

ESA

Environmental
Services Australia

2021

Wallan Biodiversity Assessment



Acknowledgement of Country

The authors acknowledge the traditional owners of Country throughout Australia,
and their continuing connection to land, sea, and community;
and pay respect to them and their cultures,
and to their Elders both past and present.



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Environmental Systems Analysis
Assessment 4: GIS Report*

Contents

Table of Contents

- Introduction 3
 - Project Context 3
 - Contextual Grounding 4
 - Study Area 5
 - Terrain Overview 6
- Results 7
 - Vegetation Area Analysis Results 7
 - Land Use Area Analysis 8
- Maps 9
 - Vegetation Classification 9
 - Minimum Protection Zones 10
- Recommendations 13
 - Advised Protection Zones 13
- References 15
- APPENDIX 16



Introduction

Project Context

Environmental Services Australia (ESA Pty Ltd) was commissioned by Mitchell Shire Council to make recommendations to support the future development of Wallan, Victoria based upon council guidelines while maintaining current blue/green spaces in the study area.

The objective of this assessment is to

- Identify areas that protect, at a minimum, a percentage of the following vegetation types.
 - o Endangered, 99% protection
 - o Vulnerable, 80% protection
 - o Depleted, 50% protection
- Maps identifying these vegetation types and illustrate recommended protected areas
- Calculate the required private land acquisition needed for the protection areas

The ultimate objective of this process is to maintain the sustainability of ecological processes and values while meeting the requirements of population growth and precinct development.

Contextual Grounding

Australia is listed in the top 10 land clearing counties in the world (Heagney, Falster & Kovač 2021). 564,800 hectares of natural vegetation was removed in 2000 alone and while land clearing has stabilised somewhat since 2000 through government legislation and attention, Australia still clears more land than any other developed country in the world (Pickering & Hill 2007). This land clearing has resulted in the extinction of 61 plant species and an additional 1,240 listed as vulnerable or threatened (Pickering & Hill 2007). This places Australia as one of the seven countries contributing to more over half the world's global biodiversity loss (Heagney, Falster & Kovač 2021).

In order to combat the high levels of land clearing, the Australian government recognises the importance of the local government authorities, with a focus on urban-rural governments and councils roll in the protection and biodiversity conservation of vegetation in areas with high urban development potential (Stenhouse 2004). Because majority of urban-rural land is private property (Stenhouse 2004) it is important to understand where private land holdings and vegetation protection zones overlap, with the aim of the local council to either buy back the land or work in coordination with landholders to promote effective stewardship of protected vegetation and promote biodiversity.

While there are many methods of modelling vegetation protection zoning, this assessment will focus on conservation of grouping the largest areas of vegetation types where possible. Our investigation into various models shows that the best outcomes have been seen with the establishment of reserves large enough to remain viable (Lunt 1991, Keddy 2005) and that isolated areas tend to have lower biodiversity or species richness (Wolf 2001). It is for this reason that the largest areas will be prioritized in order to meet the Mitchell Shire Council's minimum area criteria per vegetation type.

In addition to minimum vegetation protection zones, the assessment will make recommendations of additional protection zones for the council's consideration.

1. *Riparian Zones*

Vegetation adjacent to water courses of either natural or human-made. These areas are of importance as different soils and proximity to water produce vegetation that is distinct from that of surrounding areas (Hancock, Ladd & Froend 1996). Preserving these areas will further preserve and promote biodiversity in the area. In order to improve terrestrial biodiversity surrounding riparian zones, a buffer zone of 62.6m and 169.4m for low and medium importance water courses respectively will be utilised. These buffer widths are supported through literature of (Hansen et al. 2015), who conducted an analysis of multiple case studies to find ideal widths to support various ecological functions (Figure 2) including terrestrial biodiversity.

| Ecological function | Land-use intensity | | | No. cases |
|---|--------------------|---------------|--------------|-----------|
| | Low | Moderate | High | |
| Improving water quality | 20.6 (2.6) | 31.8 (9.4) | 26.4 (3.6) | 68 |
| Inputs for aquatic fauna | 38.6 (9.6) | 50.0 (NA) | — | 10 |
| Shading | 35.6 (8.5) | — | — | 9 |
| Terrestrial biodiversity (flora and fauna combined) | 62.6 (30.5) | 169.4 (105.6) | 130.0 (57.2) | 44 |

Table 1 - Recommended buffer widths for varying ecological functions (Hansen et al. 2015)

2. *Flora and Fauna Guarantee (FFG) Act Threatened list*

The Victoria Biodiversity Atlas (VBA) in conjunction with the Australian FFG provides spatial information of threatened, vulnerable, and endangered species. In order to best conserve and protect vegetation but also support the urban expansion of Wallan, species only listed on both the FFG, and VBA will be taken into consideration as the Victorian Advisory List from VBA is now considered obsolete ('Metadata | Victorian Government Data Directory' 2021).

Further zones that the Mitchell Shire Council can use as advisements will be listed and discussed in the results and recommendations. It should also be noted that vegetation types, and their species are migratory and dynamic over wide ranges of time and scale (Boitani 2003). Although this evaluation is appropriate for the current time and size, we urge that it be repeated over time, and as additional urban growth expands in the Wallan area.

