NEWMONT BODDINGTON GOLD
FUTURE TAILINGS DEPOSITION OPTIONS
VISUAL IMPACT ASSESSMENT

Newmont

ecoscape

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SUMMARY

The following document details the visual impact assessment (VIA) undertaken for the Newmont Boddington Gold (NBG) Future Tailings Deposition Options (TDO) project near Boddington WA. This assessment updates the VIA undertaken by Ecoscape in 2012 for the Newmont Boddington Gold (NBG) Life of Mine (LOM) extension project.

The TDO project is planned to be undertaken over two phases as follows:

+ Phase 1 (current to mid 2029) – increase the capacity of the current F1/F3 residue disposal area (RDA)
+ Phase 2 – increase the capacity of current facilities (inclusive of the old R4 RDA) to a capacity of at least 1.27Bt of tailings. Newmont is investigating two options for tailings deposition beyond 2029:
    + Construct a second facility in the Saddleback Treefarm with a maximum capacity of 600Mt (referred to as RDA2); or
    + Increase the capacity of the current facility to 1.27 Mm^3 (referred to as RDA1-X)

A desktop analysis identified that the study area occurs within the Darling Uplands Landscape Character Type (LCT) which is characterised by an expansive undulating landscape blanketed with green forest vegetation and occasional rocky outcrops and peaks. The land uses are varied within this LCT and range from state forests, national parks, plantations, farming, mining and residential development.

A site visit was undertaken on the 14th and 19th of June 2023 to assess the landscape values of the study area and the potential visibility of the TDO Project from the Bibbulmun Track, Albany Highway, Bannister Marradong Road and Pinjarra Williams Road.

A visual landscape evaluation described the landscape character and identified the landscape values and view experiences of the study area. In summary:

+ Five Landscape Character Units (LCUs) were identified: Rolling Forest, Peaks, Rolling Farmland, Plantation and Mining
+ View experience was classified into five categories; focal, enclosed, open rural, panoramic and open elevated
+ The landscape values identified were isolated peaks and waterforms.

The assessment also identified the objectives for managing the visual landscape character which is the **Protection and Maintenance** of landscape character with the aim of:

+ retaining the prominence of natural landscape character and landscape values
+ maintaining the rural landscape character.

A visual impact assessment was undertaken of the proposed TDO project using viewshed analysis and photo montages. Photo montages were prepared at five view locations to illustrate the visual change likely to occur as a result of the TDO Project during the construction of Residue Disposal Facilities (RDA) and during the operational phase. The visual impact from these locations ranged from Prominent to Not Evident resulting from a number of factors such as:

+ distance from the site: closer proximity resulted in a prominent impact compared to further distance resulting in a blending impact.
+ variable landform: undulating landform helps to screen the TDO Project from view.
+ vegetation screening: tall forest vegetation screens the TDO Project from view from many locations.
+ similar visual characteristics to surrounding landscape such as line and form help the TDO Project blend at some locations.
+ contrasting visual characteristics such as colour and texture of the RDAs result in a more prominent impact from elevated view locations with panoramic views.

From most of the assessed travel routes, the Visual Management Objective of Protection and Maintenance is achievable, which is the retention of the natural landscape character (Rolling Forest LCU), landscape values (Peaks LCU and waterforms) and the Rolling Farmland LCU. Two view locations; Boonering Hill and Kimberling Hill were the only locations identified to experience a Prominent (Level 1) visual impact rating as a result of the Phase 2 RDA 2 option. During the construction stage, movement in the landscape as a result of clearing and building the RDA may result in a greater impact than portrayed on the montages. During the operational stage the prominent impact may be perceived as a positive change where the waterform of the RDAs may be viewed as a landscape value.

The acceptability of visual impacts identified from these panoramic view locations along the Bibbulmun Track can be further determined through discussion with relevant stakeholders. Factors which may be considered for discussion include:

+ that the TDO Project may provide a varied view experience and a source of interest to walkers particularly during the operational stage where the waterform created by the RDAs may be perceived as a landscape value
+ interpretation opportunities of the Mine, particularly during the construction stage. For example, informing walkers of construction, operation and closure timeframes with photo montages
+ that the duration of the visual impact is comparatively short for walkers as it is observed once they have reached the summit of the panoramic view locations
+ visual impact mitigation opportunities through rehabilitation.

