



Main Roads Western Australia

North West Coastal Highway SLK 620.5 to 767

Biological Survey

April 2013

Executive Summary

Main Roads Western Australia (MRWA) is proposing to upgrade sections of the North West Coastal Highway (NWCH) between SLK 620.5 to 767. The proposed works include widening of the existing road seal, additional material source locations and construction of a fenceline at SLK 651 and 667 (the Project Area). MRWA commissioned GHD Pty Ltd (GHD) to undertake a Biological Survey of the Project Area.

The field component of the vegetation, flora and fauna assessment undertaken for the Project Area was conducted in November, 2012.

A summary of GHD findings is as follows:

- No Environmental Sensitive Areas overlap the Project Area;
- A search was undertaken on the Department of Environment and Conservation (DEC) database and found one DEC managed estate is located within the Project Area, ex–Giralia Station;
- The southern section of the Project Area occurs in a buffer area of the Priority 4 PEC. The PEC forms a part of the Carnarvon Basin (CB) buffers including CB 76, CB 77, CB 78 and CB 79. This PEC covers the invertebrate assemblages on Lake MacLeod. Lake MacLeod is located 19 km to the west of the Project Area. Lake MacLeod and the associated PEC will not be impacted by the proposed works. It should be noted that DEC provides locations for TEC and PEC that have a buffer placed typically at a 500 metre radius around the community. As such, the TEC/PEC may not be present within the entire extent of the buffer area;
- The vegetation types classified during the field survey were extrapolated and found to generally match Beard (1975) Vegetation Associations 11, 95, 98, 264, 307, 1162, 1322, 1601 and 2675 mapped for the Project Area;
- All Beard (1975) Vegetation Associations within the Project Area are classified as *Least Concern* in extent remaining at a State, IBRA, IBRA Sub-region and Local Government Authority level;
- The vegetation condition of the Project Area ranged from Condition 2 (*Excellent*) to Condition 6 (*Completely Degraded*). Vegetation Condition 6 was generally noted within six metres of the road side and pull off areas. Results from the field survey revealed a total of 289 flora taxa from 42 families, of which three are considered introduced;
- No flora taxa of national conservation significance listed under the Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) or species listed under the State *Wildlife Conservation Act 1950* were recorded from the Project Area;
- A total of two Priority Flora taxa were recorded from the Project Area during the field survey. They include:
 - *Acacia startii* Priority 3; and
 - *Eremophila youngii* subsp., *lepidota* Priority 4;
- A total of three weeds were identified during the field surveys. No Weeds of National Significance (WONS) or Declared Plants under the AARP Act were recorded from the Project Area;

- A total of 46 birds, eight mammals and 13 reptile taxa were recorded from the Project Area;
- A total of six introduced mammals were recorded in the Project Area, including European Cattle, Goat, European Rabbit, Donkey, Camel and Dingo;
- No fauna species listed under the EPBC Act or WC Act were recorded in the Project Area during the field survey;
- Two Priority Fauna species were recorded within the middle and northern section of the Project Area, the Pebble Mound Mouse and Australian Bustard:
 - One Pebble Mound Mouse extinct mound was recorded outside the vicinity of Material Pit SLK 808; and
 - The Australia Bustard was recorded within the road corridor on the NWCH in the northern and middle sections of the Project Area;
- An assessment against the Ten Clearing Principles considered the Project to be “at variance” with Principle (a):
 - Principle (a) is considered to be “at variance”. *Acacia startii* was recorded at a number of locations within the Southern Portion of the Project Area. MRWA has indicated that approximately 30 to 35 plants will possibly be impacted by project works. GHD recommends MRWA liaise with the DEC in this regard;
- Principle (h) is considered to be “not likely at variance”, because the proposed project works within the road corridor are considered unlikely to have an impact on the environmental values. MRWA are advised to liaise with the DEC if considering undertaking works outside the road corridor; and
- Referral to the Environmental Protection Authority (EPA) or Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) is not considered to be warranted for this Project.

This report is subject to, and must be read in conjunction with, the limitations set out in Section 1.2 and the assumptions and qualifications contained throughout the Report.

Table of Contents

1.	Introduction	1
1.1	Background	1
1.2	Project Area	1
1.3	Scope and Limitations	1
1.4	Assumptions.....	3
2.	Desktop Review	4
2.1	Previous Studies	4
2.2	Surrounding Land Use.....	6
2.3	Climate.....	6
2.4	Reserves and Conservation Areas.....	6
2.5	Environmentally Sensitive Areas.....	6
2.6	Geology and Soils	7
2.7	Acid Sulphate Soils	7
2.8	Wetlands and Watercourses.....	7
2.9	Public Drinking Water Catchments.....	7
2.10	Vegetation.....	8
2.11	Flora	11
2.12	Diseases or Pathogens	15
2.13	Fauna.....	15
3.	Field Investigations	18
3.1	Survey Methodology.....	18
3.2	Results of Field Investigation.....	19
3.3	Vegetation.....	19
4.	Clearing of Native Vegetation	29
4.1	Assessment Against the Ten Clearing Principles	29
5.	Requirement for Referral	30
5.1	Commonwealth Government	30
5.2	Western Australian Government.....	30
6.	Conclusions and Recommendations.....	31
6.1	Recommendations	32
7.	References	33

Table Index

Table 1:	Project Area	1
Table 3:	Vegetation Extent and Status	9
Table 4:	Conservation Significant Flora Taxa Indicated to Occur Within the Project Area.....	13
Table 5:	Department of Agriculture and Food Declared Plant Control Classes	15
Table 6:	Vegetation Condition Scale (after Keighery, 1994)	20
Table 7:	Environmental Weed Rating for the Southern Portion of the Project Area.....	24
Table 8:	Categories and Definitions for EPBC Act Listed Flora and Fauna Species	42
Table 9:	Conservation Codes and Descriptions for DEC Declared Rare and Priority Flora Species	42
Table 10:	Western Australian Wildlife Conservation Act 1950 Conservation Codes	48
Table 11:	DEC Priority Fauna Codes	48
Table 12:	Project Area Flora Survey Results	50
Table 13:	Vegetation Type Observed in the Project Area.....	61
Table 14:	<i>Acacia startii</i> locations	76
Table 15:	<i>Eremophila youngii</i> subsp. <i>lepidota</i> locations	81
Table 16:	Fauna Records from Database searches and Observed taxa from the Project Area	83

Figure Index

Figure 1	Project Location
Figure 2	Project Area Environmental Constraints
Figure 3a	Northern Section Vegetation Types
Figure 3b	Middle Section Vegetation Types
Figure 3c	Southern Section Vegetation Types
Figure 4a	Northern Section Vegetation Conditions
Figure 4b	Middle Section Vegetation Conditions
Figure 4c	Southern Section Vegetation Conditions

Appendices

Appendix A	Figures
Appendix B	Conservation Categories
Appendix C	Flora
Appendix D	Fauna
Appendix E	Ten Clearing Principles Assessment

1. Introduction

1.1 Background

The North West Coastal Highway (NWCH) provides connection between Geraldton and Carnarvon to Karratha, Exmouth and Port Hedland. The road primarily services pastoral, mining and tourist industries as well as community access. As a result of increasing commercial growth in the region it has become essential that the NWCH is upgraded.

Main Roads Western Australia (MRWA) proposes to widen the existing road seal on the NWCH between SLK 620.5 to 767. The upgrade provides overtaking opportunities and decreases the risk of road accidents arising as a result of the existing narrow seal. As a part of the proposed project MRWA have selected additional locations for the purpose of the material source extraction for the road upgrades. MRWA also proposes to construct fencelines either side of the NWCH between SLK 651 and 667. MRWA has previously completed a Preliminary Environmental Impact Assessment in 2009 and indicated that the project may be at variance with some the Department of Environment and Conservation's (DEC's) Ten Clearing Principles.

MRWA has commissioned GHD Pty Ltd (GHD) to complete a Biological Survey along the NWCH from SLK 620.5 to 767 (the Project Area) (Figure 1). The results of the Biological Survey are to assist in the preparation of an Environmental Impact Assessment, Environmental Management Plan and referral documents.

1.2 Project Area

The Project Area is located along the NWCH in the Shires of Carnarvon, Ashburton and Exmouth, Western Australia. Six material pits and 146 km of road corridor were surveyed for this project (Figure 1). Table 1 provides a summary of the approximate area and material pits surveyed during the field work.

Table 1: Project Area

Sections	Survey Area	Survey Size
Northern	NWCH SLK 619.5 – 675.4	146 km, including 200 m from the centre line on both sides of the road.
Middle	NWCH SLK 675.4 – 728.8	146 km, including 200 m from the centre line on both sides of the road.
Southern	NWCH SLK 728.8 – 767.7	146 km, including 200 m from the centre line on both sides of the road.
Northern	Material Pit SLK 739	4.3 hectares
Northern	Material Pit SLK 743A	8.4 hectares
Northern	Material Pit SLK 743B	5 hectares
Northern	Material Pit SLK 743C	2.3 hectares
Northern	Material Pit SLK 770	210 hectares
Northern	Material Pit SLK 808	40 hectares

1.3 Scope and Limitations

1.3.1 Scope of Works

The scope of works includes:

- Desktop assessment of the Project Area;
- Field study of relevant biological aspects and issues, including reserves and other relevant land use;
- Assessment of the project against the *Environmental Protection Act 1986* Ten Clearing Principles (Schedule 5);
- Consultation and liaison with relevant statutory authorities or specialists as required; and
- Indication and discussion of the requirement for referral to statutory authorities or for other clearances for the project.

1.3.2 Clearing of Native Vegetation

With regard to the clearing of native vegetation, GHD has:

- Examined whether the clearing of native vegetation will occur;
- Examined what permits or exemptions apply or are required;
- Investigated whether the project occurs within an Environmental Sensitive Area (ESA);
- Assessed native vegetation to be cleared against the Ten Clearing Principles; and
- Advised whether weeds are likely to spread to and result in environmental harm to adjacent areas of native vegetation which is in good or better condition.

1.3.3 Limitations

This report has been prepared by GHD for Main Roads Western Australia and may only be used and relied on by Main Roads Western Australia for the purpose agreed between GHD and Main Roads Western Australia as set out in Section 1.3.1 this report.

GHD otherwise disclaims responsibility to any person other than Main Roads Western Australia arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in Section 1.3.1 of this report. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by Main Roads Western Australia and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

The opinions, conclusions and any recommendations in this report are based on information obtained from, and testing undertaken at or in connection with, specific sample points. Site conditions at other parts of the site may be different from the site conditions found at the specific sample points.

This report presents the results of a Level 1 flora and reconnaissance fauna survey and desktop findings prepared for the purpose of this commission. The fauna survey was limited to a reconnaissance fauna survey. The data and advice provided herein must be reviewed by a competent scientist before being used for any other purposes. GHD accepts no responsibility for other use of the data.

Investigations undertaken in respect of this report are constrained by the particular site conditions, such as the location of buildings, services and vegetation. As a result, not all relevant site features and conditions may have been identified in this report.

Site conditions may change after the date of this Report. GHD does not accept responsibility arising from, or in connection with, any change to the site conditions. GHD is also not responsible for updating this report if the site conditions change.

The opinions, conclusions and any recommendations in this Report are based on assumptions made by GHD when undertaking services and preparing the Report ("Assumptions"), including (but not limited to):

- Information provided by Government Agencies is correct;
- Some flora species, such as annuals, are only identifiable at certain times. Additionally, climatic and stochastic events (such as rainfall and fire) may affect the presence and developmental stage of species. These factors impact on the number of species and growth forms observed during the survey;
- Flora composition changes over time, with flora species having specific growing periods, especially annuals and ephemerals (some plants lasting for a markedly brief time, some only a day or two). Therefore the results of future botanical surveys in this location may differ from the results of this survey. As this survey was conducted during one calendar year, as opposed to over several years, the abundance and/or the presence of especially annual and ephemeral species within the Project area is indicative only;
- Additionally, climatic and stochastic events (such as fire) may affect the presence of plant species. Species that have a very low abundance in the area are more difficult to locate, due to the above factors;
- The flora survey was restricted to vascular plants and vertebrate fauna.

1.4 Assumptions

This report uses the Project Area as provided by MRWA. Any change to the extent of the Project Area may alter the results and recommendations presented in this assessment.

2. Desktop Review

The following information has been used to support the field assessment and project assessment against the Ten Clearing Principles.

2.1 Previous Studies

A number of previous studies have been completed within the vicinity of the Project Area a summary of these reports is provided below

GHD (2012a) at location NWCH Material Pit SLK 660A and 660B

These study sections are adjacent to that examined in this report.

- Two Beard (1975) Vegetation Associations are present and are considered of *Least Concern* (more than 50% of their pre-European extent remaining);
- The Project Area occurs within the buffer of a series of Priority Ecological Communities, which forms a part of the Carnarvon Basin Survey (CB) buffers of the Lake MacLeod Invertebrate Assemblages for CB 76, CB 77, CB 78 and CB 79; and
- No flora species listed under the EPBC Act or WC Act were recorded from the Project Area.

GHD (2012b) at location NWCH Material Pit SLK 655A and 655B

These study sections are adjacent to that examined in this report.

- Two Beard (1975) Vegetation Associations are known within the vicinity of the Project Area and are considered of *Least Concern*;
- The Project Area occurs within the buffer of a series of Priority Ecological Communities, which forms a part of the Carnarvon Basin Survey (CB) buffers of the Lake MacLeod Invertebrate Assemblages for CB 76, CB 77, CB 78 and CB 79;
- No Flora listed under the EPBC Act or WC Act were recorded from the Project Area;
- One Priority Flora species was recorded from the Project Area – *Acacia startii* (Priority 3);
- The assessment against the Ten Clearing Principles is considered unlikely to be at variance with Principle (a) as:
 - *Acacia startii* (Priority 3) was recorded in the Project Area at a number of locations. GHD considers that this species population within the local and regional area will not be under threat from the proposed project activities;
 - GHD believes that the proposed project activities are likely to enhance the area of preferred habitat and increase germination of this species; and
 - As the records are primarily located in one distinct area of the Project Area. GHD recommends avoiding all known locations.

GHD (2012c) at locations NWCH Material Pit SLK 666A and 666B

These study sections are adjacent to that examined in this report.

- One Beard Vegetation Association is known within the vicinity of the Project Area and is considered of *Least Concern*;
- The Project Area occurs within the buffer of a series of Priority Ecological Communities, which forms a part of the Carnarvon Basin Survey (CB) buffers of the Lake MacLeod Invertebrate Assemblages for CB 76, CB 77, CB 78 and CB 79;

- No Threatened (Declared Rare) Flora were recorded from the Project Area;
- One Priority Flora species was recorded within the Project Area – *Acacia startii* (Priority 3);
- The assessment against the Ten Clearing Principles is considered unlikely to be at variance with Principle (a):
 - *Acacia startii* (Priority 3) was recorded in the Project Area at a number of locations. A total of 253 plants were recorded within the 'Cleared/Degraded' area of the Material Pit and 252 plants within the undisturbed area;
 - Given that the population within the 'Cleared/Degraded' area of the Material Pit is equivalent to the population within the undisturbed area and it thrives from disturbances, GHD believes that the proposed project activities are likely to enhance the preferred habitat and increase germination of this species. *Acacia startii* has been identified as a disturbance response species; and
 - GHD considers that this species population will not be under threat from the proposed project activities, as this species is widespread within the local and regional area.

GHD (2012d) at locations NWCH Material Pit SLK 770

This study sections are adjacent to that examined in this report.

- Four Beard Vegetation Associations are known within the vicinity of the Project Area. These are considered of *Least Concern*; and
- No Threatened (Declared Rare) Flora taxa or Priority Flora species were recorded from the Project Area.

GHD (2012e) at location Burkett Road Material Pit SLK 1.5 to 10

Burkett Road Material Pit SLK 1.5 to 10 has been considered as a part of this review. This area is adjacent to the Project Area.

- One Beard Vegetation Association is known within the vicinity of the Project Area. This is considered of *Least Concern*;
- No Threatened (Declared Rare) Flora taxa or Priority Flora species were recorded from the Project Area;
- Two Priority 4 bird species (the Bush Stone-curlew and the Australian Bustard) were recorded within the vicinity of the Project Area;
- The assessment against the Ten Clearing Principles is considered to not likely at variance with Principle (h):
 - Ex-Giralia DEC estate overlaps the Project Area. However as the road reserve has been excised from DEC Estates, the project is considered not likely at variance with this Principle. This is on the condition that works are restricted to the road corridor only in areas adjacent to the DEC Estate. In addition indirect impacts (such as erosion) are to be adequately managed.

GHD (2012f) at locations 26th Parallel Sign NWCH SLK 328, Tropic of Capricorn Sign SLK 666, Strategic Material Pit SLK 772, SLK 918, SLK 934 and SLK 950

SLK 666 and SLK 772 are the only locations that have been considered as a part of this review. These two locations are adjacent to that examined in this report.

- Three Beard Vegetation Associations are known within the vicinity of the Project Area. These are considered of *Least Concern*;

- The Project Area occurs within the buffer of a series of Priority Ecological Communities, which forms a part of the Carnarvon Basin Survey (CB) buffers of the Lake MacLeod Invertebrate Assemblages for CB 76, CB 77, CB 78 and CB 79;
- The assessment against the Ten Clearing Principles considered unlikely to be at variance with Principle (a). One Priority flora taxa, *Acacia startii*, was noted within along within SLK 666:
 - *Acacia startii* was recorded within the vicinity of Study Area 1. In total, seven plants were noted within the Study Area. GHD believes that any impacts to plants on site will be counter-balanced by the large numbers known from bushlands still intact in vegetation within and adjacent to the adjacent Material Pit (NWCH SLK 666).;

2.2 Surrounding Land Use

The Shires of Exmouth, Carnarvon and Ashburton are predominately covered by pastoral lease land used for extensive grazing of native pastures. The region is also occupied by Aboriginal reserves, mining leases, national parks and DEC managed conservation estates (Figure 2).

2.3 Climate

The climate experienced within the Project Area is arid, semi-arid to sub-tropical. Seasonal tropical cyclones can affect the region, resulting in periods of heavy rain, high temperatures and strong winds, but summers are generally dry (Kendrick and Mau, 2012).

The closest Bureau of Meteorology (BoM) weather station to the Project Area is located at Learmonth (Station No. 005007). Recorded climatic data is summarised below:

- Mean Daily Maximum Temperature: 24.2 °C in July to 37.9 °C in January;
- Mean Daily Minimum Temperature 11.4 °C in July to 24.1 °C in February;
- Mean Annual Rainfall: 259.1 mm; and
- Mean Annual Rain Days 16.6 days.

(Source: Bureau of Meteorology, 2012)

2.4 Reserves and Conservation Areas

A search was undertaken on the DEC database and found one DEC managed estate located within the Project Area, ex-Giralia Station (Figure 2).

Giralia Pastoral Station is approximately 232,894 ha in size and situated 310 km north of Carnarvon on Burkett Road, 125 km south of Exmouth. From 1921 until 2003 the property was run as a sheep station. In 2002 the property was acquired by DEC to be run as a national park. The property is listed as an International Union for Conservation of Nature (IUCN II) on the online Natural Resource and Management (NRM) database.

The NWCH road corridor has been excised from Giralia Station and any project activities undertaken within the corridor will not impact on the environmental values. If MRWA considers undertaking works outside the road corridor GHD advises MRWA to liaise with the DEC.

2.5 Environmentally Sensitive Areas

Environmentally Sensitive Areas (ESAs) are subject to definition under Section 51B of the *Environmental Protection Act 1986* (EP Act) and may include areas such as those requiring special management attention to protect important scenic values, fish and wildlife resources, historical and cultural values and other natural systems or processes.

The DEC Native Map Viewer did not indicate the presence of any ESAs within the vicinity of the Project Area.

2.6 Geology and Soils

The Project Area occurs in the northern Carnarvon basin which lies to the west of the Pilbara Craton. This region is characterised by a mixture of alluvial plains, sandplains and dunefields. There are also areas of low hills and gently undulating lateritic uplands that have developed on uplifted sedimentary rocks. Generally red deep sands cover most of the sandplains (Tille, 2006).

2.7 Acid Sulphate Soils

The DEC (2009) describes Acid Sulphate Soils (ASS) as naturally occurring soils and sediments containing sulphide minerals, predominantly pyrite (an iron sulphide). In an undisturbed state below the water table these soils are benign and not acidic. However, if the soils are drained, excavated or exposed by lowering of the water table the sulphides will react with oxygen to form sulphuric acid.

Inappropriate disturbance of these soils can generate large amounts of sulphuric acid and leaching of contaminants naturally occurring in soils. Flushing of acidic leachate to ground water and surface waters can cause off-site impacts including:

- Ecological damage to aquatic and riparian ecosystems;
- Effects on estuarine fisheries and aquaculture projects;
- Contamination of groundwater with arsenic, aluminium and other metals;
- Reduction in agricultural productivity through metal contamination of soils; (predominantly aluminium); and
- Drainage to infrastructure through the corrosion of concrete and steel pipes, bridges and other sub-surface assets.

The Australian Soil Resource Information System (ASRIS) indicated that the Project Area is located within an area of *Low Probability/Very Low Confidence* and *Extremely Low Probability/Very Low Confidence*.

2.8 Wetlands and Watercourses

A search was undertaken on the online State Land Information Portal (SLIP) NRM information website and found two defined watercourses that transverse the Project Area, Lyndon River and Yannarie River. The Yannarie River transects the NWCH at the Barradale Roadhouse and Lyndon River transects the most southern section of the Project Area at the Minilya-Exmouth Road turn-off. The majority of waterways and wetlands occurring within the region are considered ephemeral and generally flow or fill during seasonal rainfall events. Lake MacLeod is a non-perennial lake and is listed as a Nationally Important Wetland which is located approximately 13 km west of the Project Area. Other unnamed non-perennial lakes occur 1 km east of the Project Area.

2.9 Public Drinking Water Catchments

A search of the Department of Water (DoW) Geographic Data Atlas indicates that the Project Area is not within, or located in proximity to, any Gazetted Public Drinking Water Source Areas (PDWSAs) (Department of Water, 2011).

2.10 Vegetation

The Project Area is situated in the Carnarvon Interim Biogeographic Regionalisation of Australia (IBRA) region and the Cape Range IBRA subregion. The vegetation of the Carnarvon region comprises of a mosaic of alluvial plains with samphire and saltbush low shrublands, Bowgada low woodlands on sandy ridges and plains, Snakewood scrubs on clay flats, tree to shrub steppe over hummock grasslands on and between red sand dune fields and limestone strata with *Acacia startii/bivenosa* shrublands outcrop in the north.

Broadscale vegetation mapping was undertaken by Beard (1975), which indicates that nine vegetation associations are present within the Project Area (Table 2).

Table 2: Beard Vegetation Associations within the Project Area+

Vegetation Association	Description	Project Area Location
11	Medium woodland; coolabah (<i>Eucalyptus microtheca</i>)	Northern Section
95	Hummock grasslands, shrub steppe; acacia & grevillea over <i>Triodia basedowii</i>	Middle Section, Southern Section
98	Hummock grasslands, shrub steppe; kanji over soft spinifex & <i>Triodia basedowii</i>	Northern Section, Middle Section, Material Pit SLK 770
264	Low woodland; <i>Acacia victoriae</i> & snakewood	Southern Section
307	Low woodland; bowgada & <i>Acacia subtressarogona</i>	Middle Section
1162	Hummock grasslands, grass steppe; hard spinifex <i>Triodia wiseana</i> & t. <i>basedowii</i>	Material Pit SLK 808
1322	Shrublands; <i>Acacia sclerosperma</i> , <i>A. victoriae</i> & snakewood scrub	Middle Section
1601	Mosaic: Shrublands; snakewood & <i>A. Victoria</i> scrub/ Hummock grasslands; grass steppe, hard spinifex, <i>Triodia basedowii</i>	Northern Section, Material Pit SLK 770
2675	Hummock grasslands, low tree & shrub steppe; scattered eucalypts, kanji over <i>Triodia pungens</i> & <i>T. basedowii</i>	Northern Section, Material Pit SLK 740, SLK 743 (1) and SLK 743 (2)

2.10.1 Vegetation Extent and Status

A vegetation type is considered to be under-represented if there is less than 30% of its original extent remaining. From a biodiversity perspective and taking no account of any other land degradation issues, there are several key criteria applied to vegetation where clearing is still occurring (Environmental Protection Authority (EPA) Position Statement No. 2, December 2000):

- The “threshold level” below which species loss appears to accelerate exponentially at an ecosystem level is regarded as being at a level of 30% of the pre-European extent of the vegetation type. Vegetation communities where less than 30% of the original vegetation extent remain are referred to as “Vulnerable”; and

- A level of 10% of the original vegetation extent is regarded as being a level representing an “Endangered” vegetation community.

Such vegetation community status can be delineated into five classes, where:

- Presumed Extinct: Probably no longer present in the bioregion.
- Endangered*: <10% of pre-European extent remains.
- Vulnerable*: 10-30% of pre-European extent exists.
- Depleted*: >30% and up to 50% of pre-European extent exists.
- Least Concern: >50% pre-European extent exists and subject to little or no degradation over a majority of this area.

*or a combination of depletion, loss of quality, current threats and rarity gives a comparable status

Beard (1975) Vegetation Associations represented in the Project Area, their extent and reservation status are drawn from the 2011 Statewide Vegetation Statistics-Full Report (Government of Western Australia 2011). These extents at the State, IBRA, Sub-IBRA and the Local Government Area (LGA) Shire of Exmouth are shown in Table 3. The Vegetation Associations 11, 95, 98, 264, 307, 1162, 1322, 1601 and 2675 are considered to be of Least Concern.

Table 3: Vegetation Extent and Status

Scale	Vegetation Association	Pre-European Extent (Ha)	Current Extent (Ha)	% Remaining	Status
State	11	31,723.47	31,698.72	99.92	Least Concern for all Vegetation Associations
	95	1,224,626.58	1,223,593.75	99.92	
	98	309,629.71	309,605.59	99.99	
	264	581,127.75	581,123.31	100.00	
	307	476,645.10	476,645.10	100.00	
	1162	71,617.49	71,598.97	99.97	
	1322	245,308.90	245,308.90	100.00	
	1601	129,097.54	129,097.54	100.00	
	2675	351,230.61	351,230.61	100.00	
IBRA					
Carnarvon	11	3,737.92	3,737.92	100.00	Least Concern for all Vegetation Associations
	95	390,079.72	389,943.64	99.97	
	98	221,820.23	221,812.78	100.00	
	264	503,681.76	503,677.32	100.00	
	307	476,645.10	476,645.10	100.00	
	1162	778.56	778.56	100.00	
	1322	245,308.90	245,308.90	100.00	
	1601	1,330.01	1,330.01	100.00	
	2675	351,166.04	351,166.04	100.00	

Scale	Vegetation Association	Pre-European Extent (Ha)	Current Extent (Ha)	% Remaining	Status
Gascoyne	11	2,831.02	2,831.02	100.00	Least Concern for all Vegetation Associations
	95	442,548.23	442,548.23	100.00	
	98	386.68	384.31	99.39	
	264	71,412.48	71,412.48	100.00	
	1162	61,908.47	61,889.95	99.97	
	2675	64.57	64.57	100.00	
Sub-IBRA					
Carnarvon 1 Cape Range	11	3,737.92	3,737.92	100.00	Least Concern for all Vegetation Associations
	1162	778.56	778.56	100.00	
	2675	350959.95	350959.95	100.00	
Carnarvon 2 Wooramel	95	332271.98	332135.89	99.96	Least Concern for all Vegetation Associations
	307	455878.42	455878.42	100.00	
	1322	85558.71	85558.71	100.00	
	2675	206.08	206.08	100.00	
Gascoyne 1 Ashburton	95	119.21	119.21	100.00	Least Concern for all Vegetation Associations
	98	386.68	384.31	99.39	
	264	5841.07	5841.07	100.00	
	1162	61908.47	61889.95	99.97	
	2675	64.57	64.57	100.00	
Local Government Authorities					
Shire of Ashburton	11	3,737.92	3,737.92	100.00	Least Concern for all Vegetation Associations
	95	6,293.93	6,293.93	100.00	
	98	235,855.15	235,831.03	99.99	
	264	6,898.55	6,898.55	100.00	
	307	5,868.28	5,868.28	100.00	
	601	13,792.84	13,792.84	100.00	
	1162	71,617.49	71,598.97	99.97	
	1322	85,479.43	85,479.43	100.00	
	2675	193,587.75	193,587.75	100.00	
Shire of Carnarvon	95	385,399.51	384,366.68	99.73	Least Concern for all Vegetation Associations
	98	27,281.99	27,281.99	100.00	
	264	218,235.67	218,231.24	100.00	
	307	464,950.11	464,950.11	100.00	
	1322	156,121.08	156,121.08	100.00	
	2675	21,697.10	21,697.10	100.00	

Scale	Vegetation Association	Pre-European Extent (Ha)	Current Extent (Ha)	% Remaining	Status
Shire of Exmouth	98	5,973.31	5,973.31	100.00	<i>Least Concern</i> for all Vegetation Associations
	1322	3,708.39	3,708.39	100.00	
	2675	135,945.75	135,945.75	100.00	

2.10.1 Threatened Ecological Communities

Ecological communities are defined as naturally occurring biological assemblages that occur in a particular type of habitat (English and Blythe, 1997). Threatened Ecological Communities (TECs) are ecological communities that have been assessed and assigned to one of four categories related to the status of the threat to the community, i.e. Presumed Totally Destroyed, Critically Endangered, Endangered, and Vulnerable.

Some TECs are protected under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act). Although TECs are not formally protected under the *State Wildlife Conservation Act 1950* (WC Act) the loss of, or disturbance to, some TECs triggers the EPBC Act.

Possible TECs that do not meet survey criteria are added to the Department of Environment and Conservation's Priority Ecological Community (PEC) Lists under 1, 2 and 3. These are ecological communities that are adequately known, are rare but not threatened, or meet criteria for Near Threatened. PECs that have been recently removed from the threatened list are placed in Priority 4. These ecological communities require regular monitoring. Conservation Dependent ecological communities are placed in Priority 5.

A search of the EPBC Act Protected Matters Search (DSEWPaC 2012) did not identify the presence of any EPBC Act TECs within 20 km of the Project Area.

A search of the DEC's TEC and PEC database was undertaken for the Project Area which indicated the following:

- The Southern Section of the Project Area occurs in a buffer area of the Priority 4 PEC. The PEC forms apart of the Carnarvon Basin (CB) buffers including CB 76, CB 77, CB 78 and CB 79. This PEC covers the invertebrate assemblages on Lake MacLeod. Lake MacLeod located 19 km to the west of the Project Area. Lake MacLeod and the associated PEC will not be impacted by the proposed works. It should be noted that DEC provides locations for TEC and PEC that have a buffer placed typically at a 500 metre radius around the community. As such, the TEC/PEC may not be present within the entire extent of the buffer area.

2.11 Flora

Flora species considered to be significant are listed under the EPBC Act and/or the WC Act. Any activities that are deemed to have a significant impact on species that are recognised by the WC Act and/or the EPBC Act can trigger referral to the EPA and/or the DSEWPaC.

A description of Conservation Categories delineated under the EPBC Act is detailed in Table 8. These are applicable to threatened flora and fauna species.

An EPBC Act Protected Matters Search (DSEWPaC 2012) was undertaken for the Project Area. This identified a total of 12 EPBC Act listed flora species predicted to occur within a 10 km buffer of the Project Area.

In addition to the EPBC Act, significant flora in Western Australia is protected by the WC Act. This Act, administered by the DEC, protects Threatened (Declared Rare) Flora taxa. The DEC

also maintains a list of Priority Flora species. Conservation codes for flora species are assigned by the DEC to define the level of conservation significance. Priority Flora are not protected under the WC Act. Priority Flora may be rare or threatened, but cannot be considered for declaration as Threatened Flora until adequate surveys have been undertaken of known sites and the degree of threat to these populations have been clarified. Special consideration is often given to sites that contain Priority Flora despite them not having formal legislator protection. A description of the DEC's Conservation Codes that relate to flora species is provided in Table 9.

A search of the DEC's Rare Flora Databases and the Western Australian Herbarium (WAHERB) records was performed. Significant species that are likely to occur in the Project Area are shown in Table 4.

2.11.1 Conservation Significant Flora

Desktop searches of the EPBC Act Protected Matters database (DSEWPaC, 2012b), DEC's Rare Flora Databases, *NatureMap* database (DEC, 2012f) and the Western Australian Herbarium (WAHERB) records identified the presence/potential presence of 12 conservation significant flora species within 10 km of the Project Area. This includes:

- One Priority 1 taxa;
- Three Priority 2 taxa;
- Six Priority 3 taxa; and
- Two Priority 4 taxa.

A Likelihood of Occurrence Assessment that takes into account the habitats present, known species distribution and previous records, was completed for all conservation significant flora identified in the desktop queries, which indicated that two taxa were deemed to be very likely to be present within the Project Area, one likely, five unlikely and two very unlikely to be present within the Project Area (Table 4).

Table 4: Conservation Significant Flora Taxa Indicated to Occur Within the Project Area

Family	Genus	Species	EPBC Act Status	WC Act Status	DEC Status	Database Source	Project Area Within Known Range	Project Area Within Known Habitat	Likelihood of Occurrence in Project Area
Malvaceae	<i>Abutilon</i>	<i>pritzelianum</i>			P1	TPFL; WAHerb	Y	Y	Possible
Malvaceae	<i>Abutilon</i>	<i>uncinatum</i>			P1	TPFL; WAHerb	Y	Y	Likely
Malvaceae	<i>Abutilon</i>	sp. Quobba (H. Demarz 3858)			P2	TPL	N	Y	Very Unlikely
Fabaceae	<i>Acacia</i>	<i>ryaniana</i>			P2	TPL; TPFL; WAHerb	N	Y	Unlikely
Fabaceae	<i>Acacia</i>	<i>startii</i>			P3	TPL; TPFL; WAHerb	Y	Y	Very Likely
Euphorbiaceae	<i>Beyeria</i>	<i>cinerea</i> subsp. <i>cinerea</i>			P3	WAHerb	N	N	Very Unlikely
Malvaceae	<i>Corchorus</i>	<i>congener</i>			P3	TPL; TPFL; WAHerb	Y	Y	Possible
Amaryllidaceae	<i>Crinum</i>	<i>flaccidum</i>			P2	TPL; TPFL; WAHerb	N	Y	Unlikely
Poaceae	<i>Eragrostis</i>	<i>crateriformis</i>			P3	TPL; WAHerb	N	Y	Unlikely
Scrophulariaceae	<i>Eremophila</i>	<i>youngii</i> subsp. <i>lepidota</i>			P4	WAHerb	Y	Y	Very Likely
Euphorbiaceae	<i>Euphorbia</i>	<i>inappendiculata</i>			P3	TPL	N	N	Very Unlikely
Apocynaceae	<i>Gymnanthera</i>	<i>cunninghamii</i>			P3	TPL; WAHerb	Y	Y	Possible
Asteraceae	<i>Myriocephalus</i>	<i>nudus</i>			P1	TPL; TPFL; WAHerb	Y	Y	Likely
Meliaceae	<i>Owenia</i>	<i>acidula</i>			P3	TPL; TPFL; WAHerb	N	Y	Possible
Celastraceae	<i>Stackhousia</i>	<i>clementii</i>			P3	TPFL	N	N	Unlikely
Hydatellaceae	<i>Trithuria</i>	<i>australis</i>	CR		P4	TPL	N	N	Very Unlikely
Polygonaceae	<i>Rumex</i>	<i>crystallinus</i>			P2	TPL; WAHerb	N	Y	Unlikely
Asteraceae	<i>Rhodanthe</i>	<i>ascendens</i>			P2	TPL	N	Y	Unlikely
Malvaceae	<i>Triumfetta</i>	<i>echinata</i>			P3	WAHerb	Y	Y	Possible
Amaranthaceae	<i>Ptilotus</i>	<i>alexandri</i>			P2	WAHerb	N	N	Unlikely
Chenopodiaceae	<i>Sclerolaena</i>	<i>stylosa</i>			P1	WAHerb	N	N	Unlikely

2.11.2 Invasive Species

The EPBC Act Protected Matters Search (DSEWPaC, 2012) indicates that there are two potentially invasive flora species that may occur in the vicinity of the Project Area:

- **Cenchrus ciliaris* Buffel Grass; and
- **Lycium Ferocissimum* African Boxthorn.

Nature Map (DEC, 2012f) indicates two weed species is present within the vicinity of the Project Area:

- **Cenchrus ciliaris* Buffel Grass; and
- **Cylindropuntia fulgida* var. *mamillata*.

Note: * weed species

Weeds of National Significance (WONS)

The spread of weeds across a range of land uses or ecosystems is important in the context of socio-economic and environmental values. The assessment of WONS is based on four major criteria:

- Invasiveness;
- Impacts;
- Potential for spread; and
- Socio-economic and environmental values.

Declared Plants (DP)

Weeds that are, or may become, a problem to agriculture or the environment can be formally classified as Declared Plants under the *Agriculture and Related Resources Protection Act 1976* (ARRP Act). The Department of Agriculture and Food and the Agriculture Protection maintains a list of Declared Plants for Western Australia. If a plant is declared for the whole of the State or for particular Local Government Areas, all landholders are obliged to comply with the specific category of control. Declarations specify a category, or categories, for each plant according to the control strategies or objectives which the Agriculture Protection Board believes are appropriate in a particular place.

Among the factors considered in categorising declared plants are:

- The impact of the plant on individuals;
- Agricultural production and the community in general;
- Whether it is already established in the area;
- The feasibility and cost of possible control measures.

These Declared Plants are divided into five classes, which are detailed in Table 5.

Table 5: Department of Agriculture and Food Declared Plant Control Classes

Priority Class	Description
P1	Prohibits movement of plants or their seeds within the State. This prohibits the movement of contaminated machinery and produce including livestock and fodder.
P2	Eradicate infestation to destroy and prevent propagation each year until no plants remain. The infested area must be managed in such a way that prevents the spread of seed or plant parts on or in livestock, fodder, grain, vehicles and/or machinery.
P3	Control infestation in such a way that prevents the spread of seed or plant parts within and from the property on or in livestock, fodder, grain, vehicles and/or machinery. Treat to destroy and prevent seed set all plants.
P4	Prevent the spread of infestation from the property on or in livestock, fodder, grain, vehicles and/or machinery. Treat to destroy and prevent seed set on all plants.
P5	Infestations on public lands must be controlled.

Environmental Weed Rating

In developing the Environmental Weed Strategy for Western Australia (EWSWA, 1999), criteria for the assessment and ranking of weeds in terms of their environmental impact on biodiversity were formulated. A list of 467 weeds occurring within the DEC Mid West Region were rated as either High, Moderate, Mild or Low against these criteria. Three criteria were selected to rate weeds. These were:

- Invasiveness,
- Distribution; and
- Environmental impacts.

2.12 Diseases or Pathogens

Phytophthora cinnamomi ("Dieback") disease is generally restricted to areas of the south west of the State, south of the 26th parallel of latitude, in areas receiving an average annual rainfall of greater than 400 mm.

As the Project Area is north of this latitude the area is not considered to be susceptible to the development of the *Phytophthora cinnamomi* pathogen.

2.13 Fauna

Existing Fauna Records

A search on NatureMap (ref) was undertaken for the Project Area. The NatureMap records indicate that 94 birds, 13 mammals, 62 reptiles and four amphibians have been officially recorded in the vicinity of the Project Area. A list of these species is provided in Table 16.

2.13.1 Significant Fauna

The conservation of fauna species and their significance status is currently assessed under both Commonwealth (EPBC Act) and State (WC Act) legislation.

Commonwealth

The significance levels for fauna used in the EPBC Act are those recommended by the International Union for the Conservation of Nature and Natural Resources (IUCN). A description of Conservation Categories delineated under the EPBC Act and the circumstances under which a project will trigger referral to the DSEWPaC are described in Appendix B.

The EPBC Act protects migratory species that are listed under the following International Agreements:

- Appendices to the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animals) for which Australia is a range state under the Convention (BONN);
- The Agreement between the Government of Australia and the Government of the People's Republic of China for the Protection of Migratory Birds and their Environment (CAMBA);
- The Agreement between the Government of Japan and the Government of Australia for the Protection of Migratory Birds and Birds in Danger of Extinction and their Environment (JAMBA);
- The Agreement between the Republic of Korea and the Government of Australia for the Protection of Migratory Birds and Birds in Danger of Extinction and their Environment (ROKAMBA); and
- Listed migratory species also include species identified in other international agreements approved by the Commonwealth Environment Minister.

The Act also protects Marine Listed species on Commonwealth lands and waters.

The DSEWPaC maintains a database of matters of national environmental significance that are protected under the EPBC Act. An EPBC Act Protected Matters Report was generated for the matters of significance that may occur in, or relate to, the Project Area (DSEWPaC, 2011). These records are shown in Table 16.

State – Western Australia

The WC Act uses a set of Schedules but also classifies species using some of the IUCN categories. These Schedules are described in Appendix B.

In Western Australia the DEC also produces a supplementary list of Priority Fauna, these being species that are not considered Threatened under the Western Australian WC Act but for which the Government feels there is a cause for concern. These species have no special legislative protection, but their presence would normally be considered. Such taxa need further survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna. Levels of Priority are described Appendix B.

A search of the DEC's Threatened Fauna database for any rare and priority species that may occur in the general area has previously been undertaken. These records are in Appendix B.

From the DEC and the records of the Western Australian Museum (WAM) and the DSEWPaC databases a number of protected fauna species were identified as potentially occurring within, or within the vicinity of, the Project Area. These are listed in Appendix B.

It should be noted that some species that appear in the EPBC Act Protected Matters Search Tool are often not likely to occur within the specified area, as the search provides a general guidance to matters of national significance that require further investigation. The records from the DEC searches (NatureMap) of threatened fauna provide more accurate information for the

general area; however some records of sightings or trappings can be dated and often misrepresent the current range of threatened species.

2.13.2 Exotic Fauna

The results of the NatureMap search indicate that one introduced fauna taxa have been reported within the vicinity of the Project Area.

- **Equus asinus* Donkey

The EPBC Act Protected Matters searches indicate the potential presence of four exotic (feral) fauna taxa within the Project Area:

- **Capra hircus* Goats;
- **Felis catus* Feral Cat;
- **Oryctolagus cuniculus* European Rabbit; and
- **Vulpes vulpes* Red Fox.

3. Field Investigations

GHD undertook a field survey to examine and further describe the vegetation, flora and fauna within the Project Area. The methodology and results are detailed below.

3.1 Survey Methodology

Level 1 flora and fauna surveys were undertaken with regards to the Environmental Protection Authority (EPA, 2004a) Guidance Statement No. 51 and (EPA, 2004b) Guidance Statement No. 56.

The survey and subsequent report include the following:

Environmentally Sensitive Areas

- Determination of whether the Project Area is within an Environmentally Sensitive Area (ESA).

Vegetation and Flora

- A description and location of plant communities, including mapping to be linked to already known and described communities, where possible (EPA, 2004a);
- A rating of the condition of the vegetation communities or areas using the Keighery (1994) rating scale (EPA, 2004a);
- An inventory of vascular plant species in the Project Area (EPA, 2004a);
- A review and search for native plant species considered to be rare or potentially endangered. Other species of interest, including those of limited distribution or outliers from their known range, will be discussed. Locations of Threatened (Declared Rare) or Priority Flora will be mapped at a suitable scale (EPA, 2004a);
- A review of the local and regional significance of the plant communities in terms of the intrinsic value, extent, rarity and condition (EPA, 2004a);
- An inventory of dominant exotic plants and Declared noxious plants and weed species. This will include the provision of advice on whether weeds are considered likely to spread to and result in environmental harm adjacent areas of native vegetation (EPA, 2004a);
- A discussion of the presence, location extent and impact of any known plant pests or diseases (EPA, 2004a); and
- An assessment of the clearing of vegetation against the Ten Clearing Principles (EPA, 2004a).

Fauna

The fauna field survey was undertaken in conjunction with the vegetation and flora survey. An assessment of the likelihood of significant fauna, opportunistic records of fauna species and fauna habitats were undertaken. The field survey was undertaken traversing the study area by a vehicle and on foot. Areas considered to contain unusual or potentially significant habitat were targeted.

3.1.1 Survey Timing

The vegetation and flora field survey was completed in November 2012 following winter rains, to maximise the likelihood of recording as many species as possible.

The Project Area has received no rainfall for the three months prior to undertaking the survey. The long term average for this period is 16.2 mm. As the area received no rainfall it is likely to have influenced the outcome of the biological survey.

3.1.2 Flora

A list of vascular flora species recorded within the Project Area was generated. Where field identification of flora species was uncertain a sample was collected for comparison with taxonomic literature, online databases and the Western Australian Herbarium (WAHERB) reference collection. The presence of Threatened (Declared Rare) or Priority Flora was assessed.

3.1.3 Fauna

A Level 1 fauna field survey was conducted in conjunction with the flora survey over six days. The survey was limited to daylight hours and only examined terrestrial animals occurring within the Project Area. Identification of fauna species was made in the field using available field guides. Where identification was not possible, photographs of specimens were collected in a systematic manner to be later identified by in-house zoologists.

3.1.4 Taxonomic Identification and Nomenclature

Nomenclature used in this report follows that used by the DEC's online *FloraBase* and the DEC/WA Museum online *NatureMap*, as these are deemed to contain the most up to date species information for Western Australia.

3.2 Results of Field Investigation

3.2.1 Environmentally Sensitive Areas

No Environmentally Sensitive Areas were recorded in the Project.

3.2.2 Wetlands

No wetlands were recorded within the Project Area.

3.2.3 Watercourses

The NWCH transits over the Yannarie and Lynton river system. Riparian vegetation was noted along the banks of these rivers systems. MRWA has advised GHD that the existing bridges will not be upgraded as a part of the project works.

A number of ephemeral drainage lines were identified within the Project Area and these have been previously modified as a result of the construction of floodways. MRWA has advised GHD that they propose to widen the existing floodways (50 cm either side) and raise the floodways by 100 to 150 mm. As the existing hydrological flow has been previously impacted as a result of existing floodways, GHD considers that the proposed works will have minimal impact on the hydrology. No riparian vegetation was recorded along these drainage lines.

3.3 Vegetation

A total of six vegetation types were recorded within the northern section, nine vegetation types in the middle section and 16 vegetation types in the southern section, during the field assessment. The vegetation types are shown in Appendix C and Figure 3.

3.3.1 Vegetation Extent

Vegetation types recorded in the Project Area are considered to be similar to Vegetation Association defined by Beard (1975), all these associations are well represented at state, IBRA, sub-IBRA and LGA level with over 99% remaining.

3.3.2 Vegetation Condition

The vegetation in the Project Area was given a condition rating based on the Bush Forever Volume 2 vegetation condition rating scale (after Keighery, 1994). Condition is based on:

- Completeness of structural levels;
- Extent of weed invasion;
- Historical disturbance from tracks and other clearing or dumping; and
- The potential for natural or assisted regeneration.

Vegetation condition consists of six rating levels as outlined below in [Table 6](#).

Table 6: Vegetation Condition Scale (after Keighery, 1994)

Assigned Number	Classification	Description
1	Pristine or Nearly So	Pristine or nearly so, no obvious signs of disturbance.
2	Excellent	Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species.
3	Very Good	Vegetation structure altered obvious signs of disturbance.
4	Good	Vegetation structure significantly altered by very obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it.
5	Degraded	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management.
6	Completely Degraded	The structure of the vegetation is no longer intact and the area is completely or almost without native species.

The vegetation condition of the Project Area was rated during the field survey using the Vegetation Condition Scale (after Keighery, 1994). The vegetation condition of the Project Area ranged from Condition 2 (Excellent) to Condition 6 (Completely Degraded) and is shown in Figure 4. Vegetation within the existing road corridor, historical material extraction sites and fencelines were generally *Degraded* (Condition 5). The remainder of the Project Area contained mostly unaltered vegetation and assigned *Excellent/Very Good* condition.

3.3.3 Threatened Ecological Communities

No Threatened Ecological Communities or Priority Ecological Communities were recorded in the Project Area during the field survey.

3.3.4 Disease or Pathogens

No evidence of plant disease caused by dieback was observed within the Project Area.

3.3.5 Flora Records

Results from the field survey revealed a total of 289 taxa from 42 families, of which three taxa are considered introduced.

The dominant families recorded included:

- Fabaceae (Pea, wattles) 68 taxa;
- Poaceae (Grasses) 34 taxa;
- Malvaceae (Mallows) 24 taxa; and
- Chenopodiaceae (Goosefoot family) 20 taxa.

The dominant genera recorded from the Project Area were:

- *Acacia* 29 taxa;
- *Ptilotus* 12 taxa;
- *Senna* 12 taxa; and
- *Eremophila* 10 taxa.

A full list of the flora species present in the Project Area is provided in Table 12.

3.3.6 Conservation Significant Flora Taxa

EPBC Act Listed Flora

No flora taxa of national conservation significance listed under the EPBC Act were recorded from the Project Area.

WC Act

No Threatened (Declared Rare) species as listed under the WC Act were recorded from the Project Area.

DEC Listed

One Priority 3 Flora taxon was recorded within the southern portion of the Project Area during the 2012 field survey.

Acacia startii (Priority 3) is described as dense, rounded, much-branched shrub, approximately one to two metres tall and up to three metres wide, with green to yellow flowers in July to August (Plate 1) (DEC, 2012c). A search was undertaken on *NatureMap* which reported 48 known locations of this species within the Carnarvon IBRA region. This species is known to occur in calcareous loam with limestone pebbles, stony hills and near water courses. This species is related to the common *Acacia bivenosa*, but within the vicinity of the Project Area the two taxa are not sympatric, with *Acacia startii* occurring to the west and south of the range of *Acacia bivenosa* (DEC, 2012c).

Recent surveys completed by GHD in 2011 and 2012 recorded *Acacia startii* at the following locations:

- SLK 666 Material Pit – In 2011 a total of 505 plants were noted within this material pit and 417 plants outside of the boundary. This species was associated with vegetation types 'Sandplain Rocky'; and 'Cleared/Degraded'. A total of 253 plants were recorded within the 'Cleared/Degraded' area and 252 plants within the 'Sandplain Rocky' vegetation types of the Material Pit.

- SLK 655 Material – In 2011 a total of 156 plants were recorded occurring in a distinct area in the centre of the Material Pit and generally growing within a rehabilitated area.
- SLK 666 Tropic of Capricorn Sign – In 2012 a total of seven of locations were recorded within the Project Area.
- In 2012, a total of 951 plants were recorded at SLK 666 and SLK 655. This taxa was generally noted in areas associated with disturbance mainly resulting from Telstra infrastructure works. The population of this taxa within the region is considered to have been introduced to the site as a result of soil material being relocated and spread as a growth medium during rehabilitation of the Site.



Plate 1: *Acacia startii* (JS172)

One Priority 4 Flora taxa was recorded within the southern portion of the Project Area during the 2012 field survey.

Eremophila youngii subsp. *lepidota* (Priority 4) is described as a dense, spreading shrub approximately one to three metres tall and up to two metres wide, with purple/red/pink flowers in January or March or June or August to September (Plate 2) (DEC, 2012c). A search was undertaken on *NatureMap* that reported five known locations of this species within the Carnarvon IBRA region. This species is known to occur on stony red sandy loam, plains, floodplains, sometimes semi-saline and clay flats.

GHD's field survey identified over 210 *Eremophila youngii* subsp. *lepidota* plants were recorded occurring in a distinct area near SLK 630 and were mostly noted within the floodways of the Southern Section of the Project Area. GHD has recorded this species along the Minilya–Exmouth Road within shallow depressions away from the proposed road alignment. GHD does not consider these species to be under threat from the proposed works, as the known locations

are likely to be able to be avoided as a part of the project works. The recorded locations of this flora taxa are shown in Table 15 and Figure 3.



Plate 2: *Eremophila youngii* subsp. *lepidota* (JS152)

3.3.7 Other Significant Species

Two other significant flora taxa were recorded from the Project Area, *Aotus* aff. *phylicoides* and *Acacia victoriae*.

Aotus aff. *phylicoides* flora taxa has characteristics that resemble *Aotus phylicoides*. *Aotus phylicoides* is known within the Local Government Areas of the Shire of the Chapman Valley, Shire of Northampton and Shire of Shark Bay (DEC, 2012c). A search was undertaken on *NatureMap* with the nearest records 73 km north of the recorded location. This flora taxon is also considered to be a range extension as it was recorded beyond the boundaries of its known range.

Acacia victoriae was recorded from the Project Area beyond the boundaries of its known range. This taxa is widespread and not considered to be under threat. A search was undertaken on *NatureMap* with the nearest record is 200 km east of the Project Area.

3.3.8 Weeds and Introduced Species

The Project contains a low proportion of weeds and introduced flora, but is dominated by one weed species, **Cenchrus ciliaris* (Buffel Grass). This weed species is wide-spread as it is a palatable grass species and deliberately introduced by the pastoral industry. Weed spread in more recent times is due to grazing and road maintenance activities.

A total of three weed species **Cenchrus ciliaris*, **Asphodelus fitulosus* and **Vachellia farnesiana* were recorded from the Project Area. This is considered to be a result of the remoteness of the locations and relatively undisturbed status of the area. These species recorded are widespread

in disturbed areas, having been deliberately introduced as fodder species for the pastoral industry.

None of the weed species recorded are considered to be WONS or Declared Plants under the ARRPP Act.

Environmental Weed Rating

The southern portion of the Project Area falls under the DEC Mid West district. Two of the weeds recorded are known from the Southern portion of the Project Area. Of the two, one had a high EWSWA and the other had no allocated Environmental Weed Rating (EWR) as indicated by Environmental Weed Environmental Weed Strategy Western Australia (EWSWA)(1999). A list of the weeds recorded within the Southern Portion of the Project Area is presented in [Table 7](#).

Table 7: Environmental Weed Rating for the Southern Portion of the Project Area

Genus	Species	Common name	Rating
* <i>Asphodelus</i>	<i>fitulosus</i>	Onion Weed	-
* <i>Cenchrus</i>	<i>ciliaris</i>	Buffel Grass	Moderate

Weed Spread

Buffel Grass is a dominant species along the existing road alignment. Project works are unlikely to increase the propensity of this weed species or other species present within the Project Area.

3.3.9 Fauna

3.3.10 Fauna Habitat

Fauna Habitat Types

The assessment identified eight broad habitat types present within the Project Area, including:

- Woodlands;
- Hummock grasslands on sandplain;
- Open shrubland;
- Floodplain;
- Sand dune;
- Spinifex Steppe; and
- Highly disturbed.

Some of the habitats within the Project Area have been impacted by weed invasion, fire, road maintenance activities and grazing by domestic livestock.

Habitat Value

Habitats within the Project Area are considered to be widespread and similar in condition, or better, in the local and regional area away from the North West Coastal Highway.

Habitat for Conservation Significant Fauna

Within the Project Area the extent of vegetation remains relatively unaltered, apart from localised impacts from road works, historical material pitting, fire and grazing impacts from

pastoral activities. The habitat is relatively uniform across the Project Areas, consisting of low shrubland and Spinifex Steppe. However, there is some variation in the habitat types around the sand dune areas. These areas have the highest value for fauna habitat as they offer diversity from the majority of habitat of the area and because they provide important shelter.

A number of conservation significant fauna were identified from the desktop assessment. The sanddune section of the Project Area is considered to contain suitable habitat for these fauna taxa. MRWA has advised GHD that the proposed works does not include the upgrade of the road infrastructure within associated sanddune sections.

Habitat Linkages

Habitat Linkages are important to allow animals to move between areas of resource availability. Habitat linkage is important for ground and aerial fauna, providing cover, resources and linking areas suitable for rest and reproduction.

Fragmentation of habitat limits the resources available to species, particularly to sedentary species, which means they may be more vulnerable to natural disasters or habitat change over time. Fragmentation of habitat can also lead to edge effects, leading to degradation of the habitat. Where the distance between habitat fragments is small species may still be able to move between these areas, but may be more exposed to predation pressures in the cleared areas.

GHD considers that there are relatively continuous habitat linkages in the Project Area as the Project Area is wholly surrounded by relatively unaltered vegetation.

3.3.11 Fauna Records

A total of 46 birds, eight mammals and 13 reptile taxa were recorded from the Project Area. Six of the mammal taxa recorded are considered to be introduced (Table 16).

3.3.12 Conservation Significant Fauna

No fauna taxa listed under the EPBC Act or WC Act were observed during the field assessment.

Two Priority 4 Fauna taxon was identified occurring within the Project Area, Australian Bustard (*Ardeotis australis*) and Western Pebble Mound Mouse (*Pseudomys chapmani*). *Ardeotis australis* was recorded from two locations (along the road side within the Project Area) (Figure 2). This species will not be impacted by the proposed works as it is considered to be highly mobile and is nomadic, following preferred food source. A *Pseudomys chapmani*'s extinct mound was recorded outside the Project Area. This species is not considered to be impacted by the proposed works.

The desktop assessment indicated that a number of protected fauna may occur within the vicinity of the Project Area. The habitat requirements of these species and the likelihood of their occurrence within the Project Area (with information from the field survey) is considered below:

Malleefowl (*Leipoa ocellata*) [EPBC Act - Vulnerable; WC Act – Schedule 1]

The Malleefowl inhabits semi-arid and arid zones of temperate Australia, where it occupies shrublands and low woodlands that are dominated by mallee vegetation. It also occurs in other habitat types, including eucalypt or *Callitris* woodlands, *Acacia* shrublands, Broombush vegetation or coastal heathlands. The breeding habitat of the Malleefowl, within its home range, is characterised by light soil and an abundant leaf litter, which is used in the construction of nesting mounds (DEC, 2006).

Assessment: The Project Area does not contain optimal habitat for this species. The area falls well outside the known range of this taxon, the nearest record over 300 km south of the Project Area (DEC, 2012d). The potential for this species to utilise the Project Area is considered to be extremely low.

Mulgara (*Dasycercus cristicauda*) [EPBC Act - Vulnerable; WC Act – Schedule 1]

The Mulgara inhabits the arid sandy regions of Australia, mostly living in burrows on the flats between low sand dunes of central Australia. The Mulgara survives on insects, arthropods and small vertebrates (Strahan, 2009).

Assessment: Current distribution of this species suggests that it is unlikely for it to occur within the Project Area. The nearest known records are associated with the Dampier Bunbury Natural Gas Pipeline, 25 km east of the Project Area (Northern Section). However, as no records and observations have been made within the Project Area, it is unlikely this species to be impacted by project works.

Brush-tailed Mulgara (*Dasycercus blythi*) [DEC – Priority 4]

The Brush-tailed Mulgara was originally described as distinct from *D. cristicauda*, but for more than thirty years it was assumed to be synonymous with that species. A limited molecular study of the genus *Dasycercus* was undertaken, which determine that in fact there were two species of similar characteristics *D. cristicauda* and *D. hillieri*. It has since been established that the correct names for the two species are *D. blythi* and *D. cristicauda*. These species is widely distributed in arid regions of the central and western parts of the country. Because the re-recognition of *D. blythi* as a species has been so recent, the identity of museum specimens must be re-checked before the true range limits of both it and *D. cristicauda* can be determined. This species occupies spinifex (*Triodia* spp.) grasslands, and burrows in flats between sand dunes. It is generally a solitary species that hunts at night, although it is not strictly nocturnal (IUCN, 2012b)

Assessment: Current distribution of these species suggests it is out of range. The spinifex grasslands habitat type may provide a suitable habitat for this species. This species has also been recorded along Burkett Road. This specimen is currently preserved. However, as no records and observations have been made within the Project Area, it is unlikely this species to be impacted by project works.

Northern Quoll (*Dasyurus hallucatus*) [EPBC Act – Endangered; WC Act – Schedule 1]

The Northern Quoll distribution extends north of Shark Bay, mainly within the Pilbara region and isolated population in the Kimberley region (DSEWPaC, 2012). This species is known to generally inhabit rocky areas such as ranges, escarpments, mesas, gorges, breakaways, boulder fields, major drainage lines or treed creek lines. This taxon also inhabits structurally diversified woodland or forest areas containing large diameter trees, termite mounds and hollow logs (DSEWPaC, 2011). The Northern Quoll is an opportunistic omnivore, consuming beetles, grasshoppers, spiders, scorpions and centipedes. They also eat fruit and nectar and also have been known to feed on human refuse (DSEWPaC, 2012).

Assessment: The Project Area is located in the Northern Quoll distribution region that is considered 'Species May Occur' in accordance with the EPBC Guidelines (DSEWPaC, 2011). Historical *NatureMap* records indicate that the nearest known location is 44 km north of the Project Area (Northern Section). However, there is a possibility for this species to utilise the Lyndon River as a corridor. MRWA has advised GHD that no works will be undertaken in and around the Lyndon River. This species was not observed or recorded during the field investigation. GHD considers that this species will not be impacted by the proposed works.

Australian Bustard (*Ardeotis australis*) [DEC - Priority 4]

The Australian Bustard was once common in large flocks across much of mainland Australia, but now the numbers have declined (Australian Wildlife Conservancy, 2012). The species can be found in grasslands, open grassy woodlands, low shrublands and chenopod flats and plains, and often occur in areas that have been opened up by fire. The Bustard moves nomadically in response to local variations in the supply of a preferred diet of insects, small vertebrates, seeds and fruit. Due to its nomadic nature the abundance can vary locally and seasonally from scarce to common, largely according to the abundance of grasshoppers (Johnstone and Storr, 1998).

Assessment: Two observations were made of this species during the field survey within the road corridor of Middle and Northern Section of the Project Area. However, this species will not be impacted by the proposed works as it is considered to be highly mobile and is nomadic, following preferred food source.

Grey Falcon (*Falco hypoleucos*) [WC – Schedule 1]

The Grey Falcon is widespread, but very sparse, with 2000 mature individuals in a single population. The populations are in decline. The species can be found in arid and semi-arid areas of Western Australia, where the annual rainfall is less than 500 mm (IUCN RedList, 2012).

Assessment: It is possible for the species to occur within the Project Area, as suitable fauna habitat is present. Records indicate that this species has been recorded 174 km east of the Project Area. This species may fly over; however will not be impacted by the proposed works as it is considered to be highly mobile and is nomadic, following preferred food source.

Western Pebble-mound Mouse (*Pseudomys chapmani*) [DEC - Priority 4]

The Western Pebble-mound Mouse is found in areas of rocky, hummock grassland with little or no soil and an over storey of *Acacia*. Animals live in small family groups in burrows below mounds of pebbles (IUCN RedList, 2012a).

Assessment: One observation was made, an extinct mound located outside the Project Area at Material Pit SLK 808. This species will not be impacted by the proposed works.

Migratory, Marine and Schedule 3 Species

A number of EPBC Act Migratory Listed, Marine Listed and/or WC Act Schedule 3 Listed fauna species are considered to possibly occur in the vicinity of the Project Area as a result of database searches.

While these species are protected under international agreements, many are considered to be of least concern and not under threat. The proposed Project is not considered to have a significant impact on the ongoing existence or habitat of these species.

3.3.13 Introduced Species

There were six introduced species recorded in the Project Area including:

- **Bos Taurus* European Cattle;
- **Capra hircus* Goat;
- **Camelus dromedaries* Camel;
- **Canis lupus* Dingo;
- **Felis catus* Domestic Cat; and
- **Oryctolagus cuniculus* European Rabbit.

3.3.14 Fauna Impacts

The loss of fauna habitat as a result of vegetation clearing is considered to be temporary. MRWA has previously proposed to clear approximately two hectares of vegetation over the timeframe of two years within Material Pit areas. MRWA considers this a staged development approach, as each one to two hectares will be revegetated at each stage, before opening up new areas for clearing. It is not considered that the clearing of vegetation will significantly alter the fauna habitat of the region. Disturbance is most likely to occur on a local scale, impacting individual animals, rather than a species.

Impacts which are likely to occur to individual animals and include:

- Minor loss of habitat and feeding areas. This is not considered to be a substantial impact on current extent of habitat. There will be a minor loss of refuge vegetation and associated foraging resources; and
- Harm/deaths/displacement of individual animals. This may occur during clearing activities.

4. Clearing of Native Vegetation

Clearing applications are assessed against ten principles outlined in Schedule 5 of the *Environmental Protection Act 1986*. These principles aim to ensure that all potential impacts resulting from removal of native vegetation can be assessed in an integrated way. The principles address three main environmental areas:

- Biodiversity significance;
- Land degradation; and
- Ground and surface water quality.

These principles apply to all lands throughout Western Australia. If the project involves significant impacts other than on native vegetation, or the clearing is exempt under Section 51C but is considered likely to have a significant impact, it should be referred to the EPA for consideration.

Any clearing of native vegetation requires a permit under Part V of the *Environmental Protection Act 1986*, except where exemptions apply under Schedule 6 of the *Act* or are prescribed in the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004*. These exemptions do not apply in Environmentally Sensitive Areas (ESAs).

The MRWA Purpose Permit (818/7) which has been granted to MRWA under Section 51E of the *Environmental Protection Act 1986* allows the clearance of native vegetation for this project activity. However, this Permit does not authorise the clearance of native vegetation for project activities where:

4.1 Assessment Against the Ten Clearing Principles

The Project has been assessed against the Ten Clearing Principles (Appendix D) and found to be “at variance” with Principle (a): “Native vegetation should not be cleared if it comprises a high level of biological diversity.” *Acacia startii* (Priority 3) was recorded at a number of locations within the Southern Portion of the Project Area. MRWA has indicated that approximately 30 to 35 plants will possibly be impacted by project works.

As the project is at variance with Principle (a) it is recommended that MRWA liaise with the DEC regarding impacts to this species and whether the project can commence under the existing MRWA purpose permit.

5. Requirement for Referral

5.1 Commonwealth Government

A review of the DSEWPac, 2012 online database was conducted.

The desktop assessment indicated that there is a possibility of the Northern Quoll and Mulgara occurring within the Project Area. The Northern Quoll occurs in the zone 'species may occur' (DSEWPac, 2011). The actions that remove more than five hectares of known habitat or dispersal habitat are considered unlikely to warrant referral to the Commonwealth Government.

5.2 Western Australian Government

5.2.1 Environmental Protection Authority

The Project proposes to upgrade NWCH. Based on the small scale of this Project, associated level of public interest and covered in our assessment based on biological aspects discussed in this report referral to the EPA is not warranted.

5.2.2 Department of Environment and Conservation

MRWA Purpose Permit (818/7) which has been granted to MRWA under Section 51E of the *Environmental Protection Act 1986* allows for the clearance of native vegetation for this project activity. However, this Permit does not authorise the clearance of native vegetation for the project activities where:

- The clearing may be seriously at variance with the clearing principles; or
- Those project activities are incorporated in any proposal that is referred to and assessed under Part IV of the *Environmental Protection Act 1986* by the EPA.

The assessment of the project against the Ten Clearing Principles indicates that the project is "at variance" with Clearing Principle (a):

- *Acacia startii* was recorded at a number of locations within the Southern Portion of the Project Area. MRWA has indicated that approximately 30 to 35 plants will possibly be impacted by project works; and

GHD recommends that MRWA liaise with the DEC regarding impacts to this species and whether the project can commence under the existing MRWA purpose permit. The assessment of the project against the Ten Clearing Principles also indicates that the project is "not likely at variance" with one of the Clearing Principles, on the proviso that:

- Clearing Principle (h): The road reserve has been excised from a DEC Estate. The assessment considers the Project not likely at variance with this Principle if works are restricted to the road corridor only in areas adjacent to the DEC Estate and indirect impacts (such as erosion) are adequately managed.

GHD recommends MRWA discuss the Project with DEC to determine whether the Project is at variance with Principle a) and h).

6. Conclusions and Recommendations

The following conclusions on environmental aspects were made.

- No ESAs overlap the Project Area;
- A search was undertaken on the DEC database and found one DEC managed estate located within the vicinity of the Project Area, ex–Giralia Station;
- The Southern Section of the Project Area occurs in a buffer area of the Priority 4 PEC. The PEC forms apart of the Carnarvon Basin (CB) buffers including CB 76, CB 77, CB 78 and CB 79. This PEC covers the invertebrate assemblages on Lake MacLeod. Lake MacLeod is located 19 km to the west of the Project Area. Lake MacLeod and the associated PEC will not be impacted by the proposed works. It should be noted that DEC provides locations for TEC and PEC that have a buffer placed typically at a 500 metre radius around the community. As such, the TEC/PEC may not be present within the entire extent of the buffer area;
- The vegetation types classified during the field survey were extrapolated and found generally matched with the Beard Vegetation Associations known to occur within the vicinity of the Project Area;
- All Vegetation Association within the Project Area is considered to be *Least Concern* in extent remaining at a (State, IBRA, IBRA Sub-region and LGA);
- The vegetation condition of the Project Area ranged from Condition 2 (*Excellent*) to Condition 6 (*Completely Degraded*). Vegetation Condition 6 was generally noted within six metres of the roadside and pull off areas;
- Results from the field survey revealed a total of 289 flora taxa from 42 families, of which three are considered introduced;
- No flora taxa of national conservation significance listed under the EPBC Act were recorded from the Project Area;
- A total of two Priority Flora taxa were recorded from the Project Area during the field survey. They include:
 - *Acacia startii* Priority 3; and
 - *Eremophila youngii* subsp, *lepidota* Priority 4.
- A total of three weeds were identified during the field surveys. No WONS or Declared Plants were recorded from the Project Area;
- A total of 46 birds, eight mammals and 13 reptile taxa were recorded from the Project Area;
- A total of six introduced mammals were recorded in the Project Area, including European Cattle, Goat, European Rabbit, Donkey, Camel and Dingo;
- No threatened fauna species were recorded in the Project Area during the reconnaissance fauna survey;
- Two Priority Fauna species were recorded within the middle and northern section of the Project Area, including the Pebble Mound Mouse and Australian Bustard.

- A Pebble Mound Mouse extinct mound was recorded outside the survey boundary of Material Pit SLK 808;
- The Australia Bustard was recorded within the road corridor on the North West Coastal Highway in the northern and middle sections of the Project Area;
- No habitat deemed conservation significant was recorded within the Project Area. However, it is recommended that MRWA avoid any project works on sanddunes;
- The project is considered to be “likely at variance” with Principle (a) and “not likely at variance” with Principle (h) of the DEC’s Ten Clearing Principles;
- Principle (a) is considered to be “likely at variance”. *Acacia startii* was recorded at a number of locations within the Southern Portion of the Project Area. MRWA has indicated that approximately 30 to 35 plants will possibly be impacted by project works. GHD recommends MRWA liaise with the DEC in this regard;
- Principle (h): The road reserve has been excised from a DEC Estate. The assessment considers the Project not likely at variance with this Principle on the proviso that works are restricted to the road corridor only in areas adjacent to the DEC Estate and indirect impacts (such as erosion) are adequately managed;
- Referral to the Environmental Protection Authority (EPA) is not considered to be warranted for this Project;
- Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) is considered unlikely to be warranted for this Project.

6.1 Recommendations

Recommendation 1:

A total of three weed species were identified during the field survey. The Project Area is considered to occur in area of low disturbance. As such, the majority of weed species identified during the survey are regarded as invasive weeds typical of disturbed areas, i.e. material pit areas. GHD recommends that, as far as practicable, weed management is implemented so as to reduce the risk of spreading or introducing new weeds as a result of Project works.

Recommendation 2:

The desktop assessment revealed that a DEC estate, ex-Giralia Station, overlaps the middle section of the Project Area. GHD understands that all road corridors have been excised from the DEC estate. If MRWA considers undertaking any works outside the road corridor GHD advises MRWA to liaise with the DEC.

Recommendation 3:

The field assessment reveals Priority 3 *Acacia startii* within the Southern Section of the Project Area. GHD understands that MRWA’s project works will impact a number of individual’s locations. GHD recommends that MRWA liaise with the DEC regarding impacts to this species and whether the project can commence under the existing MRWA purpose permit.

7. References

- Beard, J. S. (1978) Murchison, 1:1 000,000 vegetation series: explanatory notes to sheet 6L the vegetation of the Murchison region Nedlands, W.A.: University of Western Australia Press with assistance from the Interim Council for the Australian Biological Resource Study.
- DSEWPaC (2011) Environment Protection and Biodiversity Act 1999 referral guidelines for the endangered north quoll, *Dasyurus hallucatus*. EPBC Act Policy Statement 3.25.
- Bureau of Meteorology (BOM) (2012) *Climate Statistics for Australian Locations*. Accessed Online http://www.bom.gov.au/climate/averages/tables/cw_005007.shtml on [December 2012]
- CSIRO (2012). Australian Soil Resource Information System. Accessed from: http://www.asris.csiro.au/index_ie.html
- Department of Environment and Conservation (DEC, 2012). *FloraBase*, Western Australian Herbarium. Accessed from: <http://florabase.dec.wa.gov.au/>.
- Department of Environment and Conservation (DEC, 2012a). List of Threatened Ecological Communities (endorsed by the Minister – July 2007).
- Department of Environment and Conservation (DEC, 2012b). NatureMap. Mapping Western Australia's Biodiversity. Accessed Online: <http://naturemap.dec.wa.gov.au/default.aspx> on [December 2012]
- Department of Environment and Conservation (DEC, 2012c) Western Australian Herbarium – Florabase. Accessed Online: <http://florabase.dec.wa.gov.au> on [November 2012]
- Department of Environment and Conservation (DEC, 2006) Malleefowl, *Leipoa ocellata* (Gould, 1840) Accessed Online <http://www.dec.wa.gov.au/search.html?searchword=Malleefowl&searchphrase=all> on [January 2013]
- Department of Sustainability, Environment, Water, Population and Communities (DoSEWPC)(2012) Species Profile and Threats Database. Accessed Online <http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl> on [December 2012]
- Department of Sustainability, Environment, Water, Population and Communities (2012b). Environment Protection and Biodiversity Act 1999 Protected Matters Report.
- Environmental Protection Authority (2004a). Guidance Statement No. 51: Vegetation and Flora Surveys for Environmental Impact Assessment in Western Australia. EPA, Perth
- Environmental Protection Authority (2004b). Guidance Statement No. 56: Terrestrial Fauna Surveys for Impact Assessment in Western Australia. EPA, Perth.
- GHD (2012) *Main Road Western Australia*. North West Coastal Highway, Strategic Material Pit SLK 655A and 655B. Preliminary Environmental Impact Assessment. April 2012. Unpublished Report for MRWA.
- GHD (2012a) *Main Road Western Australia*. North West Coastal Highway, Strategic Material Pit SLK 660A and 660B. Preliminary Environmental Impact Assessment. April 2012. Unpublished Report for MRWA.

- GHD (2012b) Main Roads Western Australia. North West Coastal Highway Strategic Material Pit SLK 666A and 666B, Preliminary Environmental Impact Assessment. April 2012. Unpublished Report for MRWA.
- GHD (2012c) Main Roads Western Australia. North West Coastal Highway, Strategic Material Pit SLK 770, Preliminary Environmental Impact Assessment. March 2012. Unpublished Report for MRWA;
- GHD (2012d) Main Roads Western Australia. Burkett Road, Strategic Material Pit SLK 1.5 to 10, Preliminary Environmental Impact Assessment. March 2012. Unpublished Report for MRWA
- GHD (2012e) *Main Roads Western Australia*. Preliminary Environmental Impact Assessment. 26th Parallel Sign SLK 328, Tropic of Capricorn Sign SLK 66, Strategic Material Pit SLK 772, SLK 918, SLK 934 and SLK 950. December 2012. Unpublished Report for MRWA.
- International Union for Conservation of Nature and Natural Resources (IUCN, 2012) *Falco hypoleucos*. Accessed Online <http://www.iucnredlist.org/details/106003615/0> on [November 2012].
- International Union for Conservation of Nature and Natural Resources (IUCN, 2012) *Pseudomys chapmani*. Accessed Online <http://www.iucnredlist.org/details/42648/0> on [November 2012].
- International Union for Conservation of Nature and Natural Resources (IUCN, 2012) *Dasycercus blythi*. Accessed Online <http://www.iucnredlist.org/details/6267/0> on [November 2012].
- Johnston, R and Storr, G. (1998) *Handbook of Western Australian Birds*, Volume 1 – Non – passerines (Emu to Dollarbird). Western Australian Museum. Perth.
- Moore, P (2005) *A Guide to Plants of Inland Australia*. French Forest, Australia: New Holland Publishers (Australia) Pty Ltd
- Tille, P (2006) Resource Management Technical Report 313. Soil – landscapes of Western Australia's Rangelands and Arid Interior. December 2012. Department of Agriculture and Food Government of Australia.