Study Area

Location: Wallan, Victoria, 3756

Population: ~11,074 (Australian Bureau of Statistics 2016)

Elevation: 308m

Council: Mitchell Shire Council, 113 High St, Broadford VIC 3658

Study Area: ~59km²

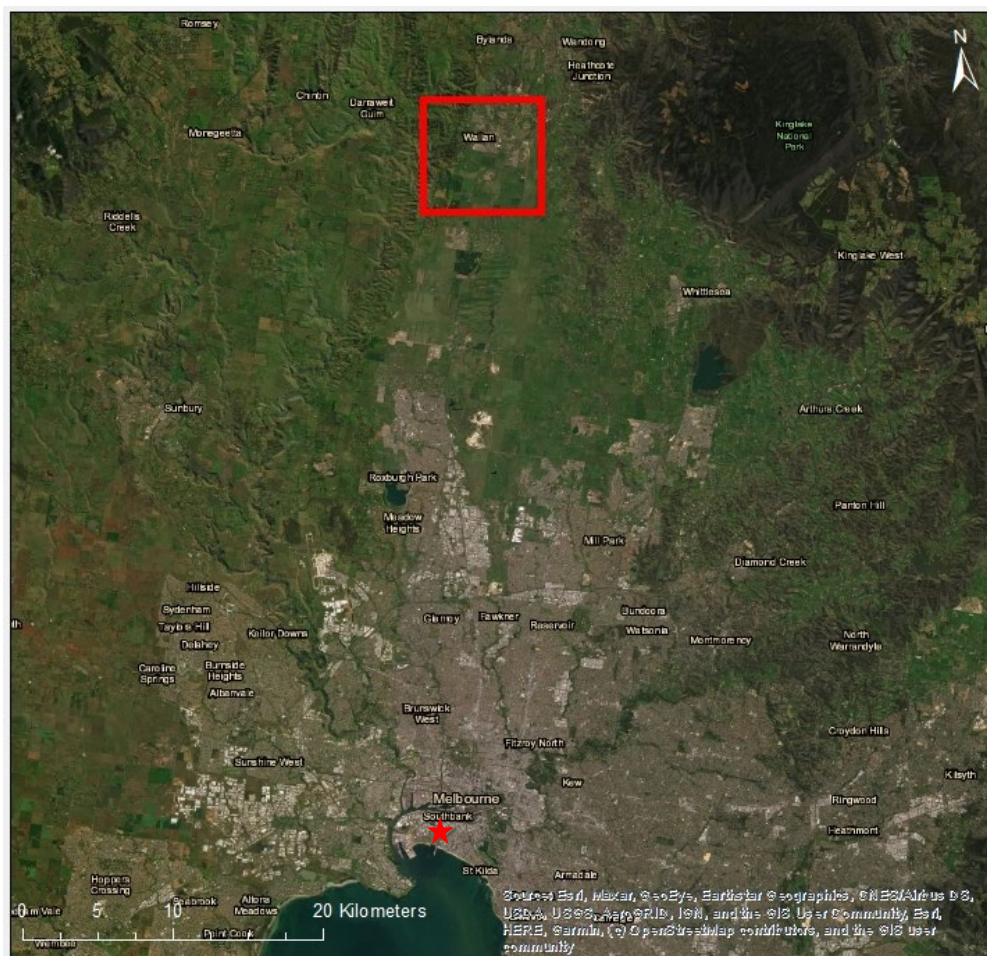


Figure 1 - Wallan study area extent in relation to Melbourne CBD

Terrain Overview

Wallan is located approximately 51 km north of Melbourne. Minimum elevation of 280m, maximum of 400m, and average 344m (Fig. 2). The town centre and adjacent urban development is located predominantly in the north-west region of the study area with rail services running south to north-east. The town centre of Wallan is mainly flat with mountainous regions to the north-west ranging south-westward.

