure 13.

For a full description of the existing vegetation, refer to the Biological Report found at D23#689178.

Table 3. Summary of Vegetation Types within Biota's (2023a) Survey Area (inc. Contextual Area) and its intersections with the Development Envelope.

Code	Mapping Unit	Mapped Vegetation		Vegetation in DE (ha)
		Area (ha)	Proportion of Veg %	
Vegetation of Plains				
P1	*Grevillea striata, Hakea arborescens, Lysiphyllum cunninghamii* low open woodland over *Acacia eriopoda* scattered tall shrubs to tall open shrubland over *Chrysopogon fallax, Eriachne obtusa* tussock grassland to open tussock grassland	1,816.2	36.86%	118.96
P2	*Lysiphyllum cunninghamii, Adansonia gregorii, Corymbia greeniana, Grevillea striata* low open woodland over *Acacia eriopoda, (Acacia monticola, Flueggea virosa* subsp. *melanthesoides*) tall shrubland to tall open shrubland over *Eriachne obtusa, Chrysopogon fallax* open tussock grassland	251.1	5.10%	4.69
P3	*Lysiphyllum cunninghamii, Corymbia greeniana, C. cadophora* subsp. *cadophora* low open woodland over *Acacia tumida* var. *tumida* tall open scrub over *Triodia caelestialis* open hummock grassland with *Chrysopogon fallax, Eriachne obtusa* open tussock grassland	140.2	2.85%	0.00
P4	*Terminalia canescens, Hakea arborescens, Corymbia greeniana* low woodland over *Chrysopogon fallax, Eriachne obtusa* open tussock grassland	1,167.5	23.69%	495.62
P5	*Corymbia greeniana, (Hakea arborescens, Adansonia gregorii*) low woodland over *Chrysopogon fallax* open tussock grassland	43.4	0.88%	3.03
Vegetation of Drainage Areas				
D1	*Melaleuca nervosa, (Adansonia gregorii*) low open woodland over *Acacia colei* scattered tall shrubs over mixed open tussock grassland	924.2	18.76%	69.43
D2	*Eucalyptus coolabah, Melaleuca nervosa* low woodland over mixed very open tussock grassland	80.8	1.64%	9.81
D3	*Lysiphyllum cunninghamii, Corymbia flavescens, Eucalyptus chlorophylla* low open woodland over *Chrysopogon fallax, Dichanthium* sp., (*Eriachne obtusa*) tussock grassland	48.3	0.98%	0.00
Vegetation of Gravelly Rises and Low Hills				
H1	*Corymbia greeniana, C. cadophora* subsp. *cadophora* scattered low trees over *Acacia monticola* tall shrubland to tall open scrub over *Triodia intermedia, T. pungens* open hummock grassland	11.4	0.23%	0.00
H2	*Corymbia cadophora* subsp. *cadophora* scattered low trees over *Triodia intermedia* open hummock grassland	114.9	2.33%	0.00
H3	*Corymbia cadophora* subsp. *cadophora* scattered low trees to low open woodland over mixed tall open shrubland over *Triodia caelestialis* open hummock grassland and/or mixed open tussock grassland	65.3	1.33%	0.00
Mosaic Mapping Units				
H1/P2	Mosaic of units H1 and P2	139.8	2.84%	4.03
Other Mapping Units				
Cleared	Cleared areas; completely or virtually devoid of vegetation.	124.6	2.53%	0.03
	Total	**4,927.7**	**100%**	**705.61**

Table 4. Pre-European Vegetation Representation

Pre-European Vegetation Association	Scale	Pre–European Extent (ha)	Current Extent (ha)	% Remaining	% Current Extent in DBCA Managed Land (proportion of pre-European Extent)
Veg Assoc No. 64	**Statewide** North Fitzroy Plains	434,783.66	434,560.88	99.95	0
	IBRA Bioregion Dampierland	434,783.66	434,560.88	99.95	0
	IBRA Sub-region Fitzroy Trough	410,085.60	409,862.82	99.95	0
	Local Government Authority Shire of Derby / West Kimberley	427,578.09	427,355.31	99.95	0
Veg Assoc No. 745	**Statewide** North Fitzroy Plains	230,257.94	229,300.03	99.58	0.50
	IBRA Bio region Dampierland	192,624.80	191,695.67	99.52	0.20
	IBRA Sub-region Fitzroy Trough	192,624.80	191,695.67	99.52	0.20
	Local Government Authority Shire of Derby / West Kimberley	230,257.94	229,300.03	99.58	0.50

5 ASSESSMENT AGAINST THE TEN CLEARING PRINCIPLES

In assessing whether the Proposal's proposed clearing is likely to have a significant impact on the environment, the Proposal was assessed against the ten Clearing Principles (EP Act, Schedule 5).

Each principle has been assessed in accordance with the former Department of Environment Regulation (now Department of Water and Environmental Regulation (DWER) '*A Guide to the Assessment of Applications to Clear Native Vegetation*' (Department of Environment Regulation, 2014) and other relevant clearing permit application decision reports prepared by DWER.

The proposed clearing is at variance to Principle (f) and is not at variance, or not likely to be at variance, with the remaining Clearing Principles.

(a) Native vegetation should not be cleared if it comprises a high level of biological diversity.

Proposed clearing is not likely to be at variance to this Principle.

The Development Envelope does not occur in any of the eight Biodiversity Hotspots located in Western Australia. The nearest Biodiversity Hotspot is the Northern Kimberley IBRA region, which at its nearest extent is located over 105 km north of the Development Envelope. Current guidance on the assessment of biological diversity, described in DER (2014), includes the following five metrics as indicators of high diversity:

1. Flora and Fauna species diversity;
2. Priority and other Significant Flora;
3. Fauna Habitat & Priority Fauna;
4. Significant Ecological Communities; and
5. Vegetation Condition.

1. Flora and Fauna species diversity

Flora Diversity

A total of 265 native flora species from 140 genera and 59 families were recorded from the Survey Area (Biota, 2023a). The families and genera identified are typically representative of species lists from this region.

A total of 195 species were recorded in 2022 (Biota, 2023b), and two additional Priority species were already known to occur, taking the total to 197 species. A further 68 native species were added in 2023 (Biota, 2023a), most of which were annual species. An additional thirteen species identified are introduced species, comprising approximately 4.68% of flora species identified. No Threatened flora taxa, range extension taxa, or flora considered to potentially represent conservation significant taxa were recorded.

The proposed clearing will impact approximately 1% of the vegetation mapped from Biota's (2023a) Biological Survey. The proposed clearing will have a maximum potential impact of 12.14% of the mapped extent of any intact vegetation type in the Survey Area (9.81 ha of 80.8 ha of D2). Vegetation Type D2 encompasses the entirety of the road corridor for over 400 m at one location and is approximately 300 m wide, making it highly likely for the proposed works to impact all of vegetation type D2 within the Development Envelope to reach a 12% impact.

Significant proportions of this habitat type for flora species exist both upstream and downstream of the Development Envelope, towards Blina Swamp and Le Livere Swamp, respectively.

Vegetation types in the Development Envelope are likely to be common and widespread at a regional scale based on the remaining extent of pre-European vegetation as outlined in Table 4. Floristic diversity within the Development Envelope is unlikely to be high in comparison to surrounding uncleared areas both locally and regionally given that the families and genera of flora species recorded are typical of the region (Biota, 2023a) and comprise vegetation types that are well represented beyond the Development Envelope.

Fauna Diversity

A total of 76 vertebrate fauna species were recorded across Biota's 2022 field survey, including four significant mammal species. This total included possible ultrasonic recordings of three bat species. A total of 21 vertebrate fauna species were recorded opportunistically during Biota's 2023 targeted flora survey, 11 of which were not recorded in 2022; these comprised 10 birds, all of which were associated with wetlands, and one dragon). The Endangered West Kimberley Rock-wallaby was again seen in 2023.

The 87 combined vertebrate fauna species recorded for the Survey Area comprised 18 mammal species, 65 bird species, and four reptile species. The mammals included 12 bat species (three of which were only tentatively confirmed), and three introduced species: Cat (*Felis catus*), European Cattle (*Bos taurus*), and Dog/Dingo (*Canis familiaris*).

Fauna diversity in the Development Envelope is not expected to be high in comparison to the broader Survey Area or surrounding uncleared areas beyond the Survey Area, given that the habitat type Biota (2023a) considered most likely to support significant fauna roosting and denning activity (Rocky hills and breakaways) is not present in the Development Envelope. Furthermore, fauna diversity in the Development Envelope would not be considered high in comparison to the Le Lievre Swamp System Directory of Important Wetland, located approximately 7 km south of the Development Envelope and known to support a diverse assemblage of fauna, particularly Migratory waterbird species.

2. Priority and other Significant Flora

No Threatened flora species were recorded by Biota (2023a; 2023b) and there are currently no Threatened flora species listed for the locality. Two Priority flora species have been recorded in the Survey Area, *Nymphoides beaglensis* (P3) and *Utricularia tubulata* (P1) (in 2021 by Main Roads) but only *Nymphoides beaglensis* (P3) was identified by Biota (2023a) within the Survey Area. An additional third species, *Goodenia sepalosa var. glandulosa* (P3) was not identified in the Survey or Contextual area, but records are present in the local area. These three species are discussed below.

One Priority 3 species, *Nymphoides beaglensis*, was recorded from several populations in the Survey Area (and the Development Envelope), some of which extended into the Contextual Area, and an additional population was found outside the Contextual Area. The species is an aquatic annual, herb which flowers white/white-pink-purple from March to June and occurs in shallow freshwater at the edges of permanent waterholes or in seasonally inundated claypans and depressions (Western Australian Herbarium, 1998-). At its furthest extent, *N. beaglensis* has been observed over 365 km north near Airfield Swamp and 215 km northwest. DBCA records indicate the species occurs over a 472 km range in Western Australia (as seen in Plate 2). Large gaps of species distribution suggest a lack of survey effort in the Kimberley region, due to the remote nature, poor accessibility, and sparse development of the region.

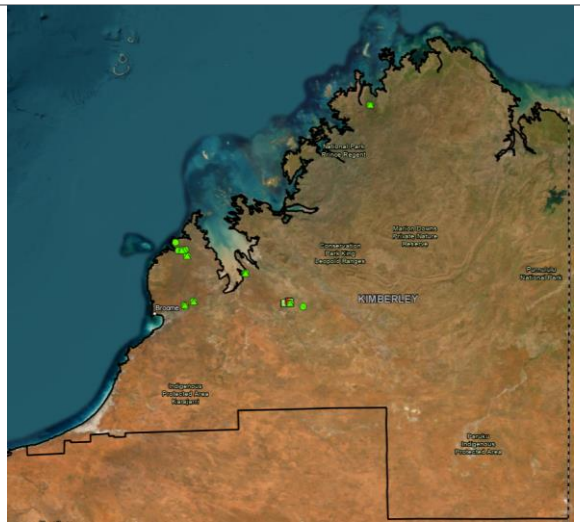


Plate 2. *Nymphoides beaglensis* (Priority 3) distribution in Western Australia from WA Herbarium and DBCA records.

The Priority 1 species, *Utricularia tubulata***,** was previously recorded in 2021 by Main Roads at a location in the Biota Survey Area but was not found there by Biota in 2022 or 2023 (Biota, 2023a; 2023b). A population of this species was found in 2023 outside the Contextual Area. The species is a submerged aquatic perennial, herb, flowering purple-blue from February to March or June and it occurs in ephemeral swamps (Western Australian Herbarium, 1998-). At its furthest extent, *U. tubulata* has been observed over 182 km northwest of the Development Envelope near Second Yarp and 512 km northwest in Kununurra (as seen in Plate 3). The species is also known to occur further northwest, over 200 km east of Darwin. DBCA records indicate the species occurs over a 628 km range in Western Australia. Large gaps of species distribution suggest a lack of survey effort in the Kimberley region, due to the remote nature, poor accessibility, and sparse development of the region as a whole.