ACRONYMS AND ABBREVIATIONS

Table 1: Acronyms and abbreviations

Acronyms	
BoM	Bureau of Meteorology
Bt	Billion tonnes
CALM	Western Australian Department of Conservation and Land Management (1985-2006, now DBCA)
DBCA	Western Australian Department of Biodiversity, Conservation and Attractions
GIS	Geographic Information System
GPS	Global Positioning System
ha	hectare/hectares
km	kilometre/kilometres
LCT	Landscape Character Type
LCU	Landscape Character Unit
LOM	Life of Mine
m	metre/metres
MGA	Map Grid of Australia
Mm^3	Million cubic metres
Mt	Megatonne / million tonnes
NBGL	Newmont Boddington Gold Pty Ltd
RDA	Residue Disposal Area
TDO	Tailings Deposition Option
VIA	Visual Impact Assessment
VLE	Visual Landscape Evaluation
WRD	Waste Rock Dump

1 INTRODUCTION

1.1 PROJECT SCOPE

The purpose of this study is to assess the landscape values and potential visual impacts associated with the proposed Newmont Boddington Gold Pty Ltd (NBGPL) Future Tailings Deposition Options (TDO) project in accordance with current landscape planning guidelines. The assessment will identify potential impacts associated with both Phase 1 and Phase 2 works. The project objective is to undertake an updated visual impact assessment from the main roads near the site and from the Bibbulmun Track using viewshed analysis and photomontages for inclusion into an Environmental Assessment.

This assessment adheres to the following objectives for visual impact assessment as set out by the WAPC (2007):

1. define the scope and context of the assessment
2. describe the visual landscape character
3. evaluate how the visual landscape character is viewed, experienced and valued
4. develop strategies for managing visual landscape character (visual management objectives)
5. describe the potential visual impacts
6. develop visual management strategies
7. prepare final recommendations.

1.2 PROPOSED DEVELOPMENT

NBGPL operates Newmont Boddington Gold (NBG) located in the Shire of Boddington, approximately 17 km north-west of the town of Boddington. The mine first commenced operations in 1987 and operated continually until December 2001 when the mine was placed under 'care and maintenance' pending a decision to initiate large-scale basement ore mining.

An expansion of the original proposal was approved in 2006 which enabled an increase in nominal rates from 29 million tonnes per annum (Mtpa) to 35 Mtpa, with a possible 15% increase through potential efficiency gains.

In 2012, NBGPL proposed to expand the mine as lower grade material became economically feasible to mine. NBGPL requested approval to expand the mine by adding additional waste rock dumps (WRDs) and residue disposal areas (RDAs). This was known as the LOM Extension Project which sought to extend the LOM to around 2052 for mining and 2060 for processing activities.

The 2012 study assessed the potential impacts of the following:

- Two WRDs: one that expands on the existing WRD (WRD south) and another smaller one to the north (WRD State Forest)
- Expansion of the current north and south pits into on open pit
- OPTION 1: 2 billion tonne (Bt) RDA which expands the existing RDA
- OPTION 2: 1Bt RDA and another new 1Bt RDA to the north.

The 2023 study will assess the potential impacts of Phase 1 and Phase 2 tailings expansions:

- Phase 1 current RDA – expands the current F1/F3 RDA to a maximum capacity of 750Mt to extend the deposition life to mid-2029.
- Phase 2 – two options to increase the tailings deposition capacity beyond 2029, these are:
  - RDA 2: a new facility located northwest of the current dam in the Saddleback Treefarm which will have a maximum capacity of 600Mt
  - RDA 1-X: this option will increase the current facility to 1.27 Mm^3.

Since 2012 the footprints have been reduced in area as shown on **Figure 1**.