Appendices

Appendix A Figures

Figure 1 Project Location

Figure 2 Environmental Constraints

Figure 3a Northern Section Vegetation Type

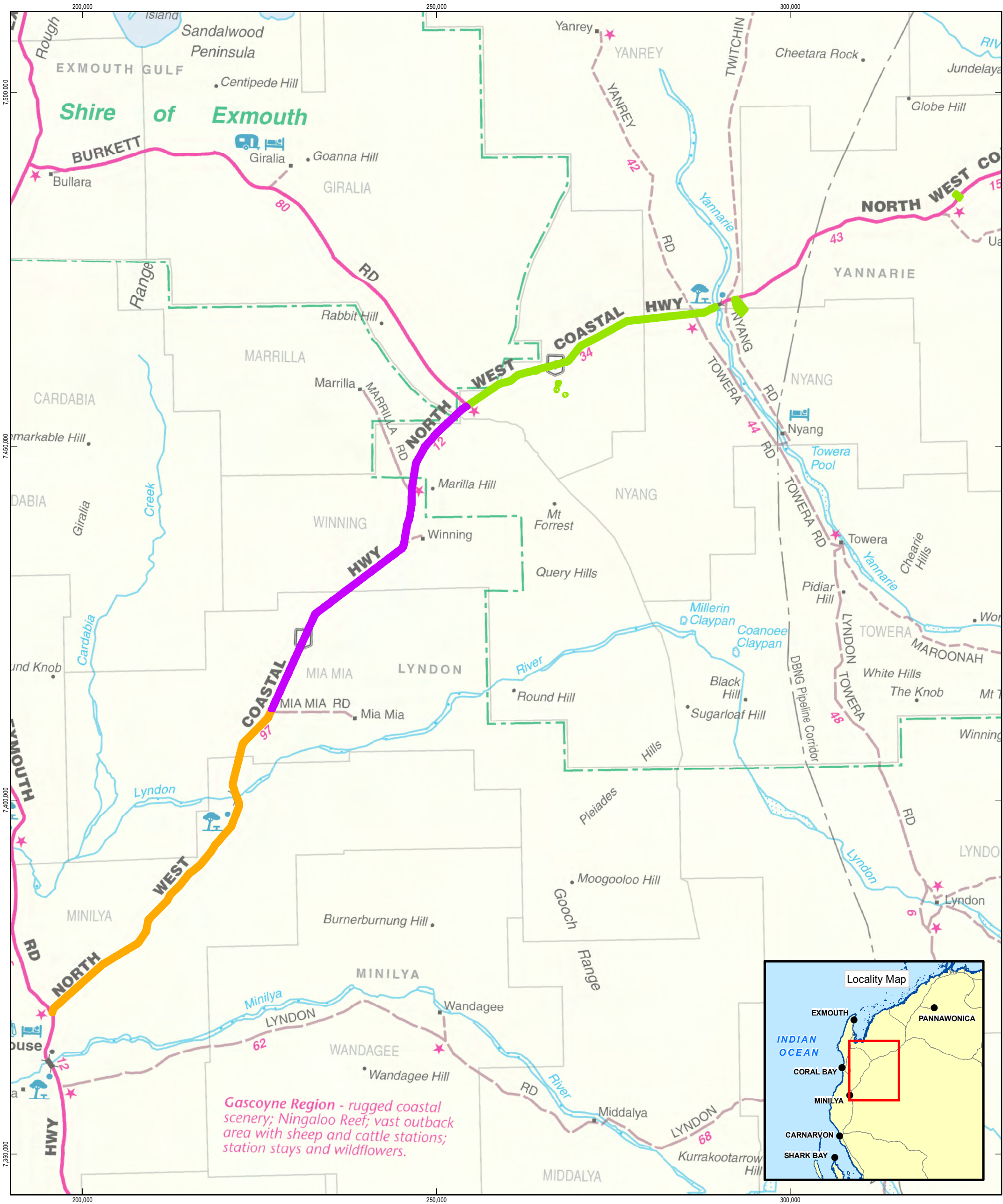
Figure 3b Middle Section Vegetation Type

Figure 3c Southern Section Vegetation Type

Figure 4a Northern Section Vegetation Conditions

Figure 4b Middle Section Vegetation Conditions

Figure 4c Southern Section Vegetation Conditions



LEGEND

Survey Area

Northern Section

Middle Section

Southern Section

1: 500,000 (at A3)

02.5510152025

Kilometres

Map Projection: Transverse Mercator

Horizontal Datum: Geocentric Datum of Australia

Grid: Map Grid of Australia 1994, Zone 50

N

GHD

mainroads

WESTERN AUSTRALIA

powered by

SLIP ENABLER

Main Roads Western Australia

MRWA ETS BDS

North West Coastal Highway SLK 620.5 – 767

Biological Survey

Job Number

Revision

Date

61-28865

0

03 Apr 2013

Locality

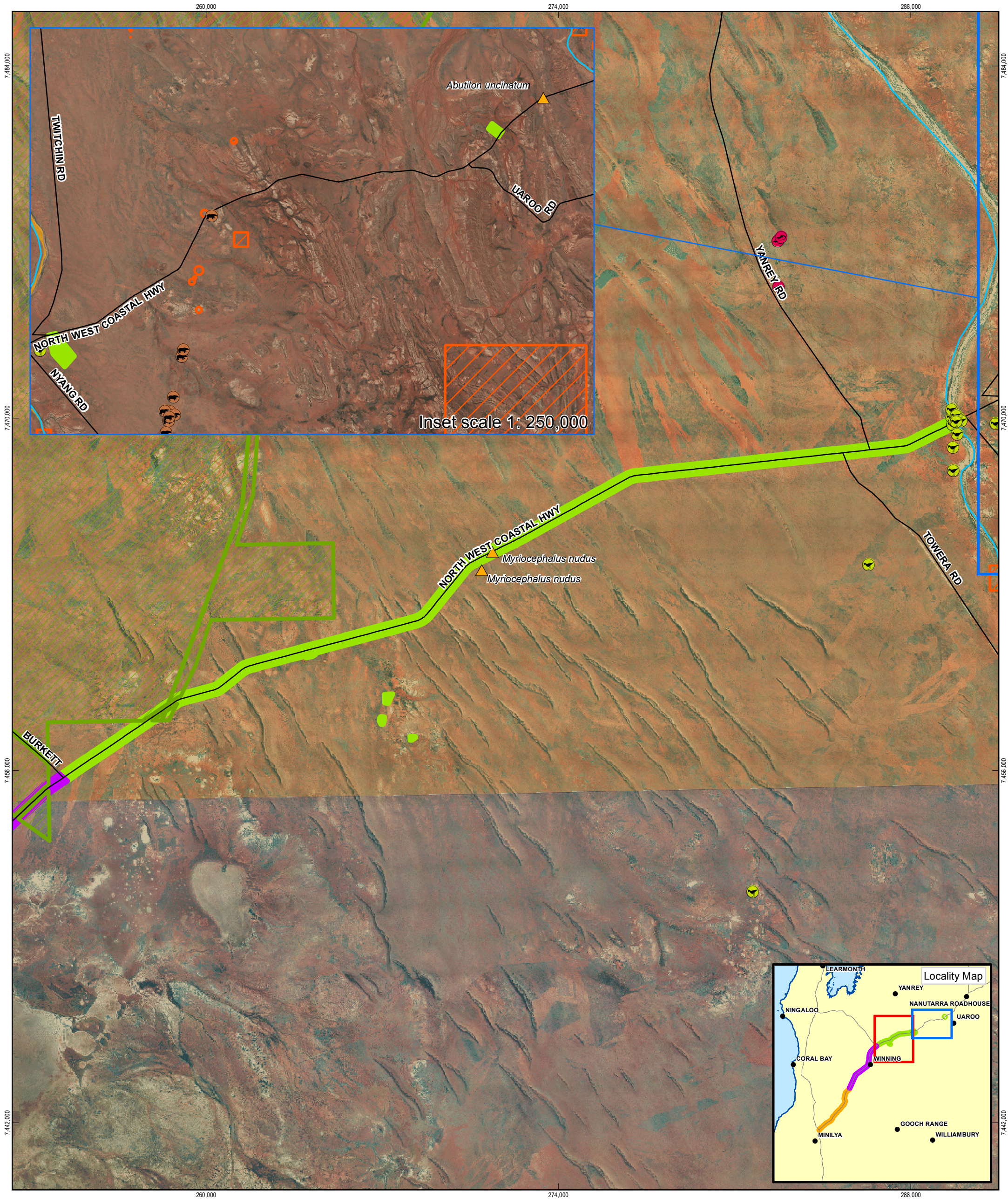
Figure 1

G:\6128865\GIS\Maps\MXD\6128865_G001_Fig1_Rev0.mxd

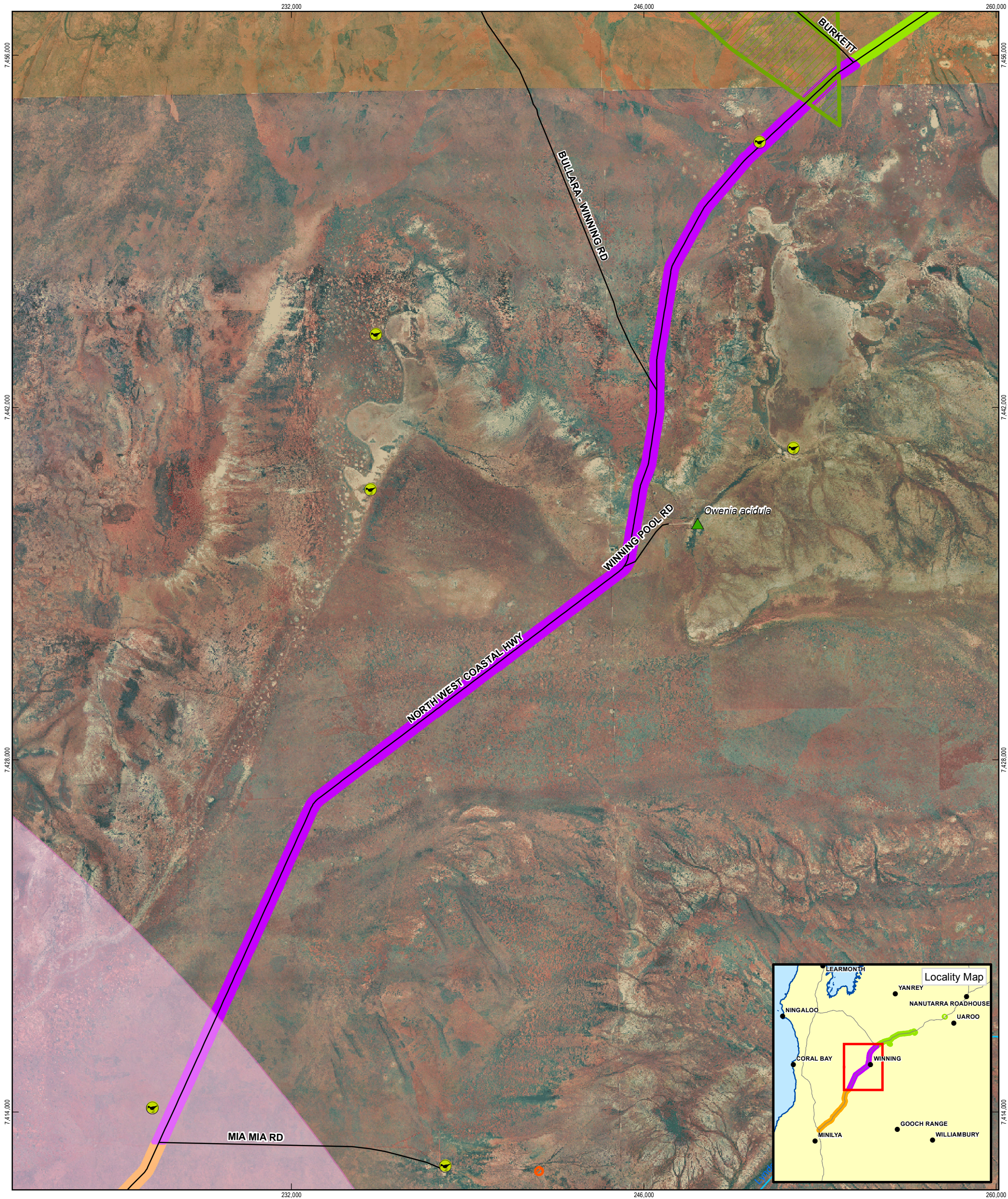
239 Adelaide Terrace Perth WA 6004 Australia T 61 8 6222 8222 F 61 8 6222 8555 E permail@ghd.com.au W www.ghd.com.au

© 2013. Whilst every care has been taken to prepare this map, GHD, MRWA, GA and Landgate make no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and cannot accept liability and responsibility of any kind (whether in contract, tort or otherwise) for any expenses, losses, damages and/or costs (including indirect or consequential damage) which are or may be incurred by any party as a result of the map being inaccurate, incomplete or unsuitable in any way and for any reason.

Data source: Landgate: Travellers Atlas 2006; GHD: Survey Area - 20121114; GA: Topo 250k Series 3 - 2006. Created by: bforczak, radeleon



LEGEND						
Threatened (Declared Rare) and Priority Flora			Threatened or Priority Fauna		Survey Area	
▲ (T) Threatened Rare Flora - Extant Taxa	▲ Priority 3 - Poorly Known Taxa	● Bird	— Roads	■ Northern Section	■ DEC Estates	
▲ Priority 1 - Poorly Known Taxa	▲ Priority 4 - Rare Taxa	● Mammal	— Rivers	■ Middle Section	■ Aboriginal Heritage Sites	
▲ Priority 2 - Poorly Known Taxa	▲ Priority 5 - Conservation Dependent Taxa	● Reptile		■ Southern Section	■ Priority Ecological Communities	



LEGEND

Threatened (Declared Rare) and Priority Flora

- (T) Threatened Rare Flora - Extant Taxa
- Priority 1 - Poorly Known Taxa
- Priority 2 - Poorly Known Taxa

Threatened or Priority Fauna

- Bird
- Mammal
- Reptile

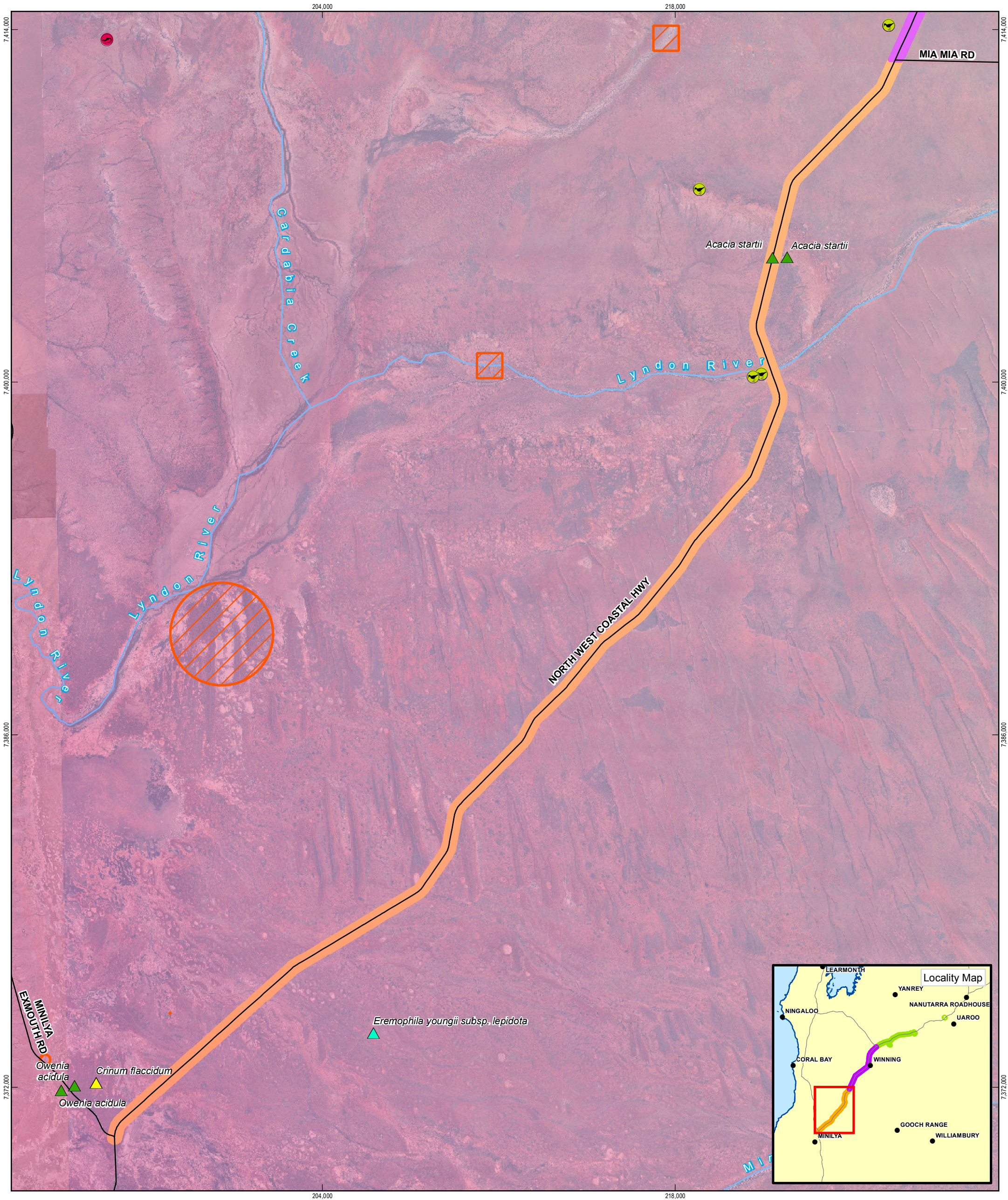
Survey Area

- Northern Section
- Middle Section
- Southern Section

DEC Estates

- Aboriginal Heritage Sites
- Priority Ecological Communities

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50



LEGEND

Threatened (Declared Rare) and Priority Flora

- (T) Threatened Rare Flora - Extant Taxa
- Priority 1 - Poorly Known Taxa
- Priority 2 - Poorly Known Taxa

- Priority 3 - Poorly Known Taxa
- Priority 4 - Rare Taxa
- Priority 5 - Conservation Dependent Taxa

Threatened or Priority Fauna

- Bird
- Mammal
- Reptile

Roads

Rivers

Survey Area

- Northern Section
- Middle Section
- Southern Section

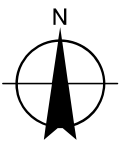
- DEC Estates
- Aboriginal Heritage Sites
- Priority Ecological Communities

1: 140,000 (at A3)

0 0.7 1.4 2.8 4.2 5.6 7

Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50

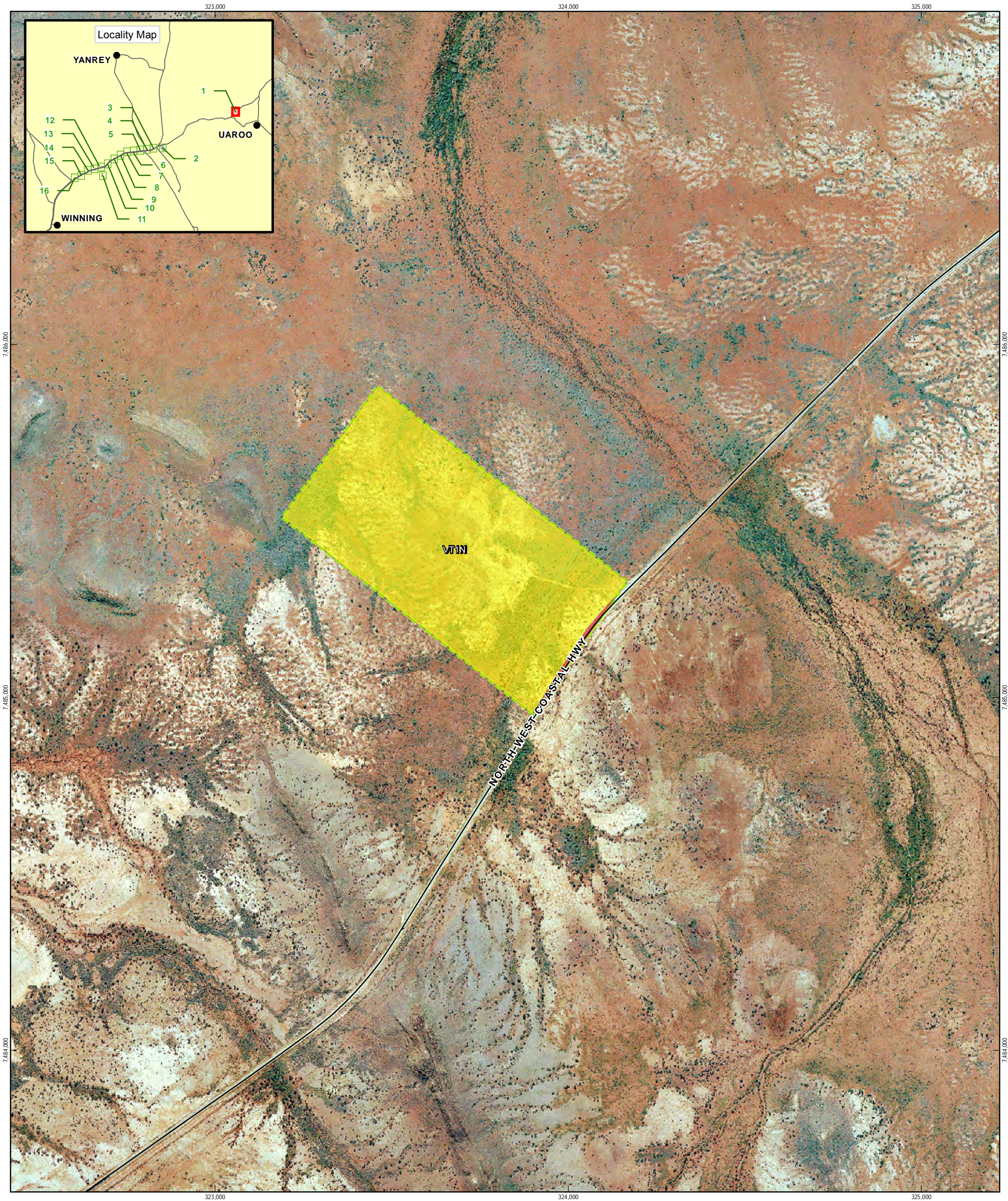


Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number | 61-28865
Revision | 0
Date | 03 Apr 2013

Southern Section Environmental Constraints

Sheet 3 of 3
Figure 2



- LEGEND**
- Priority Flora (GHD)**
- Priority 1
 - Priority 2
 - Priority 3
 - Priority 4
 - Priority 5
- Priority Fauna (GHD)**
- Priority Fauna (GHD)
- Roads**
- Roads
- Northern Section Survey Area**
- Northern Section Survey Area
- Priority Ecological Communities**
- Priority Ecological Communities
- DEC Estates**
- DEC Estates

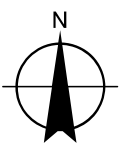
- Vegetation Types**
- VT1N
 - VT2N
 - VT3N
 - VT4N
 - VT5N
 - VT6N
 - HD

1: 10,000 (at A3)

0 50 100 200 300 400 500

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50



Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number 61-28865
Revision 0
Date 03 Apr 2013

Northern Section Vegetation Types

Sheet 1 of 16

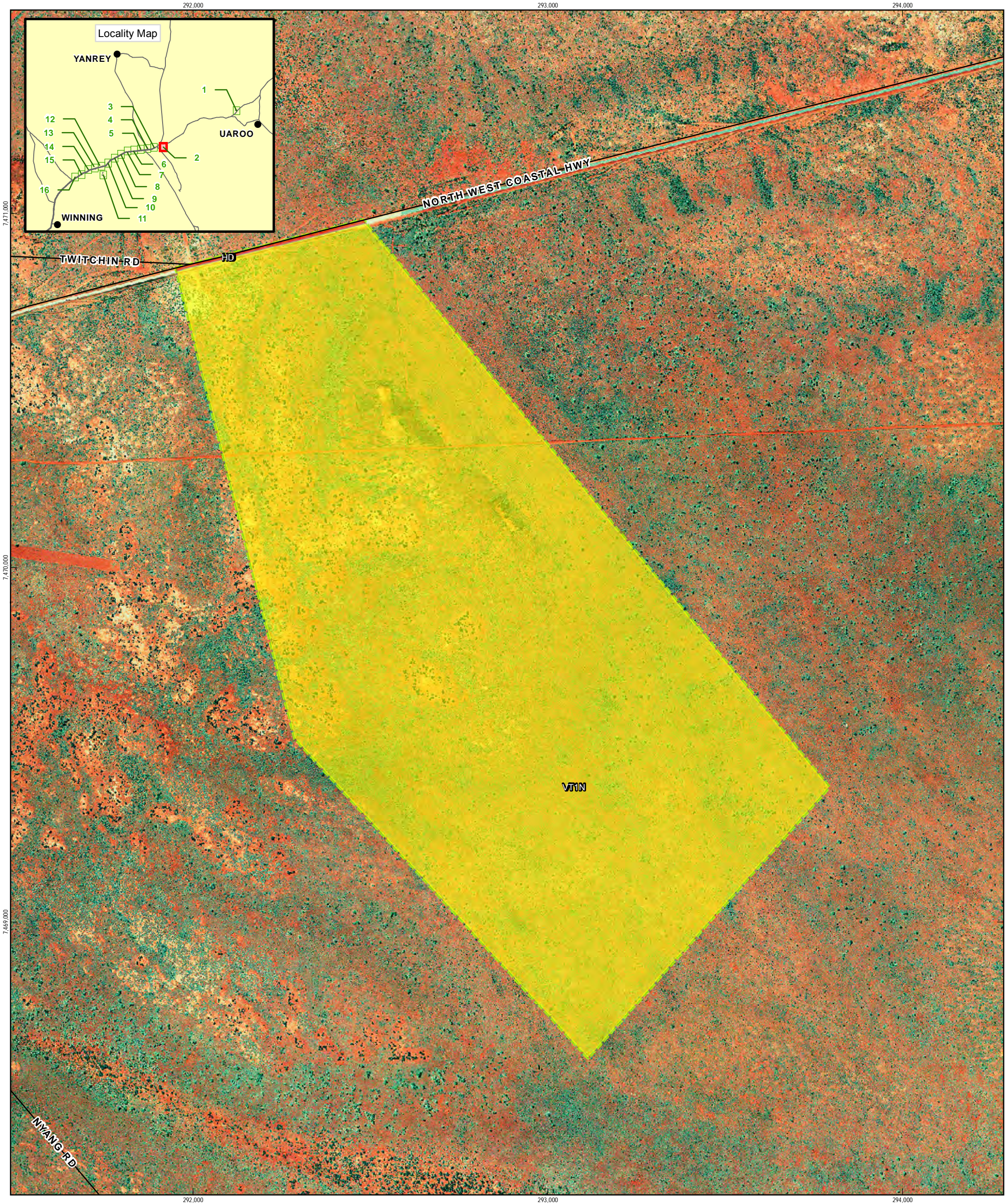
Figure 3a

G:\6128865\GIS\Maps\MXD\6128865_G003_Fig3a_VegTypeNorth_Rev0.mxd

239 Adelaide Terrace Perth WA 6004 Australia T 61 8 6222 8222 F 61 8 6222 8555 E permail@ghd.com.au W www.ghd.com.au

© 2013. Whilst every care has been taken to prepare this map, GHD, MRWA, DEC, GA and Landgate make no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and cannot accept liability and responsibility of any kind (whether in contract, tort or otherwise) for any expenses, losses, damages and/or costs (including indirect or consequential damage) which are or may be incurred by any party as a result of the map being inaccurate, incomplete or unsuitable in any way and for any reason.

Data source: Landgate: Uaroo 2005 Mosaic - 20121115, Mia Mia 2007 Mosaic - 20121115, Winning 2007 Mosaic - 20121115, Barradale 2007 Mosaic - 20121115; MRWA: Roads - 20120528; GHD: Northern Section Survey Area - 20121114, Priority Flora - 20130201, Priority Fauna - 20130201, Vegetation Types - 20130128; DEC: Priority Ecological Communities - 20121129, DEC Estates - 20121219; GA: Topo 250k Series 3 - 2006. Created by: radeleon



LEGEND

Priority Flora (GHD)

- Priority 1
- Priority 2
- Priority 3
- Priority 4
- Priority 5

Priority Fauna (GHD)

-

Roads

-

Northern Section Survey Area

-

Priority Ecological Communities

-

DEC Estates

-

Vegetation Types

- VT1N
- VT2N
- VT3N

- VT4N
- VT5N
- VT6N
- HD

1: 10,000 (at A3)

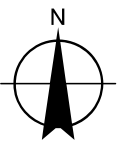
0 50 100 200 300 400 500

Metres

Map Projection: Transverse Mercator

Horizontal Datum: Geocentric Datum of Australia

Grid: Map Grid of Australia 1994, Zone 50



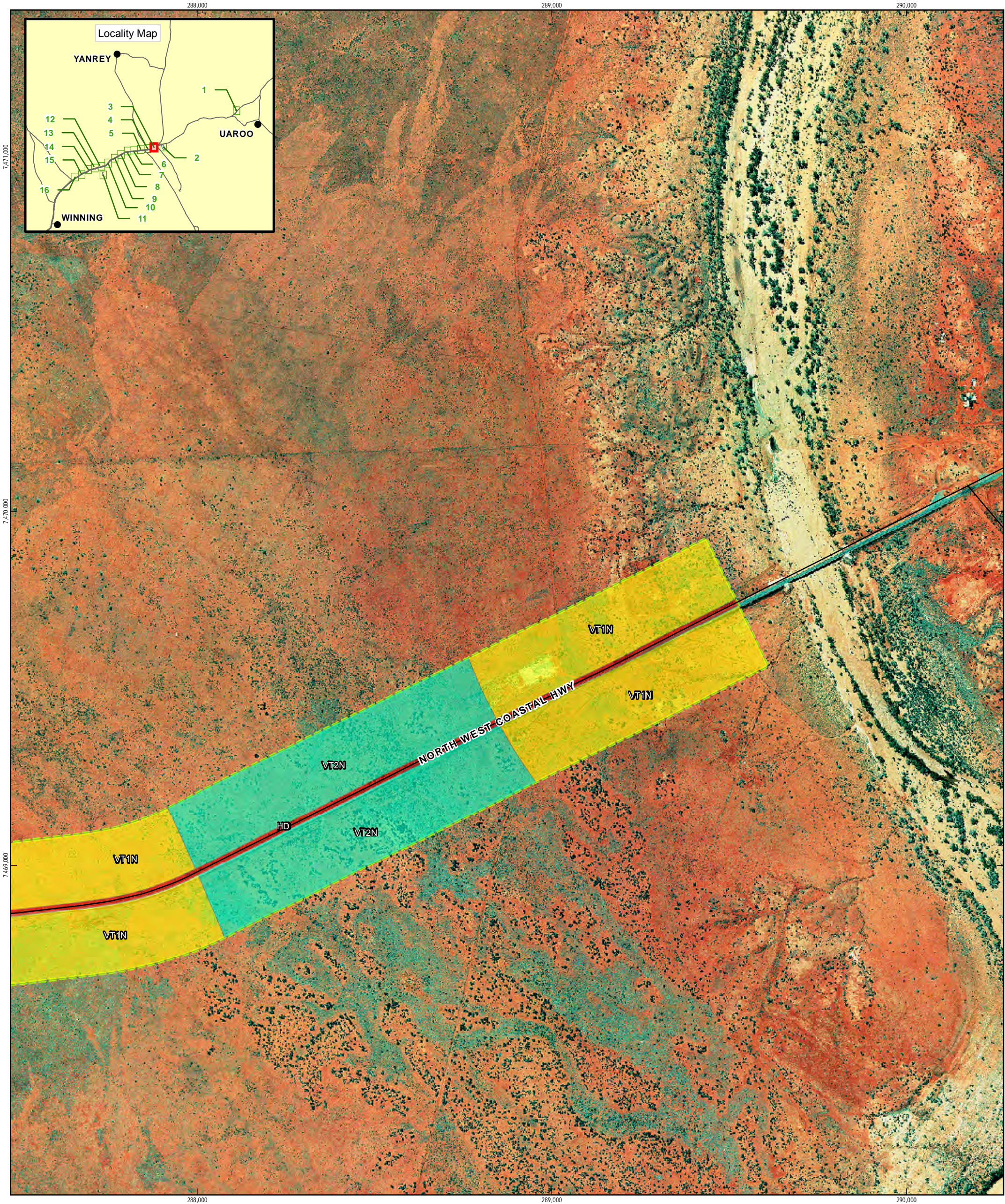
Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number	61-28865
Revision	0
Date	03 Apr 2013

Northern Section Vegetation Types

Sheet 2 of 16

Figure 3a



LEGEND

Priority Flora (GHD)

- Priority 1
- Priority 2
- Priority 3
- Priority 4
- Priority 5

Priority Fauna (GHD)

- Priority Fauna (GHD)

Roads

- Roads

Northern Section Survey Area

- Northern Section Survey Area

Priority Ecological Communities

- Priority Ecological Communities

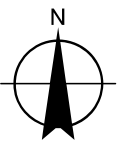
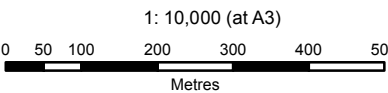
DEC Estates

- DEC Estates

Vegetation Types

- VT1N
- VT2N
- VT3N

- VT4N
- VT5N
- VT6N
- HD



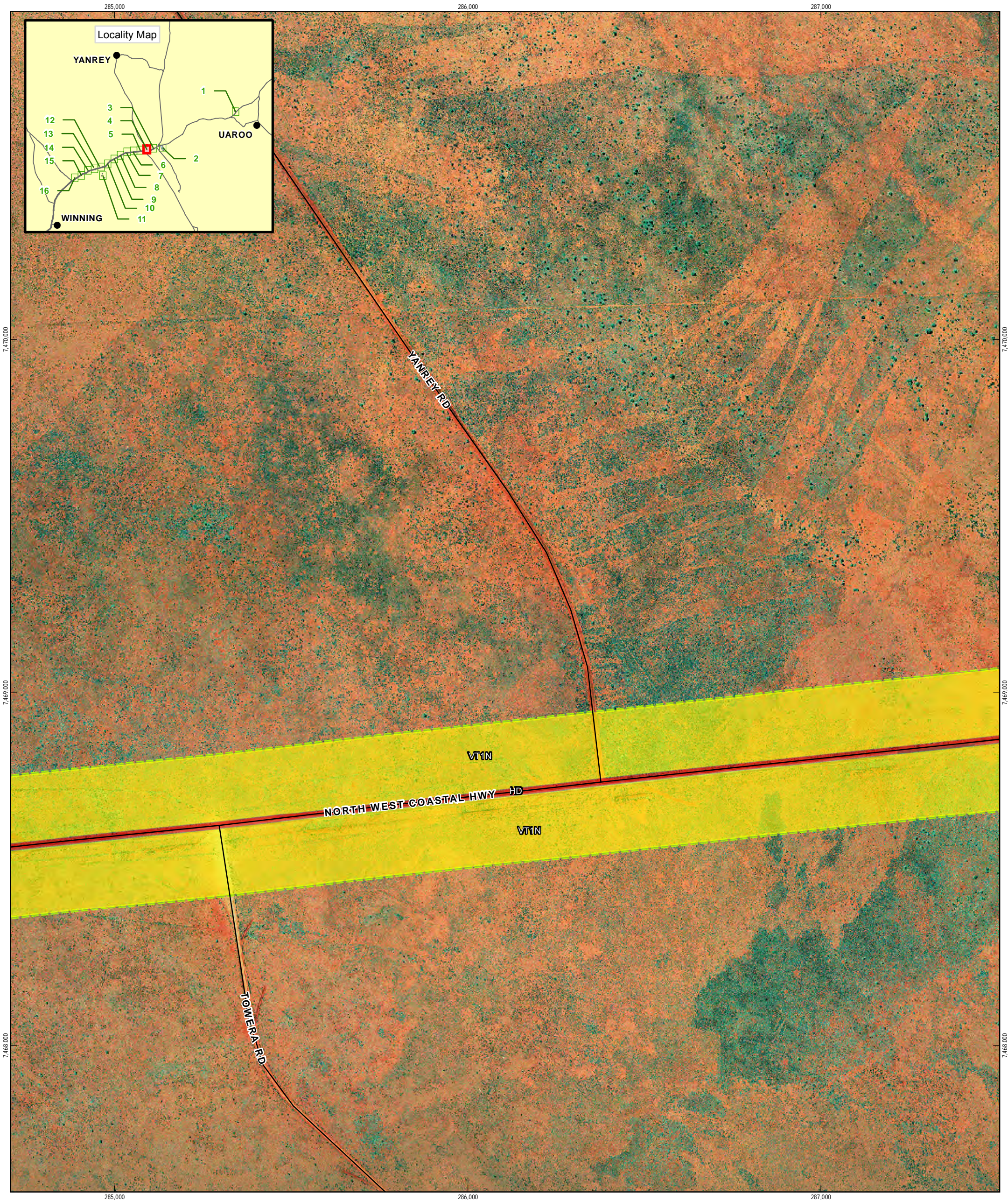
Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number | 61-28865
Revision | 0
Date | 03 Apr 2013

Northern Section Vegetation Types

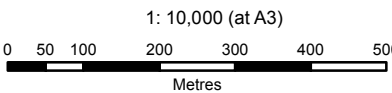
Sheet 3 of 16

Figure 3a

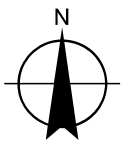


- LEGEND**
- Priority Flora (GHD)**
- Priority 1
 - Priority 2
 - Priority 3
 - Priority 4
 - Priority 5
- Priority Fauna (GHD)**
- Priority Fauna (GHD)
- Roads**
- Roads
- Northern Section Survey Area**
- Northern Section Survey Area
- Priority Ecological Communities**
- Priority Ecological Communities
- DEC Estates**
- DEC Estates

- Vegetation Types**
- VT1N
 - VT2N
 - VT3N
 - VT4N
 - VT5N
 - VT6N
 - HD



Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50



Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number 61-28865
Revision 0
Date 03 Apr 2013

Sheet 4 of 16

Northern Section Vegetation Types

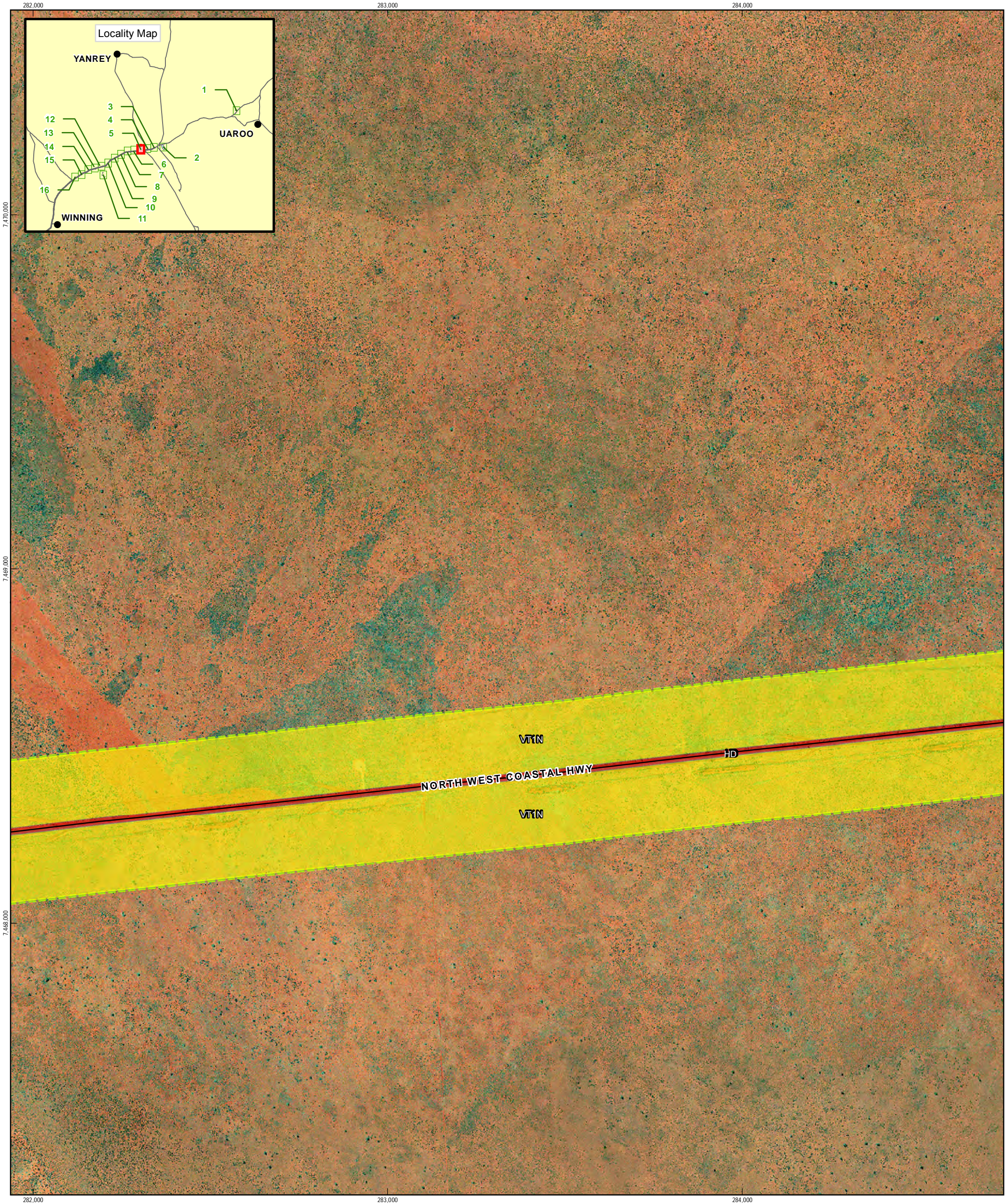
Figure 3a

G:\6128865\GIS\Maps\MXD\6128865_G003_Fig3a_VegTypeNorth_Rev0.mxd

239 Adelaide Terrace Perth WA 6004 Australia T 61 8 6222 8222 F 61 8 6222 8555 E permail@ghd.com.au W www.ghd.com.au

© 2013. Whilst every care has been taken to prepare this map, GHD, MRWA, DEC, GA and Landgate make no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and cannot accept liability and responsibility of any kind (whether in contract, tort or otherwise) for any expenses, losses, damages and/or costs (including indirect or consequential damage) which are or may be incurred by any party as a result of the map being inaccurate, incomplete or unsuitable in any way and for any reason.

Data source: Landgate: Uaroo 2005 Mosaic - 20121115, Mia Mia 2007 Mosaic - 20121115, Winning 2007 Mosaic - 20121115, Barradale 2007 Mosaic - 20121115; MRWA: Roads - 20120528; GHD: Northern Section Survey Area - 20121114, Priority Flora - 20130201, Priority Fauna - 20130201, Vegetation Types - 20130128; DEC: Priority Ecological Communities - 20121129, DEC Estates - 20121219; GA: Topo 250k Series 3 - 2006. Created by: radeleon



LEGEND

Priority Flora (GHD)

- Priority 1
- Priority 2
- Priority 3
- Priority 4
- Priority 5

Priority Fauna (GHD)

- Priority Fauna (GHD)

Roads

- Roads

Northern Section Survey Area

- Northern Section Survey Area

Priority Ecological Communities

- Priority Ecological Communities

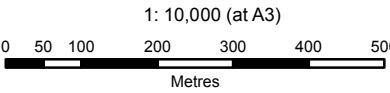
DEC Estates

- DEC Estates

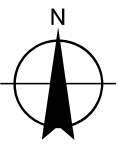
Vegetation Types

- VT1N
- VT2N
- VT3N

- VT4N
- VT5N
- VT6N
- HD



Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50



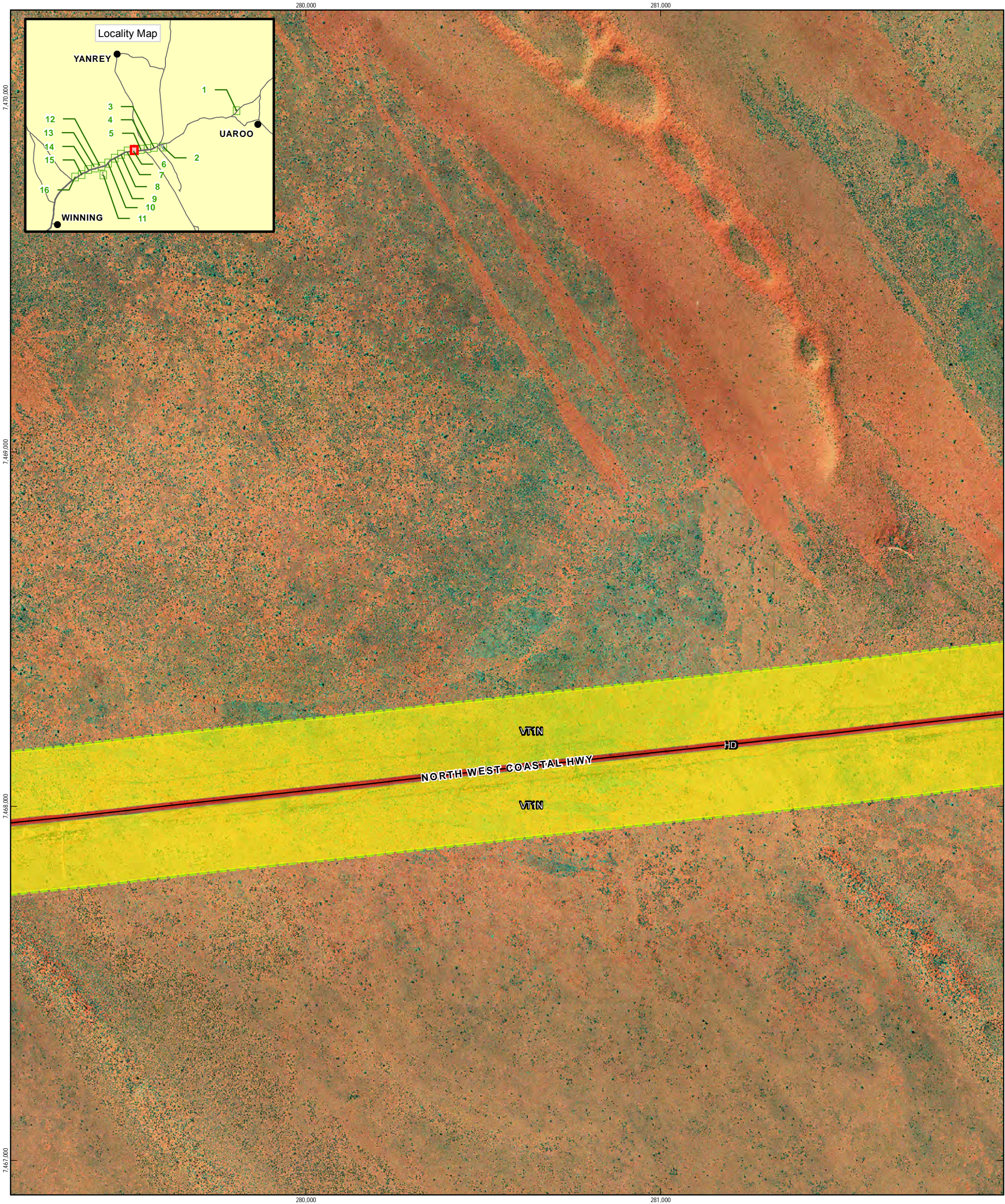
Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number | 61-28865
Revision | 0
Date | 03 Apr 2013

Northern Section Vegetation Types

Sheet 5 of 16

Figure 3a



LEGEND

Priority Flora (GHD)

Priority 1

Priority 2

Priority 3

Priority 4

Priority 5

Priority Fauna (GHD)

Roads

Northern Section Survey Area

Priority Ecological Communities

DEC Estates

Vegetation Types

VT1N

VT2N

VT3N

VT4N

VT5N

VT6N

HD

Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number	61-28865
Revision	0
Date	03 Apr 2013

Sheet 6 of 16

Northern Section Vegetation Types

Figure 3a

G:\6128865\GIS\Maps\MXD\6128865_G003_Fig3a_VegTypeNorth_Rev0.mxd
© 2013. Whilst every care has been taken to prepare this map, GHD, MRWA, DEC, GA and Landgate make no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and cannot accept liability and responsibility of any kind (whether in contract, tort or otherwise) for any expenses, losses, damages and/or costs (including indirect or consequential damage) which are or may be incurred by any party as a result of the map being inaccurate, incomplete or unsuitable in any way and for any reason.
Data source: Landgate: Uaroo 2005 Mosaic - 20121115, Mia Mia 2007 Mosaic - 20121115, Winning 2007 Mosaic - 20121115, Barradale 2007 Mosaic - 20121115; MRWA: Roads - 20120528; GHD: Northern Section Survey Area - 20121114, Priority Flora - 20130201, Priority Fauna - 20130201, Vegetation Types - 20130128; DEC: Priority Ecological Communities - 20121129, DEC Estates - 20121219; GA: Topo 250k Series 3 - 2006. Created by: radeleon

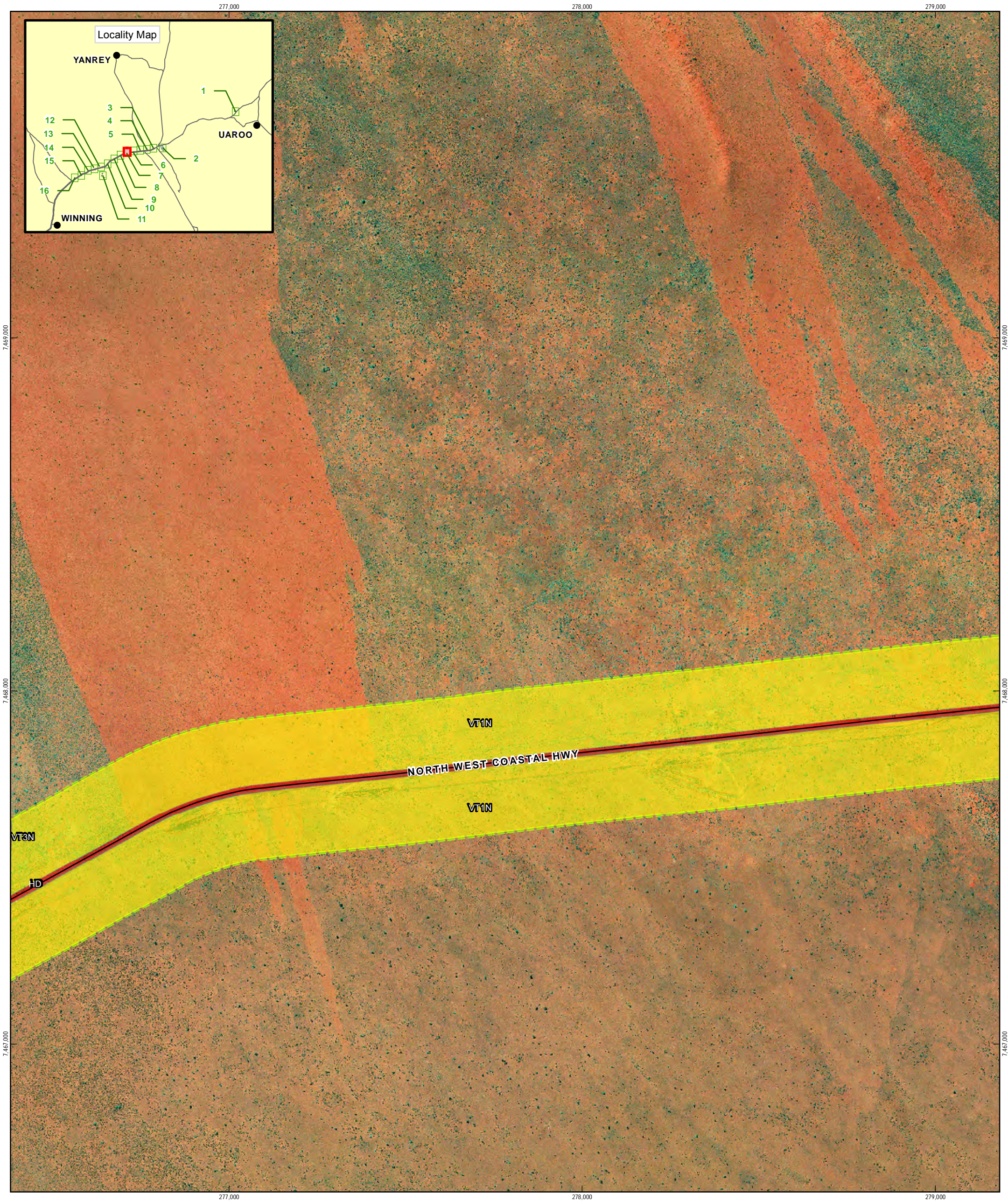
239 Adelaide Terrace Perth WA 6004 Australia

T 61 8 6222 8222

F 61 8 6222 8555

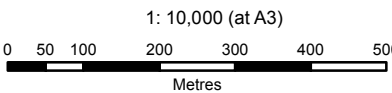
E permail@ghd.com.au

W www.ghd.com.au

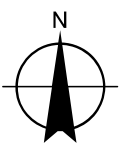


- LEGEND**
- Priority Flora (GHD)**
- Priority 1
 - Priority 2
 - Priority 3
 - Priority 4
 - Priority 5
- Priority Fauna (GHD)**
- Priority Fauna (GHD)
- Roads**
- Roads
- Northern Section Survey Area**
- Northern Section Survey Area
- Priority Ecological Communities**
- Priority Ecological Communities
- DEC Estates**
- DEC Estates

- Vegetation Types**
- VT1N
 - VT2N
 - VT3N
 - VT4N
 - VT5N
 - VT6N
 - HD



Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50



Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number 61-28865
Revision 0
Date 03 Apr 2013

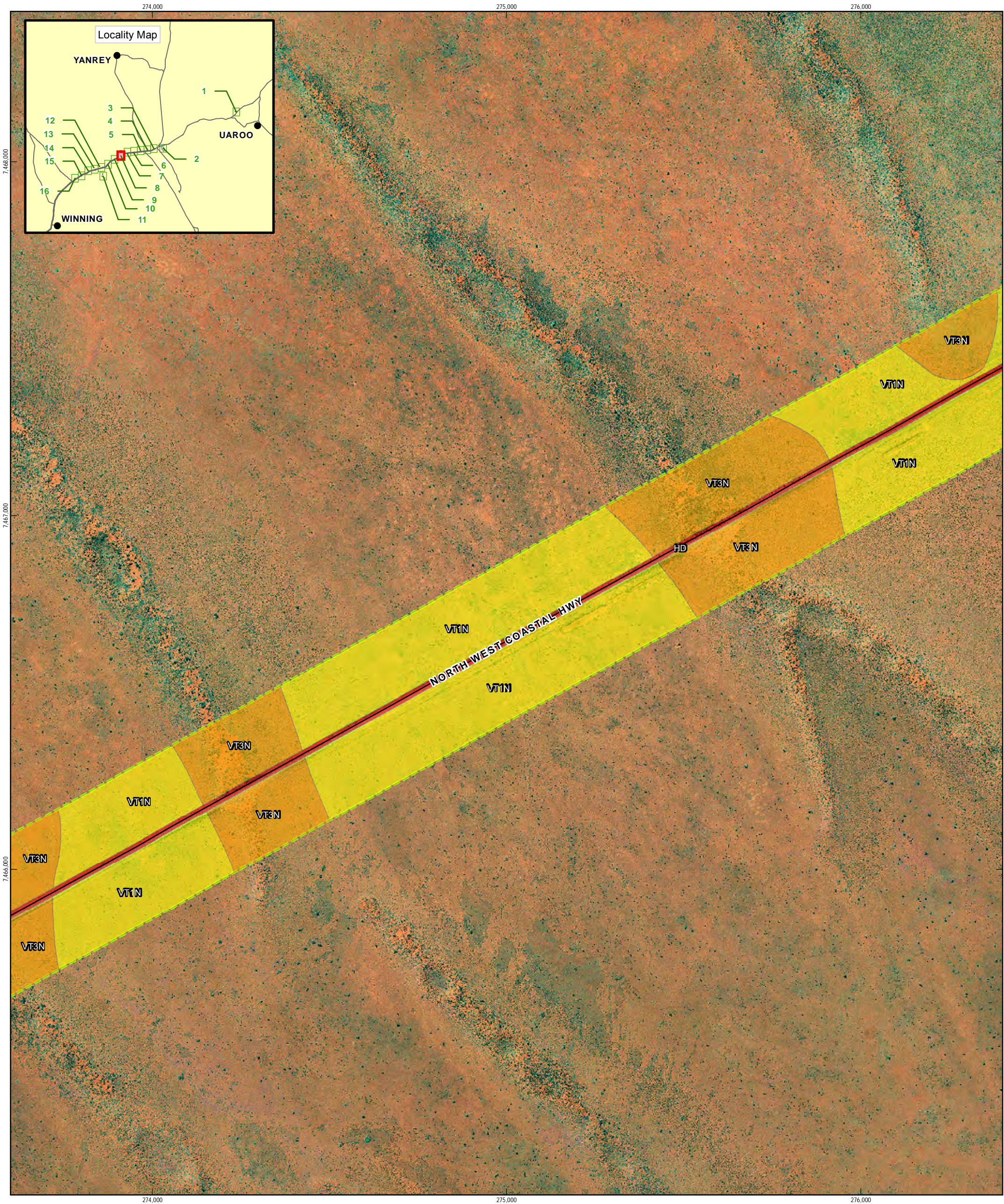
Northern Section Vegetation Types

Sheet 7 of 16

Figure 3a

G:\6128865\GIS\Maps\MXD\6128865_G003_Fig3a_VegTypeNorth_Rev0.mxd

239 Adelaide Terrace Perth WA 6004 Australia T 61 8 6222 8222 F 61 8 6222 8555 E permail@ghd.com.au W www.ghd.com.au
© 2013. Whilst every care has been taken to prepare this map, GHD, MRWA, DEC, GA and Landgate make no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and cannot accept liability and responsibility of any kind (whether in contract, tort or otherwise) for any expenses, losses, damages and/or costs (including indirect or consequential damage) which are or may be incurred by any party as a result of the map being inaccurate, incomplete or unsuitable in any way and for any reason.
Data source: Landgate: Uaroo 2005 Mosaic - 20121115, Mia Mia 2007 Mosaic - 20121115, Winning 2007 Mosaic - 20121115, Barradale 2007 Mosaic - 20121115; MRWA: Roads - 20120528; GHD: Northern Section Survey Area - 20121114, Priority Flora - 20130201, Priority Fauna - 20130201, Vegetation Types - 20130128; DEC: Priority Ecological Communities - 20121129, DEC Estates - 20121219; GA: Topo 250k Series 3 - 2006. Created by: radeleon



- LEGEND**
- Priority Flora (GHD)**
- Priority 1
 - Priority 2
 - Priority 3
 - Priority 4
 - Priority 5
- Priority Fauna (GHD)**
- Priority Fauna (GHD)
- Roads**
- Roads
- Northern Section Survey Area**
- Northern Section Survey Area
- Priority Ecological Communities**
- Priority Ecological Communities
- DEC Estates**
- DEC Estates

Vegetation Types

- VT1N
- VT2N
- VT3N

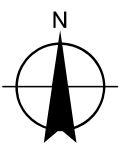
- VT4N
- VT5N
- VT6N
- HD

1: 10,000 (at A3)

0 50 100 200 300 400 500

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50



Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number 61-28865
Revision 0
Date 03 Apr 2013

Northern Section Vegetation Types

Sheet 8 of 16

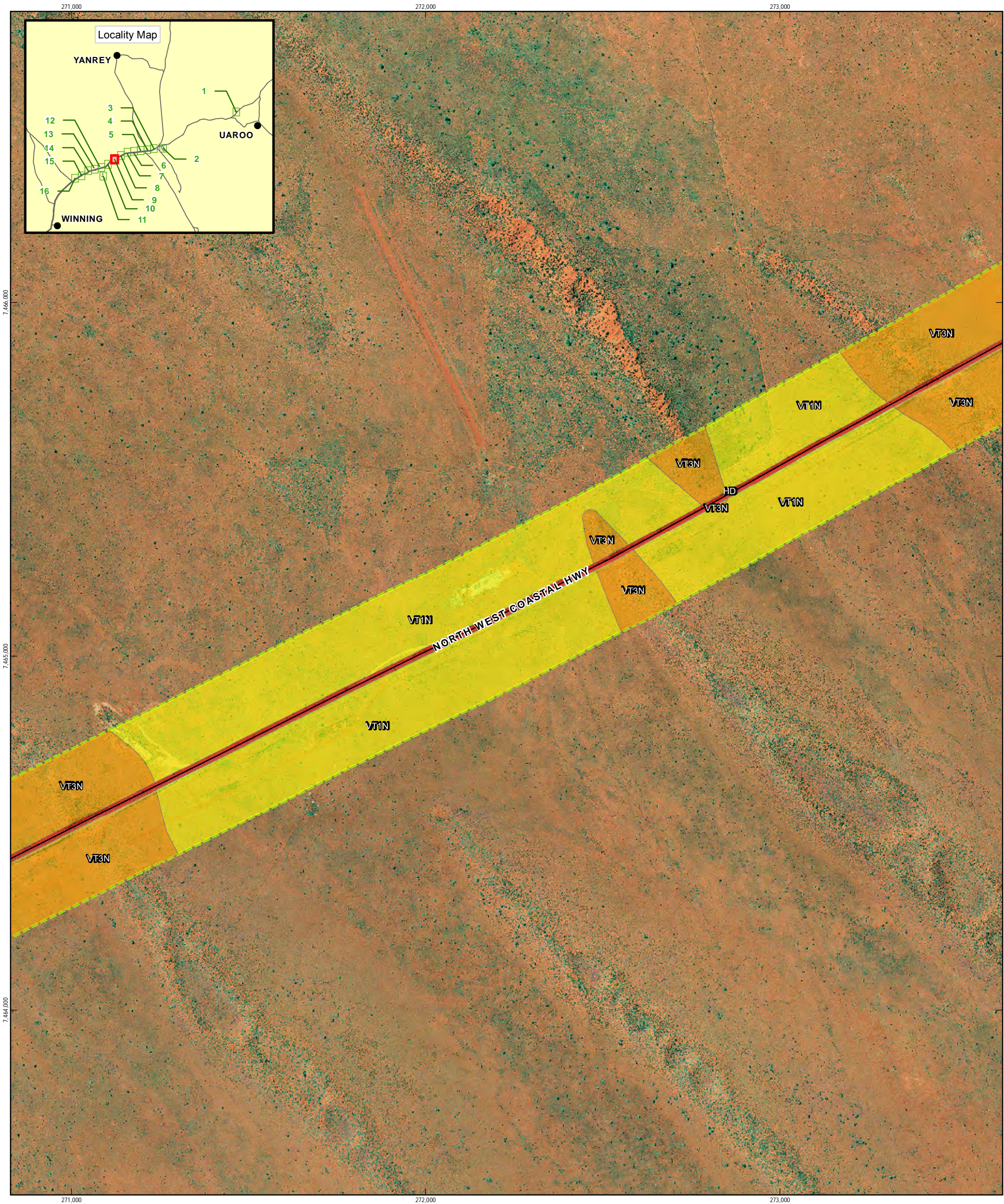
Figure 3a

G:\6128865\GIS\Maps\MXD\6128865_G003_Fig3a_VegTypeNorth_Rev0.mxd

239 Adelaide Terrace Perth WA 6004 Australia T 61 8 6222 8222 F 61 8 6222 8555 E permail@ghd.com.au W www.ghd.com.au

© 2013. Whilst every care has been taken to prepare this map, GHD, MRWA, DEC, GA and Landgate make no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and cannot accept liability and responsibility of any kind (whether in contract, tort or otherwise) for any expenses, losses, damages and/or costs (including indirect or consequential damage) which are or may be incurred by any party as a result of the map being inaccurate, incomplete or unsuitable in any way and for any reason.

Data source: Landgate: Uaroo 2005 Mosaic - 20121115, Mia Mia 2007 Mosaic - 20121115, Winning 2007 Mosaic - 20121115, Barradale 2007 Mosaic - 20121115; MRWA: Roads - 20120528; GHD: Northern Section Survey Area - 20121114, Priority Flora - 20130201, Priority Fauna - 20130201, Vegetation Types - 20130128; DEC: Priority Ecological Communities - 20121129, DEC Estates - 20121219; GA: Topo 250k Series 3 - 2006. Created by: radeleon



LEGEND

Priority Flora (GHD)

- Priority 1
- Priority 2
- Priority 3
- Priority 4
- Priority 5

Priority Fauna (GHD)

- Priority Fauna (GHD)

Roads

- Roads

Northern Section Survey Area

- Northern Section Survey Area

Priority Ecological Communities

- Priority Ecological Communities

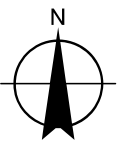
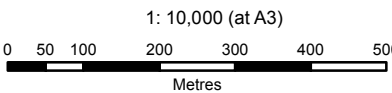
DEC Estates

- DEC Estates

Vegetation Types

- VT1N
- VT2N
- VT3N

- VT4N
- VT5N
- VT6N
- HD



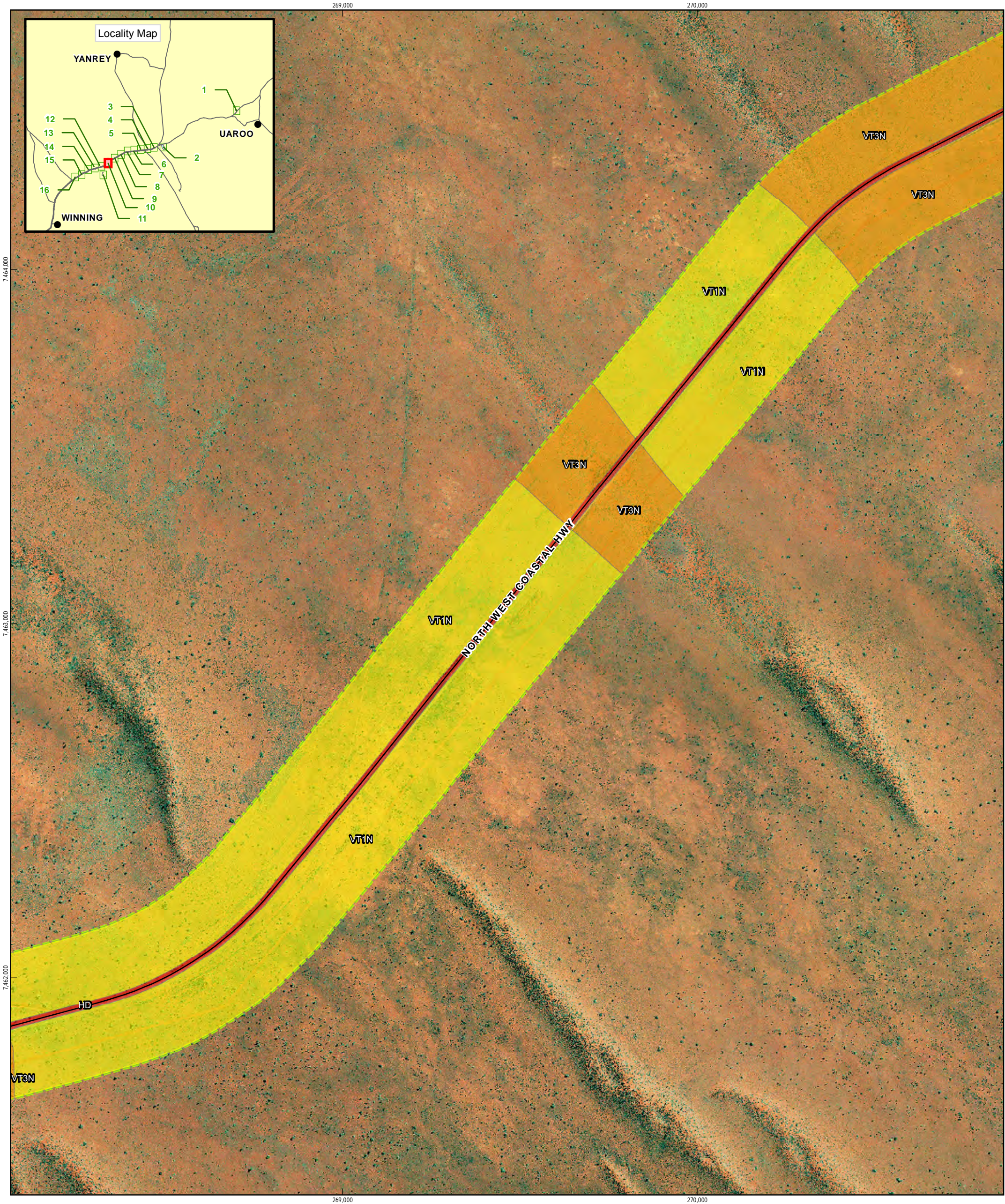
Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number 61-28865
Revision 0
Date 03 Apr 2013

Northern Section Vegetation Types

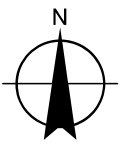
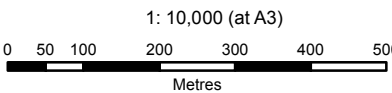
Sheet 9 of 16

Figure 3a



- LEGEND**
- Priority Flora (GHD)**
- Priority 1
 - Priority 2
 - Priority 3
 - Priority 4
 - Priority 5
- Priority Fauna (GHD)**
- Priority Fauna (GHD)
- Roads**
- Roads
- Northern Section Survey Area**
- Northern Section Survey Area
- Priority Ecological Communities**
- Priority Ecological Communities
- DEC Estates**
- DEC Estates

- Vegetation Types**
- VT1N
 - VT2N
 - VT3N
 - VT4N
 - VT5N
 - VT6N
 - HD



Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number 61-28865
Revision 0
Date 03 Apr 2013

Northern Section Vegetation Types

Sheet 10 of 16

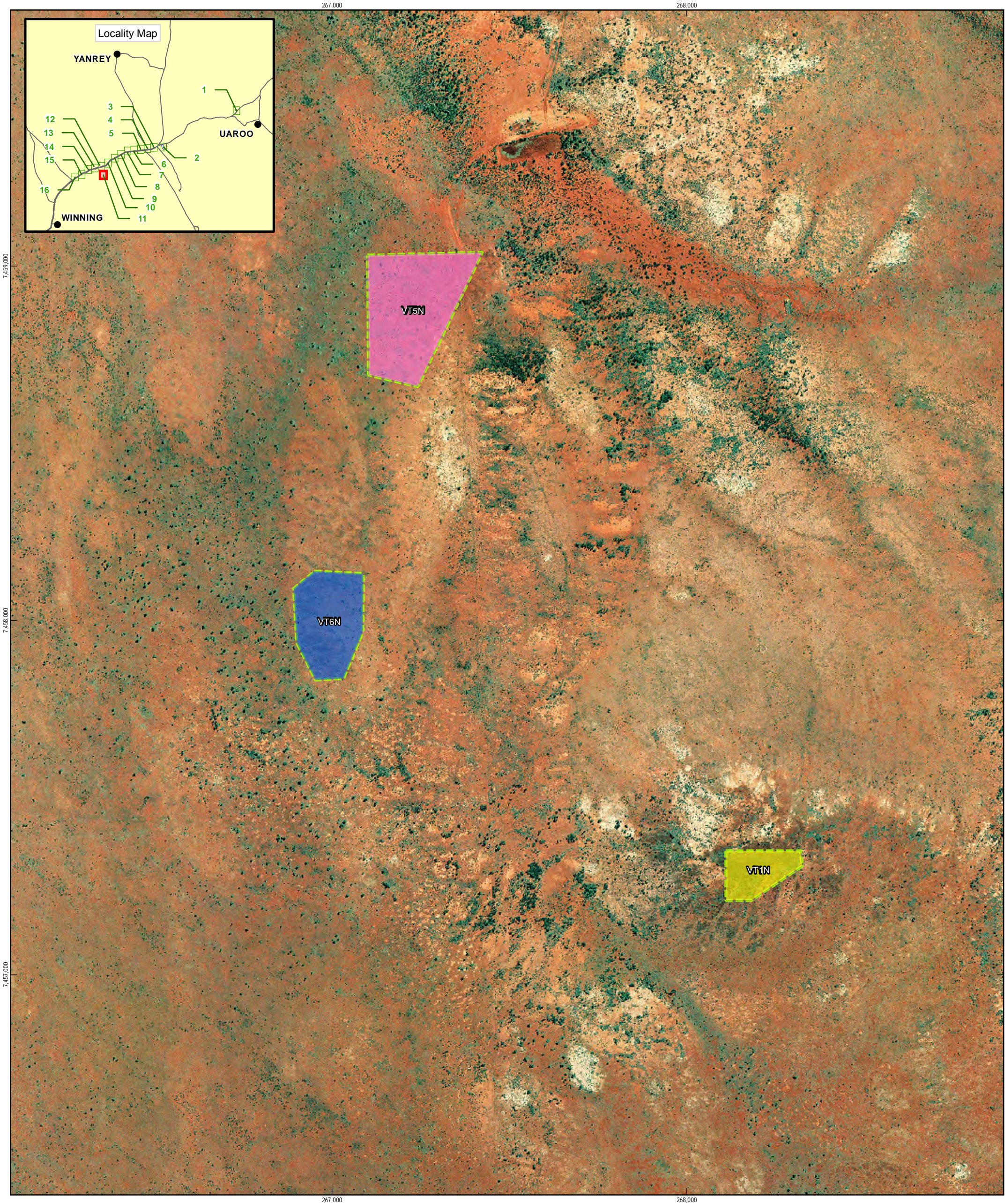
Figure 3a

G:\6128865\GIS\Maps\MXD\6128865_G003_Fig3a_VegTypeNorth_Rev0.mxd

239 Adelaide Terrace Perth WA 6004 Australia T 61 8 6222 8222 F 61 8 6222 8555 E permail@ghd.com.au W www.ghd.com.au

© 2013. Whilst every care has been taken to prepare this map, GHD, MRWA, DEC, GA and Landgate make no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and cannot accept liability and responsibility of any kind (whether in contract, tort or otherwise) for any expenses, losses, damages and/or costs (including indirect or consequential damage) which are or may be incurred by any party as a result of the map being inaccurate, incomplete or unsuitable in any way and for any reason.