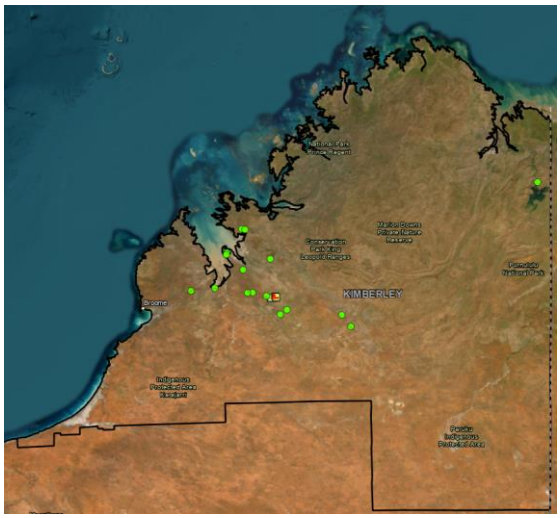


Plate 3. *Utricularia tubulata* (Priority 1) distribution in Western Australia from WA Herbarium and DBCA records.

Both Priority species were recorded in vegetation type D2 (924.2 ha), and *N. beaglensis* was also recorded in vegetation type D1 (80.8 ha), and as such, at least 924 ha (of D2) of suitable habitat is available for each species. Both species are mobile and aquatic, being carried with moving water and settling in pooling areas. As such, recorded locations of the species are unlikely to be a good indicator of impacts to the species, except for significant low points such as dams and large drainage lines where the species would progressively congregate as pooled water dries.

As *U. tubulata* and *N. beaglensis* share the same habitat type, it is reasonable to assume that the species should share a similar distribution across the Kimberley region. The smaller 215 km range of *N. beaglensis* versus the 682 km range of *U. tubulata* could be attributed to poor survey effort for the species across the region.

Impacts on the availability of suitable habitat are likely to be a more accurate method of estimating immediate and ongoing impacts to these species. The proposed clearing is unlikely to have a significant impact on suitable habitat for the species due to the linear nature of road infrastructure works, the significant amount of suitable habitat (over 924 ha for each species mapped in 2023), and the significant availability of habitat beyond this area, 12 km northwest in Blina Swamp and 7 km southwest in the Le Lievre Swamp (which spans over 40,409 ha). No significant impact on *Nymphoides beaglensis (P3) or Utricularia tubulata (P1)* is anticipated from the proposed clearing.

As evident in Plate 1, locations where significant clusters of *Nymphoides beaglensis* (P3) individuals were recorded have been excised from the Development Envelope, where practicable. Other clusters will be avoided where practicable on ground, minimising direct impacts to mapped occurrences of this species.

Whilst not recorded in the Development Envelope or broader Survey Area, one other small herb, *Goodenia sepalosa* var. *glandulosa* (P3), was considered in Biota's likelihood of occurrence assessment to 'may occur', as there are numerous records from the locality including some in proximity to the Development Envelope. The species is a prostrate to sprawling herb that grows 0.03-0.3 m high and flowers yellow from January to December (mainly from April to July) in red sand or loam. At its furthest extent from the Development Envelope, *G. sepalosa var. glandulosa* has been observed over 140 km west, 127 km north, 136 km southwest, and 497 km northwest of Kununurra (as seen in Plate 4). DBCA records indicate the species occurs over a 637 km range in Western Australia, almost reaching from Broome to Kununurra. The species has been recorded from four IBRA bioregions (Central Kimberley, Dampierland, Northern Kimberley and Victoria Bonaparte).

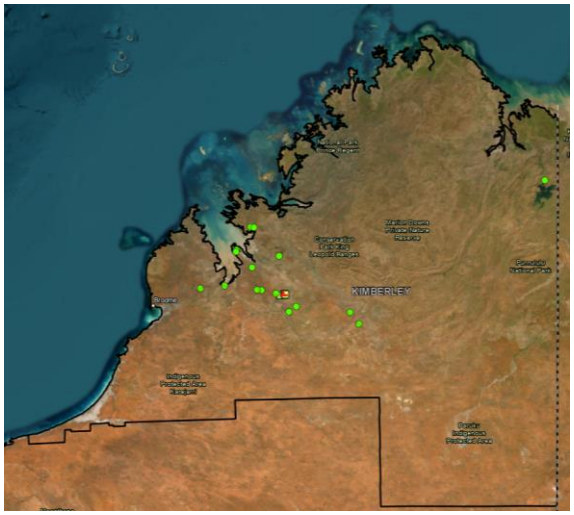


Plate 4. *Goodenia sepalosa var. glandulosa* (Priority 3) distribution in Western Australia from WA Herbarium records.

Suitable habitat for the species was extensive across the Survey Area, comprising vegetation types P1-P5 of which over 3,418 ha was mapped by Biota (2023a), and another 139.8 ha of suitable habitat mapped as a mosaic of H1 and P2, meaning that over 80% of mapped vegetation would potentially be suitable habitat for this species. Due to the widespread

availability of suitable habitat for the species, no significant impact is anticipated from the proposed clearing.

3. Fauna Habitat & Conservation Significant Fauna

Fauna Habitats

Three broad fauna habitats (excluding Cleared) occur in the Development Envelope (as seen in Figure 14 and Table 6). All habitat types are well represented in the wider Survey Area and Contextual Area and are widespread in the surrounding locality. Importantly, the habitat type Biota (2023a) considered most likely to support significant fauna roosting and denning activity (Rocky hills and breakaways) is not present in the Development Envelope

Due to the contiguous habitat across the Kimberley region, none of this habitat is providing an important ecological linkage or facilitating a discrete ecological function that is not provided by the surrounding, uncleared landforms and associated vegetation. The fauna habitats in the Development Envelope are not unique and are unlikely to support a high level of fauna diversity in comparison to other uncleared areas locally or regionally.

Conservation Significant Fauna

As further discussed in Clearing Principle (b), the Development Envelope provides suitable habitat for a range of conservation significant and other fauna species, however these fauna species are more likely to be foraging visitors rather than roosting, denning or breeding residents. Fauna species are unlikely to be reliant on habitats in the Development Envelope given the extent of similar, better quality habitat both upstream towards Blina Swamp, downstream towards the nationally important wetlands that form part of the Le Lievre Swamp System and westwards towards the Rocky Hills and breakaways habitat of the Erskine Range.

4. Significant Ecological Communities

No Threatened or Priority Ecological Communities (TECs/PECs) were recorded by Biota (2023a) from within the Development Envelope or the Survey Area. The nearest PEC is the Kimberley Vegetation Association 1271, which is over 7 km south of the Development Envelope. The nearest TEC is the Assemblages of Big Springs organic mound, approximately 100 km northwest (GIS Databases).

None of the vegetation associations identified in the Development Envelope have restricted regional representation or distribution, with over 99% remaining at all scales (Government of Western Australia, 2019). Similarly, none of the recorded vegetation units occur as small, isolated communities, and all extend beyond the boundary of the Survey Area in multiple locations and would not be considered to be limited in their local extent or distribution.

No significant ecological communities will be impacted by the proposed clearing.

5. Vegetation Condition

Table 5. Vegetation Condition within the Survey Area and Development Envelope as mapped by Biota (2023a).

Vegetation Condition	Survey Area		Development Envelope	
	(ha)	(%)	(ha)	(%)
Excellent	433.6	31.4%	336.7	47.7%
Very Good	615.6	44.6%	265.3	37.6%
Good to Very Good	14	1.0%	12.6	1.8%
Good	213	15.4%	88.6	12.6%
Degraded	3.9	0.3%	2.5	0.4%
Completely Degraded	0.2	0.0%	0.0	0.0%
Cleared	99.4	7.2%	0.0	0.0%
Total	**1379.7**	**100%**	**705.6**	**100%**

As seen from Table 5, the Development Envelope predominantly consists of vegetation mapped as Excellent, followed by Very Good, and Good. The availability of high-quality vegetation is unlikely to be significantly impacted by the proposed clearing, with over 88.33% of Excellent vegetation remaining, and this high-quality vegetation is likely to extend beyond the Survey Area, both locally and regionally (based on analysis of aerial imagery and extent of Pre-European vegetation remaining).

Summary

The Development Envelope is not representative of any TEC or PEC, nor does it contain Threatened flora. A small amount of suitable habitat for *Utricularia tubulata* (P1) and *Nymphoides beaglensis* (P3) will be impacted, however, this is not significant in the context of the abundant suitable habitat within the broader Survey and Contextual Areas, and extensively upstream and downstream throughout the Camballin floodplain. Similarly, fauna diversity of the Development Envelope is unlikely to be high in comparison to the Directory of Important Wetland system located approximately 7 km downstream, and the Erskine Range further to the west, which provides greater roosting, denning and shelter for a range of species such as bats and other small ground-dwelling mammals.

Based on the above, the proposed clearing is not likely to be at variance to this Principle.

Methodology

- Biota (2023a)
- Biota (2023b)
- DER (2014)
- Government GIS Shapefiles:
  - DBCA Threatened and Priority Ecological Community database search (Accessed February 2025)
  - DBCA Threatened and Priority flora database search (Accessed February 2025)
- Government of Western Australia (2019)
- Natural Resource Management SLIP Soil Systems (Accessed February 2025)
- Western Australian Herbarium (1998-)

(b) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna.

Proposed clearing is not likely to be at variance to this Principle.

Fauna Habitats:

Three broad fauna habitats (excluding Cleared) occur in the Development Envelope (as seen in Figure 14 and Table 6). All habitat types are well represented in the wider Survey Area and Contextual Area and are widespread in the surrounding locality. Importantly, the habitat type Biota (2023a) considered most likely to support significant fauna roosting and denning activity (Rocky hills and breakaways) is not present in the Development Envelope.

Due to the contiguous habitat across the Kimberley region, none of the habitat in the Development Envelope is considered to be providing an important ecological linkage or facilitating a discrete ecological function that is not provided by the surrounding, uncleared landforms and associated vegetation. The fauna habitats in the Development Envelope are not unique and are unlikely to support a high level of fauna diversity in comparison to other uncleared areas locally or regionally.

Table 6. Fauna Habitat mapped in Biota's 2023 Biological Survey.

Habitat	Mapped Habitat		Extent in DE*	Description
	Area (ha)	Proportion of Mapped Habitat (%)		
Savannah plains	3075.50	62.41%	617.58	Tussock grassland plains with a variable overstorey of shrubs and low trees including *Corymbia*, *Hakea*, *Terminalia*. Vegetation units: P1, P4, P5, D3. Condition: Variable but overall very good.
***Melaleuca* floodplain**	1005.00	20.39%	79.23	Low-lying floodplain vegetated primarily with open *Melaleuca nervosa* over open tussock grassland. This habitat floods in wet conditions from overflow from Blina Swamp. Vegetation units: D1, D2. Condition: Good to very good.
***Acacia* shrubland**	542.40	11.01%	8.72	Shrubland of *Acacia* including *A. monticola*, *A. eriopoda* and *A. tumida*, with scattered taller trees including *Corymbia* spp. and *Lysiphyllum cunninghamii* over patchy tussock or hummock grassland. Vegetation units: H1, P2, P3. Condition: Very good.
Rocky hills and breakaways	180.20	3.66%	0.00	Low rocky hills and breakaways, primarily associated with the Erskine Range, vegetated with hummock grassland (*Triodia* spp.) with scattered *Corymbia* and mixed shrubs. Vegetation units: H2, H3. Condition: Excellent.
Dams and materials pits	6.60	0.13%	0.00	Artificial dams and materials pits that hold surface water on a temporary or permanent basis. Vegetation units: Cleared. Condition: N/A.