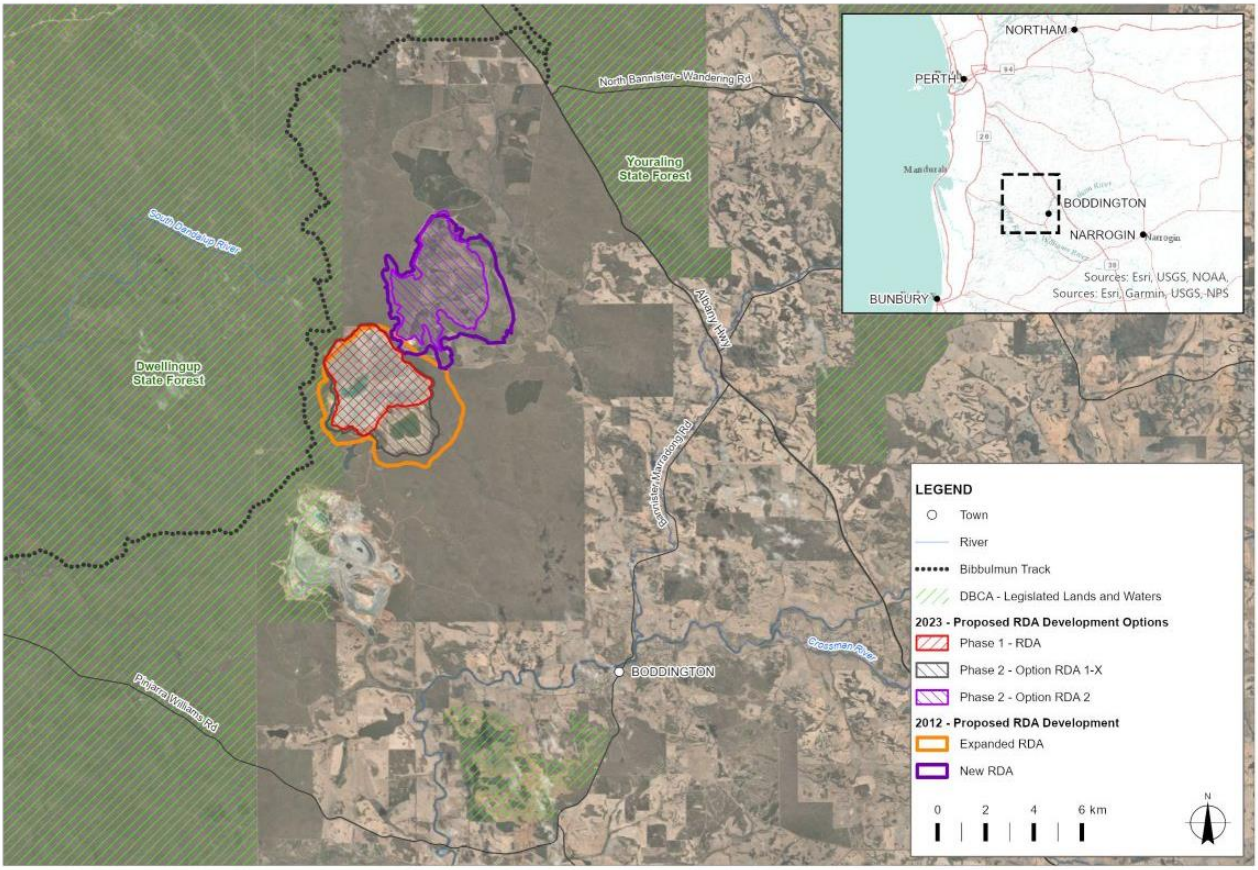


Figure 1: A comparison of 2012 and 2023 NBGPL project options

1.3 STUDY AREA

The TDO Project is located 10-20 kilometres northwest of the Boddington townsite, which is 120 kilometres southeast of Perth. The site is located within the Darling Scarp landscape near the Dwellingup State Forest (DEC 2010) and Saddleback Treefarms, privately owned by Newmont. The Bibbulmun Track occurs in the vicinity of the TDO Project which is a regionally significant walk trail. The proposed TDO expansion occurs about 320m east of the Track at the closest point. Other travel routes in the vicinity include Albany Highway which is a main travel route that runs to the east of the site, and Pinjarra Williams Road and Bannister Marradong Road which are secondary routes that occur to the south of the TDO Project **(Map 1**).

1.4 PLANNING CONTEXT

The following documents provide guidance on visual landscape planning in Western Australia.

