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Gnangara Conservation Significance Assessment

Gnangara Sustainability Strategy
(Project No. 0169-0006)

Report prepared for:
WA DEC

Final Draft

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ABN 87 096 512 088 | address 108 Stirling St Perth 6000
postal GPO Box G444 Perth BC WA 6841 | phone 08 9227 1070 | fax 08 9227 1078
web www.ecoaus.com.au

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Ph - (08) 9227 1070
Fax - (08) 9227 1078

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1. Introduction

Eco Logical Australia (ELA) have been commissioned by the Department of Environment and Conservation (DEC) to complete a Conservation Significance Assessment (CSA) map for the Gnangara region. The work will assist DEC with the decision making process in planning for future land use in the area.

This document is intended to add value to the mapping product we have been commissioned to develop by providing some background information on methods and approach, and a stimulus for further discussion on the way forward.

The document includes a description of the CSA methodology, mapped and tabular results, discussions and recommendations.

1.1 CSA Objectives

The weightings applied to each variable in the CSA analysis reflect their importance in the landscape. The weightings and relative value between variables reflect the objectives for the landscape, and are outlined in the methodology below:

The resulting maps from each separate CSA criteria and the presentation of the final map is provided for consideration.

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2. Methodology

The methodology below allocates a series of scores depending on each of the variables identified within the study area, and their conservation value. The scores are totalled for each data layer, with higher scores reflecting a higher conservation significance. Each variable is outlined below, with details on how each of the scores will be allocated.

2.1 TEC Score

Objective: Protect Critically Endangered and Threatened Ecological Communities. Threatened Ecological Communities (TEC) have been scored separately to other vegetation due to their legislative status. Critically endangered TECs have been given the highest priority.

Table 1: TEC Score

TEC Status	Score
Critically Endangered TEC	5
Other TEC	3

2.2 Vegetation Community Status

Objective: Give greater priority to those vegetation types that are rare within the landscape. Vegetation complexes throughout the Swan Coastal Plain (SCP) have been broken into 4 distinct categories, as outlined below.

Table 2: Vegetation Community Status Score

Vegetation Status	Score
< 10 % retained over SCP or is on the Eastern side of the Swan Coastal Plain (Pinjara Plain and Gingin Scarp)	4
< 30 % retained over SCP or < 400 ha remain across the SCP or > 60 % of pre-European extent occurs in the GSS study area	3
> 30 % retained over SCP and < 30 % is protected in the GSS study area	2
> 30 % retained over SCP and > 30 % protected in the GSS and no additional protection is required	1

2.3 Plantation Linkages

Objective: Give priority to plantation land that serves a role in linking patches of vegetation. Plantation linkages were mapped by DEC. These rank the priority of maintaining remnants and rehabilitating cleared areas within plantation areas.

Table 3: Plantation Linkage Score

Vegetation Status	Score
Plantation Linkage 1 and 2	2
Not a Plantation Linkage 1	0

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2.4 Bush Forever

Objective: Give priority to Bush forever sites. Bush forever sites, and Northern Crown Reserves, have been identified as important areas within the landscape. They have therefore been included in the analysis.

Table 4: Bush Forever Score

Patch Size	Score
Bush Forever or Northern Crown Reserve	2
Plantation/Cleared	0

2.5 Vegetation Patch Size

Objective: Large, well connected areas provide habitat for a broad range of species. This variable, therefore, has been included to weight large well connected vegetated areas higher than those which are small and isolated.

Table 5: Patch Size Score

Patch Size	Score
>1000ha	5
250-1000 ha	4
100-250 ha	3
20-100 ha	2
<20ha	1
Plantation/Cleared	0

2.6 Existing Threatened Flora Records

Objective: Give a high priority to areas within a distance of 500m of an existing threatened species records.

Existing threatened species records indicate the existence of landscape features preferred by species at risk. The methodology therefore gives a high weight to areas within a distance of 500m of an existing threatened species record. The record is buffered by 500m to allow for possible inaccuracies in data capture and the potential movement of some threatened species away from the site where they were recorded.

Table 6: Existing Threatened Species Flora Score

Threatened Species Records	Score
Within 500m of existing threatened flora record	4
Outside 500m threatened flora record	0

2.7 Western Swamp Tortoise Habitat Boundary

Objective: Give priority to Western Swamp Tortoise Habitat.

The Western Swamp Tortoise (WST) is a rare and threatened species that utilises parts of the Gnangara study area. The WST has two designated areas within the study area identified as "habitat", being Twin Swamps and Ellen Brook Nature Reserves. These areas have been identified as important and included in the analysis.

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Table 7: Western Swamp Tortoise Habitat Boundary Score

Threatened Species Records	Score
Within Tortoise Habitat	4
Outside Tortoise Habitat boundary	0

2.8 Western Swamp Tortoise Policy Boundary

Objective: Give priority to land within the Western Swamp Tortoise Policy boundary.

The Western Swamp Tortoise (WST) is a rare and threatened species that utilises parts of the Gnangara study area. A Policy Boundary has been defined for the species. Land within the area defined by the WST Policy (Environmental Protection (Western Swamp Tortoise Habitat) Policy Approval Order 2002) have been allocated an additional score in the methodology.

Table 8: Western Swamp Tortoise Habitat Boundary Score

Threatened Species Records	Score
Within Tortoise Policy Boundary	2
Outside Tortoise Policy boundary	0

2.9 Important and Conservation Wetlands

Objective: Give priority to Important or conservation wetlands, resource enhancement and multiple use wetlands.

These are defined by the layer "geomorphic wetlands", and are allocated the following scores.

Table 9: Wetlands Score

Wetlands	Score
Contains "Important" or "Conservation" wetlands	5
Contains "Resource Enhancement" wetlands	3
Contains "Multiple Use" wetlands	2
Does not contain wetlands	0

2.10 Final Score

A final score is achieved once all layers are analysed and combined within a GIS. The final score allocates the areas of highest priority with the highest score, with the areas of lowest priority allocated the lowest score. A total maximum score of 33 is achievable, however the actual maximum score achieved is 28. The lowest score possible is 0.