Cleared areas	118.00	2.39%	0.07	Previously cleared areas, particularly roads and tracks, including the Great Northern Highway. Vegetation units: Cleared. Condition: N/A.
Total	**4927.70**	**100%**	**705.61**	

DE*: Development Envelope

Conservation Significant Fauna Species:

Twenty-three nationally listed threatened species were identified from the Protected Matters Search Tool (PMST) Report as occurring or potentially occurring within the Study Area. Four of these species were not assessed by Biota (2023a or 2023b) as they were federally listed in December 2023 (after the surveys were conducted and the reports finalised). Main Roads has undertaken a desktop Likelihood of Occurrence Assessment for these four species, using published literature and data collated by Biota's field assessment. One of these species is considered Unlikely to Occur (Kimberley brush-tailed Phascogale), and three May Occur (Northern Blue-tongued Skink, Mitchell's Water Monitor and Mertens' Water Monitor).

As the Kimberley brush-tailed Phascogale has been assessed as Unlikely to Occur within the Development Envelope, it is not discussed further. Conservation significant fauna species recorded by Biota (2023a) or assessed as 'Likely to Occur' or 'May Occur' in the Survey Area by Biota (2023a) or Main Roads are discussed below.

Biota's 2022 and 2023 field assessments recorded 87 combined vertebrate fauna species from the Survey and Contextual Area, which comprised 18 mammal species, 65 bird species and four reptile species (Biota, 2023a; 2023b). The mammals included 12 bat species (three of which were only tentatively confirmed). Of the 87 vertebrate fauna species recorded, three conservation-significant fauna species were recorded and a potential fourth species (Ghost Bat) was recorded, but unable to be confirmed by specialists (Biota, 2023a, 2023b). Whilst not recorded during the field surveys, a number of other conservation significant fauna species were considered 'Likely to Occur' or 'May Occur', based on nearby records, known distributions and habitat preferences. The outcomes of this Likelihood of Occurrence Assessment are summarised below:

Known to Occur /Recorded (3):

1. *Petrogale lateralis kimberleyensis* (West Kimberley Rock-wallaby) (State: EN, EPBC: EN)
2. *Vespadelus douglasorum* (Yellow-lipped Cave-bat) (State: DBCA P2, EPBC: –)

Migratory:

3. *Plegadis falcinellus* (Glossy Ibis) (State: MI, EPBC: MI)

Likely to Occur (8):

1. *Falco hypoleucos* (Grey Falcon) (State: VU, EPBC: VU)
2. *Falco peregrinus* (Peregrine Falcon) (State: OS, EPBC: –)
3. *Leggadina lakedownensis* (Short-tailed Mouse) (DBCA: P4, EPBC: –)
4. *Macroderma gigas* (Ghost Bat) (State: VU, EPBC: VU)
5. *Trichosurus vulpecula arnhemensis* (Northern Brushtail Possum) (State: VU, EPBC: VU)

Migratory:

6. *Apus pacificus* (Pacific Swift) (State: MI, EPBC: MI)
7. *Glareola maldivarum* (Oriental Pratincole) (State: MI, EPBC: MI)
8. *Tringa glareola* (Wood Sandpiper) (State: MI, EPBC: MI)

May Occur (26):

1. *Chloebia gouldiae* (Gouldian Finch) (State: DBCA P4, EPBC: EN)
2. *Ctenotus uber johnstonei* (Spotted Ctenotus) (State: DBCA P2, EPBC: –)
3. *Lagorchestes conspicillatus leichardti* (Spectacled Hare-Wallaby (mainland)) (State: DBCA P4, EPBC: –)
4. *Macrotis lagotis* (Greater Bilby) (State: VU, EPBC: VU)
5. *Rostratula australis* (Australian Painted Snipe) (State: EN, EPBC: EN)
6. *Tiliqua scincoides intermedia* (Northern Blue-tongued Skink) (EPBC: CR)
7. *Varanus mitchelli* (Mitchell's Water Monitor) (EPBC: CR)
8. *Varanus mertensi* (Mertens' Water Monitor) (EPBC: EN)

Migratory:

9. *Actitis hypoleucos* (Common Sandpiper) (State: MI, EPBC: MI)
10. *Calidris acuminata* (Sharp-tailed Sandpiper) (State: MI, EPBC: MI)
11. *Calidris ferruginea* (Curlew Sandpiper) (State: CR, EPBC: CR; MI)
12. *Calidris melanotos* (Pectoral Sandpiper) (State: MI, EPBC: MI)
13. *Calidris ruficollis* (Red-necked Stint) (State: MI, EPBC: MI)
14. *Calidris subminuta* (Long-toed Stint) (State: MI, EPBC: MI)
15. *Charadrius dubius* (Little Ringed Plover) (State: MI, EPBC: MI)
16. *Charadrius veredus* (Oriental Plover) (State: MI, EPBC: MI)
17. *Chlidonias leucopterus* (White-winged Tern) (State: MI, EPBC: MI)
18. *Gallinago megala* (Swinhoe's Snipe) (State: MI, EPBC: MI)
19. *Hirundo rustica* (Barn Swallow) (State: MI, EPBC: MI)
20. *Hydroprogne caspia* (Caspian Tern) (State: MI, EPBC: MI)
21. Li*mosa limosa* (Black-tailed Godwit) (State: MI, EPBC: MI)
22. Motac*illa tschutschensis* (Eastern Yellow Wagtail) (State: MI, EPBC: MI)
23. *Numenius minutus* (Little Curlew) (State: MI, EPBC: MI)
24. *Tringa nebularia* (Common Greenshank) (State: MI, EPBC: MI)
25. *Tringa stagnatilis* (Marsh Sandpiper) (State: MI, EPBC: MI)
26. *Gelochelidon [nilotica]* (Gull-billed Tern) (State: MI, EPBC: MI)

West Kimberley Rock-wallaby (Observed)

According to the Threatened Species Scientific Committee (TSSC) (2020b), the West Kimberley Rock-wallaby is known from 168 occurrence records between 1901 and 2019, with an area of occupancy of approximately 224 square kilometres (22,400 ha). The subspecies is known from three-four locations, including Erskine Range (within 5 kilometres of the Development Envelope), Edgar Range, Grant Range and Mt Anderson. The species shelters in caves, rock crevices and among cliffs in the hottest part of the day and forages on grasses and herbs in the evening/night.

Based on survey work undertaken by Nyikina Mangala Rangers and WWF in 2013-2019, the Erskine Range subpopulation is estimated to have 211 individuals, at a density of 9.19 animals per square kilometre (100 ha). Area of occupancy for the Erskine Range subpopulation has been estimated at 44 square kilometres (4,400 ha). Key threats to the Erskine Range subpopulation are listed as predation by feral cats and dingoes, wildfire/inappropriate fire regimes, habitat degradation and resource depletion by introduced species and reduced genetic diversity (TSSC, 2020b).

The species was observed 50 m and 700 m north of the Survey Area (Biota 2023a, 2023b) and is known from historical records in the area (roadkill in 1992) and more recent recordings (cameras and scats) by Nyikina Mangala Rangers and WWF in 2013, 2015, 2016 and 2017. The mapped

fauna habitat, Rocky Hills and breakaways, would represent core habitat for this species however this habitat does not occur within the Development Envelope. The species would also be likely to use surrounding habitats within the study area for foraging and dispersal (Biota, 2023).

Biota mapped 180.20 ha of Rocky Hills Habitat in the Survey and Contextual Area, however, none of this habitat occurs within the Development Envelope and therefore, won't be directly impacted by the proposed clearing. As Rocky Hills and breakaways habitat will not be directly impacted, the habitat in the Development Envelope may potentially be used for foraging and dispersal only. The habitat is unlikely to be critical for the species given the abundance of similar habitat in the surrounding uncleared landscape. No foraging or dispersing wallabies would be expected to be encountered during clearing activities, noting that the species is nocturnal and clearing works will be limited to daylight hours only.

Yellow-lipped Cave-bat (Recorded) and Ghost Bat (Potential Recording)

The Yellow-lipped Cave-bat was recorded in the Survey Area, and a potential Ghost Bat call was detected on an Acoustic Sound Recorder. The nearest records of these species are 38 km southwest and 39 km southwest of the Development Envelope respectively (however, these records are only accurate to 50 km, so the precise location is unknown) (DBCA, 2024).

The Yellow-lipped cave bat has typically been recorded foraging in habitats including *Melaleuca* and *Pandanus*-lined waterways, and adjacent tropical woodlands; and roosting in colonies of up to 80 individuals in sandstone and limestone caves, typically near water (Churchill, 2008).

The Ghost Bat roosts in caves, rock crevices and old mines, and forages in a broad range of habitats, with their distribution being influenced by the availability of suitable caves and mines for roost sites. Ghost Bats are known to forage over areas up to 60 ha (Churchill, 2008). Feeding and roosting sites are usually readily identifiable based on the accumulation of discarded remains of prey animals and scat material (van Dyck and Strahan, 2008).

No suitable roost caves were identified in the Survey Area or Contextual Area during the survey, however some roosting habitat may occur further away within the rocky hills and breakaways habitat types which are not present in the Development Envelope. These species are likely to forage over all habitat types in the Survey Area (Biota, 2023a).

Due to the widespread availability of foraging habitat (occurring across the whole Survey Area) and lack of known roosting habitat, the Development Envelope is unlikely to constitute significant habitat for the Yellow-lipped Cave Bat or Ghost Bat.

Grey Falcon (Likely)

According to the Threatened Species and Scientific Committee (TSSC) (2020a), the Grey Falcon occurs at low densities across arid and semi-arid inland Australia and is mainly found where annual rainfall is less than 500 mm. The species was not recorded by Biota (2023a), however there is a 2017 record approximately 3 km west of the Survey Area. Suitable foraging habitat occurs across all habitats in the Survey Area, and areas of free surface water attracting aggregations of birds will likely be particularly favored. The Grey Falcon usually breeds in taller trees such as River Red Gums (*Eucalyptus camaldulensis*), or on isolated man-made structures such as communications towers. Neither of these habitats are present within the Development Envelope, and as such no breeding habitat will be impacted by the proposed clearing.

Due to the lack of preferred breeding habitat and the widespread availability of foraging habitat across the Development Envelope and further in the surrounding uncleared landscape, the Development Envelope is unlikely to constitute significant habitat for the Grey Falcon.

Peregrine Falcon (Likely)

The Peregrine Falcon occurs almost Australia-wide and inhabits a wide range of habitats, including forests, woodlands, wetlands and open country (Pizzey and Knight, 2007). Individuals maintain large home ranges of up to 30 km^2, and nest in recesses of cliff faces, tree hollows and along rivers (Johnstone and Storr, 1998). Whilst not recorded by Biota (2023a), there are several previous records to the south, primarily along the Fitzroy River (ALA, 2025; DBCA, 2025). The closest of these is approximately 21 km south of the Survey Area (DBCA, 2025). Biota (2023a) noted that as per the Grey Falcon, suitable foraging habitat for the Peregrine Falcon occurs across all habitats in the Survey Area. Potentially suitable breeding habitat exists within the Rocky Hills and breakaways habitat of the Erskine Range, located west of the Development Envelope. Given the lack of rocky hills habitat in the Development Envelope and the wide-ranging nature of the species when foraging, the Development Envelope is unlikely to constitute significant habitat for the Peregrine Falcon.

Short-tailed Mouse (Likely)

In Western Australia, its distribution encompasses the Pilbara and Kimberley regions (Menkhorst and Knight 2011), although NatureMap records also place it in the Great Sandy Desert. Regional records suggest that the primary mainland habitat comprises areas of cracking clay and adjacent habitats. However, other sources provide a more diverse picture of habitat utilisation that includes areas of open tussock and hummock grassland, Acacia shrubland and savannah woodland, sandy soils as well as cracking clays (Morris et al. 2008), hilltops (Dr Peter Kendrick, DBCA, pers. comm. with Biota 2003), and sandy coastal areas (Biota, unpublished data). Population sizes vary dramatically by season.