1.4.1 VISUAL LANDSCAPE PLANNING IN WESTERN AUSTRALIA (WAPC, 2007)

This comprehensive manual has been developed to help public and private sector planners address visual landscape in the planning process. The manual explains the fundamental planning tools of visual landscape evaluation and visual impact assessment. It provides guidelines for siting and design in relation to a range of landscape types and land uses. It has been developed through extensive research, workshops and also draws on previous visual methodologies. The manual has been developed specifically for Western Australian landscapes and presents a systematic method for undertaking visual assessments in Western Australia. The process of assessing the visual landscape set out in this manual is generally consistent with other methodologies, however it provides added detail on landscape preferences and specific land uses.

1.4.2 STATE PLANNING POLICY NO 2 ENVIRONMENT AND NATURAL RESOURCES

The Environment and Natural Resources Policy (WAPC, 2003) defines the principles and considerations that represent good and responsible planning in terms of environment and natural resource issues within the framework of the State Planning Strategy.

The objectives of the policy are to:

+ integrate environment and natural resource management with broader land use planning and decision-making
+ protect, conserve and enhance the natural environment
+ promote and assist in the wise and sustainable use and management of natural resources.

This policy also identifies the importance of protecting and enhancing landscapes and states the need:

+ to identify and protect landscapes with high natural resource value
+ for careful planning, siting and design of development proposals in a way that is sensitive to the landscape character
+ for landscape or visual impact assessment for proposals that may impact on sensitive landscapes (WAPC, 2007).

1.4.3 ENVIRONMENTAL GUIDANCE FOR PLANNING AND DEVELOPMENT

Environmental Protection Authority (EPA) Guidance Statement Number 33 (EPA, 2008) is a document relevant for land use planning and was developed to assist government agencies, proponents and consultants achieve environmentally acceptable outcomes. The EPA's position on Visual Amenity is addressed in Part B (Landscape and Landforms).

The EPA's objective for the protection of landscape and landform is:

+ *to maintain their integrity, ecological functions and environmental values.*

The visual landscape is also considered part of the social surroundings of a proposal as outlined in the Environmental Factor Guideline for Social Surroundings (EPA, 2023). The EPA's objective for social surroundings is:

+ *to protect social surroundings from significant harm.*

1.4.4 POLICY STATEMENT 34 – VISUAL RESOURCE MANAGEMENT ON LAND AND WATERS MANAGED BY CALM (1989)

Many DBCA planning documents refer to this policy, which was one of the first policies addressing visual resource management in WA. The objective stated in this policy is:

+ *to ensure that land and waters management by the DEC are planned and carried out in a way that sustain the beauty of the natural environment.*

The policy states that the main goal of visual resource management is to ensure that activities are planned and managed in a way that complements the surrounding landscape and not detract from the visual quality. This requires an understanding of the landscape setting which can be achieved through a visual landscape assessment as recommended by the WAPC (2007).

The DBCA would apply the Visual Resource Management (VRM) system when assessing landscape amenity which identified public sensitivity, scenic quality and visual exposure (or distance zones from the observer). These factors would be overlayed to identify broad visual management zones for an area where zone A would be the highest priority for management followed by zones B and C. The current methodology for assessing landscapes in WA is set out in the WAPC (2007) manual which employs some of the VRM criteria. Instead of

identifying management zones however, the WAPC suggest mapping the landscape values and key view experiences within an area resulting in the identification of visual management objectives for the landscape.

1.4.5 SHIRE OF BODDINGTON LOCAL PLANNING STRATEGY 2018

The Shire of Boddington have a Local Planning Strategy which is aims to guide long term planning direction by providing a framework for planning at a local level. The future vision stated in the strategy is:

+ *for Boddington to be widely recognised as a progressive local authority providing quality services and facilities that encourage people to live, work, visit and invest in the district.*

The Strategy identifies that visual amenity is a key asset within the Shire and needs to be protected and maintained wherever possible. It is recommended to:

+ *support the protection of landscapes and their visual amenity, as well as the character of viewsheds associated with major roads and tourist routes.*

2 METHOD

2.1 VISUAL ASSESSMENT METHODOLOGY

Ecoscape applied the methodology outlined in the Visual Landscape Planning Manual (WAPC, 2007) to undertake the visual impact assessment of the NBG TDO Project. The manual specifies a two-stage process to the visual assessment and is the accepted methodology for Western Australia:

+ visual landscape evaluation
+ visual impact assessment.