2.11 Formulation of scoring and significance categories

The formulation of significance categories and the scoring system was undertaken via a consultative process of iterations of mapping and criteria with DEC officers. After project team discussion, a new set of scores and modified criteria was produced based on changes to the relative values of criteria within each attribute as well as across the range of attributes. Although this was a subjective approach, decisions were made based on knowledge of the data and the significance of each attribute to the landscape.

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2.12 Derivation of CSA Score classes

Once a refined map was produced, an analysis of the final scores was undertaken to determine how to divide the scoring for the final map. An analysis of the distribution of the number of polygons for each possible score was undertaken. This approach grouped each of the five classes into approximately 20% blocks, which provided an even breakdown of the number of polygons within each class.

Please note that cleared land was excluded by the CSA. As these areas are relatively data poor, or may have biodiversity value at a different scale to the adjoining landscape, they were excluded so that the model did not infer that they have a low biodiversity value.

2.13 Limitations of Data

The CSA analysis was carried out utilising data that was currently available for the entire study area. The following limitations apply:

- Issues of mapping scale: The vegetation mapping used to identify "Vegetation Community Status" is a coarse layer. Further refinement of the vegetation mapping could identify additional vegetation types of high conservation significance.
- The remnant native vegetation layer used to generate patch size was quite coarse, leading to large well connected patches of vegetation. In reality it is likely that gaps exist between vegetation patches which the mapping has not identified.
- No vegetation condition data was available for the entire study area. While some data was available for a very small area, it was not widespread and was therefore not used within the analysis.
- Threatened fauna information was not available for the study area.

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3. Results

The results of the CSA Analysis have been presented in a mapped format. Figure 1 presents the final 5 CSA classes in a mapped format. The mapped results of the individual scoring steps have been provided as Appendix 1.

3.1 CSA Scoring Results

The derived CSA score classes are shown below (Table 10) along with the percentage break down of each class (Table 11).

Table 10: Option 2 Final Classes

Final Score	Conservation Priority
Very Low	1-2
Low	3-4
Moderate	5-6
High	7-9
Very High	10-28

Table 11: Statistical Analysis of Option 2 Classes

CSA Score Results	Polygon Count	Polygon Count (%)	CSA Score Classes
0	1026		
2	2183	12.5	Very Low (12.5%)
3	1524	8.7	Low (20.7%)
4	2090	11.9	
5	2403	13.7	Moderate (20.8%)
6	1238	7.1	
7	2033	11.6	High (23.3%)
8	994	5.7	
9	1041	6.0	
10	913	5.2	Very High (22.8%)
11	752	4.3	
12	635	3.6	
13	642	3.7	
14	261	1.5	
15	357	2.0	
16	117	0.7	
17	89	0.5	
18	78	0.4	
19	52	0.3	
20	40	0.2	
21	9	0.1	
22	17	0.1	
23	9	0.1	
24	4	0.0	
25	1	0.0	
26	5	0.0	
27	3	0.0	
28	3	0.0	

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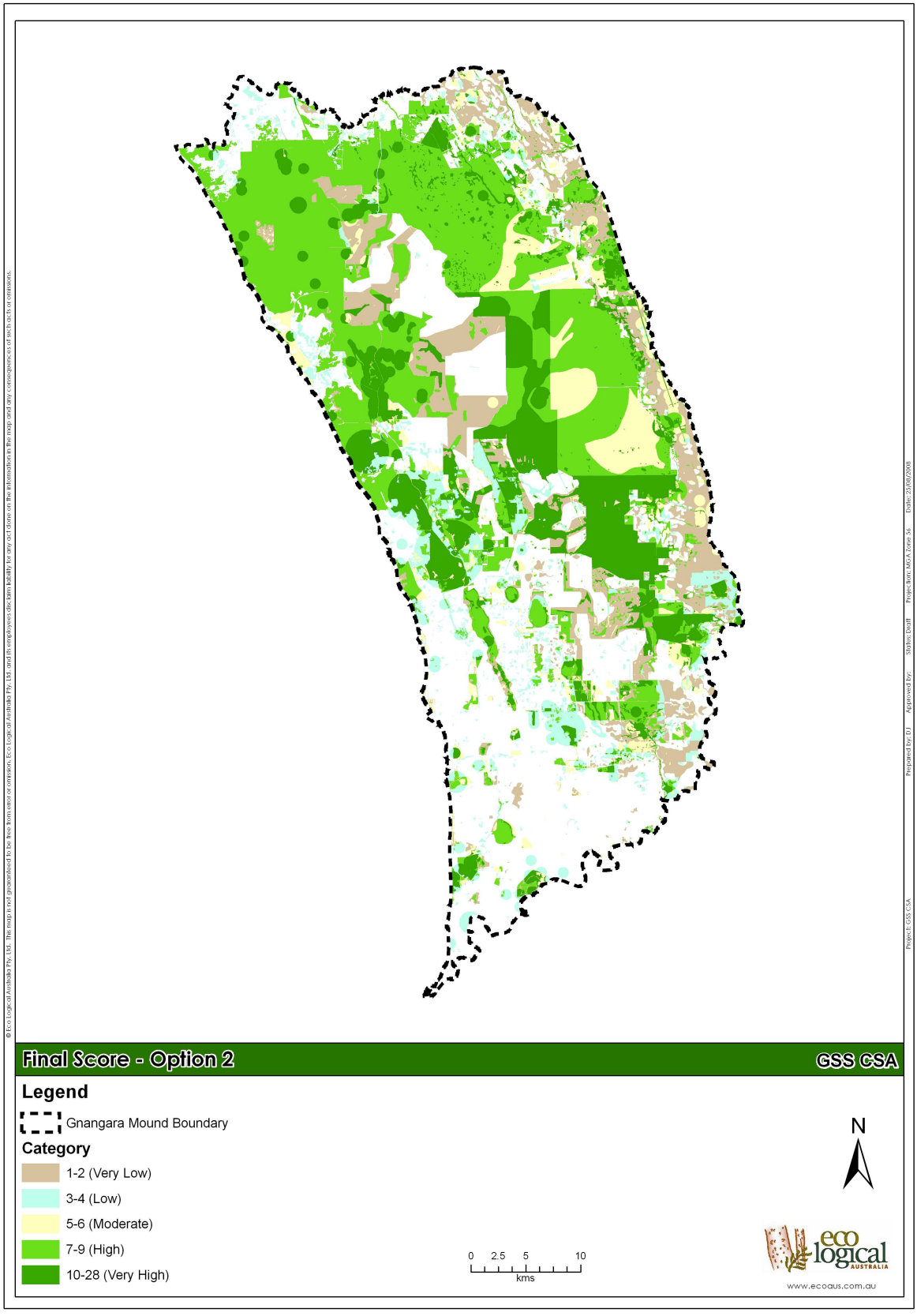
Figure 2: Final CSA Map



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4. Discussion of Results

As discussed throughout this document, the CSA mapping is intended to be used as a trigger for identifying relative conservation value land and informing decisions about future land use for urban development, and where to target efforts for consolidation of the existing conservation reserve network.