The Short-tailed Mouse was not recorded during Biota's surveys (2023a, 2023b) but there are multiple records from 20-35 km southeast of the Development Envelope. Three habitat types identified in the Survey were deemed suitable, the *Melaleuca* floodplain, Savannah Plain and *Acacia* Shrubland habitat types. These three habitat types equate to 4,622.90 ha of suitable habitat for the species mapped in Biota's (2023a) survey and a maximum impact of 50.6 ha (1.19%) will be cleared by the proposed activities. Due to the widespread availability of habitat in the local area, the Development Envelope is unlikely to constitute significant habitat for this species.

Northern Brushtail Possum (Likely)

According to the Threatened Species Scientific Committee (TSSC) (2021), this subspecies is nocturnal and occurs mainly in tall Eucalypt open forests with large hollow-bearing trees, particularly where the understorey includes some shrubs that bear fleshy fruits. It commonly nests in tree hollows and forest canopy and is found in higher abundance where shrub density is high; these areas likely provide refuge from predation as well as important food resources. It occurs in some mangrove communities, some rainforests and some semi-urban areas (notably around Darwin). Most of the current population appears to be in the Northern Territory, with limited sightings recorded in Western Australia in the past 20 years. The subspecies is described as rare in Western Australia, with a handful of records spanning the northern Kimberley (Mitchell Plateau) to the central Kimberley (Mt Gladys in the King Leopolds, Mornington Sanctuary, Glenroy Station) and southern Kimberley (Edgars Ranges in 2019). The Northern Brushtail Possum has a broad distribution, with an estimated extent of occurrence of 228, 770 square kilometres (22,877,000 ha) and an occupancy are of 1,392 square kilometres (139,200 ha). The Northern Brushtail Possum is mainly threatened by frequent, intense fires, predation by feral cats and habitat modification from invasive grasses.

Two individuals of this subspecies were recorded on a motion sensor camera approximately 1.5 km west of the Development Envelope on a rocky escarpment in the Rocky Hills and breakaways habitat. This habitat is likely to provide shelter from predation, hence the recording of the subspecies in this habitat type, which doesn't correlate with the preferred habitat description provided by TSSC (2021). No Rocky Hills habitat is present within the Development Envelope. However, Biota (2023a) noted that the subspecies may also use taller vegetation in the Savannah Plains and *Melaleuca* Floodplain habitats. Prior to Biota's 2022 and 2023 field surveys, the nearest record of the subspecies was over 37 km south from 1965, and the accuracy of this is only within 50 km, so the precise location is unknown.

Approximately 4,260.7 ha of potentially suitable habitat for the Northern Brushtail Possum was mapped in the Survey and Contextual Area by Biota (2023). No Rocky Hills habitat is present within the Development Envelope where the species was recorded, meaning all impacts will be limited to Savannah Plains and *Melaleuca* Floodplain habitats of which the proposed clearing will impact a maximum of 50.6 ha (or 1.19%) of mapped suitable habitat. Whilst records of the species are sparse in the local area, significant amounts of potentially suitable habitat were mapped in the Survey Area, which is typical of the region and is widespread in the surrounding locality (Biota, 2023a). It is also noted that the vegetation mapped by Biota (2023a) doesn't include 'Eucalypt forests' or 'forest canopy', which is described as the main/preferred habitat for the species, including preferred nesting habitat.

Based on the above, the Development Envelope is unlikely to constitute significant habitat for the Northern Brushtail Possum.

Migratory Species:

One Migratory species was observed in the Survey Area and Contextual Area in 2021 (Glossy Ibis), and a further twenty-one are either 'Likely to Occur' or 'May Occur' in the Survey Area, and consequently, the Development Envelope. These species typically inhabit wetlands, either freshwater or brackish, that are permanent or ephemeral. These species have a scattered distribution throughout many parts of Australia. The nationally important Camballin Floodplain (Le Lievre Swamp System), located approximately 7 km south of the Development Envelope, is known to provide important habitat for a range of Migratory and waterbird species (DWER, 2023).

Melaleuca floodplain habitat present within the Development Envelope (79.23 ha) does include suitable habitat for a range of Migratory species. However, floodplains within the Development Envelope are seasonally inundated along with the surrounding upstream and downstream areas. The habitat in the Development Envelope is unlikely to be critical for any Migratory species given the abundance of similar or better-quality habitat in the local area (>1,000 ha of Melaleuca floodplain mapped from the Survey Area and Contextual Area). Furthermore, the proposed clearing is unlikely to significantly impact habitat for the purpose of foraging for these species, with only a short-term impact at the end of the wet season when the seasonally inundated floodplain has dried up enough for road works to occur.

Due to the widespread availability of suitable habitat both locally and broadly across the region (Biota 2023a), no significant impact on any Migratory species is anticipated from the proposed clearing.

Gouldian Finch (EN) – May Occur

The closest known record is over 13.5 km from the Development Envelope, which was recorded in 1992, however, this is listed as "moderately certain" on the species identification. The preferred habitat for the Gouldian Finch is rocky hills with hollow-bearing, smooth-barked gums that are close to small waterholes or springs that persist through the dry season (Craigie, A.,

McCabe, T. and Plant S., 2023). Potentially suitable foraging habitat exists in the Development Envelope when suitable grasses are seeding in the Savannah Plains, *Melaleuca* floodplain and *Acacia* shrubland habitat types. Nearby dams and materials pits habitat provides potential drinking water sources, although this habitat type is not present within the Development Envelope. Based on the above, the Gouldian Finch may occur in the Development Envelope and broader Survey Area, though most likely only as a sporadic foraging visitor (Biota, 2023a). Vegetation change through altered fire regimes and grazing by introduced herbivores are the factors most likely to have caused past declines, and to be preventing recovery in Gouldian Finch populations (O'Malley, 2006; Legge et al., 2015). Routing by feral pigs can also cause significant damage to patches of foraging grass, and introduced herbivores can reduce or degrade waterholes used by Gouldian Finches in the dry season by trampling and eating surrounding vegetation (O'Malley, 2006). The proposed clearing is unlikely to contribute to any of these landscape-scale threats.

The proposed clearing is unlikely to affect habitat availability for the species given the proposed works will impact up to 50.6 ha (or 1.07%) of 4,629.50 ha of mapped foraging habitat (Biota, 2023a), and noting that the surrounding landscape is largely uncleared. As such, the Development Envelope is unlikely to constitute significant habitat for the Gouldian Finch.

Spotted Ctenotus – May Occur

Biota (2023a) noted there are numerous records of this species 25 – 35 km southeast of the Survey Area and considered the Savannah plains, Melaleuca floodplain and Acacia shrubland habitat types to constitute potentially suitable habitat. On this basis, all of the Development Envelope constitutes potential habitat for this species, however Biota (2023a) mapped over 4,600 ha of these habitat types from the broader Survey Area and Contextual Area. Given the abundance of potentially suitable habitat available for this species, the Development Envelope is unlikely to constitute significant habitat for the Spotted Ctenotus.

Spectacled Hare-wallaby – May Occur

In Western Australia, this species only occurs in a few isolated populations in the Pilbara and Kimberley (Woinarski et al. 2014). The species occurs in a range of tussock and hummock grassland habitats with sparse to moderately dense tree or shrub cover (Menkhorst and Knight 2011). Biota (2023a) concluded that the species is now very rare in the Kimberley, however potentially suitable habitat occurs in parts of the Savannah plains, Melaleuca floodplain and Acacia shrubland habitat types. On this basis, all of the Development Envelope constitutes potential habitat for this species, however Biota (2023a) mapped over 4,600 ha of these habitat types from the broader Survey Area and Contextual Area. Given the abundance of potentially suitable habitat available for this species, the Development Envelope is unlikely to constitute significant habitat for the Spectacled Hare-wallaby.

Greater Bilby – May Occur

The species prefers areas suitable for burrowing where the substrate comprises sand, sandy clay or sandy gravel soils (DBCA, 2017), though it is also known from atypical stony gravelly areas (M. Dziminski, DBCA, pers. comm.). Additionally, the Bilby demonstrates a strong association with particular species of *Acacia* that host root-dwelling larvae (DBCA, 2017). They are a highly mobile species and individuals can have large foraging ranges, moving in response to resource availability. In the north of Western Australia, suitable habitat for the Bilby includes: woodlands (<10 m) with Eucalyptus and Acacia spp., Pindan woodlands with hummock and tussock grass, on coarse sand to light medium clay; low shrub cover of Acacia spp. over hummock and tussock grasses, on sandy soils, loams and red earth; spinifex grasslands with low shrub cover of Acacia and Melaleuca spp. on sandy and sandy loam soils (Cramer et al., 2016).

No evidence (burrows, foraging diggings, tracks or scats) of the Bilby was recorded during the fauna survey (Biota, 2023a). There is a Bilby record from 2015 approximately 200 m north of the western part of the Survey Area, however, the coordinates may be questionable given the stated location of "Mount Hardman", which is some distance southeast of the Survey Area. Biota (2023a) concluded that there is potentially suitable habitat within the Survey Area, particularly within the sandier sections of the Acacia shrubland habitat type, so despite the lack of evidence, the species may occur in the Survey Area at times. Over 542 hectares of Acacia Shrubland habitat was mapped by Biota (2023a), of which up to 8.72 ha (or 1.61%) will be impacted by the proposed clearing. As depicted in Figure 14, all of this habitat type is located in a single occurrence at the western end of the Development Envelope. Given the small extent of potentially suitable Bilby habitat within the Development Envelope, and noting this fauna habitat is typical of the region and widespread in the surrounding locality the Development Envelope is unlikely to constitute significant habitat for Bilby.

Australian Painted Snipe – May Occur

This species occurs in wetlands and surrounds, usually vegetated freshwater wetlands (Biota, 2023a). It has not been previously recorded in the Study Area; however it is cryptic and nomadic. Biota (2023a) concluded that it may occur in seasonally inundated areas of the Development Envelope (Melaleuca floodplain habitat type) when water is present. Given the abundance of Melaleuca floodplain habitat mapped by Biota (>1,000 ha), the proposed clearing of 50.6 ha is unlikely to impact habitat critical to the survival of the species, noting there are extensive wetland areas both upstream and downstream of the Survey Area that would also provide suitable habitat.

Northern Blue-tongued Skink - May Occur

As of December 2023, the Northern Blue-tongued Skink is a federally listed species, meaning it was not assessed in Biota's (2023a or 2023b) biological surveys. Utilising desktop data and habitat mapping from Biota's (2023a) biological survey, Main Roads has conducted a Likelihood of Occurrence assessment for the species and determined the species or species habitat may occur within the Development Envelope. However, the species is not a conservation significant species in Western Australia, where the species is common. No records are available within 40 km of the Survey Area from DBCA data, due to the new Federal status and lack of a BC Act status. Significant impacts to the species are predominantly from Cane Toads (DCCEEW, 2023). The Northern Blue-tongued Skink occurs in a wide variety of ecosystems and has been recorded from dissected sandstone plateaus and gorges, limestone ranges, granite, basalt and dolerite hills, glacial shale undulations, sand plains, sandy waterways, swamps, cracking clay floodplains and coastal flats (DCCEEW, 2023). Due to the extensive availability of fauna habitats in the Development Envelope and beyond in surrounding areas (Biota, 2023a), lack of clearing pressures, and broad utilisation of habitat types, the Development Envelope is unlikely to constitute significant habitat for this species.