Data source: Landgate: Uaroo 2005 Mosaic - 20121115, Mia Mia 2007 Mosaic - 20121115, Winning 2007 Mosaic - 20121115, Barradale 2007 Mosaic - 20121115; MRWA: Roads - 20120528; GHD: Northern Section Survey Area - 20121114, Priority Flora - 20130201, Priority Fauna - 20130201, Vegetation Types - 20130128; DEC: Priority Ecological Communities - 20121129, DEC Estates - 20121219; GA: Topo 250k Series 3 - 2006. Created by: radeleon



LEGEND

Priority Flora (GHD)

Priority 1

Priority 2

Priority 3

Priority 4

Priority 5

Priority Fauna (GHD)

Roads

Northern Section Survey Area

Priority Ecological Communities

DEC Estates

Vegetation Types

VT1N

VT2N

VT3N

VT4N

VT5N

VT6N

HD

1: 10,000 (at A3)

0

50

100

200

300

400

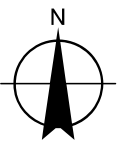
500

Metres

Map Projection: Transverse Mercator

Horizontal Datum: Geocentric Datum of Australia

Grid: Map Grid of Australia 1994, Zone 50

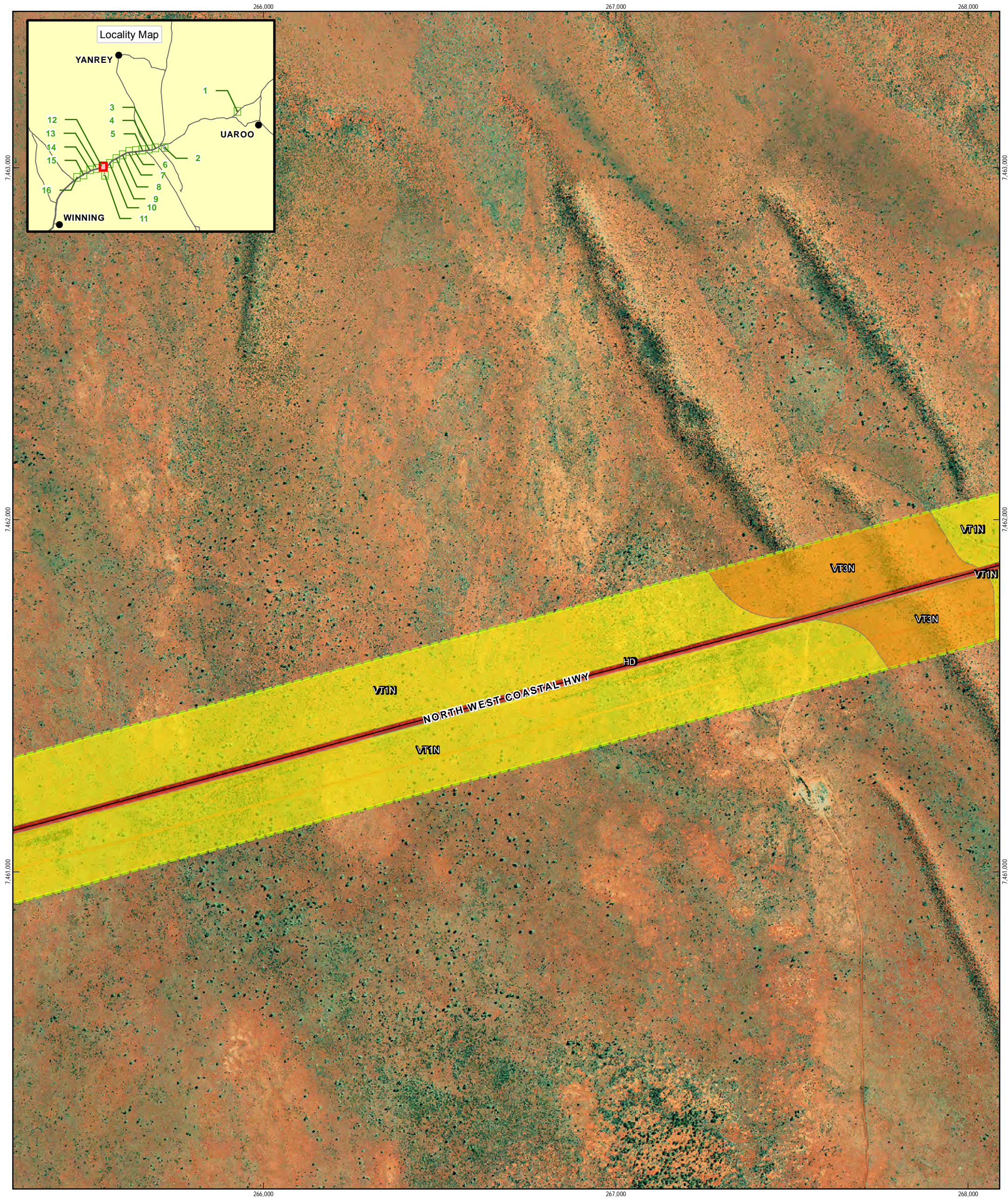


Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number	61-28865
Revision	0
Date	03 Apr 2013

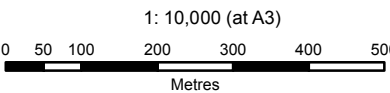
Northern Section Vegetation Types

Sheet 11 of 16
Figure 3a

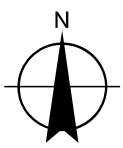


- LEGEND**
- Priority Flora (GHD)**
- Priority 1
 - Priority 2
 - Priority 3
 - Priority 4
 - Priority 5
- Priority Fauna (GHD)**
- Priority Fauna (GHD)
- Roads**
- Roads
- Northern Section Survey Area**
- Northern Section Survey Area
- Priority Ecological Communities**
- Priority Ecological Communities
- DEC Estates**
- DEC Estates

- Vegetation Types**
- VT1N
 - VT2N
 - VT3N
 - VT4N
 - VT5N
 - VT6N
 - HD



Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50



Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number 61-28865
Revision 0
Date 03 Apr 2013

Northern Section Vegetation Types

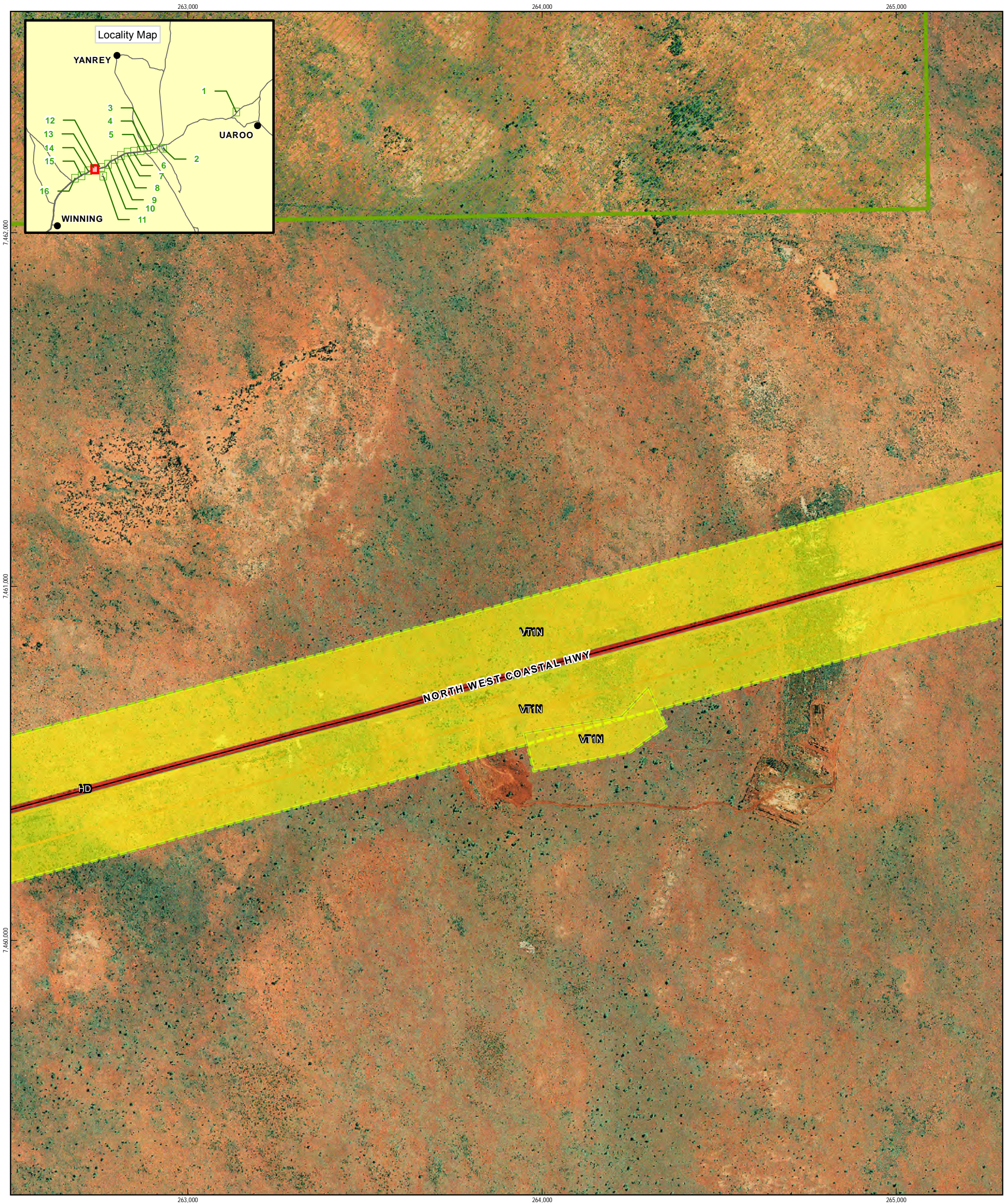
Sheet 12 of 16

Figure 3a

G:\6128865\GIS\Maps\MXD\6128865_G003_Fig3a_VegTypeNorth_Rev0.mxd

© 2013. Whilst every care has been taken to prepare this map, GHD, MRWA, DEC, GA and Landgate make no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and cannot accept liability and responsibility of any kind (whether in contract, tort or otherwise) for any expenses, losses, damages and/or costs (including indirect or consequential damage) which are or may be incurred by any party as a result of the map being inaccurate, incomplete or unsuitable in any way and for any reason.
Data source: Landgate: Uaroo 2005 Mosaic - 20121115, Mia Mia 2007 Mosaic - 20121115, Winning 2007 Mosaic - 20121115, Barradale 2007 Mosaic - 20121115; MRWA: Roads - 20120528; GHD: Northern Section Survey Area - 20121114, Priority Flora - 20130201, Priority Fauna - 20130201, Vegetation Types - 20130128; DEC: Priority Ecological Communities - 20121129, DEC Estates - 20121219; GA: Topo 250k Series 3 - 2006. Created by: radeleon

239 Adelaide Terrace Perth WA 6004 Australia T 61 8 6222 8222 F 61 8 6222 8555 E permail@ghd.com.au W www.ghd.com.au



- LEGEND**

Priority Flora (GHD)

 - Priority 1
 - Priority 2
 - Priority 3
 - Priority 4
 - Priority 5
- Priority Fauna (GHD)**

 - Priority Fauna (GHD)

Roads

 - Roads

Northern Section Survey Area

 - Northern Section Survey Area

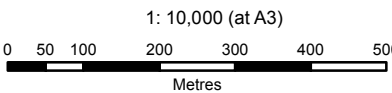
Priority Ecological Communities

 - Priority Ecological Communities

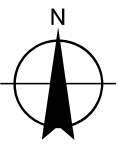
DEC Estates

 - DEC Estates

- Vegetation Types**
- VT1N
 - VT2N
 - VT3N
 - VT4N
 - VT5N
 - VT6N
 - HD



Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50



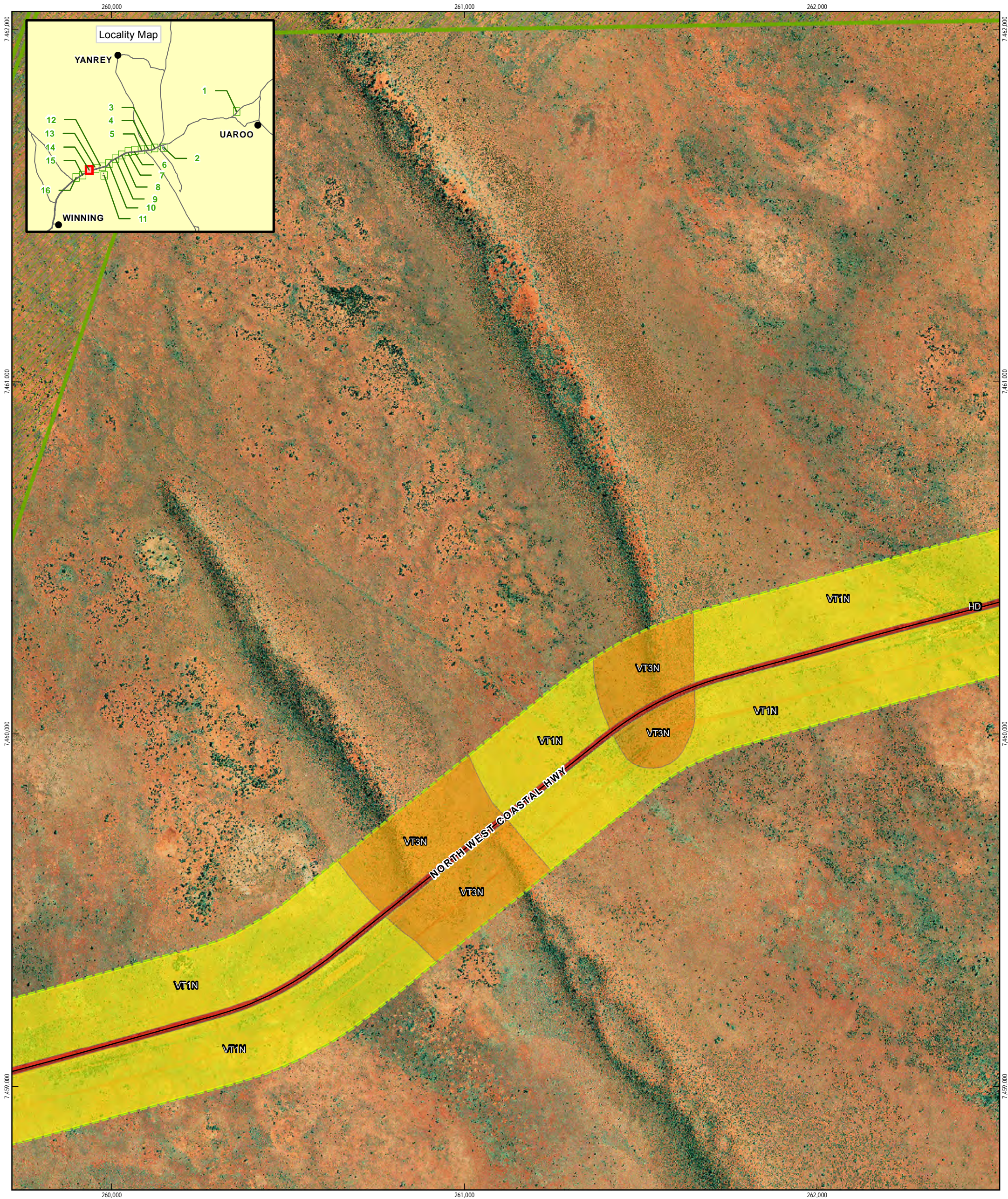
Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number 61-28865
Revision 0
Date 03 Apr 2013

Northern Section Vegetation Types

Sheet 13 of 16

Figure 3a



- LEGEND**
- Priority Flora (GHD)**
- Priority 1
 - Priority 2
 - Priority 3
 - Priority 4
 - Priority 5
- Priority Fauna (GHD)**
- Priority Fauna (GHD)
- Roads**
- Roads
- Northern Section Survey Area**
- Northern Section Survey Area
- Priority Ecological Communities**
- Priority Ecological Communities
- DEC Estates**
- DEC Estates

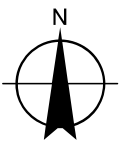
- Vegetation Types**
- VT1N
 - VT2N
 - VT3N
 - VT4N
 - VT5N
 - VT6N
 - HD

1: 10,000 (at A3)

0 50 100 200 300 400 500

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50



Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number 61-28865
Revision 0
Date 03 Apr 2013

Northern Section Vegetation Types

Sheet 14 of 16

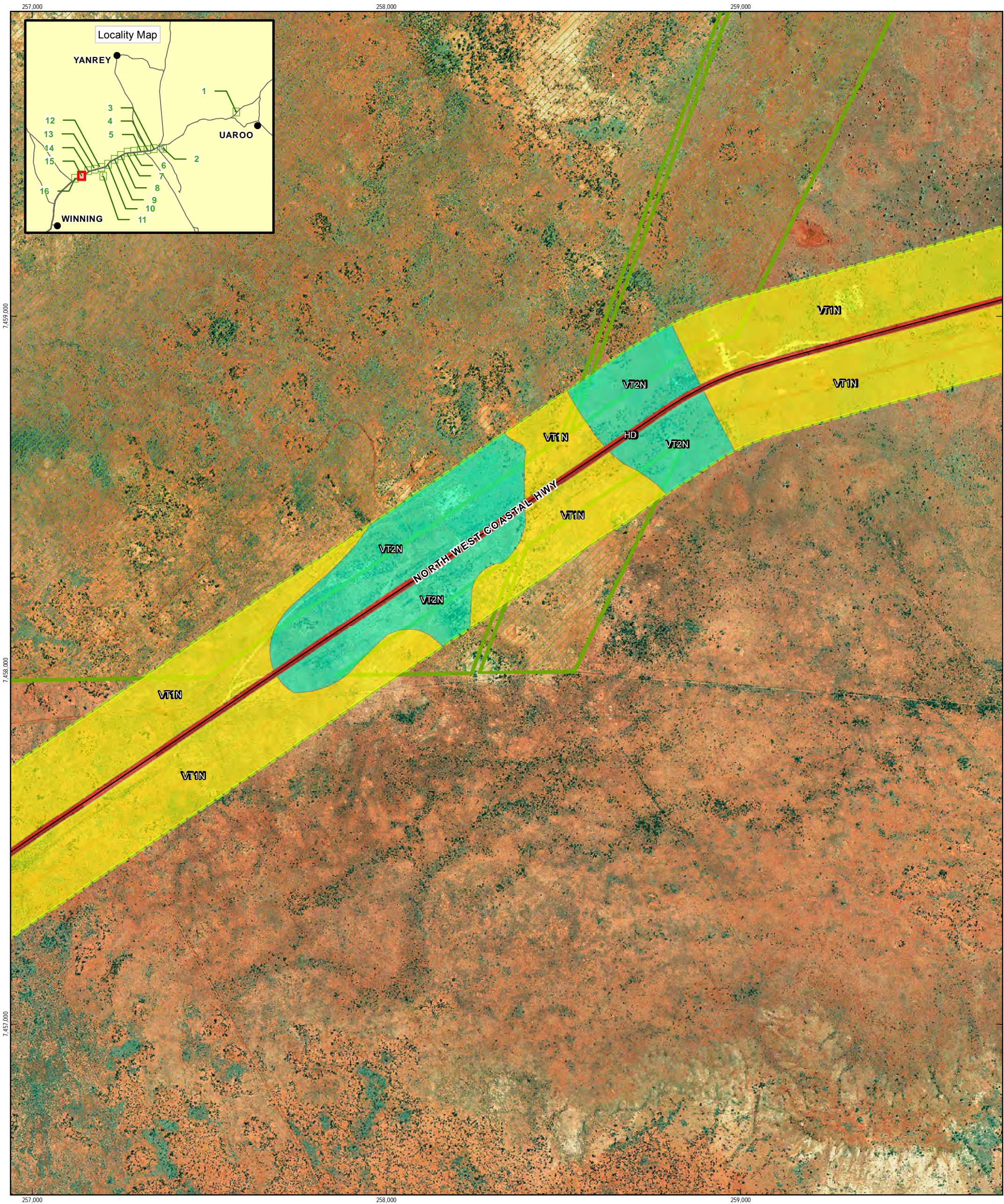
Figure 3a

G:\6128865\GIS\Maps\MXD\6128865_G003_Fig3a_VegTypeNorth_Rev0.mxd

239 Adelaide Terrace Perth WA 6004 Australia T 61 8 6222 8222 F 61 8 6222 8555 E permail@ghd.com.au W www.ghd.com.au

© 2013. Whilst every care has been taken to prepare this map, GHD, MRWA, DEC, GA and Landgate make no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and cannot accept liability and responsibility of any kind (whether in contract, tort or otherwise) for any expenses, losses, damages and/or costs (including indirect or consequential damage) which are or may be incurred by any party as a result of the map being inaccurate, incomplete or unsuitable in any way and for any reason.

Data source: Landgate: Uaroo 2005 Mosaic - 20121115, Mia Mia 2007 Mosaic - 20121115, Winning 2007 Mosaic - 20121115, Barradale 2007 Mosaic - 20121115; MRWA: Roads - 20120528; GHD: Northern Section Survey Area - 20121114, Priority Flora - 20130201, Priority Fauna - 20130201, Vegetation Types - 20130128; DEC: Priority Ecological Communities - 20121129, DEC Estates - 20121219; GA: Topo 250k Series 3 - 2006. Created by: radeleon



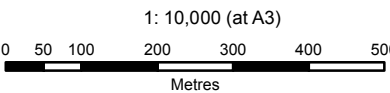
- LEGEND**

Priority Flora (GHD)

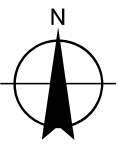
 - Priority 1
 - Priority 2
 - Priority 3
 - Priority 4
 - Priority 5
- Priority Fauna (GHD)**

 - Roads
 - Northern Section Survey Area
 - Priority Ecological Communities
 - DEC Estates

- Vegetation Types**
- VT1N
 - VT2N
 - VT3N
 - VT4N
 - VT5N
 - VT6N
 - HD



Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50



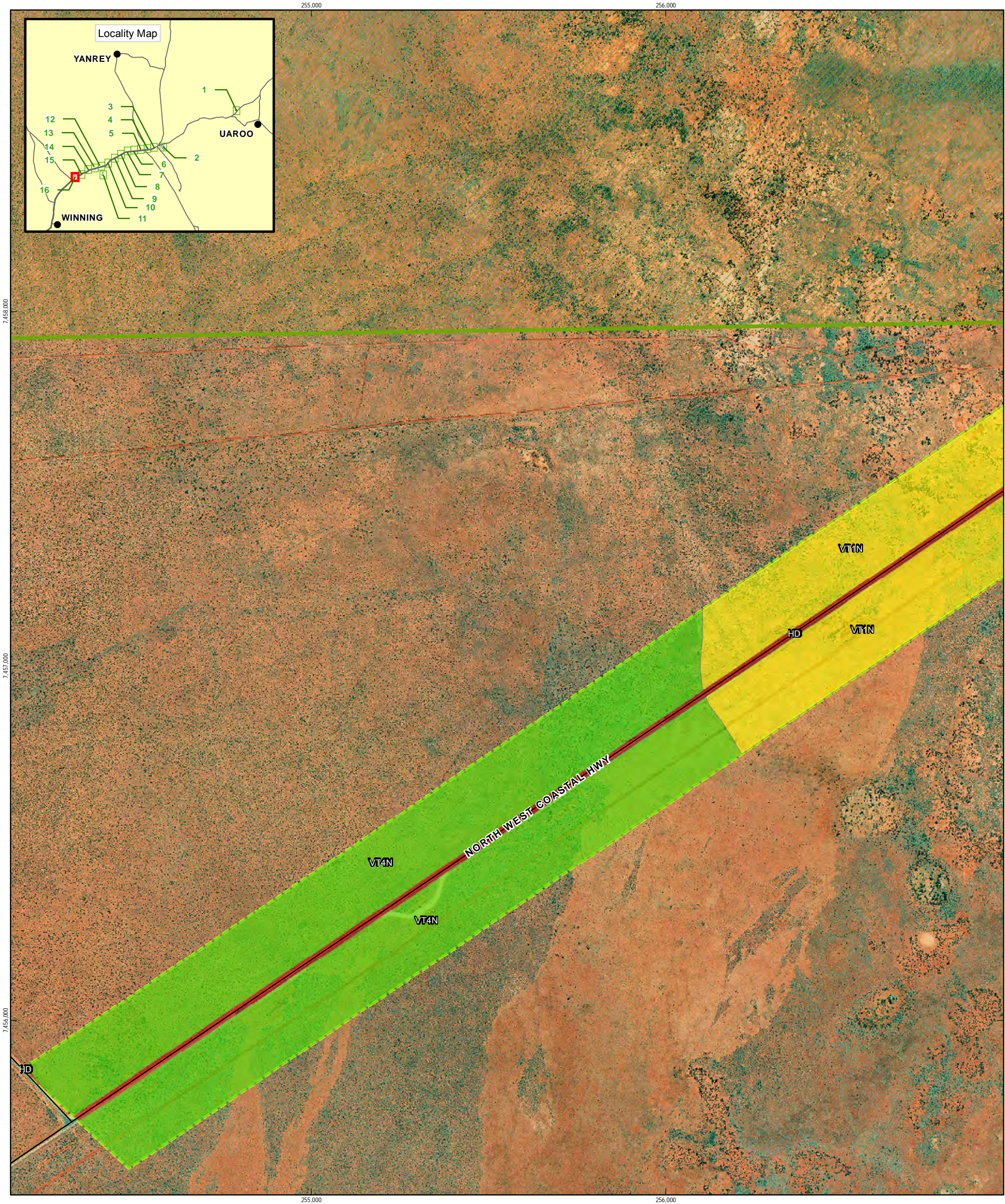
Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number 61-28865
Revision 0
Date 03 Apr 2013

Northern Section Vegetation Types

Sheet 15 of 16

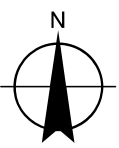
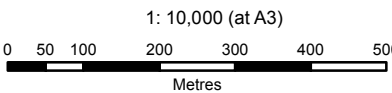
Figure 3a



LEGEND
Priority Flora (GHD)
Priority 1
Priority 2
Priority 3
Priority 4
Priority 5

Priority Fauna (GHD)
Roads
Northern Section Survey Area
Priority Ecological Communities
DEC Estates

Vegetation Types
VT1N
VT2N
VT3N
VT4N
VT5N
VT6N
HD



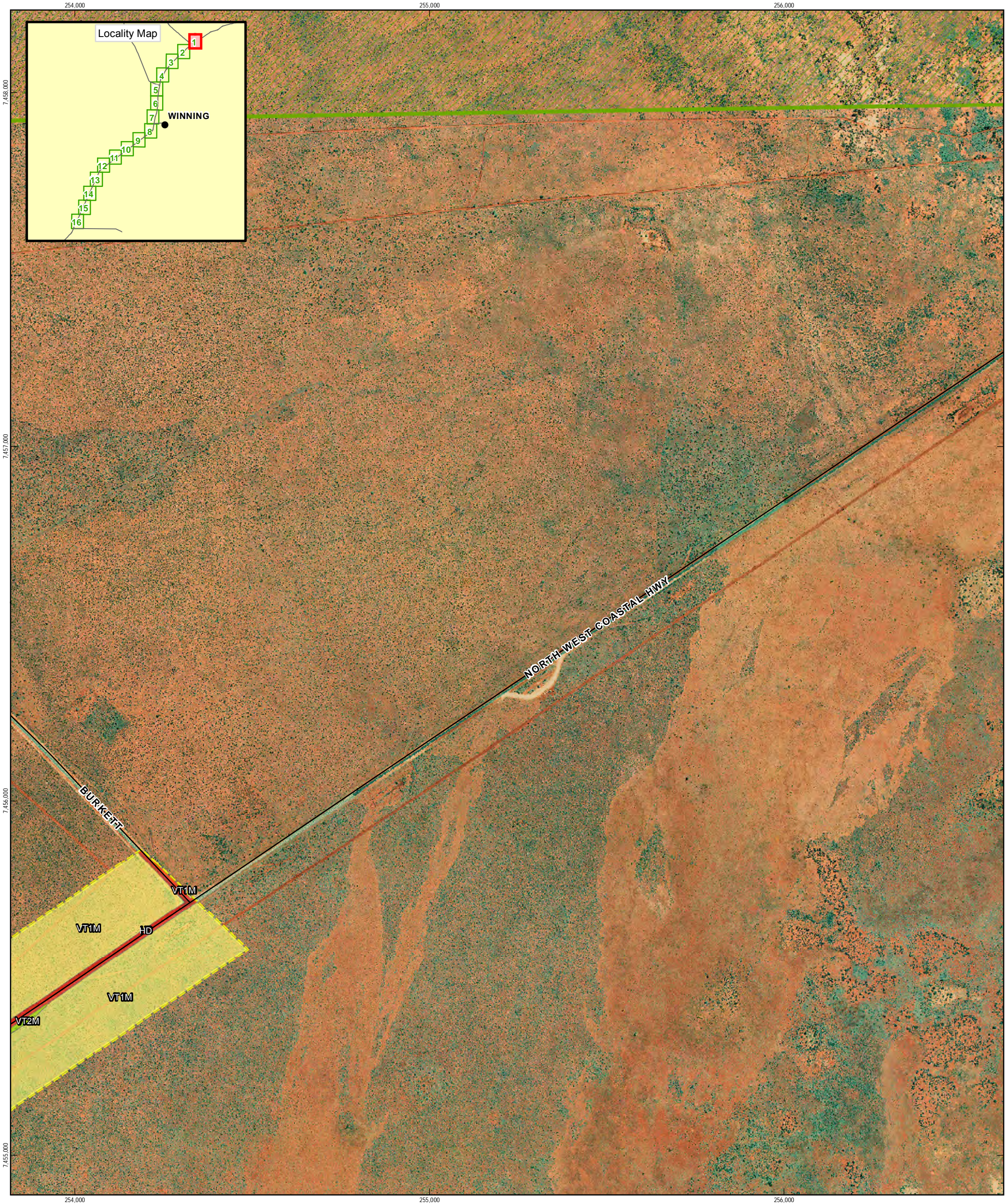
Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number 61-28865
Revision 0
Date 03 Apr 2013

Northern Section Vegetation Types

Sheet 16 of 16

Figure 3a



- LEGEND**
- Priority Flora (GHD)**
- Priority 1
 - Priority 2
 - Priority 3
 - Priority 4
 - Priority 5
- Priority Fauna (GHD)**
- Priority Fauna (GHD)
- Roads**
- Roads
- Middle Section Survey Area**
- Middle Section Survey Area
- Priority Ecological Communities**
- Priority Ecological Communities
- DEC Estates**
- DEC Estates

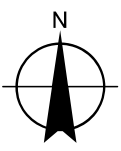
- Vegetation Types**
- VT1M
 - VT2M
 - VT3M
 - VT4M
 - VT5M
 - VT6M
 - VT7M
 - VT8M
 - HD

1: 10,000 (at A3)

0 50 100 200 300 400 500

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50



Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number 61-28865
Revision 0
Date 03 Apr 2013

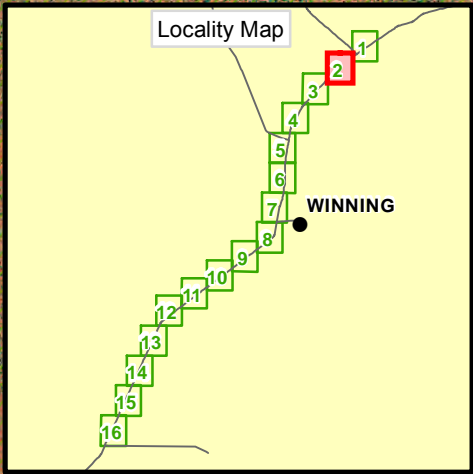
Sheet 1 of 16

Middle Section Vegetation Types

Figure 3b

252,000

253,000



7,455,000

7,454,000

7,453,000

7,455,000

7,454,000

7,453,000

252,000

253,000

LEGEND

Priority Flora (GHD)

- Priority 1
- Priority 2
- Priority 3
- Priority 4
- Priority 5



Priority Fauna (GHD)



Roads



Middle Section Survey Area



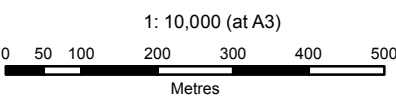
Priority Ecological Communities



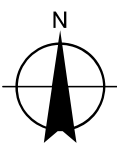
DEC Estates

Vegetation Types

- VT1M
- VT2M
- VT3M
- VT4M
- VT5M
- VT6M
- VT7M
- VT8M
- HD



Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50



Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number 61-28865
Revision 0
Date 03 Apr 2013

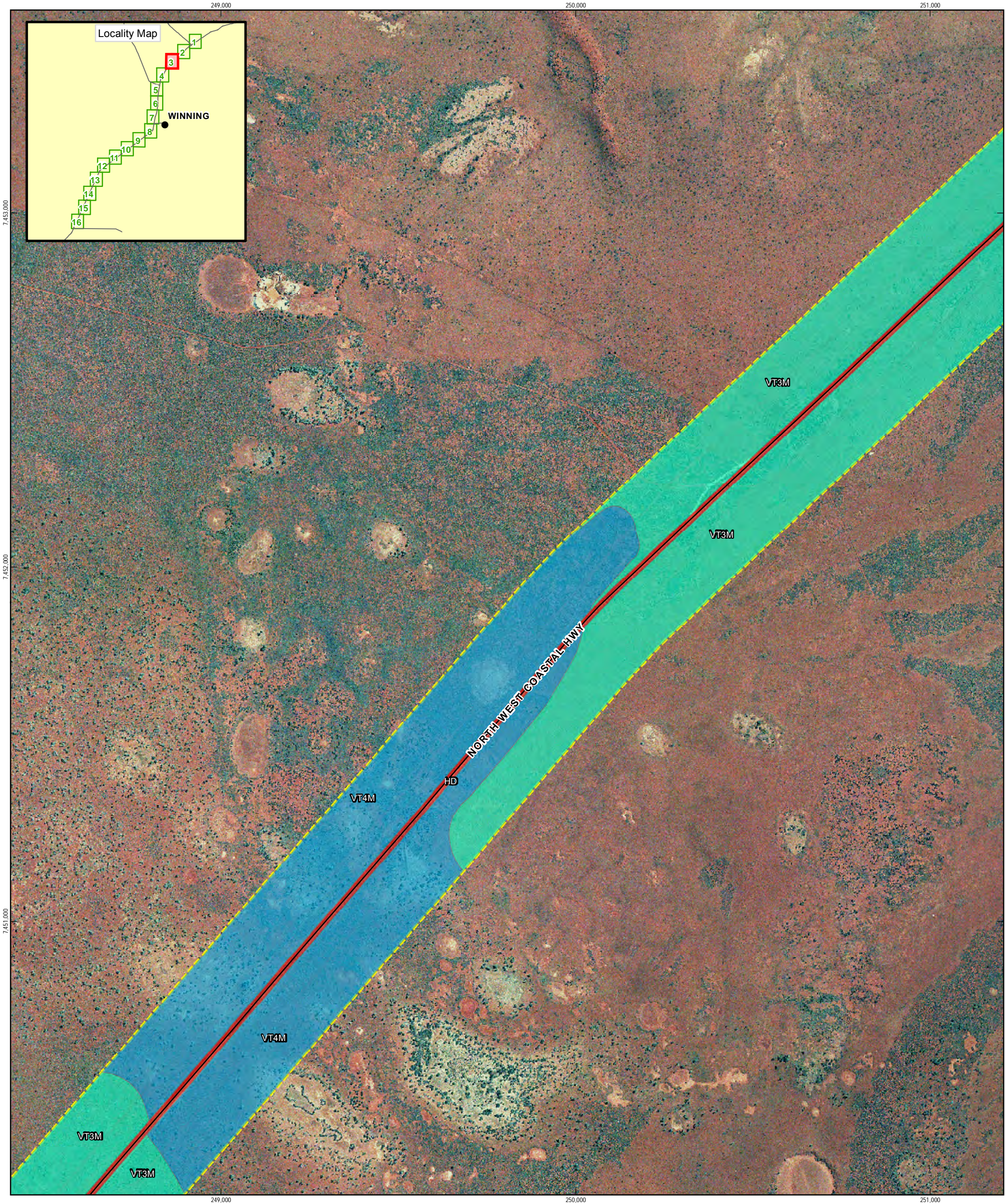
Middle Section Vegetation Types

Sheet 2 of 16

Figure 3b

G:\6128865\GIS\Maps\MXD\6128865_G003_Fig3b_VegTypeMiddle_Rev0.mxd

239 Adelaide Terrace Perth WA 6004 Australia T 61 8 6222 8222 F 61 8 6222 8555 E permail@ghd.com.au W www.ghd.com.au
© 2013. Whilst every care has been taken to prepare this map, GHD, MRWA, DEC, GA and Landgate make no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and cannot accept liability and responsibility of any kind (whether in contract, tort or otherwise) for any expenses, losses, damages and/or costs (including indirect or consequential damage) which are or may be incurred by any party as a result of the map being inaccurate, incomplete or unsuitable in any way and for any reason.
Data source: Landgate: Mia Mia 2007 Mosaic - 20121115, Winning 2007 Mosaic - 20121115; MRWA: Roads - 20120528; GHD: Middle Section Survey Area - 20121114, Vegetation Types - 20130128, Priority Flora - 20130201, Priority Fauna - 20130201; DEC: Priority Ecological Communities - 20121129, DEC Estates - 20121219; GA: Topo 250k Series 3 - 2006. Created by: radeleon



LEGEND

Priority Flora (GHD)

Priority 1

Priority 2

Priority 3

Priority 4

Priority 5

Priority Fauna (GHD)

Roads

Middle Section Survey Area

Priority Ecological Communities

DEC Estates

Vegetation Types

VT1M

VT2M

VT3M

VT4M

VT5M

VT6M

VT7M

VT8M

HD

1: 10,000 (at A3)

0

50

100

200

300

400

500

Metres

Map Projection: Transverse Mercator

Horizontal Datum: Geocentric Datum of Australia

Grid: Map Grid of Australia 1994, Zone 50

Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number	61-28865
Revision	0
Date	03 Apr 2013

Middle Section Vegetation Types

Sheet 3 of 16

Figure 3b

G:\6128865\GIS\Maps\MXD\6128865_G003_Fig3b_VegTypeMiddle_Rev0.mxd

239 Adelaide Terrace Perth WA 6004 Australia

T 61 8 6222 8222

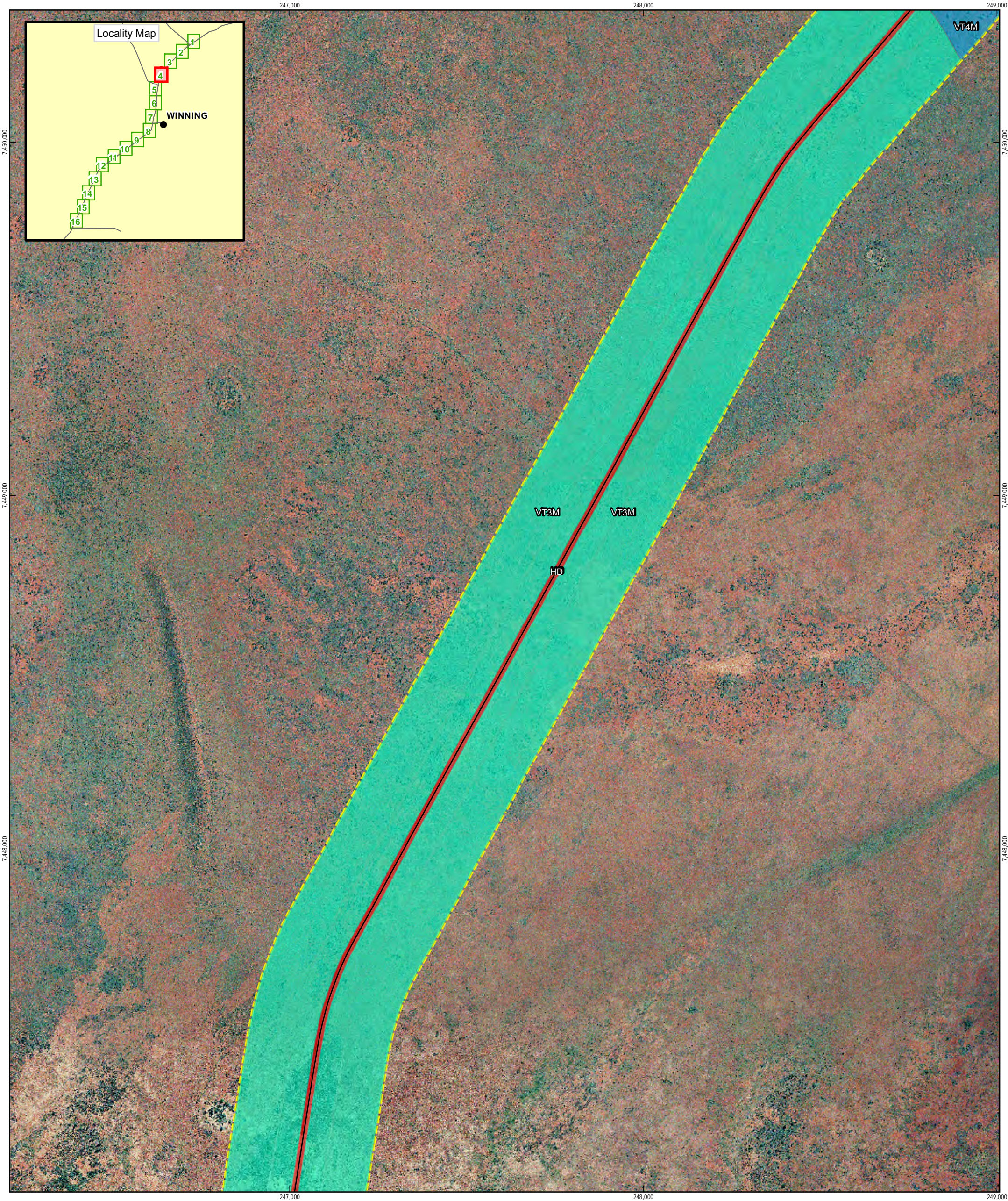
F 61 8 6222 8555

E permail@ghd.com.au

W www.ghd.com.au

© 2013. Whilst every care has been taken to prepare this map, GHD, MRWA, DEC, GA and Landgate make no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and cannot accept liability and responsibility of any kind (whether in contract, tort or otherwise) for any expenses, losses, damages and/or costs (including indirect or consequential damage) which are or may be incurred by any party as a result of the map being inaccurate, incomplete or unsuitable in any way and for any reason.

Data source: Landgate: Mia Mia 2007 Mosaic - 20121115; Winning 2007 Mosaic - 20121115; MRWA: Roads - 20120528; GHD: Middle Section Survey Area - 20121114; Vegetation Types - 20130128; Priority Flora - 20130201; Priority Fauna - 20130201; DEC: Priority Ecological Communities - 20121129, DEC Estates - 20121219; GA: Topo 250k Series 3 - 2006. Created by: radeleon



- LEGEND**

Priority Flora (GHD)

 - Priority 1
 - Priority 2
 - Priority 3
 - Priority 4
 - Priority 5
- Priority Fauna (GHD)**

 - Priority Fauna (GHD)

Roads

 - Roads

Middle Section Survey Area

 - Middle Section Survey Area

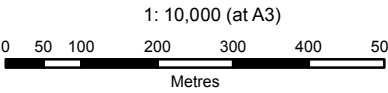
Priority Ecological Communities

 - Priority Ecological Communities

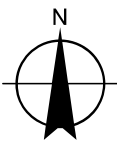
DEC Estates

 - DEC Estates

- Vegetation Types**
- VT1M
 - VT2M
 - VT3M
 - VT4M
 - VT5M
 - VT6M
 - VT7M
 - VT8M
 - HD



Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50



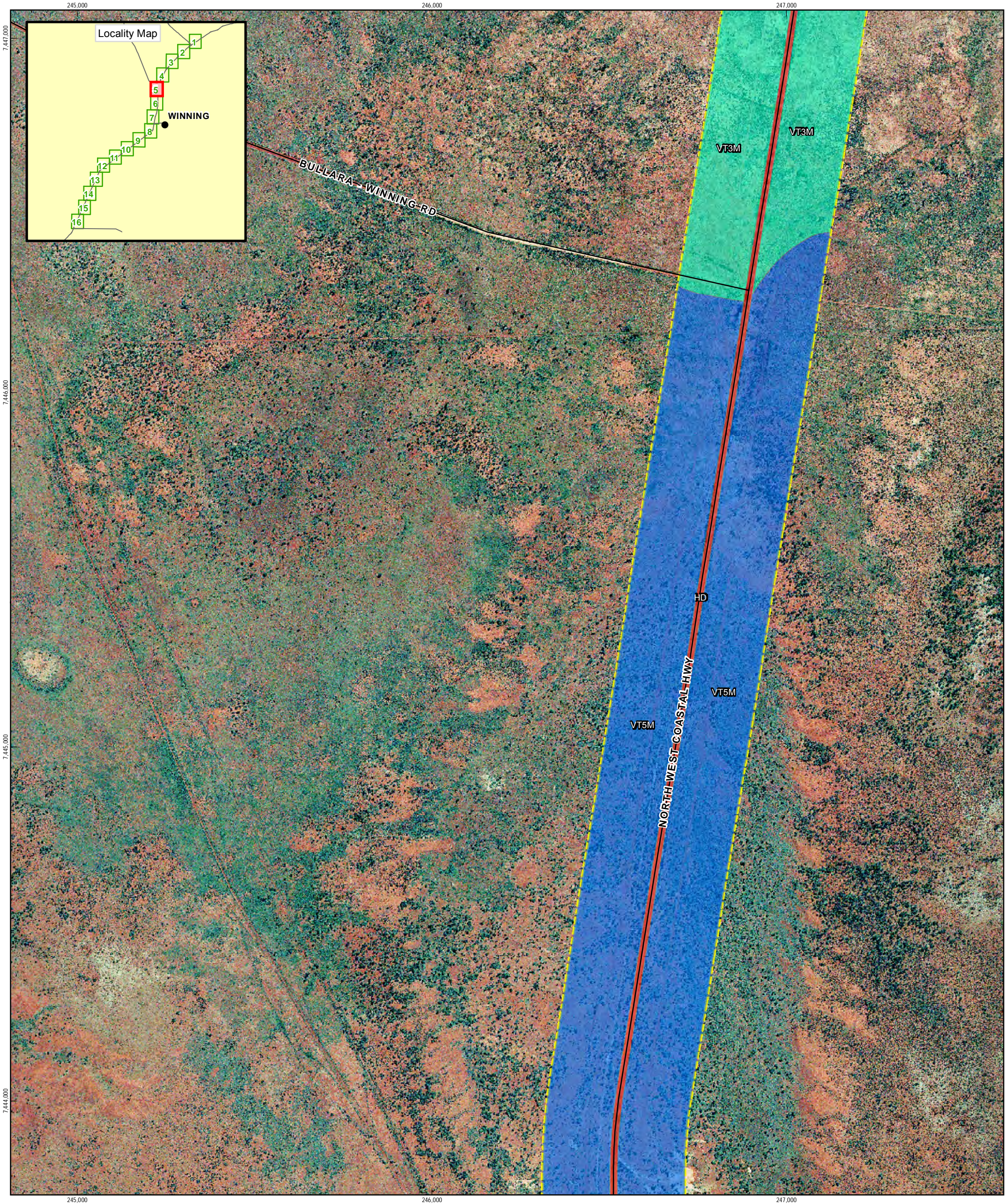
Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number 61-28865
Revision 0
Date 03 Apr 2013

Middle Section Vegetation Types

Sheet 4 of 16

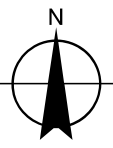
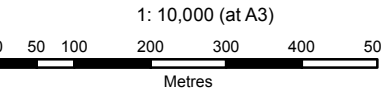
Figure 3b



- LEGEND**
- Priority Flora (GHD)**
- Priority 1
 - Priority 2
 - Priority 3
 - Priority 4
 - Priority 5
- Priority Fauna (GHD)**
- Priority Fauna (GHD)
- Roads**
- Roads
- Middle Section Survey Area**
- Middle Section Survey Area
- Priority Ecological Communities**
- Priority Ecological Communities
- DEC Estates**
- DEC Estates

Vegetation Types

- VT1M
- VT2M
- VT3M
- VT4M
- VT5M
- VT6M
- VT7M
- VT8M
- HD



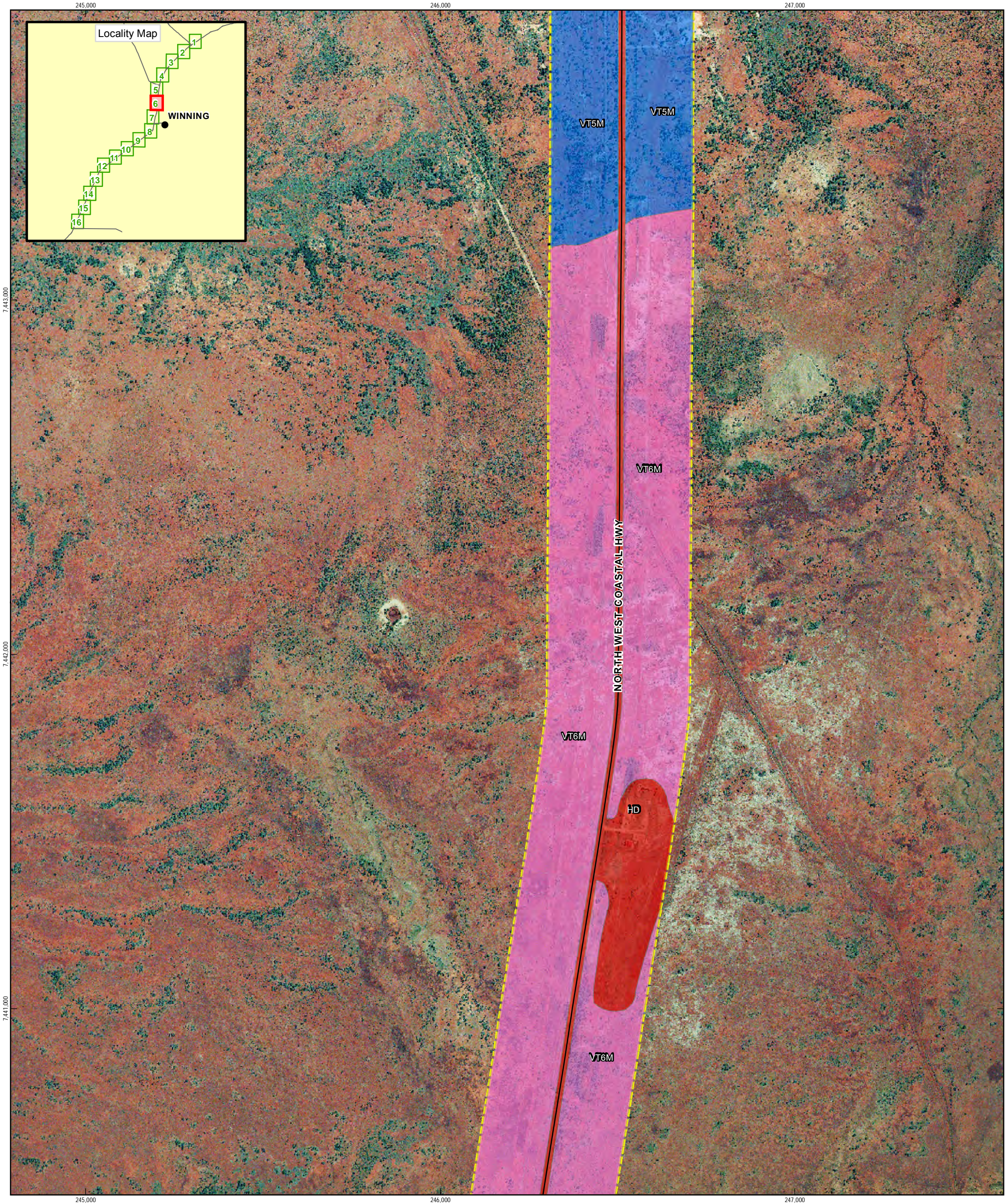
Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number 61-28865
Revision 0
Date 03 Apr 2013

Middle Section Vegetation Types

Sheet 5 of 16

Figure 3b



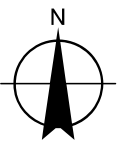
LEGEND
Priority Flora (GHD)
Priority 1
Priority 2
Priority 3
Priority 4
Priority 5

Priority Fauna (GHD)
Roads
Middle Section Survey Area
Priority Ecological Communities
DEC Estates

Vegetation Types
VT1M
VT2M
VT3M
VT4M
VT5M
VT6M
VT7M
VT8M
HD

1: 10,000 (at A3)
0 50 100 200 300 400 500
Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50

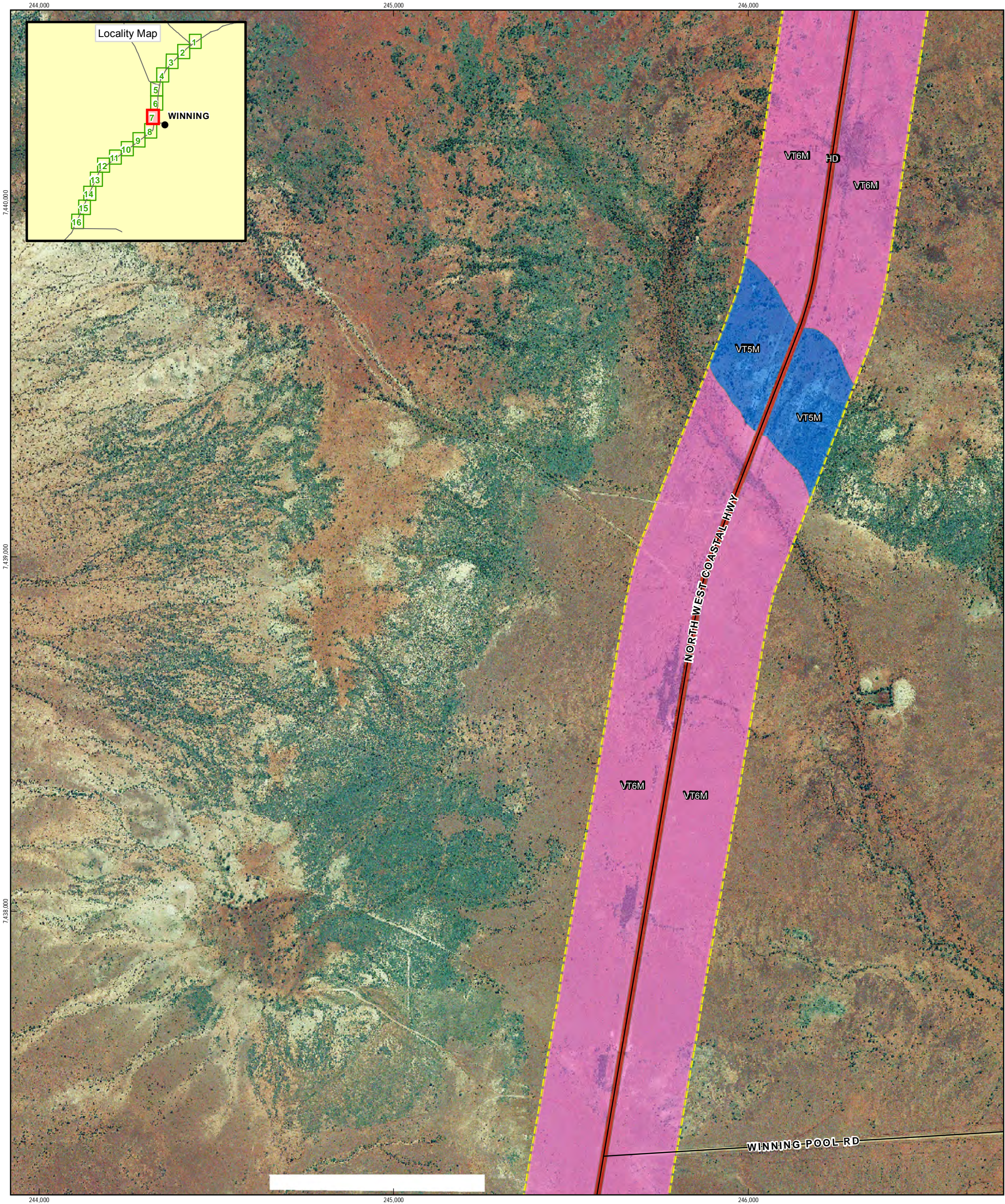


Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number | 61-28865
Revision | 0
Date | 03 Apr 2013

Middle Section Vegetation Types

Sheet 6 of 16
Figure 3b



LEGEND
Priority Flora (GHD)
Priority 1
Priority 2
Priority 3
Priority 4
Priority 5

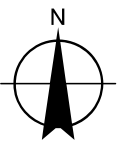
Priority Fauna (GHD)
Roads
Middle Section Survey Area
Priority Ecological Communities
DEC Estates

Vegetation Types
VT1M
VT2M
VT3M
VT4M

VT5M
VT6M
VT7M
VT8M
HD

1: 10,000 (at A3)
0 50 100 200 300 400 500
Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50



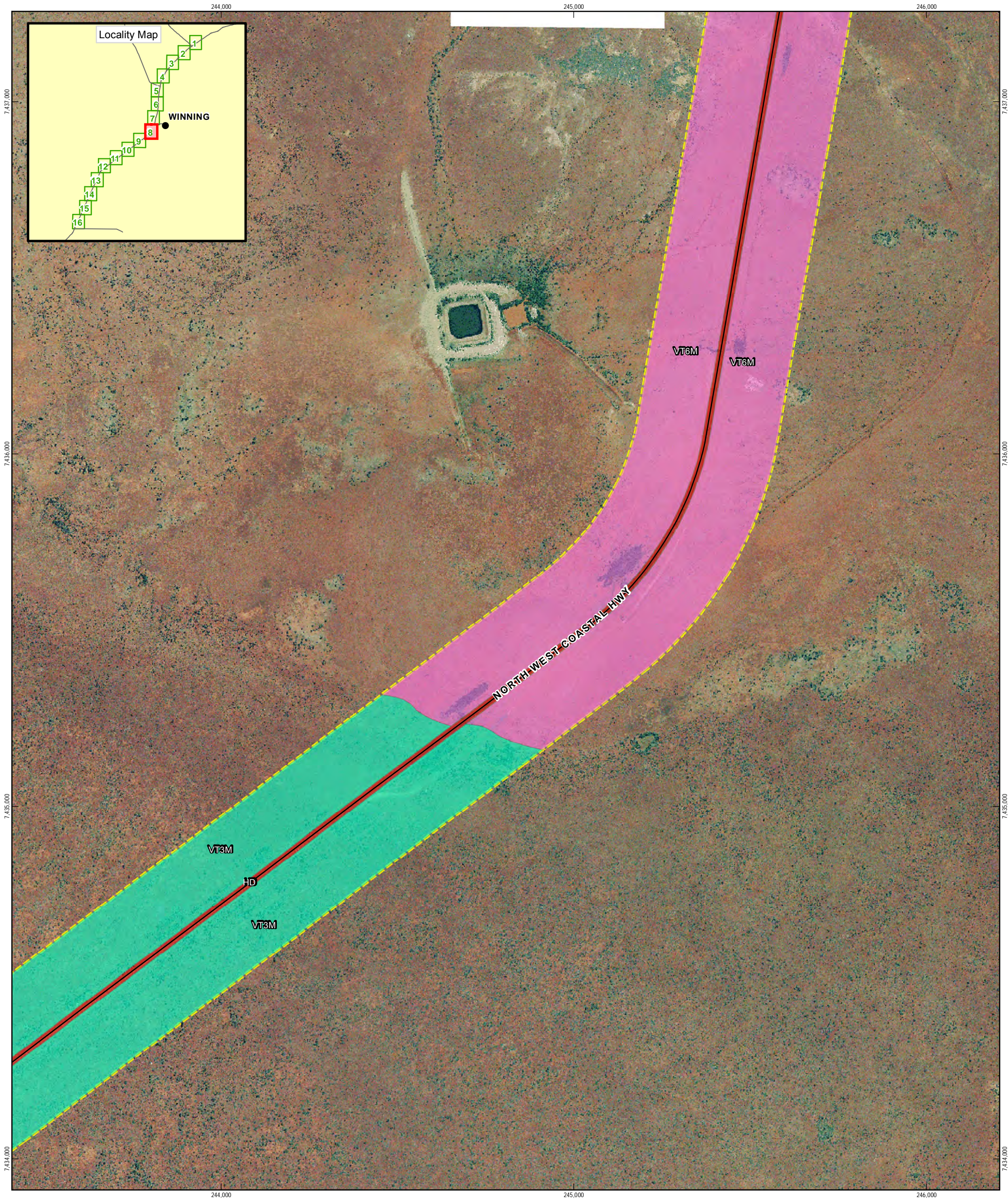
Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number 61-28865
Revision 0
Date 03 Apr 2013

Middle Section Vegetation Types

Sheet 7 of 16

Figure 3b



- LEGEND**
- Priority Flora (GHD)**
- Priority 1
 - Priority 2
 - Priority 3
 - Priority 4
 - Priority 5
- Priority Fauna (GHD)**
- Priority Fauna (GHD)
- Roads**
- Roads
- Middle Section Survey Area**
- Middle Section Survey Area
- Priority Ecological Communities**
- Priority Ecological Communities
- DEC Estates**
- DEC Estates

Vegetation Types

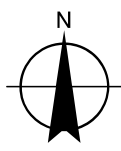
- | | |
|------|------|
| VT1M | VT5M |
| VT2M | VT6M |
| VT3M | VT7M |
| VT4M | VT8M |
| | HD |

1: 10,000 (at A3)

0 50 100 200 300 400 500

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50



Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number 61-28865
Revision 0
Date 03 Apr 2013

Sheet 8 of 16

Middle Section Vegetation Types

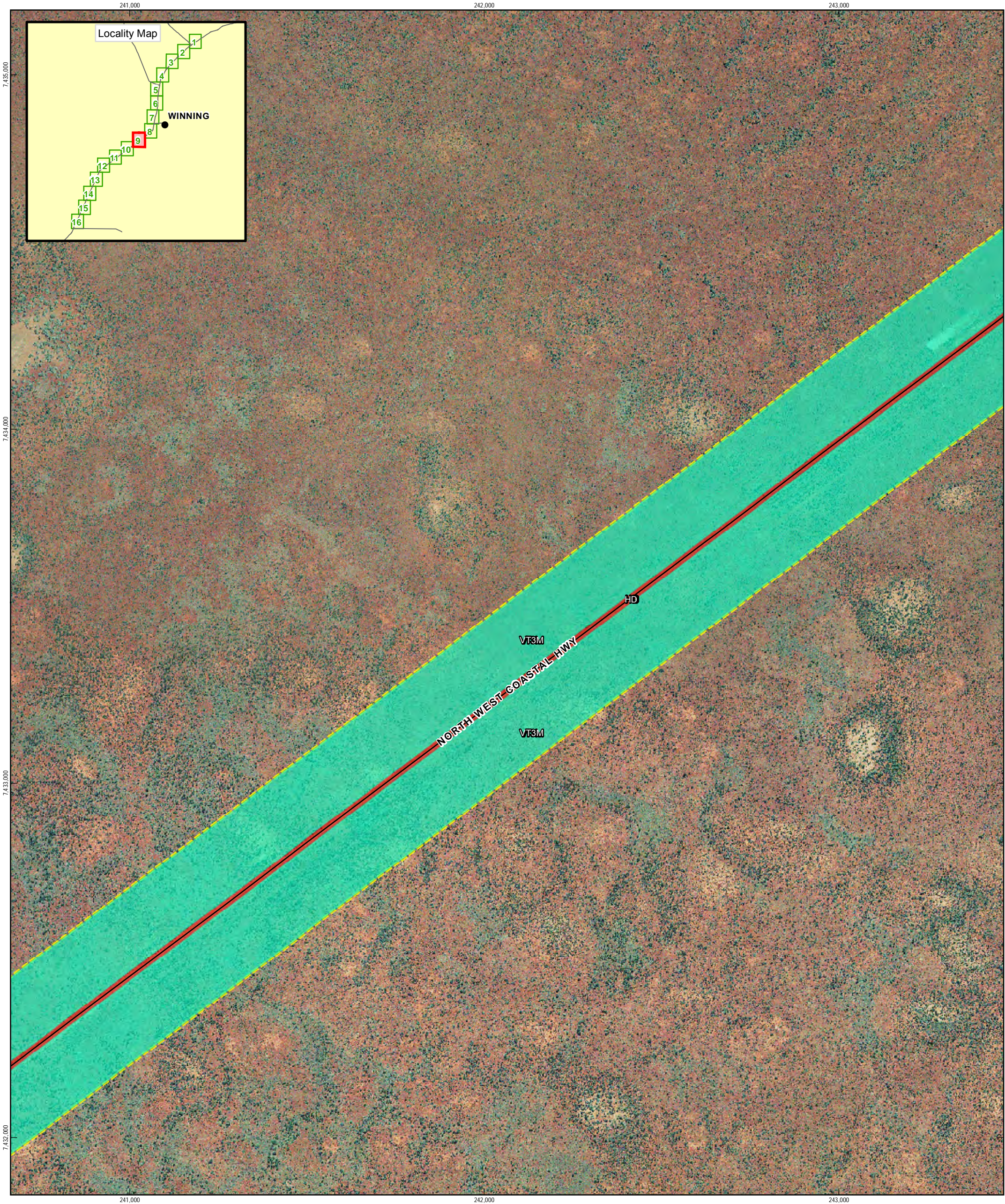
Figure 3b

G:\6128865\GIS\Maps\MXD\6128865_G003_Fig3b_VegTypeMiddle_Rev0.mxd

239 Adelaide Terrace Perth WA 6004 Australia T 61 8 6222 8222 F 61 8 6222 8555 E permail@ghd.com.au W www.ghd.com.au

© 2013. Whilst every care has been taken to prepare this map, GHD, MRWA, DEC, GA and Landgate make no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and cannot accept liability and responsibility of any kind (whether in contract, tort or otherwise) for any expenses, losses, damages and/or costs (including indirect or consequential damage) which are or may be incurred by any party as a result of the map being inaccurate, incomplete or unsuitable in any way and for any reason.

Data source: Landgate: Mia Mia 2007 Mosaic - 20121115, Winning 2007 Mosaic - 20121115, Barradale 2007 Mosaic - 20121115; MRWA: Roads - 20120528; GHD: Middle Section Survey Area - 20121114, Vegetation Types - 20130128, Priority Flora - 20130201; DEC: Priority Ecological Communities - 20121129, DEC Estates - 20121219; GA: Topo 250k Series 3 - 2006. Created by: radeleon



LEGEND

Priority Flora (GHD)

- Priority 1
- Priority 2
- Priority 3
- Priority 4
- Priority 5

Priority Fauna (GHD)

- Priority Fauna (GHD)

Roads

- Roads

Middle Section Survey Area

- Middle Section Survey Area

Priority Ecological Communities

- Priority Ecological Communities

DEC Estates

- DEC Estates

Vegetation Types

- VT1M
- VT2M
- VT3M
- VT4M

- VT5M
- VT6M
- VT7M
- VT8M
- HD

1: 10,000 (at A3)

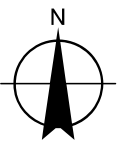
0 50 100 200 300 400 500

Metres

Map Projection: Transverse Mercator

Horizontal Datum: Geocentric Datum of Australia

Grid: Map Grid of Australia 1994, Zone 50



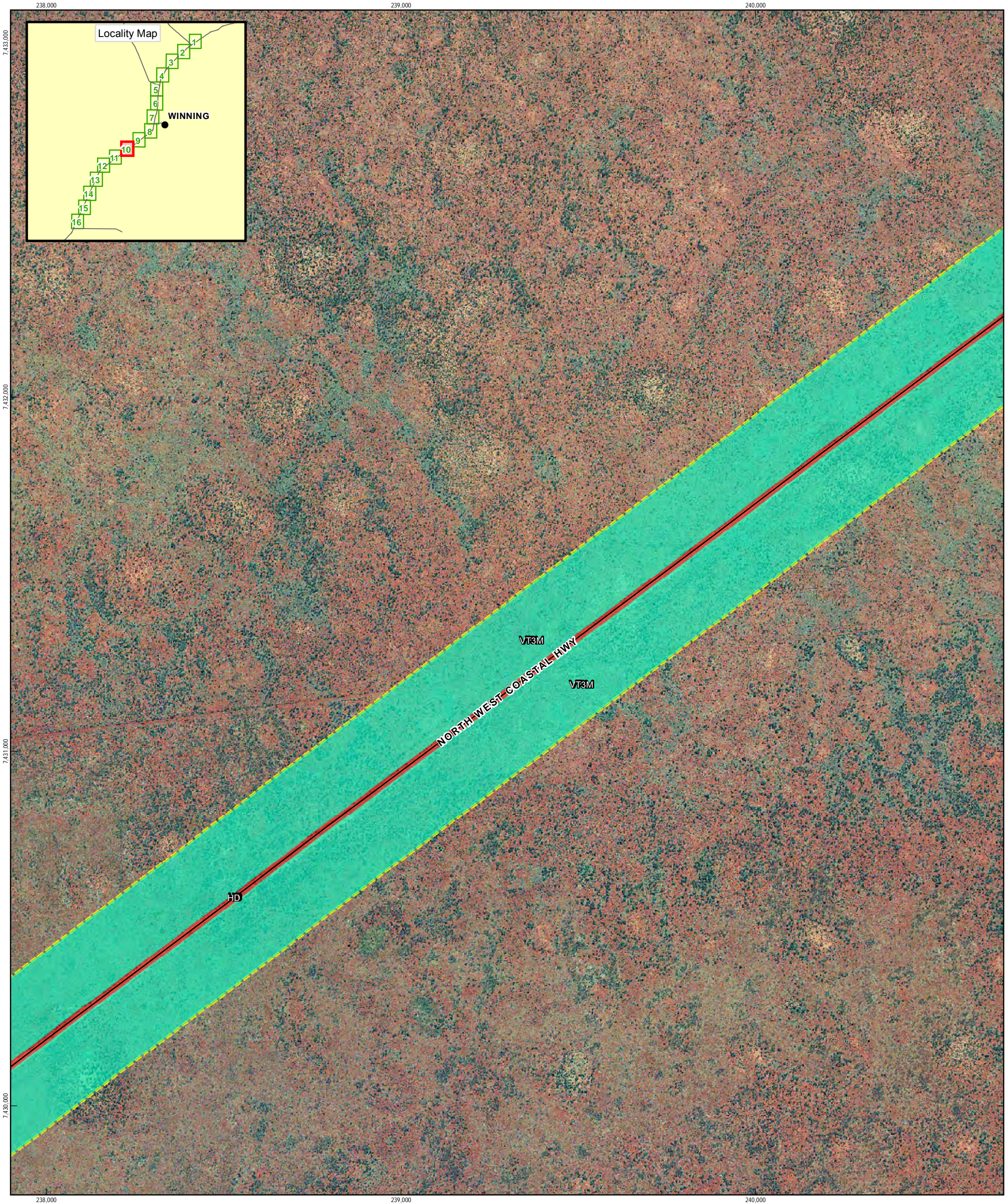
Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number	61-28865
Revision	0
Date	03 Apr 2013

Middle Section Vegetation Types

Sheet 9 of 16

Figure 3b



LEGEND

Priority Flora (GHD)

- Priority 1
- Priority 2
- Priority 3
- Priority 4
- Priority 5



Priority Fauna (GHD)



Roads



Middle Section Survey Area



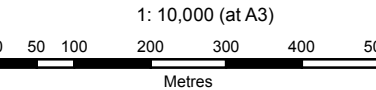
Priority Ecological Communities



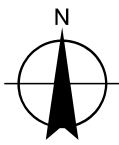
DEC Estates

Vegetation Types

- | | |
|------|------|
| VT1M | VT5M |
| VT2M | VT6M |
| VT3M | VT7M |
| VT4M | VT8M |
| | HD |



Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50



Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number	61-28865
Revision	0
Date	03 Apr 2013

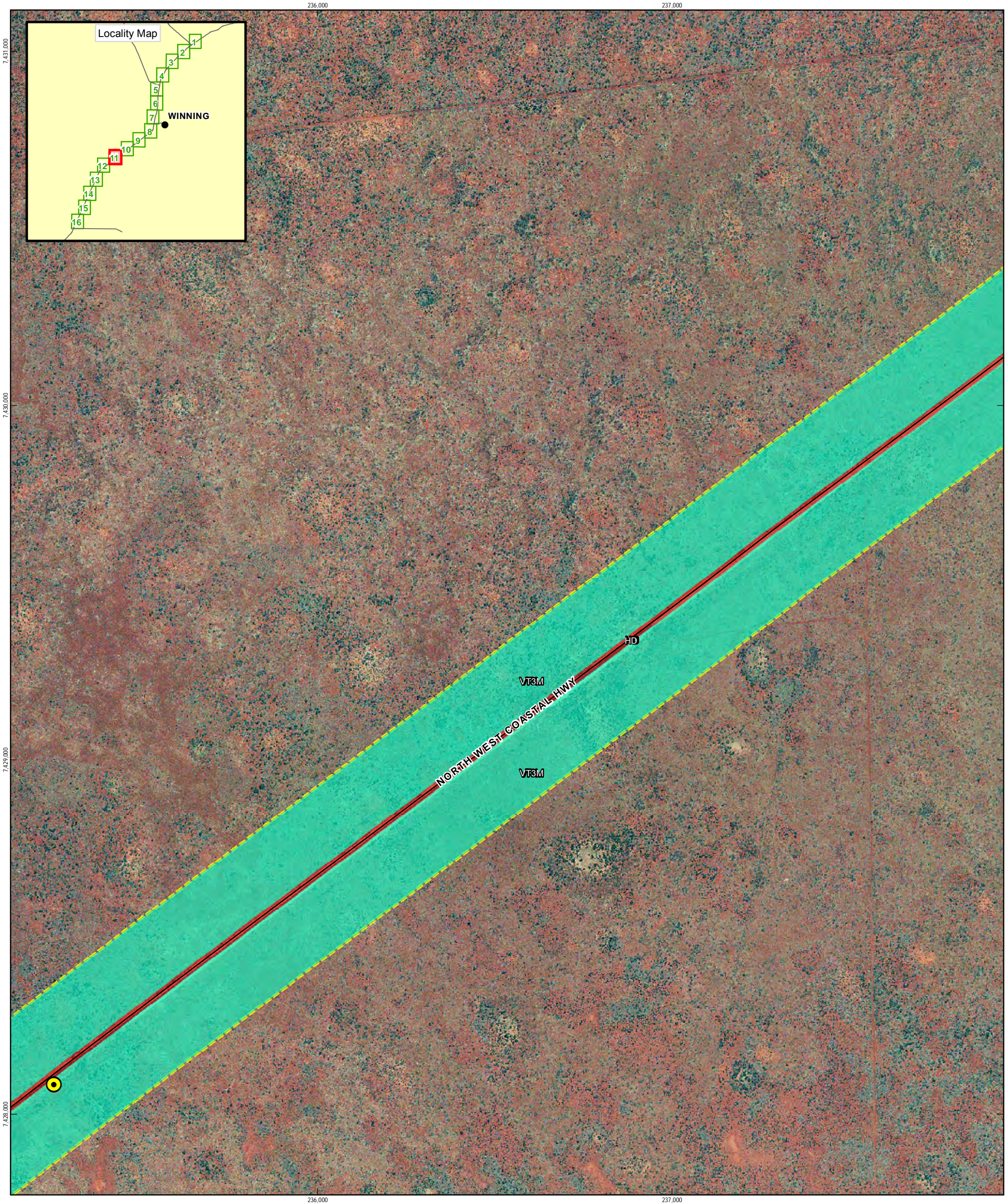
Middle Section Vegetation Types

Sheet 10 of 16

Figure 3b

G:\61128865\GIS\Maps\MXD\6128865_G003_Fig3b_VegTypeMiddle_Rev0.mxd

239 Adelaide Terrace Perth WA 6004 Australia T 61 8 6222 8222 F 61 8 6222 8555 E permail@ghd.com.au W www.ghd.com.au
© 2013. Whilst every care has been taken to prepare this map, GHD, MRWA, DEC, GA and Landgate make no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and cannot accept liability and responsibility of any kind (whether in contract, tort or otherwise) for any expenses, losses, damages and/or costs (including indirect or consequential damage) which are or may be incurred by any party as a result of the map being inaccurate, incomplete or unsuitable in any way and for any reason.
Data source: Landgate: Mia Mia 2007 Mosaic - 20121115; Winning 2007 Mosaic - 20121115; MRWA: Roads - 20120528; GHD: Middle Section Survey Area - 20121114; Vegetation Types - 20130128; Priority Flora - 20130201; DEC: Priority Ecological Communities - 20121129, DEC Estates - 20121219; GA: Topo 250k Series 3 - 2006. Created by: radeleon



LEGEND

Priority Flora (GHD)

Priority 1

Priority 2

Priority 3

Priority 4

Priority 5

Priority Fauna (GHD)

Roads

Middle Section Survey Area

Priority Ecological Communities

DEC Estates

Vegetation Types

VT1M

VT2M

VT3M

VT4M

VT5M

VT6M

VT7M

VT8M

HD

1: 10,000 (at A3)

0

50

100

200

300

400

500

Metres

Map Projection: Transverse Mercator

Horizontal Datum: Geocentric Datum of Australia

Grid: Map Grid of Australia 1994, Zone 50

Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number	61-28865
Revision	0
Date	03 Apr 2013

Middle Section Vegetation Types

Sheet 11 of 16

Figure 3b

G:\6128865\GIS\Maps\MXD\6128865_G003_Fig3b_VegTypeMiddle_Rev0.mxd

239 Adelaide Terrace Perth WA 6004 Australia

T 61 8 6222 8222

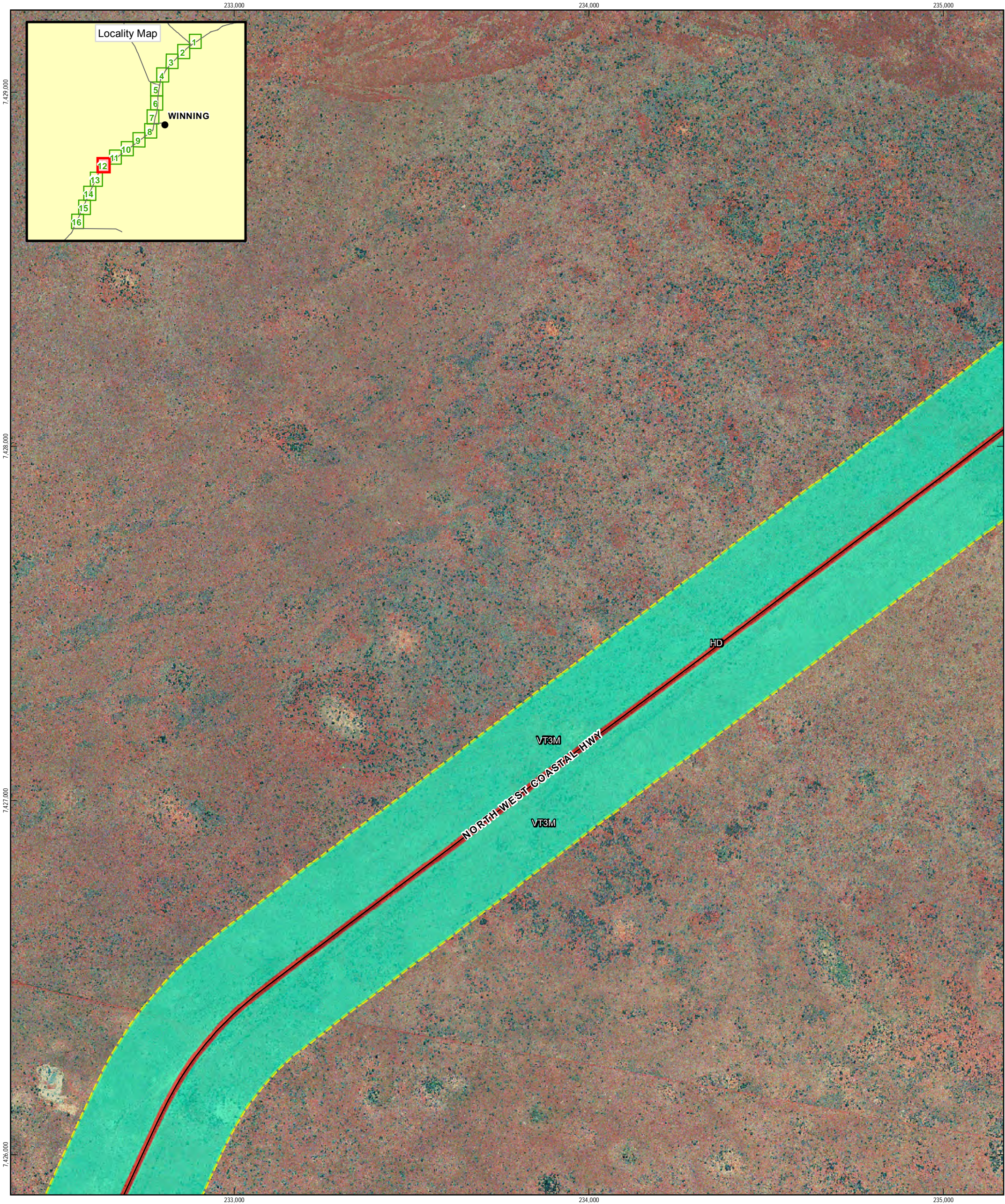
F 61 8 6222 8555

E permail@ghd.com.au

W www.ghd.com.au

© 2013. Whilst every care has been taken to prepare this map, GHD, MRWA, DEC, GA and Landgate make no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and cannot accept liability and responsibility of any kind (whether in contract, tort or otherwise) for any expenses, losses, damages and/or costs (including indirect or consequential damage) which are or may be incurred by any party as a result of the map being inaccurate, incomplete or unsuitable in any way and for any reason.