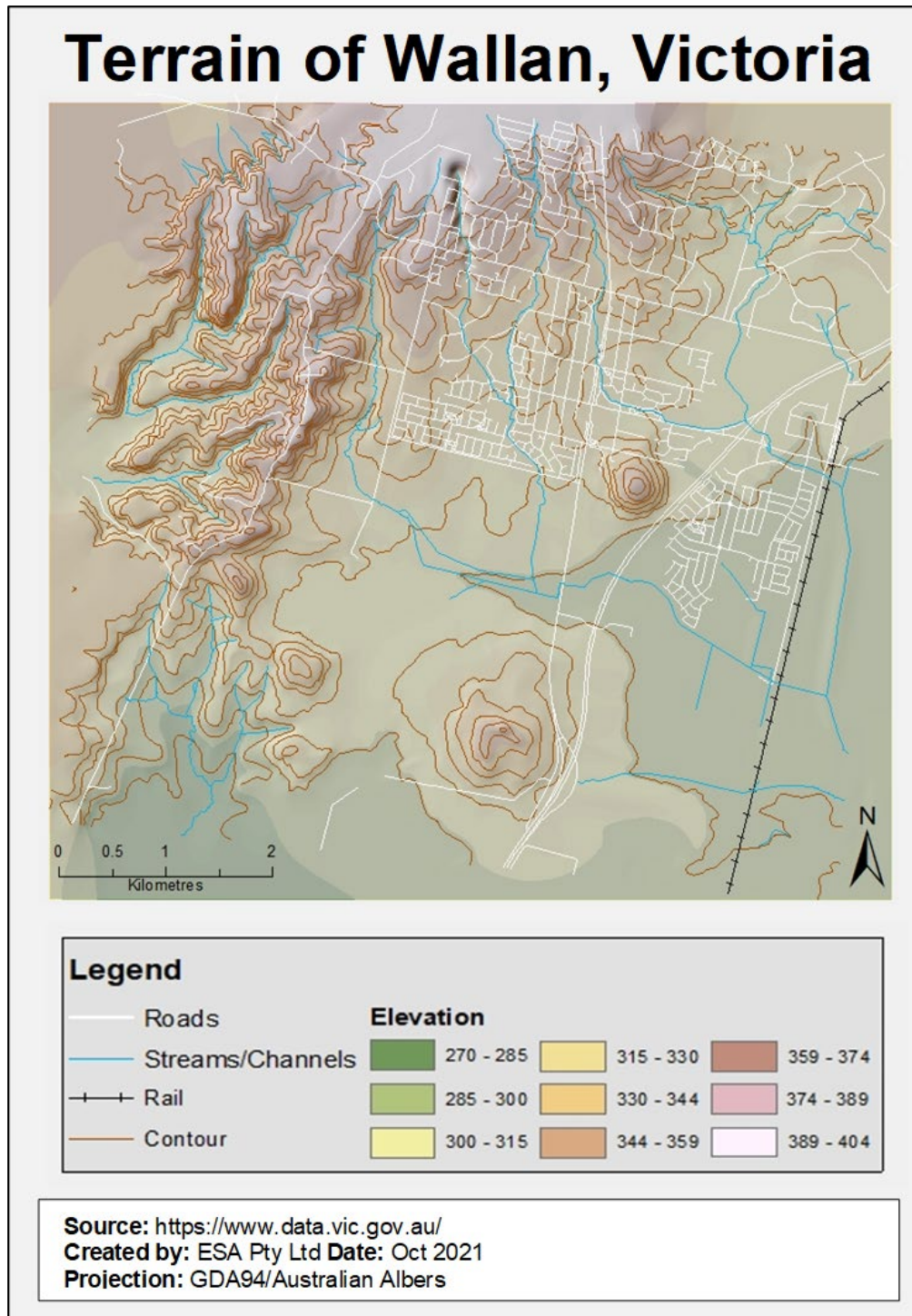


Figure 2 - Wallan Terrain Profile

Results

Vegetation Area Analysis Results

The Wallan area comprises of a total of 1,164.22 hectares of vegetation classified as endangered, vulnerable, or depleted. Swampy Riparian Complex makes up 66% of the endangered vegetation, emphasising the need for water course buffer zones to protect these high biodiverse areas. Valley Grassy Forest makes up 99.9% of vulnerable vegetation type, and Grassy Dry Forest makes up 66% of the depleted vegetation (Table 2).

| Vegetation Conservation Status & Type | Area (ha) |
|--|------------------|
| Endangered | 94.53 |
| Grassy Woodland | 0.48 |
| Plains Grassland | 3.43 |
| Plains Grassy Wetland | 0.81 |
| Plains Grassy Woodland | 26.96 |
| Swampy Riparian Complex | 62.84 |
| Vulnerable | 105.22 |
| Herb-rich Foothill Forest | 0.09 |
| Valley Grassy Forest | 105.13 |
| Depleted | 964.47 |
| Grassy Dry Forest | 633.98 |
| Herb-rich Foothill Forest | 330.59 |
| Total | 1164.22 |

Table 2 – Total area by vegetation classifications and species

Mitchell Shire Council provided ESA with minimum save percentages of each vegetation type and the resulting minimum protection areas can be viewed in Table 2.1.

| Vegetation Conservation Status | Area (ha) | Min % | Min Protection Area (ha) |
|---------------------------------------|------------------|--------------|---------------------------------|
| Endangered | 94.53 | 99% | 93.58 |
| Vulnerable | 105.22 | 80% | 84.18 |
| Depleted | 964.47 | 50% | 482.24 |
| Total | 1,164.22 | | 660.00 |

Table 2.1 – Minimum save area by vegetation classification type

Land Use Area Analysis

Due to vegetation types located on both private and public land, a breakdown by type was conducted in order for the council to understand the possible acquisition of private land and what was already existing on public land including the rail reserve. Table 3 indicates the total area of land parcels containing each vegetation type. Due to some land parcels containing multiple vegetation types, a secondary analysis was conducted to omit any doubling of land parcels that contained more than one vegetation type (Table 4).

| Vegetation Conservation Status | Total Area (ha) | Min % | Min Area for Protection | Private Land Parcel Area | Public Land |
|---------------------------------------|------------------------|--------------|--------------------------------|---------------------------------|--------------------|
| Endangered | 94.53 | 99% | 93.58 | 3,139.79 | 64.92 |
| Vulnerable | 105.22 | 80% | 84.18 | 360.10 | 0.00 |
| Depleted | 964.47 | 50% | 482.24 | 2,552.99 | 0.00 |
| Total | 1,164.22 | | 660.00 | | |