The areas in the final map (Figure 1) that indicate areas of "High" and "Very High" significance identified within this option are predominantly driven by the intersection of key attributes, namely:

- Threatened and Critically Endangered Ecological Communities.
- Vegetation Community Status.
- Proximity to Threatened Flora.
- Wetlands.

There are a number of items displayed in the mapping that merit further discussion and analysis. These include:

- Large high value lands to the north and lower value lands to the south - generally reflective of the distribution of conservation reserves and settlement patterns around Perth and the SCP.
- Isolated patches of high conservation value land surrounded by built up or cleared areas. If these are to be kept, appropriate planning controls will need to be considered to afford them appropriate protection.
- Isolated patches of vegetation with an edge to area ratio that may make them less viable in the longer term – for example long linear patches of vegetation in the south.
- Wetland vegetation on the eastern side of the escarpment that has been scored as low value, although anecdotal evidence suggests this land has a higher value.
- Artifacts of mapping that include:
    - Straight line boundaries that separate otherwise contiguous vegetation.
    - Different rankings within the same polygon, particularly at smaller sizes, may not necessarily reflect the conservation value of the patch as a whole.
    - Circular or uniform buffers that may not necessarily be the most appropriate shape for a conserved patch of bushland, or within the context of surrounding land use.

Land outside the study area boundary will also have an effect on the overall values presented on the map. Issues that need to be considered in the conservation planning stage include:

- Proximity of land in the study area to large patches outside.
- Threats to viable patches from adjoining land use outside.
- Contextual information on the presence of similar conservation values and what role they may play in development tradeoffs.

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5. Recommendations

The recommendations on the following page are provided as a suggested next logical step in this process, and build on the CSA mapping.

5.1 Conservation Plan

In order to achieve the overall objectives of defining a conservation network for the Gnangara region, the recommended next step for this analysis would be the preparation of a Conservation Plan. A conservation plan would combine a CAR analysis (Comprehensive, Adequate, Representative) of the Gnangara landscape (see below) with the CSA, as well as provide recommendations on accompanying planning provisions for areas identified as being critical to the conservation network.

This conservation plan would be focused on land that scored highly in the CSA, the CAR analysis and that is outside of the current reserve system, and would require further planning consideration, as discussed below. We also note that the connectivity mapping will need to be incorporated into a future conservation plan.

5.2 Planning considerations

The conservation plan will provide priority areas that can complement the existing reserve system to provide an outline of the future conservation network for the Gnangara, with appropriate planning recommendations and provisions to deal with off reserve conservation, appropriate buffers to reserves, controls to adjoining development, recommendations for management planning etc. These would need to tie into the requirements of regional and town planning strategies and schemes, for the local government areas that are covered in the Gnangara Sustainability Strategy.

The conservation plan will also need to consider the viability of existing patches, the opportunities that exist within and outside the study area to develop tradeoffs, leverage loss of vegetation and target priorities for protection and restoration (This could be linked to an offsets strategy). The issues identified with the CSA that require further interpretation will also need to be addressed.

5.3 CAR Analysis

The Conservation Significance Assessment can be used in conjunction with a CAR analysis to further inform planning for a future conservation network and achieve a CAR reserve outcome. Representativeness of vegetation community and condition would be an ideal measure for complementing the CSA. As existing community and condition datasets are coarse or non-existent, a surrogate dataset could be utilised. Initial scoping of required approach indicates that soils data obtained by Eco Logical Australia as part of the data audit process could be used as a surrogate for representativeness across the landscape. The soils data to be used would be the Department of Agriculture 'Soil Groups of Western Australia' and the 'Soil Landscape Mapping'.

The soil data can be interrogated several ways, and further research would be required before analysis could be undertaken. From ELAs initial review it is likely that analysis could be conducted on one of the mapped entities listed below:

- Map Units
- Soil Groups
- Soil Super Groups

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- Land Units

The CAR analysis would involve identifying the representativeness of each soil unit within the existing reserve network, to determine which are adequately represented in reserves and which are not. Soil units less represented within the existing reserve network would then be identified. These would be targeted as significant and important to creation of a CAR reserve system and would receive an appropriate ranking.

5.4 Offsetting Strategy

The CSA and Connectivity analysis effectively ranks the landscape and produces a reference map for conservation value. This reference mapping can form the basis for identifying potential donor and receiving sites across the landscape, as part of an offsetting strategy. An offsetting strategy aims to guide environmental enhancement and restoration in key areas identified across the landscape, and ameliorate negative environmental impacts of development at a regional and local level whilst facilitating some development, which may have negative impacts, in appropriate areas. An offsetting strategy provides the policy and mechanism for co-ordinating this process.

An offsetting strategy should set out principles and approach to offsets in a regional and state context, a discussion of the process and offset mechanism, develop offset ratios and present guidelines for implementation. The focus should be on a transparent, repeatable process that is easy to understand and implement.

5.5 Additional considerations

The CSA mapping provided with the current analysis provides a solid foundation for understanding the relative conservation values in the landscape and can be used as a tool for future conservation planning.

If desired, the CSA methodology and analysis can be improved and refined with the capture of finer scale and more accurate data layers. Data layers that would improve the CSA outputs, and potential options to capture this data, are outlined below.

1. **Vegetation presence/absence:** The location and extent of native vegetation underpins the CSA methodology, with the generation of patch size and vegetation status relying on the information.
2. **Vegetation type:** The generation of vegetation status also relies on the accurate mapping of vegetation type throughout the study area. Access to accurate vegetation type information would allow highly threatened vegetation types to be identified at a fine scale, thus increasing their weighting in the CSA analysis.
3. **Vegetation condition:** Vegetation condition information across the study area would allow areas of differing condition to be ranked accordingly in the CSA analysis.