Mitchell's Water Monitor - May Occur

As of December 2023, Mitchell's Water Monitor is a federally listed species, meaning it was not assessed in Biota's (2023a or 2023b) biological survey. Utilising desktop data and habitat mapping from Biota's (2023a) biological survey, Main Roads has conducted a Likelihood of Occurrence assessment for the species and determined the species or species habitat may occur within the Development Envelope. However, the species is not a conservation significant species in Western Australia, where the species is common. Mitchell's Water Monitor shelters under bark and in hollow tree limbs that overhang the water (Wilson & Knowles, 1988). It is often encountered basking or resting on pandanus and other woody vegetation near the water,

partially submerged logs, mangroves, riverbanks, rocks, and manmade structures such as rocky sea walls and slabs of concrete (Shine 1986; Doody et al. 2017; de Laive et al. 2021).

No records of Mitchell's Water Monitor are available within 40 km of the Survey Area from DBCA data due to the new Federal status and lack of BC Act status. The species conservation management plan lists the primary threats to the species as deaths from Cane Toads, impacts from Feral Pigs and Asian water Buffalo, fire impacts, followed by clearing for urban development and mining, which are anticipated to have moderate and minor impacts respectively.

According to broadscale Species of National Significance (SNES) mapping, DCCEEW (2024) has mapped the nearest habitat where the species may occur over 2 km from the Development Envelope, and the nearest habitat it is likely to occur is mapped over 29 km from the Development Envelope. Over 23,069,280 ha of habitat where the species may or is likely to occur is mapped across the Kimberley region. The species may utilise areas with pooled water or trees in adjacent habitats. Potentially suitable habitat within the Development Envelope includes Acacia Shrubland, Savannah Plains and Melaleuca Floodplains. No significant impact is anticipated from the clearing of 50.6 ha (3.73%) of mapped potentially suitable habitat for the species in the Survey Area and Contextual Area, given that habitat within the Development Envelope is typical of the region and widespread in the surrounding uncleared landscape (Biota, 2023a). The Development Envelope is unlikely to constitute significant habitat for Mitchell's Water Monitor.

Mertens' Water Monitor - May Occur

As of December 2023, the Mertens' Water Monitor is a federally listed species, meaning it was not assessed in Biota's (2023a or 2023b) biological survey. Utilising desktop data and habitat mapping from Biota's (2023a) biological survey, Main Roads has conducted a Likelihood of Occurrence assessment for the species and determined the species or species habitat may occur within the Development Envelope. However, the species is not a conservation significant species in Western Australia, where the species is common. Mertens' Water Monitor is a highly aquatic lizard that seldom ventures more than 5–10 m from the edge of the water (Wilson & Knowles 1988; Mayes 2006; Smith & Griffiths 2009) except when transiting among core aquatic activity areas (Mayes, 2006). The species is usually recorded from:

1. Perennial and semi-permanent pools in upper catchment areas, including springs, seeps, swamps, creeks and gorges,
2. The margins of permanent streams, rivers and lakes in lower catchment areas,
3. Floodplain billabongs, lagoons, swamps and soaks,
4. Perennial waterholes in woodlands, and
5. Man-made irrigation channels and the margins of dams.

No records of Mertens' Water Monitor are available within 40 km of the Survey Area from DBCA data due to the new Federal conservation status and lack of BC Act status. The species conservation management plan lists the primary threats to the species as deaths from Cane Toads, impacts from Feral Pigs and Asian water Buffalo, fire impacts, and clearing for development, which is anticipated to have minor impacts.

The Development Envelope is located within an area where the species or species' habitat may occur, according to broadscale Protected Matters Search Tool mapping (DCCEEW, 2024). Over 26,655,420 ha of habitat where the species may or is likely to occur is mapped across the Kimberley region. The species may utilise areas with pooled water or small amounts of adjacent habitats. As such, the Melaleuca Floodplains habitat within the Development Envelope may potentially be suitable for the species. However, as habitat within the Development Envelope is

typical of the region and widespread in the surrounding locality (Biota, 2023a), no significant impact is anticipated from the clearing of up to 50.6 ha (or 5%) of mapped potentially suitable habitat for the species in the Survey and Contextual Area. Based on the above, the Development Envelope is unlikely to constitute significant habitat for Mertens' Water Monitor.

Summary

In summary, the fauna habitats present in the Development Envelope are well represented within the broader Survey Area, with less than 1.05% (up to 50.6 ha) of fauna habitat mapped by Biota (2023a) proposed to be cleared. Beyond the Survey Area, habitats are also likely to be common and widespread at a local and regional scale, with over 99% pre-European vegetation remaining at all scales. Importantly, the Rocky hills and breakaways habitat, considered most likely by Biota (2023a) to support conservation significant species such as the West Kimberley Rock-wallaby, and potential denning and roosting habitat for a range of other species, is not present within the Development Envelope. Furthermore, seasonally inundated areas of the Development Envelope are unlikely to be critical habitat given the availability of abundant habitat upstream (northeast towards Blina Swamp) and downstream (south towards the nationally important Le Lievre Swamp System).

Based on the above, the proposed clearing is not likely to be at variance to this Principle.

Methodology

- Biota (2023a)
- Biota (2023b)
- Churchill (2008)
- Cramer et al. (2016)
- DBCA (2017)
- DBCA (2024)
- DCCEEW (2023)
- DCCEEW (2024)
- de Laive et al. (2021)
- Doody et al. 2017
- Government GIS Shapefiles:
  - DBCA Threatened and Priority fauna database search (Accessed February 2025)
  - Ecological Linkages (Accessed February 2025)
- Legge et al. (2015)
- Mayes (2006)
- Menkhorst and Knight (2011)
- Morris et al. (2008)
- O'Malley (2006)
- Pizzey and Knight (2007)
- Shine (1986)
- Smith & Griffiths 2009
- TSSC (2020a)
- TSSC (2020b)
- TSSC (2021)
- van Dyck and Strahan (2008)
- Wilson & Knowles (1988)
- Woinarski et al. (2014)

(c) Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, threatened flora.

Proposed clearing is not at variance to this Principle.

Desktop database searches identified no known records of Threatened flora within a 40 km radius of the Development Envelope.

Biota (2023a; 2023b) did not record any Threatened flora taxa from the Development Envelope or the Survey Area, and none are considered likely to occur.

Based on the above, the proposed clearing is not at variance to this Principle.

Methodology

- Biota (2023a)
- Biota (2023b)
- Government GIS shapefiles:
  - DBCA Threatened and Priority fauna database search (Accessed February 2025)
  - WA Herbarium flora database search (Accessed February 2025)

(d) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of a threatened ecological community.

Proposed clearing is not at variance to this Principle.

Neither the Desktop Study nor Biota's (2023a; 2023b) Biological Surveys identified any TECs in the Survey Area or within 40 km of the Development Envelope (Study Area).

Based on the above, the native vegetation proposed for clearing does not comprise the whole or a part of, and is not necessary for the maintenance of a TEC.

The proposed clearing is not at variance to this Principle.

Methodology

- Biota (2023a)
- Biota (2023b)
- Government GIS shapefiles:
  - DBCA Threatened Ecological Community database search (Accessed February 2025)

(e) Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared.

Proposed clearing is not at variance to this Principle.

The National Objectives and Targets for Biodiversity Conservation recognise that the retention of 30% or more of the pre-clearing extent of each ecological community is necessary if Australia's biological diversity is to be protected (Commonwealth of Australia, 2001) except in constrained areas (Perth and Peel) where 10% representation should be maintained.

Vegetation within the Development Envelope is broadly mapped as pre-European Vegetation Associations 64 and 745 (as seen in Table 4), both of which have over 99% of their pre-European extent remaining (Government of Western Australia, 2019). The Development Envelope is not located in an area that has been extensively cleared and the vegetation proposed for clearing is not significant as a remnant.

Based on the above, the proposed clearing is not at variance to this Principle.

Methodology

- Commonwealth of Australia (2001)
- Government GIS shapefiles:
  - Pre-European vegetation (DPIRD-006) (Accessed February 2025)
- Government of Western Australia (2019)

(f) Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.

Proposed clearing is at variance to this Principle.

Watercourses:

According to GIS hydrography datasets, one minor non-perennial watercourse, Nemile Creek, intersects the Development Envelope and its intersection with Great Northern Highway is mapped at SLK 2390.47. Analysis of Google Streetview (2023) imagery indicates no obvious watercourse is present at this mapped location, with a raised access track to service a solar-powered floodway camera and a levee bank (see Plate 5 below).

Plate 5. Google Streetview (2023) imagery of SLK 2390.47, where Nemile Creek is mapped, according to Geoscience Australia's 'Surface Hydrolines Regional' GIS mapping.

Nemile Creek is likely 100 m west of the mapped location where a large culvert allows the unobstructed flow of water underneath Great Northern Highway (see Plate 6).

Plate 6. Google Streetview (2023) imagery of the culvert at Nemile Creek, approximately 100 m west of the mapped location according to Geoscience Australia's 'Surface Hydrolines Regional' GIS mapping.

Vegetation associated with Nemile Creek has been mapped by Biota (2023a) as vegetation type D2: *Eucalyptus coolabah*, *Melaleuca nervosa* low woodland over mixed very open tussock grassland (refer to Figure 13). Biota (2023a) noted that D2 occurred in very shallow channels within the broader D1 vegetation type, as opposed to the more extensive D1 vegetation type, that occurred broadly over low-lying areas.

As outlined in Table 3, 9.81 ha of D2 vegetation occurs in the Development Envelope, of 80.8 ha mapped from the Survey Area and Contextual Area (Biota, 2023a). This equates to a maximum potential impact of approximately 12% of the mapped extent of D2 vegetation. This vegetation type is likely to be more extensive both upstream (towards Blina Swamp) and downstream (towards the Le Lievre Swamp System), of the Biota (2023a) mapped Survey Area and Contextual Areas.

Wetlands:

The Development Envelope does not intersect any internationally significant (Ramsar) or nationally significant (Directory of Important Wetlands in Australia) wetlands. As shown in Figure 15, the nearest significant, mapped wetland is the Camballin Floodplain (Le Lievre Swamp System), located approximately 7 km south of the Development Envelope at its nearest point (GIS Databases).

The eastern extent of the Development Envelope intersects part of the broader Camballin Floodplain of the Fitzroy River that extends from Blina Swamp (11 km north of the Development Envelope) to the Fitzroy River (approximately 30 km south) (Biota, 2023a) (Figure 16).

Land subject to inundation (as mapped by Geoscience Australia) that intersects the Development Envelope is mapped across approximately 350,000 hectares and extends over 50 km north to south before intersecting the Fitzroy River. Based on this GIS layer, the Development Envelope intersects a 400 m stretch of the mapped extent of this 'land subject to inundation' through a 200 m road corridor (or 0.002% of the mapped extent of the land subject to inundation).

Using Biota's vegetation mapping, Biota (2023a) identified three vegetation types (D1, D2 and D3) growing in association with drainage features in the Survey Area and surrounding Contextual Area. Vegetation type D3 does not occur in the Development Envelope, whilst 69.43 ha and 9.81 ha of vegetation types D1 and D2, respectively, occur within the Development Envelope. The combined area of the D1 and D2 vegetation types within the Development Envelope is 79.24 ha, which is also consistent with the area mapped as the 'Melaleuca floodplain' fauna habitat type. The mapped D1, D2 and Melaleuca floodplain vegetation types and fauna habitats are all associated with the broader Camballin Floodplain. Given the Development Envelope contains vegetation growing in association with Nemile Creek and low-lying seasonally inundated areas, the proposed clearing is at variance to this Principle.