Table 3 – Vegetation by classification and resulting land use parcel areas

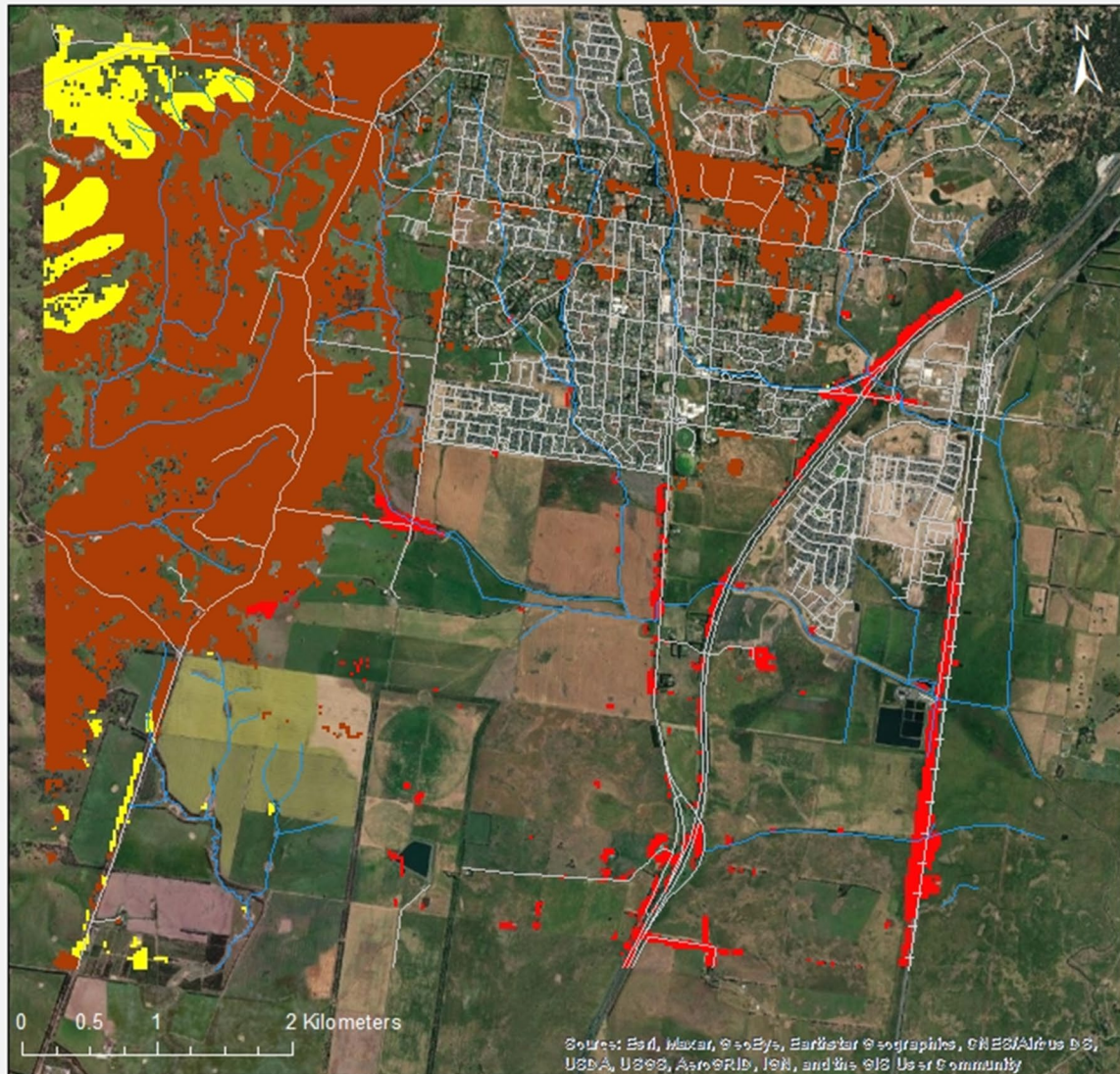
| Private Land Parcel Area (ha) | Public Land Parcel Area (ha) | Total Land Parcel Area (ha) |
|--------------------------------------|-------------------------------------|------------------------------------|
| 4,765.66 | 64.92 | 4,830.58 |

Table 4 – Total land use areas by type that contain vulnerable, endangered, and or depleted vegetation

Maps

Vegetation Classification

Vulnerable, Endangered, and Depleted Vegetation Extents



Legend

- Vulnerable Vegetation
- Endangered Vegetation
- Depleted Vegetation
- Roads
- Rail
- Streams/Channels

Created by: ESA Pty Ltd Date: Oct 2021
Source: <https://www.data.vic.gov.au/> Projection: GDA94/Australian Albers