Data source: Landgate: Mia Mia 2007 Mosaic - 20121115, Winning 2007 Mosaic - 20121115, Barradale 2007 Mosaic - 20121115; MRWA: Roads - 20120528; GHD: Middle Section Survey Area - 20121114, Vegetation Types - 20130128, Priority Flora - 20130201, Priority Fauna - 20130201; DEC: Priority Ecological Communities - 20121129, DEC Estates - 20121219; GA: Topo 250k Series 3 - 2006. Created by: radeleon



- LEGEND**

Priority Flora (GHD)

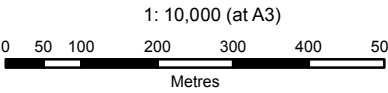
 - Priority 1
 - Priority 2
 - Priority 3
 - Priority 4
 - Priority 5
- Priority Fauna (GHD)**

 - Priority Fauna (GHD)

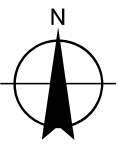
Roads

 - Middle Section Survey Area
 - Priority Ecological Communities
 - DEC Estates

- Vegetation Types**
- VT1M
 - VT2M
 - VT3M
 - VT4M
 - VT5M
 - VT6M
 - VT7M
 - VT8M
 - HD



Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50

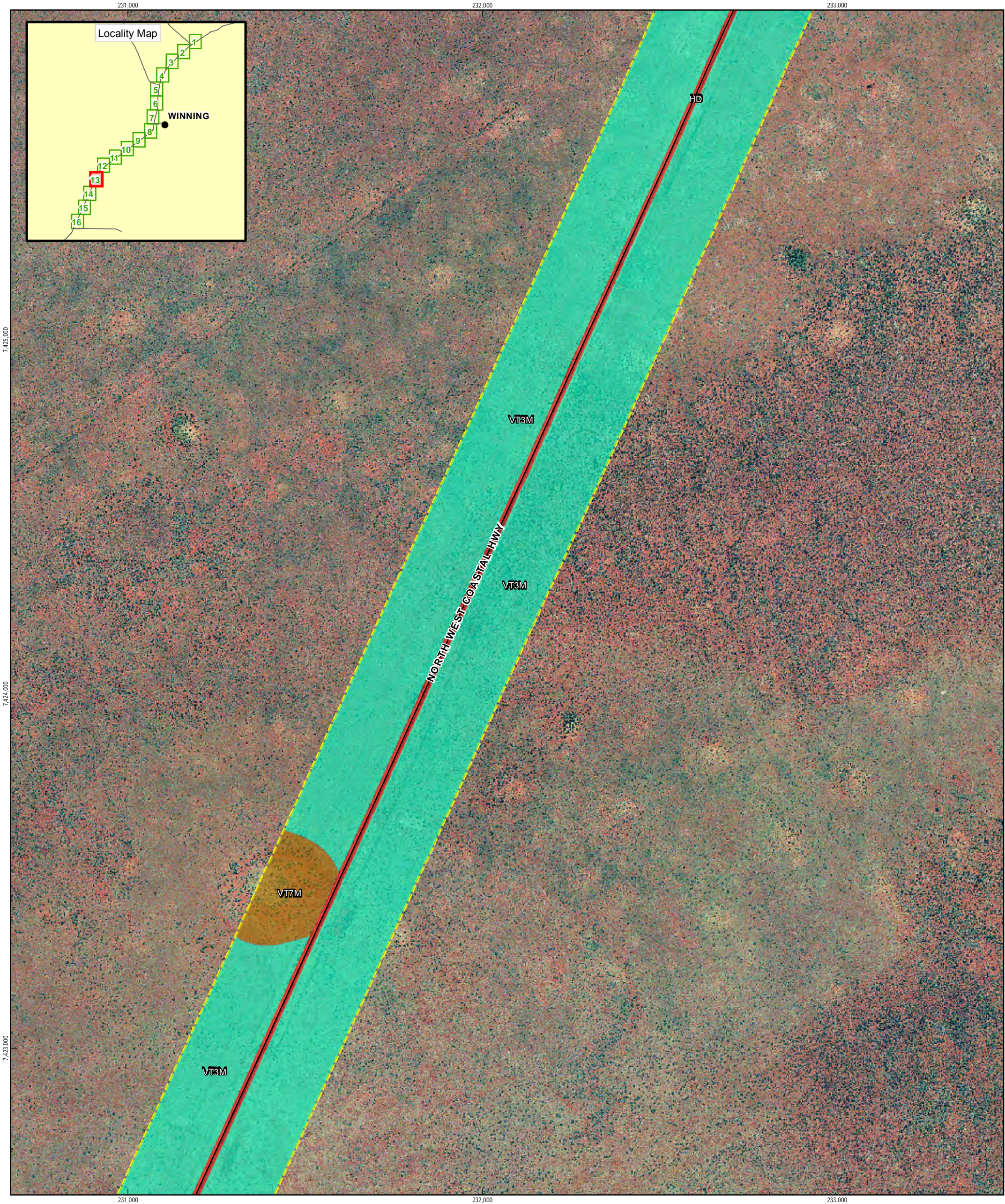


Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number | 61-28865
Revision | 0
Date | 03 Apr 2013

Middle Section Vegetation Types

Sheet 12 of 16
Figure 3b



LEGEND

Priority Flora (GHD)

- Priority 1
- Priority 2
- Priority 3
- Priority 4
- Priority 5

Priority Fauna (GHD)

Roads

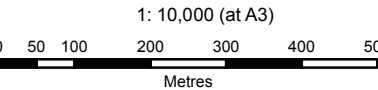
Middle Section Survey Area

Priority Ecological Communities

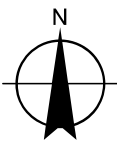
DEC Estates

Vegetation Types

- VT1M
- VT2M
- VT3M
- VT4M
- VT5M
- VT6M
- VT7M
- VT8M
- HD



Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50



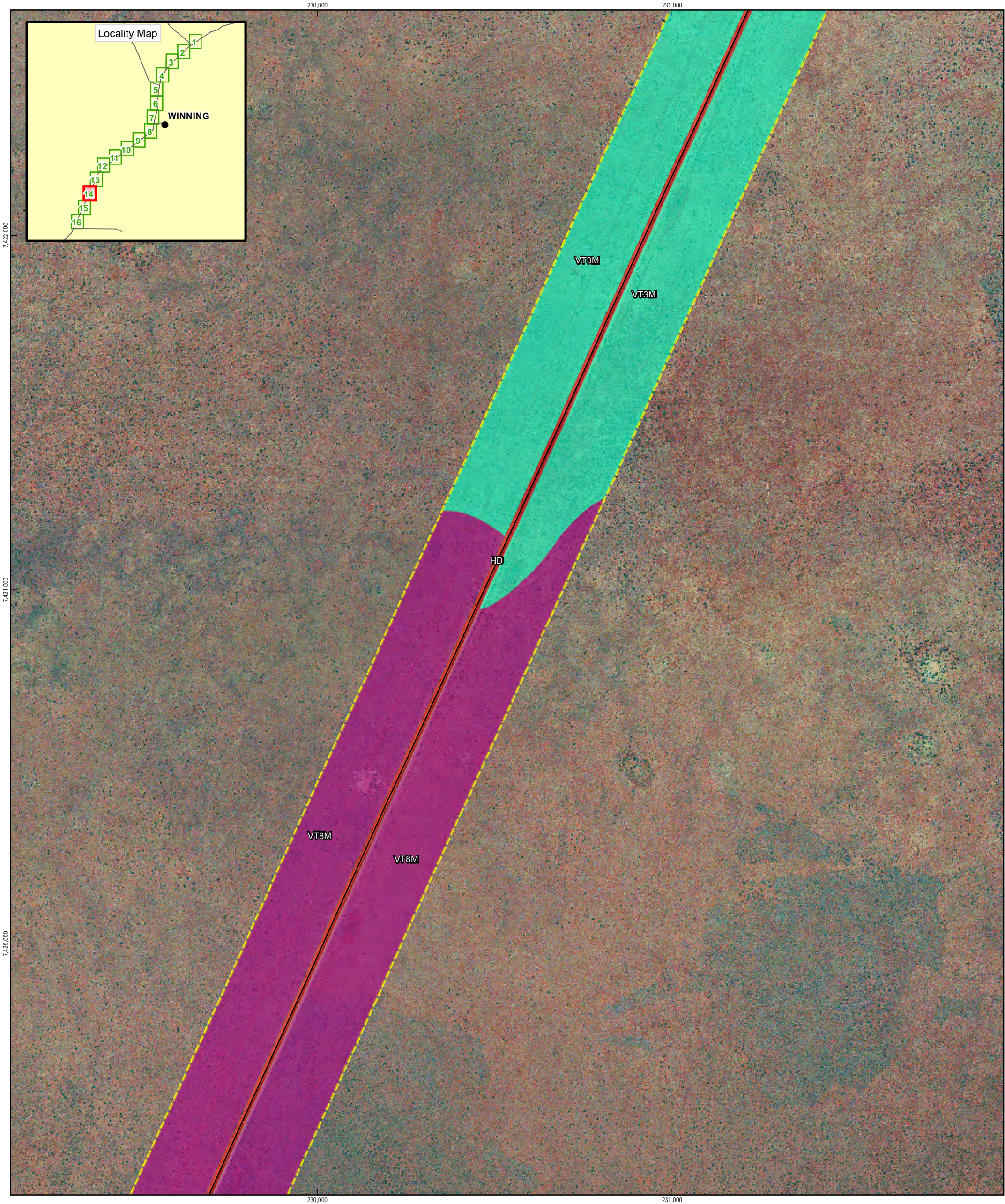
Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number 61-28865
Revision 0
Date 03 Apr 2013

Middle Section Vegetation Types

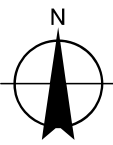
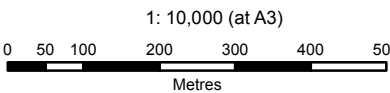
Sheet 13 of 16

Figure 3b



- LEGEND**
- Priority Flora (GHD)**
- Priority 1
 - Priority 2
 - Priority 3
 - Priority 4
 - Priority 5
- Priority Fauna (GHD)**
- Priority Fauna (GHD)
- Roads**
- Roads
- Middle Section Survey Area**
- Middle Section Survey Area
- Priority Ecological Communities**
- Priority Ecological Communities
- DEC Estates**
- DEC Estates

- Vegetation Types**
- VT1M
 - VT2M
 - VT3M
 - VT4M
 - VT5M
 - VT6M
 - VT7M
 - VT8M
 - HD



Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number 61-28865
Revision 0
Date 03 Apr 2013

Middle Section Vegetation Types

Sheet 14 of 16

Figure 3b



LEGEND

Priority Flora (GHD)

Priority 1

Priority 2

Priority 3

Priority 4

Priority 5

Priority Fauna (GHD)

Roads

Middle Section Survey Area

Priority Ecological Communities

DEC Estates

Vegetation Types

VT1M

VT2M

VT3M

VT4M

VT5M

VT6M

VT7M

VT8M

HD

1: 10,000 (at A3)

0

50

100

200

300

400

500

Metres

Map Projection: Transverse Mercator

Horizontal Datum: Geocentric Datum of Australia

Grid: Map Grid of Australia 1994, Zone 50

Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number	61-28865
Revision	0
Date	03 Apr 2013

Middle Section Vegetation Types

Sheet 15 of 16

Figure 3b

G:\6128865\GIS\Maps\MXD\6128865_G003_Fig3b_VegTypeMiddle_Rev0.mxd

239 Adelaide Terrace Perth WA 6004 Australia

T 61 8 6222 8222

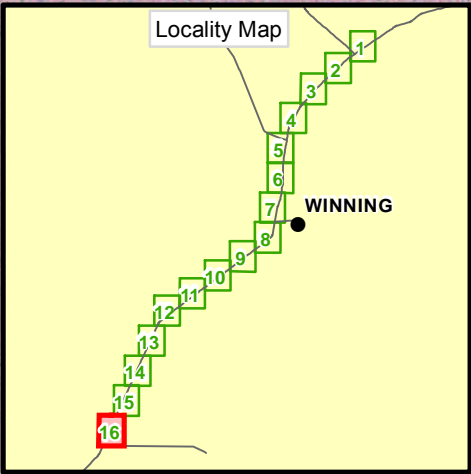
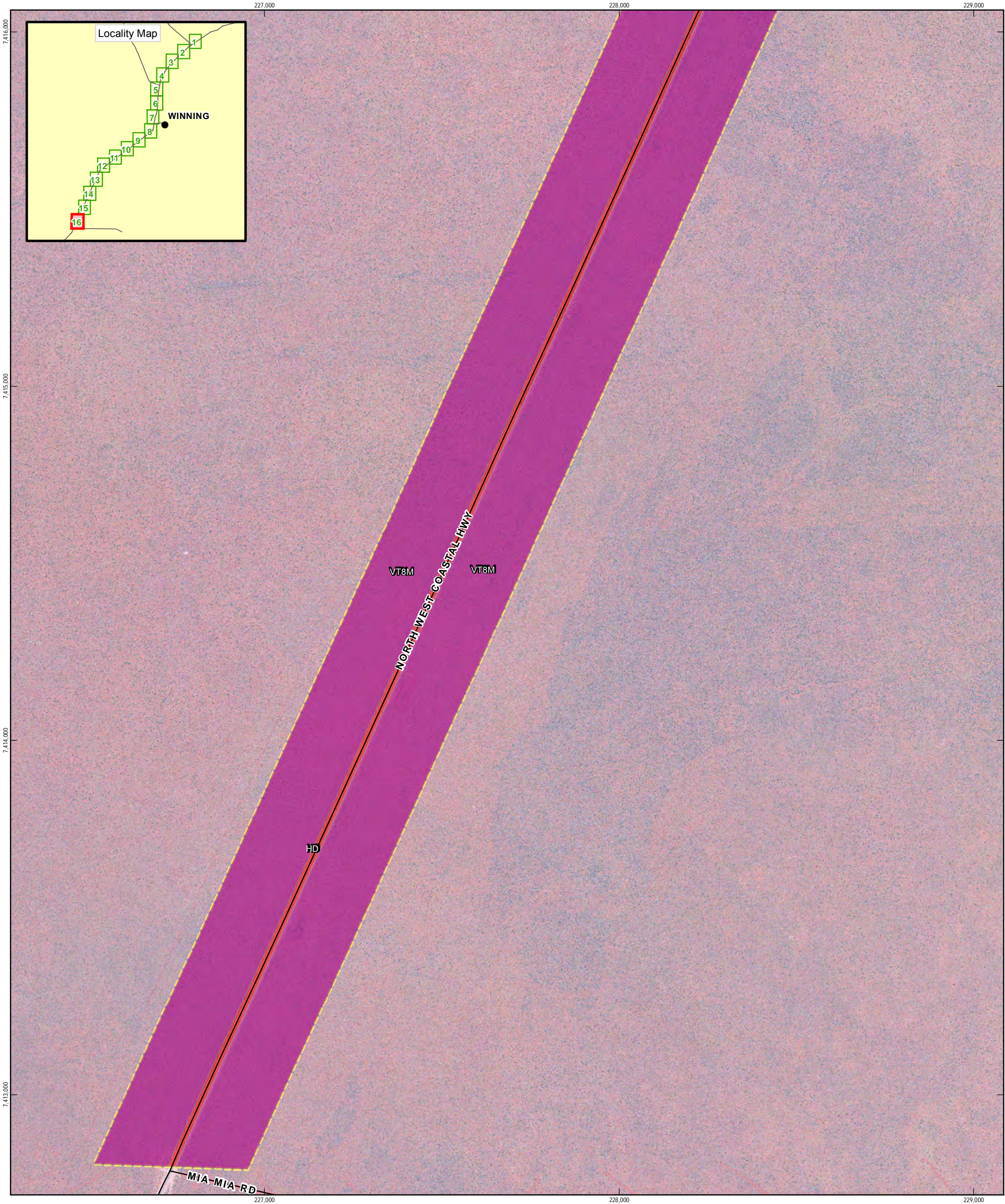
F 61 8 6222 8555

E permail@ghd.com.au

W www.ghd.com.au

© 2013. Whilst every care has been taken to prepare this map, GHD, MRWA, DEC, GA and Landgate make no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and cannot accept liability and responsibility of any kind (whether in contract, tort or otherwise) for any expenses, losses, damages and/or costs (including indirect or consequential damage) which are or may be incurred by any party as a result of the map being inaccurate, incomplete or unsuitable in any way and for any reason.

Data source: Landgate: Mia Mia 2007 Mosaic - 20121115; Winning 2007 Mosaic - 20121115; MRWA: Roads - 20120528; GHD: Middle Section Survey Area - 20121114; Vegetation Types - 20130128; Priority Flora - 20130201; DEC: Priority Ecological Communities - 20121129, DEC Estates - 20121219; GA: Topo 250k Series 3 - 2006. Created by: radeleon



LEGEND
Priority Flora (GHD)

- Priority 1
- Priority 2
- Priority 3
- Priority 4
- Priority 5



Priority Fauna (GHD)



Roads



Middle Section Survey Area



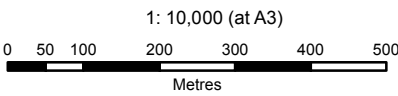
Priority Ecological Communities



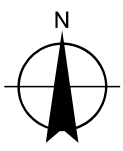
DEC Estates

Vegetation Types

- VT1M
- VT2M
- VT3M
- VT4M
- VT5M
- VT6M
- VT7M
- VT8M
- HD



Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50



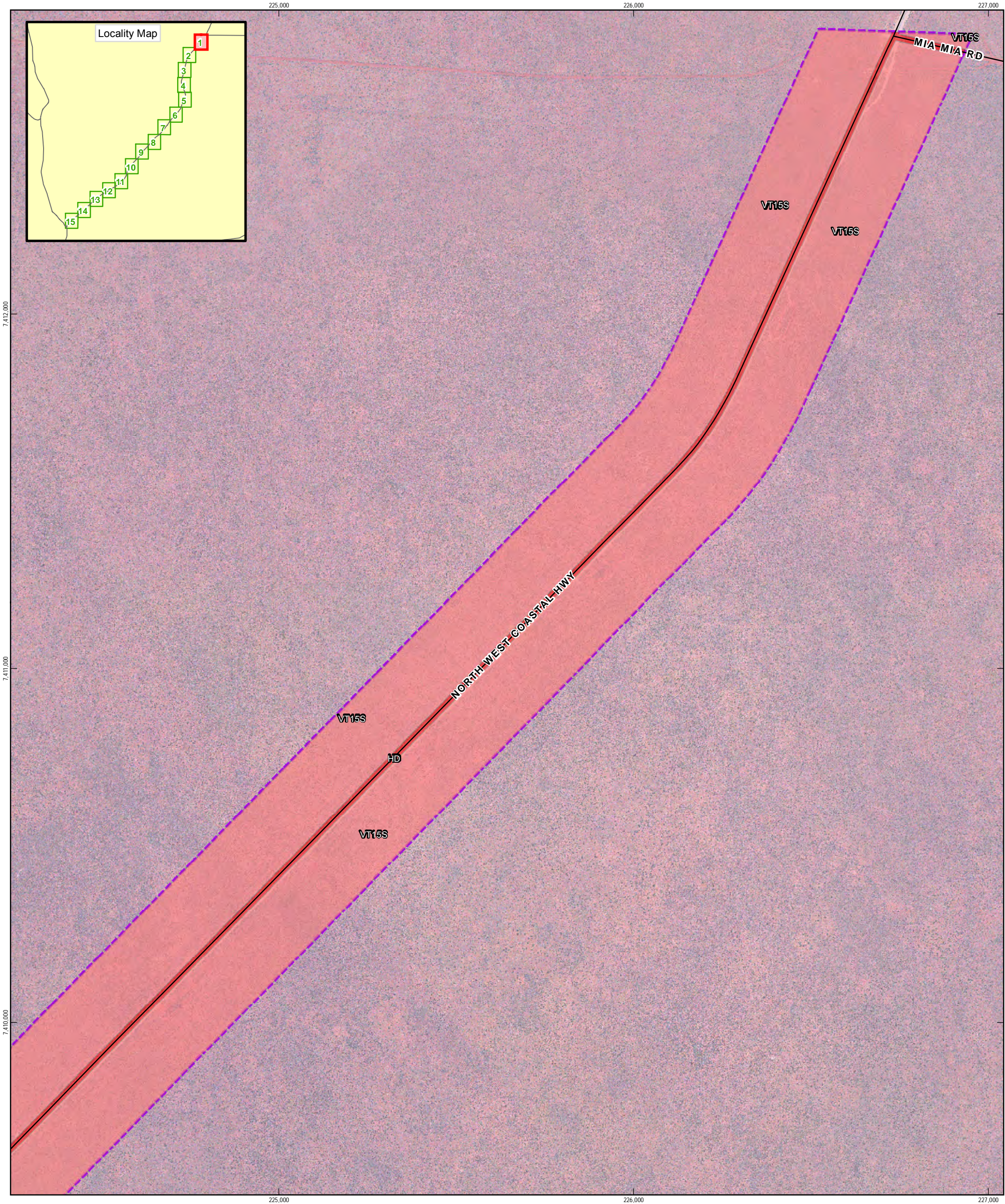
Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number | 61-28865
Revision | 0
Date | 03 Apr 2013

Middle Section Vegetation Types

Sheet 16 of 16

Figure 3b



LEGEND

Priority Flora (GHD)

- Priority 1
- Priority 2
- Priority 3
- Priority 4
- Priority 5



Priority Fauna (GHD)



Roads



Southern Section Survey Area



Priority Ecological Communities



DEC Estates

Vegetation Types

- VT1S
- VT2S
- VT3S
- VT4S

VT5S

VT6S

VT7S

VT8S

VT9S

VT10S

VT11S

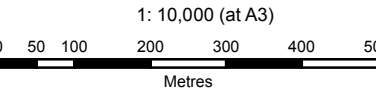
VT12S

VT13S

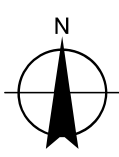
VT14S

VT15S

HD



Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50



Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number 61-28865
Revision 0
Date 03 Apr 2013

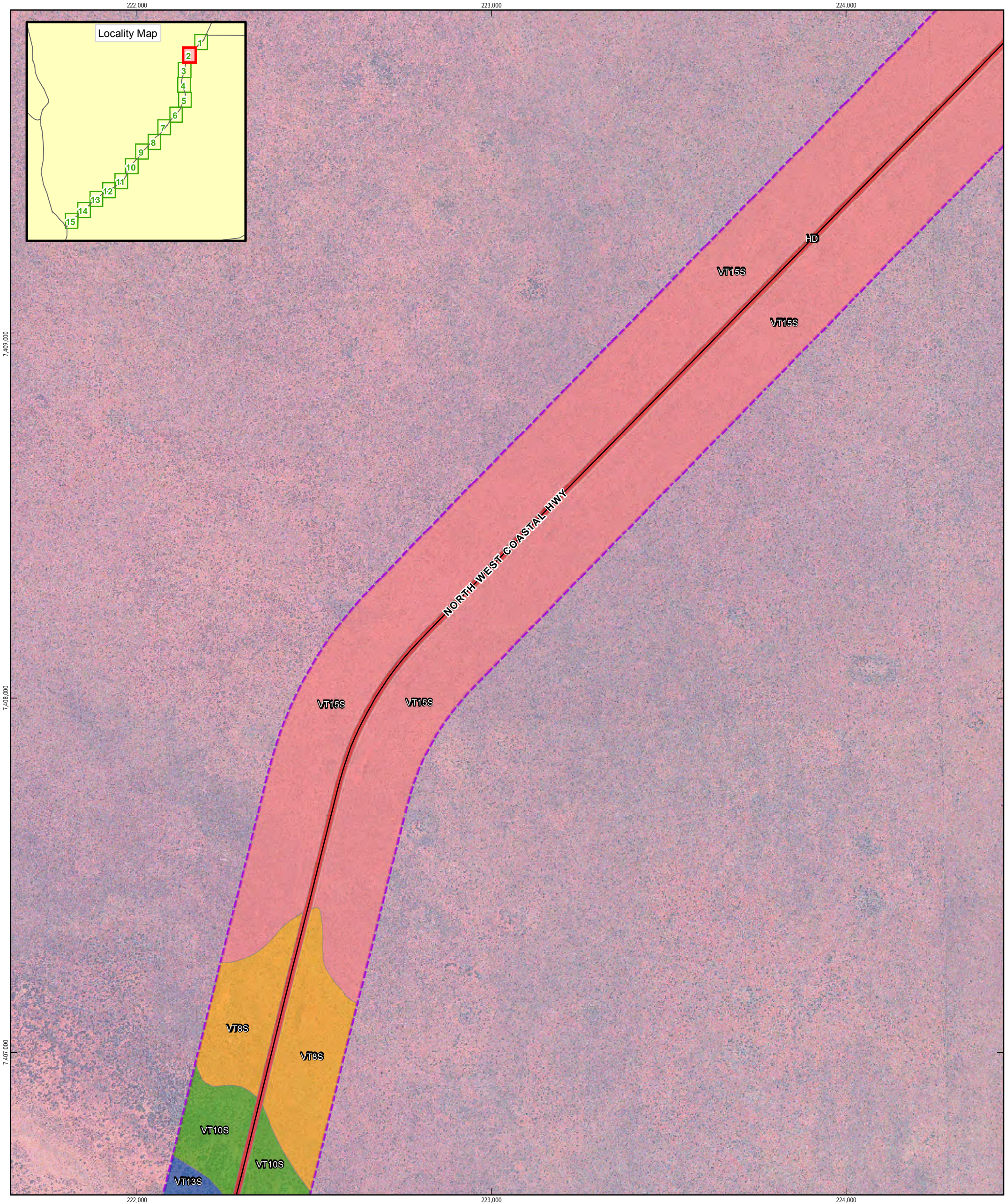
Southern Section Vegetation Types

Sheet 1 of 15

Figure 3c

G:\6128865\GIS\Maps\MXD\6128865_G003_Fig3c_VegTypeSouth_Rev0.mxd

239 Adelaide Terrace Perth WA 6004 Australia T 61 8 6222 8222 F 61 8 6222 8555 E permail@ghd.com.au W www.ghd.com.au
© 2013. Whilst every care has been taken to prepare this map, GHD, MRWA, DEC, GA and Landgate make no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and cannot accept liability and responsibility of any kind (whether in contract, tort or otherwise) for any expenses, losses, damages and/or costs (including indirect or consequential damage) which are or may be incurred by any party as a result of the map being inaccurate, incomplete or unsuitable in any way and for any reason.
Data source: Landgate: Mia Mia 2007 Mosaic - 20121115; Barrabiddy 2007 Mosaic - 20121115; MRWA: Roads - 20120528; GHD: Southern Section Survey Area - 20121114; Vegetation Types - 20130128; Priority Flora - 20130201; Priority Fauna - 20130201; DEC: Priority Ecological Communities - 20121129; DEC Estates - 20121219; GA: Topo 250k Series 3 - 2006. Created by: radeleon



LEGEND

Priority Flora (GHD)

- Priority 1
- Priority 2
- Priority 3
- Priority 4
- Priority 5



Priority Fauna (GHD)



Roads



Southern Section Survey Area



Priority Ecological Communities



DEC Estates

Vegetation Types

- VT1S
- VT2S
- VT3S
- VT4S



VT5S



VT6S



VT7S



VT8S



VT9S



VT10S



VT11S



VT12S



VT13S



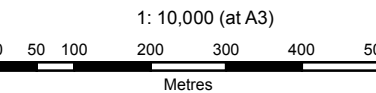
VT14S



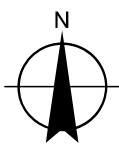
VT15S



HD



Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50



Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number 61-28865
Revision 0
Date 03 Apr 2013

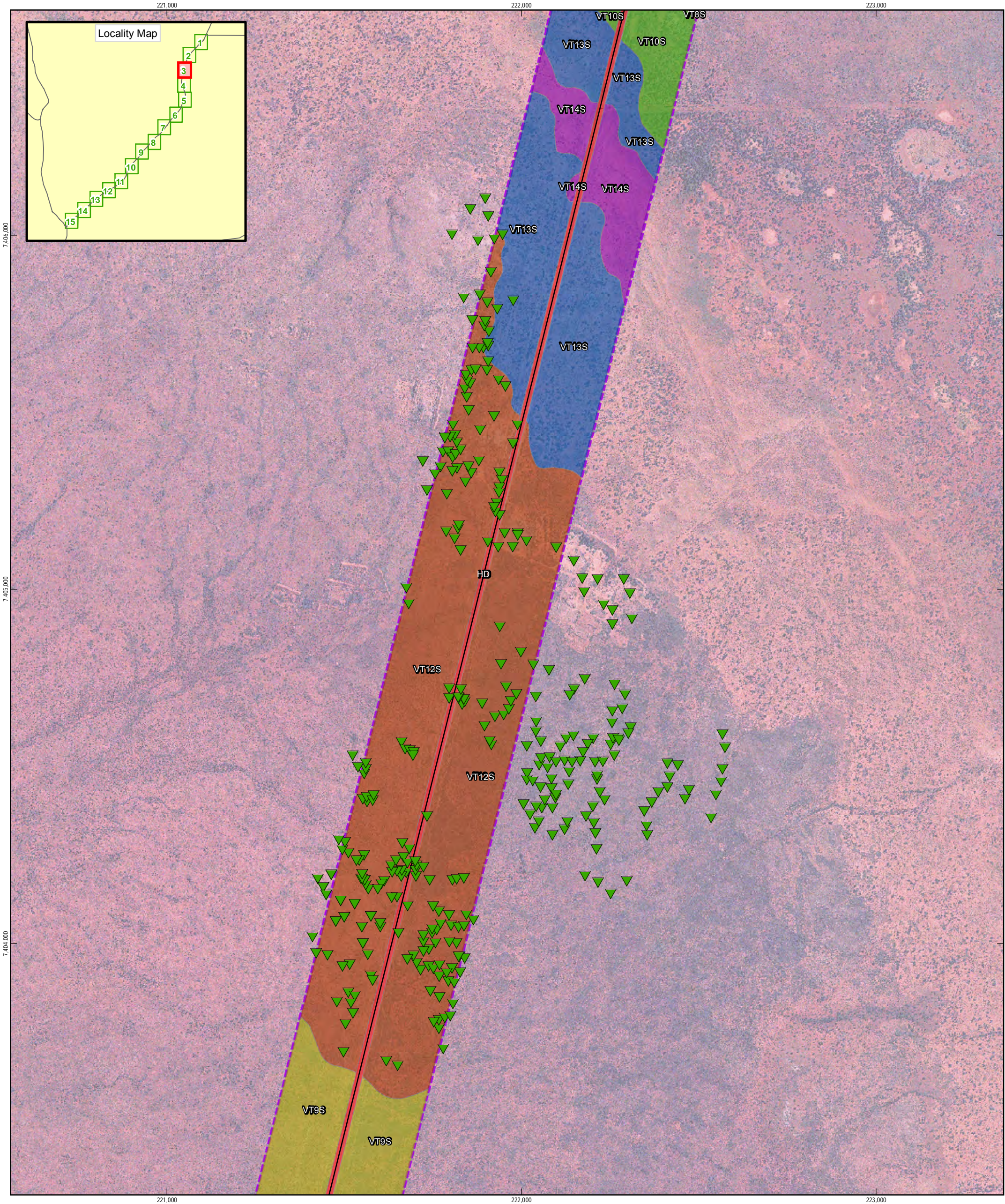
Southern Section Vegetation Types

Sheet 2 of 15

Figure 3c

G:\6128865\GIS\Maps\MXD\6128865_G003_Fig3c_VegTypeSouth_Rev0.mxd

239 Adelaide Terrace Perth WA 6004 Australia T 61 8 6222 8222 F 61 8 6222 8555 E permail@ghd.com.au W www.ghd.com.au
© 2013. Whilst every care has been taken to prepare this map, GHD, MRWA, DEC, GA and Landgate make no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and cannot accept liability and responsibility of any kind (whether in contract, tort or otherwise) for any expenses, losses, damages and/or costs (including indirect or consequential damage) which are or may be incurred by any party as a result of the map being inaccurate, incomplete or unsuitable in any way and for any reason.
Data source: Landgate: Mia Mia 2007 Mosaic - 20121115; Barrabiddy 2007 Mosaic - 20121115; MRWA: Roads - 20120528; GHD: Southern Section Survey Area - 20121114; Vegetation Types - 20130128; Priority Flora - 20130201; Priority Fauna - 20130201; DEC: Priority Ecological Communities - 20121129; DEC Estates - 20121219; GA: Topo 250k Series 3 - 2006. Created by: radeleon



LEGEND

Priority Flora (GHD)

Priority 1

Priority 2

Priority 3

Priority 4

Priority 5

Priority Fauna (GHD)

Roads

Southern Section Survey Area

Priority Ecological Communities

DEC Estates

Vegetation Types

VT1S

VT2S

VT3S

VT4S

VT5S

VT6S

VT7S

VT8S

VT9S

VT10S

VT11S

VT12S

VT13S

VT14S

VT15S

HD

Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

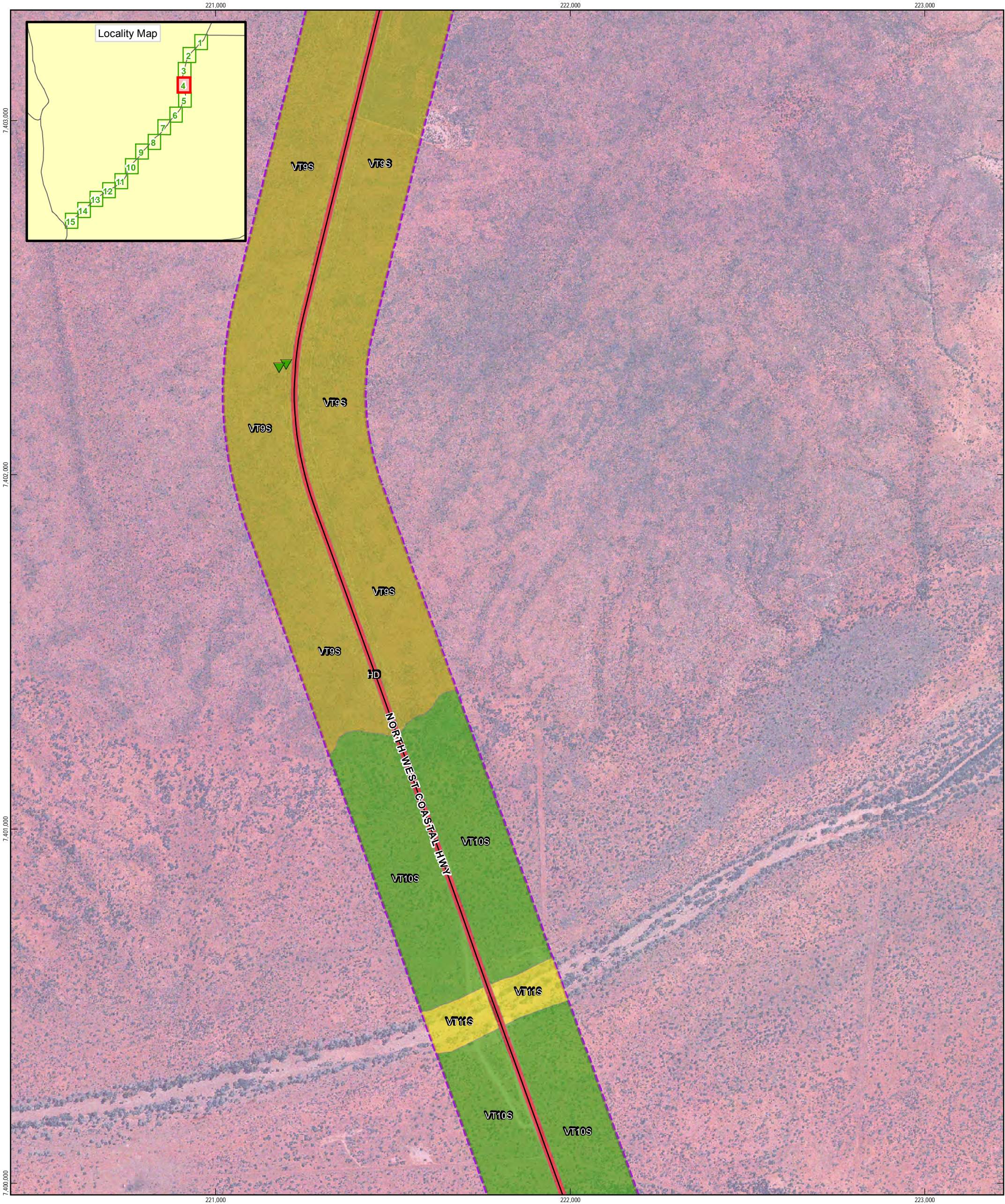
Job Number 61-28865
Revision 0
Date 03 Apr 2013

Southern Section Vegetation Types

Sheet 3 of 15

Figure 3c

G:\6128865\GIS\Maps\MXD\6128865_G003_Fig3c_VegTypeSouth_Rev0.mxd
© 2013. Whilst every care has been taken to prepare this map, GHD, MRWA, DEC, GA and Landgate make no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and cannot accept liability and responsibility of any kind (whether in contract, tort or otherwise) for any expenses, losses, damages and/or costs (including indirect or consequential damage) which are or may be incurred by any party as a result of the map being inaccurate, incomplete or unsuitable in any way and for any reason.
Data source: Landgate: Mia Mia 2007 Mosaic - 20121115; MRWA: Roads - 20120528; GHD: Southern Section Survey Area - 20121114, Vegetation Types - 20130128, Priority Flora - 20130201, Priority Fauna - 20130201; DEC: Priority Ecological Communities - 20121129, DEC Estates - 20121219; GA: Topo 250k Series 3 - 2006. Created by: radeleon
239 Adelaide Terrace Perth WA 6004 Australia T 61 8 6222 8222 F 61 8 6222 8555 E permail@ghd.com.au W www.ghd.com.au



LEGEND

Priority Flora (GHD)

- Priority 1
- Priority 2
- Priority 3
- Priority 4
- Priority 5



Priority Fauna (GHD)



Roads



Southern Section Survey Area



Priority Ecological Communities



DEC Estates

Vegetation Types

VT1S

VT2S

VT3S

VT4S

VT5S

VT6S

VT7S

VT8S

VT9S

VT10S

VT11S

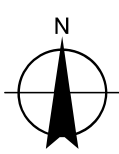
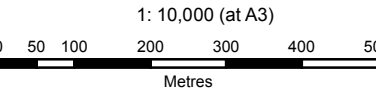
VT12S

VT13S

VT14S

VT15S

HD



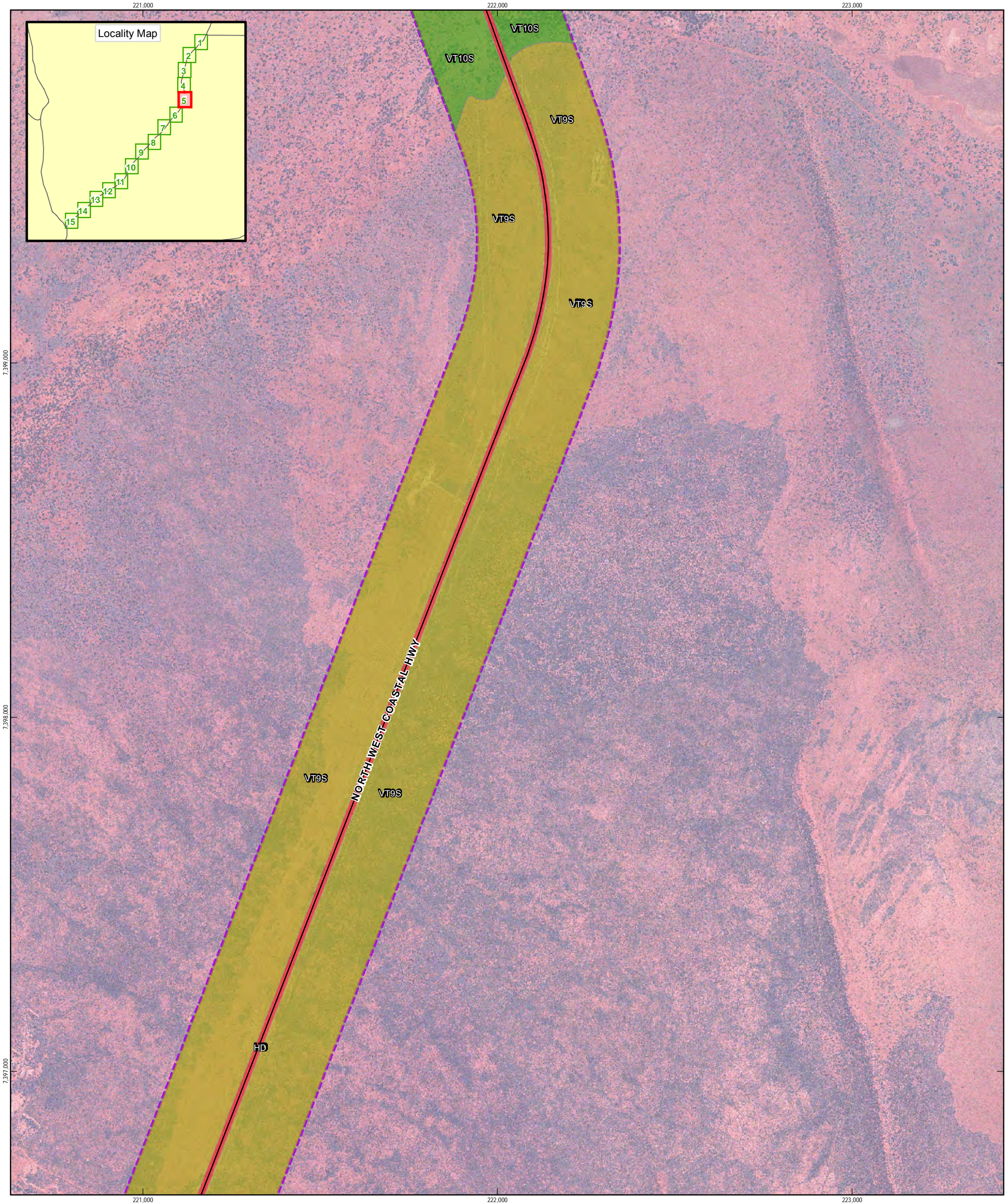
Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number 61-28865
Revision 0
Date 03 Apr 2013

Southern Section Vegetation Types

Sheet 4 of 15

Figure 3c



LEGEND

Priority Flora (GHD)

- Priority 1
- Priority 2
- Priority 3
- Priority 4
- Priority 5



Priority Fauna (GHD)



Roads



Southern Section Survey Area



Priority Ecological Communities



DEC Estates

Vegetation Types

- VT1S
- VT2S
- VT3S
- VT4S

VT5S

VT6S

VT7S

VT8S

VT9S

VT10S

VT11S

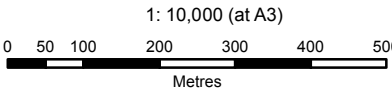
VT12S

VT13S

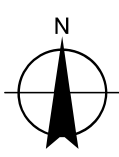
VT14S

VT15S

HD



Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50



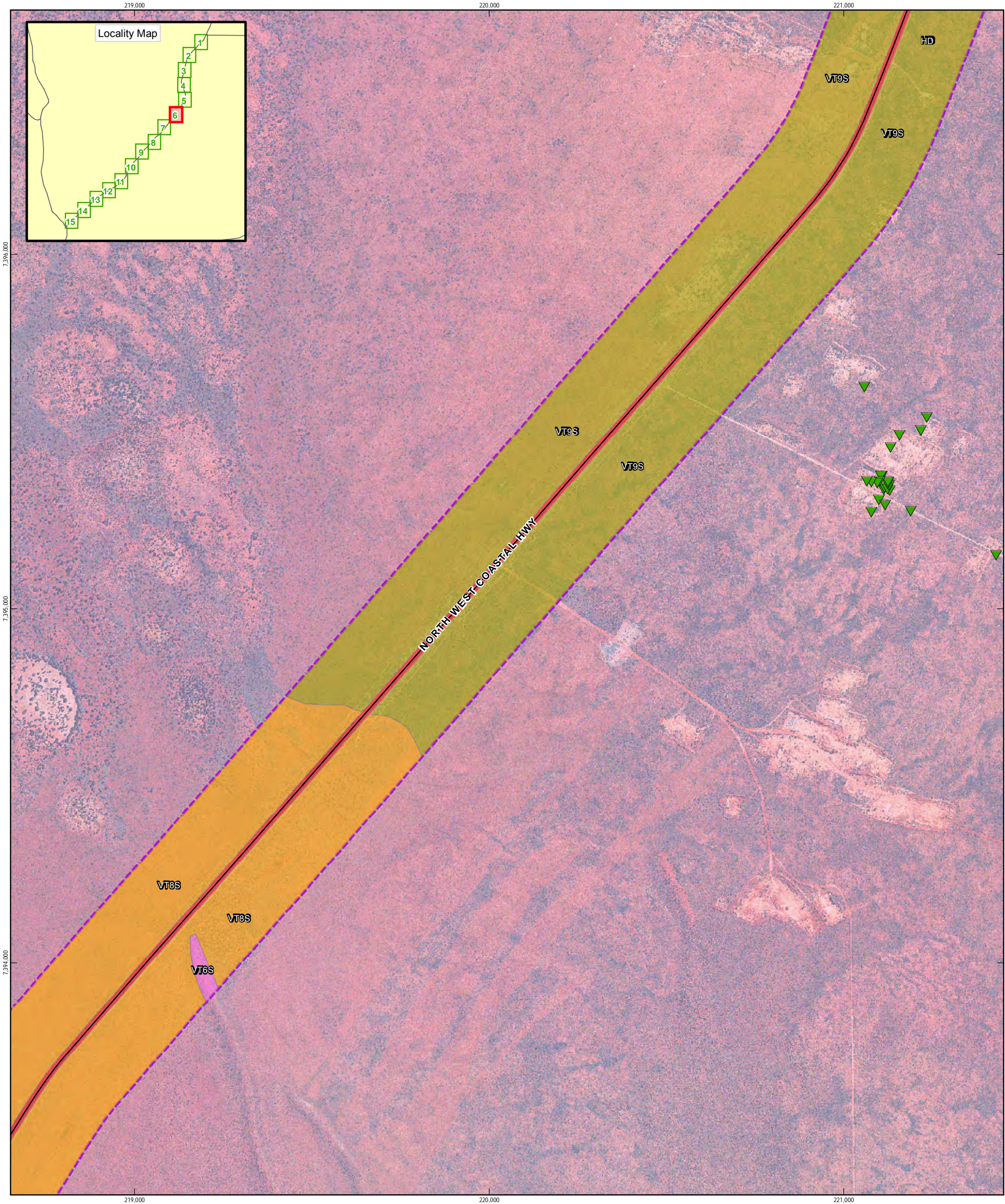
Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number | 61-28865
Revision | 0
Date | 03 Apr 2013

Southern Section Vegetation Types

Sheet 5 of 15

Figure 3c



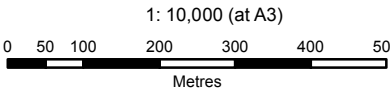
- LEGEND**
- Priority Flora (GHD)**
- Priority 1
 - Priority 2
 - Priority 3
 - Priority 4
 - Priority 5
- Priority Fauna (GHD)**
- Priority Fauna (GHD)
- Roads**
- Roads
- Southern Section Survey Area**
- Southern Section Survey Area
- Priority Ecological Communities**
- Priority Ecological Communities
- DEC Estates**
- DEC Estates

- Vegetation Types**
- VT1S
 - VT2S
 - VT3S
 - VT4S

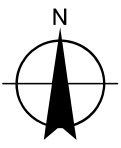
- VT5S
- VT6S
- VT7S
- VT8S

- VT9S
- VT10S
- VT11S
- VT12S

- VT13S
- VT14S
- VT15S
- HD



Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50



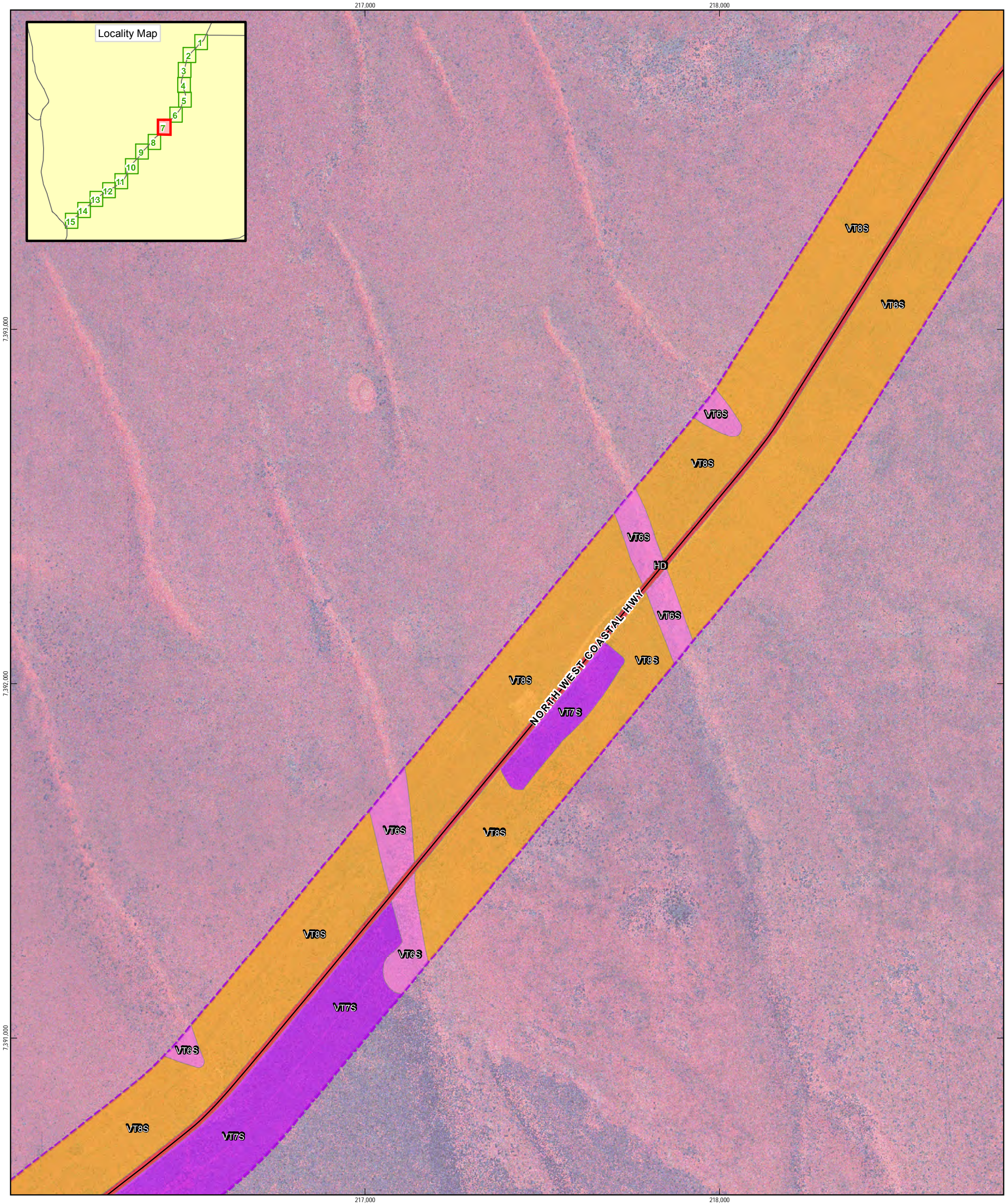
Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number 61-28865
Revision 0
Date 03 Apr 2013

Southern Section Vegetation Types

Sheet 6 of 15

Figure 3c



LEGEND

Priority Flora (GHD)

- Priority 1
- Priority 2
- Priority 3
- Priority 4
- Priority 5



Priority Fauna (GHD)



Roads



Southern Section Survey Area



Priority Ecological Communities



DEC Estates

Vegetation Types

- VT1S
- VT2S
- VT3S
- VT4S

VT5S

VT6S

VT7S

VT8S

VT9S

VT10S

VT11S

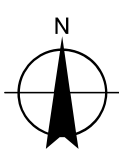
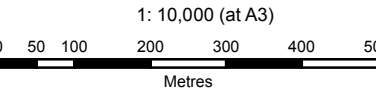
VT12S

VT13S

VT14S

VT15S

HD



Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number 61-28865
Revision 0
Date 03 Apr 2013

Southern Section Vegetation Types

Sheet 7 of 15

Figure 3c



LEGEND

Priority Flora (GHD)

- Priority 1
- Priority 2
- Priority 3
- Priority 4
- Priority 5

Priority Fauna (GHD)

- Roads
- Southern Section Survey Area
- Priority Ecological Communities
- DEC Estates

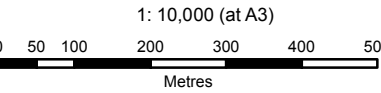
Vegetation Types

- VT1S
- VT2S
- VT3S
- VT4S

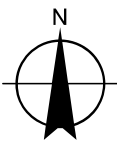
- VT5S
- VT6S
- VT7S
- VT8S

- VT9S
- VT10S
- VT11S
- VT12S

- VT13S
- VT14S
- VT15S
- HD



Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50



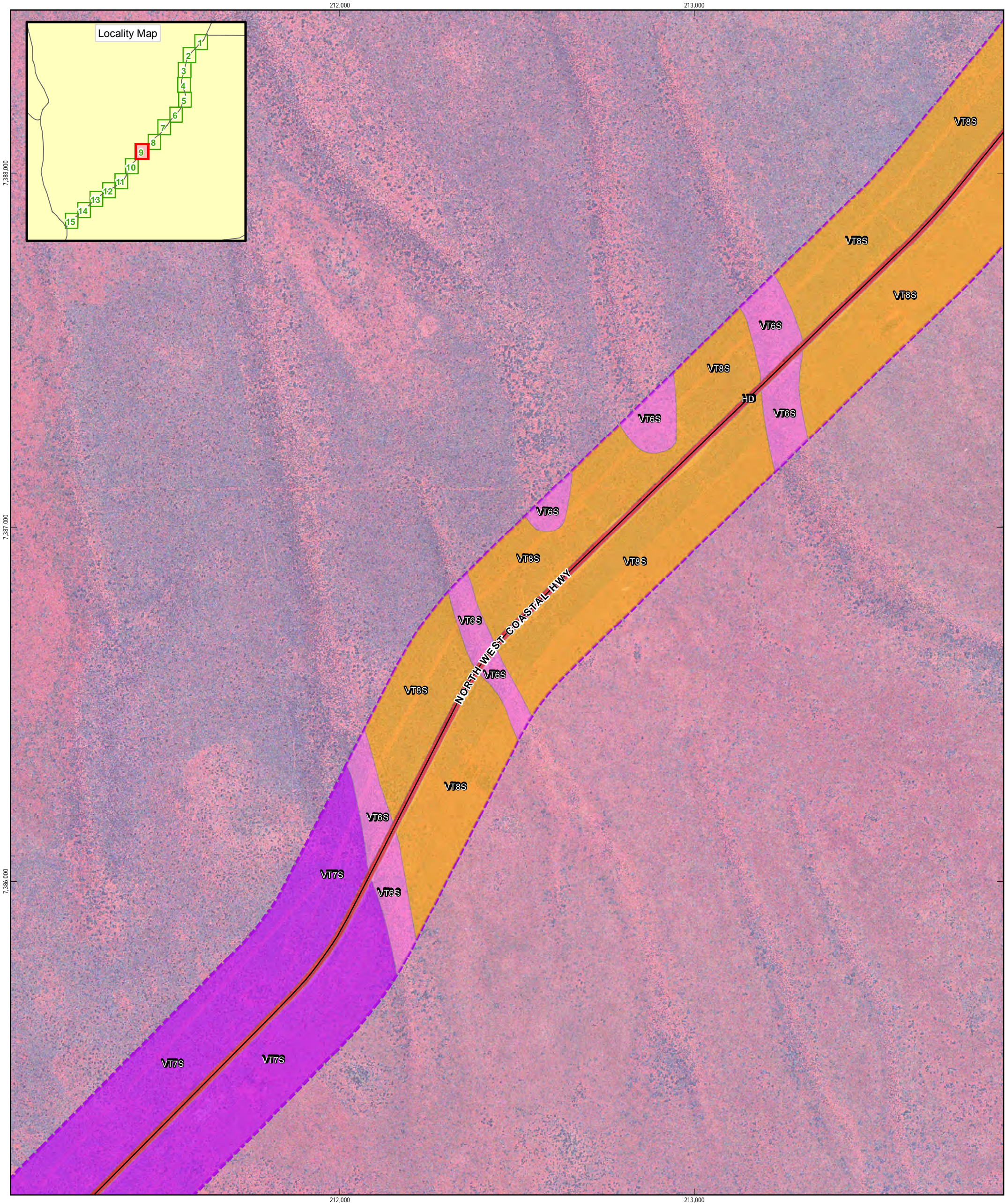
Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number 61-28865
Revision 0
Date 03 Apr 2013

Southern Section Vegetation Types

Sheet 8 of 15

Figure 3c



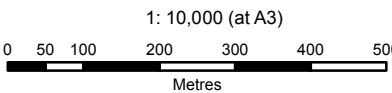
- LEGEND**
- Priority Flora (GHD)**
- Priority 1
 - Priority 2
 - Priority 3
 - Priority 4
 - Priority 5
- Priority Fauna (GHD)**
- Priority Fauna (GHD)
- Roads**
- Roads
- Southern Section Survey Area**
- Southern Section Survey Area
- Priority Ecological Communities**
- Priority Ecological Communities
- DEC Estates**
- DEC Estates

- Vegetation Types**
- VT1S
 - VT2S
 - VT3S
 - VT4S

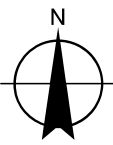
- VT5S
- VT6S
- VT7S
- VT8S

- VT9S
- VT10S
- VT11S
- VT12S

- VT13S
- VT14S
- VT15S
- HD



Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50



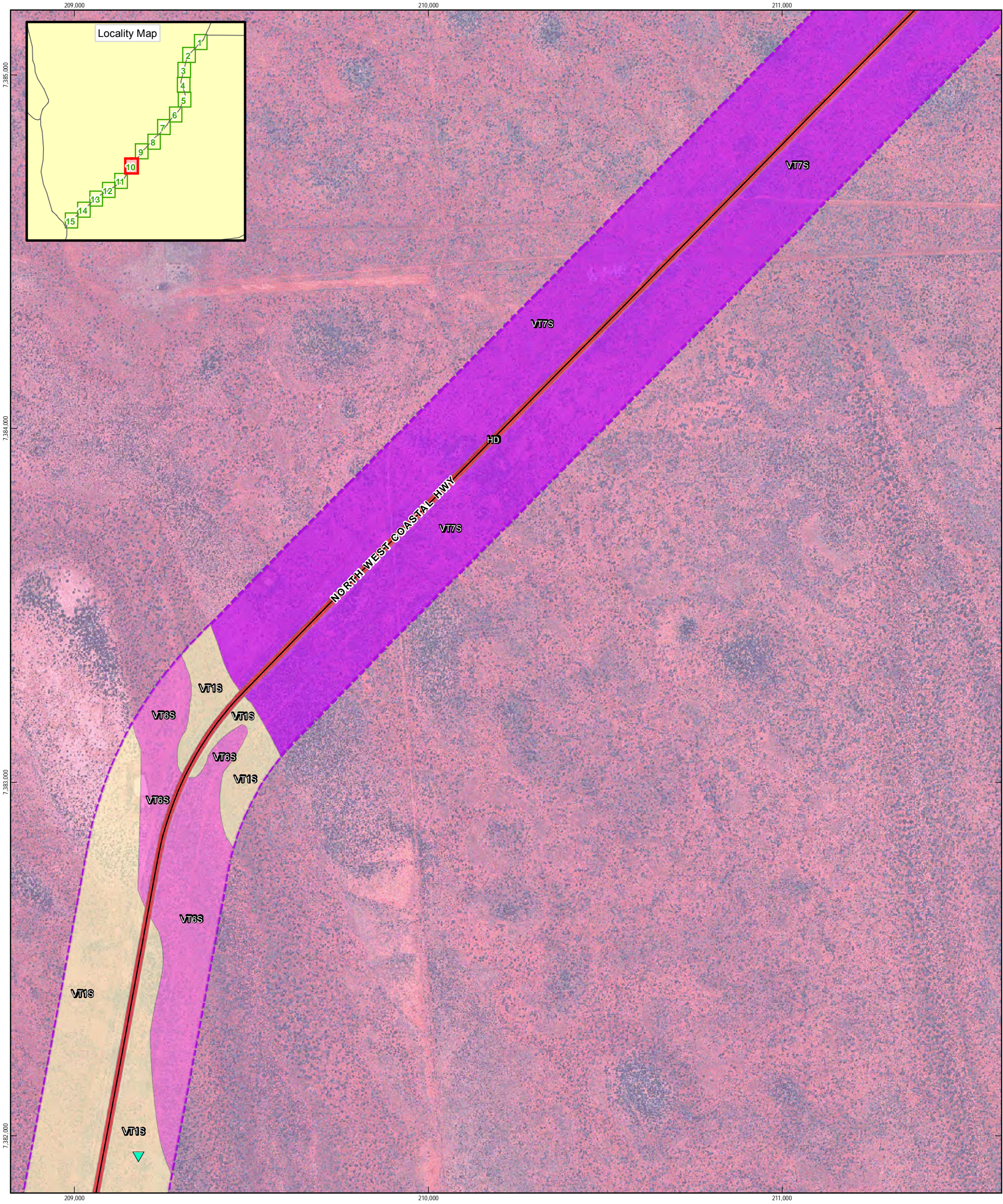
Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number 61-28865
Revision 0
Date 03 Apr 2013

Southern Section Vegetation Types

Sheet 9 of 15

Figure 3c



LEGEND

Priority Flora (GHD)

- Priority 1
- Priority 2
- Priority 3
- Priority 4
- Priority 5

Priority Fauna (GHD)

- Priority Fauna (GHD)

Roads

- Roads

Southern Section Survey Area

- Southern Section Survey Area

Priority Ecological Communities

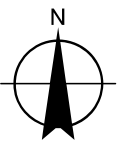
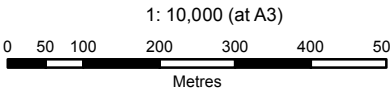
- Priority Ecological Communities

DEC Estates

- DEC Estates

Vegetation Types

VT1S	VT5S	VT9S
VT2S	VT6S	VT10S
VT3S	VT7S	VT11S
VT4S	VT8S	VT12S
		VT13S
		VT14S
		VT15S
		HD



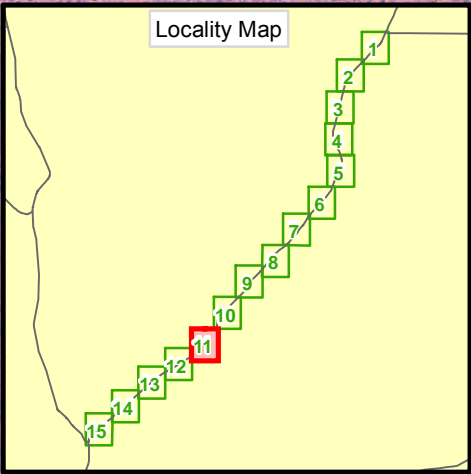
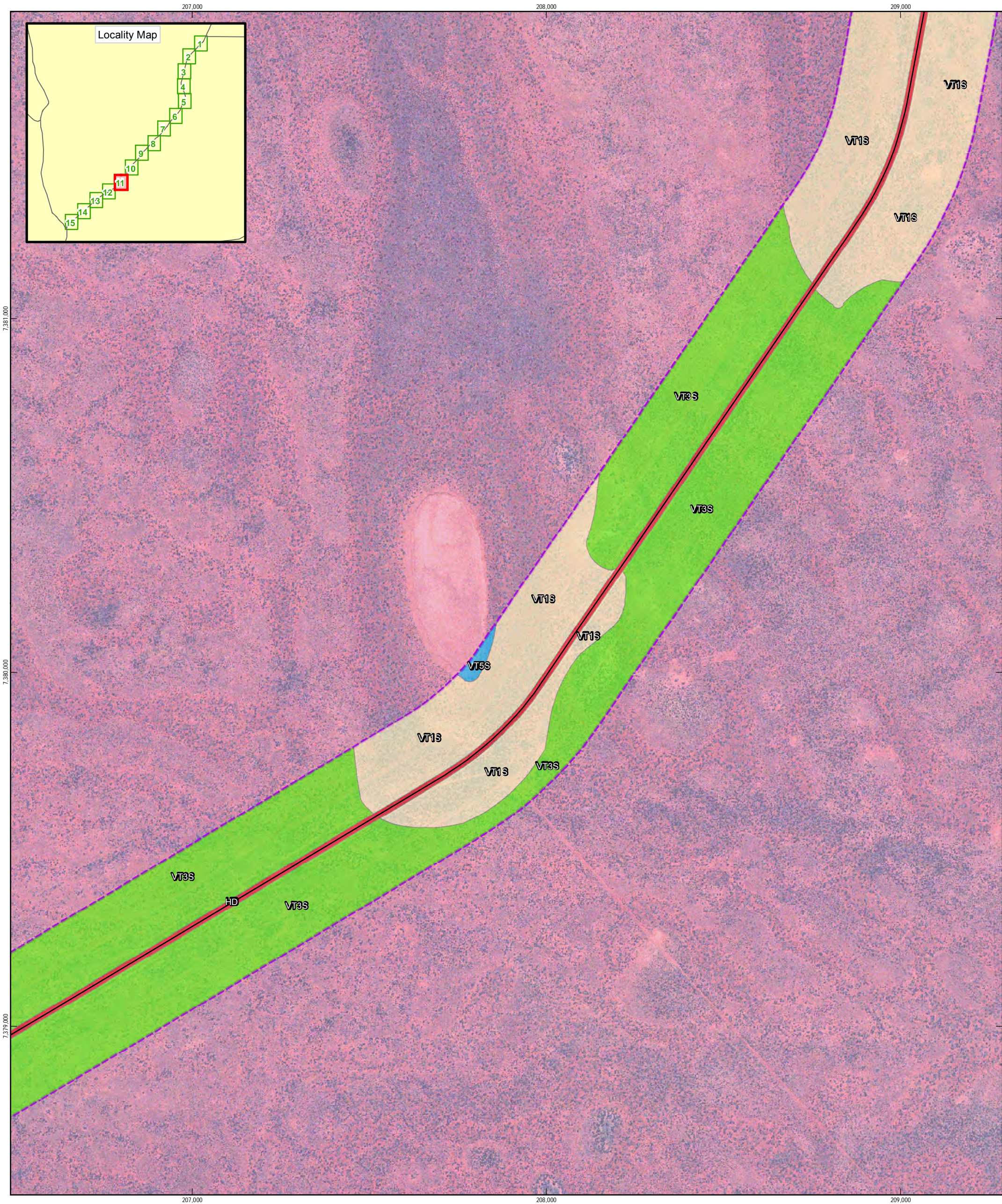
Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number | 61-28865
Revision | 0
Date | 03 Apr 2013

Southern Section Vegetation Types

Sheet 10 of 15

Figure 3c



LEGEND

Priority Flora (GHD)

- Priority 1
- Priority 2
- Priority 3
- Priority 4
- Priority 5

Priority Fauna (GHD)

- Priority Fauna (GHD)

Roads

- Roads

Southern Section Survey Area

- Southern Section Survey Area

Priority Ecological Communities

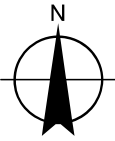
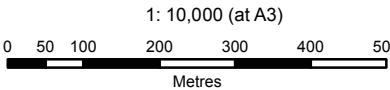
- Priority Ecological Communities

DEC Estates

- DEC Estates

Vegetation Types

VT1S	VT5S	VT9S	VT13S
VT2S	VT6S	VT10S	VT14S
VT3S	VT7S	VT11S	VT15S
VT4S	VT8S	VT12S	HD



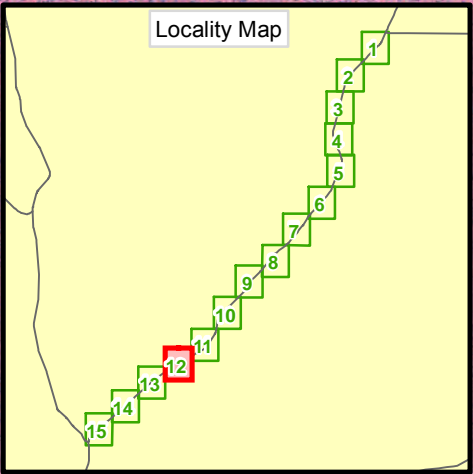
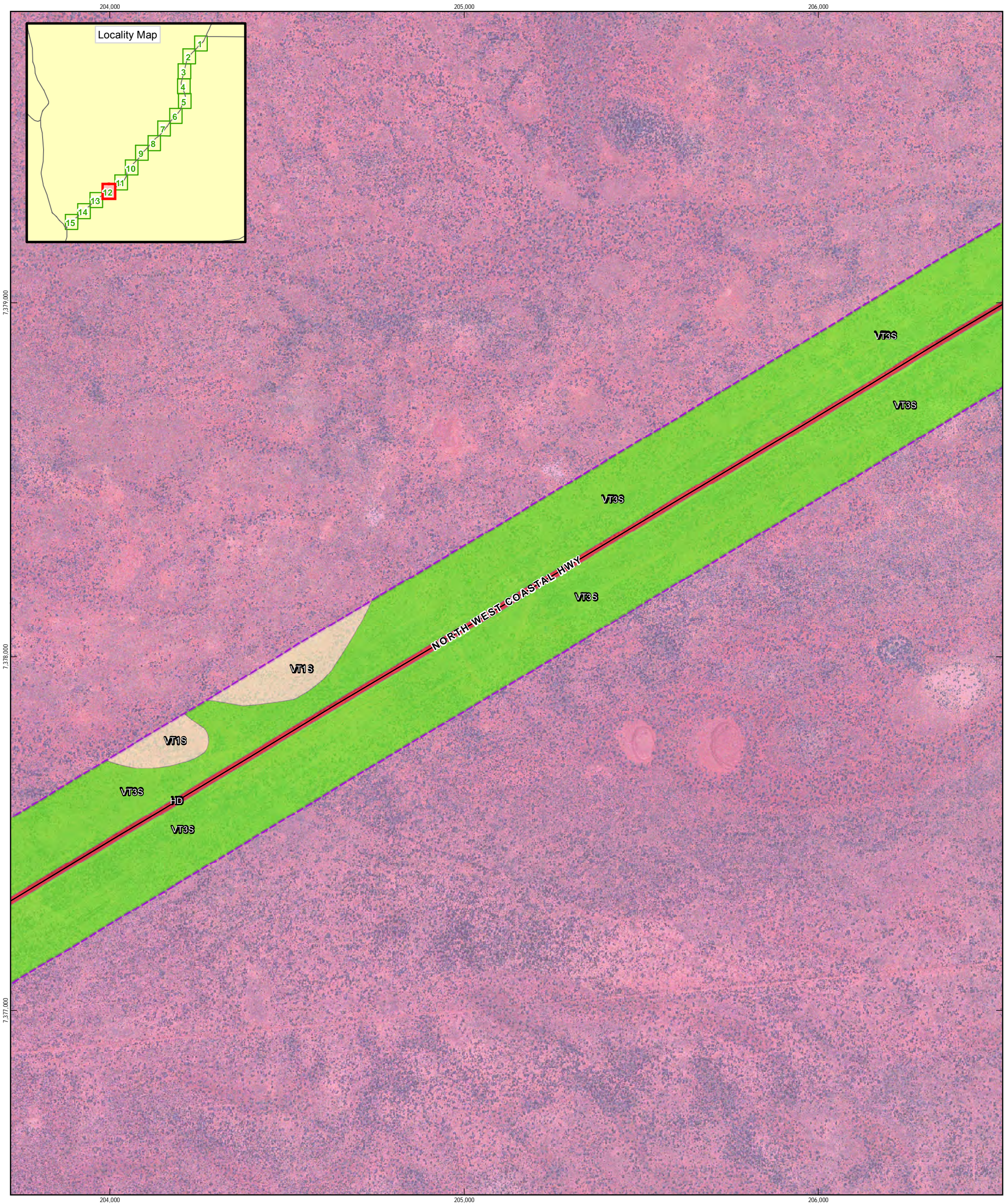
Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number 61-28865
Revision 0
Date 03 Apr 2013

Southern Section Vegetation Types

Sheet 11 of 15

Figure 3c



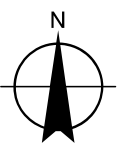
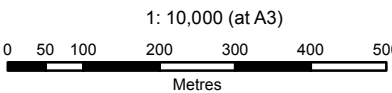
- LEGEND**
- Priority Flora (GHD)**
- Priority 1
 - Priority 2
 - Priority 3
 - Priority 4
 - Priority 5
- Priority Fauna (GHD)**
- Priority Fauna (GHD)
- Roads**
- Roads
- Southern Section Survey Area**
- Southern Section Survey Area
- Priority Ecological Communities**
- Priority Ecological Communities
- DEC Estates**
- DEC Estates

- Vegetation Types**
- VT1S
 - VT2S
 - VT3S
 - VT4S

- VT5S
- VT6S
- VT7S
- VT8S

- VT9S
- VT10S
- VT11S
- VT12S

- VT13S
- VT14S
- VT15S
- HD



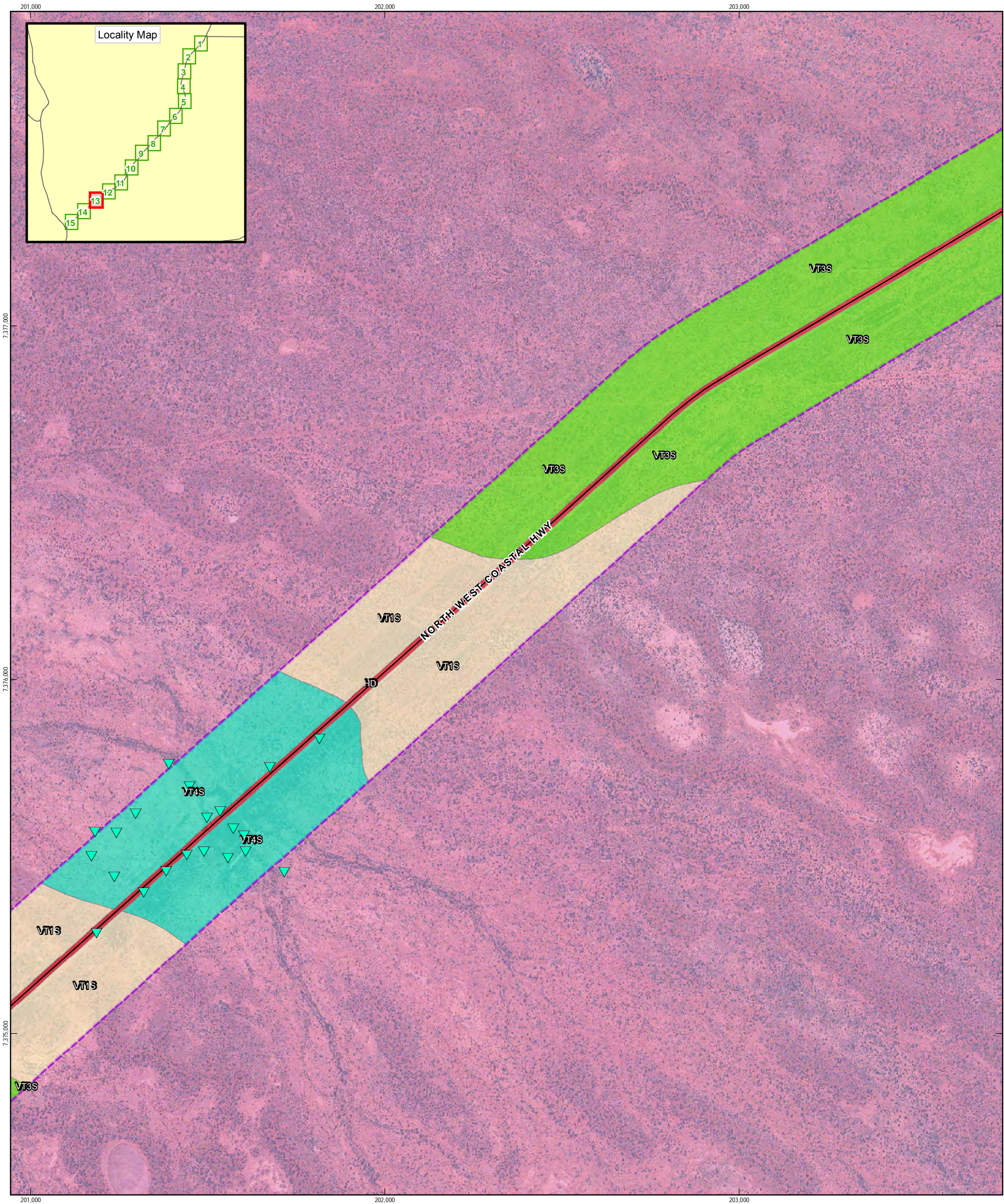
Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number 61-28865
Revision 0
Date 03 Apr 2013

Southern Section Vegetation Types

Sheet 12 of 15

Figure 3c



LEGEND

Priority Flora (GHD)

- Priority 1
- Priority 2
- Priority 3
- Priority 4
- Priority 5

- Priority Fauna (GHD)

- Roads
- Southern Section Survey Area
- Priority Ecological Communities
- DEC Estates

Vegetation Types

- VT1S
- VT2S
- VT3S
- VT4S

- VT5S

- VT6S

- VT7S

- VT8S

- VT9S

- VT10S

- VT11S

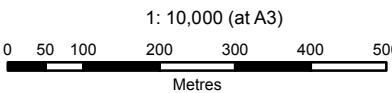
- VT12S

- VT13S

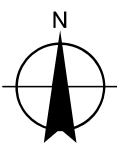
- VT14S

- VT15S

- HD



Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50



Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number 61-28865
Revision 0
Date 03 Apr 2013

Southern Section Vegetation Types

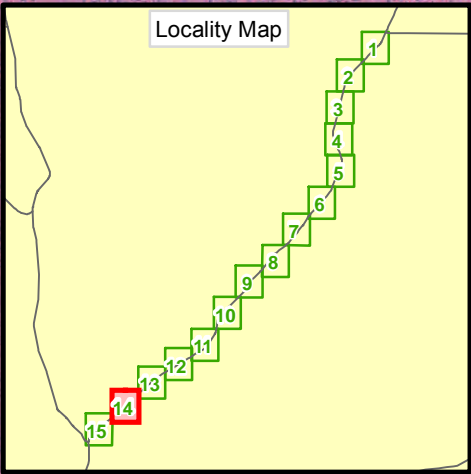
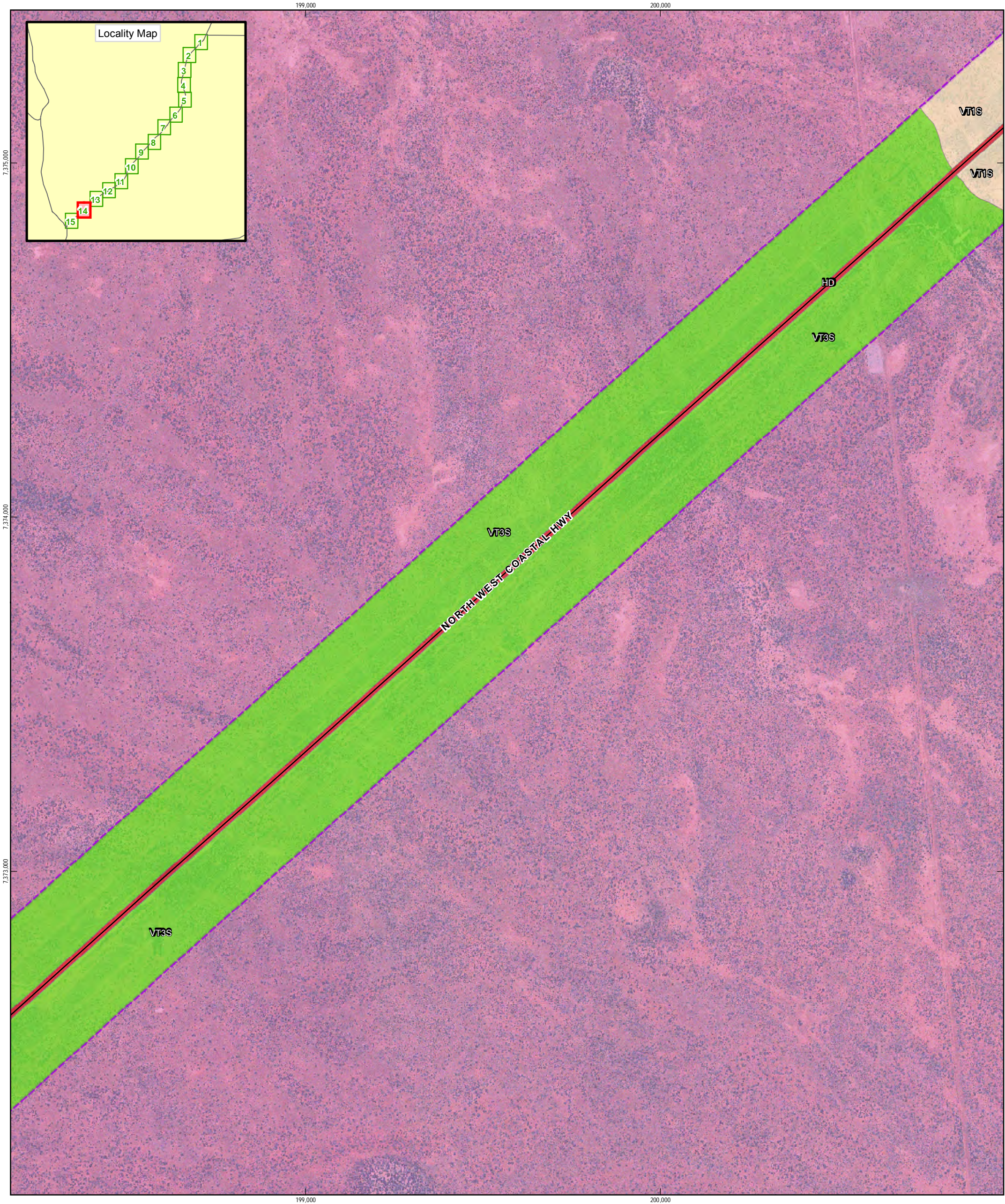
Sheet 13 of 15

Figure 3c

G:\6128865\GIS\Maps\MXD\6128865_G003_Fig3c_VegTypeSouth_Rev0.mxd

© 2013. Whilst every care has been taken to prepare this map, GHD, MRWA, DEC, GA and Landgate make no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and cannot accept liability and responsibility of any kind (whether in contract, tort or otherwise) for any expenses, losses, damages and/or costs (including indirect or consequential damage) which are or may be incurred by any party as a result of the map being inaccurate, incomplete or unsuitable in any way and for any reason.
Data source: Landgate: Mia Mia 2007 Mosaic - 20121115; Barrabiddy 2007 Mosaic - 20121115; MRWA: Roads - 20120528; GHD: Southern Section Survey Area - 20121114; Vegetation Types - 20130128; Priority Flora - 20130201; Priority Fauna - 20130201; DEC: Priority Ecological Communities - 20121129; DEC Estates - 20121219; GA: Topo 250k Series 3 - 2006. Created by: radeleon

239 Adelaide Terrace Perth WA 6004 Australia T 61 8 6222 8222 F 61 8 6222 8555 E permail@ghd.com.au W www.ghd.com.au



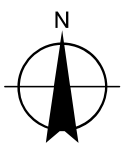
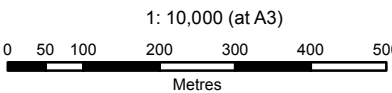
- LEGEND**
- Priority Flora (GHD)**
- Priority 1
 - Priority 2
 - Priority 3
 - Priority 4
 - Priority 5
- Priority Fauna (GHD)**
- Priority Fauna (GHD)
- Roads**
- Roads
- Southern Section Survey Area**
- Southern Section Survey Area
- Priority Ecological Communities**
- Priority Ecological Communities
- DEC Estates**
- DEC Estates

- Vegetation Types**
- VT1S
 - VT2S
 - VT3S
 - VT4S

- VT5S
- VT6S
- VT7S
- VT8S

- VT9S
- VT10S
- VT11S
- VT12S

- VT13S
- VT14S
- VT15S
- HD

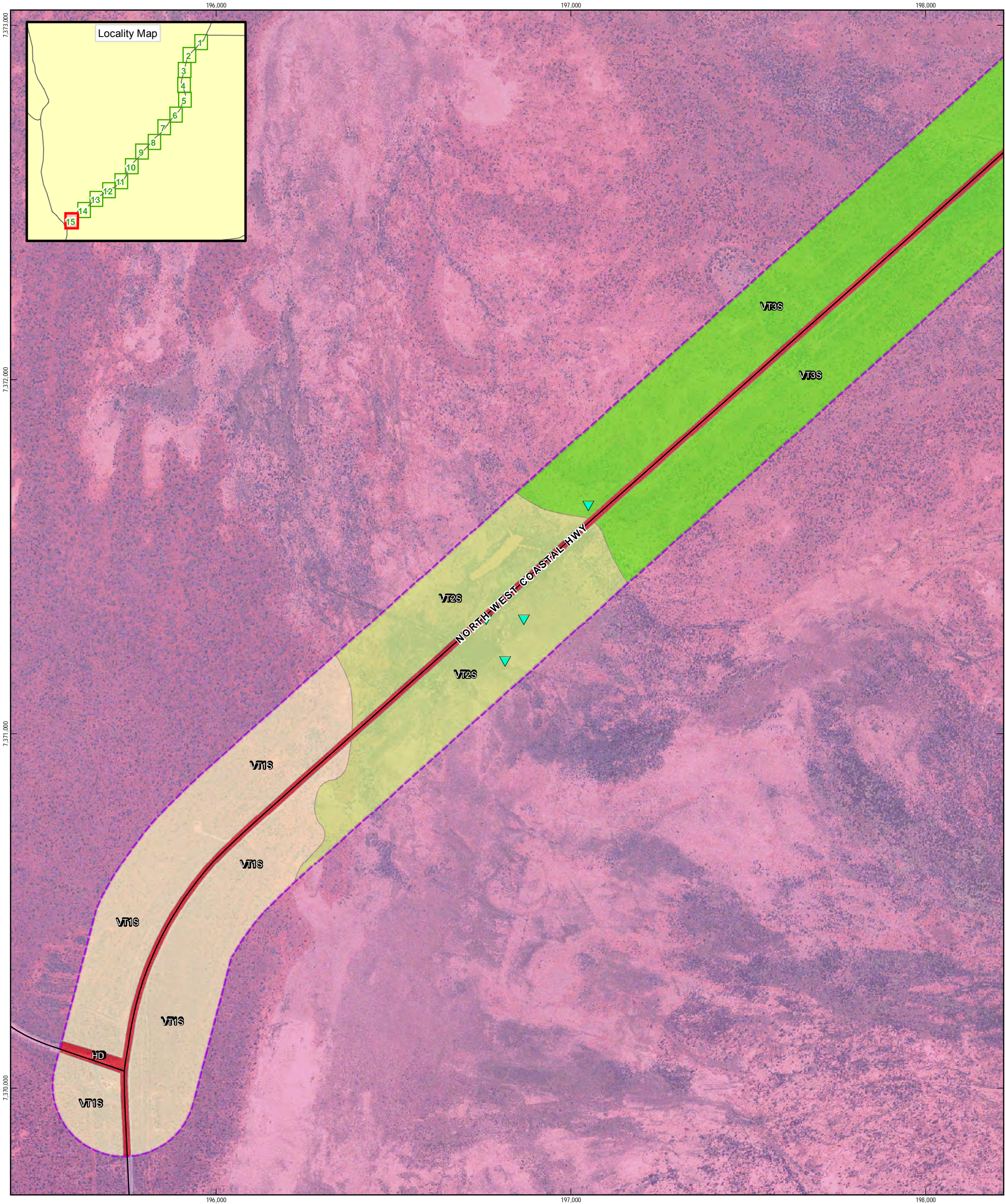


Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number 61-28865
Revision 0
Date 03 Apr 2013