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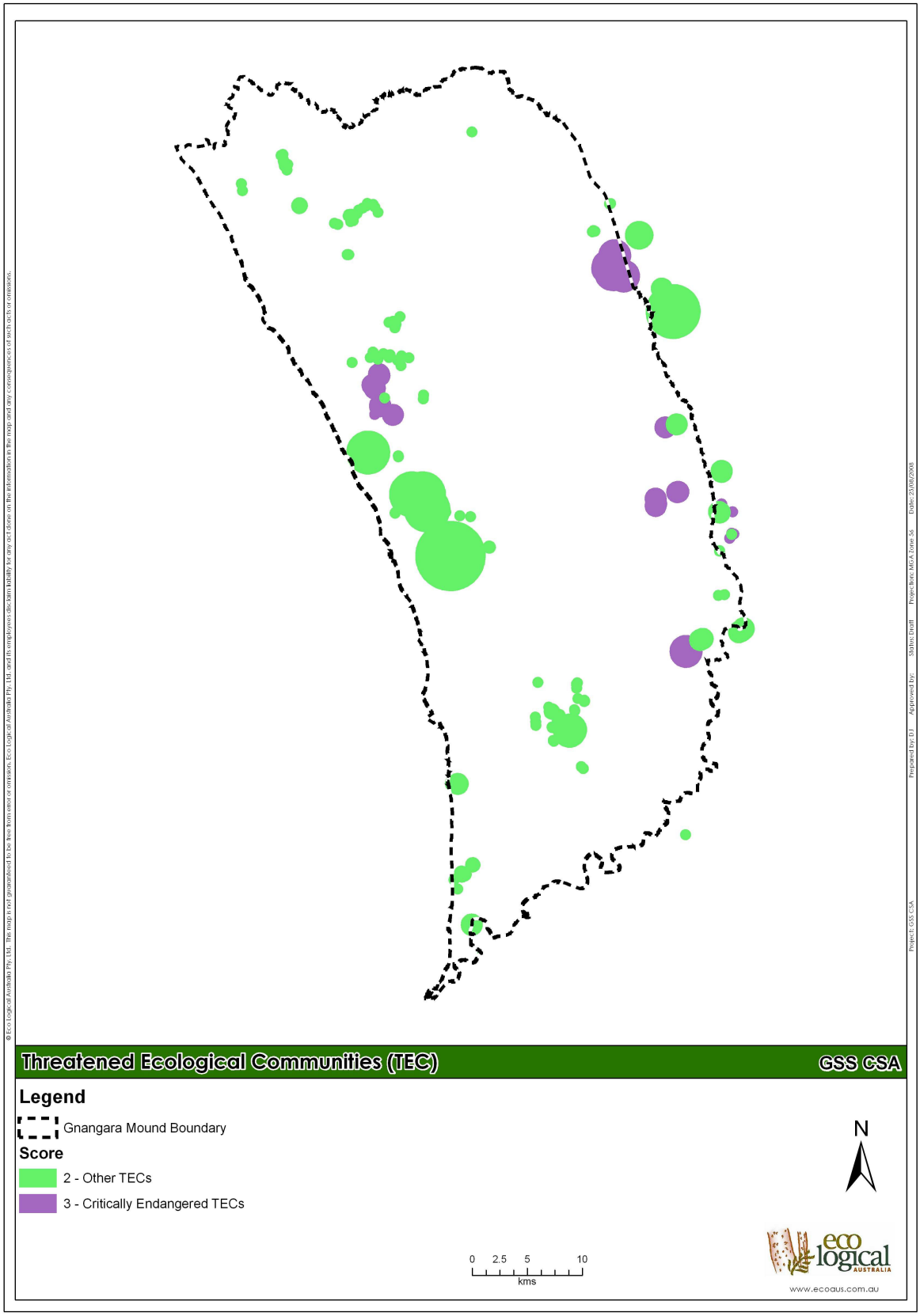
6. Appendix 1: Input Data



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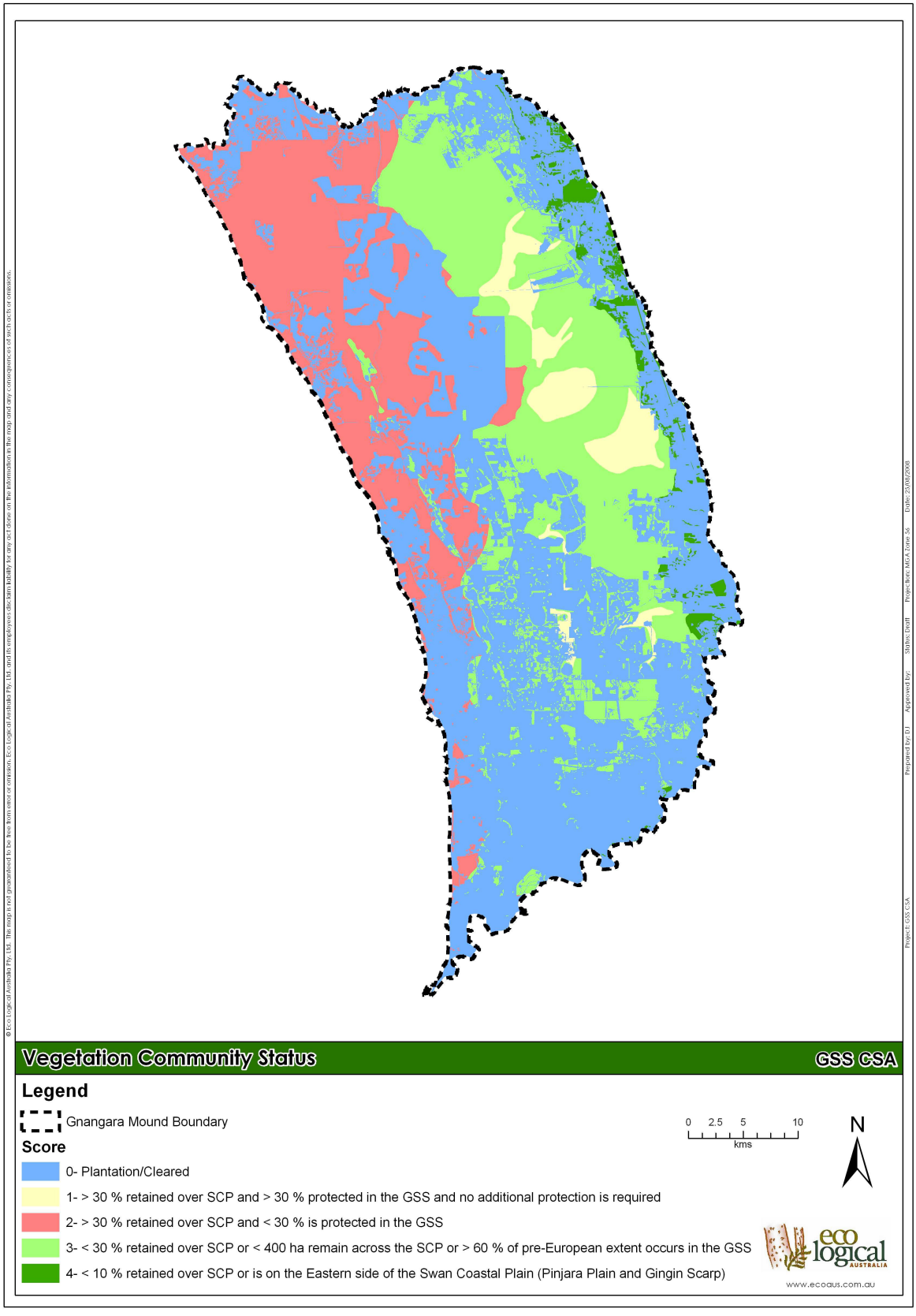