Figure 3 - Vegetation areas by classification type

Minimum Protection Zones

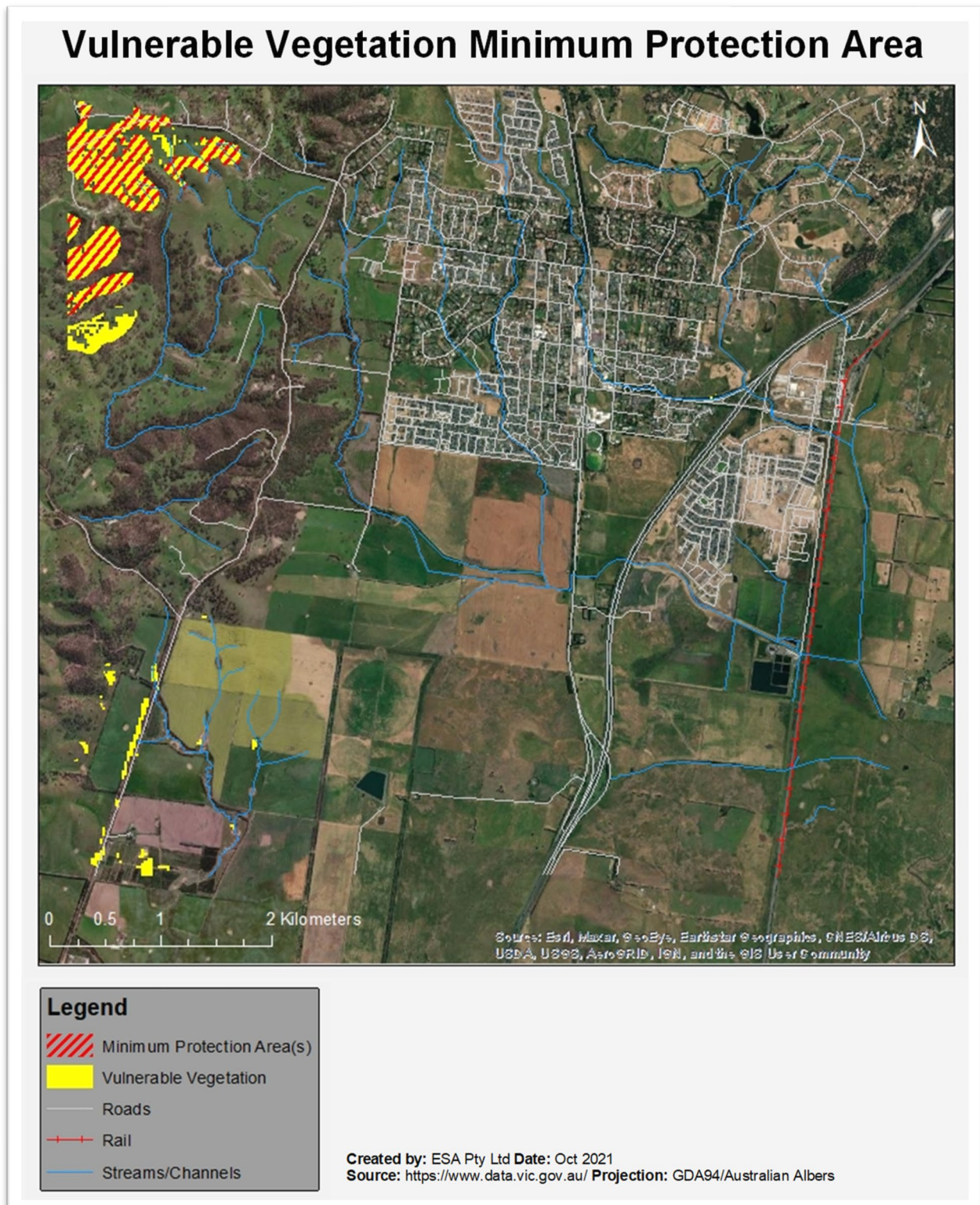
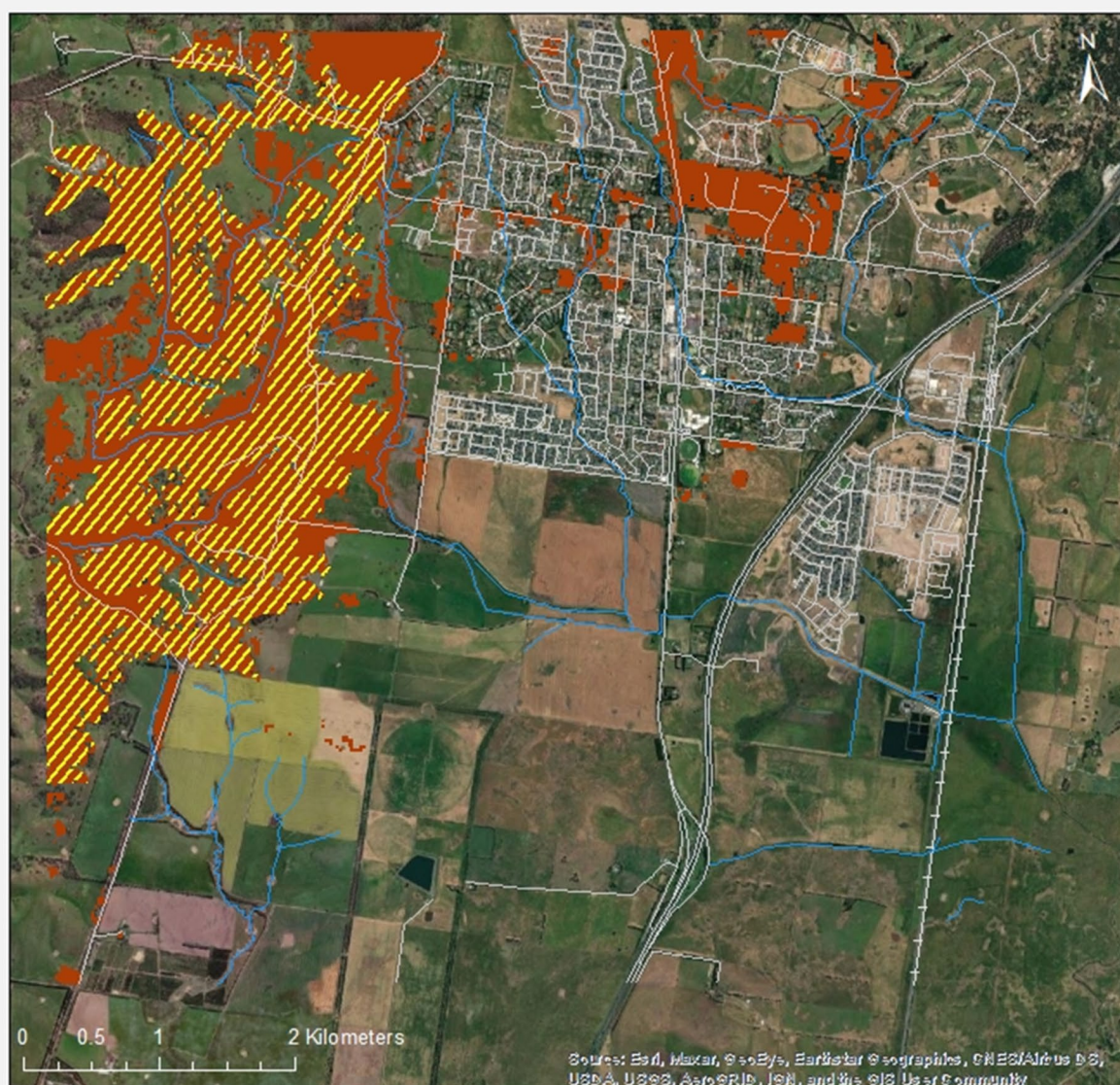