Southern Section Vegetation Types

Sheet 14 of 15
Figure 3c



LEGEND

Priority Flora (GHD)

- Priority 1
- Priority 2
- Priority 3
- Priority 4
- Priority 5

Priority Fauna (GHD)

- Priority Fauna (GHD)

Roads

- Roads

Southern Section Survey Area

- Southern Section Survey Area

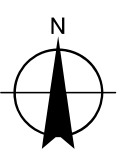
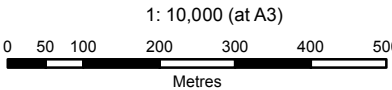
Priority Ecological Communities

- Priority Ecological Communities

DEC Estates

- DEC Estates

Vegetation Types		
VT1S	VT5S	VT9S
VT2S	VT6S	VT10S
VT3S	VT7S	VT11S
VT4S	VT8S	VT12S
		VT13S
		VT14S
		VT15S
		HD



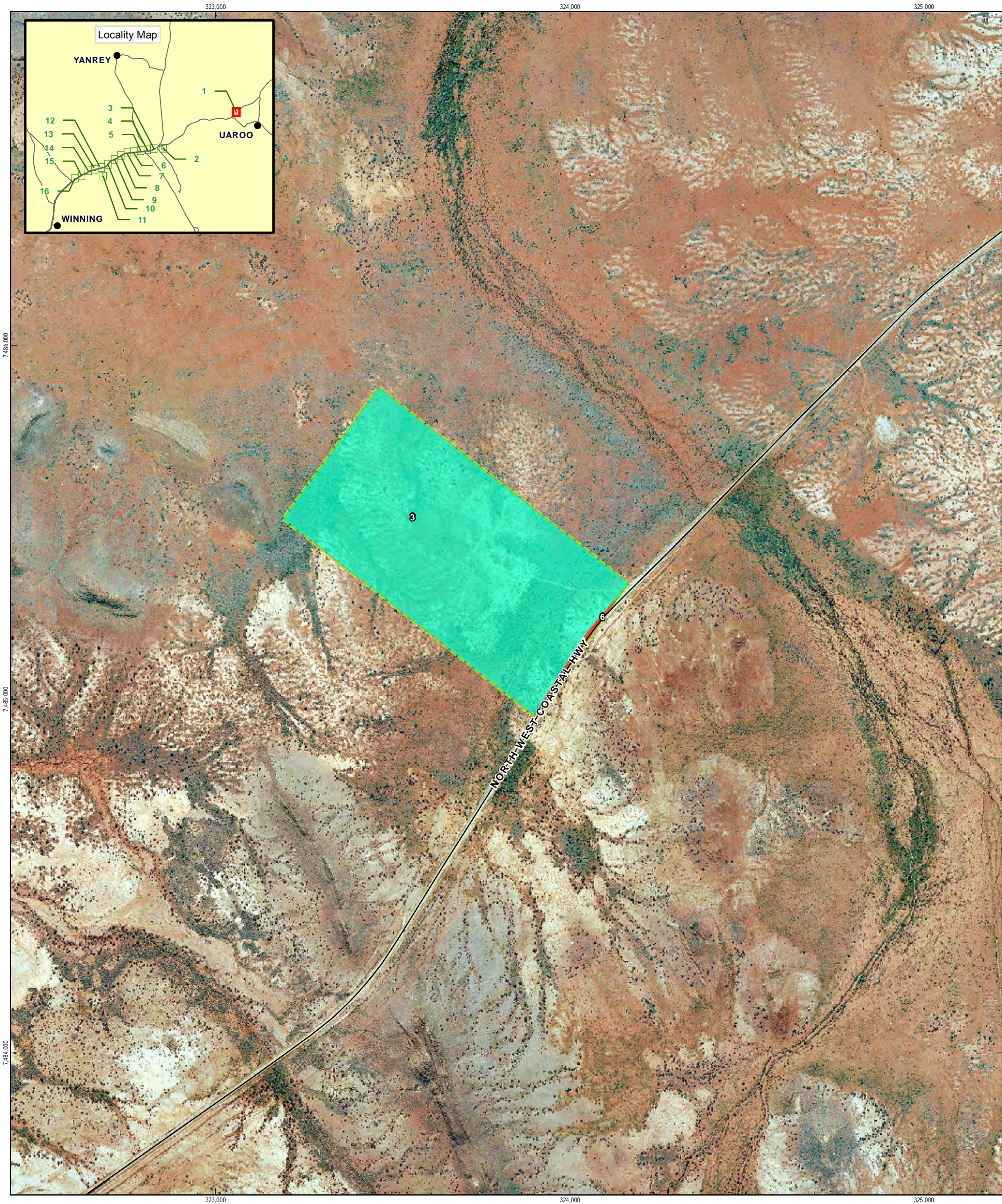
Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number 61-28865
Revision 0
Date 03 Apr 2013

Southern Section Vegetation Types

Sheet 15 of 15

Figure 3c



LEGEND

— Roads

Northern Section Survey Area

Priority Ecological Communities

DEC Estates

Vegetation Conditions (Keighery, 1994)

1. Pristine or Nearly So

1-2

2. Excellent

2-3

3. Very Good

3-4

4. Good

4-5

5. Degraded

5-6

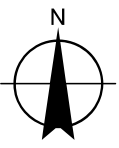
6. Completely Degraded

1: 10,000 (at A3)

0 50 100 200 300 400 500

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50



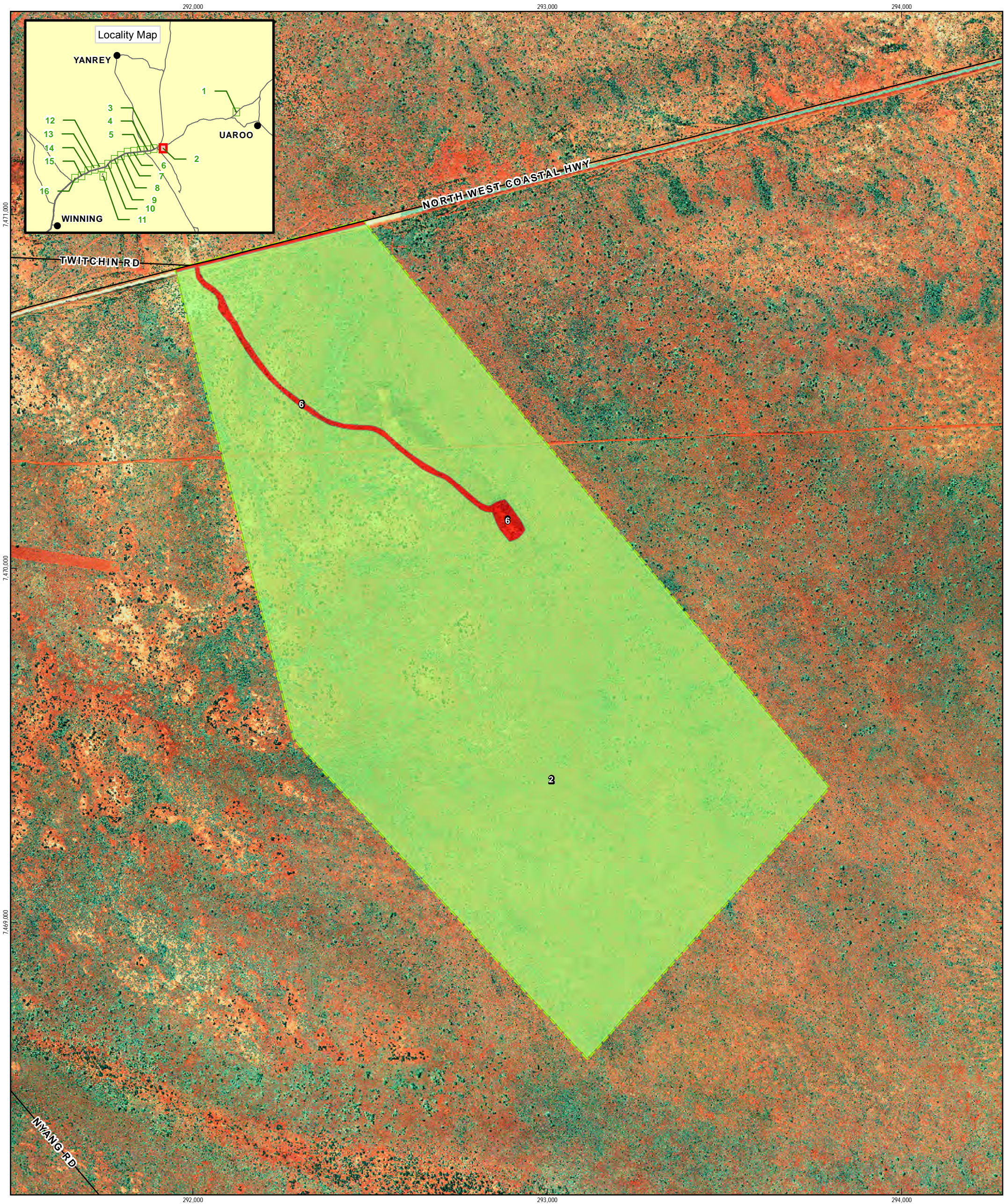
Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number | 61-28865
Revision | 0
Date | 03 Apr 2013

Northern Section Vegetation Conditions

Sheet 1 of 16

Figure 4a



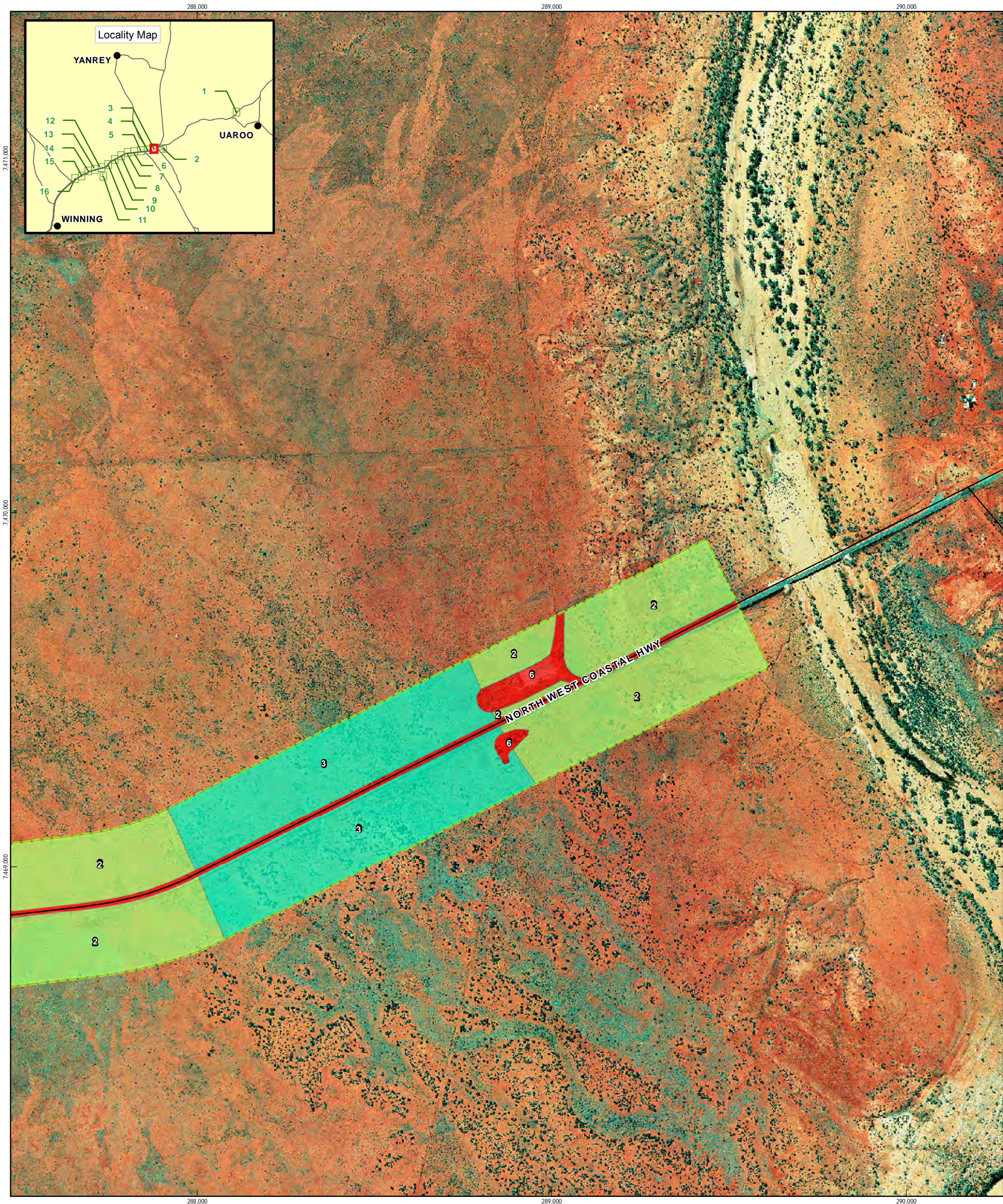
LEGEND

- Roads
- Northern Section Survey Area
- Priority Ecological Communities
- DEC Estates

Vegetation Conditions (Keighery, 1994)

- 1. Pristine or Nearly So
- 1-2
- 2. Excellent
- 2-3
- 3. Very Good

- 3-4
- 4. Good
- 4-5
- 5. Degraded
- 5-6
- 6. Completely Degraded



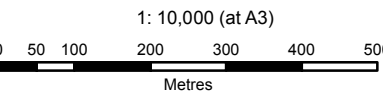
LEGEND

- Roads
- Northern Section Survey Area
- Priority Ecological Communities
- DEC Estates

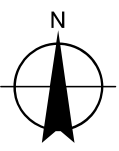
Vegetation Conditions (Keighery, 1994)

- 1. Pristine or Nearly So
- 1-2
- 2. Excellent
- 2-3
- 3. Very Good

- 3-4
- 4. Good
- 4-5
- 5. Degraded
- 5-6
- 6. Completely Degraded



Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50



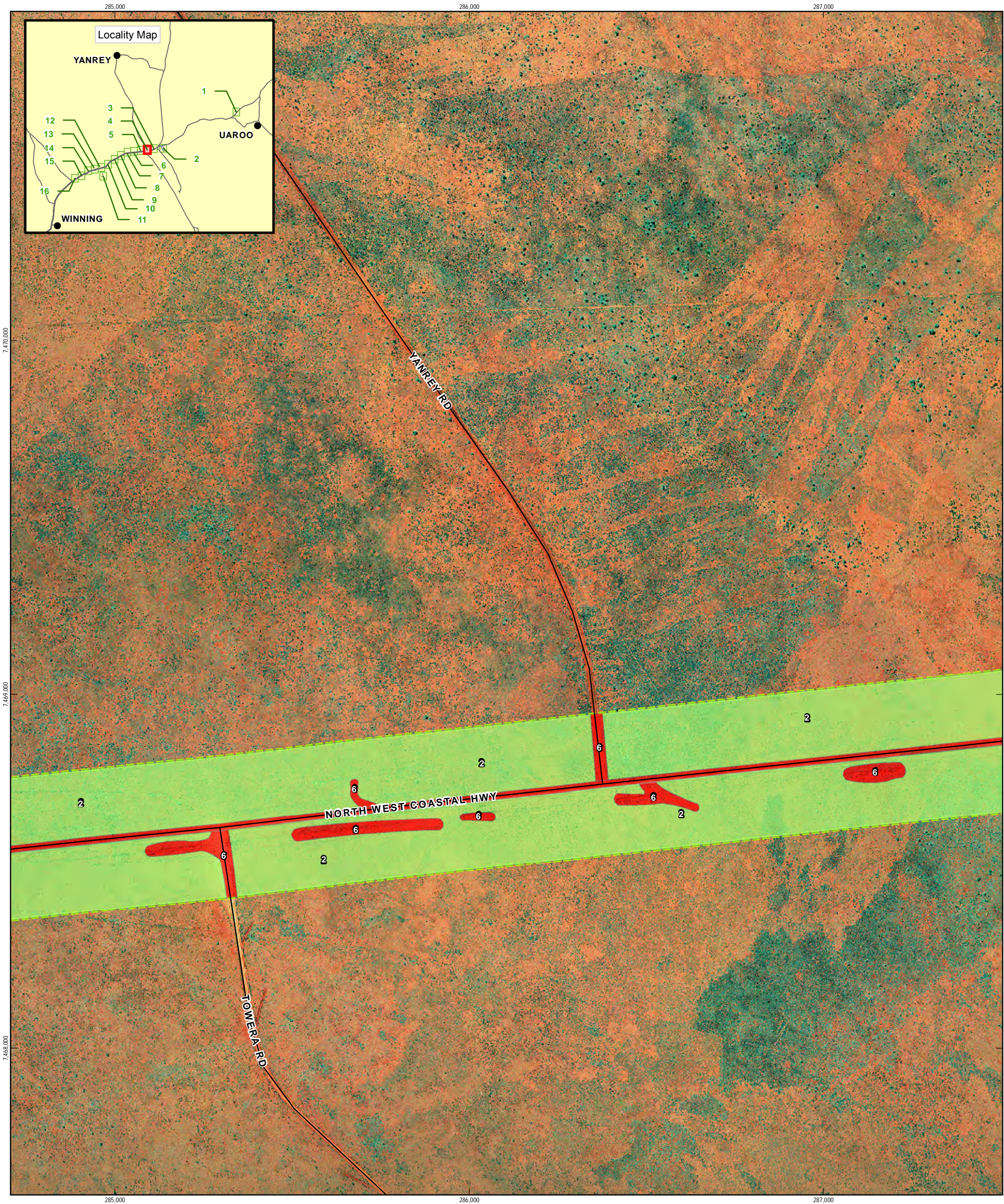
Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number 61-28865
Revision 0
Date 03 Apr 2013

Northern Section Vegetation Conditions

Sheet 3 of 16

Figure 4a



LEGEND

— Roads

Northern Section Survey Area

Priority Ecological Communities

DEC Estates

Vegetation Conditions (Keighery, 1994)

1. Pristine or Nearly So

1-2

2. Excellent

2-3

3. Very Good

3-4

4. Good

4-5

5. Degraded

5-6

6. Completely Degraded

1: 10,000 (at A3)

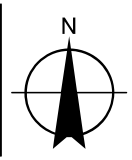
0 50 100 200 300 400 500

Metres

Map Projection: Transverse Mercator

Horizontal Datum: Geocentric Datum of Australia

Grid: Map Grid of Australia 1994, Zone 50



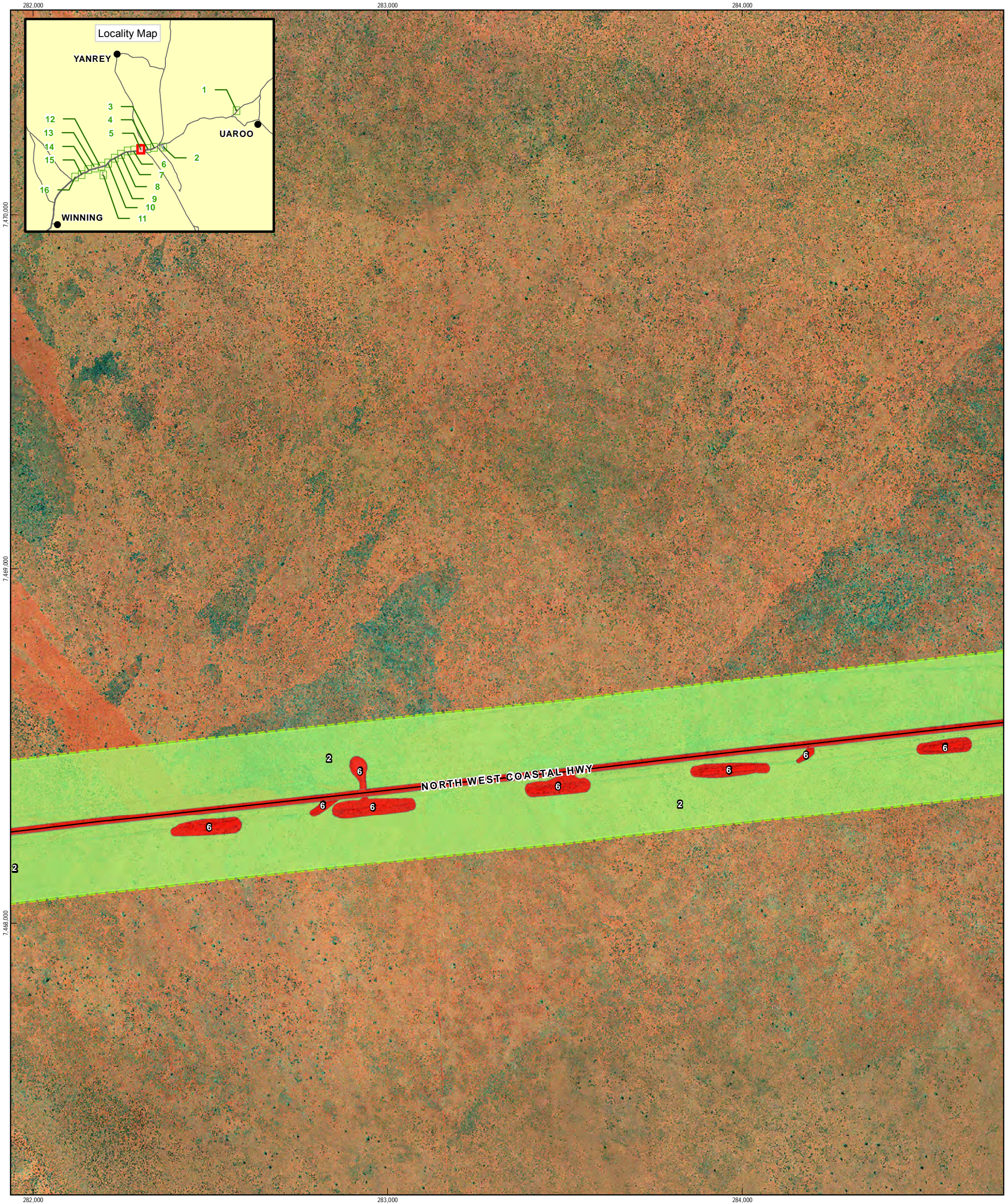
Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number	61-28865
Revision	0
Date	03 Apr 2013

Northern Section Vegetation Conditions

Sheet 4 of 16

Figure 4a



LEGEND

— Roads

Northern Section Survey Area

Priority Ecological Communities

DEC Estates

Vegetation Conditions (Keighery, 1994)

1. Pristine or Nearly So

1-2

2. Excellent

2-3

3. Very Good

3-4

4. Good

4-5

5. Degraded

5-6

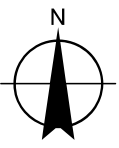
6. Completely Degraded

1: 10,000 (at A3)

0 50 100 200 300 400 500

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50



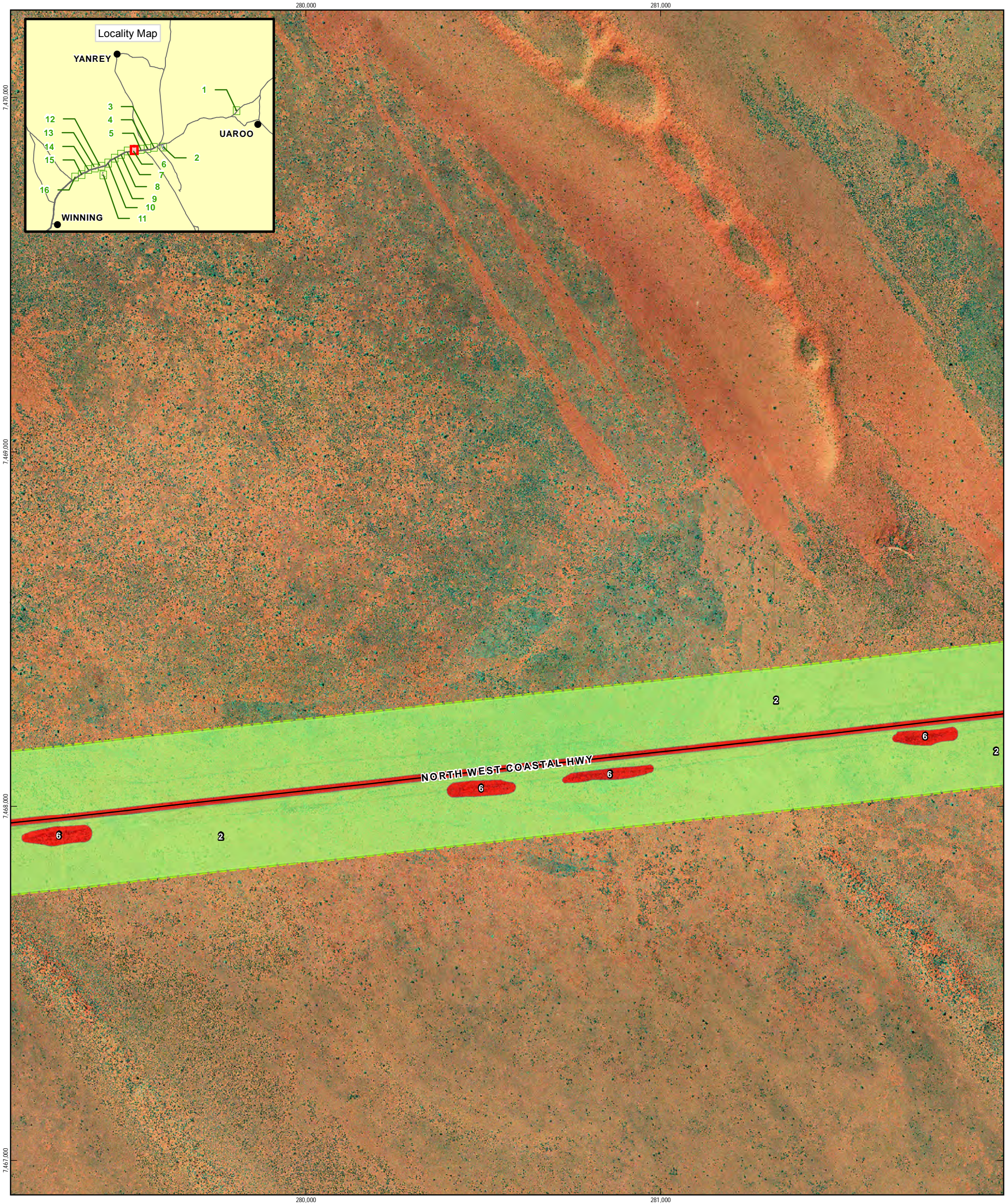
Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number | 61-28865
Revision | 0
Date | 03 Apr 2013

Northern Section Vegetation Conditions

Sheet 5 of 16

Figure 4a



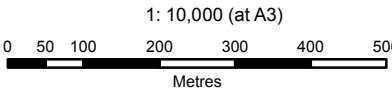
LEGEND

- Roads
- Northern Section Survey Area
- Priority Ecological Communities
- DEC Estates

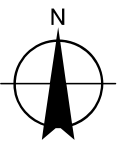
Vegetation Conditions (Keighery, 1994)

- 1. Pristine or Nearly So
- 1-2
- 2. Excellent
- 2-3
- 3. Very Good

- 3-4
- 4. Good
- 4-5
- 5. Degraded
- 5-6
- 6. Completely Degraded



Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50



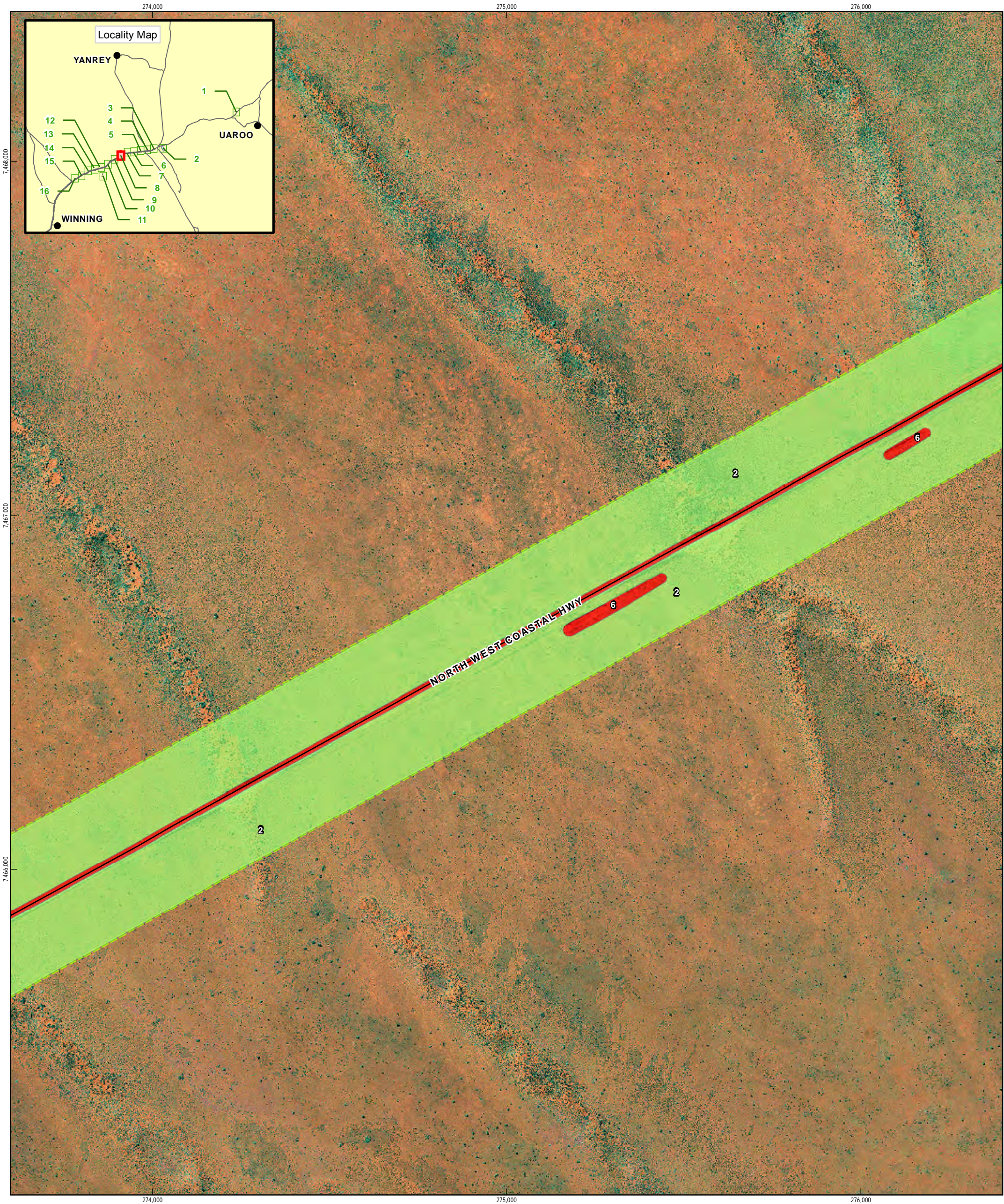
Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number 61-28865
Revision 0
Date 03 Apr 2013

Northern Section Vegetation Conditions

Sheet 6 of 16

Figure 4a



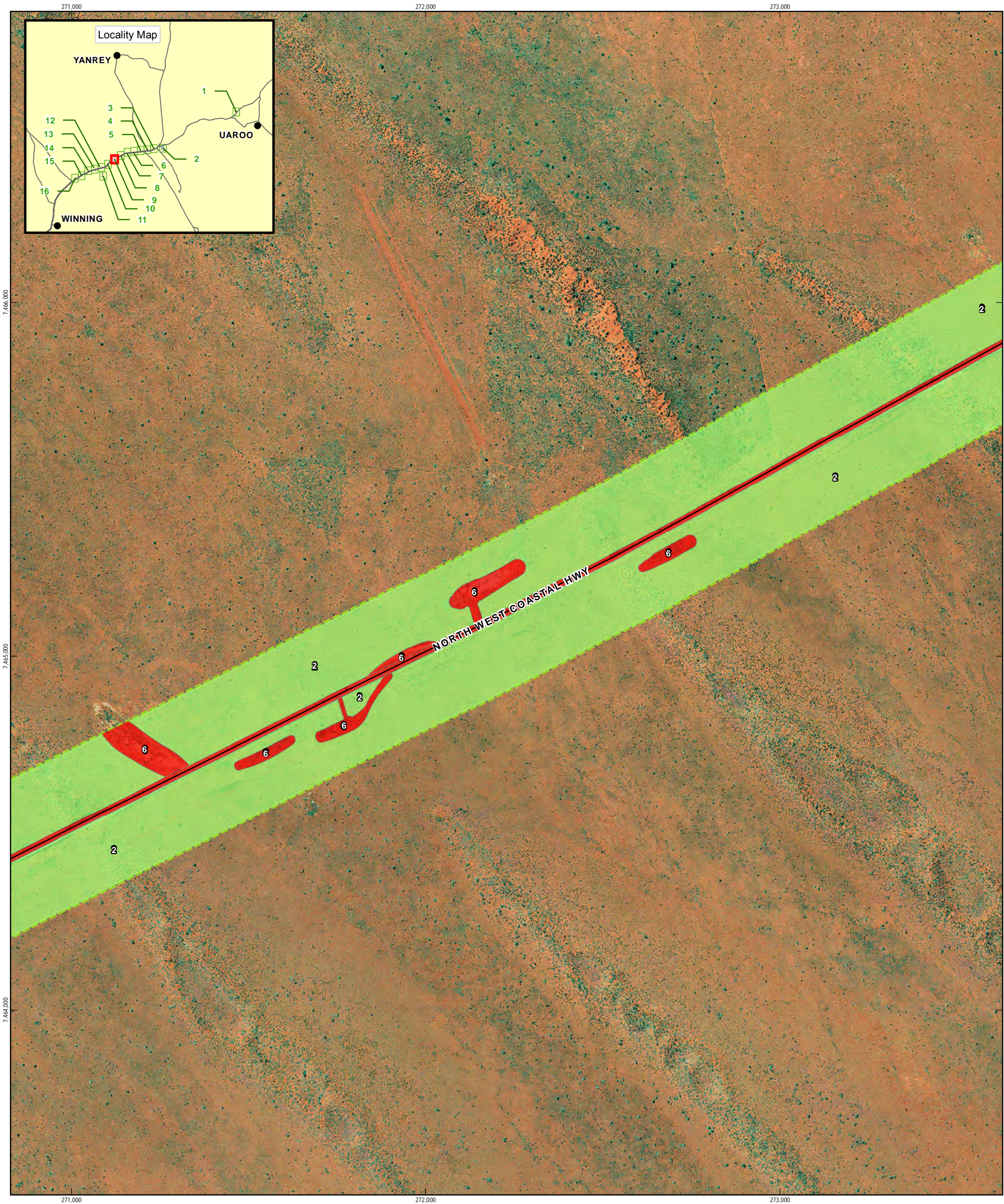
LEGEND

- Roads
- Northern Section Survey Area
- Priority Ecological Communities
- DEC Estates

Vegetation Conditions (Keighery, 1994)

- 1. Pristine or Nearly So
- 1-2
- 2. Excellent
- 2-3
- 3. Very Good

- 3-4
- 4. Good
- 4-5
- 5. Degraded
- 5-6
- 6. Completely Degraded



LEGEND

— Roads

Northern Section Survey Area

Priority Ecological Communities

DEC Estates

Vegetation Conditions (Keighery, 1994)

1. Pristine or Nearly So

1-2

2. Excellent

2-3

3. Very Good

3-4

4. Good

4-5

5. Degraded

5-6

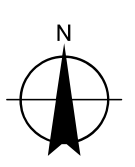
6. Completely Degraded

1: 10,000 (at A3)

0 50 100 200 300 400 500

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50

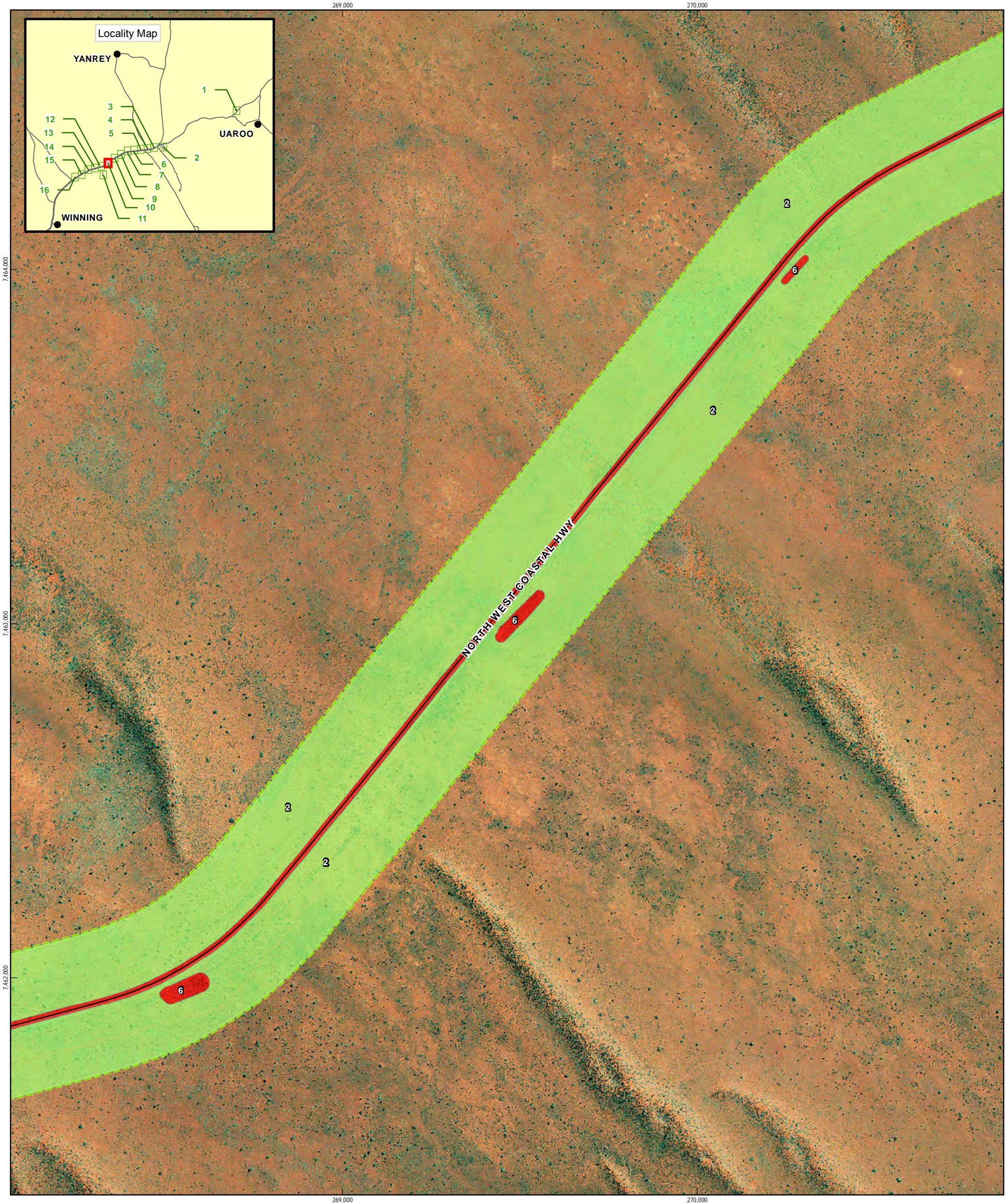


Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number | 61-28865
Revision | 0
Date | 03 Apr 2013

Sheet 9 of 16

Figure 4a



LEGEND

— Roads

Northern Section Survey Area

Priority Ecological Communities

DEC Estates

Vegetation Conditions (Keighery, 1994)

1. Pristine or Nearly So

1-2

2. Excellent

2-3

3. Very Good

3-4

4. Good

4-5

5. Degraded

5-6

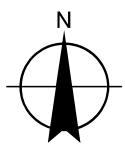
6. Completely Degraded

1: 10,000 (at A3)

0 50 100 200 300 400 500

Metres

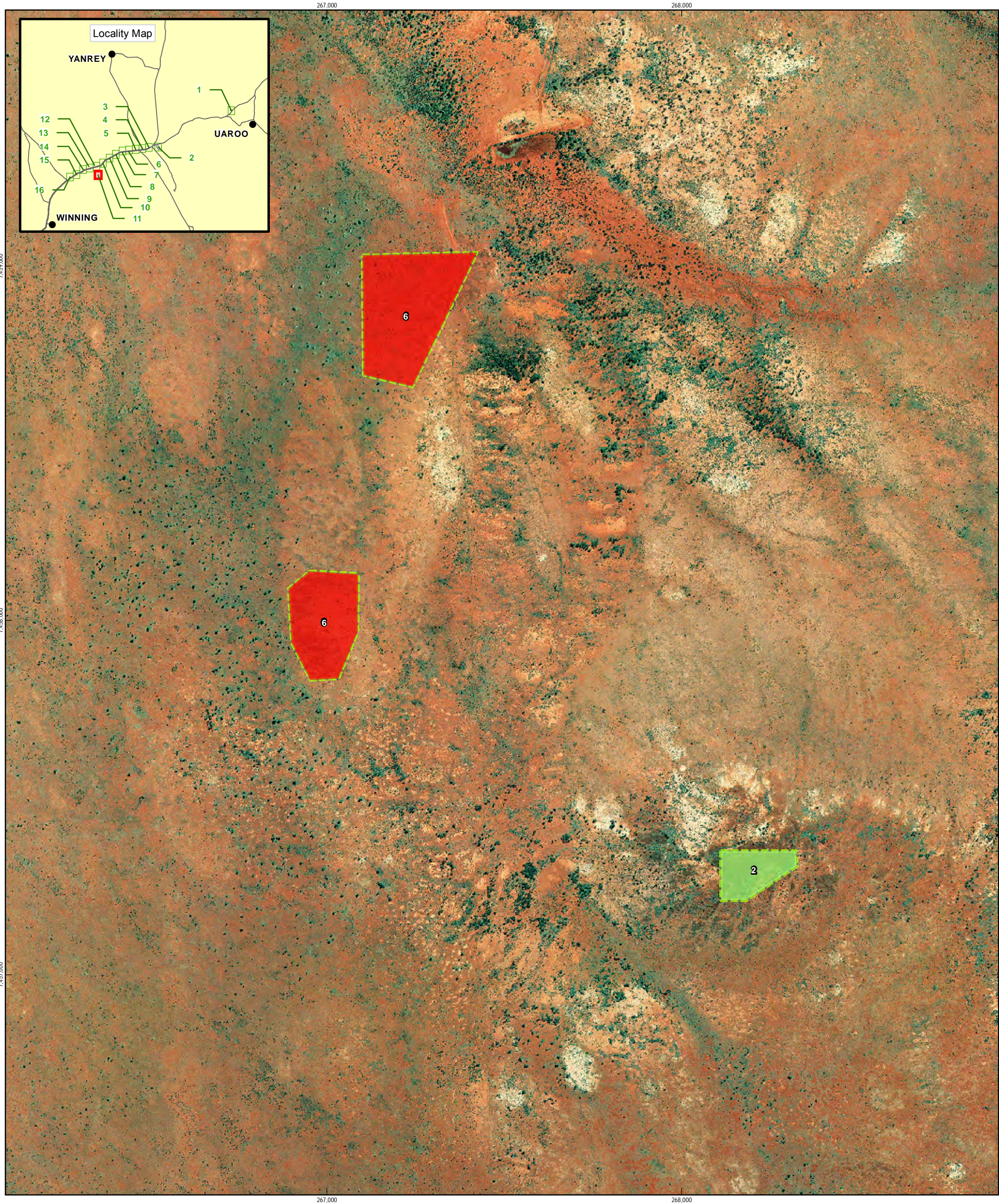
Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50



Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number	61-28865
Revision	0
Date	03 Apr 2013

Northern Section Vegetation Conditions



LEGEND

— Roads

Northern Section Survey Area

Priority Ecological Communities

DEC Estates

Vegetation Conditions (Keighery, 1994)

1. Pristine or Nearly So

1-2

2. Excellent

2-3

3. Very Good

3-4

4. Good

4-5

5. Degraded

5-6

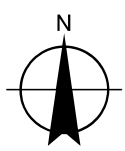
6. Completely Degraded

1: 10,000 (at A3)

0 50 100 200 300 400 500

Metres

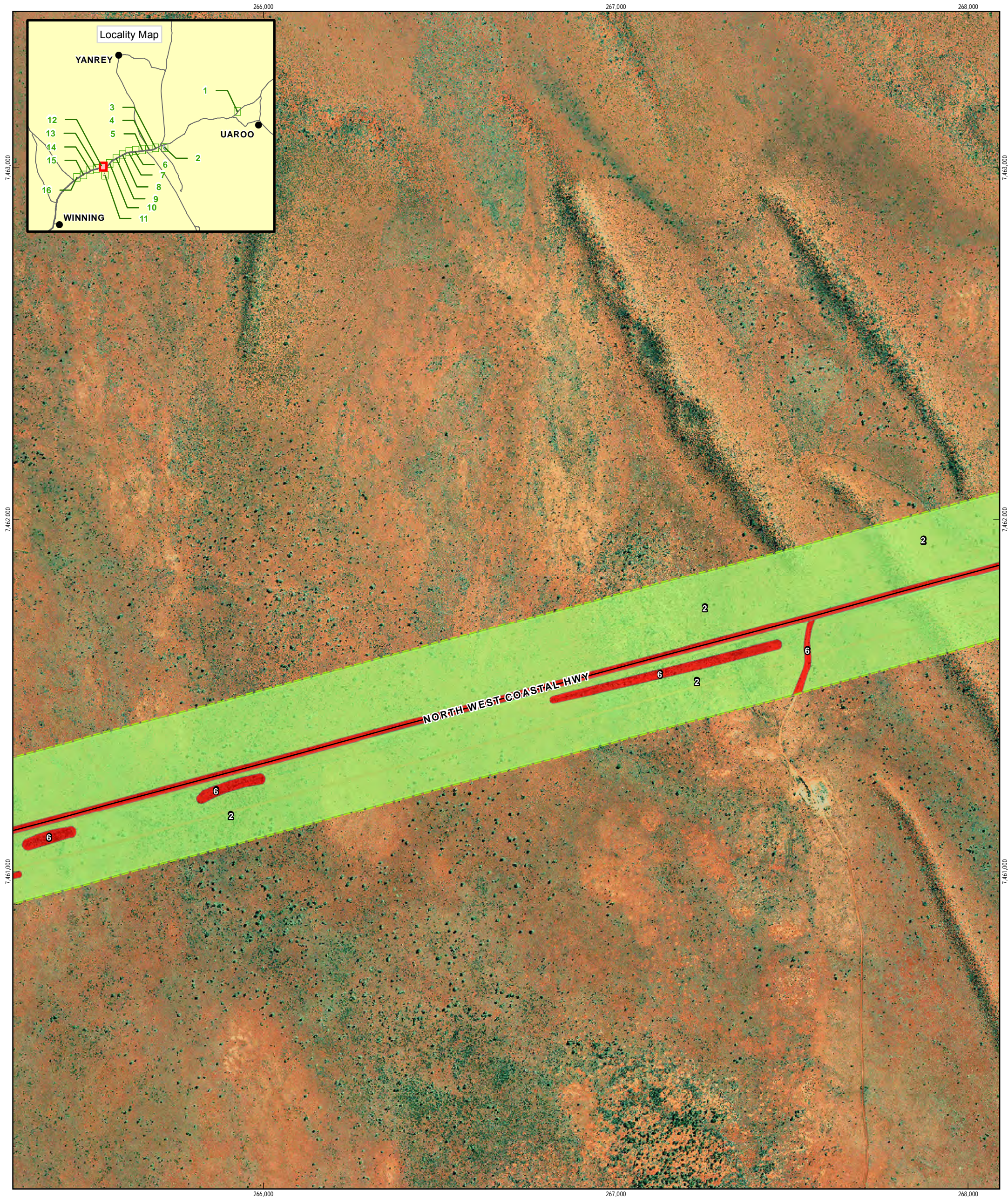
Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50



Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number	61-28865
Revision	0
Date	03 Apr 2013

Northern Section Vegetation Conditions



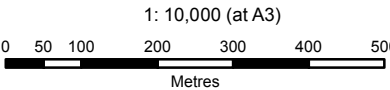
LEGEND

- Roads
- Northern Section Survey Area
- Priority Ecological Communities
- DEC Estates

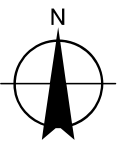
Vegetation Conditions (Keighery, 1994)

- 1. Pristine or Nearly So
- 1-2
- 2. Excellent
- 2-3
- 3. Very Good

- 3-4
- 4. Good
- 4-5
- 5. Degraded
- 5-6
- 6. Completely Degraded



Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50



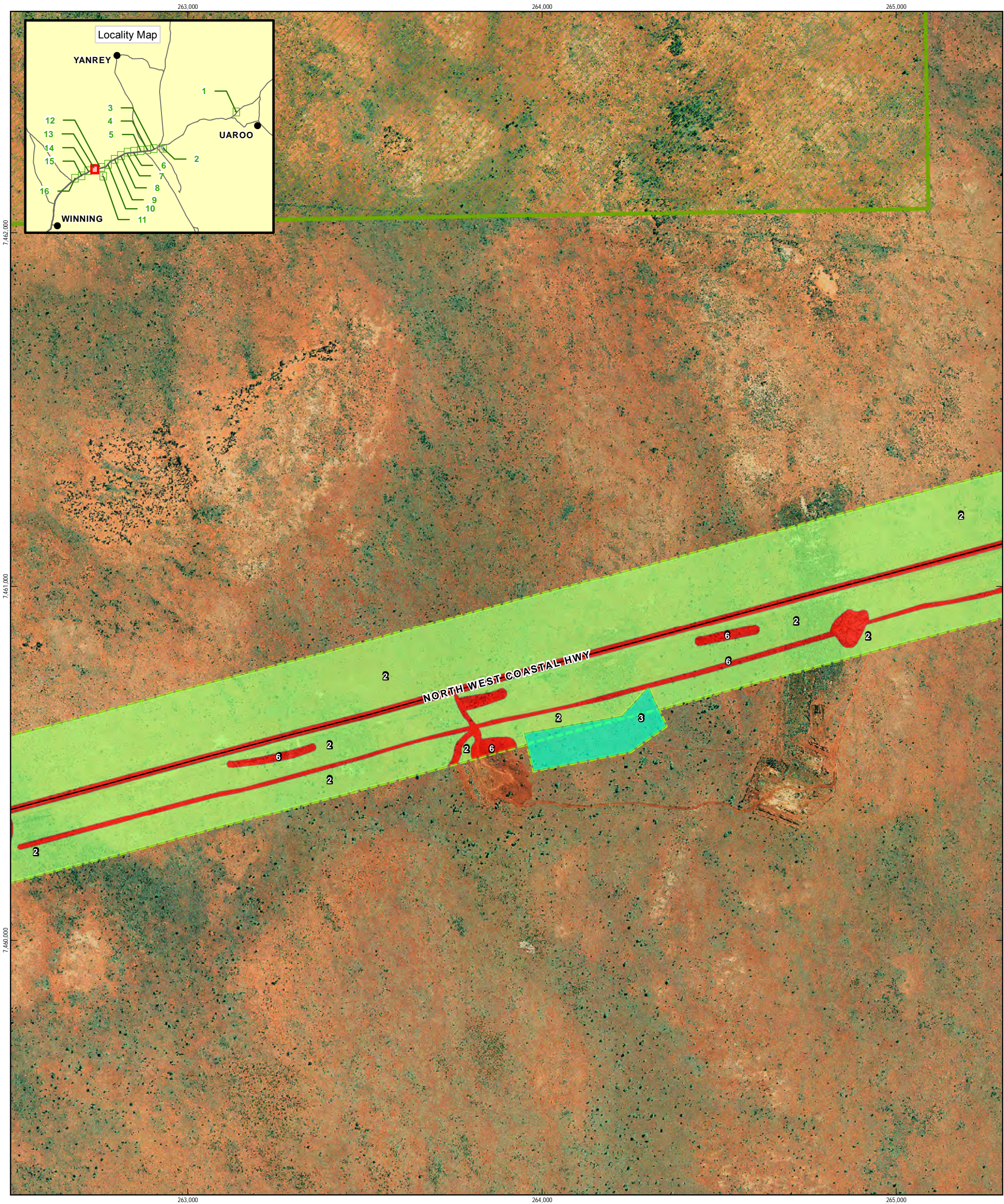
Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number 61-28865
Revision 0
Date 03 Apr 2013

Northern Section Vegetation Conditions

Sheet 12 of 16

Figure 4a



LEGEND

— Roads

Northern Section Survey Area

Priority Ecological Communities

DEC Estates

Vegetation Conditions (Keighery, 1994)

1. Pristine or Nearly So

1-2

2. Excellent

2-3

3. Very Good

3-4

4. Good

4-5

5. Degraded

5-6

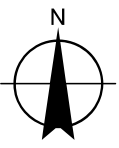
6. Completely Degraded

1: 10,000 (at A3)

0 50 100 200 300 400 500

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50

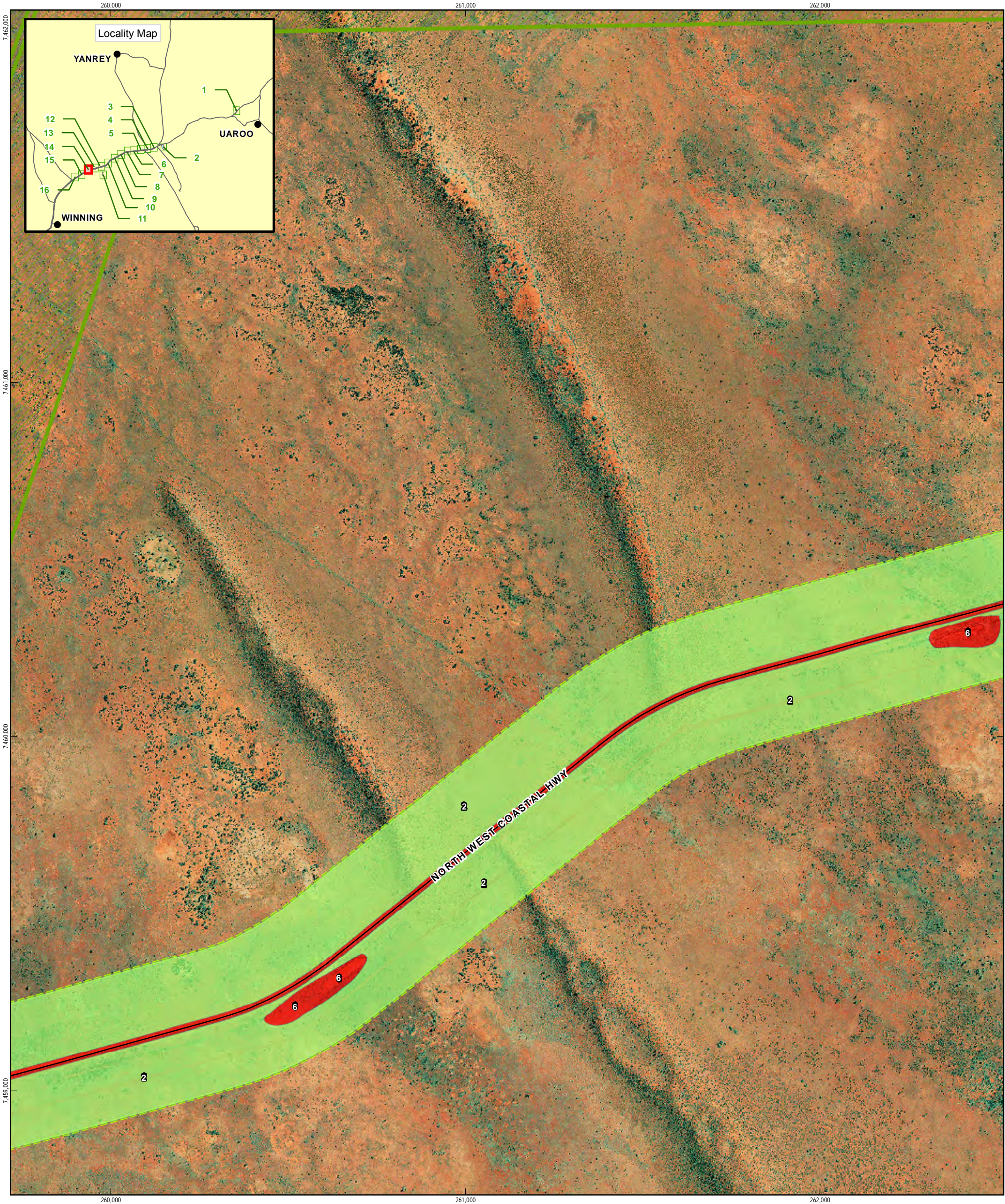


Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number 61-28865
Revision 0
Date 03 Apr 2013

Northern Section Vegetation Conditions

Sheet 13 of 16
Figure 4a



LEGEND

— Roads

Northern Section Survey Area

Priority Ecological Communities

DEC Estates

Vegetation Conditions (Keighery, 1994)

1. Pristine or Nearly So

1-2

2. Excellent

2-3

3. Very Good

3-4

4. Good

4-5

5. Degraded

5-6

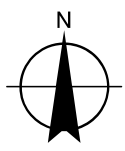
6. Completely Degraded

1: 10,000 (at A3)

0 50 100 200 300 400 500

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50

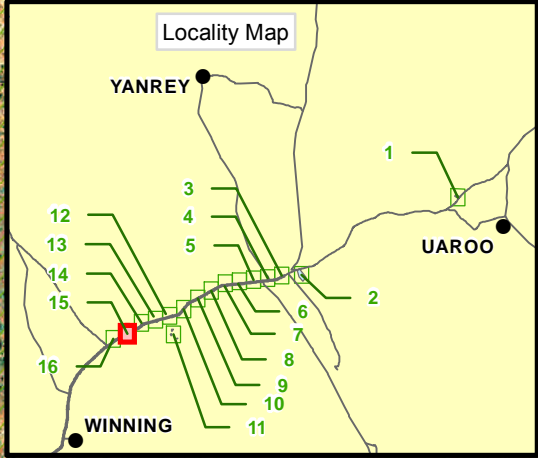
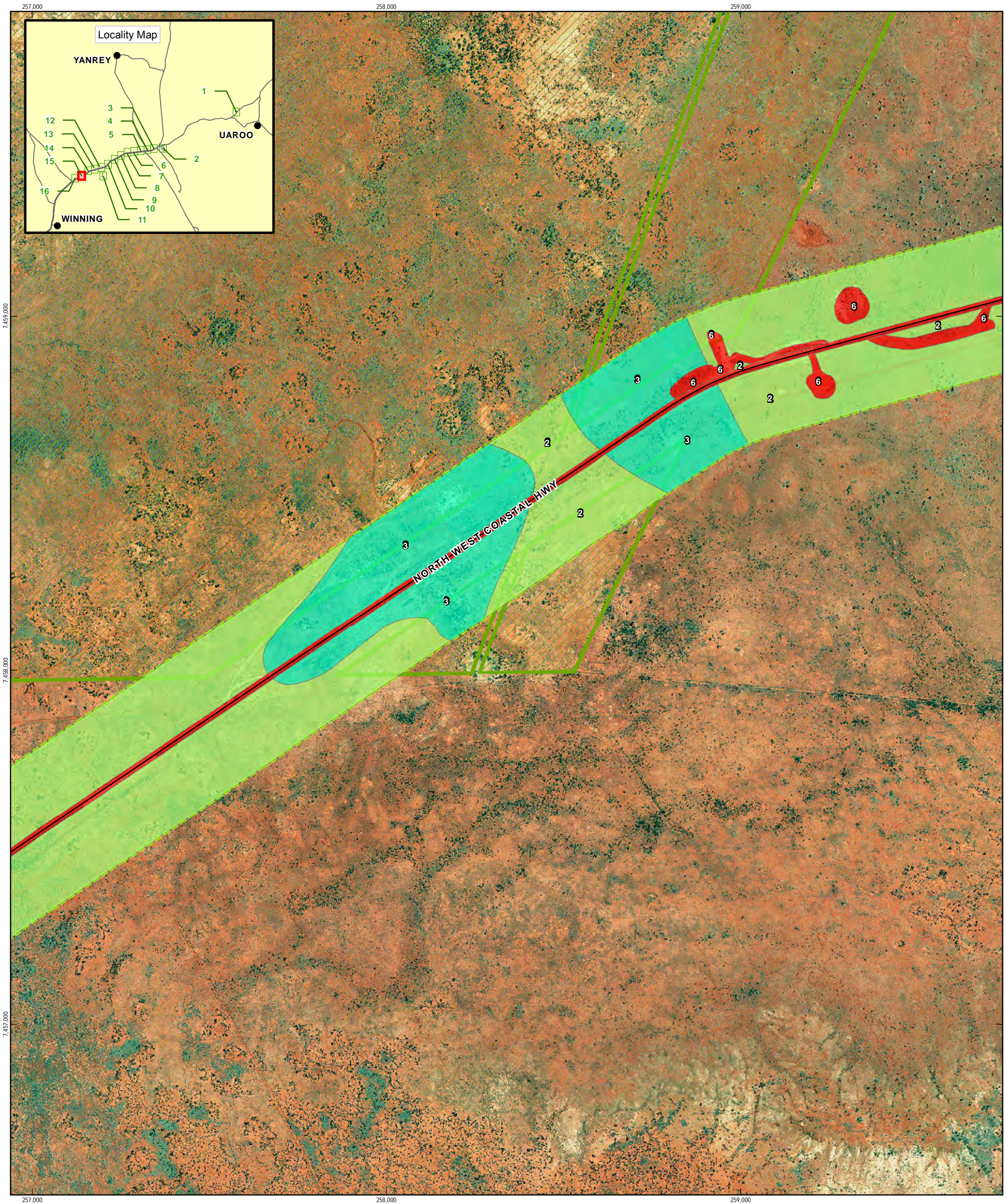


Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number | 61-28865
Revision | 0
Date | 03 Apr 2013

Northern Section Vegetation Conditions

Sheet 14 of 16
Figure 4a



LEGEND

— Roads

Northern Section Survey Area

Priority Ecological Communities

DEC Estates

Vegetation Conditions (Keighery, 1994)

1. Pristine or Nearly So

1-2

2. Excellent

2-3

3. Very Good

3-4

4. Good

4-5

5. Degraded

5-6

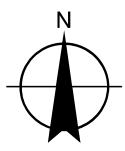
6. Completely Degraded

1: 10,000 (at A3)

0 50 100 200 300 400 500

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50

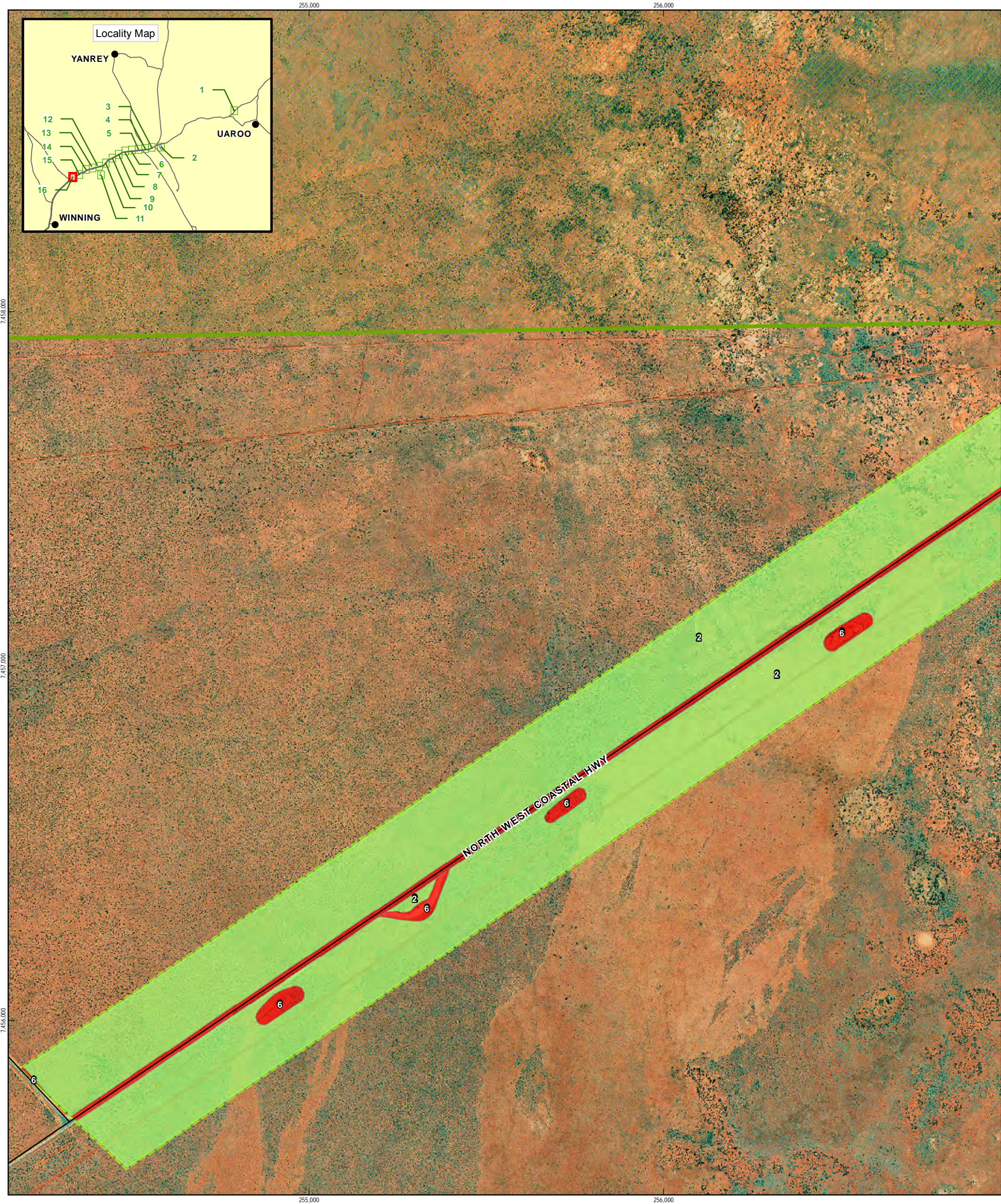


Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number | 61-28865
Revision | 0
Date | 03 Apr 2013

Northern Section Vegetation Conditions

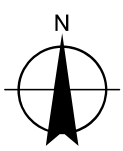
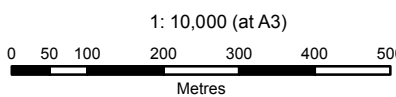
Sheet 15 of 16
Figure 4a



LEGEND
— Roads
 Northern Section Survey Area
 Priority Ecological Communities
 DEC Estates

Vegetation Conditions (Keighery, 1994)
 1. Pristine or Nearly So
 1-2
 2. Excellent
 2-3
 3. Very Good

3-4
 4. Good
 4-5
 5. Degraded
 5-6
 6. Completely Degraded



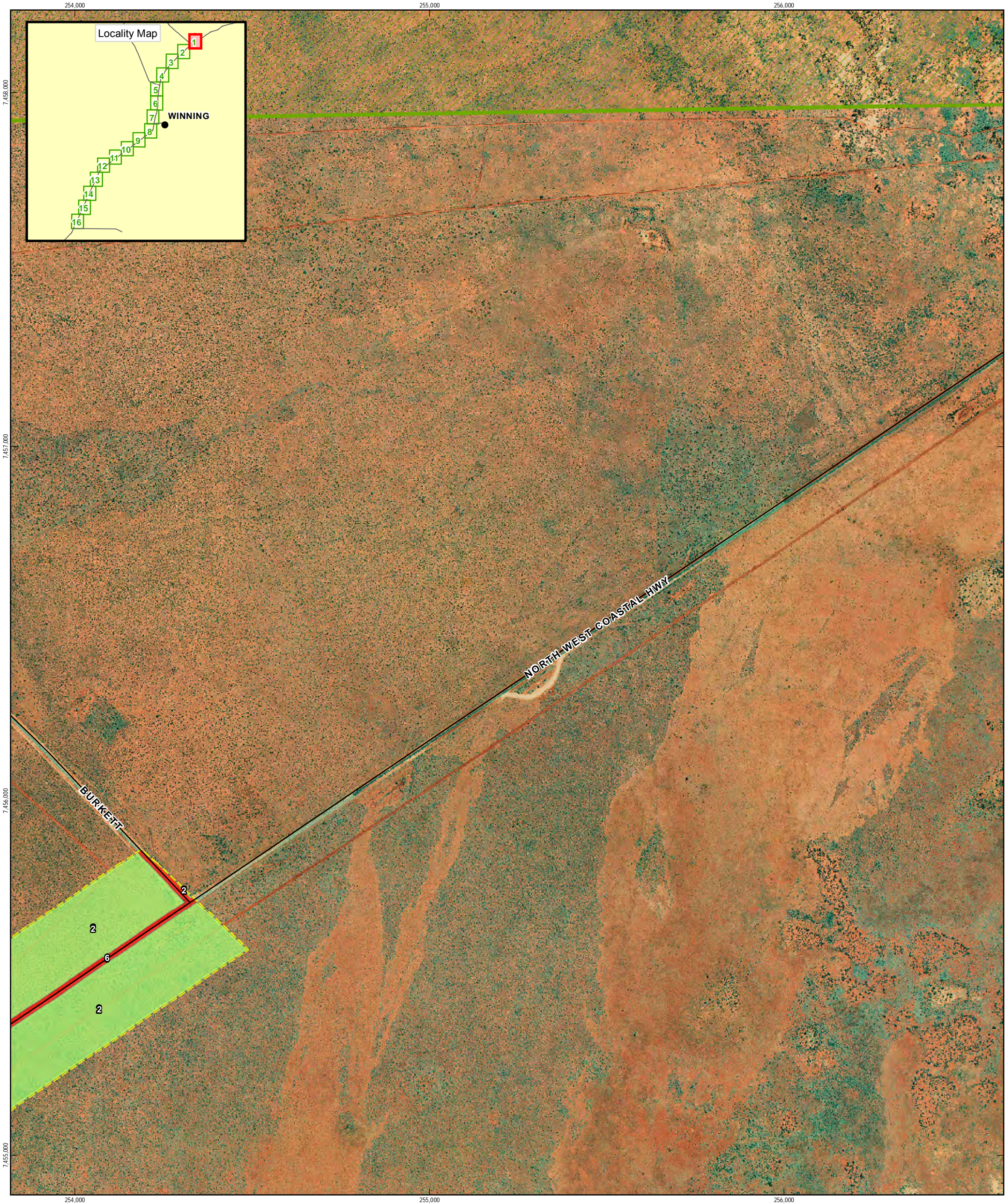
Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number	61-28865
Revision	0
Date	03 Apr 2013

Northern Section Vegetation Conditions

Sheet 16 of 16

Figure 4a



LEGEND

— Roads

▭ Middle Section Survey Area

▭ Priority Ecological Communities

▭ DEC Estates

Vegetation Conditions (Keighery, 1994)

1. Pristine or Nearly So

1-2

2. Excellent

2-3

3. Very Good

3-4

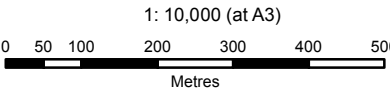
4. Good

4-5

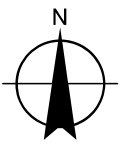
5. Degraded

5-6

6. Completely Degraded



Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50



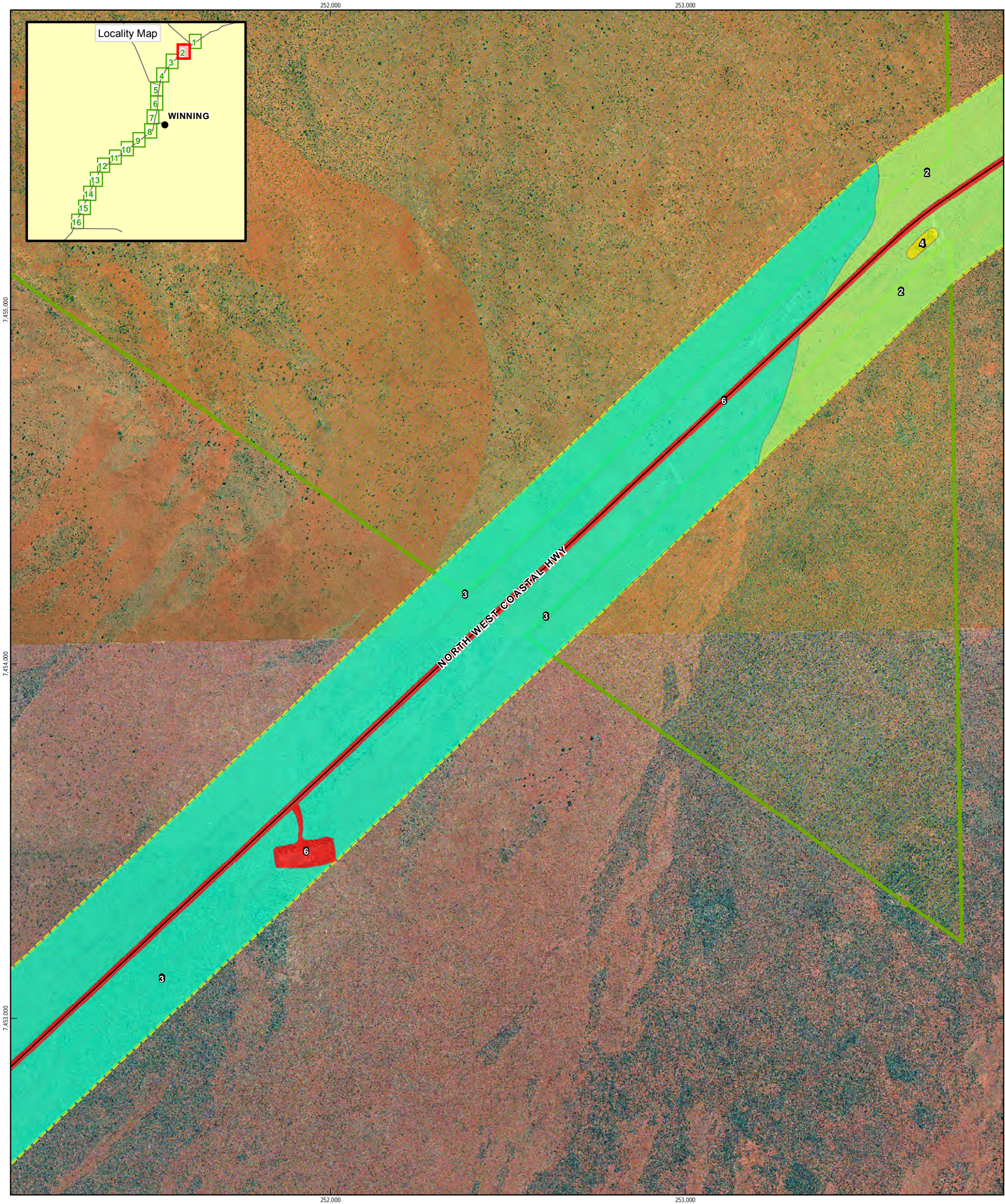
Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number | 61-28865
Revision | 0
Date | 03 Apr 2013

Middle Section Vegetation Conditions

Sheet 1 of 16

Figure 4b



LEGEND

— Roads

▭ Middle Section Survey Area

▭ Priority Ecological Communities

▨ DEC Estates

Vegetation Conditions (Keighery, 1994)

1. Pristine or Nearly So

1-2

2. Excellent

2-3

3. Very Good

3-4

4. Good

4-5

5. Degraded

5-6

6. Completely Degraded

1: 10,000 (at A3)

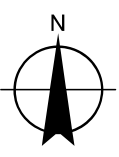
0 50 100 200 300 400 500

Metres

Map Projection: Transverse Mercator

Horizontal Datum: Geocentric Datum of Australia

Grid: Map Grid of Australia 1994, Zone 50



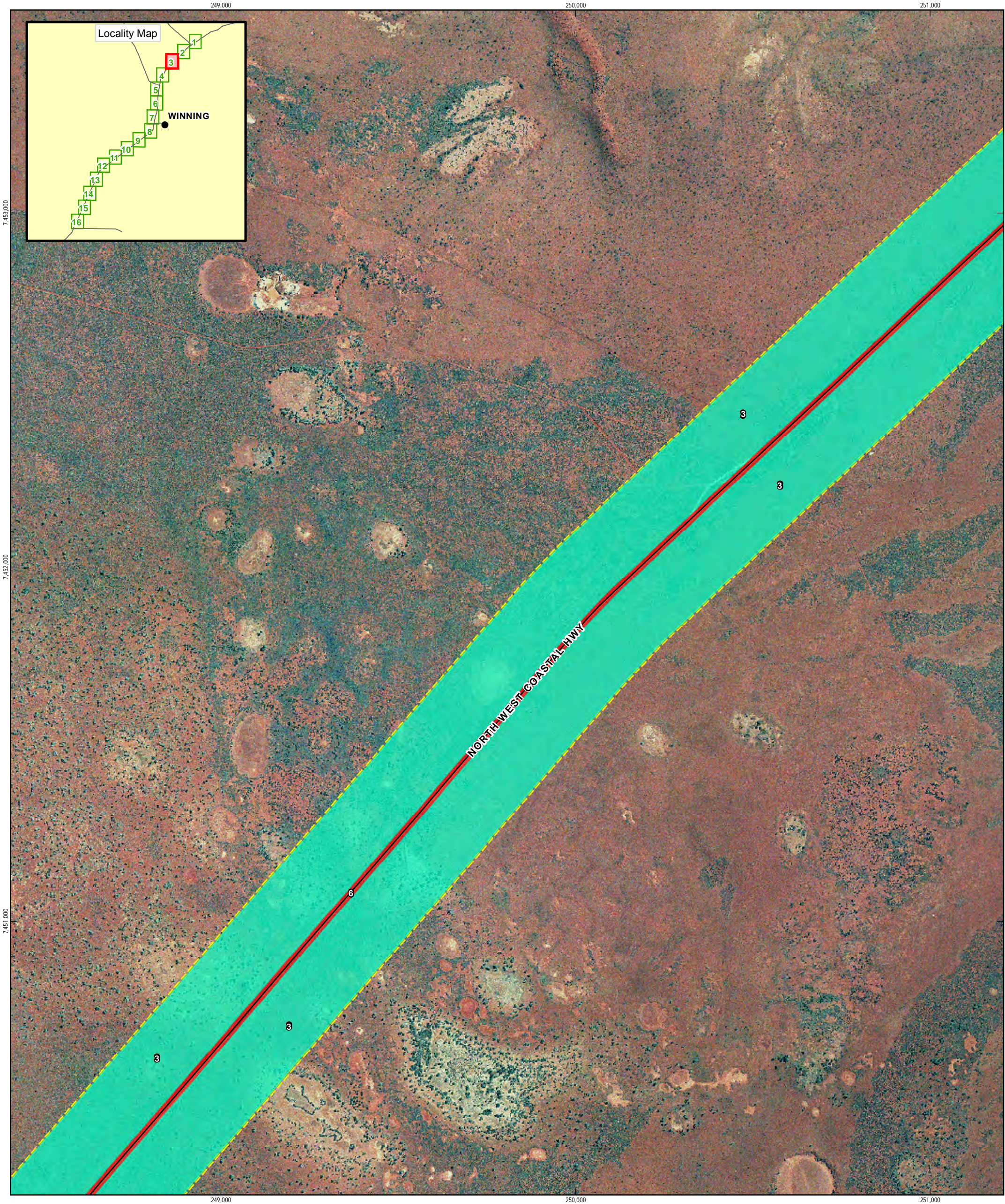
Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number 61-28865
Revision 0
Date 03 Apr 2013