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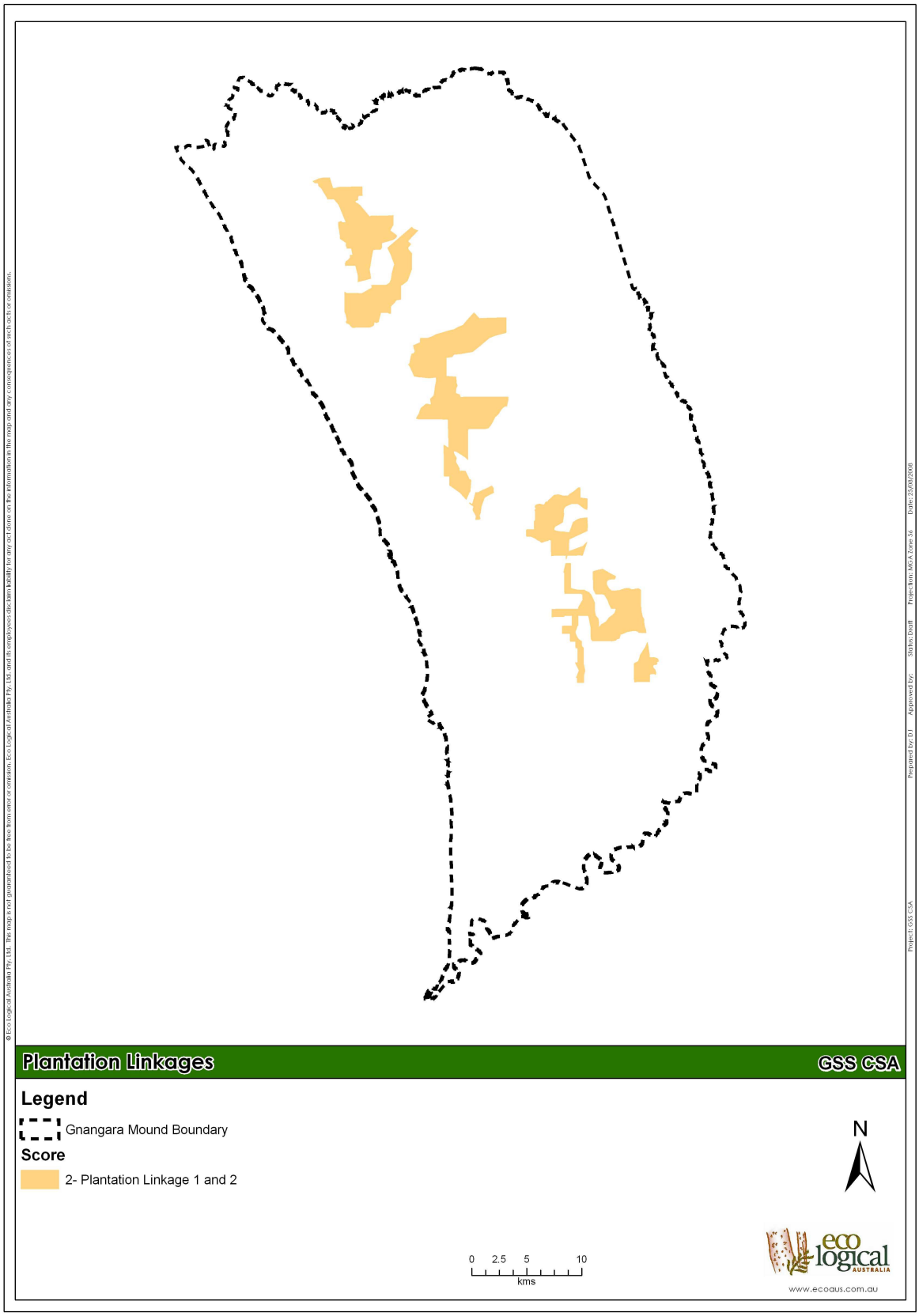