Figure 4 - Minimum protection area of vegetation classification type vulnerable

Depleted Vegetation Minimum Protection Area



Legend

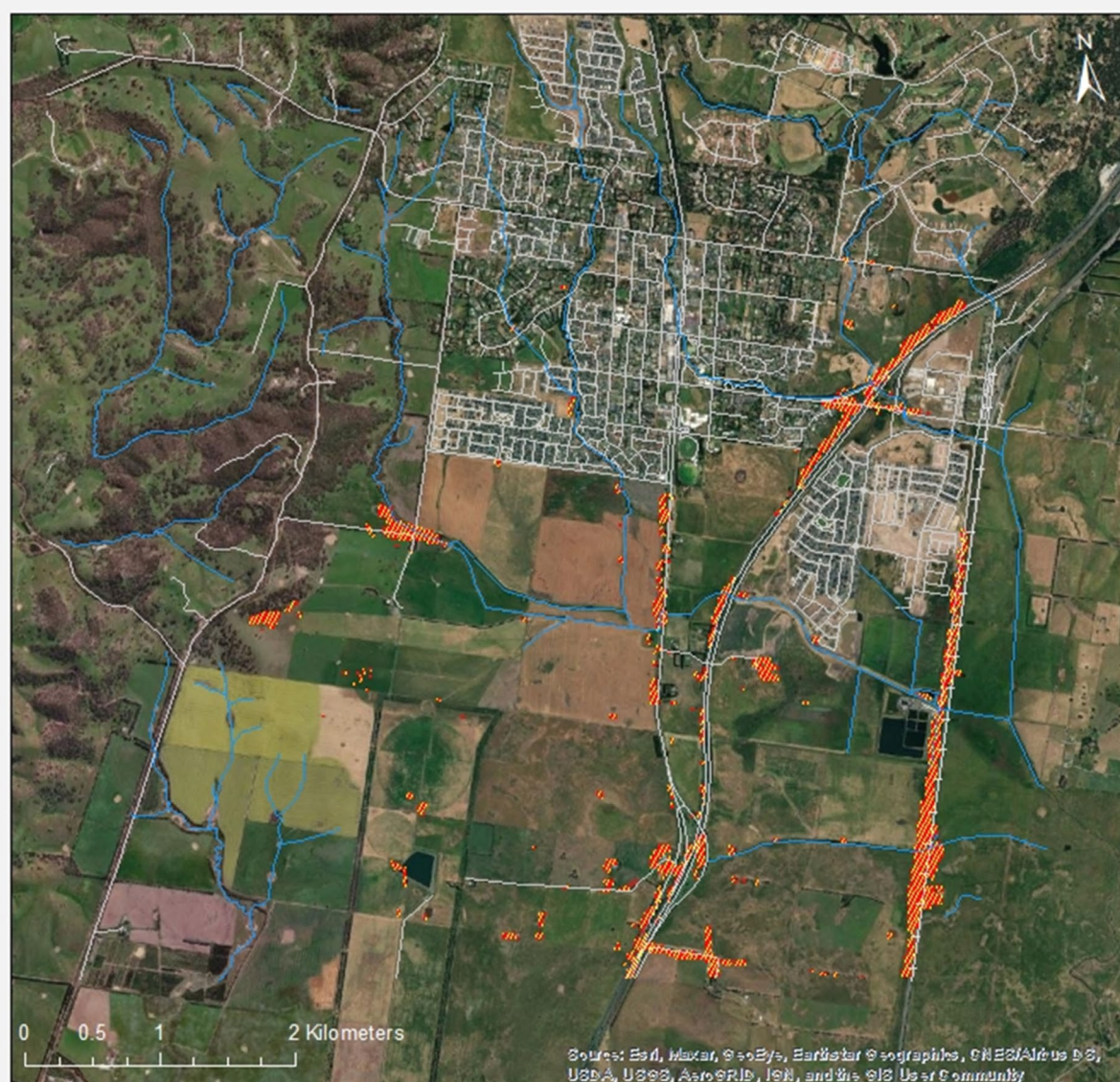
-  Minimum Protection Areas(s)
-  Depleted Vegetation
-  Roads
-  Rail
-  Streams/Channels