The **visual landscape evaluation** stage is undertaken to understand the context of the project and the surrounding landscape. It is also undertaken to set objectives for managing the visual landscape character. From this evaluation it can be determined if a visual impact assessment is necessary. The evaluation stage consists of the following five steps:

+ define the scope and context of the assessment
+ describe the visual landscape character
+ evaluate how the visual landscape character is viewed, experienced and valued
+ develop strategies for managing visual landscape character
+ implement strategies through the planning system (done for strategic projects at the planning stage).

The **visual impact assessment** stage consists of five steps, some of which overlap with the steps undertaken during the visual landscape evaluation:

+ determine visual management objectives
+ describe the proposed development
+ describe the potential visual impacts
+ develop visual management measures
+ prepare final recommendations.

Ecoscape incorporated the relevant stages for this assessment as outlined below:

+ a description of the proposed project and visual elements of proposed infrastructure (**Section 1**)
+ Landscape Character Analysis: to identify and evaluate the existing landscape and Landscape Character Types which is done from desktop and site analysis (**Section 3**)
+ View Experience: to assess viewing locations, viewing experience and valued landscape characteristics to identify the visual management objectives for the study area (**Section 4**)
+ Visual Management Strategies: developed to manage the landscape character and view experience of the study area (**Section 5**)
+ Visual Impact Analysis: to determine the level of visual impact (**Section 6**)
+ Visual Impact Management: to determine visual management recommendations for visual impact mitigation if required (**Section 7**).

Ecoscape also refers to a number of published and unpublished documents in the visual assessment process. These include:

+ Western Australian Planning Commission (WAPC) (2007) *Visual Landscape Planning in Western Australia: a manual for evaluation, assessment, siting and design*. Western Australian Planning Commission, Perth.
+ Conservation and Land Management, Department of (CALM) (1994) *Reading the Remote: Landscape Characters of Western Australia*. CALM, Perth.
+ Conservation and Land Management, Department of (CALM) (2000) *Visual Landscape Management Awareness Course Material*. Recreation and Landscape Unit, CALM, Perth.

+ Institute of Environment Assessment and The Landscape Institute (1995) *Guidelines for Landscape and Visual Impact Assessment* (1st edition).

2.1.1 SITE ASSESSMENT

Visual landscape analysis criteria were established prior to undertaking the field assessment. The majority of the route was traversed by foot and vehicle on the 14th and 19th of June 2023. Waypoints and field notes were recorded at view locations. Photographs were taken using a digital SLR camera of the landscape surrounding the TDO Project to enable further assessment through the preparation of photo montages. GPS coordinates and a compass bearing for photographs were recorded at view locations.

The information noted at each viewpoint includes details of the visual elements of the landscape such as the list below. The terminology used to describe landscape character have been adapted from CALM (1994), WAPC (2007) and The Landscape Institute (1995).

+ view description: general description of view
+ land use: natural, industrial, residential, recreational
+ topography: flat, undulating, rugged
+ vegetation: description of vegetation type and form
+ waterform: evident or not evident, type of waterform
+ colours: monochrome, muted, colourful, type of colours
+ texture: smooth, textured, rough
+ line: straight, angular, curved, sinuous
+ form: vertical, sloping, rolling, horizontal.

2.1.2 PHOTO MONTAGE ANALYSIS

An important component of visual impact analysis is the preparation and analysis of photo montages.

The preparation of photomontages requires the following steps:

+ Data Collation: to produce a 3D model of the existing conditions, including topography, cadastral boundaries, aerial photography and viewpoint (photograph) locations.
+ 3D Model Preparation: the data is imported into a 3D Studio Max virtual world and combined with a 3D model of the proposed infrastructure. Virtual cameras are used to produce representative views of each identified sensitive viewpoints.
+ Preparation of Photo Montages: the output of the 3D model is a rendered 3D wireframe image of the proposed infrastructure. This is overlaid on a panoramic photograph which results in a photo montage of the TDO Project.