However, Geoscience Australia's regional scale hydological mapping indicates there is approximately 350,000 ha of land subject to inundation in the local area (Figure 16), and most of this occurs downstream of the Development Envelope. The areas to be impacted are a small percentage of the D1 and D2 vegetation types mapped within the broader Survey Area and Contextual Area (approximately 1,005 ha of D1 and D2 vegetation was mapped by Biota (2023a)). The 50.6 ha of clearing represents a conservative maximum potential impact of 5% of the mapped extent of D1 and D2 vegetation types, assuming that all clearing takes place within these two vegetation types. In reality, this will not be the case, given D1 and D2 vegetation only occurs in the eastern-extent of the proposed road upgrade. These calculated impacts to drainage vegetation are based only on the Biota (2023a) mapping and would substantially reduce if Contextual Area mapping was extended further upstream towards Blina Swamp and downstream towards the Le Lievre Swamp System.

Given the contextually small extent of clearing associated with watercourses and wetlands, and noting clearing will be undertaken during the dry season when areas are not likely to be inundated, the proposed clearing is unlikely to significant impact ecological functions associated with watercourses or wetlands.

Methodology

- Biota (2023a)
- Biota (2023b)
- Government GIS shapefiles:
  - Ramsar Sites (DBCA-010) (Accessed February 2025)
  - Directory of Important Wetlands in Australia – Western Australia (DBCA-045) (Accessed February 2025)
  - Watercourses (Accessed February 2025)
  - RIWI Act Rivers (Accessed February 2025)
- Geoscience Australia Surface Hydrology (Linear and Polygons) (Accessed February 2025)

(g) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.

Proposed clearing is not likely to be at variance to this Principle.

According to Soil Landscape System mapping by Payne and Schoknecht (2011), the Development Envelope intersects the Waganut System (331Wa), Egan System (331Eg) and Sisters System (337Si). A summary of each is provided below in Table 7:

Table 7. Soil Landscape Systems intersecting the Development Envelope (Payne and Schoknecht, 2011).

Land System	Description	Extent in the Dampierland Bioregion (ha)	Extent in the DE* (ha)	Proportion in Dampierland Bioregion that Occurs in the DE*
Sisters (337Si)	Low sandy plateaus and sand plains with through-going drainage, deep red sands and yellow loamy soils, pindan and tall woodlands.	300,160	482.8	0.16%
Egan (331Eg)	Outcrop plains with low lateritic rises, grassy woodlands and spinifex. Restricted cracking clay plains.	162,117	158.4	0.10%
Waganut (331Wa)	Low lying sandplains and dune fields with through-going drainage supporting pindan acacia shrublands with emergent eucalypt trees.	699,097	64.4	0.01%

These land systems are prone to degradation where cattle grazing is uncontrolled and fire frequency is not managed, which can lead to soil erosion. The proposed clearing will not alter existing grazing or fire regimes and is unlikely to exacerbate the incidence of land degradation from erosion.

The CSIRO Acid Sulfate Soils risk mapping indicates that acid sulfate soils have a low (Bn(p4)), and extremely low probability (Cq(p4)) of occurring in the Development Envelope. The proposed clearing is unlikely to cause land degradation associated with acid sulfate soils.

The proposed clearing of 50.6 ha, spread across a Development Envelope of over 700 ha, is unlikely to cause appreciable land degradation in the context of the largely uncleared local and regional landscape.

Based on the above, the proposed clearing is not likely to be at variance to this Principle.

Methodology

- Payne and Schoknecht (2011)
- Government GIS Shapefiles:
  - Acid Sulfate Soil Risk Map (Accessed February 2025)

(h) Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.

Proposed clearing is not at variance to this Principle.

There are no conservation reserves within 40 km of the Development Envelope (GIS Databases). The nearest conservation reserve, Balili Conservation Park (Devonian Reef), is approximately 50 km east of the Development Envelope.

The Camballin Floodplain (Le Lievre Swamp System), is a seasonally inundated wetland on the Fitzroy River's Camballin Floodplain, located between Mt Wynne Creek (located approximately 18 km southeast of the eastern-most extent of the Development Envelope) and Liveringa Station homestead (located approximately 15 km southwest of the western-most extent of the Development Envelope). This part of the broader Camballin Floodplain is listed on the Directory of Important Wetlands and is mapped as an Environmentally Sensitive Area (ESA) (see Figure 15 and Figure 16, as described in principle (f)).

The mapped boundary of the Directory of Important Wetland and associated ESA is located approximately 7 km south (downstream) of the Development Envelope and includes a 30,000 ha area of distinct wetlands such as the Le Lievre Swamp (1,300 ha), Moulamen Swamp (300 ha), 17 Mile Dam (700 ha, 13 km long, 100–1,000 m wide, including Lake Josceline), seven unnamed seasonal wetlands each 50 – 300 ha and Uralla/Snake Creek (10 km long, 50–100 m wide). This mapped wetland provides habitat for more than 30 migratory bird species and supports reptiles such as Freshwater and Saltwater Crocodiles in river pools and permanent dry season wetlands (DWER, 2023). The proposed clearing will not impact on the environmental values of this important wetland system, given the distance between the Development Envelope and the mapped boundary of the wetland, the substantial vegetated buffer between the Development Envelope and the wetland and the minor extent of proposed clearing in the context of the broader floodplain, both upstream and downstream of the Development Envelope.

Vegetation in the local area is highly contiguous, with over 99% of the pre-European extent of native vegetation remaining at all scales (Government of Western Australia, 2019). The proposed clearing will not impact any buffers, ecological linkages or environmental values of any conservation areas.

Based on the above, the proposed clearing is not at variance to this Principle.

Methodology

- DWER (2023)
- Government of Western Australia (2019)
- Government GIS Shapefiles:
  - DBCA Legislated Lands and Waters (DBCA-011) (Accessed February 2025)
  - DBCA Lands of Interest (DBCA-012) (Accessed February 2025)
  - Environmentally Sensitive Areas (DWER-046) (Accessed February 2025)
  - Ramsar Sites (DBCA-010) (Accessed February 2025)
  - Directory of Important Wetlands in Australia – Western Australia (DBCA-045) (Accessed February 2025)

(i) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.

Proposed clearing is not likely to be at variance to this Principle.

According to GIS Databases, no Public Drinking Water Source Areas (PDWSAs) or places listed under the Country Areas Water Supply Act (CAWSA) intersect the Development Envelope. The Development Envelope is located within the Proclaimed Canning-Kimberley Groundwater Area. The quality of groundwater is unlikely to be impacted by the proposed clearing of 50.6 ha, spread across a Development Envelope of over 700 ha and spanning a linear distance of more than 13 km; and noting the surrounding landscape is largely uncleared.

The CSIRO Acid Sulfate Soils risk mapping indicates that acid sulfate soils have a low (Bn(p4)), and extremely low probability (Cq(p4)) of occurring in the Development Envelope. The proposed clearing is unlikely to interact with acid sulfate soils or contaminate water receptors.

The Development Envelope is partially located within the Proclaimed Fitzroy River and Tributaries Surface Water Area. As discussed in Principle (f), the Development Envelope intersects the Nemile Creek, a minor non-perennial watercourse, and the eastern end of the Development Envelope crosses a broad floodplain area that is subject to seasonal inundation. The portion of the Development Envelope intersecting this floodplain is small in the context of the upstream and downstream floodplain, as described in Principle (f).

Clearing will be undertaken post-wet season when the Nemile Creek is likely to be dry, reducing the potential for impacts on surface water quality. Standard construction environmental management techniques and engineering controls will be implemented to reduce potential impacts on Nemile Creek and important downstream surface water receptors such as the nationally important Camballin Floodplain (Le Lievre Swamp System). No adverse impacts to surface water quality are expected from the proposed clearing, given the small extent of proposed clearing, the above-mentioned controls and noting that a vegetated buffer of approximately 7 km will continue to exist between the Development Envelope and the downstream Le Lievre Swamp System.

Based on the above, the proposed clearing is not likely to be at variance to this Principle.

Methodology

- Government GIS Shapefiles:
  - CSIRO ASRIS Acid Sulfate Soils (Accessed February 2025)
  - CAWSA Part 2A Clearing Control Catchments (DWER-004) (Accessed February 2025)
  - Public Drinking Water Source Areas (DWER-033) (Accessed February 2025)
  - RIWI Act, Groundwater Areas (DWER-034) (Accessed February 2025)
  - RIWI Act, Surface Water Areas and Irrigation Districts (DWER-037) (Accessed February 2025)
  - WWYS Geoscience Australia Regional Surface Hydrology Lines (Accessed February 2025)

(j) Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding.

Proposed clearing is not at variance to this Principle.

The subregional climate is described as dry winter and hot semi-arid summer with a median annual rainfall of 571.1 mm (Blina WA (Station Number 003033) (BoM, 2025). Extreme weather events are a significant, natural component of the Kimberley climate. Tropical cyclones and tropical storms can bring heavy and sustained rainfall, particularly in the months leading up to and during the wet season. It is common for a large proportion of the region's rainfall to be recorded in one single event, leading to extensive flooding of rivers, creeks and roadways.

The proposed clearing will take place in the dry season, reducing the potential escalation of flooding, waterlogging or erosion. No significant changes to the existing levels of natural flooding are anticipated. As noted above, climatic conditions are the main factor influencing flooding and the small amount of proposed clearing will have no measurable influence on surface water runoff or flood regimes in the area, given the receiving catchment and surrounding landscape is largely uncleared.

Based on the above, the proposed clearing is not at variance to this Principle.

Methodology

- BoM (2025)

6 REHABILITATION, REVEGETATION AND OFFSETS

6.1 Revegetation and Rehabilitation

No temporary clearing will be undertaken as part of the Proposal activities and therefore no revegetation or rehabilitation will be conducted under CPS 818.

6.2 Offset Proposal

No offset proposal is required as the proposed clearing will not result in significant residual impacts on native vegetation within the region.

7 STAKEHOLDER CONSULTATION

Main Roads will undertake stakeholder consultation in accordance with CPS 818 Condition 8.

8 COMPLIANCE WITH CPS 818

Table 8 summarises what further pre-clearing impact assessment is required in accordance with CPS 818.

Table 8. Summary of Additional Management Actions Required by CPS 818

Impact of Clearing	Yes/No or NA	Further Action Required
1. The CAR indicates that the clearing is 'At Variance' or 'May be at Variance' with one or more of the Clearing Principles.	**Yes**	**1.** Clearing Report to be published on website and submissions sought for 21 days. **2.** Submissions invited from relevant parties, including the LGA, the owner or occupier of the land and other stakeholders in accordance with Condition 8 of CPS 818. **3.** VMP has been completed, refer to Appendix 2. **4.** In accordance with Condition 11 of CPS 818, an offset proposal will be provided to DWER for approval, unless advised in writing that an offset proposal is not required. **5.** A summary of stakeholder submissions received and a statement addressing each of those submissions will be published on Main Roads' website.
2. Clearing is at variance or may be at variance with Clearing Principle (g) land degradation, (i) surface or underground water quality **or** (j) the incidence of flooding.	**No**	No further action required.
3. Clearing is at variance with Clearing Principle (g) land degradation, (i) surface or underground water quality **and** (j) the incidence of flooding.	**No**	No further action required.
4. The Proposal involves clearing for temporary works (as defined by CPS 818).	**No**	No further action required.

Impact of Clearing	Yes/No or NA	Further Action Required
5a. Proposal is within a Region that: • has rainfall greater than 400mm; and, • is South of the 26th parallel; and, • works are necessary in 'Other than dry conditions'; and, • works have potential for **uninfested** areas to be impacted.	**No**	Standard Vehicle and Plant management actions from Annexure 204B (TABLE 204B.9.1), Hygiene Checklists *(D17#859669)* and Vehicle, Plant and Machinery Hygiene Register Template *(D23#179551)* will be applied.
5b. Do the proposed works require clearing within or adjacent to DBCA managed lands in non-dry conditions?	**No**	No further action required.
6. Main Roads has been notified by DWER or an environmental specialist that the area to be cleared is susceptible to a pathogen other than dieback.	**No**	No further action required.
7. Weeds are likely to spread to and result in environmental harm to adjacent areas of native vegetation that are in good or better condition.	**No**	No further action required.