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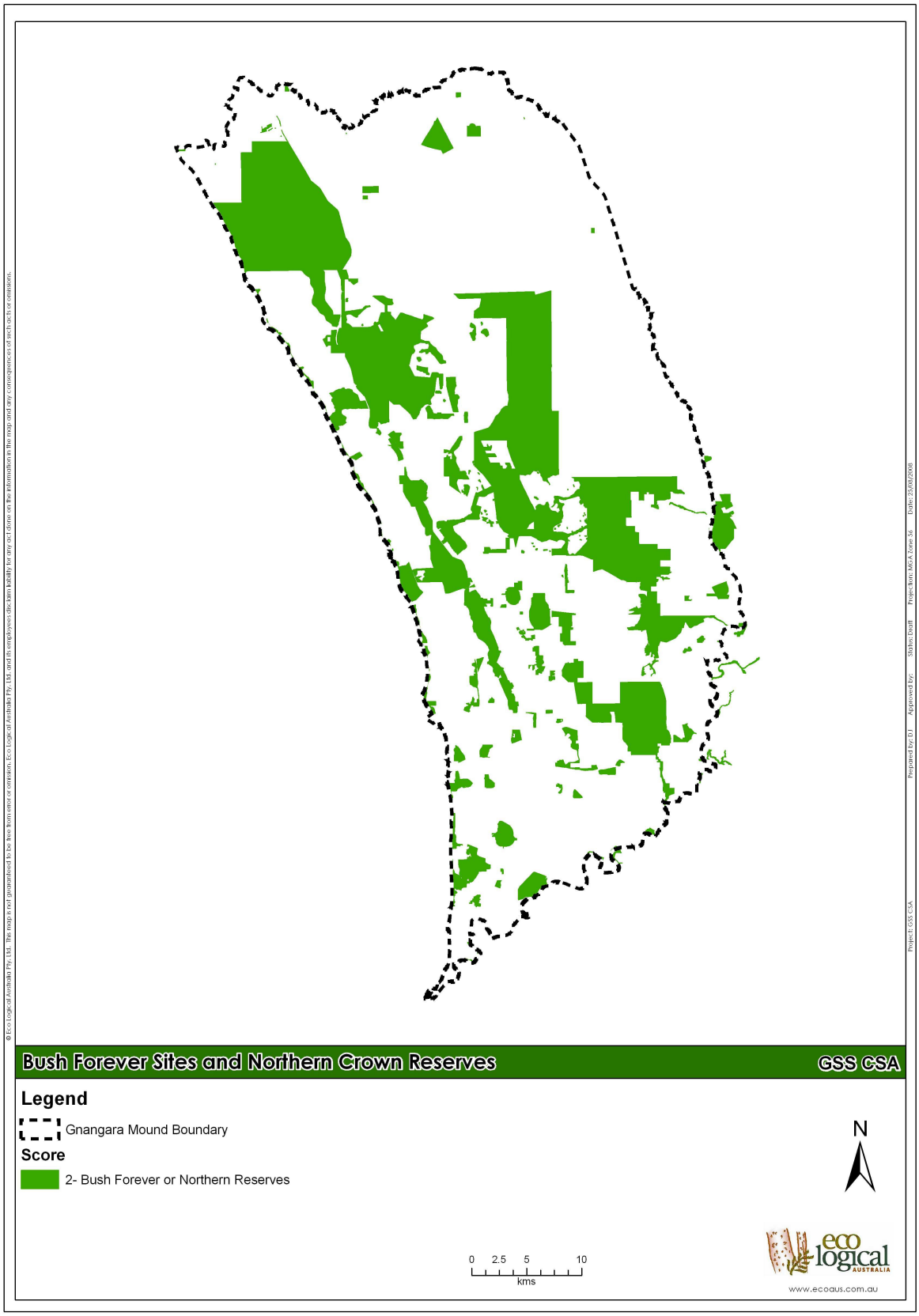

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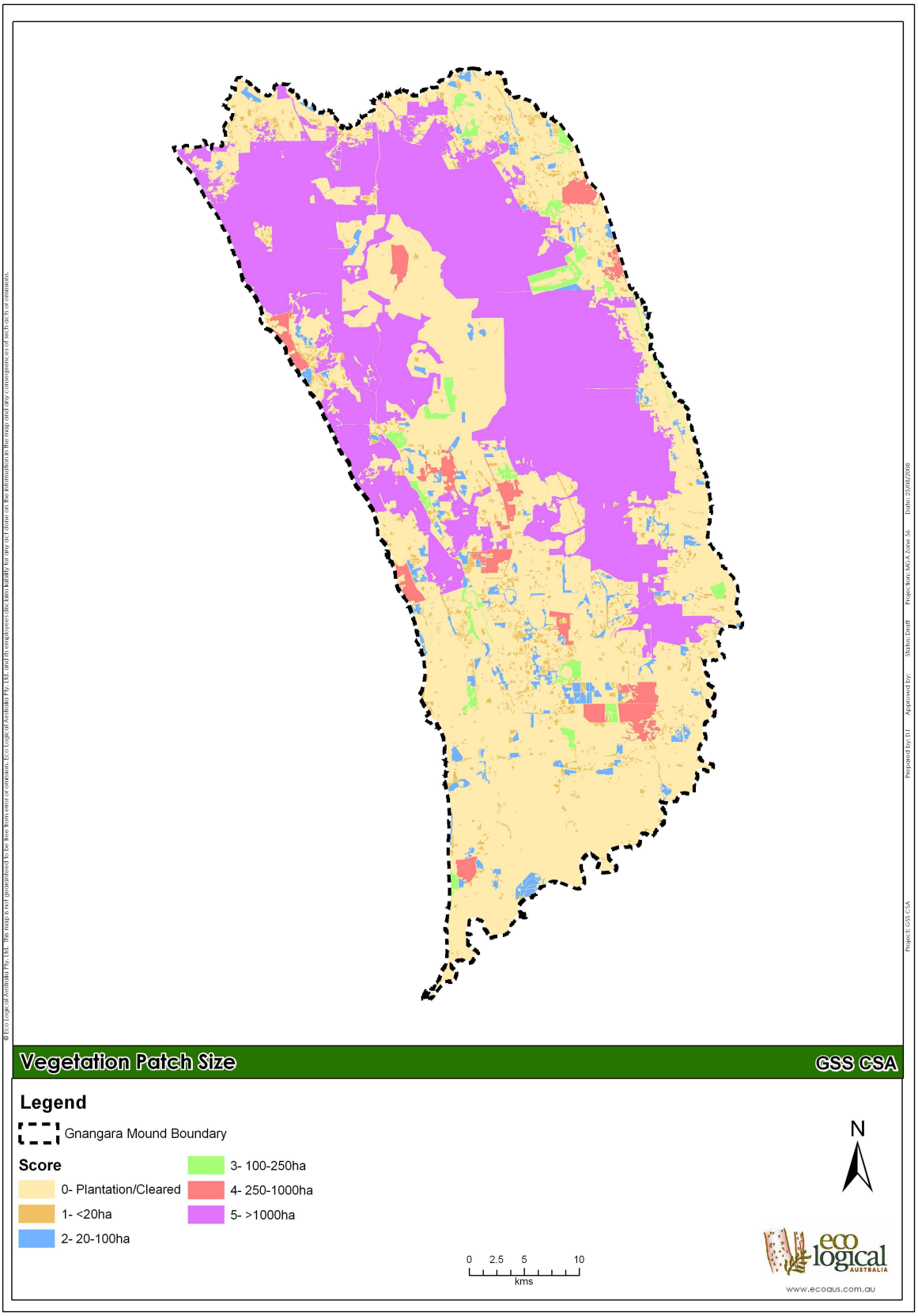