Middle Section Vegetation Conditions

Sheet 2 of 16

Figure 4b



LEGEND

— Roads

▭ Middle Section Survey Area

▭ Priority Ecological Communities

▭ DEC Estates

Vegetation Conditions (Keighery, 1994)

1. Pristine or Nearly So	3-4
1-2	4. Good
2. Excellent	4-5
2-3	5. Degraded
3. Very Good	5-6
	6. Completely Degraded

1: 10,000 (at A3)

0 50 100 200 300 400 500

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50



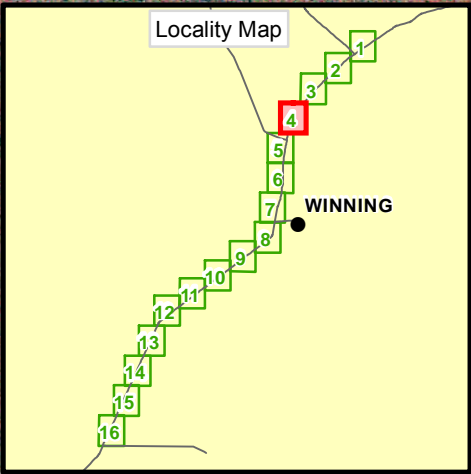
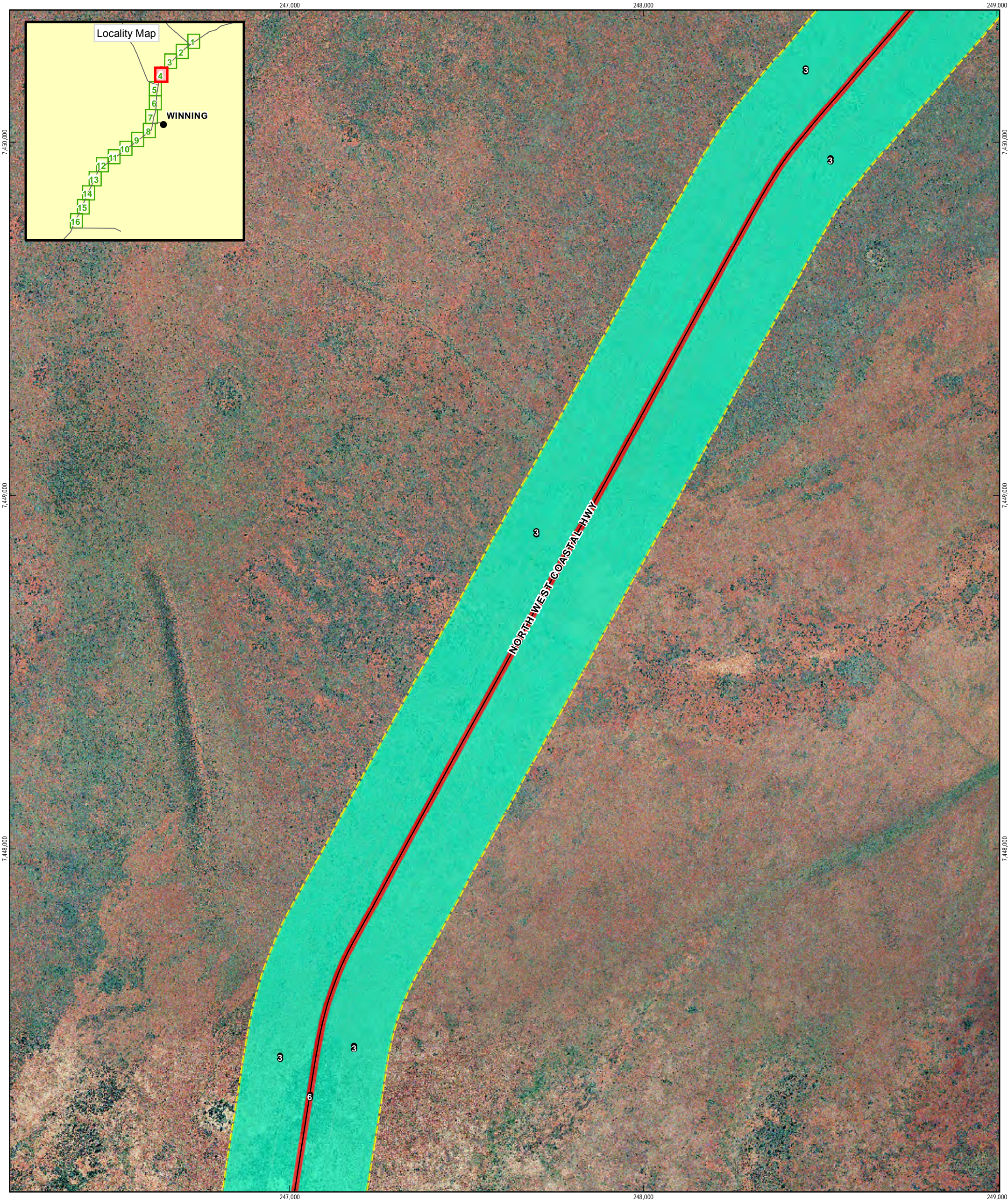
Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number	61-28865
Revision	0
Date	03 Apr 2013

Middle Section Vegetation Conditions

Sheet 3 of 16

Figure 4b



LEGEND

— Roads

▭ Middle Section Survey Area

▭ Priority Ecological Communities

▭ DEC Estates

Vegetation Conditions (Keighery, 1994)

1. Pristine or Nearly So

1-2

2. Excellent

2-3

3. Very Good

3-4

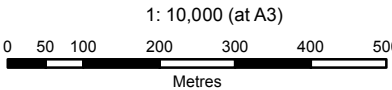
4. Good

4-5

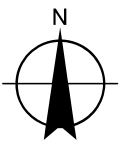
5. Degraded

5-6

6. Completely Degraded



Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50



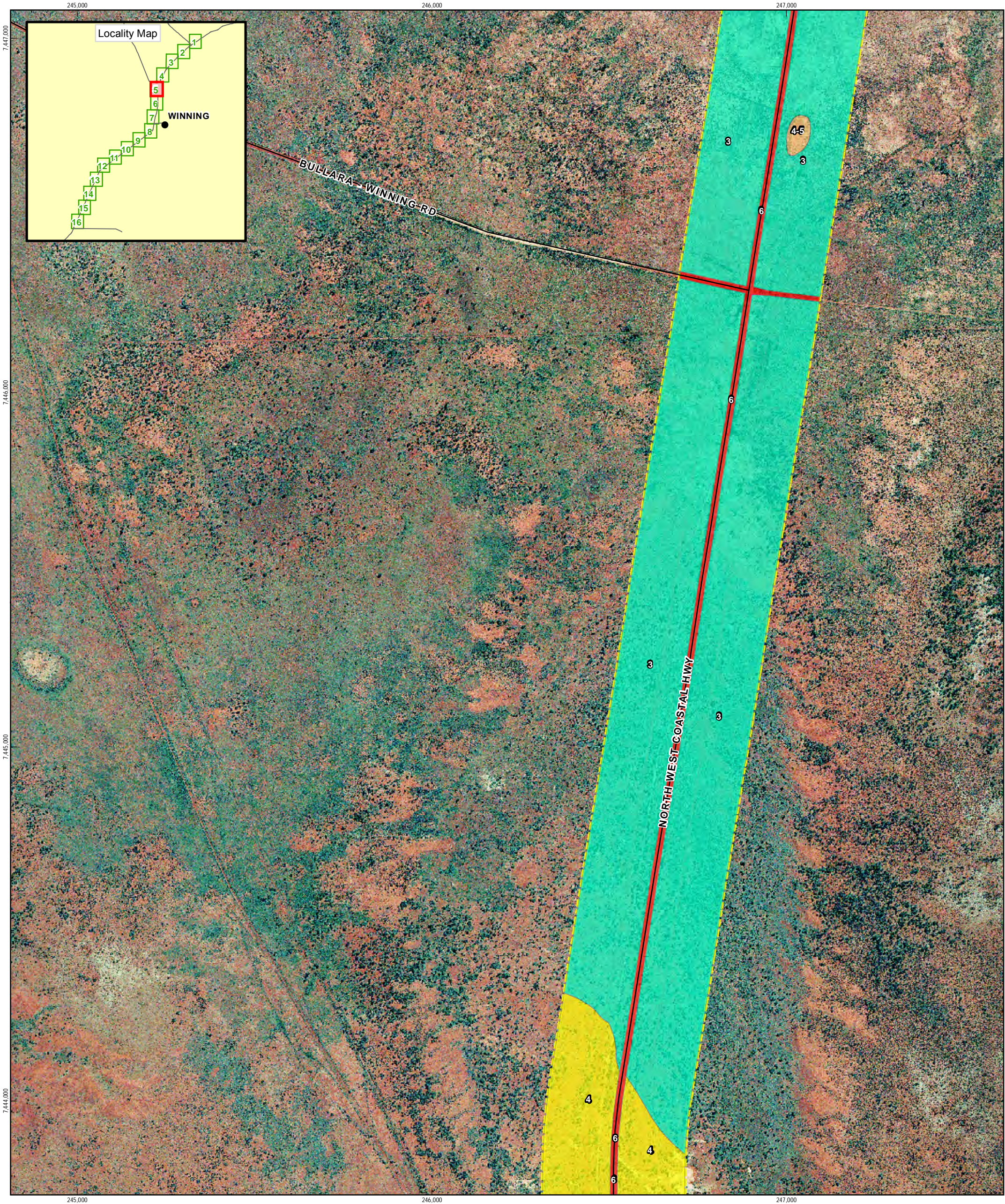
Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number | 61-28865
Revision | 0
Date | 03 Apr 2013

Middle Section Vegetation Conditions

Sheet 4 of 16

Figure 4b



LEGEND

Roads

Middle Section Survey Area

Priority Ecological Communities

DEC Estates

Vegetation Conditions (Keighery, 1994)

	1. Pristine or Nearly So
	2. Excellent
	3. Very Good
	4. Good
	5. Degraded
	6. Completely Degraded

	3-4
	4. Good
	5. Degraded
	6. Completely Degraded

1: 10,000 (at A3)

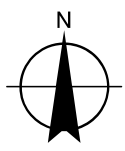
0 50 100 200 300 400 500

Metres

Map Projection: Transverse Mercator

Horizontal Datum: Geocentric Datum of Australia

Grid: Map Grid of Australia 1994, Zone 50



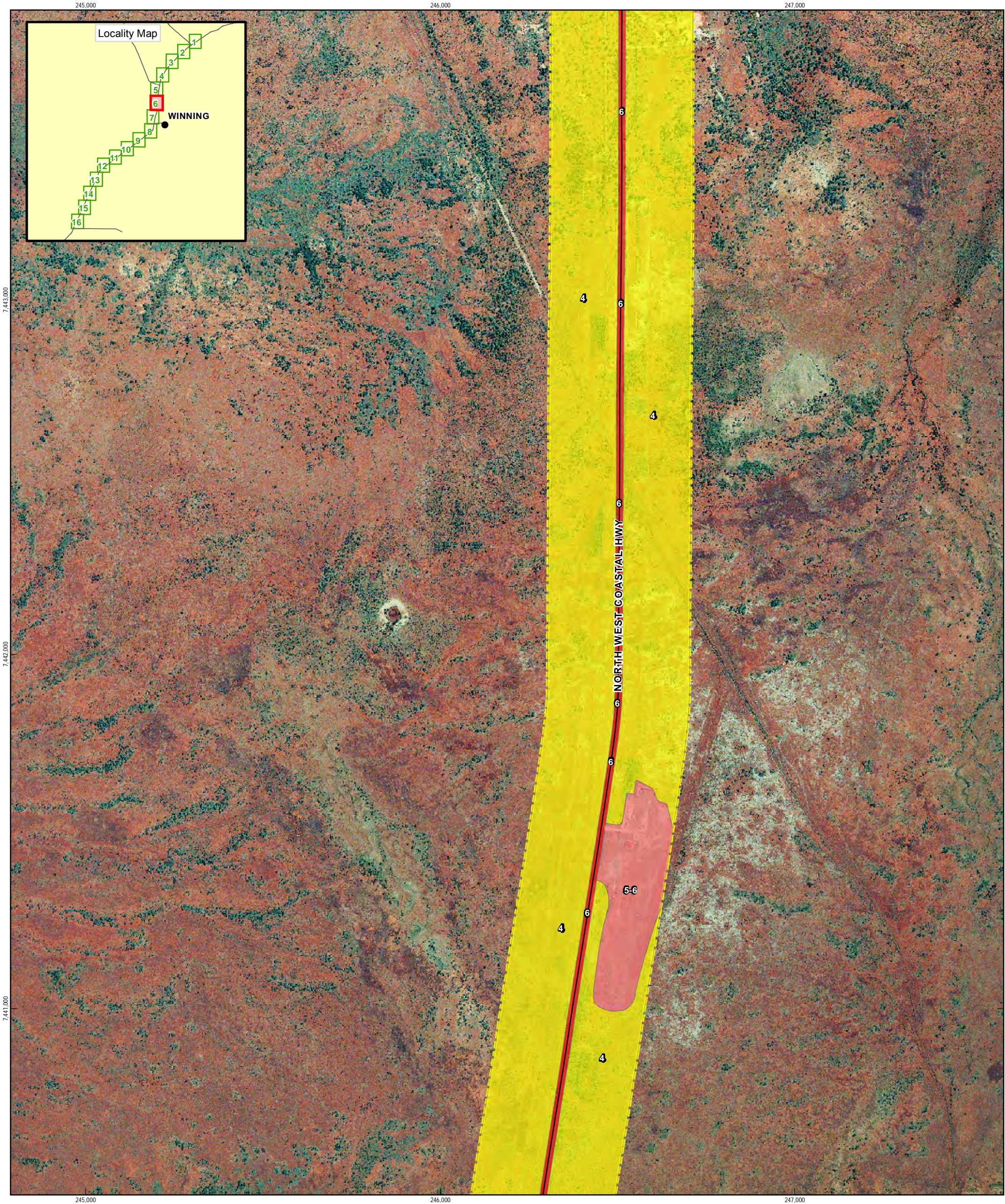
Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number	61-28865
Revision	0
Date	03 Apr 2013

Middle Section Vegetation Conditions

Sheet 5 of 16

Figure 4b



LEGEND

— Roads

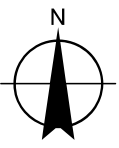
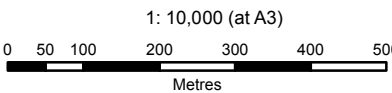
▭ Middle Section Survey Area

▭ Priority Ecological Communities

▨ DEC Estates

Vegetation Conditions (Keighery, 1994)

1. Pristine or Nearly So	3-4
1-2	4. Good
2. Excellent	4-5
2-3	5. Degraded
3. Very Good	5-6
	6. Completely Degraded



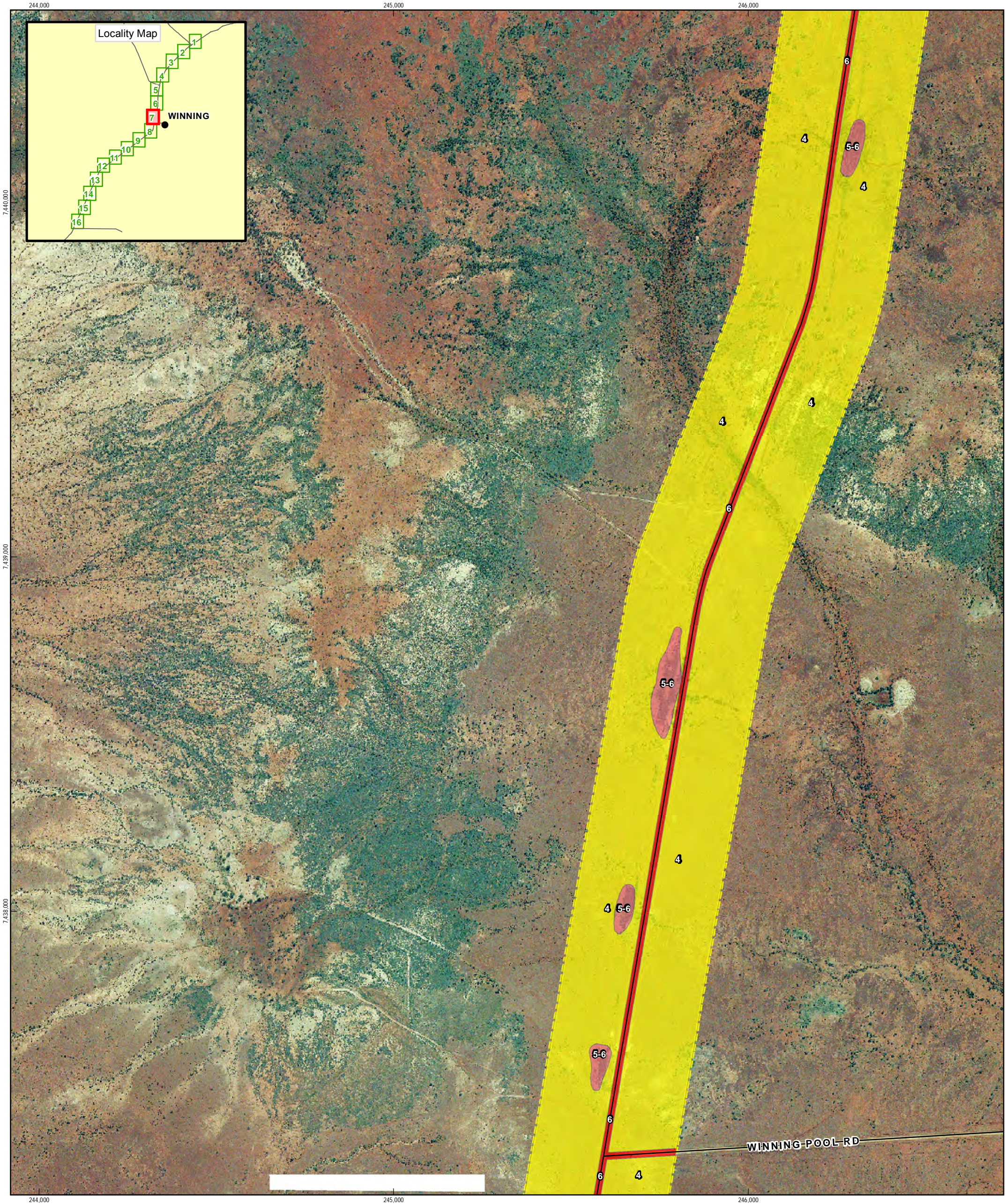
Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number	61-28865
Revision	0
Date	03 Apr 2013

Middle Section Vegetation Conditions

Sheet 6 of 16

Figure 4b



LEGEND

— Roads

▭ Middle Section Survey Area

▭ Priority Ecological Communities

▭ DEC Estates

Vegetation Conditions (Keighery, 1994)

1. Pristine or Nearly So

1-2

2. Excellent

2-3

3. Very Good

3-4

4. Good

4-5

5. Degraded

5-6

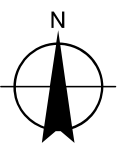
6. Completely Degraded

1: 10,000 (at A3)

0 50 100 200 300 400 500

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50

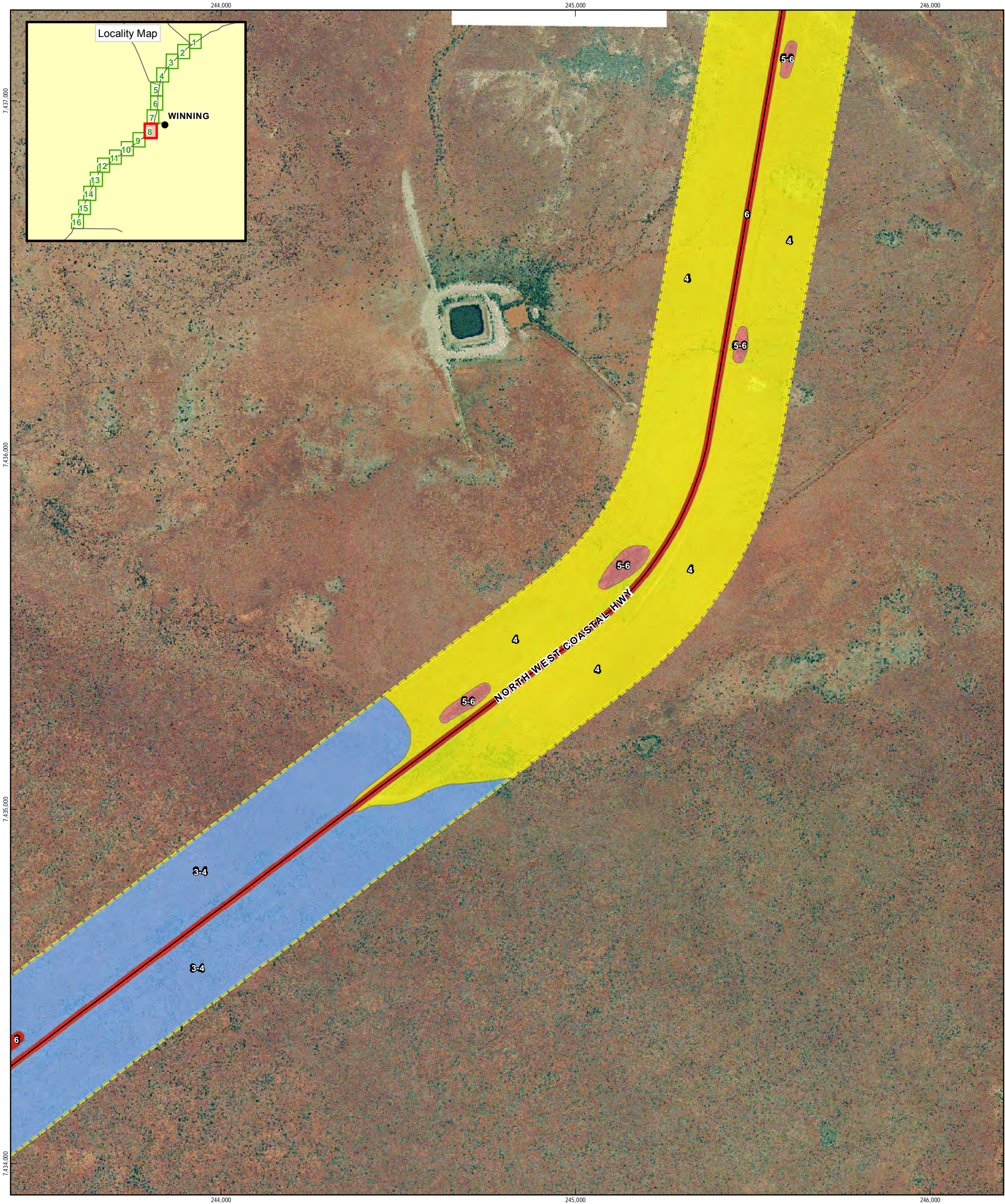


Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number 61-28865
Revision 0
Date 03 Apr 2013

Middle Section Vegetation Conditions

Figure 4b



LEGEND

— Roads

— Middle Section Survey Area

— Priority Ecological Communities

— DEC Estates

Vegetation Conditions (Keighery, 1994)

1. Pristine or Nearly So

1-2

2. Excellent

2-3

3. Very Good

3-4

4. Good

4-5

5. Degraded

5-6

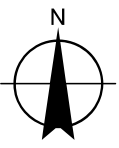
6. Completely Degraded

1: 10,000 (at A3)

0 50 100 200 300 400 500

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50



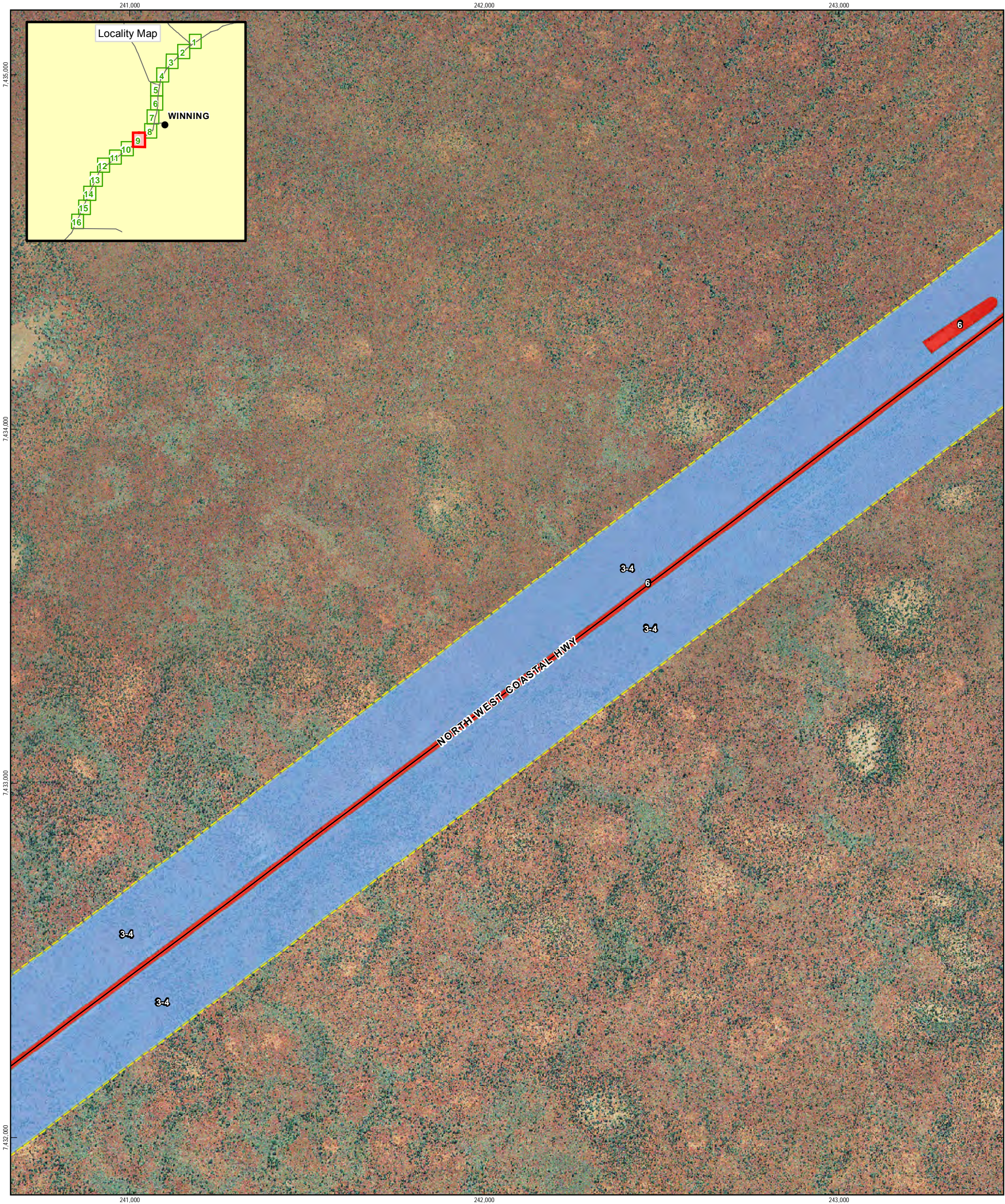
Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number | 61-28865
Revision | 0
Date | 03 Apr 2013

Middle Section Vegetation Conditions

Sheet 8 of 16

Figure 4b



LEGEND

— Roads

--- Middle Section Survey Area

Priority Ecological Communities

DEC Estates

Vegetation Conditions (Keighery, 1994)

1. Pristine or Nearly So

1-2

2. Excellent

2-3

3. Very Good

3-4

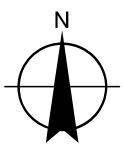
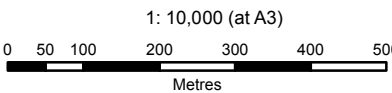
4. Good

4-5

5. Degraded

5-6

6. Completely Degraded



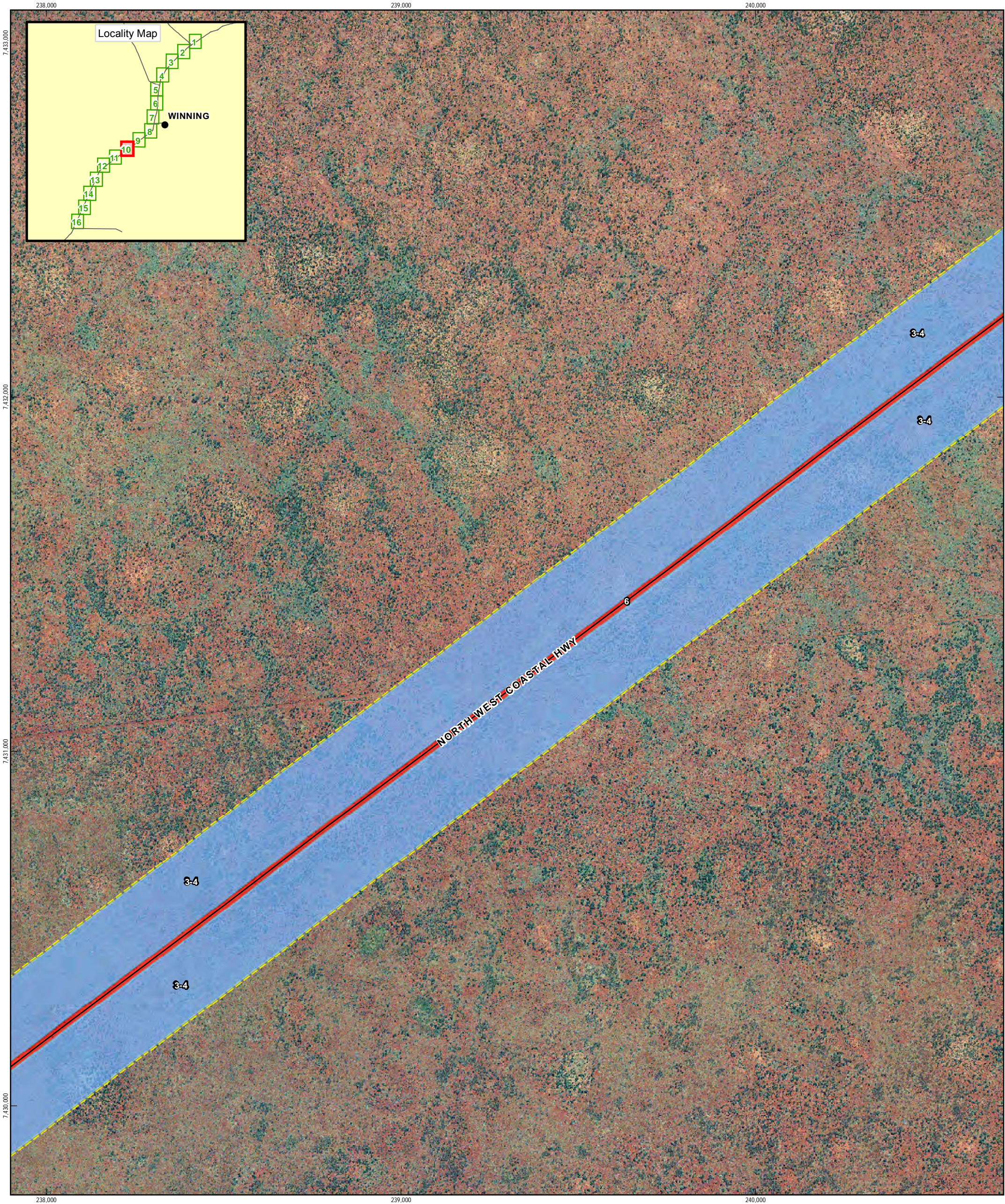
Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number 61-28865
Revision 0
Date 03 Apr 2013

Middle Section Vegetation Conditions

Sheet 9 of 16

Figure 4b



LEGEND

— Roads

▭ Middle Section Survey Area

▭ Priority Ecological Communities

▭ DEC Estates

Vegetation Conditions (Keighery, 1994)

1. Pristine or Nearly So

1-2

2. Excellent

2-3

3. Very Good

3-4

4. Good

4-5

5. Degraded

5-6

6. Completely Degraded

1: 10,000 (at A3)

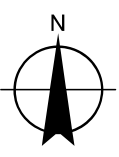
0 50 100 200 300 400 500

Metres

Map Projection: Transverse Mercator

Horizontal Datum: Geocentric Datum of Australia

Grid: Map Grid of Australia 1994, Zone 50



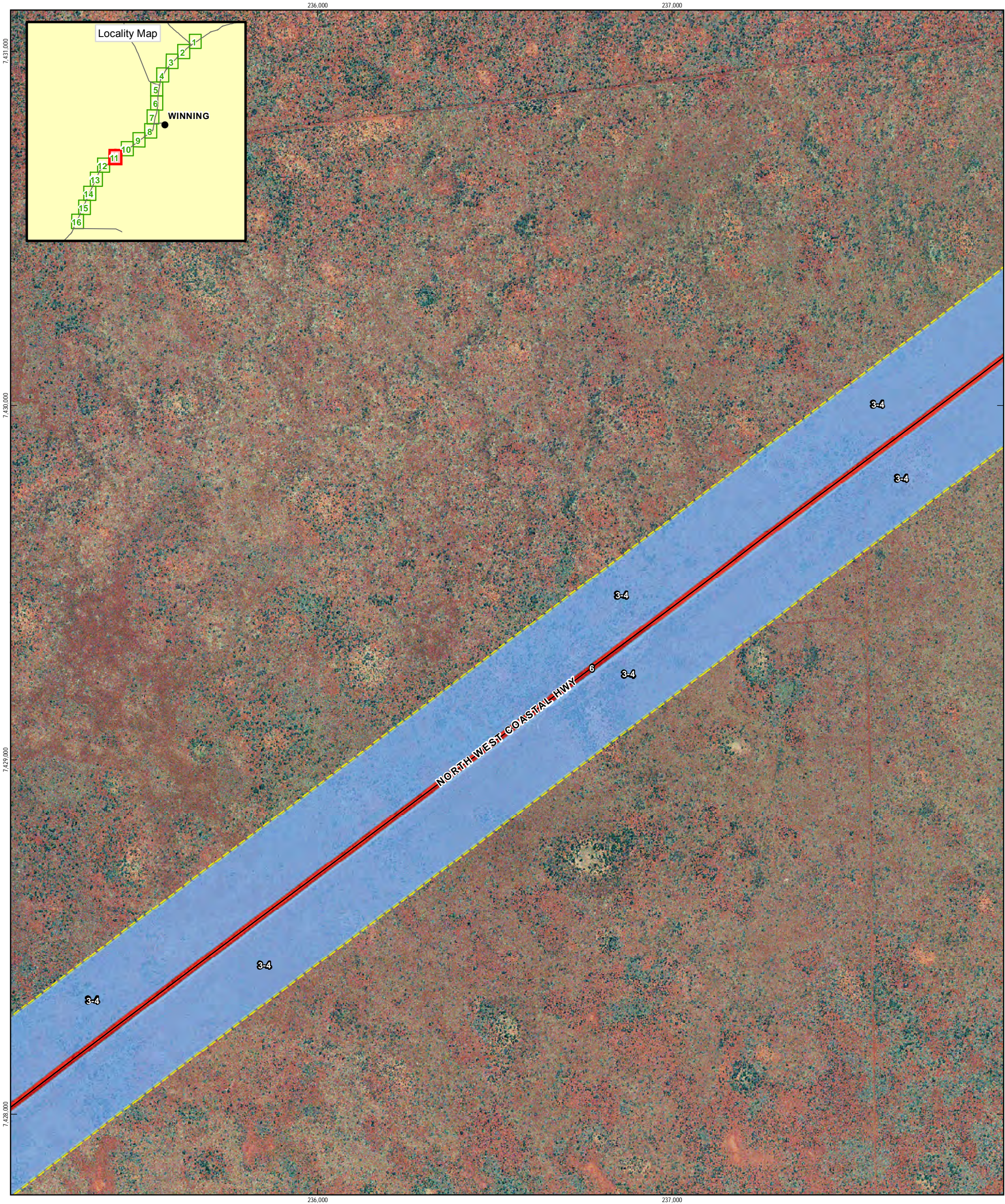
Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number | 61-28865
Revision | 0
Date | 03 Apr 2013

Middle Section Vegetation Conditions

Sheet 10 of 16

Figure 4b



LEGEND

- Roads
- Middle Section Survey Area
- Priority Ecological Communities
- DEC Estates

Vegetation Conditions (Keighery, 1994)

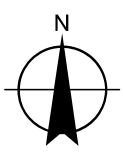
- 1. Pristine or Nearly So
- 1-2
- 2. Excellent
- 2-3
- 3. Very Good
- 3-4
- 4. Good
- 4-5
- 5. Degraded
- 5-6
- 6. Completely Degraded

1: 10,000 (at A3)

0 50 100 200 300 400 500

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50



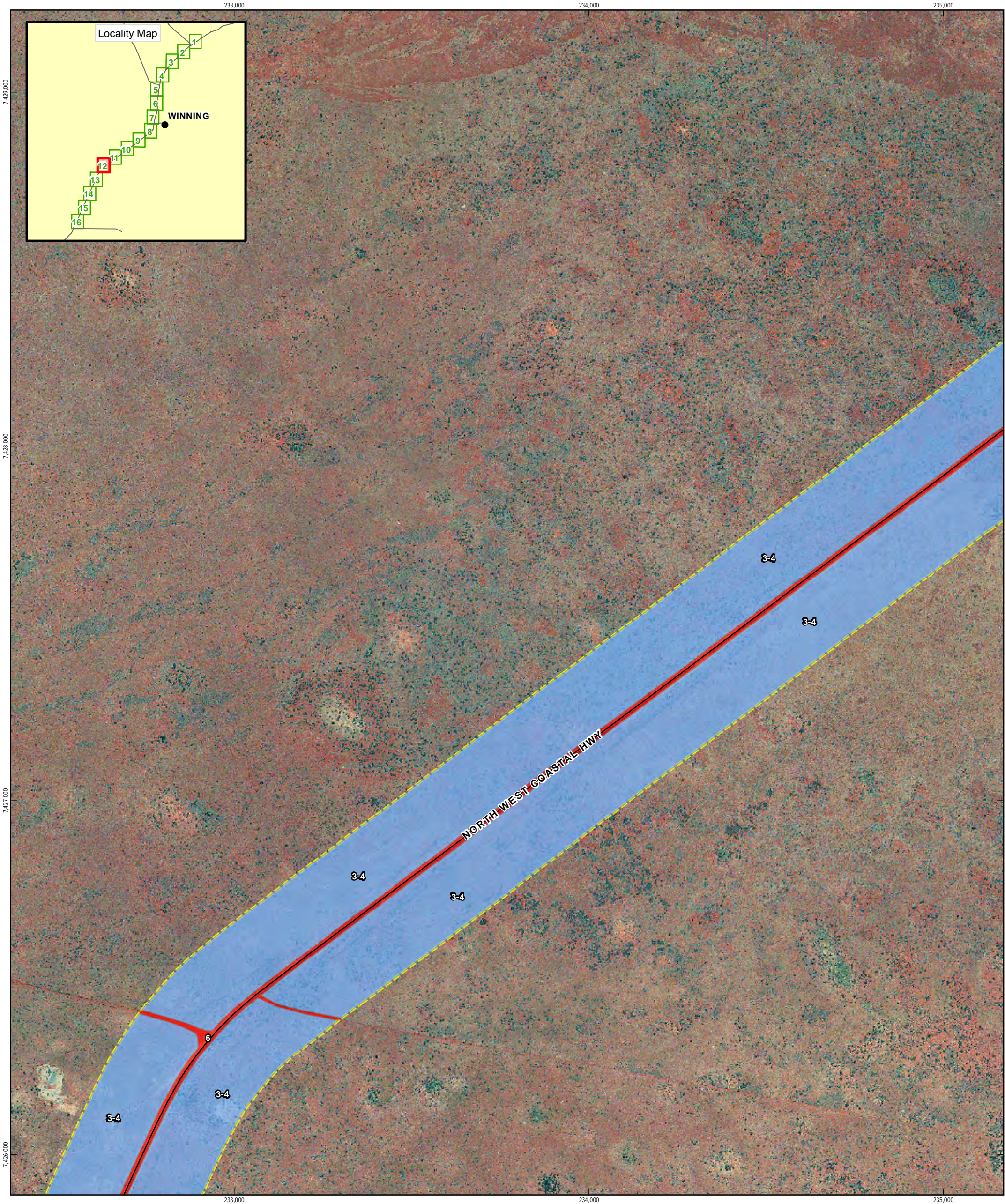
Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number | 61-28865
Revision | 0
Date | 03 Apr 2013

Middle Section Vegetation Conditions

Sheet 11 of 16

Figure 4b



LEGEND

— Roads

▭ Middle Section Survey Area

▭ Priority Ecological Communities

▭ DEC Estates

Vegetation Conditions (Keighery, 1994)

1. Pristine or Nearly So

1-2

2. Excellent

2-3

3. Very Good

3-4

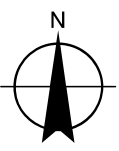
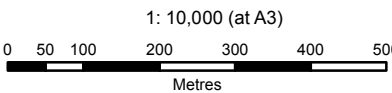
4. Good

4-5

5. Degraded

5-6

6. Completely Degraded

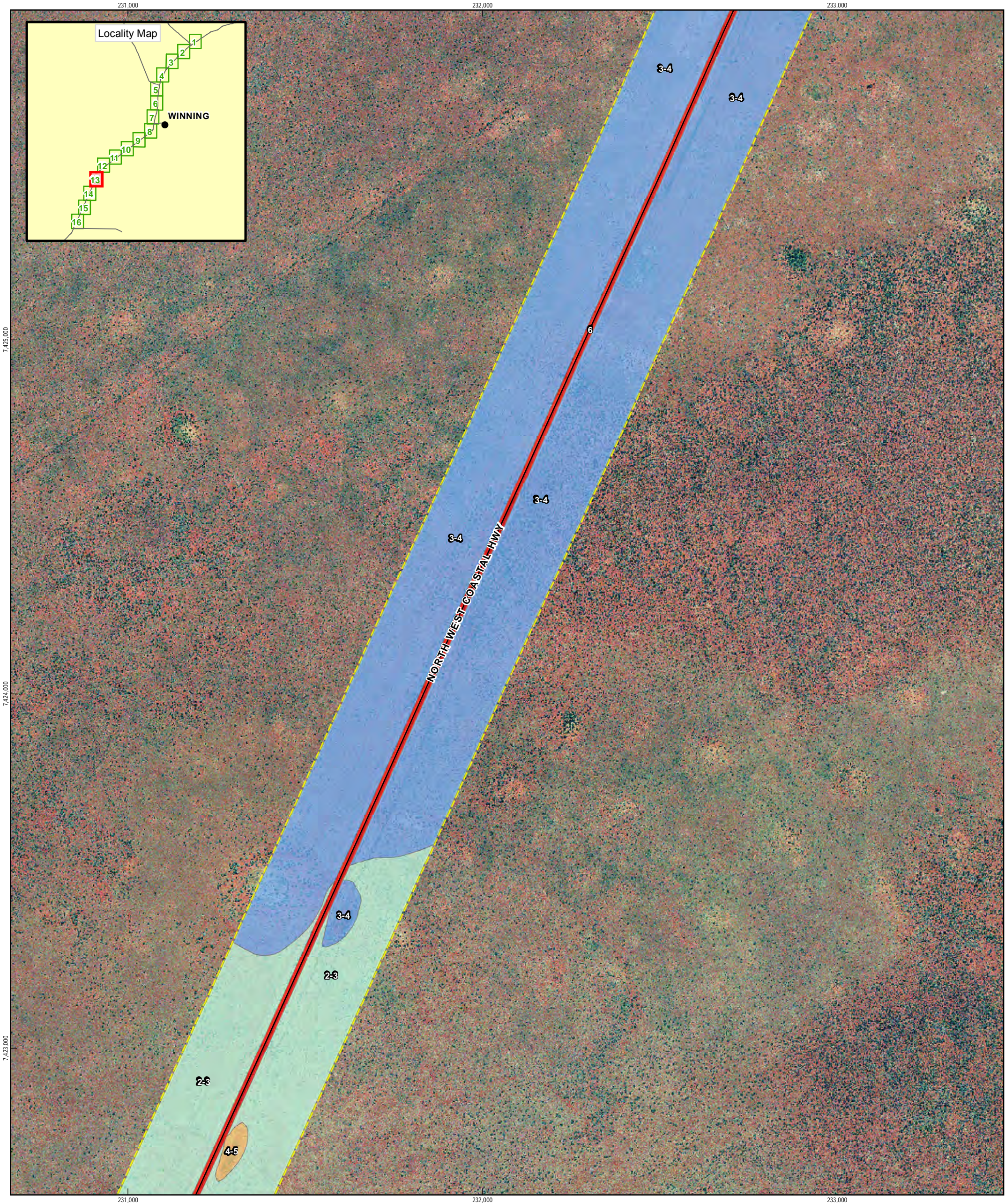


Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number | 61-28865
Revision | 0
Date | 03 Apr 2013

Middle Section Vegetation Conditions

Sheet 12 of 16
Figure 4b



LEGEND

Roads

Middle Section Survey Area

Priority Ecological Communities

DEC Estates

Vegetation Conditions (Keighery, 1994)

1. Pristine or Nearly So

1-2

2. Excellent

2-3

3. Very Good

3-4

4. Good

4-5

5. Degraded

5-6

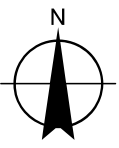
6. Completely Degraded

1: 10,000 (at A3)

0 50 100 200 300 400 500

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50

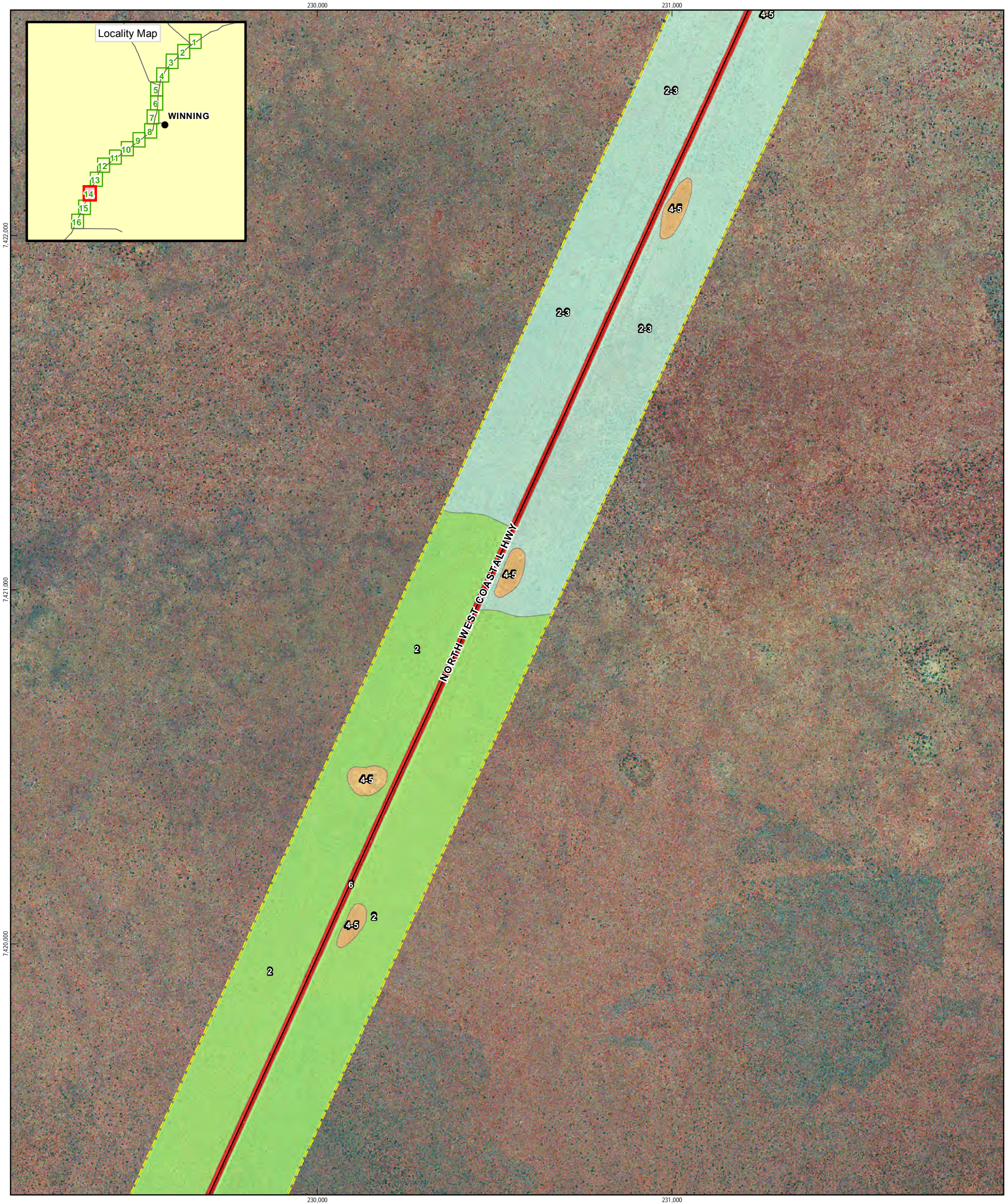


Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number | 61-28865
Revision | 0
Date | 03 Apr 2013

Middle Section Vegetation Conditions

Sheet 13 of 16
Figure 4b



LEGEND

— Roads

▭ Middle Section Survey Area

▭ Priority Ecological Communities

▨ DEC Estates

Vegetation Conditions (Keighery, 1994)

1. Pristine or Nearly So

1-2

2. Excellent

2-3

3. Very Good

3-4

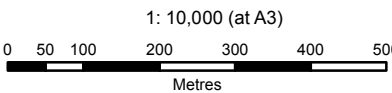
4. Good

4-5

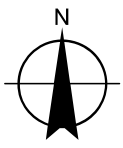
5. Degraded

5-6

6. Completely Degraded



Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50

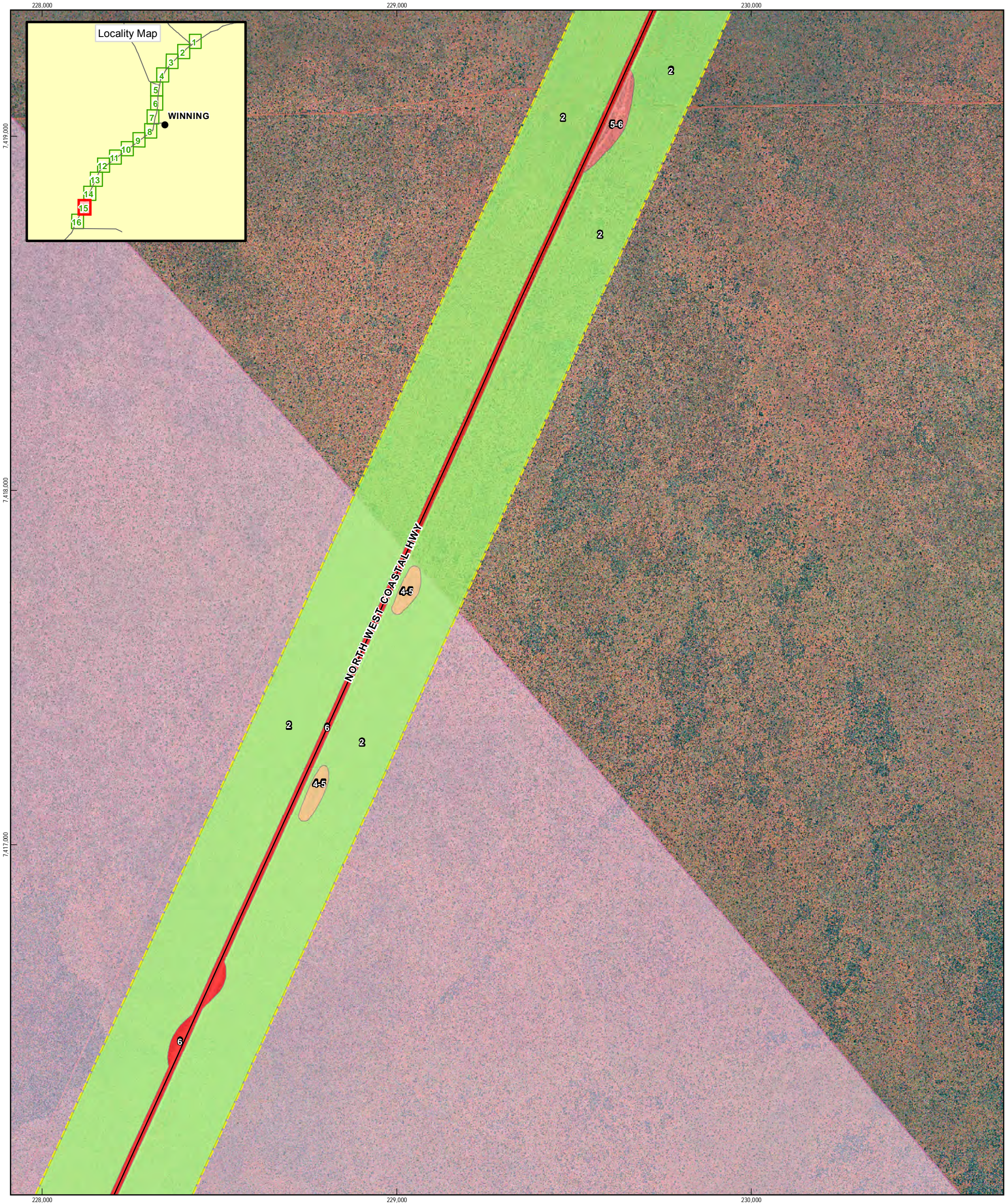


Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number 61-28865
Revision 0
Date 03 Apr 2013

Middle Section Vegetation Conditions

Sheet 14 of 16
Figure 4b



LEGEND

— Roads

▭ Middle Section Survey Area

▭ Priority Ecological Communities

▭ DEC Estates

Vegetation Conditions (Keighery, 1994)

1. Pristine or Nearly So

1-2

2. Excellent

2-3

3. Very Good

3-4

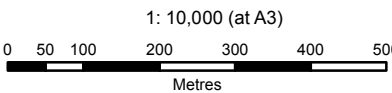
4. Good

4-5

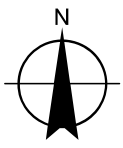
5. Degraded

5-6

6. Completely Degraded



Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50

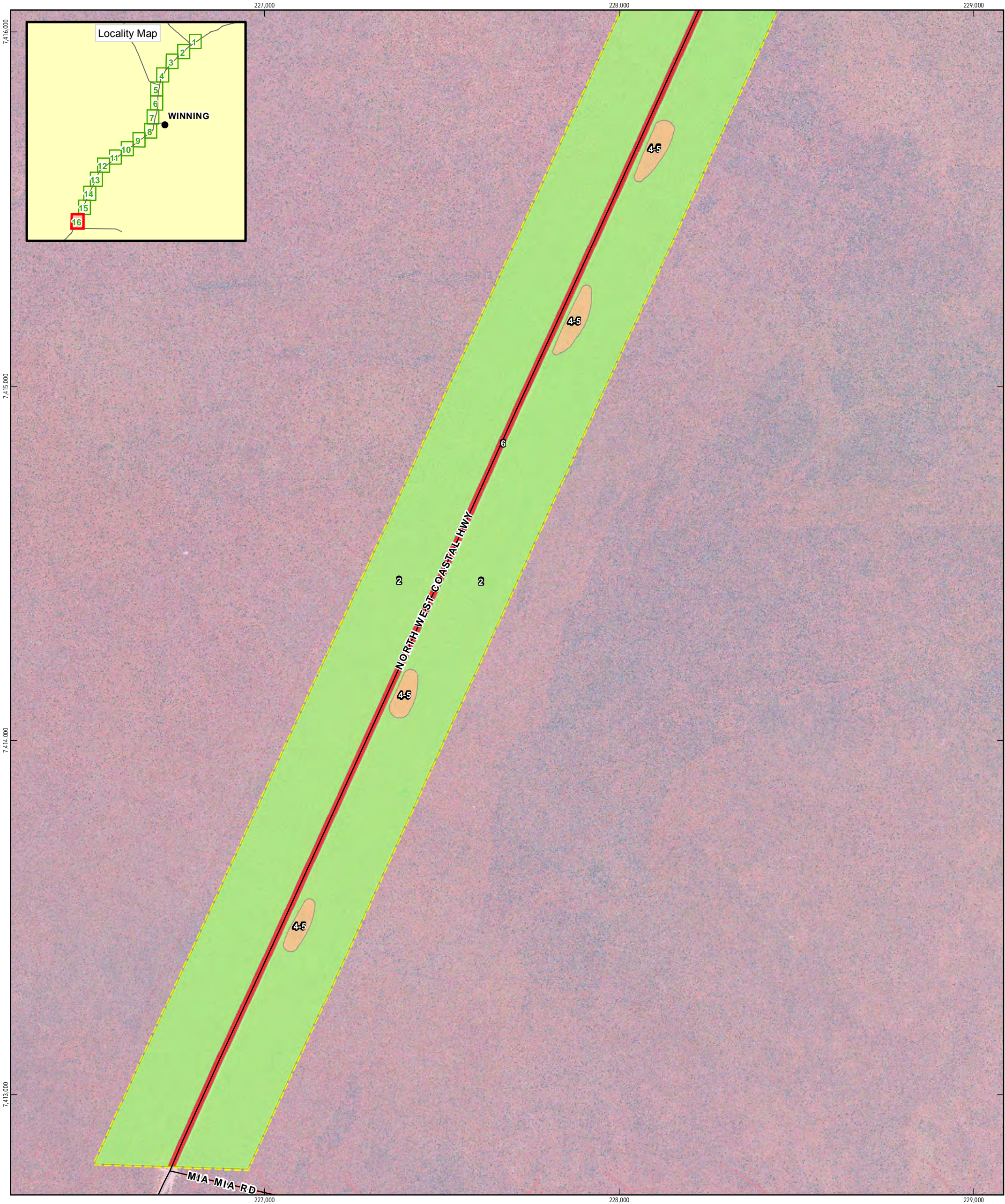


Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number 61-28865
Revision 0
Date 03 Apr 2013

Middle Section Vegetation Conditions

Sheet 15 of 16
Figure 4b



LEGEND

— Roads

▭ Middle Section Survey Area

▭ Priority Ecological Communities

▭ DEC Estates

Vegetation Conditions (Keighery, 1994)

1. Pristine or Nearly So

1-2

2. Excellent

2-3

3. Very Good

3-4

4. Good

4-5

5. Degraded

5-6

6. Completely Degraded

1: 10,000 (at A3)

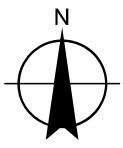
0 50 100 200 300 400 500

Metres

Map Projection: Transverse Mercator

Horizontal Datum: Geocentric Datum of Australia

Grid: Map Grid of Australia 1994, Zone 50

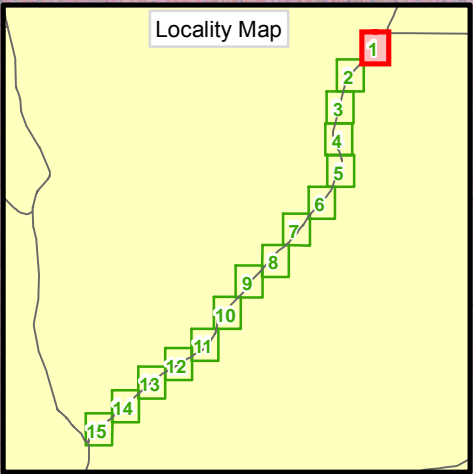
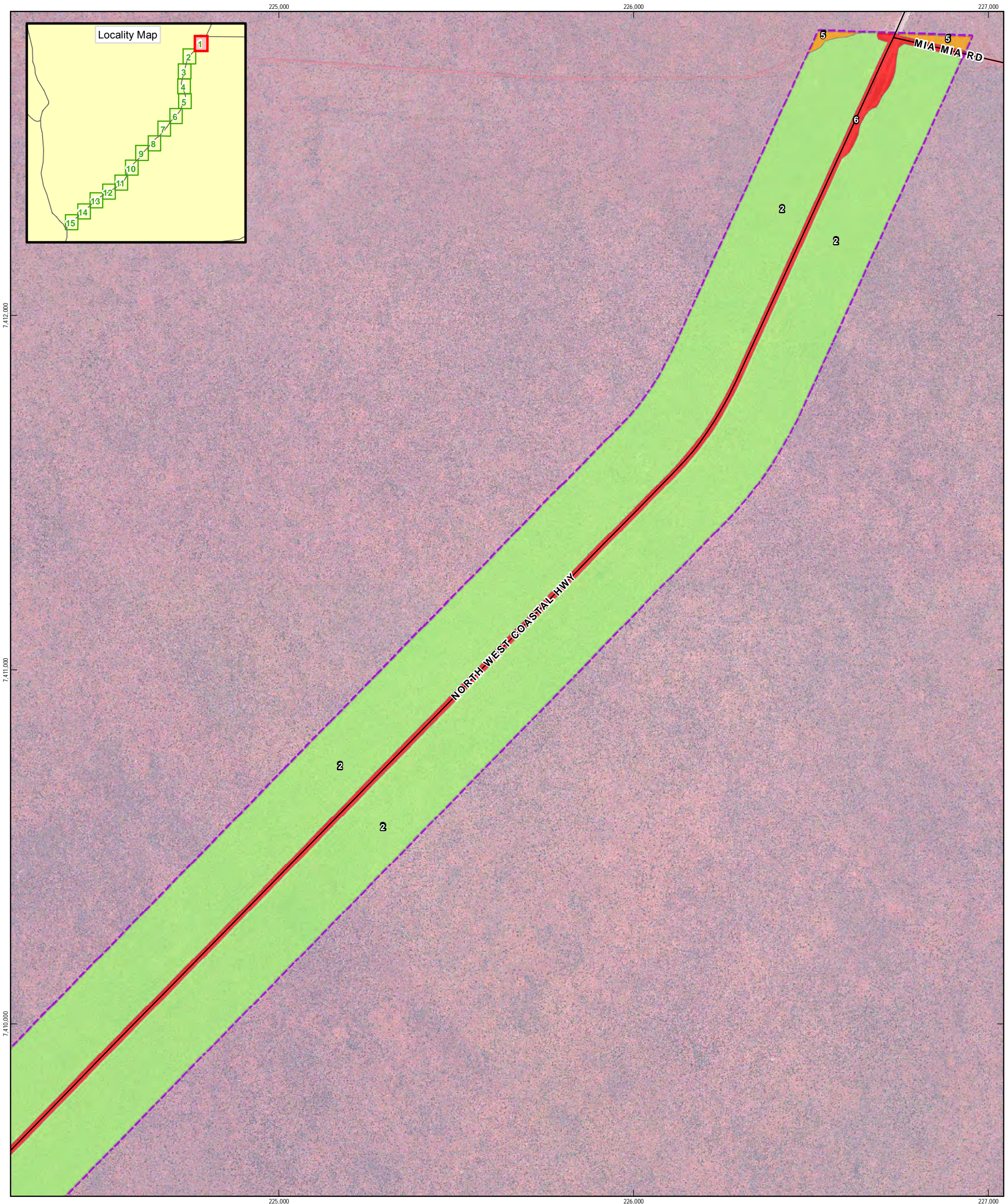


Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number	61-28865
Revision	0
Date	03 Apr 2013

Middle Section Vegetation Conditions

Sheet 16 of 16
Figure 4b



LEGEND

- Roads
- Southern Section Survey Area
- Priority Ecological Communities
- DEC Estates

Vegetation Conditions (Keighery, 1994)

- 1. Pristine or Nearly So
- 1-2
- 2. Excellent
- 2-3
- 3. Very Good

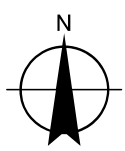
- 3-4
- 4. Good
- 4-5
- 5. Degraded
- 5-6
- 6. Completely Degraded

1: 10,000 (at A3)

0 50 100 200 300 400 500

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50



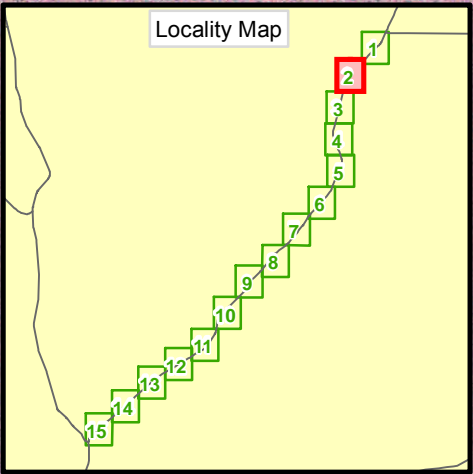
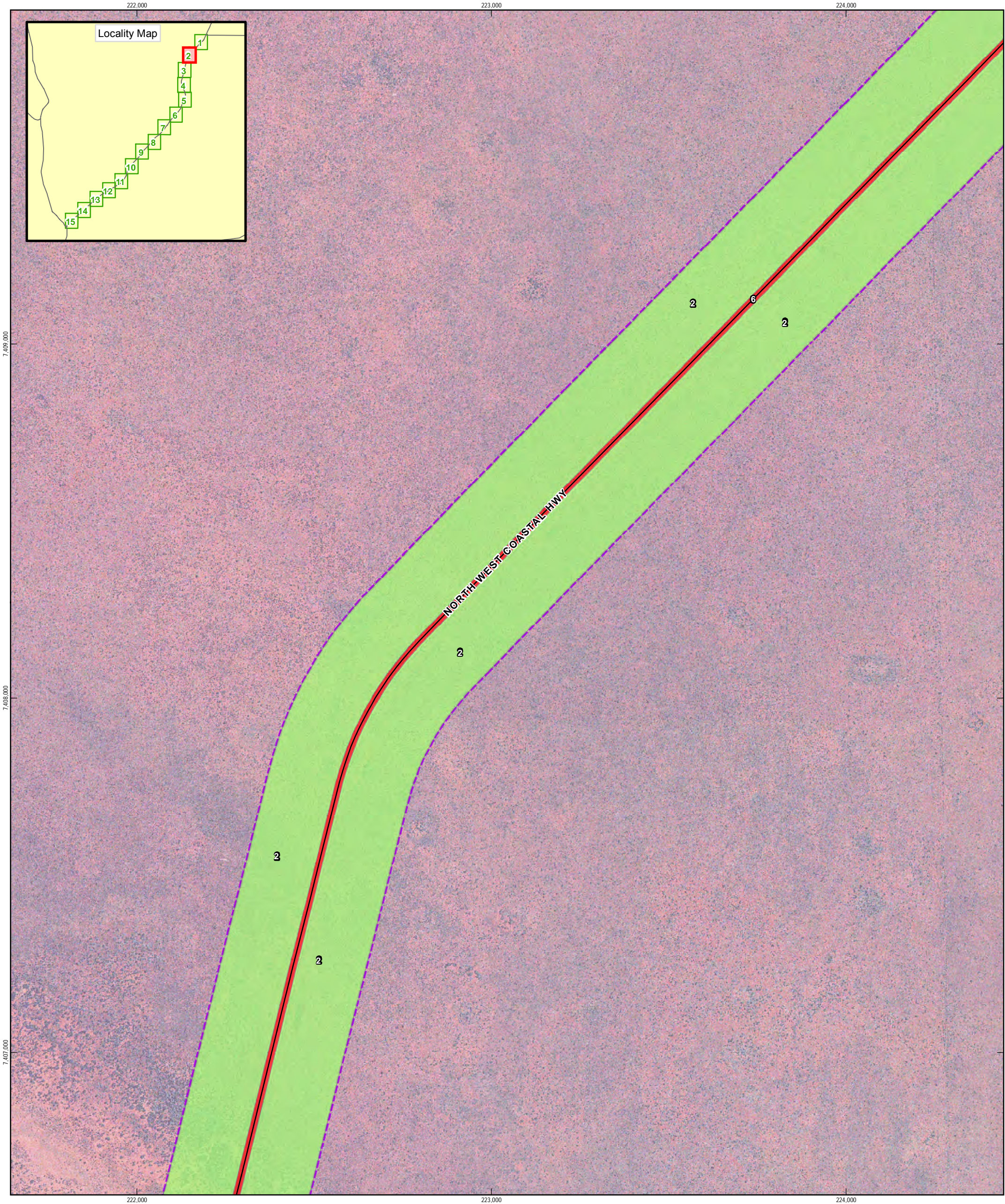
Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number	61-28865
Revision	0
Date	03 Apr 2013

Southern Section Vegetation Conditions

Sheet 1 of 15

Figure 4c



LEGEND

- Roads
- Southern Section Survey Area
- Priority Ecological Communities
- DEC Estates

Vegetation Conditions (Keighery, 1994)

- 1. Pristine or Nearly So
- 1-2
- 2. Excellent
- 2-3
- 3. Very Good

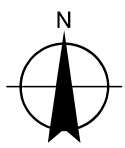
- 3-4
- 4. Good
- 4-5
- 5. Degraded
- 5-6
- 6. Completely Degraded

1: 10,000 (at A3)

0 50 100 200 300 400 500

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50

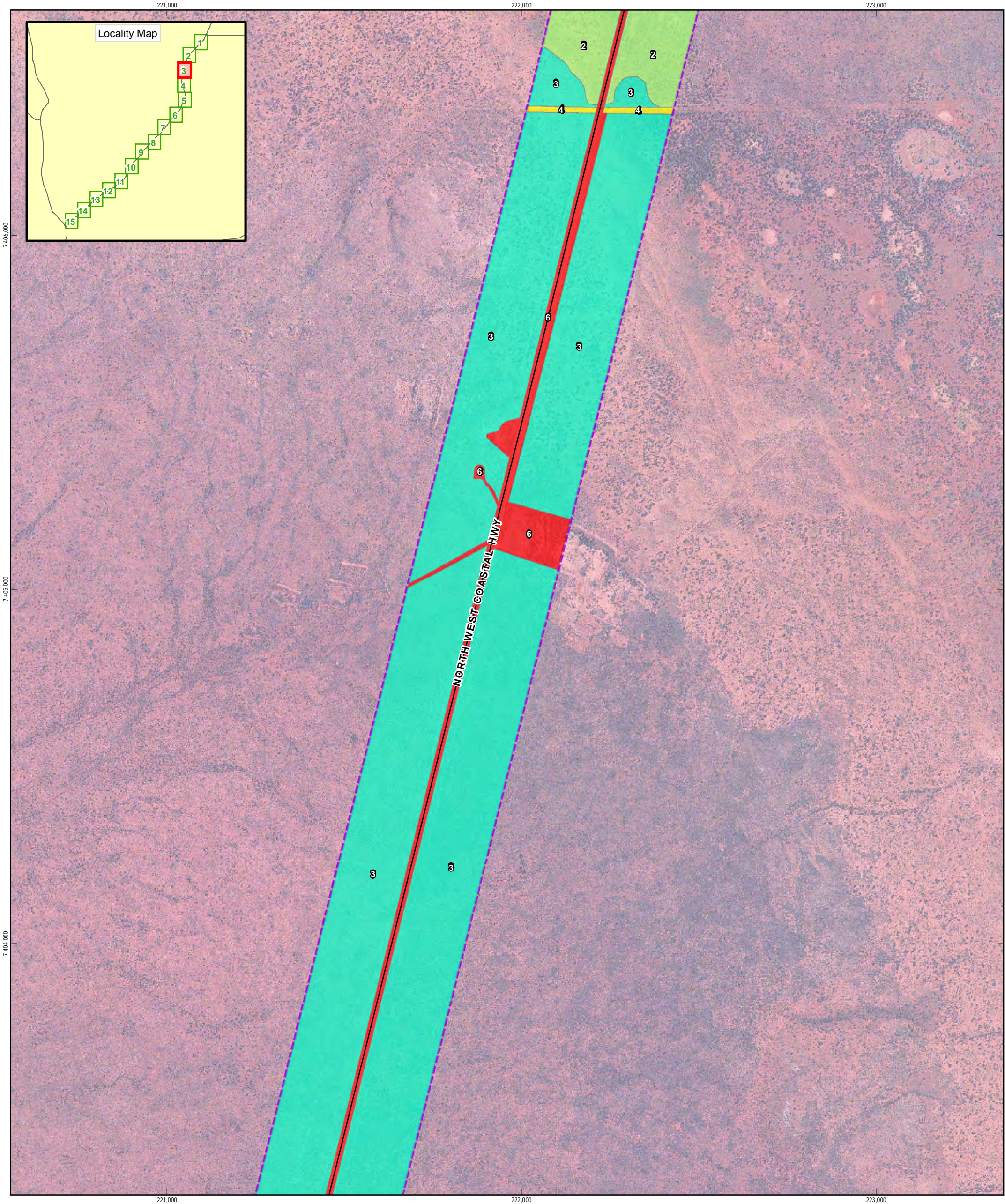


Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number 61-28865
Revision 0
Date 03 Apr 2013

Southern Section Vegetation Conditions

Figure 4c



LEGEND

— Roads

Southern Section Survey Area

Priority Ecological Communities

DEC Estates

Vegetation Conditions (Keighery, 1994)

1. Pristine or Nearly So

1-2

2. Excellent

2-3

3. Very Good

3-4

4. Good

4-5

5. Degraded

5-6

6. Completely Degraded

1: 10,000 (at A3)

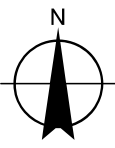
0 50 100 200 300 400 500

Metres

Map Projection: Transverse Mercator

Horizontal Datum: Geocentric Datum of Australia

Grid: Map Grid of Australia 1994, Zone 50



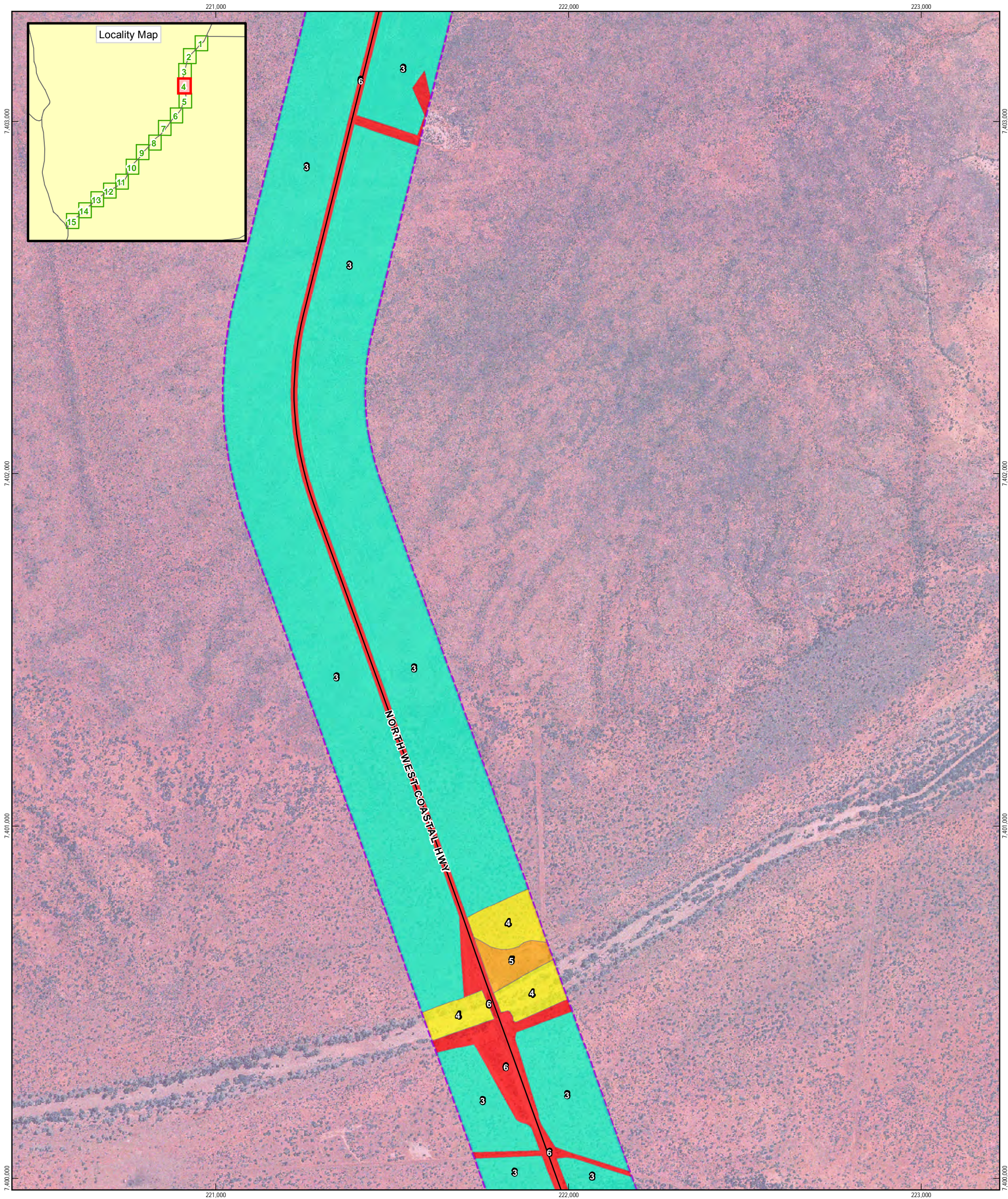
Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number	61-28865
Revision	0
Date	03 Apr 2013

Southern Section Vegetation Conditions

Sheet 3 of 15

Figure 4c



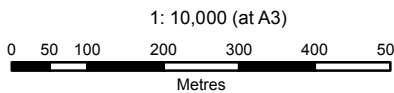
LEGEND

- Roads
- Southern Section Survey Area
- Priority Ecological Communities
- DEC Estates

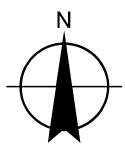
Vegetation Conditions (Keighery, 1994)

- 1. Pristine or Nearly So
- 1-2
- 2. Excellent
- 2-3
- 3. Very Good

- 3-4
- 4. Good
- 4-5
- 5. Degraded
- 5-6
- 6. Completely Degraded



Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50



Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number 61-28865
Revision 0
Date 03 Apr 2013