Impact of Clearing	Yes/No or NA	Further Action Required
8. Did an environmental specialist conduct the survey or field assessment?	**Yes**	The Environmental Specialist undertaking the biological assessments was suitably qualified and had more than three years' experience.
9. Did an environmental specialist prepare the Assessment Report and any other associated documentation including the VMP, Dieback Management Plan or Offset Proposal?	**Yes**	The Environmental Specialist preparing the Assessment Report and any other associated documentation including the VMP, Dieback Management Plan or Offset Proposal was suitably qualified and had more than three years' experience.

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10 APPENDICES

Appendix 1: CPS 818 condition 8 (e) (iii) Biological Surveys and Field Assessment Executive Summary and Report Conclusions

Biota (2023a) Great Northern Highway Camballin to Blina Biological Survey and Targeted Flora Survey

Executive Summary

Main Roads Western Australia is planning to raise, overlay and widen a 24 km section of the Great Northern Highway between SLK 2370 and 2394 (Camballin to Erskine to Blina), 85 km southeast of Derby in the Shire of Derby / West Kimberley. Specific project activities will include clearing of vegetation, and stripping and stockpiling of topsoil and overburden. An area of 1,380.3 ha was identified in which the proposed works will be undertaken (the 'Survey Area').

To identify biological features of significance in the Survey Area that may be impacted, Biota Environmental Sciences undertook:

- A desktop study to identify records of significant communities and species previously recorded from a 40 km radius of the Survey Area;
- A basic fauna survey in September 2022, focusing on description and mapping of fauna habitats, which was extended over the contextual area (a 500 m area surrounding the Survey Area);
- Targeted searches for significant fauna in September 2022. This work included deployment of motion cameras and electronic recording equipment, which remained on site until October 2022;
- A single-phase detailed flora and vegetation survey in October 2022. This included mapping of vegetation types and vegetation condition, which was extrapolated over the contextual area, and sampling of vegetation with 24 quadrats and eight relevés; and
- Targeted surveys for significant flora in October 2022 (under dry conditions) and late April-early May 2023 (optimal timing following substantial rainfall). These involved targeted searches through the Survey Area for Threatened and Priority flora, and for serious weeds (Declared Plants and Weeds of National Significance). Some opportunistic fauna records were also made during the 2023 survey.

The survey identified six broad fauna habitats in the Survey Area: Savannah plains (67.1%); *Melaleuca* floodplain (17.8%); *Acacia* shrubland (7.7%); Rocky hills and breakaways (0.2%); Dams and materials pits (0.2%); and Cleared areas (7.0%). The habitats most likely to support significant fauna comprised the Rocky hills and breakaways habitats (particularly for the West Kimberley Rock-wallaby, Northern Brushtail Possum and significant bats); and the *Melaleuca* floodplain and Dams and materials pits (for significant birds and bats, particularly during the wet season).

The Yellow-lipped Cave-bat, *Vespadelus douglasorum* (Priority 2) was recorded in the Survey Area during the current survey. The West Kimberley Rock-wallaby, *Petrogale lateralis kimberleyensis* (Endangered) and the Northern Brushtail Possum, *Trichosurus vulpecula arnhemensis* (Vulnerable) were recorded in the contextual area immediately adjacent to the Survey Area, along with a possible call of the Ghost Bat, *Macroderma gigas* (Vulnerable). The Glossy Ibis, *Plegadis falcinellus*

(Migratory) has been previously recorded in the Survey Area, and a number of other significant species are either likely to occur, or may occur. No caves suitable for roosting by significant bats were found within the Survey Area.

Eleven vegetation types were identified for the Survey Area: three units associated with drainage areas, three units on low hills, and five units on plains. None of the vegetation types comprised listed Threatened Ecological Communities or Priority Ecological Communities, however vegetation types D1 and D2 were associated with the Camballin Floodplain, which is a significant area containing a number of important wetlands. These vegetation types occurred in the eastern section of the Survey Area and totalled 245.8 ha, or 17.8% of the Survey Area. This vegetation occurs more extensively northeast towards Blina Swamp and southwest towards Le Lievre Swamp.

A total of 265 native flora species from 140 genera and 59 families have been recorded from the Survey Area. Two Priority species are known to occur in the Survey Area. The Priority 1 aquatic herb, *Utricularia tubulata* was recorded from a single location in 2021, but was not recorded there despite intensive searches in May 2023; it was, however, recorded at a location to the north. The Priority 3 water lily, *Nymphoides beaglensis* was recorded from several locations within the Survey Area. Both species occur in vegetation type D2, and *Nymphoides beaglensis* was also recorded in D1.

Thirteen introduced flora species were recorded during the field survey, including one Declared Plant. Two individuals of Calotrope (**Calotropis procera*) were found near a dam in the contextual area in 2022; a total of 20 individuals were found near this dam in 2023, one of which was located in the Survey Area.

DISCUSSION

Significant Vegetation

None of the vegetation types comprised listed TECs or PECs.

In general, the vegetation types were representative of those occurring on similar landforms in the locality, however vegetation types D1 and D2, which occurred in the drainage area in the eastern section of the Survey Area, are considered to be locally significant. These occur in the largest surface drainage feature in the local area; this is part of the Camballin Floodplain, which extends between Blina Swamp and the Fitzroy River, and is recognised as containing important wetlands. Vegetation types D1 and D2 would therefore likely fulfil "an important function required to maintain ecological integrity of a significant ecosystem", as per EPA (2016). In addition, D2 is known to support two Priority flora species when this habitat is flooded, and one of these was also recorded in vegetation type D1. Based on the information available from the desktop study, this vegetation has not been well sampled, and other significant species may occur.

These two units together totalled 245.8 ha, or 17.8% of the Survey Area. The amount inside the Survey Area comprised a quarter (24.5%) of the extent in the local area (the Survey Area and contextual area combined), and similar vegetation occurs to the northeast towards Blina Swamp and to the southwest towards Le Lievre Swamp.

Significant Flora

No Threatened flora were recorded, and there are currently no species listed as Threatened for the locality.

One Priority 3 species, *Nymphoides beaglensis*, was recorded from several populations in the Survey Area, some of which extended into the contextual area, and an additional population was found outside the contextual area. The Priority 1 species *Utricularia tubulata* had also been recorded in 2021 at a location in the Survey Area but was not found there in 2022 or 2023. A population of this species was, however, found in 2023 outside the contextual area. Both of the Priority species were recorded in vegetation type D2, and *Nymphoides beaglensis* was also recorded in vegetation type D1.

One other species has some potential to occur in the Survey Area. The small herb *Goodenia sepalosa* var. *glandulosa* (Priority 3) may occur, as there are numerous records from the locality, including some in proximity. Suitable habitat is also extensive, comprising vegetation types P1-P5. These units total 983.5 ha, with another 37.6 ha mapped as a mosaic of H1 and P2, meaning that over 70% of the Survey Area would potentially be suitable habitat for this species.

Significant Weeds

Only one Declared Plant was recorded during the survey. Two individuals of **Calotropis procera* (Calotrope) were recorded near a dam in the central contextual area in 2022. A total of 20 individuals were recorded near the same dam in 2023, with one of these plants occurring within the actual Survey Area. No other populations of Calotrope were observed in the locality.

Twelve other introduced flora species were recorded, all of which are common and widespread weed species in the Kimberley. The most invasive of these (the **Cenchrus* and **Stylosanthes* species) were already widespread through most of the Survey Area except the northernmost materials pit, but generally occurred as only scattered plants.

Fauna

The six habitats described for the Survey Area and contextual area were typical of the region and widespread in the surrounding locality. None are restricted to the immediate area; however, with the exception of the cleared areas, all have the potential to be utilised by a variety of fauna, including significant species.

The West Kimberley Rock-wallaby (Endangered) and the Northern Brushtail Possum (Vulnerable) were both recorded from rocky habitats in the contextual area, immediately adjacent to the Survey Area. It is likely that both species would occur in the Survey Area, although the amount of core rocky habitat available is limited compared to the surrounds, totaling only 2.4 ha or 1.3% of the amount mapped in the local area (the Survey Area and contextual area combined). Furthermore, three records of roadkill West Kimberley Rock-wallaby from this section of the Great Northern Highway indicate that the species likely moves between rocky outcroppings on either side of the roadway, and probably use the surrounding habitats for foraging and dispersal. This could also be true for the Northern Brushtail Possum, which may utilise the taller vegetation in the savannah plains and *Melaleuca* floodplain habitats.

The other significant species known to occur or likely to occur in the Survey Area are largely bat or bird species. No core roosting habitat (caves) for the bat species was found within the Survey Area, so their use of the area is likely to be limited to foraging. There may be potential breeding habitat within the Survey Area for the Grey Falcon (Vulnerable) and Peregrine Falcon (Other Specially Protected Fauna), particularly taller trees in the drainage areas and on the plains. There is only limited rocky habitat on hillslopes within the Survey Area, which did not appear particularly prospective for nesting by the Peregrine Falcon. Both species would be particularly likely to forage in areas with free water that attract bird aggregations (i.e. permanent dams, materials pits holding

water following rain, and the drainage habitat at the eastern end of the Survey Area when this is in flood). The Migratory bird species would similarly most often be associated with the latter habitat. While likely to occur in the Survey Area, the Priority 4 Short-tailed Mouse is difficult to record even with systematic trapping, which was beyond the scope of the current survey. Given its broad habitat preferences, there is considerable habitat available for this species both in the Survey Area and surrounds.

Biota (2023b) Great Northern Highway Camballin to Blina Vegetation, Flora and Fauna Survey

Executive Summary

Main Roads Western Australia is planning to raise, overlay and widen a 24 km section of the Great Northern Highway between SLK 2370 and 2394 (Camballin to Erskine to Blina), 85 km southeast of Derby in the Shire of Derby / West Kimberley. Specific project activities will include clearing of vegetation, and stripping and stockpiling of topsoil and overburden. An area of 1,380.3 ha was identified in which the proposed works will be undertaken (the 'survey area').

To identify biological features of significance in the survey area that may be impacted, Biota Environmental Sciences undertook:

- A desktop study to identify records of significant communities and species previously recorded from a 40 km radius of the survey area;
- A basic fauna survey in September 2022, focusing on description and mapping of fauna habitats, which was extended over the contextual area (a 500 m area surrounding the survey area);
- Targeted searches for significant fauna in September 2022. This work included deployment of motion cameras and electronic recording equipment, which remained on site until October 2022;
- A single-phase detailed flora and vegetation survey in October 2022. This included mapping of vegetation types and vegetation condition, which was extrapolated over the contextual area, and sampling of vegetation with 24 quadrats and eight relevés; and
- A targeted flora survey for significant flora in October 2022. This involved targeted searches through the survey area for Threatened and Priority flora, and for serious weeds (Declared Plants and Weeds of National Significance).

The survey identified six broad fauna habitats in the survey area: Savannah plains (67.1%); Melaleuca floodplain (17.8%); Acacia shrubland (7.7%); Rocky hills and breakaways (0.2%); Dams and materials pits (0.2%); and Cleared areas (7.0%). The habitats most likely to support significant fauna comprised the Rocky hills and breakaways habitats (particularly for the West Kimberley Rock-wallaby, Northern Brushtail Possum and significant bats); and the Melaleuca floodplain and Dams and materials pits (for significant birds and bats, particularly during the wet season).