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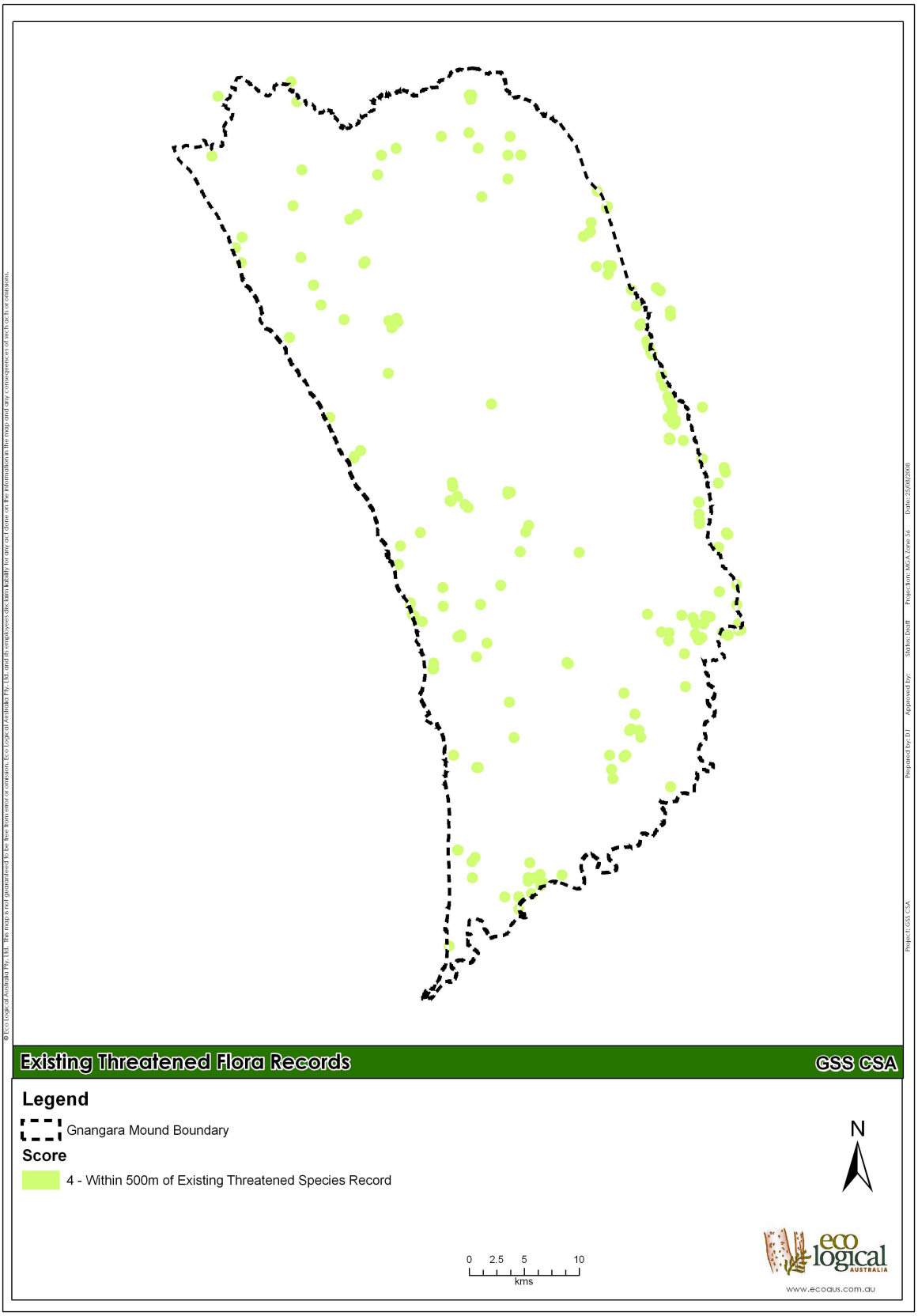