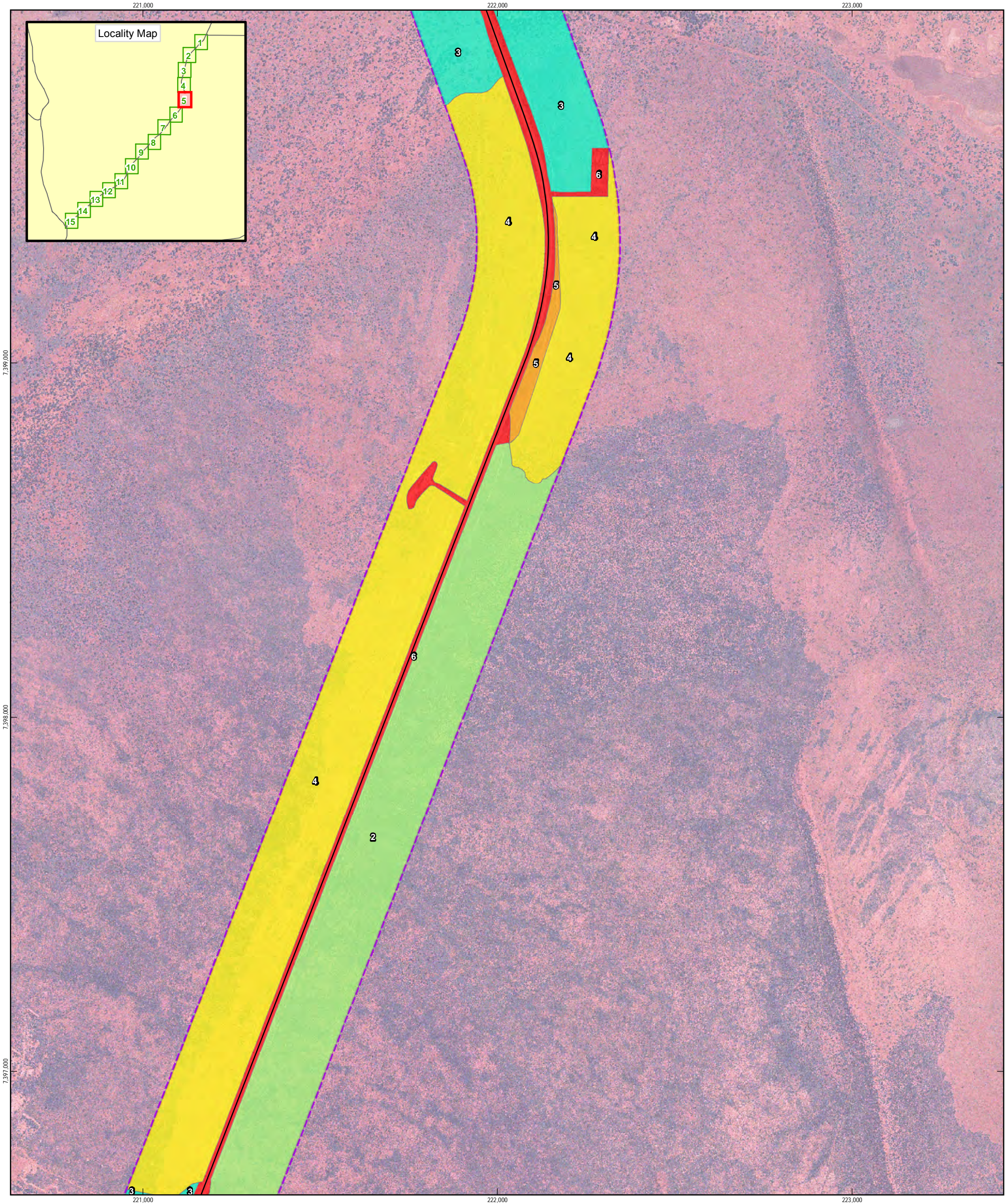
Southern Section Vegetation Conditions

Sheet 4 of 15

Figure 4c

G:\6128865\GIS\Maps\MXD\6128865_G003_Fig4c_VegConditionSouth_Rev0.mxd

239 Adelaide Terrace Perth WA 6004 Australia T 61 8 6222 8222 F 61 8 6222 8555 E permail@ghd.com.au W www.ghd.com.au
© 2013. Whilst every care has been taken to prepare this map, GHD, MRWA, DEC, GA and Landgate make no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and cannot accept liability and responsibility of any kind (whether in contract, tort or otherwise) for any expenses, losses, damages and/or costs (including indirect or consequential damage) which are or may be incurred by any party as a result of the map being inaccurate, incomplete or unsuitable in any way and for any reason.
Data source: Landgate: Mia Mia 2007 Mosaic - 20121115; Barrabiddy 2007 Mosaic - 20121115; MRWA: Roads - 20120528; GHD: Southern Section Survey Area - 20121114, Vegetation Conditions - 20130128; DEC: Priority Ecological Communities - 20121129, DEC Estates - 20121219; GA: Topo 250k Series 3 - 2006. Created by: radeleon



LEGEND

Roads

Southern Section Survey Area

Priority Ecological Communities

DEC Estates

Vegetation Conditions (Keighery, 1994)

1. Pristine or Nearly So

1-2

2. Excellent

2-3

3. Very Good

3-4

4. Good

4-5

5. Degraded

5-6

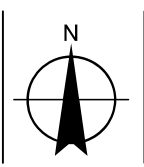
6. Completely Degraded

1: 10,000 (at A3)

0 50 100 200 300 400 500

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50

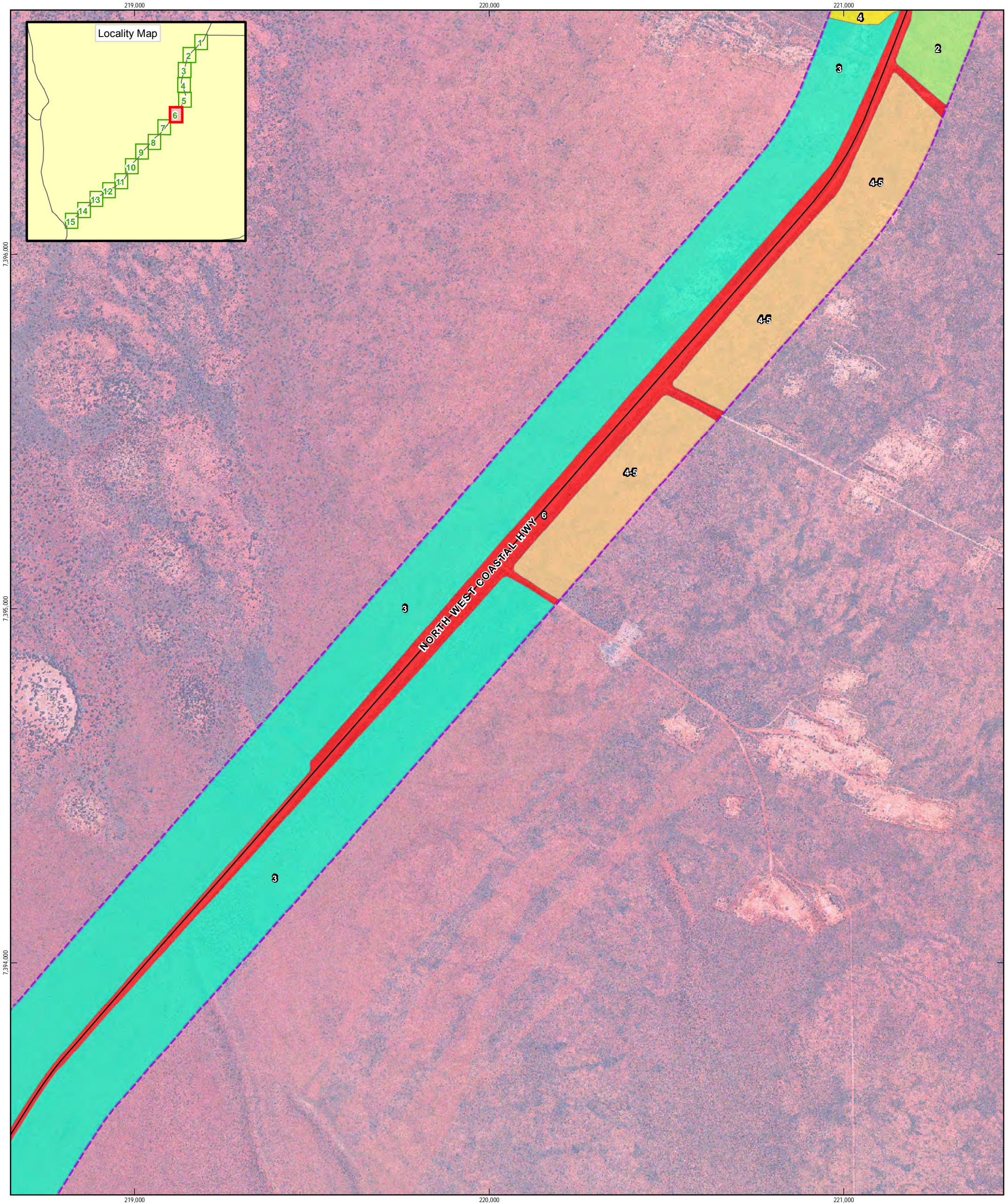


Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number | 61-28865
Revision | 0
Date | 03 Apr 2013

Sheet 5 of 15

Figure 4c



LEGEND

— Roads

— Southern Section Survey Area

— Priority Ecological Communities

— DEC Estates

Vegetation Conditions (Keighery, 1994)

1. Pristine or Nearly So

1-2

2. Excellent

2-3

3. Very Good

3-4

4. Good

4-5

5. Degraded

5-6

6. Completely Degraded

1: 10,000 (at A3)

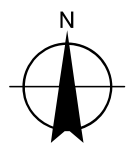
0 50 100 200 300 400 500

Metres

Map Projection: Transverse Mercator

Horizontal Datum: Geocentric Datum of Australia

Grid: Map Grid of Australia 1994, Zone 50



Main Roads Western Australia

MRWA ETS BDS

North West Coastal Highway SLK 620.5 – 767

Biological Survey

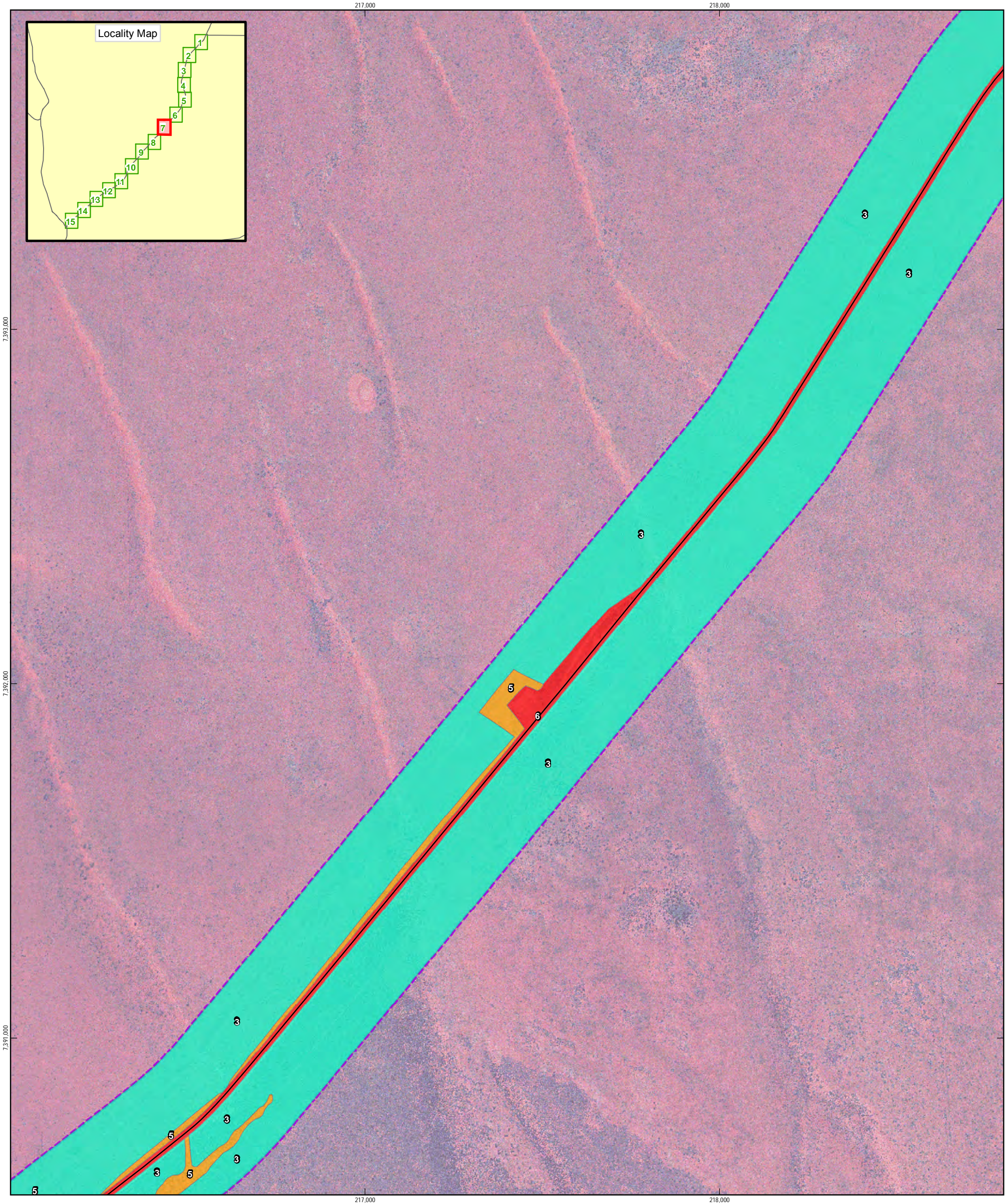
Job Number 61-28865

Revision 0

Date 03 Apr 2013

Southern Section Vegetation Conditions

Figure 4c



LEGEND

— Roads

Southern Section Survey Area

Priority Ecological Communities

DEC Estates

Vegetation Conditions (Keighery, 1994)

	1. Pristine or Nearly So
	1-2
	2. Excellent
	2-3
	3. Very Good

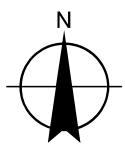
	3-4
	4. Good
	4-5
	5. Degraded
	5-6
	6. Completely Degraded

1: 10,000 (at A3)

0 50 100 200 300 400 500

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50



Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number | 61-28865
Revision | 0
Date | 03 Apr 2013

Sheet 7 of 15

Figure 4c



LEGEND

— Roads

Southern Section Survey Area

Priority Ecological Communities

DEC Estates

Vegetation Conditions (Keighery, 1994)

1. Pristine or Nearly So

1-2

2. Excellent

2-3

3. Very Good

3-4

4. Good

4-5

5. Degraded

5-6

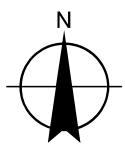
6. Completely Degraded

1: 10,000 (at A3)

0 50 100 200 300 400 500

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50

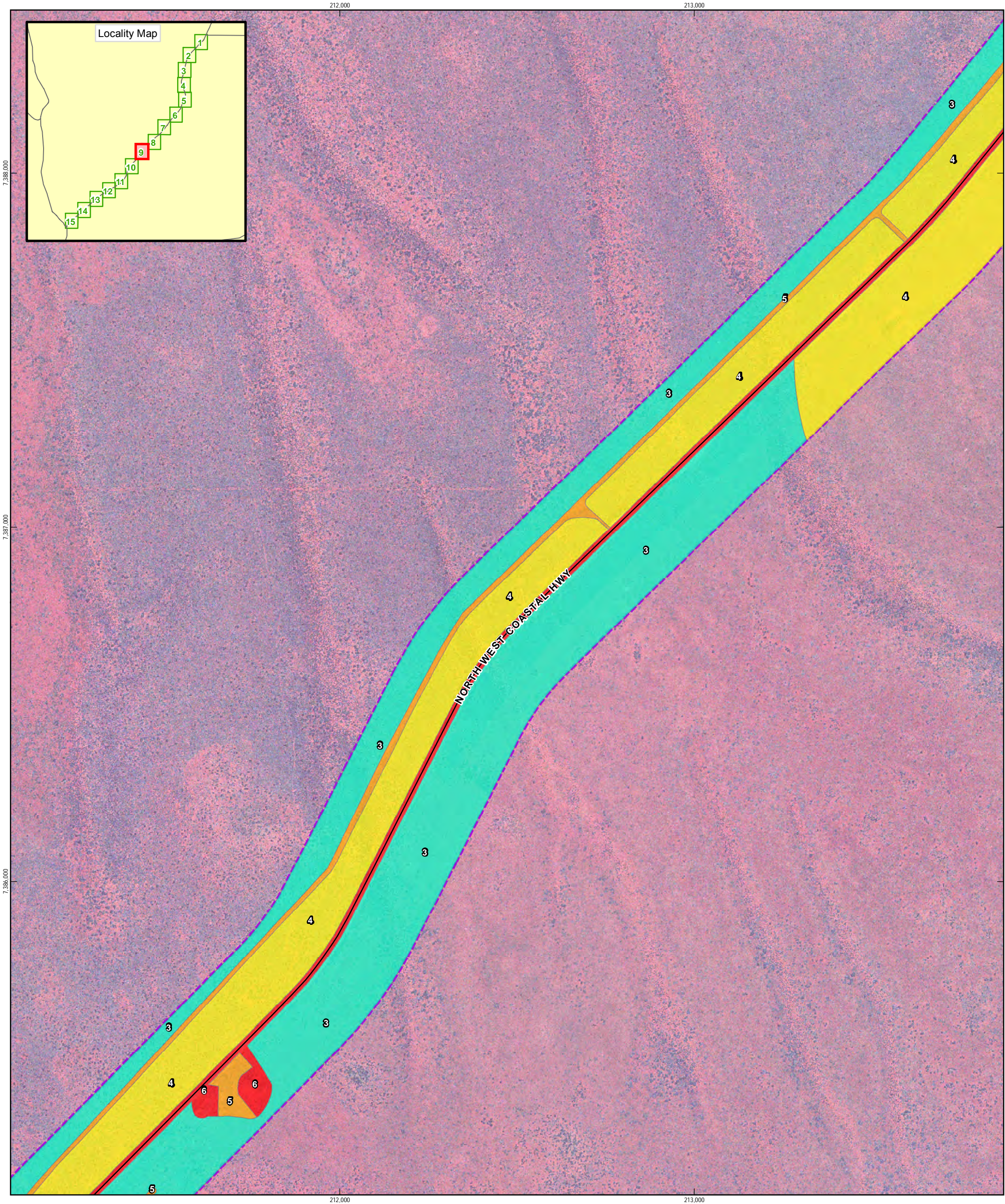


Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number | 61-28865
Revision | 0
Date | 03 Apr 2013

Southern Section Vegetation Conditions

Figure 4c



LEGEND

— Roads

Southern Section Survey Area

Priority Ecological Communities

DEC Estates

Vegetation Conditions (Keighery, 1994)

1. Pristine or Nearly So

1-2

2. Excellent

2-3

3. Very Good

3-4

4. Good

4-5

5. Degraded

5-6

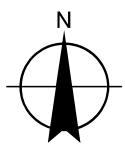
6. Completely Degraded

1: 10,000 (at A3)

0 50 100 200 300 400 500

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50



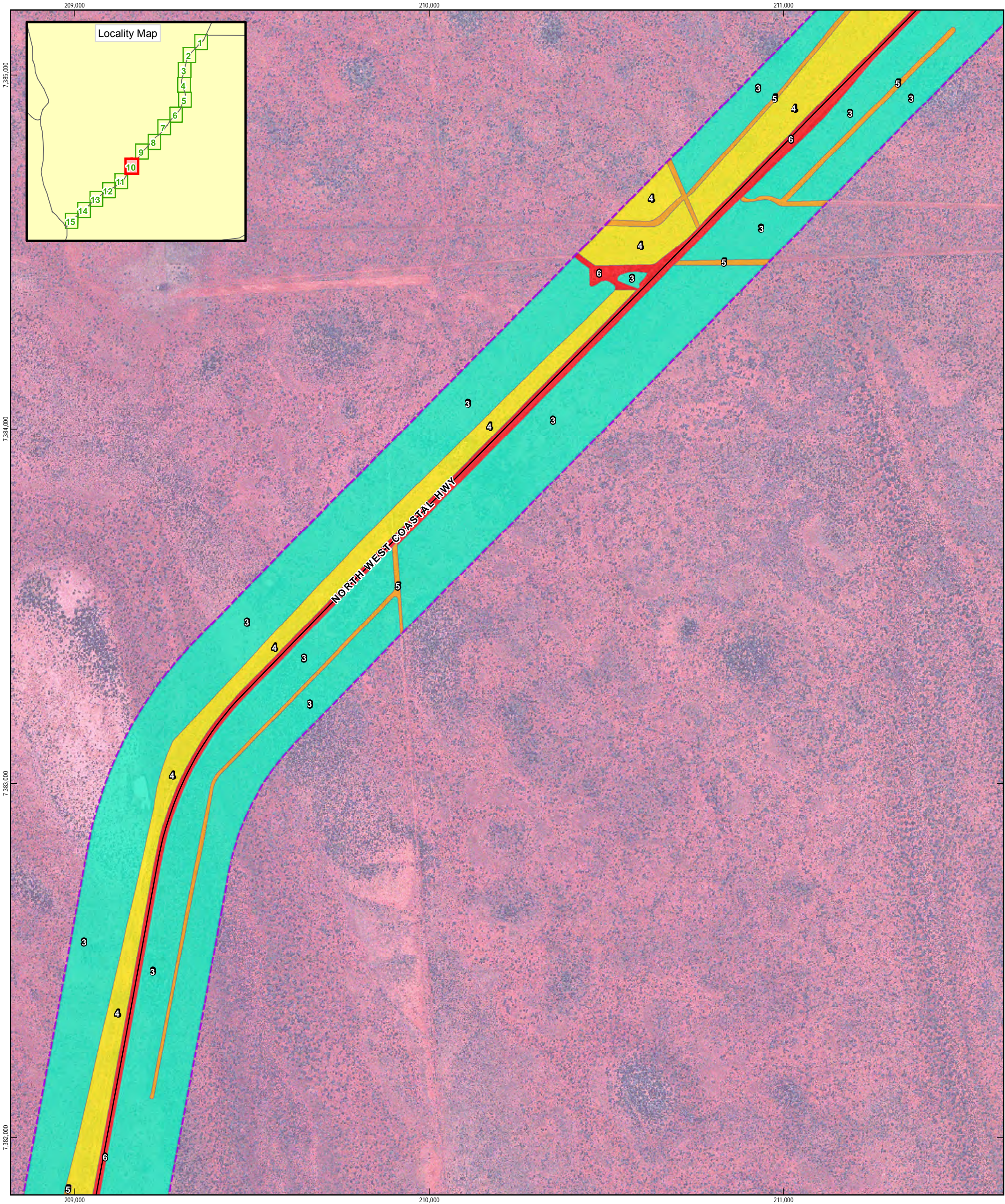
Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number	61-28865
Revision	0
Date	03 Apr 2013

Southern Section Vegetation Conditions

Sheet 9 of 15

Figure 4c



LEGEND

— Roads

▭ Southern Section Survey Area

▭ Priority Ecological Communities

▭ DEC Estates

Vegetation Conditions (Keighery, 1994)

1. Pristine or Nearly So

1-2

2. Excellent

2-3

3. Very Good

3-4

4. Good

4-5

5. Degraded

5-6

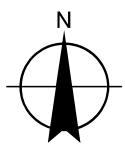
6. Completely Degraded

1: 10,000 (at A3)

0 50 100 200 300 400 500

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50

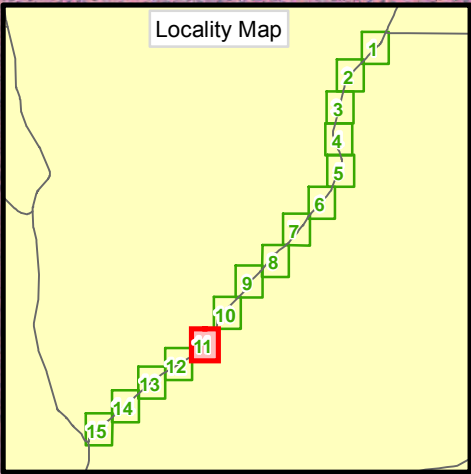
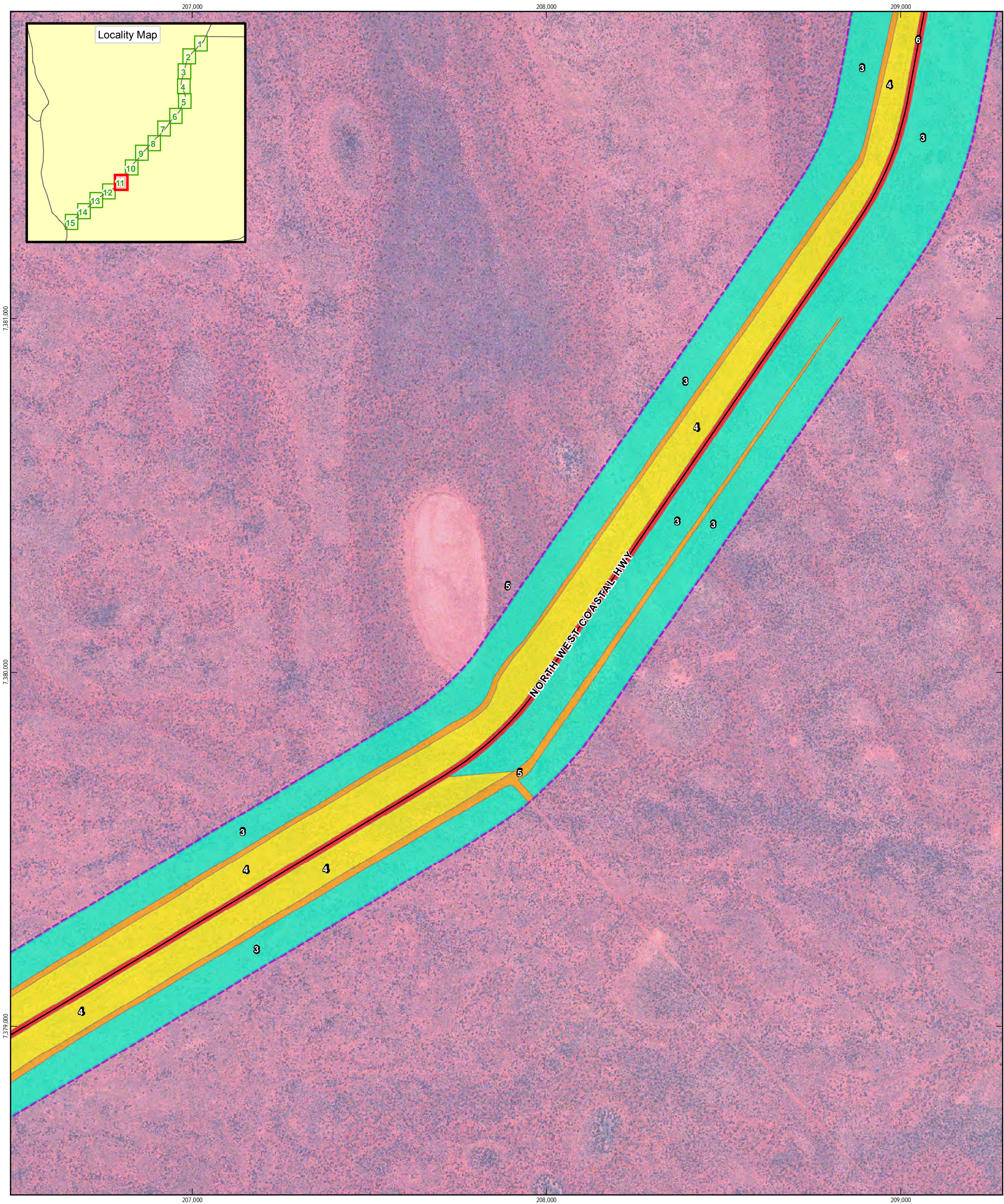


Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number 61-28865
Revision 0
Date 03 Apr 2013

Sheet 10 of 15

Figure 4c

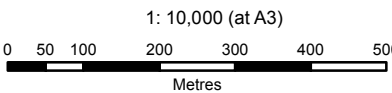


LEGEND

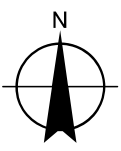
- Roads
- Southern Section Survey Area
- Priority Ecological Communities
- DEC Estates

Vegetation Conditions (Keighery, 1994)

- 1. Pristine or Nearly So
- 1-2
- 2. Excellent
- 2-3
- 3. Very Good
- 3-4
- 4. Good
- 4-5
- 5. Degraded
- 5-6
- 6. Completely Degraded



Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50



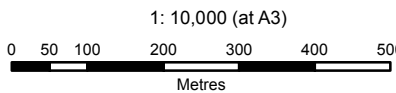
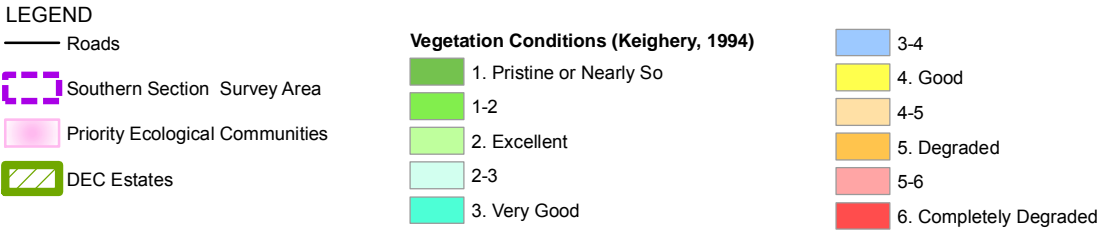
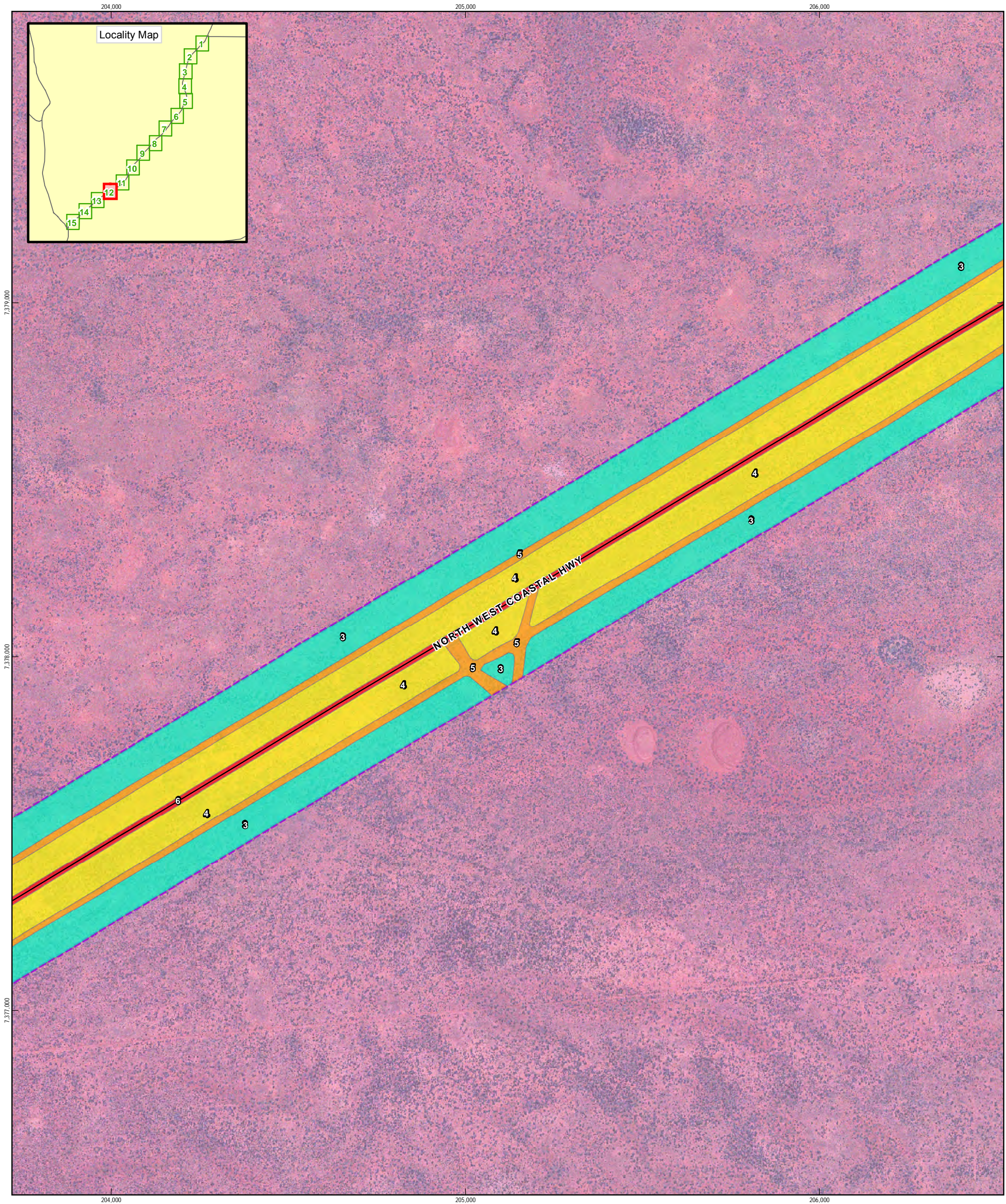
Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number 61-28865
Revision 0
Date 03 Apr 2013

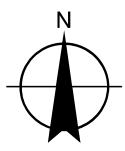
Southern Section Vegetation Conditions

Sheet 11 of 15

Figure 4c



Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50



Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number	61-28865
Revision	0
Date	03 Apr 2013

Southern Section Vegetation Conditions

Sheet 12 of 15

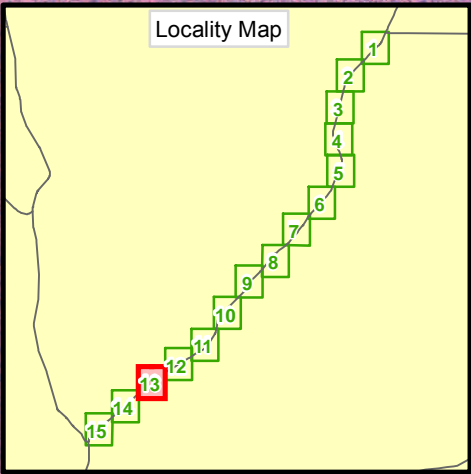
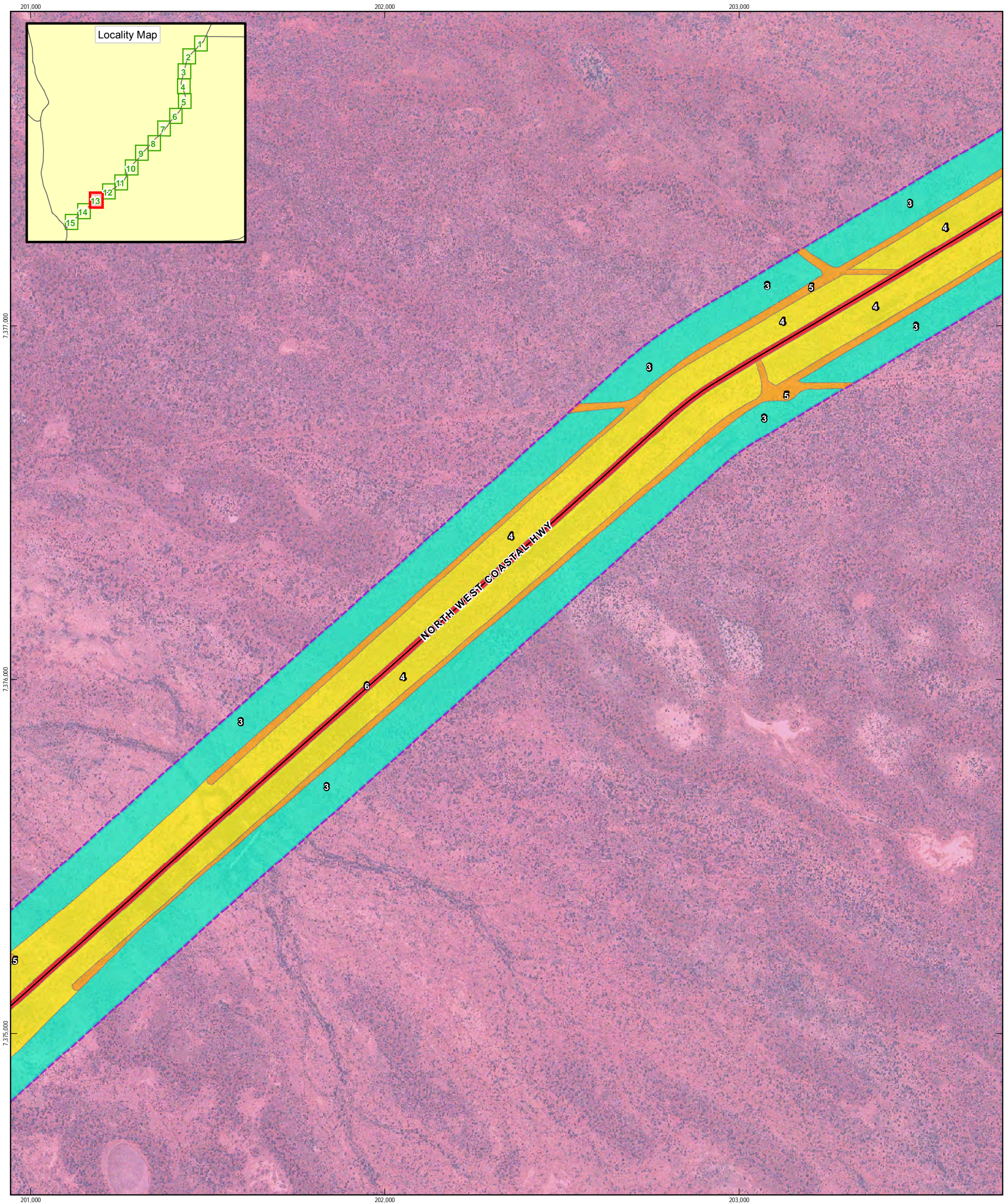
Figure 4c

G:\6128865\GIS\Maps\MXD\6128865_G003_Fig4c_VegConditionSouth_Rev0.mxd

239 Adelaide Terrace Perth WA 6004 Australia T 61 8 6222 8222 F 61 8 6222 8555 E permail@ghd.com.au W www.ghd.com.au

© 2013. Whilst every care has been taken to prepare this map, GHD, MRWA, DEC, GA and Landgate make no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and cannot accept liability and responsibility of any kind (whether in contract, tort or otherwise) for any expenses, losses, damages and/or costs (including indirect or consequential damage) which are or may be incurred by any party as a result of the map being inaccurate, incomplete or unsuitable in any way and for any reason.

Data source: Landgate: Mia Mia 2007 Mosaic - 20121115; Barrabiddy 2007 Mosaic - 20121115; MRWA: Roads - 20120528; GHD: Southern Section Survey Area - 20121114, Vegetation Conditions - 20130128; DEC: Priority Ecological Communities - 20121129, DEC Estates - 20121219; GA: Topo 250k Series 3 - 2006. Created by: radeleon



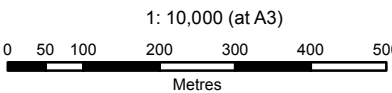
LEGEND

- Roads
- Southern Section Survey Area
- Priority Ecological Communities
- DEC Estates

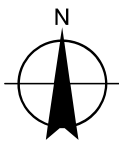
Vegetation Conditions (Keighery, 1994)

- 1. Pristine or Nearly So
- 1-2
- 2. Excellent
- 2-3
- 3. Very Good

- 3-4
- 4. Good
- 4-5
- 5. Degraded
- 5-6
- 6. Completely Degraded



Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50



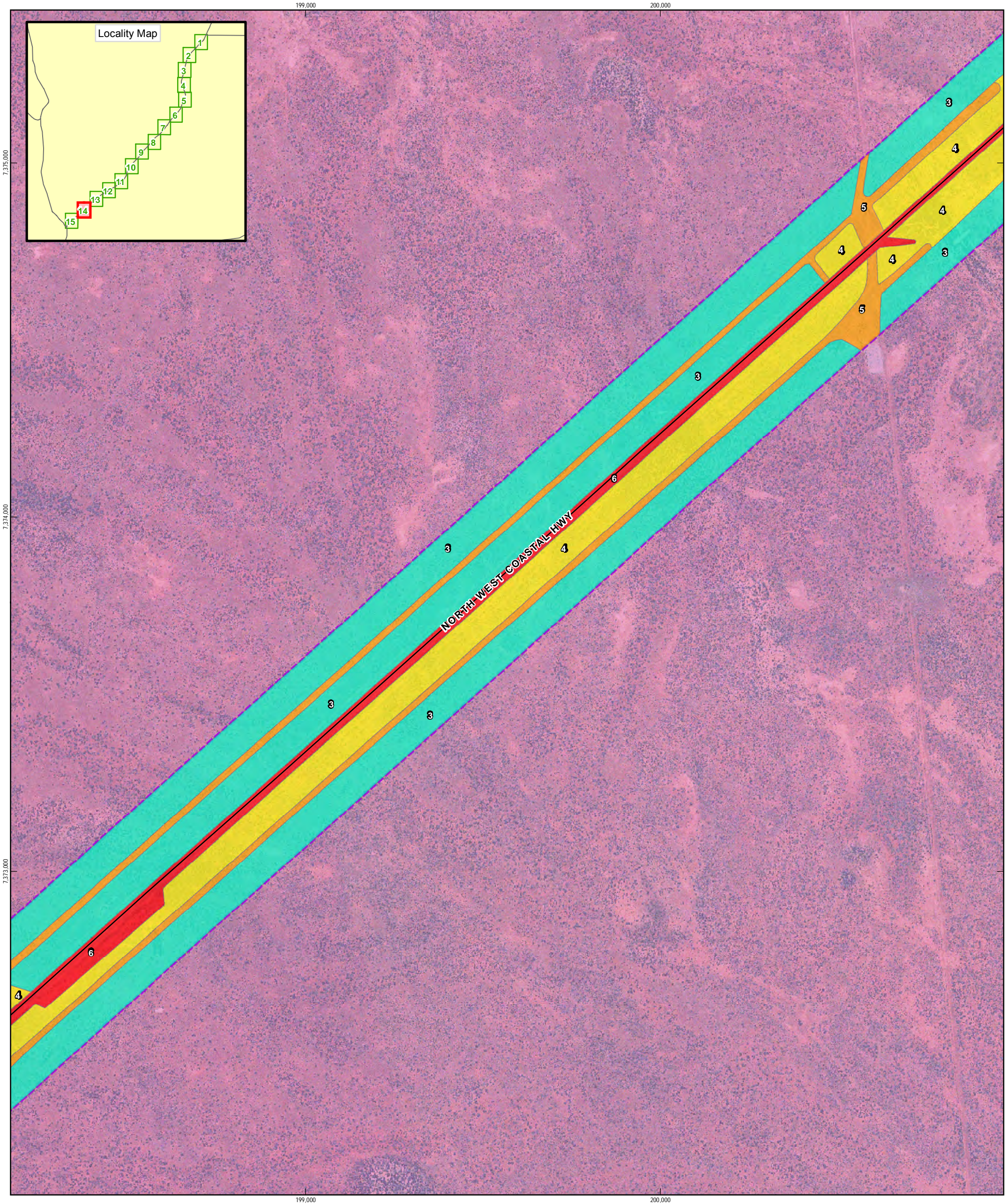
Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number 61-28865
Revision 0
Date 03 Apr 2013

Southern Section Vegetation Conditions

Sheet 13 of 15

Figure 4c



LEGEND

- Roads
- Southern Section Survey Area
- Priority Ecological Communities
- DEC Estates

Vegetation Conditions (Keighery, 1994)

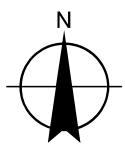
- 1. Pristine or Nearly So
- 1-2
- 2. Excellent
- 2-3
- 3. Very Good
- 3-4
- 4. Good
- 4-5
- 5. Degraded
- 5-6
- 6. Completely Degraded

1: 10,000 (at A3)

0 50 100 200 300 400 500

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50



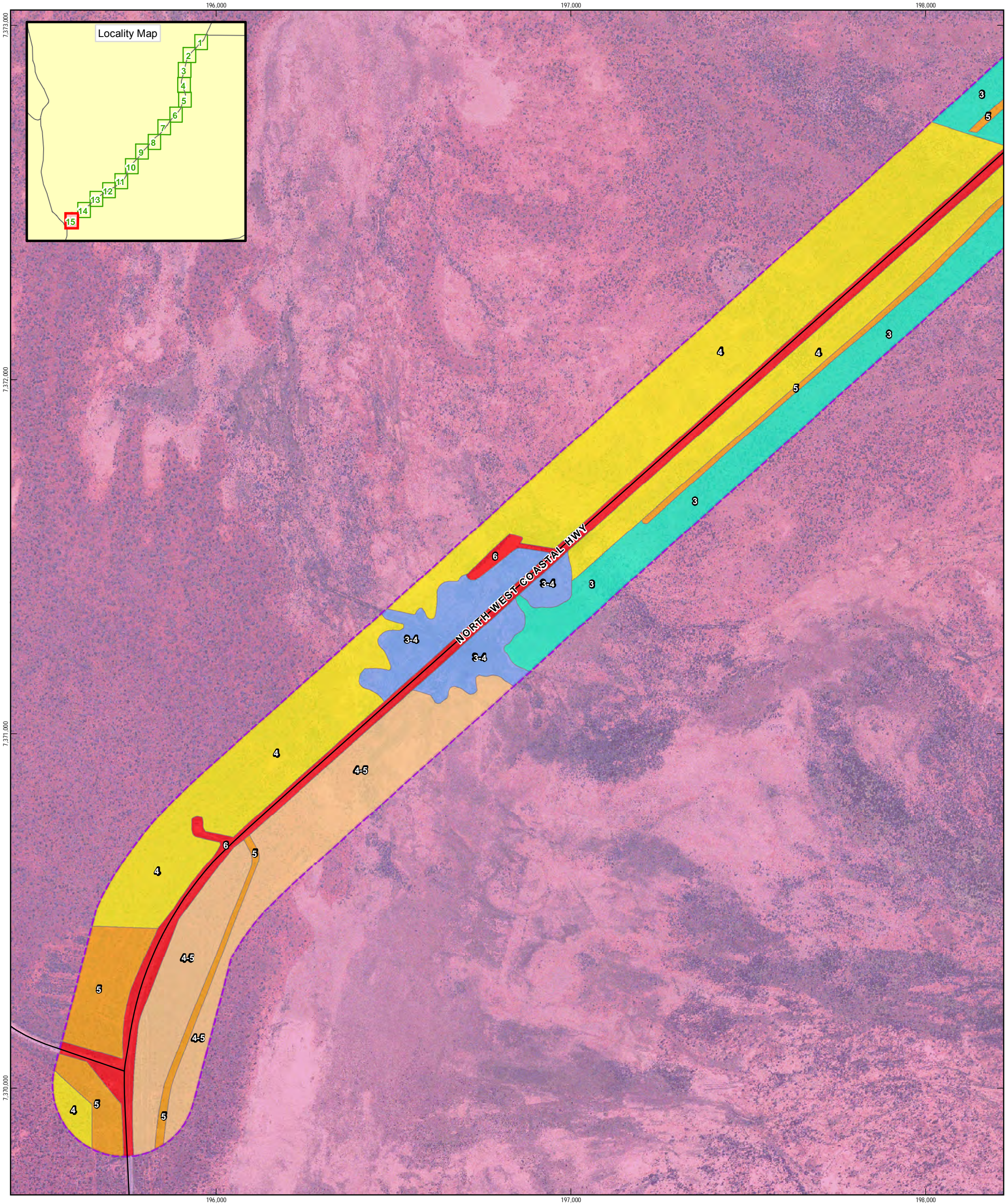
Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number	61-28865
Revision	0
Date	03 Apr 2013

Southern Section Vegetation Conditions

Sheet 14 of 15

Figure 4c



LEGEND

— Roads

Southern Section Survey Area

Priority Ecological Communities

DEC Estates

Vegetation Conditions (Keighery, 1994)

1. Pristine or Nearly So

1-2

2. Excellent

2-3

3. Very Good

3-4

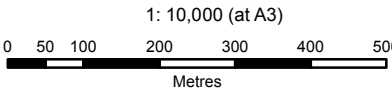
4. Good

4-5

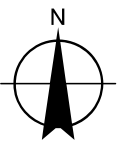
5. Degraded

5-6

6. Completely Degraded



Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50



Main Roads Western Australia
MRWA ETS BDS
North West Coastal Highway SLK 620.5 – 767
Biological Survey

Job Number | 61-28865
Revision | 0
Date | 03 Apr 2013

Southern Section Vegetation Conditions

Sheet 15 of 15

Figure 4c

Appendix B Conservation Categories

[EPBC Act Conservation Categories](#)

[WC Act Conservation Categories](#)

[DEC Conservation Categories](#)

Table 8: Categories and Definitions for EPBC Act Listed Flora and Fauna Species

Conservation Category	Definition
<i>Extinct</i>	Taxa not definitely located in the wild during the past 50 years.
<i>Extinct in the Wild</i>	Taxa known to survive only in captivity.
<i>Critically Endangered</i>	Taxa facing an extremely high risk of extinction in the wild in the immediate future.
<i>Endangered</i>	Taxa facing a very high risk of extinction in the wild in the near future.
<i>Vulnerable</i>	Taxa facing a high risk of extinction in the wild in the medium term.
<i>Near Threatened</i>	Taxa that risk becoming Vulnerable in the wild.
<i>Conservation Dependent</i>	Taxa whose survival depends upon ongoing conservation measures. Without these measures, a conservation dependent taxon would be classified as Vulnerable or more severely threatened.
<i>Data Deficient (Insufficiently Known)</i>	Taxa suspected of being Rare, Vulnerable or Endangered, but whose true status cannot be determined without more information.
<i>Least Concern</i>	Taxa that are not considered Threatened.

Table 9: Conservation Codes and Descriptions for DEC Declared Rare and Priority Flora Species

Code	Conservation Category	Description
Wildlife Conservation Act 1950		
T	Schedule 1 under the WC Act	<p>Threatened Fauna (Fauna that is rare or is likely to become extinct.</p> <p>Threatened Flora (Declared Rare Flora – Extant).</p> <p>Taxa that have been adequately searched for and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection, and have been gazetted as such.</p> <p>CR: Critically Endangered – considered to be facing an extremely high risk of extinction in the wild.</p> <p>EN: Endangered – considered to be facing a very high risk of extinction in the wild.</p> <p>VU: Vulnerable – considered to be facing a high risk of extinction in the wild.</p>

Code	Conservation Category	Description
X	Schedule 2 under the WC Act	<p>Presumed Extinct Fauna.</p> <p>Presumed Extinct Flora (Declared Rare Flora – Extinct).</p> <p>Taxa which have been adequately searched for and there is no reasonable doubt that the last individual has died, and have been gazetted as such.</p>
IA	Schedule 3 under the WC Act	<p>Birds protected under an international agreement.</p> <p>Birds that are subject to an agreement between governments of Australia and Japan relating to the protection of migratory birds and birds in danger of extinction.</p>
S	Schedule 4 under the WC Act	<p>Other specially protected fauna.</p> <p>Fauna that is in need of special protection, otherwise than for the reasons mentioned in the above schedules.</p>
DEC Priority Listed		
1	Priority One: Poorly-known taxa	Taxa that are known from one or a few collections or sight records (generally less than five), all on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, Shire, Westrail and Main Roads WA road, gravel and soil reserves, and active mineral leases and under threat of habitat destruction or degradation. Taxa may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes.
2	Priority Two: Poorly-known taxa	Taxa that are known from one or a few collections or sight records, some of which are on lands not under imminent threat of habitat destruction or degradation, e.g. national parks, conservation parks, nature reserves, State forest, vacant Crown land, water reserves, etc. Taxa may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes.
3	Priority Three: Poorly-known taxa	Taxa that are known from collections or sight records from several localities not under imminent threat, or from few but widespread localities with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Taxa may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and known threatening processes exist that could affect them.
4	Priority Four: Rare, Near Threatened and other taxa in need of monitoring	<p>(a) Rare. Taxa that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These taxa are usually represented on conservation lands.</p> <p>(b) Near Threatened. Taxa that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable.</p> <p>(c) Taxa that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.</p>

Code	Conservation Category	Description
5	Priority 5: Conservation Dependent taxa	Taxa that are not threatened but are subject to a specific conservation program, the cessation of which would result in the taxon becoming threatened within five years.

EPBC Act Fauna Conservation Categories

Listed Threatened Species and Ecological Communities

An action will require approval from the Environment Minister if the action has, will have, or is likely to have a significant impact on a species listed in any of the following categories:

- Extinct in the wild;
- Critically endangered;
- Endangered; or
- Vulnerable.

Critically Endangered and Endangered Species

An action has, will have, or is likely to have a significant impact on a critically endangered or endangered species if it does, will, or is likely to:

- lead to a long-term decrease in the size of a population, or
- reduce the area of occupancy of the species, or
- fragment an existing population into two or more populations, or
- adversely affect habitat critical to the survival of a species, or
- disrupt the breeding cycle of a population, or
- modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline, or
- result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat*, or
- interfere with the recovery of the species.

**Introducing an invasive species into the habitat may result in that species becoming established. An invasive species may harm a critically endangered or endangered species by direct competition, modification of habitat, or predation.*

Vulnerable Species

An action has, will have, or is likely to have a significant impact on a vulnerable species if it does, will, or is likely to:

- lead to a long-term decrease in the size of an important population of a species, or
- reduce the area of occupancy of an important population, or
- fragment an existing important population into two or more populations, or
- adversely affect habitat critical to the survival of a species, or
- disrupt the breeding cycle of an important population, or
- modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline, or
- result in invasive species that are harmful a vulnerable species becoming established in the vulnerable species' habitat*, or

- interferes substantially with the recovery of the species.
- An important population is one that is necessary for a species' long-term survival and recovery. This may include populations that are:
- key source populations either for breeding or dispersal,
- populations that are necessary for maintaining genetic diversity, and/or
- populations that are near the limit of the species range.

**Introducing an invasive species into the habitat may result in that species becoming established. An invasive species may harm a vulnerable species by direct competition, modification of habitat, or predation.*

Listed Migratory Species

An action will require approval from the Environment Minister if the action has, will have, or is likely to have a significant impact on a listed migratory species. Note that some migratory species are also listed as threatened species. The criteria below are relevant to migratory species that are not threatened.

An action has, will have, or is likely to have a significant impact on a migratory species if it does, will, or is likely to:

- substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat of the migratory species, or
- result in invasive species that is harmful to the migratory species becoming established* in an area of important habitat of the migratory species, or
- seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of the species.

An area of important habitat is:

- habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species, or
- habitat utilised by a migratory species which is at the limit of the species range, or
- habitat within an area where the species is declining.

Listed migratory species cover a broad range of species with different life cycles and population sizes. Therefore, what is an ecologically significant proportion of the population varies with the species (each circumstance will need to be evaluated).

**Introducing an invasive species into the habitat may result in that species becoming established. An invasive species may harm a migratory species by direct competition, modification of habitat, or predation.*

The Commonwealth Marine Environment

An action will require approval from the Environment Minister if:

- the action is taken in a Commonwealth marine area and the action has, will have, or is likely to have a significant effect on the environment, or
- the action is taken outside a Commonwealth marine area and the action has, will have, or is likely to have a significant effect on the environment in a Commonwealth marine area.

An action has, will have or is likely to have a significant impact on the environment in a Commonwealth marine area if it does, will, or is likely to:

- result in a known or potential pest species becoming established in the Commonwealth marine area*, or
- modify, destroy, fragment, isolate or disturb an important or substantial area of habitat such that an adverse impact on marine ecosystem functioning or integrity in a Commonwealth marine area results, or
- have a substantial adverse effect on a population of a marine species or cetacean including its life cycle (e.g. breeding, feeding, migration behaviour, and life expectancy) and spatial distribution, or
- result in a substantial change in air quality** or water quality (including temperature) which may adversely impact on biodiversity, ecological integrity, social amenity or human health, or
- result in persistent organic chemicals, heavy metals, or other potentially harmful chemicals accumulating in the marine environment such that biodiversity, ecological integrity, social amenity or human health may be adversely affected.

**Translocating or introducing a pest species may result in that species becoming established.*

***The Commonwealth marine area includes any airspace over Commonwealth waters.*

Table 10: Western Australian Wildlife Conservation Act 1950 Conservation Codes

Conservation Code	Description
Schedule 1	"...fauna that is rare or likely to become extinct, are declared to be fauna that is in need of special protection."
Schedule 2	"... fauna that is presumed to be extinct, are declared to be fauna that is in need of special protection."
Schedule 3	"... birds that are subject to an agreement between the governments of Australia and Japan relating to the protection of migratory birds and birds in danger of extinction are declared to be fauna that is in need of special protection."
Schedule 4	"... fauna that is in need of special protection, otherwise than the reasons mentioned [in Schedule 1-3]."

Table 11: DEC Priority Fauna Codes

Conservation Category	Description
Priority 1	Taxa with few, poorly known populations on threatened lands.
Priority 2	Taxa with few, poorly known populations on conservation lands. Taxa which are known from few specimens or sight records from one or a few localities on lands not under immediate threat of habitat destruction or degradation, e.g. national parks, conservation parks, nature reserves, State forest, vacant Crown Land , water reserves, etc.
Priority 3	Taxa, which are known from few specimens or sight records, some of which are on lands not under immediate threat of habitat destruction or degradation.
Priority 4	Rare taxa. Taxa which are considered to have been adequately surveyed and which, whilst being rare (in Australia), are not currently threatened by any identifiable factors. These taxa require monitoring every 5-10 years.
Priority 5	Taxa is in need of monitoring. Taxa which are not considered threatened but are subject to a specific conservation program, the cessation of which would result in the species becoming threatened within five years.

Appendix C Flora

[Project Area Flora List](#)

[Project Area Vegetation Types](#)

[Project Area Conservation Significant Flora Locations](#)

Table 12: Project Area Flora Survey Results

Family	Genus	Species	Common Name	Status	Northern	Middle	Southern
Aizoaceae	<i>Trianthema</i>	<i>pilosa</i>				X	
Aizoaceae	<i>Trianthema</i>	<i>triquetra</i>	Red Spinach		X		X
Amaranthaceae	<i>Alternanthera</i>	<i>javanica</i>			X		
Amaranthaceae	<i>Aerva</i>	<i>nodiflora</i>	Common Joyweed			X	X
Amaranthaceae	<i>Ptilotus</i>	<i>aeroides</i>			X		
Amaranthaceae	<i>Ptilotus</i>	<i>appendiculatus</i>			X	X	
Amaranthaceae	<i>Ptilotus</i>	<i>astrolasius</i>			X	X	X
Amaranthaceae	<i>Ptilotus</i>	<i>axillaris</i>			X	X	
Amaranthaceae	<i>Ptilotus</i>	<i>davaricatus</i>	Climbing Mulla Mulla			X	X
Amaranthaceae	<i>Ptilotus</i>	<i>helipteroides</i>			X		
Amaranthaceae	<i>Ptilotus</i>	<i>macrocephalus</i>	Featherheads				X
Amaranthaceae	<i>Ptilotus</i>	<i>murrayi</i>				X	
Amaranthaceae	<i>Ptilotus</i>	<i>nobilis</i>	Tall Mulla Mulla		X	X	X
Amaranthaceae	<i>Ptilotus</i>	<i>obovatus</i>			X	X	
Amaranthaceae	<i>Ptilotus</i>	<i>polakii</i> subsp. <i>polakii</i>				X	X
Amaranthaceae	<i>Ptilotus</i>	<i>polystachyus</i>			X		
Amaranthaceae	<i>Streptoglossa</i>	<i>macrocephala</i>					X
Apocynaceae	<i>Chrysocephalum</i>	<i>apiculatum</i>			X		
Apocynaceae	<i>Marsdenia</i>	<i>australis</i>					X
Apocynaceae	<i>Pluchea</i>	<i>dunlopii</i>			X		
Apocynaceae	<i>Pluchea</i>	<i>tetranthera</i>			X		
Apocynaceae	<i>Pterocaulon</i>	<i>sphacelatum</i>			X		
Apocynaceae	<i>Rhyncharrhena</i>	<i>linearis</i>			X		
Apocynaceae	<i>Sarcostemma</i>	<i>viminale</i> subsp. <i>australe</i>			X		X
Apocynaceae	<i>Streptoglossa</i>	<i>decurrens</i>			X		

Family	Genus	Species	Common Name	Status	Northern	Middle	Southern
Apocynaceae	<i>Streptoglossa</i>	<i>macrocephala</i>			X		
Asparagaceae	<i>Thysanotus</i>	<i>arenarius</i>			X		
Asphodelaceae	<i>Asphodelus</i>	<i>fistulosus</i>	Onion Weed	*			X
Asteraceae	<i>Actinobole</i>	<i>drummondianum</i>					X
Asteraceae	<i>Myriocephalus</i>	<i>oldfieldii</i>				X	
Asteraceae	<i>Olearia</i>	<i>dampieri</i>					X
Asteraceae	<i>Pluchea</i>	<i>dentex</i>					X
Asteraceae	<i>Pluchea</i>	<i>dunlopii</i>				X	
Asteraceae	<i>Pluchea</i>	<i>rubellifera</i>				X	X
Asteraceae	<i>Pluchea</i>	<i>tetranthera</i>				X	
Asteraceae	<i>Pterocaulan</i>	<i>sphacelatum</i>	Apple Bush			X	X
Asteraceae	<i>Rhodanthe</i>	<i>floribunda</i>				X	
Asteraceae	<i>Streptoglossa</i>	<i>bubakii</i>				X	
Asteraceae	<i>Streptoglossa</i>	<i>decurrens</i>				X	
Asteraceae	<i>Streptoglossa</i>	<i>macrocephala</i>				X	X
Boraginaceae	<i>Halgania</i>	<i>cyanea</i> var. Allambi Station					X
Boraginaceae	<i>Halgania</i>	<i>solanacea</i>					X
Boraginaceae	<i>Halgania</i>	<i>cyanea</i>	Rough Halgania			X	
Boraginaceae	<i>Heliotropium</i>	<i>chrysocarpum</i>			X	X	
Boraginaceae	<i>Heliotropium</i>	<i>ovalifolium</i>			X		
Boraginaceae	<i>Lepidium</i>	<i>platypetalum</i>	Slender Peppergrass				X
Brassicaceae	<i>Trichodesma</i>	<i>zeylanicum</i>	Camel Bush		X		X
Campanulaceae	<i>Wahlenbergia</i>	<i>gracilentia</i>	Annual Bluebush				X
Chenopodiaceae	<i>Atriplex</i>	<i>codonocarpa</i>					
Chenopodiaceae	<i>Atriplex</i>	<i>semilunaris</i>	Annual Saltbush		X		X
Chenopodiaceae	<i>Chenopodium</i>	<i>gaudichaudianum</i>	Cottony Saltbush			X	X
Chenopodiaceae	<i>Dissocarpus</i>	<i>paradoxus</i>	Curious Saltbush		X		

Family	Genus	Species	Common Name	Status	Northern	Middle	Southern
Chenopodiaceae	<i>Dysphania</i>	<i>melanocarpa</i>	Black Crumbweed				X
Chenopodiaceae	<i>Dysphania</i>	<i>rhadinostachya</i>			X	X	
Chenopodiaceae	<i>Enchylaena</i>	<i>tomentosa</i>	Barrier Saltbush		X	X	X
Chenopodiaceae	<i>Maireana</i>	<i>planifolia</i>	Low Bluebush		X	X	X
Chenopodiaceae	<i>Maireana</i>	<i>polypterygia</i>	Gascoyne Bluebush				X
Chenopodiaceae	<i>Maireana</i>	<i>tomentosa</i>	Felty Bluebush				X
Chenopodiaceae	<i>Neobassia</i>	<i>astrocarpa</i>					X
Chenopodiaceae	<i>Rhagodia</i>	<i>eremaea</i>	Thorny Saltbush		X	X	X
Chenopodiaceae	<i>Salsola</i>	sp. (Insufficient material)					X
Chenopodiaceae	<i>Salsola</i>	<i>australis</i>				X	
Chenopodiaceae	<i>Sclerolaena</i>	<i>cuneata</i>	Yellow Bindi		X	X	
Chenopodiaceae	<i>Sclerolaena</i>	<i>diacantha</i>	Grey Copperburr				X
Chenopodiaceae	<i>Sclerolaena</i>	<i>eriacantha</i>	Tall Bindii		X		X
Chenopodiaceae	<i>Sclerolaena</i>	<i>eurotioides</i>			X	X	
Chenopodiaceae	<i>Tecticornia</i>	<i>disarticulata</i>				X	
Chenopodiaceae	<i>Threlkeldia</i>	<i>diffusa</i>	Coast Bonefruit				X
Cleomaceae	<i>Cleome</i>	sp. (insufficient material)					X
Cleomaceae	<i>Cleome</i>	<i>uncifera</i>				X	
Convolvulaceae	<i>Bonamia</i>	<i>erecta</i>			X	X	X
Convolvulaceae	<i>Convolvulus</i>	<i>angustissimus</i>			X		
Convolvulaceae	<i>Convolvulus</i>	<i>clementii</i>			X		
Convolvulaceae	<i>Duperreya</i>	<i>commixta</i>			X		
Convolvulaceae	<i>Evolvulus</i>	<i>alsinoides</i>	Tropical Speedwell			X	
Convolvulaceae	<i>Ipomoea</i>	<i>muelleri</i>	Poison Morning Glory		X	X	X
Convolvulaceae	<i>Operculina</i>	<i>aequisepala</i>			X		
Cucurbitaceae	<i>Cucumis</i>	<i>maderaspatanus</i>			X		X
Cyperaceae	<i>Cyperus</i>	<i>vaginatus</i>	Stiffleaf Sedge				X

Family	Genus	Species	Common Name	Status	Northern	Middle	Southern
Cyperaceae	<i>Bulbostylis</i>	<i>barbata</i>			X	X	
Euphorbiaceae	<i>Adriana</i>	<i>tomentosa</i> var. <i>tomentosa</i>					X
Euphorbiaceae	<i>Euphorbia</i>	<i>alsiniflora</i>	Namana		X		X
Euphorbiaceae	<i>Euphorbia</i>	<i>australis</i>	Namana		X	X	X
Euphorbiaceae	<i>Euphorbia</i>	<i>biconvexa</i>			X		
Euphorbiaceae	<i>Euphorbia</i>	<i>drummondii</i>	Caustic Weed				X
Euphorbiaceae	<i>Euphorbia</i>	<i>tannensis</i> subsp. <i>eremophila</i>			X	X	
Fabaceae	<i>Acacia</i>	<i>inaequilatera</i>	Baderi		X	X	
Fabaceae	<i>Acacia</i>	<i>ancistrocarpa</i>	Fitzroy Wattle		X	X	X
Fabaceae	<i>Acacia</i>	<i>aptaneura</i>			X		
Fabaceae	<i>Acacia</i>	<i>bivenosa</i>			X	X	
Fabaceae	<i>Acacia</i>	<i>citrinoviridis</i>					X
Fabaceae	<i>Acacia</i>	<i>coriacea</i> subsp. <i>pendens</i>			X		X
Fabaceae	<i>Acacia</i>	<i>cuspidifolia</i>				X	
Fabaceae	<i>Acacia</i>	<i>gregorii</i>	Gregory's Wattle				X
Fabaceae	<i>Acacia</i>	<i>kempeana</i>				X	
Fabaceae	<i>Acacia</i>	<i>murrayana</i>	Sandplain Wattle				X
Fabaceae	<i>Acacia</i>	<i>pruinocarpa</i>	Gidgee			X	
Fabaceae	<i>Acacia</i>	<i>pteraneura</i>			X		
Fabaceae	<i>Acacia</i>	<i>pyrifolia</i>	Ranji Bush		X		X
Fabaceae	<i>Acacia</i>	<i>ramulosa</i>	Horse Mulga				X
Fabaceae	<i>Acacia</i>	<i>ramulosa</i> var. <i>linophylla</i>					X
Fabaceae	<i>Acacia</i>	<i>ramulosa</i> var. <i>ramulosa</i>				X	
Fabaceae	<i>Acacia</i>	<i>sclerosperma</i>	Limestone Wattle		X	X	
Fabaceae	<i>Acacia</i>	<i>sclerosperma</i> subsp. <i>sclerosperma</i>			X	X	X
Fabaceae	<i>Acacia</i>	<i>sericophylla</i>			X	X	X
Fabaceae	<i>Acacia</i>	<i>startii</i>		P3			X

Family	Genus	Species	Common Name	Status	Northern	Middle	Southern
Fabaceae	<i>Acacia</i>	<i>stellaticeps</i>			X	X	X
Fabaceae	<i>Acacia</i>	<i>subtessarogona</i>			X	X	
Fabaceae	<i>Acacia</i>	<i>synchronicia</i>			X	X	X
Fabaceae	<i>Acacia</i>	<i>tetragonophylla</i>	Kurara		X	X	X
Fabaceae	<i>Acacia</i>	<i>trachycarpa</i>	Mini Ritchi		X	X	
Fabaceae	<i>Acacia</i>	<i>victoriae</i>	Bramble Wattle	RE	X		X
Fabaceae	<i>Acacia</i>	<i>wanyu</i>			X		
Fabaceae	<i>Acacia</i>	<i>wiseana</i>					X
Fabaceae	<i>Acacia</i>	<i>xiphophylla</i>			X	X	X
Fabaceae	<i>Aotus</i>	aff. <i>phyllicoides</i>		MS			X
Fabaceae	<i>Chorizema</i>	<i>racemosum</i>					X
Fabaceae	<i>Crotalaria</i>	<i>cunninghamii</i>	Green Birdflower				X
Fabaceae	<i>Cullen</i>	<i>lachnostachys</i>			X		
Fabaceae	<i>Daviesia</i>	<i>benthamii</i>				X	
Fabaceae	<i>Eragrostis</i>	<i>eriopoda</i>	Woollybutt Grass				X
Fabaceae	<i>Erythrina</i>	<i>vespertilio</i>			X		
Fabaceae	<i>Indigofera</i>	<i>colutea</i>	Sticky Indigo				X
Fabaceae	<i>Indigofera</i>	<i>monophylla</i>					X
Fabaceae	<i>Indigofera</i>	<i>boviperda</i> subsp. <i>boviperda</i>				X	
Fabaceae	<i>Indigofera</i>	<i>monophylla</i>				X	
Fabaceae	<i>Indigofera</i>	<i>boviperda</i>			X		
Fabaceae	<i>Isotropis</i>	<i>atropurpurea</i>			X	X	
Fabaceae	<i>Mirbelia</i>	<i>viminalis</i>			X	X	
Fabaceae	<i>Petalostylis</i>	<i>cassioides</i>			X		
Fabaceae	<i>Petalostylis</i>	<i>labicheoides</i>	Slender Petalostylis		X		X
Fabaceae	<i>Rhynchosia</i>	<i>minima</i>	Rhynchosia		X		X
Fabaceae	<i>Senna</i>	<i>notabilis</i>					X

Family	Genus	Species	Common Name	Status	Northern	Middle	Southern
Fabaceae	<i>Senna</i>	<i>artemisioides</i> subsp. <i>helmsii</i>			X	X	
Fabaceae	<i>Senna</i>	<i>artemisioides</i> subsp. <i>helmsii</i> x <i>oligophylla</i>				X	
Fabaceae	<i>Senna</i>	<i>artemisioides</i> subsp. <i>oligophylla</i>			X	X	X
Fabaceae	<i>Senna</i>	<i>glutinosa</i> subsp. <i>glutinosa</i>			X	X	X
Fabaceae	<i>Senna</i>	<i>glutinosa</i> subsp. <i>pruinosa</i>			X	X	
Fabaceae	<i>Senna</i>	<i>glutinosa</i> subsp. <i>chatelainiana</i>			X		
Fabaceae	<i>Senna</i>	<i>glutinosa</i> subsp. x <i>luerssenii</i>			X		
Fabaceae	<i>Senna</i>	<i>notabilis</i>			X	X	X
Fabaceae	<i>Senna</i>	sp. Meekatharra (E. Bailey 1-26)			X		
Fabaceae	<i>Sesbania</i>	<i>cannabina</i>	Sesbania Pea			X	X
Fabaceae	<i>Stylosanthes</i>	<i>hamata</i>	Verano Stylo				X
Fabaceae	<i>Tephrosia</i>	<i>rosea</i> var. <i>glabrior</i>					X
Fabaceae	<i>Tephrosia</i>	<i>rosea</i> var. <i>clementii</i>			X		X
Fabaceae	<i>Tephrosia</i>	<i>rosea</i>	Flinders River Poison				X
Fabaceae	<i>Tephrosia</i>	sp. Onslow (K.R. Newbey 10571)			X		
Fabaceae	<i>Tephrosia</i>	<i>uniovulata</i>			X		
Fabaceae	<i>Vachellia</i>	<i>farnesiana</i>	Mimosa Bush			X	X
Fabaceae	<i>Vigna</i>	<i>lanceolata</i> var. <i>lanceolata</i>			X		
Gentianaceae	<i>Schenkia</i>	<i>clementii</i>				X	
Goodeniaceae	<i>Goodenia</i>	<i>corynocarpa</i>				X	
Goodeniaceae	<i>Goodenia</i>	<i>cusackiana</i>			X		X
Goodeniaceae	<i>Goodenia</i>	<i>lamprosperma</i>				X	X
Goodeniaceae	<i>Goodenia</i>	<i>microptera</i>			X		
Goodeniaceae	<i>Scaevola</i>	<i>acacioides</i>			X	X	X
Goodeniaceae	<i>Scaevola</i>	<i>sericophylla</i>			X	X	X
Goodeniaceae	<i>Scaevola</i>	<i>spinescens</i>	Currant Bush			X	X

Family	Genus	Species	Common Name	Status	Northern	Middle	Southern
Gyrostemonaceae	<i>Gyrostemon</i>	<i>ramulosus</i>	Corkybark		X		X
Gyrostemonaceae	<i>Codonocarpus</i>	<i>cotinifolius</i>	Native Poplar		X	X	
Hemerocallidaceae	<i>Corynotheca</i>	<i>micrantha</i>	Sand Lilly		X		
Lamiaceae	<i>Dicrastylis</i>	<i>cordifolia</i>			X		
Lamiaceae	<i>Lachnostachys</i>	<i>eribotrya</i>	Lambswool			X	
Lamiaceae	<i>Quoya</i>	<i>loxocarpa</i>			X		X
Lamiaceae	<i>Quoya</i>	<i>paniculata</i>					X
Laminaceae	<i>Spartothamnella</i>	<i>teucriflora</i>			X		
Lauraceae	<i>Cassytha</i>	<i>aurea</i>			X		
Lauraceae	<i>Cassytha</i>	<i>racemosa</i>			X		
Loranthaceae	<i>Abutilon</i>	<i>cunninghamii</i>					X
Loranthaceae	<i>Abutilon</i>	<i>dioicum</i>			X	X	
Malvaceae	<i>Abutilon</i>	<i>indicum</i>	Indian Lantern Flower		X		
Malvaceae	<i>Abutilon</i>	<i>lepidum</i>			X	X	X
Malvaceae	<i>Alyogyne</i>	<i>pinoniana</i>	Sand Hibiscus		X	X	X
Malvaceae	<i>Amyema</i>	<i>fitzgeraldii</i>	Pincushion Mistletoe				X
Malvaceae	<i>Amyema</i>	<i>preissii</i>	Wireleaf Mistletoe				X
Malvaceae	<i>Androcalva</i>	<i>luteifolia</i>	Yellow-flowered Rulingia		X	X	
Malvaceae	<i>Corchorus</i>	<i>crozophorifolius</i>			X		X
Malvaceae	<i>Corchorus</i>	<i>laniflorus</i>			X		
Malvaceae	<i>Corchorus</i>	<i>sidoides</i>	Flannel Weed			X	X
Malvaceae	<i>Corchorus</i>	<i>sidoides</i> subsp. <i>vermicularis</i>			X		X
Malvaceae	<i>Corchorus</i>	<i>tectus</i>				X	
Malvaceae	<i>Corchorus</i>	<i>walcottii</i>	Woolly Corchorus		X		
Malvaceae	<i>Gossypium</i>	<i>australe</i>	Native Cotton		X		
Malvaceae	<i>Hannafordia</i>	<i>quadrivalvis</i> subsp. <i>recurva</i>					X
Malvaceae	<i>Hibiscus</i>	<i>brachychlaenus</i>			X	X	X



Family	Genus	Species	Common Name	Status	Northern	Middle	Southern
Malvaceae	<i>Hibiscus</i>	<i>sturtii</i>	Sturt's Hibiscus			X	
Malvaceae	<i>Keraudrenia</i>	<i>velutina</i> subsp. <i>elliptica</i>					X
Malvaceae	<i>Keraudrenia</i>	<i>velutina</i>			X	X	
Malvaceae	<i>Sida</i>	<i>echinocarpa</i>			X	X	
Malvaceae	<i>Sida</i>	<i>rohlenae</i>			X		
Malvaceae	<i>Sida</i>	sp. Pilbara			X		
Malvaceae	<i>Triumfetta</i>	<i>chaetocarpa</i>	Urchins		X		X
Malvaceae	<i>Triumfetta</i>	<i>clementii</i>			X		
Malvaceae	<i>Waltheria</i>	<i>indica</i>					X
Marsileaceae	<i>Marsilea</i>	<i>hirsuta</i>	Nardoo				X
Meliaceae	<i>Owenia</i>	<i>acidula</i>	Gruie		X		
Molluginaceae	<i>Mollugo</i>	<i>molluginea</i>			X		
Myrtaceae	<i>Calytrix</i>	<i>truncatifolia</i>					X
Myrtaceae	<i>Corymbia</i>	<i>opaca</i>				X	X
Myrtaceae	<i>Corymbia</i>	<i>hamersleyana</i>			X		
Myrtaceae	<i>Corymbia</i>	<i>candida</i>			X		
Myrtaceae	<i>Corymbia</i>	<i>zygophylla</i>			X		
Myrtaceae	<i>Eucalyptus</i>	<i>camaldulensis</i>	River Gum				X
Myrtaceae	<i>Eucalyptus</i>	<i>victrix</i>			X	X	
Myrtaceae	<i>Melaleuca</i>	<i>cardiophylla</i>	Tangling Melaleuca				X
Myrtaceae	<i>Melaleuca</i>	<i>glomerata</i>					X
Myrtaceae	<i>Pileanthus</i>	<i>septentrionalis</i>			X		
Myrtaceae	<i>Verticordia</i>	<i>forrestii</i>	Forrest's Featherflower				X
Nyctaginaceae	<i>Boerhavia</i>	<i>coccinea</i>			X		
Oleaceae	<i>Jasminum</i>	<i>didymum</i>				X	X
Oleaceae	<i>Jasminum</i>	sp. (insufficient material)					X
Plantaginaceae	<i>Stemodia</i>	<i>viscosa</i>	Pagurda				X



Family	Genus	Species	Common Name	Status	Northern	Middle	Southern
Plantaginaceae	<i>Stemodia</i>	sp. Onslow (A.A. Mitchell 76/148)			X	X	X
Poaceae	<i>Aristida</i>	<i>contorta</i>	Keroscene Grass		X	X	X
Poaceae	<i>Aristida</i>	<i>holathera</i>			X	X	X
Poaceae	<i>Aristida</i>	<i>latifolia</i>	Feathertop Wiregrass		X		
Poaceae	<i>Austrostipa</i>	<i>elegantissima</i>				X	
Poaceae	<i>Brachyachne</i>	<i>prostrata</i>			X		
Poaceae	<i>Cenchrus</i>	<i>ciliaris</i>	Buffel Grass	*			X
Poaceae	<i>Cenchrus</i>	<i>setiger</i>	Birdwood Grass	*	X		
Poaceae	<i>Chloris</i>	<i>pectinata</i>	Comb Chloris		X		
Poaceae	<i>Cymbopogon</i>	<i>obtectus</i>	Silkyheads			X	
Poaceae	<i>Cynodon</i>	<i>dactylon</i>	Couch				X
Poaceae	<i>Digitaria</i>	<i>ciliaris</i>	Summer Grass		X		
Poaceae	<i>Enneapogon</i>	<i>caerulescens</i>	Limestone Grass		X	X	X
Poaceae	<i>Enteropogon</i>	<i>ramosus</i>	Windmill Grass				X
Poaceae	<i>Eragrostis</i>	<i>cumingii</i>	Cuming's Love Grass			X	
Poaceae	<i>Eragrostis</i>	<i>eriopoda</i>	Woollybutt Grass		X	X	X
Poaceae	<i>Eragrostis</i>	<i>lanipes</i>	Creeping Wanderrie		X	X	
Poaceae	<i>Eragrostis</i>	<i>setifolia</i>	Neverfail Grass		X	X	
Poaceae	<i>Eragrostis</i>	sp. (insufficient material)					X
Poaceae	<i>Eragrostis</i>	<i>xerophila</i>	Knotty-butt Neverfail		X	X	X
Poaceae	<i>Eriachne</i>	<i>aristidea</i>			X		X
Poaceae	<i>Eriachne</i>	<i>obtusa</i>	Northern Wandarrie Grass			X	
Poaceae	<i>Eriachne</i>	<i>gardneri</i>			X		
Poaceae	<i>Eulalia</i>	<i>aurea</i>			X		
Poaceae	<i>Iseilema</i>	<i>eremaeum</i>			X	X	
Poaceae	<i>Monachather</i>	<i>paradoxus</i>			X		
Poaceae	<i>Panicum</i>	<i>decompositum</i>	Native Millet		X		