Photo montages are analysed using visual impact criteria to determine dominant visual elements, which include visibility, line, form, colour and texture, and also variable visual elements which include motion, light, atmospheric conditions, season and distance. The outcome of this analysis is a percentage score that determines the level of visual impact, either being not evident, blending or prominent. To determine the overall impact level or the significance of the impact, the result of the visual impact analysis is combined with the Sensitivity Level and the Visual Management Objective of the study area.

3 LANDSCAPE CHARACTER

3.1 LANDSCAPE CHARACTER TYPE

A Landscape Study undertaken by the former Department of Conservation and Land Management (CALM, 1994) classified Western Australian landscapes into Character Types. The main objective was to provide a reference guide to assess the representation and significance of WA's visual landscape to develop appropriate planning and design guidelines and polices to protect and enhance the visual landscape. The term *landscape* is defined as a combination of physical and cultural features. A Landscape Character Type (LCT) is where there is a common combination of these characteristics such as landform, waterform, vegetation and land use (CALM, 1994).

The study area is located within the Darling Uplands Landscape Character Type which is characterised by undulating landform of lateritic soils blanketed with extensive areas of vegetation (**Map 2**). The landscape values of this region include deep valleys and rounded hills with granite outcrops and boulders such as the Monadnocks Conservation Park (**Plate 2**). The landscape rises from the Swan Coastal Plain to an approximate height of 300m above sea level (CALM 1994).

3.2 LANDSCAPE CHARACTERISTICS

3.2.1 LANDFORM

The visual appearance of the landform within the study area is undulating with isolated peaks blanketed in dark green vegetation. Bare grey/orange rock outcrops are also visible (**Plate 1**).

The land systems and subsystems that occur within the study area are listed below (**Table 2**) and are also shown on **Map 3**. These land systems are based on a combination of landform, soil, vegetation, and drainage characteristics. Four broad Land Systems cover the study area; the Darling Plateau (the dominant systems within the study area) and Quindanning systems which are plateaus containing jarrah-marri-wandoo woodland vegetation and the Murray Valleys and the Marradong systems which are deep valleys which also contain similar vegetation but are likely to have a greater shrubland layer.

Within these systems are smaller subsystems which are described in **Appendix Four** . The common subsystems in the vicinity of the TDO Project are summarised in the following table.

Table 2: Dominant Land Subsystems within the study area (DPIRD, 2017)

Land System Name	Summary Description	Study Area Location
Cooke Subsystem	Crests and upper slopes dominated by granite outcrop and very shallow yellow duplex soils.	Associated with the high peaks of the Monadnocks, such as Boonering Hill and Kimberling Hill.
Coolakin Subsystem (Marradong)	Minor Valleys bounded by Dwellingup or Norrine units; occasional rock outcrops and laterite spur. Wandoo woodland with some Jarrah, Marri and York Gum; mixed shrub understory.	Occurs in the eastern third of the study area, traversed by the Albany Highway and Bannister Marradong Road.
Dwellingup Subsystem	Divides, lower to upper slopes and hillcrests. Jarrah-Marri forest with some Wandoo.	Covers the western and central thirds of the study area and is traversed by the Bibbulmun Track and Pinjarra Williams Road. Mt Wells also occurs within this subsystem.
Dwellingup Subsystem (Marradong)	Divides, lower to upper slopes and hillcrests. Jarrah-Marri-Wandoo woodland; Grasstree-Sheoak or Parrotbush understory.	Covers the eastern third of the study area, traversed by the Albany Highway and Bannister Marradong Road.

Plate 1: Undulating landform of the Darling Uplands

3.2.1 VEGETATION

The vegetation within the study area appears to be dominated by woodland vegetation of mainly Jarrah and Marri trees and in some areas Banksia trees appear more dominant with an understorey of Grass Trees, Zamia Palms, Parrot Bush, Acacias and Hakeas (**Plate 2**). Along the main travel routes Marri and Jarrah appear to be the dominant species which form a dense screen of woodland vegetation particularly near State Forests. Along the Bibbulmun Track a greater variety in the vegetation is evident which is also due to the pedestrian travel speed. Heddle et. al. (1980) described the vegetation of the area as generally Jarrah-Marri open forests on the uplands with heath and herblands on the granite rocks. In valleys the vegetation is similar with jarrah-marri open forest and open woodlands with also wandoo and blackbutt. In low lying swamp areas other species occur such as Melaleuca, Banksia and sedge species.