Created by: ESA Pty Ltd Date: Oct 2021




Source: <https://www.data.vic.gov.au/> Projection: GDA94/Australian Albers

Figure 5 - Minimum protection area of vegetation type depleted

Endangered Vegetation Minimum Protection Area



Legend

-  Minimum Protection Areas(s)
-  Endangered Vegetation
-  Roads
-  Rail
-  Streams/Channels

Created by: ESA Pty Ltd Date: Oct 2021

Source: <https://www.data.vic.gov.au/> Projection: GDA94/Australian Albers

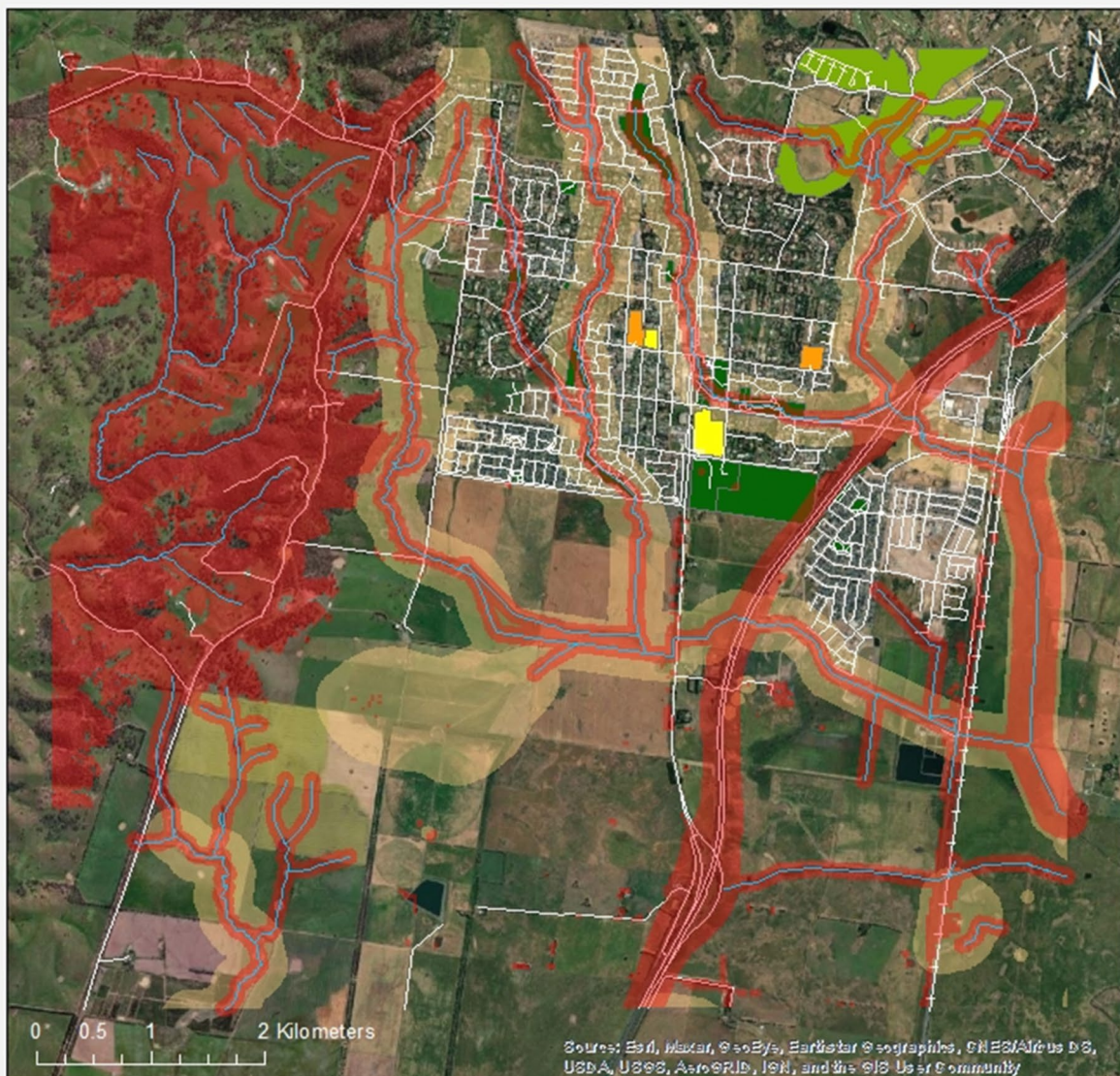
Figure 6 - Minimum protection of vegetation type endangered

Recommendations

Advised Protection Zones

The following map (Figure 7) indicates an advised protection zone for best vegetation protection and promotion of vegetation. The protection zone considers the riparian zones and Flora and Fauna Guarantee (FFG) Act Threatened list species in addition to the minimum protection zones of vulnerable, endangered, and depleted vegetations. A cultural sensitivity overlay has been added for the council's consideration when planning. This overlay includes land within 200 metres of named waterways and 50 metres of registered Aboriginal cultural heritage places.