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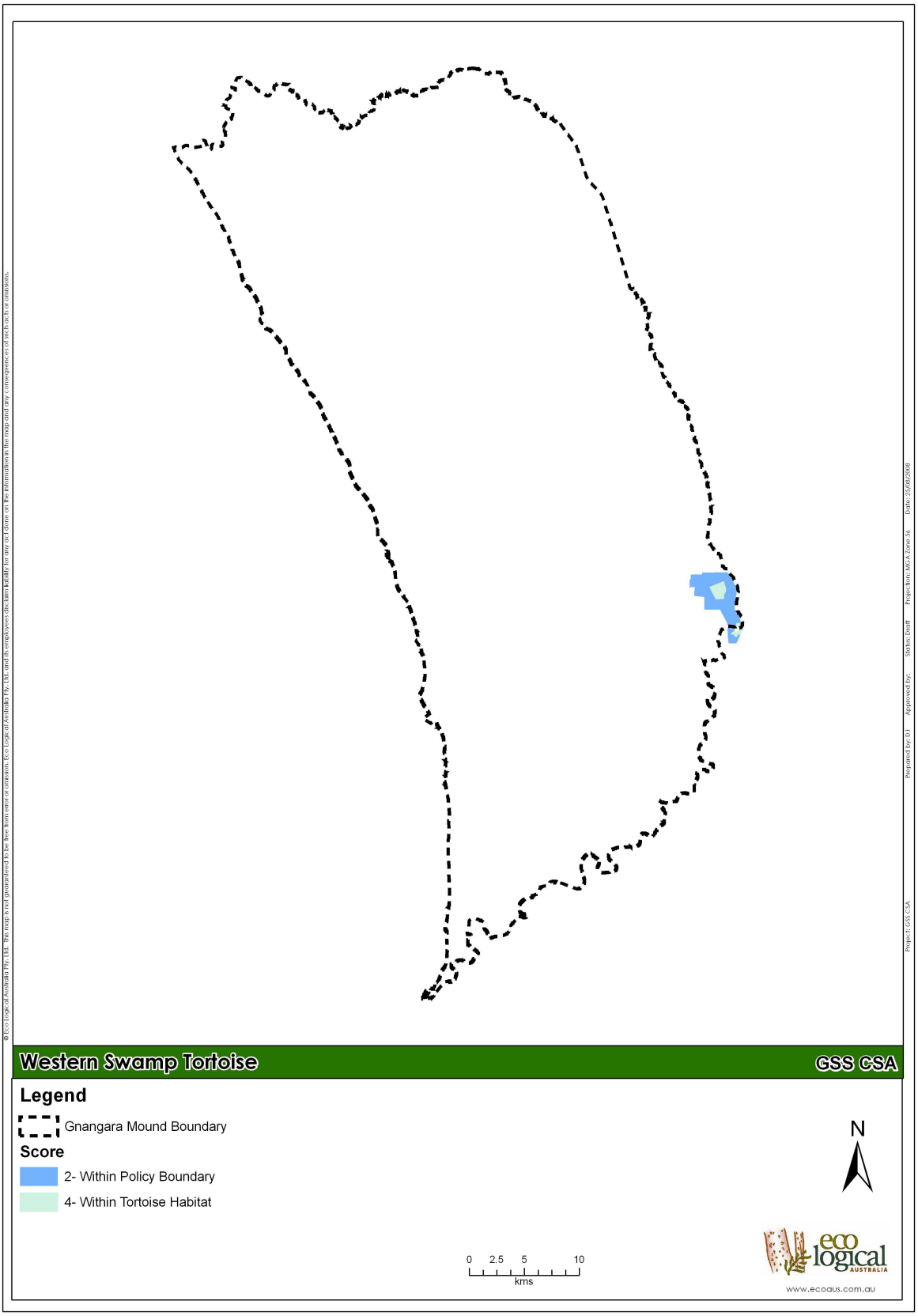

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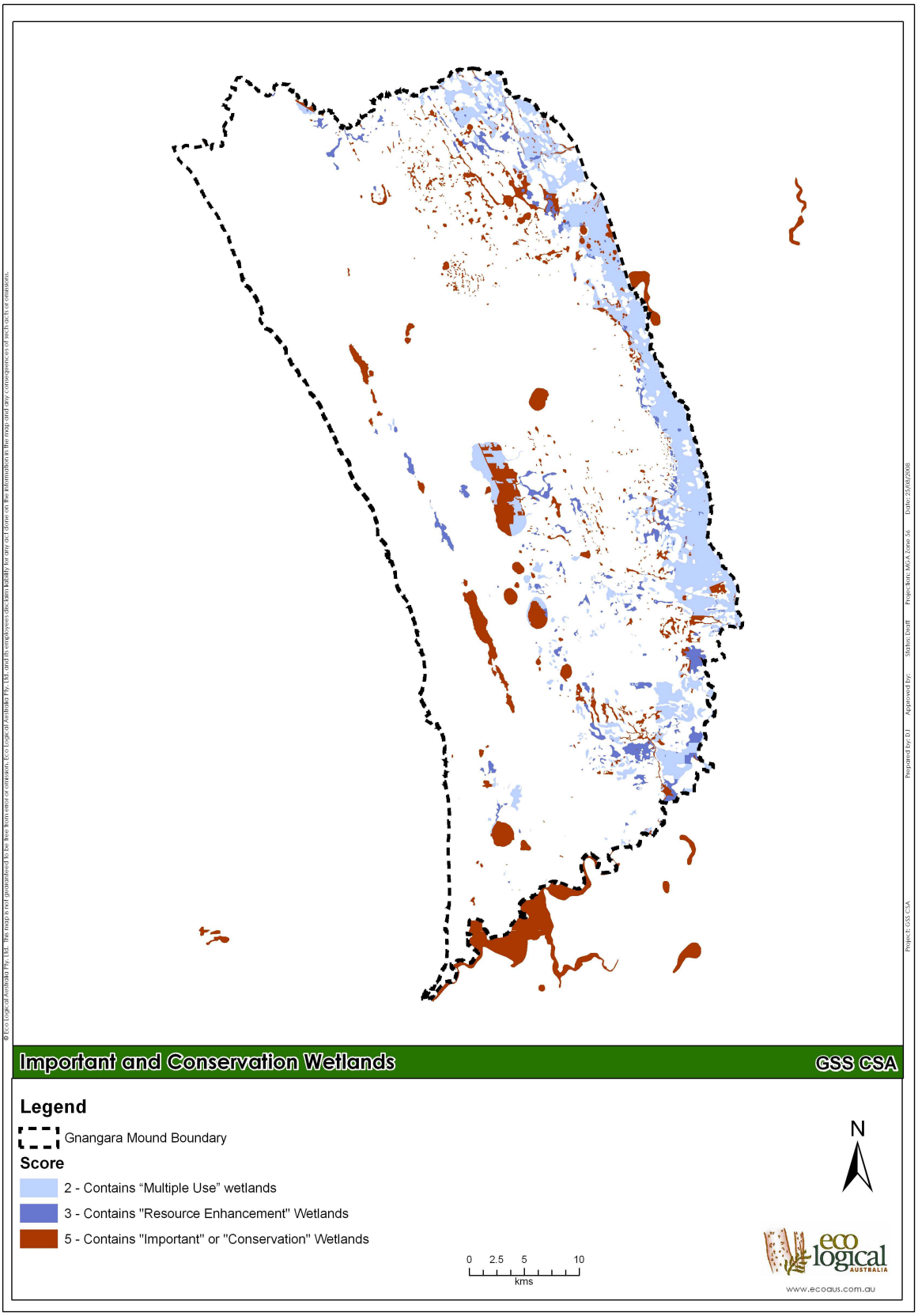

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