Plate 2: Woodland vegetation along the Bibbulmun Track

3.2.2 WATERFORM

Although many creeklines traverse the landscape, visual evidence of waterforms are not a dominant feature within the study area except where travel routes cross a watercourse. The Hotham River is the main watercourse in the area which is visible along Bannister Marradong Road and Pinjarra Williams Road (**Plate 3).**

Plate 3: The Hotham River at Boddington.

3.2.3 LAND USE

Land use within the study area is generally state forest, crown land and freehold land. Along the Albany highway state forest is the predominant visual land use and along Bannister-Marradong Road and the Pinjarra-Williams Road rural land uses are evident. The Bibbulmun Track traverses mainly the Dwellingup State Forest within the study area with large areas of remnant vegetation visible. From higher points, along the Bibbulmun Track, such as Boonering Hill and Kimberling Hill a mix of land use is evident such as State Forest, pine plantations and mining (**Plate 4** & **Plate 5**).

The tenure of the study area is shown on **Map 5**.

Plate 4: State Forest and Pine Plantations visible from Boonering Hill

Plate 5: Current NBG RDA visible from Kimberling Hill

3.3 LANDSCAPE CHARACTER UNITS OF THE STUDY AREA

A Landscape Character Unit (LCU) is a smaller unit than a Landscape Character Type (LCT). While the LCT has common characteristics at a regional scale, there will be variations within an LCT that can be mapped at a local scale. An LCU is a geographic area sharing common characteristics such as landform, vegetation, waterform and cultural land use patterns relevant to human interaction and experience. Ecoscape identified the LCUs of the study area from fieldwork and desktop analysis. The identified LCUs display particular aesthetic characteristics which relate to form, line, colour, texture, scale, vegetation, waterform and land use.

The Broad Landscape Character Type of the study area has been identified by CALM (1994) as the Darling Uplands which is characterised by an extensive undulating landscape covered with deep green woodland vegetation. Within the study area five Landscape Character Units (LCUs) have been identified which are experienced by observers travelling along the main travel routes and the Bibbulmun Track. These LCUs, which are described below, primarily relate to landform and landuse, they are also shown on **Map 6**. The purpose of describing the LCUs is to help understand the visual elements of the study area and later assess how a proposed development fits into the visual landscape. Five LCUs were identified, which are described below. The Rolling Forest and Peaks LCUs are natural units while the remaining three are modified LCUs.

3.3.1 ROLLING FOREST

Study area location

This LCU covers an expansive area and is evident from most view locations within the study area, particularly from Albany Highway and the Bibbulmun Track, it is also evident from Pinjarra Williams Road and Bannister Marradong Road.

Character description

The Rolling Forest Character Unit is an expansive and relatively uniform landscape. Watercourses dissect the expansive undulating landform resulting in extensively weathered valleys and irregular slopes. The vegetation is primarily Jarrah/Marri forest with an understorey of Sheoak, Banksia, Grass Trees, Zamia Palms, Parrot Bush, Acacias and Hakeas. From a distance the visual elements are more uniform compared to a foreground view within the forest. The dominant visual characteristics are the simple rolling to horizontal form of the undulating landform which has curved lines to a straight horizon line. Another characteristic is the large expanse of muted dark green covering the landscape and the simple texture of the dark green forest. At closer views, particularly along the Bibbulmun Track, the visual diversity increases such as the vertical and sloping form of the trees with straight and angular lines (**Plate 6**). The tracks and roads also create a curved and sinuous line through the forest (**Plate 7**). Colours and textures become a more dominant feature at a closer view such as the various muted greens of the vegetation, orange/brown soils and grey/black/brown bark. Textures vary from rough bark and stony soils to a textured canopy and leaf litter on the forest floor.

Plate 6: Close view within the Rolling Forest

Plate 7: Roads curving through the Rolling Forest

3.3.2 PEAKS

Study area location

The Peaks LCU occurs amongst the Rolling Forest LCU and are identified as the high points in the landscape which are visible from Albany Highway and along the Bibbulmun Track. They are known as the Monadnocks Conservation Reserve and are visually distinctive amongst the rolling landscape.