Wallan Advised Vegetation Protection Area



Legend

| | |
|---------------------------------|--------------------------|
| — Roads | Local Open Spaces |
| — Rail | Owner Type |
| — Water Courses | Crown |
| Advised Protection Zone | Local government |
| Cultural Sensitivity (Advisory) | Private |
| | State Government |

Created by: ESA Pty Ltd Date: Oct 2021
Source: <https://www.data.vic.gov.au/>
Projection: GDA94/Australian Albers

Figure 7 – Wallan advised vegetation protection area including additional considerations

Table 5 indicates the total area in hectares of public and private land impacted by the advised protection zone.

| Private Land Parcel Area (ha) | Pubic Land Parcel Area (ha) | Total Land Parcel Area (ha) |
|--------------------------------------|------------------------------------|------------------------------------|
| 5,895.01 | 71.68 | 5,966.69 |

Table 5 – Total land use areas by type that intersect with the advised protection zone.

The private land area incorporates the Wallan Golf course. A collaborative strategy focused on the riparian zones inside the golf course boundaries would conserve present vegetation while also increasing biodiversity, both of which benefit not just the ecosystem but also the golf course's visitors and their experience.

ESA understands that the advised protection zone is substantial and in order to benefit the Wallan ecosystem as well as allow for urban development, ESA proposes a tiered approach.

Teir 1: Minimum protection zones are listed as reserves and do not allow for urban expansion

Teir 2: Advised protection zones encourage minimal urban expansion and where urban expansion is allowed only under application and consideration of the Mitchell Shire Council

Further ESA recommendation for current urban built up areas, using the rivers and resulting buffer zones, to extend the green spaces for public use, education, and protection. Allowing for residents to become one with the land increasing public involvement in the respect and protection of all areas in Wallan.

- End report -

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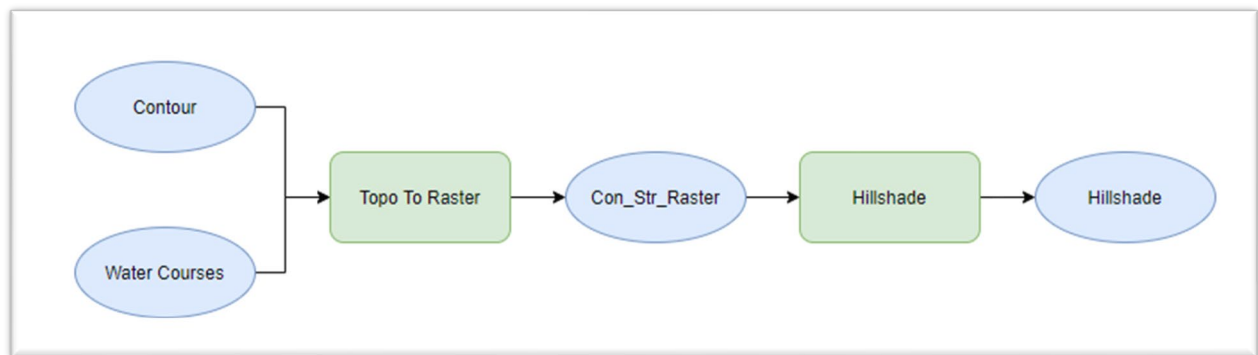
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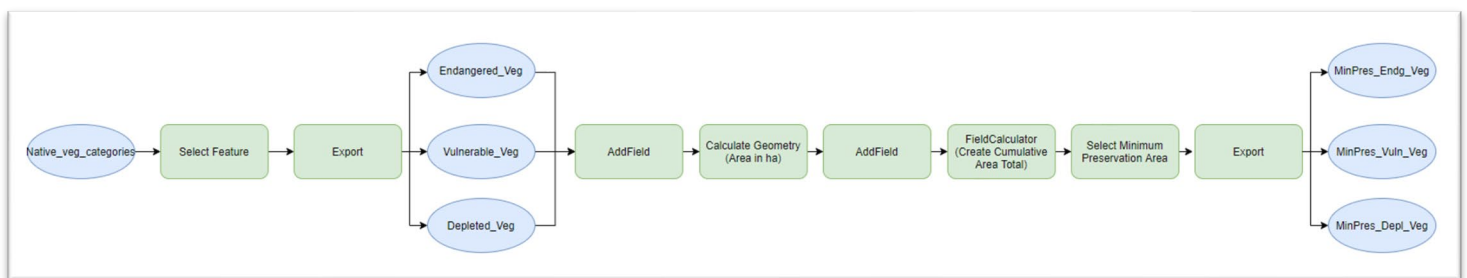
APPENDIX

All maps were created by Georgia Moore with ArcMap.

Terrain Map Process:



Vegetation Map Process:



Advised Protection Map:

This map was more detailed in its procedure, and utilised the above GIS steps in addition to the following

- Select and data export
 - o To extract the features of interest. E.g., only the FFG listed flora from the VBA Flora 25 layer.
- Buffer
 - o Apply buffers to the FFG Flora and watercourses in order to protect the appropriate areas around these features based on literature review
- Select by location
 - o In order to calculate the land use parcel areas, select by location was used on both the surround prop layer as well as the local open space layer. in conjunction with excel to calculate by vegetation classification.
- Union
 - o To create the final protection layer, union was used for
 - All minimum protections zones
 - Water course buffer zones
 - Existing vegetation protection layer
 - VBA 25 FFG listed flora