The Yellow-lipped Cave-Bat, *Vespadelus douglasorum* (Priority 2) was recorded in the survey area during the current survey. The West Kimberley Rock-wallaby, *Petrogale lateralis kimberleyensis* (Endangered) and the Northern Brushtail Possum, *Trichosurus vulpecula arnhemensis* (Vulnerable) were recorded in the contextual area immediately adjacent to the survey area, along with a possible call of the Ghost Bat, *Macroderma gigas* (Vulnerable). The Glossy Ibis, *Plegadis falcinellus* (Migratory) has been previously recorded in the survey area, and a number of other significant

species are either likely to occur, or may occur. No caves suitable for roosting by significant bats were found within the survey area.

Eleven vegetation types were identified for the survey area: three units associated with drainage areas, three units on low hills, and five units on plains. None of the vegetation types comprised listed Threatened Ecological Communities or Priority Ecological Communities, however vegetation types D1 and D2 were associated with the Camballin Floodplain, which is a significant area containing a number of important wetlands. These vegetation types occurred in the eastern section of the survey area and totalled 245.8 ha, or 17.8% of the survey area. This vegetation occurs more extensively northeast towards Blina Swamp and southwest towards Le Lievre Swamp.

A total of 195 native flora species from 110 genera and 43 families were recorded during the field survey. None of these were significant species, however the survey was done during the dry season; conditions were dry and not optimal for botanical collection and identification. Two Priority species have been recorded previously under better conditions: the Priority 1 *Utricularia tubulata* and the Priority 3 *Nymphoides beaglensis* have both been recorded from vegetation type D1 and could also occur in D2. The Priority 3 species Goodenia sepalosa var. glandulosa has not been recorded to date, but is likely to occur on plains in the survey area. Euploca foveolata (Priority 1) and Utricularia muelleri (Priority 3) may also occur, most likely in vegetation types D1 and D2.

Nine introduced flora species were recorded during the field survey, including one Declared Plant: two individuals of Calotrope (*Calotropis procera) were found at a single location near a dam in the contextual area.

DISCUSSION

Significant Vegetation

None of the vegetation types comprised listed TECs or PECs.

In general, the vegetation types were representative of those occurring on similar landforms in the locality, however vegetation types D1 and D2, which occurred in the drainage area in the eastern section of the survey area, are considered to be locally significant. These occur in the largest surface drainage feature in the local area; this is part of the Camballin Floodplain, which extends between Blina Swamp and the Fitzroy River, and is recognised as containing important wetlands. Vegetation types D1 and D2 would therefore likely fulfil “an important function required to maintain ecological integrity of a significant ecosystem”, as per EPA (2016). In addition, D2 is known to support two Priority flora species, which could also occur in vegetation type D1 when this habitat is flooded. Based on the information available from the desktop study, this vegetation has not been well sampled, and other significant species may occur.

These two units together totalled 245.8 ha, or 17.8% of the survey area. The amount inside the survey area comprised a quarter (24.5%) of the extent in the local area (the survey area and contextual area combined), and similar vegetation occurs to the northeast towards Blina Swamp and to the southwest towards Le Lievre Swamp.

Significant Flora

No Threatened flora were recorded, and there are currently no species listed for the locality. Two Priority flora have been recorded previously in the survey area, when conditions were more favourable: *Utricularia tubulata* (Priority 1) and *Nymphoides beaglensis* (Priority 3). While both species were recorded in vegetation type D2, there is the potential that they could also occur in vegetation type D1. Another significant species, Utricularia muelleri (Priority 3) may occur in these vegetation types, particularly in D2. Any further surveys for these species would need to be carefully timed as the Utricularia species would only be found while the area was flooded; *Nymphoides beaglensis* may persist for some weeks afterwards, but would likely only be recorded while the soil remained damp.

Two other species have some potential to occur in the survey area. The small herb *Goodenia sepalosa* var. *glandulosa* (Priority 3) is considered likely to occur, as there are numerous records from the locality, including some in proximity. Suitable habitat is also extensive, comprising vegetation types P1-P5. These units total 983.5 ha, with another 37.6 ha mapped as a mosaic of H1 and P2, meaning that over 70% of the survey area would potentially be suitable habitat for this species. The Priority 1 terrestrial herb *Euploca foveolata* may also occur; there are fewer records of this species from the locality, however Pilbara Flora (2011) reported one record in proximity to the current survey area. The most likely habitats to support this species would be the drainage areas supporting vegetation types D1 and D2.

Significant Weeds

Only one Declared Plant was recorded during the survey: two individuals of **Calotropis procera* (Calotrope) were recorded near a dam in the central contextual area. No other populations were observed in the locality.

Eight other introduced flora species were recorded, all of which are common and widespread weed species. The most invasive of these, the **Cenchrus* and **Stylosanthes* species, are already widespread through most of the survey area with the exception of the northernmost materials pit.

Fauna

The six habitats described for the survey area and contextual area were typical of the region and widespread in the surrounding locality. None are restricted to the immediate area, however, with the exception of the cleared areas, all have the potential to be utilised by a variety of fauna, including significant species.

The West Kimberley Rock-wallaby (Endangered) and the Northern Brushtail Possum (Vulnerable) were both recorded from rocky habitats in the contextual area, immediately adjacent to the survey area. It is likely that both species would occur in the survey area, although the amount of core rocky habitat available is limited compared to the surrounds, totaling only 2.4 ha or 1.3% of the amount mapped in the local area (the survey area and contextual area combined). Furthermore, three records of roadkill West Kimberley Rock-wallaby from this section of the Great Northern Highway indicate that the species likely moves between rocky outcroppings on either side of the roadway, and probably use the surrounding habitats for foraging and dispersal. This could also be true for the Northern Brushtail Possum, which may utilise the taller vegetation in the savannah plains and Melaleuca floodplain habitats.

The other significant species known to occur or likely to occur in the survey area are largely bat or bird species. No core roosting habitat (caves) for the bat species was found within the survey area, so their use of the area is likely to be limited to foraging. There may be potential breeding habitat within the survey area for the Grey Falcon (Vulnerable) and Peregrine Falcon (Other Specially Protected Fauna), particularly taller trees in the drainage areas and on the plains. There is only limited rocky habitat on hillslopes within the survey area, which did not appear particularly prospective for nesting by the Peregrine Falcon. Both species would be particularly likely to forage in areas with free water that attract bird aggregations (i.e. permanent dams, materials pits holding water following rain, and the drainage habitat at the eastern end of the survey area when this is in flood). The Migratory bird species would similarly most often be associated with the latter habitat. While likely to occur in the survey area, the Priority 4 Short-tailed Mouse is difficult to record even with systematic trapping, which was beyond the scope of the current survey. Given its broad habitat preferences, there is considerable habitat available for this species both in the survey area and surrounds.

Appendix 2: Vegetation Management Plan

ERSKINE TO BLINA SLK 2381-2394

Purpose and Scope

This Vegetation Management Plan (VMP) has been prepared by Main Roads for the purpose of managing native vegetation clearing impacts associated with the proposed upgrades to a 13 km section (SLK 2381-2394) of Great Northern Highway (GNH), colloquially known as 'Erskine to Blina'.

The proposed clearing will enable the following project components:

1) Material investigation and extraction;
2) Widening and sealing the existing road formation and shoulders;
3) Road drainage upgrades; and
4) Additional supporting infrastructure as required.

In specified circumstances, Main Roads VMP is required to be approved by Department of Water and Environmental Regulation (DWER) as a condition of the Main Roads Statewide Clearing Permit CPS 818.

Actions, and their relevant timeframes, from this VMP will be documented within the relevant Documentation (Specifications), such as:

- Specification 204 Environmental Management
- Specification 301 Vegetation Clearing and Demolition
- Specification 303 Materials and Water
- Specification 304 Revegetation
- Specification 304 Rehabilitation of Disturbed Areas.

Once the Contract has been awarded, The Project Manager Delivery (or equivalent roles) are to ensure that the requirements are implemented.

Avoiding, Mitigating and Managing the Impacts of Clearing

A number of measures were undertaken during the development and design of the Proposal to reduce its impact on the environment.

For further information on the alternatives that were considered during the Proposal development, please go to Section 1.5 of the Clearing Assessment Report for the Proposal.

For further information on the measures undertaken to avoid, minimise, reduce and manage the Proposal's clearing impacts, please go to Section 1.6 of the Clearing Assessment Report for the Proposal.

VMP Actions

General vegetation management actions to be undertaken is shown in Appendix 4.1: General Vegetation Management Actions for Clearing.

Appendix 2.1: General vegetation management actions for clearing

Management Action	Responsibility	Timing
Ensure plant, machinery and equipment, is cleaned down prior to arrival to the site.	Project Manager Delivery	During construction
Vehicle hygiene inspection checklists will be utilised to manage potential weed spread on earth-moving machinery.	Project Manager Delivery	During construction
No known infested soil, mulch, fill or other material will be permitted into the works area.	Project Manager Delivery	During construction
All Clearing must be undertaken in such a way to allow fauna to move out of the Clearing area.	Project Manager Delivery	During construction
The Limits of Vegetation Clearing will be demarcated on site prior to the commencement of clearing to prevent entry into areas of native vegetation.	Project Manager Delivery	During construction
Natural drainage pathways will not be obstructed from stockpile gravel, crushed rock and excavated material.	Project Manager Delivery	During construction
All recently cleared, exposed and loose surface areas shall be protected from wind, water and soil erosion.	Project Manager Delivery	During construction
Clearing of native vegetation is only undertaken in dry conditions, unless otherwise approved and / or directed by the Delivery Project Manager.	Project Manager Delivery	During construction
All Special Environmental Areas will be pegged in accordance with Main Roads' Drawing 201928-0001-1 Construction Peg Colour Code (https://www.mainroads.wa.gov.au/globalassets/technical-commercial/technical-library/standard-contract-drawings/vegetation/construction-environmental-management/201928-0001-construction-peg-colour-code-drawing.pdf?v=49bd3b).	Project Manager Delivery	During construction
A Site induction training program must be delivered that includes as a minimum, the significant environmental impacts, actual or potential, of work activities associated with the Contract	Project Manager Delivery	During construction

Main Roads' preclearing **Hold Point** applies to all projects that require vegetation clearing, as documented within Specification 301 (301.12 PRE-CLEARING PROCESS). Accordingly, all relevant Hold Point actions must be signed off prior to clearing commencing. This Hold Point comprises actions such as:

1. Prior to the commencement of any clearing operations, the Project Manager Delivery or Supervisor must certify for the Site Engineer or other relevant staff's verification and approval that the following activities have been completed in accordance with the relevant specification:

a) The pegging of limits of vegetation clearing has been undertaken.

b) The pegged vegetation clearing area does not exceed the Limits of Vegetation Clearing.

c) Mature trees have been conserved as far as practicable.

d) The pegging of special environmental areas has been undertaken.

f) All pre-clearing weed control has been undertaken.

g) All pre-clearing fauna operational controls have been undertaken.

h) Suitable and unsuitable topsoil zones have been identified.

i) Vegetation and topsoil stockpile locations have been identified.

j) All clearing machinery is compliant with controls.

Monitoring and Maintenance Program

The Project Manager Delivery (or equivalent role/s) shall monitor the implementation of management actions that are a **Hold Point**. **Hold Point** actions must be signed off by the Superintendent's Representative to confirm it has occurred and recorded within the Superintendent's Contract Management Plan.

Non-Compliance

Non-compliance with management actions will trigger corrective actions, preventative actions and/or an incident investigation. Non-compliances will be recorded with Main Roads incident management system and reviewed by Main Roads Manager Environment.

The need for reporting non-compliances with VMP management actions to DWER will be determined as part of an incident investigation.

Revegetation

Revegetation will be undertaken in accordance with Condition 9 of CPS 818. Relevant requirements from Condition 9 have been incorporated into the Project Revegetation Plan Template. The elements to be implemented will be incorporated into the relevant Specification 304.