Family	Genus	Species	Common Name	Status	Northern	Middle	Southern
Poaceae	<i>Paractaenum</i>	<i>refractum</i>			X		
Poaceae	<i>Paspalidium</i>	<i>basicladum</i>			X		
Poaceae	<i>Sporobolus</i>	<i>australasicus</i>	Fairy Grass				X
Poaceae	<i>Sporobolus</i>	<i>mitchellii</i>	Ratstail Couch		X	X	
Poaceae	<i>Triodia</i>	<i>basedowii</i>	Lobed Spinifex		X	X	X
Poaceae	<i>Triodia</i>	<i>epactia</i>				X	
Poaceae	<i>Triodia</i>	<i>schinzii</i>			X	X	X
Poaceae	<i>Triraphis</i>	<i>mollis</i>	Needle Grass		X		
Proteaceae	<i>Grevillea</i>	<i>berryana</i>			X	X	X
Proteaceae	<i>Grevillea</i>	<i>eristachya</i>	Flamed Grevillea			X	X
Proteaceae	<i>Grevillea</i>	<i>gordoniana</i>			X		X
Proteaceae	<i>Grevillea</i>	<i>stenobotrya</i>			X		X
Proteaceae	<i>Hakea</i>	<i>chordophylla</i>				X	
Proteaceae	<i>Hakea</i>	<i>preissii</i>	Needle Tree			X	X
Proteaceae	<i>Hakea</i>	<i>stenophylla</i>			X	X	
Proteaceae	<i>Hakea</i>	<i>stenophylla</i> subsp. <i>stenophylla</i>					X
Rubiaceae	<i>Dentella</i>	<i>asperata</i>			X		
Rubiaceae	<i>Psyrax</i>	<i>latifolia</i>			X	X	X
Santalaceae	<i>Exocarpos</i>	<i>sparteus</i>				X	
Santalaceae	<i>Santalum</i>	<i>lanceolatum</i>	Northern Sandalwood			X	X
Sapindaceae	<i>Alectryon</i>	<i>oleifolius</i>			X	X	X
Sapindaceae	<i>Diplopeltis</i>	<i>eriocarpa</i>	Hairy Pepperflower		X	X	X
Sapindaceae	<i>Stylobasium</i>	<i>spathulatum</i>	Pebble bush				X
Scrophulariaceae	<i>Eremophila</i>	<i>clarkei</i>	Turpentine Bush				X
Scrophulariaceae	<i>Eremophila</i>	<i>crenulata</i>					X
Scrophulariaceae	<i>Eremophila</i>	<i>cuneifolia</i>	Pinyuru		X	X	X
Scrophulariaceae	<i>Eremophila</i>	<i>forrestii</i> subsp. <i>forrestii</i>			X	X	X



Family	Genus	Species	Common Name	Status	Northern	Middle	Southern
Scrophulariaceae	<i>Eremophila</i>	<i>fraseri</i> subsp. <i>fraseri</i>			X		
Scrophulariaceae	<i>Eremophila</i>	<i>latrobei</i>				X	X
Scrophulariaceae	<i>Eremophila</i>	<i>longifolia</i>			X	X	
Scrophulariaceae	<i>Eremophila</i>	<i>maculata</i>	Native Fuchsia				X
Scrophulariaceae	<i>Eremophila</i>	<i>pteroarpa</i>				X	X
Scrophulariaceae	<i>Eremophila</i>	<i>youngii</i> subsp. <i>lepidota</i>		P4			X
Solanaceae	<i>Salsola</i>	sp. (insufficient material)					X
Solanaceae	<i>Solanum</i>	<i>lasiophyllum</i>	Flannel Bush			X	X
Solanaceae	<i>Solanum</i>	<i>sturtianum</i>	Thargomindah Nightshad		X		X
Solanaceae	<i>Solanum</i>	<i>diversiflorum</i>			X		
Solanaceae	<i>Solanum</i>	<i>phlomoides</i>			X		
Solanaceae	<i>Solsola</i>	sp. (insufficient material)					X
Surianaceae	<i>Stylobasium</i>	<i>spathulatum</i>	Pebble Bush				X
Thymelaeaceae	<i>Pimelia</i>	<i>ammocharis</i>			X	X	X
Violaceae	<i>Hybanthus</i>	<i>aurantiacus</i>					X
Zygophyllaceae	<i>Tribulus</i>	<i>hirsutus</i>			X	X	X
Zygophyllaceae	<i>Tribulus</i>	<i>macrocarpus</i>					X



Table 13: Vegetation Type Observed in the Project Area



Vegetation Type Number	Vegetation Type	Description	Photograph	Location	Vegetation Conditions
VT1N	Scattered Emergent Woodland over Open Shrubland over Hummock Grassland	Scattered Emergent Woodland of <i>Corymbia zygophylla</i> over High Open Shrubland of Scattered <i>Acacia inaequilatera</i> over Low Open Woodland of <i>Corymbia candida</i> over Open Shrubland of <i>Acacia ancistrocarpa</i> over Low Shrubland of <i>Acacia stellaticeps</i> , <i>Petallostylis cassioides</i> and <i>Tephrosia uniovulata</i> over Hummock Grassland of <i>Triodia basedowii</i> over Very Open Herbs of <i>Mollugo molluginea</i> .		Northern Section	Excellent to Completely Degraded
VT2N	Shrubland over Low Shrubland over Hummock Grassland	Shrubland of <i>Acacia xiphophylla</i> over Low Shrubland of <i>Rhagodia eremea</i> , <i>Ptilotus divaricatus</i> and <i>Atriplex amnicola</i> over Open Tussock Grassland of <i>*Cenchrus ciliaris</i> , <i>Aristida contorta</i> and <i>A. holathera</i> .		Northern Section	Very Good


Vegetation Type Number	Vegetation Type	Description	Photograph	Location	Vegetation Conditions
VT3N	Low Open Woodland over High Open Shrubland over Shrubland over Hummock Grassland over Very Open Herbs	Low Open Woodland of <i>Owenia reticulata</i> over High Shrubland of <i>Acacia victoriae</i> , <i>Grevillea gordoniana</i> , <i>G. stenobotrya</i> over Shrubland of <i>Scaevola sericophylla</i> , <i>Acacia stellaticeps</i> and <i>Quoya loxocarpa</i> over Open Hummock Grassland of <i>Triodia schinzii</i> over Very Open Herb of <i>Tribulus hirsutus</i> .		Northern Section	<i>Excellent to Good</i>
VT4N	Open Shrubland over Low Open Shrubland over Hummock Grasslands	Open Shrubland of <i>Hakea stenophylla</i> , <i>Acacia bivenosa</i> and <i>Grevillea eriostachya</i> over Low Open Shrubland of <i>Mirbelia viminalis</i> , <i>Tephrosia uniovulata</i> and <i>Acacia sclerosperma</i> over hummock grassland of <i>Triodia basedowii</i> .		Northern Section	<i>Excellent to Completely Degraded</i>


Vegetation Type Number	Vegetation Type	Description	Photograph	Location	Vegetation Conditions
VT5N	High Open Shrubland over Open Shrubland over Low Open Shrubland over Open Hummock Grasslands	High Open Shrubland of <i>Acacia subtessarogona</i> , <i>A. ancistrocarpa</i> over Open Shrubland of <i>Stylobasium spathalatum</i> over Low Open Shrubland of <i>Solanum lasiophyllum</i> over Open Hummock Grasslands of <i>Triodia basedowii</i> , <i>Aristida holathera</i> and <i>Enneapogon caerulescens</i>		Northern Section	Completely Degraded
VT6N	Open Shrubland over Low Open Shrubland over Hummock Grasslands in disturbed area	Open Shrubland of <i>Acacia ancistrocarpa</i> , <i>A. inaequilatera</i> , <i>Solanum phlomoides</i> over Low Open Shrubland of <i>Corchorus lasiocarpus</i> , <i>Keraudrenia velutina</i> , <i>Sida cardiophylla</i> over Hummock Grassland of <i>Triodia basedowii</i> in disturbed area.		Northern Section	Completely Degraded



Vegetation Type Number	Vegetation Type	Description	Photograph	Location	Vegetation Conditions
VT1M	Open High Shrubland over Low Open Shrubland over Hummock Grasslands on Sandplain	Open High Shrubland of Scattered <i>Acacia synchronicia</i> , <i>Hakea cardiophylla</i> and <i>A. ancistrocarpa</i> over Shrubland of <i>Hakea stenophylla</i> , <i>Stylobasium spathulatum</i> and <i>Grevillea eriostrachya</i> over Low Shrubland of <i>A. stellaticeps</i> , <i>Grevillea eriostrachya</i> and <i>Ptilotus astrolasisus</i> over Hummock Grassland of <i>Triodia basedowii</i> on Sandplain.		Middle Section	Excellent to Good
VT2M	Low Open Woodland over Open High Shrubland over Shrubland over Hummock Grassland on Sandplain	Low Woodland of <i>Corymbia opacu</i> over High Shrubland of Scattered <i>Acacia bivenosa</i> , <i>A. ancistrocarpa</i> and <i>Stylobasium spathulatum</i> over Hummock Grassland of <i>Triodia basedowii</i> on Sandplain.		Middle Section	Very Good



Vegetation Type Number	Vegetation Type	Description	Photograph	Location	Vegetation Conditions
VT3M	High Open Shrubland to Scattered High Shrubland over Open Heath over Low Open Shrubland over Open Tussock Grassland on Sandy-clay Floodplain	High Open Shrubland to Scattered High Shrubland of <i>Acacia synchronicia</i> , <i>A. subtessarogona</i> and <i>A. tetragonophylla</i> over Open Heath of <i>Acacia sclerosperma</i> , <i>Stylobasium spathulatum</i> and <i>Eremophila cuneifolia</i> over Low Open Shrubland of <i>Senna artemisioides</i> subsp. <i>helmsii</i> x <i>oligophylla</i> , <i>Ptilotus astrolasius</i> and <i>Solanum lasiophyllum</i> over Hummock Grassland of <i>Triodia basedowii</i> over Tussock Grassland of <i>Aristida holathera</i> , <i>*Cenchrus ciliaris</i> and <i>Eragrostis eriopoda</i> on Sandy Clay Floodplain.		Middle Section	Very Good
VT4M	Low Woodland to Scattered Low Trees Shrubland in Claypan Depression over High Open Shrubland over Open Shrubland over Hummock Grassland over Tussock Grassland	Low Woodland of <i>Eucalyptus victrix</i> to Scattered Low Trees Shrubland of <i>Lachnostachys eriobotrya</i> along edges of claypan depressions over High Shrubland to Scattered Shrubland of <i>Acacia bivenosa</i> , <i>A. sclerosperma</i> and <i>A. tetragonophylla</i> over Open Hummock Grasslands of <i>Triodia basedowii</i> over Open Tussock Grassland of <i>Eragrostis</i> sp., <i>Aristida</i> sp. and <i>*Cenchrus ciliaris</i> on Floodplain and associated claypan depressions.		Middle Section	Very Good



Vegetation Type Number	Vegetation Type	Description	Photograph	Location	Vegetation Conditions
VT5M	High Shrubland to High Open Shrubland over Shrubland to Open Shrubland over Low Open Shrubland over Hummock Grassland to Very Open Hummock Grassland on Stony Sandy Clay	High Shrubland to High Open Shrubland of <i>Acacia subtessarogona</i> , <i>A. pruinocarpa</i> and <i>A. synchronica</i> over Shrubland to Open Shrubland of <i>Acacia bivenosa</i> , <i>Eremophila cuneifolia</i> and <i>A. ancistrocarpa</i> over Low Open Shrubland of <i>Senna</i> spp, <i>Solanum lasiophyllum</i> and <i>Scaevola acacioides</i> over Hummock Grassland to Very Open Hummock Grassland of <i>Triodia basedowii</i> and <i>T. epacta</i> on Stony Sandy-clay.		Middle Section	Very Good to Good
VT6M	Open High Scattered Shrubland over Low Shrubland to Low Open Scattered Shrubland over Open Tussock Grassland on Stony Claypan	Open High Shrubland of Scattered <i>Acacia cuspidifolia</i> , <i>A. xiphophylla</i> and <i>A. synchronica</i> over Shrubland to Open Shrubland of <i>*Vachellia farnesiana</i> , <i>A. tetragonophylla</i> and <i>A. cuspidifolia</i> dominating minor drainage lines and old material pits over Low Open Shrubland to Low Scattered Shrubland of <i>Eremophila cuneifolia</i> , <i>Ptilotus polakii</i> and <i>Sclerolaena</i> spp. over Open Tussock Grassland of <i>Eragrostis xerophila</i> , <i>*Cenchrus ciliaris</i> and <i>Aristida</i> sp. on Stony Claypan.		Middle Section	Good to Completely Degraded



Vegetation Type Number	Vegetation Type	Description	Photograph	Location	Vegetation Conditions
VT7M	Low Woodland to Scattered Open High Shrubland to Scattered High Shrubland over Open Shrubland over Hummock Grassland over Open Tussock Grassland on Claypan	Low Woodland of <i>Eucalyptus victrix</i> over High Shrubland of Scattered <i>Acacia tetragonophylla</i> and <i>A. synchronicia</i> over Open Shrubland of <i>A. sclerosperma</i> , <i>Mirbelia viminalis</i> and <i>Scaevola spinescens</i> over Open Hummock Grassland of <i>Triodia basedowii</i> over Open Tussock Grassland of <i>*Cenchrus ciliaris</i> , <i>Aristida holathera</i> and <i>Eragrostis eriopoda</i> over <i>Alternanthera nodiflora</i> , <i>Ptilotus murrayii</i> and <i>Marselia</i> sp. on Claypan or Seasonal Drainage Depression.		Middle Section	Excellent to Good
VT8M	Open Scattered High Shrubland over Low Open Shrubland over Hummock Grassland over Very Open Tussock Grassland on loamy sandy plain	High Open Shrubland of Scattered <i>Acacia sericophylla</i> , <i>Grevillea eriostachya</i> , and <i>Hakea chrodophylla</i> over Shrubland of <i>A. sclerosperma</i> , <i>G. eriostachya</i> and <i>H. stenophylla</i> over Low Open Shrubland of <i>A. stellaticeps</i> and <i>Ptilotus astrolasius</i> over Hummock Grassland of <i>Triodia schinzii</i> and <i>T. basedowii</i> over Very Open Tussock Grassland of <i>Aristida holathera</i> and <i>Eragrostis eriopoda</i> on Loamy Sandplain.		Middle Section	Excellent to Completely Degraded



Vegetation Type Number	Vegetation Type	Description	Photograph	Location	Vegetation Conditions
VT1S	Mixed <i>Acacia</i> Shrubland on Sandy Rise	Open mix <i>Acacia</i> shrubland on sandy rises of <i>Acacia ramulosa</i> var. <i>linophylla</i> , <i>Acacia sclerosperma</i> , <i>Acacia synchronicia</i> , <i>Acacia tetragonophylla</i> , <i>Alectryon oleifolius</i> over <i>Eremophila forrestii</i> over Tussock Grasslands of <i>*Cenchrus ciliaris</i> .		Southern Section	Good to Completely Degraded
VT2S	Low Open Shrubland	Low open Shrubland of <i>Maireana polypterygia</i> over <i>Stemodia viscosa</i> over <i>Eriachne xerophila</i> with scattered emergent <i>Acacia sclerosperma</i> subsp. <i>sclerosperma</i> , <i>Hakea preissii</i> and <i>Vachellia farnesiana</i> .	No photograph available.	Southern Section	Good to Completely Degraded



Vegetation Type Number	Vegetation Type	Description	Photograph	Location	Vegetation Conditions
VT3S	Mixed <i>Acacia</i> Shrubland on Mixed Soils	Mix <i>Acacia</i> Shrubland on mixed soils of <i>Acacia xiphophylla</i> , <i>Acaicia synchronicia</i> , <i>Acacia victoriae</i> , <i>Hakea preissii</i> over <i>Eremophila pterocarpa</i> over <i>Neobassia astrocarpa</i> , <i>Scleroleana eriacantha</i> , <i>Atriplex codonocarpa</i> over * <i>Cenchrus ciliaris</i> .	 A photograph showing a landscape of mixed Acacia shrubland on mixed soils. The ground is reddish-brown and sandy, with scattered low-lying shrubs and grasses. The sky is clear and blue.	Southern Section	Very Good to Degraded
VT4S	Mixed <i>Acacia</i> Shrubland on Floodway	Mix <i>Acacia</i> Shrubland on floodplain of <i>Acacia xiphophylla</i> , <i>Acaicia synchronicia</i> , <i>Acacia victoriae</i> , <i>Hakea preissii</i> over <i>Eremophila pterocarpa</i> and <i>Eremophila youngii</i> subsp. <i>lepidota</i> over <i>Neobassia astrocarpa</i> , <i>Scleroleana eriacantha</i> , <i>Atriplex codonocarpa</i> over * <i>Cenchrus ciliaris</i> .	 A photograph showing a landscape of mixed Acacia shrubland on a floodway. The ground is reddish-brown and sandy, with scattered low-lying shrubs and grasses. A body of water is visible in the background under a clear blue sky.	Southern Section	Very Good to Degraded

Vegetation Type Number	Vegetation Type	Description	Photograph	Location	Vegetation Conditions
VT5S	Salt lake pan	Flat expanses of ground covered with salt and other minerals.		Southern Section	Very Good
VT6S	Low Open Shrubland on Dune	Low shrubland on dune crest of <i>Verticordia forrestii</i> , <i>Calytrix truncatifolia</i> , <i>Quoya loxocarpa</i> over <i>Triodia schinzii</i> with scattered emergent <i>Grevillea stenobotrya</i> , <i>Acacia ramulosa</i> var. <i>linophylla</i> , <i>Acacia sclerosperma</i> , <i>Acacia synchronicia</i> , <i>Acacia tetragonophylla</i> , <i>Alectryon oleifolius</i> over <i>Eremophila forrestii</i> over * <i>Cenchrus ciliaris</i> .		Southern Section	Very Good to Degraded

Vegetation Type Number	Vegetation Type	Description	Photograph	Location	Vegetation Conditions
VT7S	Mixed <i>Acacia</i> Shrubland on Mixed Soils	Mix <i>Acacia</i> Shrubland on mixed soils of <i>Acacia xiphophylla</i> , <i>Acacia synchronicia</i> , <i>Acacia victoriae</i> , <i>Hakea preissii</i> over <i>Eremophila pterocarpa</i> over <i>Neobassia astrocarpa</i> , <i>Scleroleana eriacantha</i> , <i>Atriplex codonocarpa</i> over Spinifex steppe of <i>Triodia basedowii</i> and <i>Triodia schinzii</i> over * <i>Cenchrus ciliaris</i> .		Southern Section	Very Good to Completely Degraded
VT8S	Spinifex Steppe	Spinifex steppe of <i>Triodia basedowii</i> and <i>Triodia schinzii</i> with scattered emergent <i>Acacia xiphophylla</i> , <i>Acacia synchronicia</i> , <i>Acacia victoriae</i> , <i>Hakea preissii</i> over <i>Eremophila pterocarpa</i> .		Southern Section	Very Good to Completely Degraded

Vegetation Type Number	Vegetation Type	Description	Photograph	Location	Vegetation Conditions
VT9S	Open Hummock Grasslands	Open Grasslands dominated by <i>Triodia basedowii</i> , <i>Aristida holathera</i> , <i>Aristida contorta</i> , * <i>Cenchrus ciliaris</i> with Scattered Emergent Shrubs of <i>Grevillea eriostachya</i> , <i>Senna artemisioides</i> subsp. <i>oligophylla</i> , <i>Acacia sclerosperma</i> , <i>Hakea stenophylla</i> subsp. <i>stenophylla</i> over <i>Ptilotus polystachyus</i> , <i>Ptilotus obovatus</i> and <i>Salsola</i> sp.		Southern Section	Excellent to Completely Degraded
VT10S	Mixed <i>Acacia</i> Shrubland over Hummock Grass	Mixed <i>Acacia</i> scrub of <i>Acacia xiphophylla</i> with scattered emergent <i>Acacia ramulosa</i> var. <i>linophylla</i> , <i>Acacia tetragonophylla</i> over <i>Senna artemisioides</i> subsp. <i>oligophylla</i> , <i>Acacia synchronicia</i> , <i>Acacia citrinoviridis</i> , <i>Eremophila cuneifolia</i> , <i>Eremophila forrestii</i> subsp. <i>forrestii</i> over <i>Solanum lasiophyllum</i> , <i>Ptilotus divaricatus</i> over grasses of <i>Triodia basedowii</i> , <i>Aristida holathera</i> , * <i>Cenchrus ciliaris</i> .		Southern Section	Very Good to Completely Degraded

Vegetation Type Number	Vegetation Type	Description	Photograph	Location	Vegetation Conditions
VT11S	High Open Woodland	High Open Woodland of <i>Eucalyptus camaldulensis</i> with scattered <i>Melaleuca glomerata</i> , <i>Acacia pyrifolia</i> .		Southern Section	Good to Completely Degraded
VT12S	High Shrubland on Rocky Sandplain	Open shrubland of <i>Acacia synchronicia</i> , <i>A. sclerosperma</i> subsp. <i>sclerosperma</i> with <i>Grevillea eriostachya</i> , <i>A. tetragonophylla</i> over Low Shrubland of <i>Acacia gregorii</i> , <i>Eremophila cuneifolia</i> , <i>Melaleuca cardiophylla</i> with <i>Stylobasium spathulatum</i> , <i>Eremophila latrobei</i> , <i>Ptilotus obovatus</i> , <i>Echylaena tomentosa</i> over Hummock Grasslands of <i>Triodia basedowii</i> with Tussock Grassland of <i>*Cenchrus ciliaris</i> , <i>Eragrostis pergracilis</i> , <i>Aristida holathera</i> , <i>Eriachne aristidea</i> on rocky sandplain.		Southern Section	Very Good to Completely Degraded

Vegetation Type Number	Vegetation Type	Description	Photograph	Location	Vegetation Conditions
VT13S	High Open Shrubland	High Shrubland of <i>Acacia xiphophylla</i> and <i>Acacia synchronicia</i> over Scattered Shrubs of <i>Acacia bivenosa</i> over Low Scattered Shrubs of <i>Enchylaena tomentosa</i> over Hummock Grassland of <i>Triodia wiseana</i> .		Southern Section	<i>Excellent to Good</i>
VT14S	Shrubland on Floodplain	Heath dominated by <i>Eremophila cuneifolia</i> with Scattered <i>Eremophila pterocarpa</i> subsp. <i>pterocarpa</i> , <i>Acacia ramulosa</i> , <i>Senna glutinosa</i> , <i>Lawrencia densiflora</i> over Scatterd Low Shrubs of <i>Maireana lobiflora</i> , <i>Ptilotus divaricatus</i> , <i>Sclerolaena eriacantha</i> over Scattered Tussock Grasses of <i>Enneapogon caerulescens</i> on floodplain.		Southern Section	<i>Excellent to Good</i>



Vegetation Type Number	Vegetation Type	Description	Photograph	Location	Vegetation Conditions
VT15S	Spinifex Steppe	Spinifex stepped with <i>Acacia stellaticeps</i> , <i>Acacia wiseana</i> , <i>Acacia sclerosperma</i> , <i>Hakea stenophylla</i> , <i>Grevillea eriostachya</i> over <i>Triodia basedowii</i> and <i>Triodia schinzii</i> .		Southern Section	<i>Excellent to Good</i>
HD	Highly Disturbed	Cleared/Degraded typically cleared with scattered emergent shrubs, trees and weeds. Includes areas of roads/tracks and existing material pits.		Road Side, Tracks, Fencelines and Existing Material Pits	<i>Degraded to Completely Degraded</i>

Table 14: *Acacia startii* locations

Conservation Significant Flora Taxon	Status	Plant Count	LocE	LocN
<i>Acacia startii</i>	Priority 3	3	221200	7402309
<i>Acacia startii</i>	Priority 3	3	221180	7402300
<i>Acacia startii</i>	Priority 3	3	221620	7403665
<i>Acacia startii</i>	Priority 3	1	221652	7403653
<i>Acacia startii</i>	Priority 3	12	221781	7403700
<i>Acacia startii</i>	Priority 3	5	221768	7403757
<i>Acacia startii</i>	Priority 3	6	221768	7403781
<i>Acacia startii</i>	Priority 3	3	221754	7403775
<i>Acacia startii</i>	Priority 3	3	221785	7403787
<i>Acacia startii</i>	Priority 3	30	221800	7403792
<i>Acacia startii</i>	Priority 3	12	221808	7403827
<i>Acacia startii</i>	Priority 3	3	221770	7403846
<i>Acacia startii</i>	Priority 3	1	221744	7403863
<i>Acacia startii</i>	Priority 3	4	221577	7403906
<i>Acacia startii</i>	Priority 3	4	221517	7403938
<i>Acacia startii</i>	Priority 3	4	221496	7403933
<i>Acacia startii</i>	Priority 3	1	221454	7403965
<i>Acacia startii</i>	Priority 3	2	221422	7403970
<i>Acacia startii</i>	Priority 3	20	221412	7404017
<i>Acacia startii</i>	Priority 3	2	221512	7403858
<i>Acacia startii</i>	Priority 3	3	221531	7403850
<i>Acacia startii</i>	Priority 3	6	221520	7403830
<i>Acacia startii</i>	Priority 3	1	221480	7403832
<i>Acacia startii</i>	Priority 3	6	221526	7403801
<i>Acacia startii</i>	Priority 3	1	221505	7403770
<i>Acacia startii</i>	Priority 3	3	221499	7403691
<i>Acacia startii</i>	Priority 3	4	221716	7403923
<i>Acacia startii</i>	Priority 3	2	221705	7403941
<i>Acacia startii</i>	Priority 3	2	221697	7403963
<i>Acacia startii</i>	Priority 3	1	221679	7403952
<i>Acacia startii</i>	Priority 3	2	221739	7403933
<i>Acacia startii</i>	Priority 3	5	221753	7403926
<i>Acacia startii</i>	Priority 3	3	221770	7403936
<i>Acacia startii</i>	Priority 3	5	221769	7403904
<i>Acacia startii</i>	Priority 3	1	221795	7403890
<i>Acacia startii</i>	Priority 3	1	221811	7403886
<i>Acacia startii</i>	Priority 3	1	221828	7403916
<i>Acacia startii</i>	Priority 3	3	221805	7403927
<i>Acacia startii</i>	Priority 3	3	221790	7403914
<i>Acacia startii</i>	Priority 3	1	221826	7403961
<i>Acacia startii</i>	Priority 3	20+	221841	7403956
<i>Acacia startii</i>	Priority 3	1	221824	7403961

Conservation Significant Flora Taxon	Status	Plant Count	LocE	LocN
<i>Acacia startii</i>	Priority 3	4	221818	7403998
<i>Acacia startii</i>	Priority 3	6	221798	7404001
<i>Acacia startii</i>	Priority 3	2	221759	7403999
<i>Acacia startii</i>	Priority 3	1	221740	7403980
<i>Acacia startii</i>	Priority 3	2	221725	7404001
<i>Acacia startii</i>	Priority 3	1	221725	7404020
<i>Acacia startii</i>	Priority 3	1	221749	7404026
<i>Acacia startii</i>	Priority 3	1	221762	7404036
<i>Acacia startii</i>	Priority 3	4	221749	7404038
<i>Acacia startii</i>	Priority 3	6	221773	7404053
<i>Acacia startii</i>	Priority 3	3	221803	7404047
<i>Acacia startii</i>	Priority 3	4	221824	7404043
<i>Acacia startii</i>	Priority 3	4	221839	7404046
<i>Acacia startii</i>	Priority 3	8	221865	7404063
<i>Acacia startii</i>	Priority 3	4	221846	7404078
<i>Acacia startii</i>	Priority 3	5	221797	7404077
<i>Acacia startii</i>	Priority 3	8	221768	7404088
<i>Acacia startii</i>	Priority 3	7	221752	7404102
<i>Acacia startii</i>	Priority 3	4	221680	7404103
<i>Acacia startii</i>	Priority 3	1	221650	7404128
<i>Acacia startii</i>	Priority 3	1	221635	7404127
<i>Acacia startii</i>	Priority 3	5	221614	7404173
<i>Acacia startii</i>	Priority 3	4	221606	7404165
<i>Acacia startii</i>	Priority 3	1	221569	7404150
<i>Acacia startii</i>	Priority 3	2	221562	7404162
<i>Acacia startii</i>	Priority 3	1	221559	7404176
<i>Acacia startii</i>	Priority 3	5	221549	7404179
<i>Acacia startii</i>	Priority 3	1	221552	7404193
<i>Acacia startii</i>	Priority 3	1	221465	7404192
<i>Acacia startii</i>	Priority 3	20+	221427	7404179
<i>Acacia startii</i>	Priority 3	1	221442	7404156
<i>Acacia startii</i>	Priority 3	7	221451	7404135
<i>Acacia startii</i>	Priority 3	2	221491	7404118
<i>Acacia startii</i>	Priority 3	10	221531	7404109
<i>Acacia startii</i>	Priority 3	1	221577	7404074
<i>Acacia startii</i>	Priority 3	1	221603	7404044
<i>Acacia startii</i>	Priority 3	1	221551	7404044
<i>Acacia startii</i>	Priority 3	2	221501	7404072
<i>Acacia startii</i>	Priority 3	3	221478	7404059
<i>Acacia startii</i>	Priority 3	1	221554	7403997
<i>Acacia startii</i>	Priority 3	1	221596	7404150
<i>Acacia startii</i>	Priority 3	2	221562	7404162
<i>Acacia startii</i>	Priority 3	1	221559	7404176

Conservation Significant Flora Taxon	Status	Plant Count	LocE	LocN
<i>Acacia startii</i>	Priority 3	5	221552	7404179
<i>Acacia startii</i>	Priority 3	1	221552	7404193
<i>Acacia startii</i>	Priority 3	1	221465	7404192
<i>Acacia startii</i>	Priority 3	20+	221427	7404179
<i>Acacia startii</i>	Priority 3	1	221442	7404156
<i>Acacia startii</i>	Priority 3	7	221451	7404135
<i>Acacia startii</i>	Priority 3	2	221491	7404118
<i>Acacia startii</i>	Priority 3	10	221531	7404109
<i>Acacia startii</i>	Priority 3	1	221577	7404074
<i>Acacia startii</i>	Priority 3	1	221603	7404054
<i>Acacia startii</i>	Priority 3	1	221551	7404044
<i>Acacia startii</i>	Priority 3	2	221501	7404072
<i>Acacia startii</i>	Priority 3	3	221478	7404059
<i>Acacia startii</i>	Priority 3	1	221554	7403997
<i>Acacia startii</i>	Priority 3	1	221568	7403965
<i>Acacia startii</i>	Priority 3	4	221725	7403974
<i>Acacia startii</i>	Priority 3	6	221704	7404187
<i>Acacia startii</i>	Priority 3	4	221703	7404203
<i>Acacia startii</i>	Priority 3	6	221705	7404217
<i>Acacia startii</i>	Priority 3	4	221725	7404212
<i>Acacia startii</i>	Priority 3	1	221743	7404176
<i>Acacia startii</i>	Priority 3	1	221807	7404176
<i>Acacia startii</i>	Priority 3	3	221819	7404178
<i>Acacia startii</i>	Priority 3	3	221839	7404181
<i>Acacia startii</i>	Priority 3	2	221677	7404197
<i>Acacia startii</i>	Priority 3	2	221662	7404186
<i>Acacia startii</i>	Priority 3	3	221664	7404204
<i>Acacia startii</i>	Priority 3	2	221650	7404201
<i>Acacia startii</i>	Priority 3	3	221637	7404198
<i>Acacia startii</i>	Priority 3	6	221634	7404217
<i>Acacia startii</i>	Priority 3	5	221648	7404232
<i>Acacia startii</i>	Priority 3	2	221669	7404241
<i>Acacia startii</i>	Priority 3	3	221680	7404224
<i>Acacia startii</i>	Priority 3	1	221685	7404265
<i>Acacia startii</i>	Priority 3	2	221666	7404281
<i>Acacia startii</i>	Priority 3	2	221557	7404246
<i>Acacia startii</i>	Priority 3	1	221544	7404231
<i>Acacia startii</i>	Priority 3	1	221536	7404231
<i>Acacia startii</i>	Priority 3	5	221513	7404252
<i>Acacia startii</i>	Priority 3	3	221496	7404262
<i>Acacia startii</i>	Priority 3	1	221504	7404282
<i>Acacia startii</i>	Priority 3	5	221486	7404289
<i>Acacia startii</i>	Priority 3	1	221566	7404396

Conservation Significant Flora Taxon	Status	Plant Count	LocE	LocN
<i>Acacia startii</i>	Priority 3	3	221554	7404404
<i>Acacia startii</i>	Priority 3	9	221565	7404410
<i>Acacia startii</i>	Priority 3	1	221582	7404400
<i>Acacia startii</i>	Priority 3	9	221584	7404415
<i>Acacia startii</i>	Priority 3	1	221558	7404476
<i>Acacia startii</i>	Priority 3	2	221562	7404489
<i>Acacia startii</i>	Priority 3	2	221540	7404495
<i>Acacia startii</i>	Priority 3	1	221562	7404506
<i>Acacia startii</i>	Priority 3	1	221525	7404528
<i>Acacia startii</i>	Priority 3	1	221663	7404565
<i>Acacia startii</i>	Priority 3	2	221673	7404546
<i>Acacia startii</i>	Priority 3	1	221686	7404541
<i>Acacia startii</i>	Priority 3	1	221698	7404537
<i>Acacia startii</i>	Priority 3	3	221695	7404527
<i>Acacia startii</i>	Priority 3	1	221798	7404689
<i>Acacia startii</i>	Priority 3	2	221832	7404679
<i>Acacia startii</i>	Priority 3	1	221834	7404671
<i>Acacia startii</i>	Priority 3	1	221842	7404679
<i>Acacia startii</i>	Priority 3	6	221839	7404686
<i>Acacia startii</i>	Priority 3	2	221824	7404689
<i>Acacia startii</i>	Priority 3	1	221823	7404691
<i>Acacia startii</i>	Priority 3	1	221831	7404713
<i>Acacia startii</i>	Priority 3	1	221798	7404716
<i>Acacia startii</i>	Priority 3	1	221683	7404956
<i>Acacia startii</i>	Priority 3	1	221677	7405000
<i>Acacia startii</i>	Priority 3	1	221830	7405107
<i>Acacia startii</i>	Priority 3	1	221813	7405139
<i>Acacia startii</i>	Priority 3	1	221789	7405159
<i>Acacia startii</i>	Priority 3	1	221822	7405167
<i>Acacia startii</i>	Priority 3	2	221825	7405178
<i>Acacia startii</i>	Priority 3	2	221735	7405276
<i>Acacia startii</i>	Priority 3	3	221791	7405265
<i>Acacia startii</i>	Priority 3	8	221843	7405299
<i>Acacia startii</i>	Priority 3	1	221860	7405325
<i>Acacia startii</i>	Priority 3	8	221852	7405343
<i>Acacia startii</i>	Priority 3	1	221820	7405338
<i>Acacia startii</i>	Priority 3	1	221806	7405330
<i>Acacia startii</i>	Priority 3	2	221773	7405341
<i>Acacia startii</i>	Priority 3	1	221758	7405322
<i>Acacia startii</i>	Priority 3	10+	221723	7405357
<i>Acacia startii</i>	Priority 3	2	221780	7405384
<i>Acacia startii</i>	Priority 3	9	221794	7405385
<i>Acacia startii</i>	Priority 3	2	221807	7405368

Conservation Significant Flora Taxon	Status	Plant Count	LocE	LocN
<i>Acacia startii</i>	Priority 3	1	221815	7405378
<i>Acacia startii</i>	Priority 3	2	221830	7405391
<i>Acacia startii</i>	Priority 3	5	221819	7405411
<i>Acacia startii</i>	Priority 3	1	221814	7405432
<i>Acacia startii</i>	Priority 3	1	221800	7405427
<i>Acacia startii</i>	Priority 3	1	221785	7405427
<i>Acacia startii</i>	Priority 3	1	221785	7405424
<i>Acacia startii</i>	Priority 3	6	221808	7405461
<i>Acacia startii</i>	Priority 3	70+	221885	7405446
<i>Acacia startii</i>	Priority 3	1	221924	7405485
<i>Acacia startii</i>	Priority 3	4	221853	7405502
<i>Acacia startii</i>	Priority 3	3	221847	7405539
<i>Acacia startii</i>	Priority 3	1	221842	7405563
<i>Acacia startii</i>	Priority 3	5	221857	7405577
<i>Acacia startii</i>	Priority 3	3	221848	7405585
<i>Acacia startii</i>	Priority 3	10	221845	7405601
<i>Acacia startii</i>	Priority 3	5	221860	7405615
<i>Acacia startii</i>	Priority 3	1	221872	7405617
<i>Acacia startii</i>	Priority 3	20	221904	7405614
<i>Acacia startii</i>	Priority 3	3	221937	7405588
<i>Acacia startii</i>	Priority 3	1	221956	7405569
<i>Acacia startii</i>	Priority 3	2	221908	7405639
<i>Acacia startii</i>	Priority 3	3	221894	7405678
<i>Acacia startii</i>	Priority 3	5	221882	7405678
<i>Acacia startii</i>	Priority 3	50+	221864	7405678
<i>Acacia startii</i>	Priority 3	1	221908	7405682
<i>Acacia startii</i>	Priority 3	1	221906	7405691
<i>Acacia startii</i>	Priority 3	3	221909	7405724
<i>Acacia startii</i>	Priority 3	1	221897	7405740
<i>Acacia startii</i>	Priority 3	3	221899	7405753
<i>Acacia startii</i>	Priority 3	10+	221863	7405756
<i>Acacia startii</i>	Priority 3	30+	221838	7405819
<i>Acacia startii</i>	Priority 3	13	221884	7405828
<i>Acacia startii</i>	Priority 3	1	221905	7405806
<i>Acacia startii</i>	Priority 3	1	221933	7405787
<i>Acacia startii</i>	Priority 3	1	221978	7405811
<i>Acacia startii</i>	Priority 3	8	221915	7405892
<i>Acacia startii</i>	Priority 3	16	221925	7405986
<i>Acacia startii</i>	Priority 3	1	221948	7405998
<i>Acacia startii</i>	Priority 3	9	221879	7405980
<i>Acacia startii</i>	Priority 3	2	221805	7405998
<i>Acacia startii</i>	Priority 3	1	221857	7406069
<i>Acacia startii</i>	Priority 3	1	221899	7406099

Conservation Significant Flora Taxon	Status	Plant Count	LocE	LocN
<i>Acacia startii</i>	Priority 3	15	221908	7406049
<i>Acacia startii</i>	Priority 3	20+	221939	7405326
<i>Acacia startii</i>	Priority 3	4	221947	7405305
<i>Acacia startii</i>	Priority 3	1	221939	7405283
<i>Acacia startii</i>	Priority 3	3	221938	7405269
<i>Acacia startii</i>	Priority 3	3	221931	7405240
<i>Acacia startii</i>	Priority 3		221940	7405205

Table 15: *Eremophila youngii* subsp. *lepidota* locations

Conservation Significant Flora Taxa	Status	Plant Count	LocE	LocN
<i>Eremophila youngii</i> subsp. <i>lepidota</i>	P4	1	196816	7371202
<i>Eremophila youngii</i> subsp. <i>lepidota</i>	P4	2	196868	7371319
<i>Eremophila youngii</i> subsp. <i>lepidota</i>	P4	1	196762	7371319
<i>Eremophila youngii</i> subsp. <i>lepidota</i>	P4	1	197050	7371641
<i>Eremophila youngii</i> subsp. <i>lepidota</i>	P4	1	201573	7375576
<i>Eremophila youngii</i> subsp. <i>lepidota</i>	P4	4	201604	7375557
<i>Eremophila youngii</i> subsp. <i>lepidota</i>	P4	5	201633	7375544
<i>Eremophila youngii</i> subsp. <i>lepidota</i>	P4	50	201717	7375454
<i>Eremophila youngii</i> subsp. <i>lepidota</i>	P4	10+	201608	7375511
<i>Eremophila youngii</i> subsp. <i>lepidota</i>	P4	10+	201558	7375493
<i>Eremophila youngii</i> subsp. <i>lepidota</i>	P4	10+	201490	7375512
<i>Eremophila youngii</i> subsp. <i>lepidota</i>	P4	15+	201442	7375503
<i>Eremophila youngii</i> subsp. <i>lepidota</i>	P4	15+	201384	7375455
<i>Eremophila youngii</i> subsp. <i>lepidota</i>	P4	10+	201320	7375396
<i>Eremophila youngii</i> subsp. <i>lepidota</i>	P4	20+	201237	7375440
<i>Eremophila youngii</i> subsp. <i>lepidota</i>	P4	5+	201173	7375498
<i>Eremophila youngii</i> subsp. <i>lepidota</i>	P4	2	201183	7375567
<i>Eremophila youngii</i> subsp. <i>lepidota</i>	P4	1	201243	7375564
<i>Eremophila youngii</i> subsp. <i>lepidota</i>	P4	2	201297	7375619
<i>Eremophila youngii</i> subsp. <i>lepidota</i>	P4	10+	201391	7375759
<i>Eremophila youngii</i> subsp. <i>lepidota</i>	P4	15+	201450	7375696
<i>Eremophila youngii</i> subsp. <i>lepidota</i>	P4	5+	201499	7375607
<i>Eremophila youngii</i> subsp. <i>lepidota</i>	P4	3	201536	7375625
<i>Eremophila youngii</i> subsp. <i>lepidota</i>	P4	1	201187	7375281
<i>Eremophila youngii</i> subsp. <i>lepidota</i>	P4	1	201677	7375749
<i>Eremophila youngii</i> subsp. <i>lepidota</i>	P4	1	201816	7375829
<i>Eremophila youngii</i> subsp. <i>lepidota</i>	P4	6	209182	7381939
<i>Eremophila youngii</i> subsp. <i>lepidota</i>	P4	6	209182	7381939

Appendix D Fauna

Project Area Fauna List

Table 16: Fauna Records from Database searches and Observed taxa from the Project Area

Type	Family	Genus	Species	Common Name	EPBC Act	WC Act	DEC	Source	Northern	Middle	Southern
Amphibians	Hylidae	<i>Cyclorana</i>	<i>maini</i>	Sheep Frog				NM			
Amphibians	Hylidae	<i>Cyclorana</i>	<i>platycephala</i>	Water-holding Frog				NM			
Amphibians	Hylidae	<i>Litoria</i>	<i>rubella</i>	Little Red Tree Frog				NM			
Amphibians	Limnodynastidae	<i>Neobatrachus</i>	<i>wilsmorei</i>	Plonking Frog				NM			
Birds	Acanthizidae	<i>Acanthiza</i>	<i>uropygialis</i>	Chestnut-rumped Thornbill				NM			
Birds	Acanthizidae	<i>Gerygone</i>	<i>fusca</i>	Western Gerygone				NM			
Birds	Acanthizidae	<i>Pyrrholaemus</i>	<i>brunneus</i>	Redthroat				NM			
Birds	Acanthizidae	<i>Smicrornis</i>	<i>brevirostris</i>	Weebill				NM		X	
Birds	Accipitridae	<i>Accipiter</i>	<i>cirrocephalus</i>	Collared Sparrowhawk				NM			
Birds	Accipitridae	<i>Accipiter</i>	<i>fasciatus</i>	Brown Goshawk	Ma			EPBC,NM			X
Birds	Accipitridae	<i>Aquila</i>	<i>audax</i>	Wedge-tailed Eagle				NM		X	X
Birds	Accipitridae	<i>Circus</i>	<i>assimilis</i>	Spotted Harrier				NM		X	
Birds	Accipitridae	<i>Elanus</i>	<i>axillaris</i>	Black-shouldered Kite				NM	X	X	
Birds	Accipitridae	<i>Haliastur</i>	<i>sphenurus</i>	Whistling Kite	Ma			EPBC,NM		X	
Birds	Accipitridae	<i>Hamirostra</i>	<i>melanosternon</i>	Black-breasted Buzzard				NM		X	
Birds	Accipitridae	<i>Hieraaetus</i>	<i>morphnoides</i>	Little Eagle				NM		X	
Birds	Accipitridae	<i>Milvus</i>	<i>migrans</i>	Black Kite				NM			
Birds	Accipitridae	<i>Haliaeetus</i>	<i>leucogaster</i>	White-bellied Sea-Eagle	Mi			EPBC,NM			
Birds	Accipitridae	<i>Lophoictinia</i>	<i>isura</i>	Square-tailed Kite				NM		X	
Birds	Alaudidae	<i>Mirafra</i>	<i>javanica</i>	Horsfield's Bushlark				NM		X	
Birds	Anatidae	<i>Anas</i>	<i>gracilis</i>	Grey Teal				NM			
Birds	Anatidae	<i>Anas</i>	<i>superciliosa</i>	Pacific Black Duck				NM			
Birds	Anatidae	<i>Aythya</i>	<i>australis</i>	Hardhead				NM			
Birds	Anatidae	<i>Chenonetta</i>	<i>jubata</i>	Australian Wood Duck				NM			

Type	Family	Genus	Species	Common Name	EPBC Act	WC Act	DEC	Source	Northern	Middle	Southern
Birds	Anatidae	<i>Dendrocygna</i>	<i>eytoni</i>	Plumed Whistling Duck				NM			
Birds	Anatidae	<i>Malacorhynchus</i>	<i>membranaceus</i>	Pink-eared Duck				NM			
Birds	Anatidae	<i>Tadorna</i>	<i>tadornoides</i>	Australian Shelduck				NM			
Birds	Apodidae	<i>Apus</i>	<i>pacificus</i>	Fork-tailed Swift	Mi;Ma	S3		EPBC			
Birds	Ardeidae	<i>Ardea</i>	<i>pacifica</i>	White-necked Heron				NM			
Birds	Ardeidae	<i>Nycticorax</i>	<i>caledonicus</i>	Rufous Night Heron	Ma			NM			
Birds	Ardeidae	<i>Ardea</i>	<i>alba</i>	Great Egret	Ma;Mi			EPBC			
Birds	Ardeidae	<i>Ardea</i>	<i>ibis</i>	Cattle Egret	Ma;Mi	S3		EPBC			
Birds	Ardeidae	<i>Ardea</i>	<i>modesta</i>	Eastern Grey Egret	Ma; Mi			EPBC			
Birds	Artamidae	<i>Artamus</i>	<i>cinereus</i>	Black-faced Woodswallow				NM	X	X	X
Birds	Artamidae	<i>Artamus</i>	<i>personatus</i>	Masked Woodswallow				NM		X	X
Birds	Burhinidae	<i>Burhinus</i>	<i>grallarius</i>	Bush Stone-curlew				NM			
Birds	Campephagidae	<i>Coracina</i>	<i>novaehollandiae</i>	Black-faced Cuckoo-shrike	Ma			NM	X	X	
Birds	Campephagidae	<i>Lalage</i>	<i>tricolor</i>	White-winged Triller				NM			
Birds	Casuariidae	<i>Dromaius</i>	<i>novaehollandiae</i>	Emu				NM	X	X	X
Birds	Charadriidae	<i>Charadrius</i>	<i>melanops</i>	Black-fronted Dotterel				NM			
Birds	Charadriidae	<i>Erythronyx</i>	<i>cinctus</i>	Red-kneed Dotterel				NM			
Birds	Charadriidae	<i>Vanellus</i>	<i>tricolor</i>	Banded Lapwing				NM			
Birds	Charadriidae	<i>Charadrius</i>	<i>veredus</i>	Oriental Plover	Mi	S3		EPBC			
Birds	Cinclosomatidae	<i>Psophodes</i>	<i>occidentalis</i>	Western Wedgebill				NM		X	X
Birds	Columbidae	<i>Columba</i>	<i>livia</i>	Domestic Pigeon				NM			
Birds	Columbidae	<i>Geopelia</i>	<i>cuneata</i>	Diamond Dove				NM			
Birds	Columbidae	<i>Geopelia</i>	<i>striata</i>	Peaceful Dove				NM			
Birds	Columbidae	<i>Geophaps</i>	<i>plumifera</i>	Spinifex Pigeon				NM			

Type	Family	Genus	Species	Common Name	EPBC Act	WC Act	DEC	Source	Northern	Middle	Southern
Birds	Columbidae	<i>Ocyphaps</i>	<i>lophotes</i>	Crested Pigeon				NM	X	X	X
Birds	Columbidae	<i>Phaps</i>	<i>chalcoptera</i>	Common Bronzewing				NM		X	
Birds	Corvidae	<i>Corvus</i>	<i>bennetti</i>	Little Crow				NM			
Birds	Corvidae	<i>Corvus</i>	<i>orru</i>	Torresian Crow				NM	X	X	X
Birds	Craticidae	<i>Craticus</i>	<i>nigrogularis</i>	Pied Butcherbird				NM			
Birds	Craticidae	<i>Craticus</i>	<i>torquatus</i>	Grey Butcherbird				NM			
Birds	Craticidae	<i>Craticus</i>	<i>tibicen</i>	Australian Magpie				NM		X	
Birds	Cuculidae	<i>Chrysococcyx</i>	<i>basalis</i>	Horsfield's Bronze Cuckoo	Ma			EPBC,NM			
Birds	Cuculidae	<i>Chrysococcyx</i>	<i>occulans</i>	Black-eared Cuckoo				NM			
Birds	Cuculidae	<i>Cuculus</i>	<i>pallidus</i>	Pallid Cuckoo	Ma			EPBC,NM			
Birds	Dicruridae	<i>Grallina</i>	<i>cyanoleuca</i>	Magpie-lark				NM	X	X	
Birds	Dicruridae	<i>Rhipidura</i>	<i>leucophrys</i>	Willie Wagtail				NM		X	X
Birds	Estrillidae	<i>Emblema</i>	<i>pictum</i>	Painted Finch				NM			
Birds	Estrillidae	<i>Taeniopygia</i>	<i>guttata</i>	Zebra Finch				NM	X	X	X
Birds	Falconidae	<i>Falco</i>	<i>berigora</i>	Brown Falcon				NM	X	X	
Birds	Falconidae	<i>Falco</i>	<i>cenchroides</i>	Australian Kestrel	Ma			EPBC,NM	X	X	
Birds	Falconidae	<i>Falco</i>	<i>hypoleucos</i>	Grey Falcon			V	EPBC,NM			
Birds	Falconidae	<i>Falco</i>	<i>longipennis</i>	Australian Hobby				NM			
Birds	Falconidae	<i>Falco</i>	<i>peregrinus</i>	Peregrine Falcon			S	EPBC,NM			
Birds	Glareolidae	<i>Glareola</i>	<i>maldivarum</i>	Oriental Plover	Mi, Ma	S3		EPBC,NM			
Birds	Halcyonidae	<i>Dacelo</i>	<i>leachii</i>	Blue-winged Kookaburra				NM			
Birds	Halcyonidae	<i>Todiramphus</i>	<i>pyrrhopygia</i>	Red-backed Kingfisher				NM			
Birds	Halcyonidae	<i>Todiramphus</i>	<i>sanctus</i>	Sacred Kingfisher				NM			
Birds	Hirundinidae	<i>Hirundo</i>	<i>neoxena</i>	Welcome Swallow				NM		X	
Birds	Hirundinidae	<i>Hirundo</i>	<i>rustica</i>	Barn Swallow	Mi			EPBC,NM			

Type	Family	Genus	Species	Common Name	EPBC Act	WC Act	DEC	Source	Northern	Middle	Southern
Birds	Maluridae	<i>Malurus</i>	<i>lamberti</i>	Variegated Fairy-wren				NM			X
Birds	Maluridae	<i>Malurus</i>	<i>leucopterus</i>	White-winged Fairy-wren				NM		X	
Birds	Maluridae	<i>Malurus</i>	<i>leucopterus</i> subsp. <i>leucopterus</i>					NM			
Birds	Maluridae	<i>Stipiturus</i>	<i>ruficeps</i>	Rufous-crowed Emu-wren				NM		X	X
Birds	Megapodiidae	<i>Leipoa</i>	<i>ocellata</i>	Malleefowl	V;Mi	S1		EPBC			
Birds	Meliphagidae	<i>Acanthagenys</i>	<i>rufogularis</i>	Spiny-cheeked Honeyeater				NM			
Birds	Meliphagidae	<i>Certhionyx</i>	<i>niger</i>	Black Honeyeater				NM			
Birds	Meliphagidae	<i>Epthianura</i>	<i>tricolor</i>	Crimson Chat				NM		X	
Birds	Meliphagidae	<i>Lichenostomus</i>	<i>kertlandi</i>	Grey-headed Honeyeater				NM			
Birds	Meliphagidae	<i>Lichenostomus</i>	<i>penicillatus</i>	White-plumed Honeyeater				NM		X	
Birds	Meliphagidae	<i>Lichenostomus</i>	<i>virescens</i>	Singing Honeyeater				NM		X	X
Birds	Meliphagidae	<i>Lichmera</i>	<i>indistincta</i>	Brown Honeyeater				NM			X
Birds	Meliphagidae	<i>Manorina</i>	<i>flavigula</i>	Yellow-throated Miner				NM		X	X
Birds	Meropidae	<i>Merops</i>	<i>ornatus</i>	Rainbow Bee-eater	Ma; Mi	S3		EPBC,NM		X	
Birds	Motacillidae	<i>Anthus</i>	<i>novaeeseelandiae</i>	Australasian Pipit				NM	X	X	
Birds	Neosittidae	<i>Daphoenositta</i>	<i>chrysoptera</i>	Varied Sittella				NM			
Birds	Otididae	<i>Ardeotis</i>	<i>australis</i>	Australian Bustard			P4	NM	X	X	
Birds	Pachycephalidae	<i>Colluricincla</i>	<i>harmonica</i>	Grey Shrike-thrush				NM		X	
Birds	Pachycephalidae	<i>Oreoica</i>	<i>gutturalis</i>	Crested Bellbird				NM			
Birds	Pachycephalidae	<i>Oreoica</i>	<i>gutturalis</i> subsp. <i>pallescens</i>	Crested Bellbird				NM			
Birds	Pachycephalidae	<i>Pachycephala</i>	<i>rufiventris</i>	Rufous Whistler				NM			
Birds	Pardalotidae	<i>Pardalotus</i>	<i>rubricatus</i>	Red-browed Pardalote				NM			

Type	Family	Genus	Species	Common Name	EPBC Act	WC Act	DEC	Source	Northern	Middle	Southern
Birds	Pardalotidae	<i>Pardalotus</i>	<i>striatus</i>	Striated Pardalote				NM			
Birds	Pardalotidae	<i>Pardalotus</i>	<i>striatus</i> subsp. <i>murchisoni</i>					NM			
Birds	Pelecanidae	<i>Pelecanus</i>	<i>conspicillatus</i>	Australian Pelican	Ma			NM			
Birds	Petroicidae	<i>Petroica</i>	<i>cucullata</i>	Hooded Robin				NM			
Birds	Phalacrocoracidae	<i>Phalacrocorax</i>	<i>sulcirostris</i>	Little Black Cormorant				NM			
Birds	Podicipedidae	<i>Pomatostomus</i>	<i>supercilious</i>	White-browed Babbler				NM			X
Birds	Podicipedidae	<i>Pomatostomus</i>	<i>temporalis</i>	Grey-crowned Babbler				NM			
Birds	Psittacidae	<i>Cacatua</i>	<i>roseicapilla</i>	Galah				NM	X	X	X
Birds	Psittacidae	<i>Cacatua</i>	<i>sanguinea</i>	Little Corella				NM	X	X	X
Birds	Psittacidae	<i>Melopsittacus</i>	<i>undulatus</i>	Budgerigar				NM	X	X	X
Birds	Psittacidae	<i>Nymphicus</i>	<i>hollandicus</i>	Cockatiel				NM	X	X	
Birds	Psittacidae	<i>Platycercus</i>	<i>zonarius</i>	Australian Ringneck				NM	X	X	
Birds	Rallidae	<i>Fulica</i>	<i>atra</i>	Eurasian Coot				NM			
Birds	Scolopacidae	<i>Calidris</i>	<i>ruficollis</i>	Red-necked Stint	Ma;Mi			EPBC,NM			
Birds	Scolopacidae	<i>Tringa</i>	<i>nebularia</i>	Common Greenshank	Ma;Mi			EPBC,NM			
Birds	Scolopacidae	<i>Actitis</i>	<i>hypoleucos</i>	Common Sandpiper	Ma;Mi			EPBC,NM			
Birds	Stigidae	<i>Ninox</i>	<i>novaeseelandiae</i>	Boobook Owl				NM			
Birds	Sylviidae	<i>Cincloramphus</i>	<i>cruralis</i>	Brown Songlark				NM		X	X
Birds	Sylviidae	<i>Cincloramphus</i>	<i>mathewsi</i>	Rufous Songlark				NM		X	
Birds	Threskiornithidae	<i>Platalea</i>	<i>flavipes</i>	Yellow-billed Spoonbill				NM			
Birds	Threskiornithidae	<i>Threskiornis</i>	<i>molucca</i>	Australian White Ibis	Ma			EPBC,NM			
Birds	Turnicidae	<i>Turnix</i>	<i>velox</i>	Little Button-quail				NM	X	X	
Mammals	Bovidae	<i>Bos</i>	<i>taurus</i>	European Cattle	*			NM	X	X	X
Mammals	Bovidae	<i>Capra</i>	<i>hircus</i>	Goat	*			EPBC	X	X	X
Mammals	Camelidae	<i>Camelus</i>	<i>dromedarius</i>	Camel	*			NM		X	

Type	Family	Genus	Species	Common Name	EPBC Act	WC Act	DEC	Source	Northern	Middle	Southern
Mammals	Canidae	<i>Canis</i>	<i>lupus</i>	Dingo	*			NM	X	X	
Mammals	Canidae	<i>Vulpes</i>	<i>vulpes</i>	Red Fox	*			EPBC			
Mammals	Dasyuridae	<i>Dasykaluta</i>	<i>rosamondae</i>	Little Red Kaluta				NM			
Mammals	Dasyuridae	<i>Sminthopsis</i>	<i>crassicaudata</i>	Fat-tailed Dunnart				NM			
Mammals	Dasyuridae	<i>Sminthopsis</i>	<i>ooidea</i>	Ooldea Dunnart				NM			
Mammals	Dasyuridae	<i>Sminthopsis</i>	<i>youngsoni</i>	Lesser Hairy-footed Dunnart				NM			
Mammals	Dasyuridae	<i>Dasycercus</i>	<i>cristicauda</i>	Mulgara	V	S1	T	EPBC			
Mammals	Dasyuridae	<i>Dasyurus</i>	<i>hallucatus</i>	Northern Quoll	E	S1		EPBC			
Mammals	Dasyuridae	<i>Dasycercus</i>	<i>blythi</i>	Brush-tailed Mulgara				NM			
Mammals	Equidae	<i>Equus</i>	<i>asinus</i>	Donkey				NM			
Mammals	Felidae	<i>Felis</i>	<i>catus</i>	Domestic Cat	*			EPBC	X	X	X
Mammals	Leporidae	<i>Oryctolagus</i>	<i>cuniculus</i>	European Rabbit	*			EPBC		X	X
Mammals	Molossidae	<i>Chaerephon</i>	<i>jobensis</i>	Northern Freetail-bat				NM			
Mammals	Molossidae	<i>Mormopterus</i>	<i>beccarii</i>	Beccari's Freetail-bat				NM			
Mammals	Macropodidae	<i>Macropus</i>	<i>rufus</i>	Red Kangaroo				NM	X	X	X
Mammals	Muridae	<i>Pseudomys</i>	<i>desertor</i>	Desert Mouse				NM			
Mammals	Muridae	<i>Pseudomys</i>	<i>hermannsburgensis</i>	Sandy Inland Mouse				NM			
Mammals	Muridae	<i>Leggadina</i>	<i>lakedownensis</i>	Short-tailed Mouse				NM			
Mammals	Tachyglossidae	<i>Tachyglossus</i>	<i>aculeatus</i>	Echidna				-			X
Mammals	Vespertilionidae	<i>Scotorepens</i>	<i>greyii</i>	Little Broad-nosed Bat				NM			
Mammals	Vespertilionidae	<i>Vespadelus</i>	<i>finlaysoni</i>	Finlayson's Cave Bat				NM			
Reptiles	Agamidae	<i>Amphibolurus</i>	<i>longirostris</i>	Long-nosed Dragon				NM	X	X	
Reptiles	Agamidae	<i>Ctenophorus</i>	<i>caudicinctus</i>	Ring-tailed Dragon				NM			
Reptiles	Agamidae	<i>Ctenophorus</i>	<i>caudicinctus</i> subsp. <i>caudicinctus</i>					NM			

Type	Family	Genus	Species	Common Name	EPBC Act	WC Act	DEC	Source	Northern	Middle	Southern
Reptiles	Agamidae	<i>Ctenophorus</i>	<i>clayi</i>	Collared Dragon				NM	X	X	
Reptiles	Agamidae	<i>Ctenophorus</i>	<i>femoralis</i>	Dune Dragon				NM	X	X	X
Reptiles	Agamidae	<i>Ctenophorus</i>	<i>isolepis</i>	Crested Dragon				NM			
Reptiles	Agamidae	<i>Ctenophorus</i>	<i>isolepis</i> subsp. <i>isolepis</i>	Central Military Dragon				NM	X	X	
Reptiles	Agamidae	<i>Ctenophorus</i>	<i>nuchalis</i>	Crested Netted Dragon				NM			
Reptiles	Agamidae	<i>Ctenophorus</i>	<i>reticulatus</i>	Western Netted Dragon				NM			
Reptiles	Agamidae	<i>Ctenophorus</i>	<i>rubens</i>	Red Dragon				NM	X	X	X
Reptiles	Agamidae	<i>Diporiphora</i>	<i>winneckeii</i>	Blue-lined Dragon				NM			
Reptiles	Agamidae	<i>Moloch</i>	<i>horridus</i>	Thorny Devil				NM			
Reptiles	Agamidae	<i>Pogona</i>	<i>minor</i>					NM			
Reptiles	Agamidae	<i>Pogona</i>	<i>minor</i> subsp. <i>minor</i>					NM		X	
Reptiles	Diplodactylidae	<i>Diplodactylus</i>	<i>conspicillatus</i>	Fat-tailed Gecko				NM			
Reptiles	Diplodactylidae	<i>Diplodactylus</i>	<i>klugei</i>					NM			
Reptiles	Diplodactylidae	<i>Lucasium</i>	<i>stenodactylum</i>					NM			
Reptiles	Diplodactylidae	<i>Rhynchoedura</i>	<i>ornata</i>	Beaked Gecko				NM			
Reptiles	Diplodactylidae	<i>Strophurus</i>	<i>ciliaris</i>					NM			
Reptiles	Diplodactylidae	<i>Strophurus</i>	<i>strophurus</i>					NM			
Reptiles	Diplodactylidae	<i>Strophurus</i>	<i>wellingtonae</i>					NM			
Reptiles	Elapidae	<i>Desmansia</i>	<i>psammophis</i> subsp. <i>cupreiceps</i>	Yellow-faced Whipsnak				NM	X	X	X
Reptiles	Elapidae	<i>Furina</i>	<i>ornata</i>	Moon Snake				NM			
Reptiles	Elapidae	<i>Pseudechis</i>	<i>australis</i>	Mulga Snake				NM			
Reptiles	Elapidae	<i>Pseudonaja</i>	<i>modesta</i>	Ringed Brown Snake				NM			
Reptiles	Elapidae	<i>Simoselaps</i>	<i>berthodi</i>	Jan's Banded Snake				NM			
Reptiles	Elapidae	<i>Suta</i>	<i>punctata</i>	Spotted Snake				NM			
Reptiles	Gekkonidae	<i>Gehyra</i>	<i>pilbara</i>					NM			

Type	Family	Genus	Species	Common Name	EPBC Act	WC Act	DEC	Source	Northern	Middle	Southern
Reptiles	Gekkonidae	<i>Gehyra</i>	<i>punctata</i>					NM	X		
Reptiles	Gekkonidae	<i>Gehyra</i>	<i>variegata</i>					NM			
Reptiles	Gekkonidae	<i>Heteronotia</i>	<i>binoei</i>	Bynoe's Gecko				NM		X	
Reptiles	Pygopodidae	<i>Delma</i>	<i>haroldi</i>					NM			
Reptiles	Pygopodidae	<i>Delma</i>	<i>tincta</i>					NM			
Reptiles	Pygopodidae	<i>Lialis</i>	<i>burtonis</i>					NM			
Reptiles	Scincidae	<i>Ctenotus</i>	<i>grandis</i>					NM			
Reptiles	Scincidae	<i>Ctenotus</i>	<i>hanloni</i>					NM			
Reptiles	Scincidae	<i>Ctenotus</i>	<i>helenae</i>					NM			
Reptiles	Scincidae	<i>Ctenotus</i>	<i>leohardii</i>					NM			
Reptiles	Scincidae	<i>Ctenotus</i>	<i>maryani</i>					NM			
Reptiles	Scincidae	<i>Ctenotus</i>	<i>pantherinus</i>	Leopard Ctenotus				NM			
Reptiles	Scincidae	<i>Ctenotus</i>	<i>pantherinus</i> subsp. <i>ocellifer</i>					NM		X	
Reptiles	Scincidae	<i>Ctenotus</i>	<i>quattuordecimlineatus</i>					NM			
Reptiles	Scincidae	<i>Ctenotus</i>	<i>saxatilis</i>	Rock Ctenotus				NM			
Reptiles	Scincidae	<i>Ctenotus</i>	<i>uber</i>					NM			
Reptiles	Scincidae	<i>Ctenotus</i>	<i>uber</i> subsp. <i>uber</i>					NM			
Reptiles	Scincidae	<i>Cyclodomorphus</i>	<i>melanops</i> subsp. <i>melanops</i>					NM			
Reptiles	Scincidae	<i>Lerista</i>	<i>bipes</i>					NM			
Reptiles	Scincidae	<i>Lerista</i>	<i>clara</i>					NM			
Reptiles	Scincidae	<i>Lerista</i>	<i>connivens</i>					NM			
Reptiles	Scincidae	<i>Lerista</i>	<i>macropisthopus</i> subsp. <i>fusciceps</i>					NM			
Reptiles	Scincidae	<i>Lerista</i>	<i>onsloviana</i>					NM			
Reptiles	Scincidae	<i>Lerista</i>	<i>petersoni</i>	Phantom Mole Slide				NM			

Type	Family	Genus	Species	Common Name	EPBC Act	WC Act	DEC	Source	Northern	Middle	Southern
Reptiles	Scincidae	<i>Lerista</i>	<i>rolfei</i>					NM			
Reptiles	Scincidae	<i>Menetia</i>	<i>greyii</i>					NM			
Reptiles	Scincidae	<i>Morethia</i>	<i>ruficauda</i> subsp. <i>exquisita</i>					NM			
Reptiles	Scincidae	<i>Notoscincus</i>	<i>ornatus</i> subsp. <i>ornatus</i>					NM			
Reptiles	Scincidae	<i>Tiliqua</i>	<i>occipitalis</i>	Western Bluetongue				NM			
Reptiles	Scincidae	<i>Lerista</i>	<i>planiventralis</i> subsp. <i>maryani</i>	Keeled Slider				NM			
Reptiles	Varanidae	<i>Varanus</i>	<i>brevicauda</i>	Short-tailed Pygmy Monitor				NM		X	X
Reptiles	Varanidae	<i>Varanus</i>	<i>caudolineatus</i>					NM			
Reptiles	Varanidae	<i>Varanus</i>	<i>eremius</i>	Pygmy Desert Monitor				NM			
Reptiles	Varanidae	<i>Varanus</i>	<i>gouldii</i>	Bungarra				NM		X	
Reptiles	Varanidae	<i>Varanus</i>	<i>panoptes</i>					NM	X		

Appendix E Ten Clearing Principles Assessment

Assessment of Clearing of Native Vegetation

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

Methodology	Desktop assessment of available information and field survey results
Survey Results	<p>Plant Species</p> <p><i>Total Vascular Plant Taxa</i></p> <p>Results from the field survey revealed a total of 289 taxa from 42 families, of which three taxa are considered introduced, representing a moderate level of diversity.</p> <p><i>Vascular Plant Taxa Diversity</i></p> <p>Diversity in the Project Area is considered to be comparable to that found in the local area; in similar habitat that has areas of disturbances (e.g. roads, tracks, remnant vegetation and agricultural areas).</p> <p><i>Priority Flora, Other Significant Flora</i></p> <p>Two Priority Flora taxon was recorded from the Project Area:</p> <ul style="list-style-type: none"> – <i>Acacia startii</i> – Priority 3; and – <i>Eremophila youngii</i> subsp. <i>lepidota</i> – Priority 4. <p><i>Eremophila youngii</i> subsp. <i>lepidota</i> locations can be avoided during project works. This species only noted within floodway sections of the NWCH.</p> <p>Some individual plants of <i>Acacia startii</i> are likely to be impacted by project works. GHD recommends MRWA liaise with the DEC with regard to the plants that will be impacted.</p> <p><i>Other Significant Flora</i></p> <p>One flora taxon at the end of beyond their known range was recorded from the Project Area, <i>Acacia victoriae</i>. This flora taxa is considered to be common within Western Australia. The project works will not have an impact on the status of this flora taxa.</p> <p><i>Aotus</i> aff. <i>phylicoides</i> flora taxa has characteristics that resembles <i>Aotus phylicoides</i>. <i>Aotus phylicoides</i> is known within the Local Government Areas of the Shire of Chapman Valley, Shire of Northampton and Shire of Shark Bay. This flora taxa was only recorded on sanddunes and therefore can be avoided.</p> <p>Fauna Species</p> <p>The reconnaissance fauna survey revealed 46 birds, eight mammals and reptile taxa within the Project Area, representing a moderate level of diversity.</p> <p>Ecosystem Diversity</p> <p>The desktop assessment indicated that the buffer of one Priority Ecological Community (PEC) overlaps the Project Area. The buffer forms a part of the the Lake MacLeod Invertebrate Assemblages. The proposed works will not impact the PEC buffer.</p> <p>Variety of Soil Types/Geological Formations</p> <p>Soil types or geological formations in the Project Area are also present in the local and regional area.</p>

Assessment

The Project is considered to be “at variance” with this Clearing Principle. *Acacia startii* was recorded at a number of locations within the Southern Portion of the Project Area. MRWA has indicated that approximately 30 to 35 plants will possibly be impacted by project works. GHD recommends GHD recommends that MRWA liaise with the DEC regarding impacts to this species and whether the project can commence under the existing MRWA purpose permit.

- (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 indigenous to Western Australia.

Methodology	Desktop assessment of available information and field survey results
Survey Results	<p>Significant Fauna</p> <p>Threatened Fauna</p> <p>The desktop assessment indicated that threatened fauna may potentially utilise the Project Area. Significant habitat for threatened fauna was not recorded within the Project Area with habitat is considered to be common in the local and regional area. No threatened Fauna taxa were recorded from the Project Area.</p> <p>Priority Fauna</p> <p>The desktop assessment indicated that Priority fauna may potentially utilise the Project Area for foraging. Two Priority 4 fauna species were recorded near or within the vicinity of the Project Area.</p> <ul style="list-style-type: none"> • <i>Ardeotis australis</i> (Australian Bustard); and • <i>Pseudomys chapmani</i> (Western Pebble Mound Mouse). <p>The Australian Bustard is considered to utilise a wide range of habitat and is unlikely to be impacted by the proposed project. This species is highly mobile and expected to move away during project activities.</p> <p>The Western Pebble Mound Mouse extinct mound was observed outside the Project Area of Material Pit SLK 808. This will not be impacted by the project works.</p> <p>Other Significant Fauna</p> <p>The desktop assessment indicated that significant fauna may occur in the Project Area. Four Marine and/or Migratory Listed Species were recorded from the Project Area. These species are widespread and are not considered to be under threat.</p> <p>Habitat</p> <p>Significant Habitat/Habitats of Significance</p> <p>No habitat deemed to be significant occurs in the Project Area. Habitat in the Project Area also occurs in the local area in similar or better condition.</p> <p>Habitat Extent and Retention</p> <p>Habitats recorded in the Project Area are also found in the local area in similar or better condition. The proposed Project will not significantly diminish the extent of these habitats.</p> <p>Ecological Corridors</p> <p>Generally the habitat in the Project Area is located in a region where there is minimal disturbance. Existing corridors are not considered to be significantly modified by the proposed project.</p>
Assessment	The Project is considered to be “not likely at variance” with this clearing principle.

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

Methodology	Desktop assessment of available information and field survey results
Survey Results	<p>Rare Flora</p> <p><i>Presence</i></p> <p>Threatened (Declared Rare) Flora taxa were indicated to occur within the vicinity of the Project Area as a result of database searches. No Threatened (Declared Rare) Flora taxa were recorded in the Project Area during the field survey.</p> <p><i>Habitat</i></p> <p>No habitat considered to be required for the continued existence of specific Threatened Flora is considered to be present in the Project Area.</p>
Assessment	Considered to be “not likely at variance” with clearing principle.

- (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.

Methodology	Desktop assessment of available information and field survey results
Survey Results	<p>Vegetation</p> <p><i>Extent and Status</i></p> <p>Vegetation types recorded in the Project Area are considered to be equivalent to the Vegetation Associations indicated by Beard.</p> <p><i>Communities</i></p> <p>No Threatened or Priority Ecological Communities were recorded from the Project Area.</p> <p><i>Environmentally Sensitive Areas</i></p> <p>No Environmentally Sensitive Areas were recorded from the Project Area.</p>
Assessment	Considered to be “not likely at variance” with this clearing principle.

- (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.**

Methodology	Desktop assessment of available information and field survey results
Survey Results	<p>Vegetation</p> <p><i>Extent and Status</i></p> <p>All Vegetation Association within the Project Area are considered <i>Least Concern</i> in extent remaining at (State, IBRA, IBRA Sub-region, LGA).</p> <p>Vegetation types recorded in the Project Area are considered to be equivalent to (or form part of) the Vegetation Association indicated by Beard.</p> <p>Vegetation types recorded in the Project Area are considered to occur in an area that is fragmented.</p> <p><i>Regionally Significant Areas</i></p> <p>Vegetation within the Project Area is not considered to contain communities required to maintain ecosystem services (e.g. hydrological processes).</p>
Assessment	Considered to be “not likely at variance” with clearing principle.

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

Methodology	Desktop assessment of available information and field survey results
Survey Results	<p>Watercourses and Wetlands</p> <p><i>Vegetation</i></p> <p>The NWCH transits over the Yannarie and Lynton river systems. Riparian vegetation was noted along the banks of these rivers systems. MRWA has advised GHD that the existing bridges will not be upgraded as a part of the project works.</p> <p><i>Hydrology</i></p> <p>MRWA has advised GHD that they propose to widen the existing floodways (50 cm either side) and raise the floodways by 100 to 150 mm. The existing hydrology within the vicinity of the floodway is considered to be previously modified as a result of existing floodways. GHD considers that the proposed works will have minimal impact on the hydrology.</p> <p><i>Groundwater Dependent Ecosystems</i></p> <p>No groundwater dependent ecosystems occur within or adjacent to the Project Area.</p>
Assessment	Considered to be “not likely at variance” with clearing principle.

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

Methodology	Desktop assessment of available information and field survey results
Survey Results	<p>Land Degradation</p> <p>Soil Erosion</p> <p>The project proposes to clear vegetation to road widening and to extract material for road maintenance upgrade. Erosion from wind is considered to be minimal; however some vegetation within the Project Area occurs on sanddunes. GHD recommends MRWA avoids the clearance of such vegetation.</p> <p>The clearing of vegetation is not expected to alter the quality or quantity of water run-off in or adjacent to the Project Area. Waterlogging and changes to nutrient levels are not expected to be altered by clearing of vegetation in the Project Area.</p> <p>Soil Acidity</p> <p>Databases searched generally indicated an extremely low risk of Acid sulphate Soils within the Project Area. The proposed works should not have an impact on soil acidity within the Project Area.</p> <p>Salinity</p> <p>The clearing of vegetation is not considered to significantly alter the hydrological balance and cause a change in the salinity in the Project Area.</p>
Assessment	Considered to be “not likely at variance” with clearing principle. However, potential impacts should be addressed in appropriate management plans.

- (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.

Methodology	Desktop assessment of available information and field survey results
Survey Results	<p>Conservation Areas</p> <p><i>Protected Areas</i></p> <p>The boundary of Giralia Station, which is a DEC estate, overlaps the Project Area. However, the NWCH road corridor has been excised from the DEC estate. Therefore the proposed project works within the road corridor are considered unlikely to have an impact on the environmental values. MRWA are advised to liaise with the DEC if considering undertaking works outside the road corridor.</p> <p><i>Fragmentation</i></p> <p>The Project Area occurs in a region where the vegetation is relatively unfragmented.</p> <p><i>Ecological Linkages</i></p> <p>Most of the Project Area occurs in a region where ecological linkages have been impacted by clearing of land for agricultural activities. Any existing ecological linkages are not considered to be impacted by the proposed works.</p>
Assessment	All road reserves have been excised from a DEC Estate. The assessment considers the Project to be “not likely at variance” with this Principle if works are restricted to the road corridor only in areas adjacent to the DEC Estate and indirect impacts (such as erosion) are adequately managed.

- (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.

Methodology	Desktop assessment of available information and field survey results
Survey Results	<p>Water Quality</p> <p><i>Catchment Areas</i></p> <p>The Project does not occur within a proclaimed Drinking Water Supply Catchment.</p> <p><i>Groundwater</i></p> <p>The clearing of vegetation is not considered to cause an alteration to the quality of groundwater in or adjacent to the Project Area.</p> <p>No groundwater dependent ecosystems occur in or adjacent to the Project Area.</p> <p><i>Surface water</i></p> <p>The clearing is not considered to cause an alteration to the quality of surface in or adjacent to the Project Area.</p>
Assessment	Considered “not likely at variance” with clearing principle.

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

Methodology	Desktop assessment of available information and field survey results
Survey Results	<p>Water Quantity</p> <p><i>Flooding</i></p> <p>The clearing of vegetation in the Project Area is not considered to alter the frequency or intensity of flood events. Runoff coefficients in the Project Area are not likely to be significantly altered by the clearing of native vegetation.</p>
Assessment	Considered “not likely at variance” with clearing principle.

GHD

Level 1, 209 Foreshore Drive WA 6530

PO BOX 164 Geraldton WA 6531

T: (08) 9920 9400 F: (08) 9921 7997 E: getmail@ghd.com.au

© GHD 2013

This document is and shall remain the property of GHD. The document may only be used for the purpose for which it was commissioned and in accordance with the Terms of Engagement for the commission. Unauthorised use of this document in any form whatsoever is prohibited.

G:\61\28865\WP\15828.docx

Document Status

Rev No.	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
0	J. Byrne/S. Petts	A. Nagle/ M. Toner		J. Foster		4/04/2013

www.ghd.com