Character description

The Peaks Character Unit is also a natural LCU characterised by rocky landform with pale lateritic shallow soils and exposed granite areas topped with patches of scrubby vegetation. This LCU shares similar visual characteristics as the Rolling Forest LCU however the sloping and angular forms of the Peaks stand out amongst the rolling form of the Rolling Forest LCU. At a closer range a greater variety of colour and textures are visible such as the dark grey/orange curved rock and variety of short and shrubby vegetation (**Plate 8**).

Plate 8: Varied textures, colours and curved granite of the Peaks LCU

3.3.3 ROLLING FARMLAND

Study area location

This LCU occurs between Rolling Forest LCU and Albany Highway and along Bannister Marradong Road and part of Pinjarra Williams Road. When travelling south along the Albany Highway, this LCU becomes evident as the vegetation opens up just before the turn off to Boddington.

Character description

The Rolling Farmland LCU is a modified landscape which has been cleared for farming however some remnant vegetation patches remain along creeklines and on the hilly areas. Due to the agricultural land use, there is greater visual diversity compared to the previous natural LCUs. The dominant characteristics are the rolling landform and the contrast between the cleared green to yellow paddocks (depending on the season) and dark green remnant vegetation on the curved hills which create distinctive bands of colour (**Plate 9**).

The rolling landform is a distinctive characteristic of this LCU which is clearly visible across the open cleared landscape. Also occurring within this LCU is the townsite of Boddington with various built forms in the foreground which are nestled amongst the dark green forest vegetation. Infrastructure associated with the Newmont Boddington Gold is also evident along Pinjarra Williams Road.

Plate 9: Rolling Farmland LCU

3.3.4 PLANTATION

Study area location

Pine and Blue Gum plantations occur within the Rolling Forest LCU, particularly in the northern part of the study area and is evident when looking south from Boonering Hill and Kimberling Hill.

Character description

This character unit is distinctive when looking across the landscape from an elevated position such as Boonering hill. Amongst the dark green native vegetation is a rectangular pattern of vivid greens which characterises the Plantation LCU. At closer views different stages of growth are evident and cleared areas with recently cut stumps, also evident are some timber mills in operation which contribute to more movement compared to the calmness of the natural LCUs.

3.3.5 MINING

Study area location

The Mining LCU is associated with the Newmont Boddington Gold (NBG) mine and Worsley Bauxite Mine which occurs northwest of Boddington and is located just east of Bibbulmun Track. Some of the mining areas have expanded since 2012 and the Veolia Resources Park is also new since 2012 which is visible from Boonering Hill, this has been attributed to the mining LCU as it has similar visual characteristics.

Character description

While this LCU is not a predominant visual feature it is evident from high points along the Bibbulmun Track and there are also distant glimpses to the NBG coarse ore stockpile and processing plant from the Pinjarra Williams Road, which can also be seen at night due to the lighting. Also visible from this road is an infrastructure corridor with a conveyor which runs towards the Boddington Bauxite Mine. From a distance, the mining LCU is characterised by cleared pale orange patches amongst the otherwise dark green Rolling Forest LCU, it is more obvious from distant elevated view points than along the Bibbulmun Track or other travel routes. The form and line from a distance is similar to the rolling landform which it sits within, from closer views where the Bibbulmun Track crosses an access road to the Boddington Bauxite Mine, the angular forms of the infrastructure contrast with the surrounding forest. **Plate 10** below shows the Boddington Bauxite Mine Conveyor as seen from the Pinjarra Williams Road which is associated with the Mining LCU.

Plate 10: Mining LCU visible from Pinjarra Williams Road (Google street view, May 2023)

Table 3 summarises the visual characteristics of the LCUs within the study area.

Table 3: Landscape Character Units Summary Table

Visual descriptor /LCU	Form	Line	Colour	Texture
Rolling Forest (natural)				
	+ Distant view: Rolling landform and a straight horizon + Close view: Vertical and sloping trees	+ Curved expansive landform + Straight to angular tree forms + Sinuous tracks and roads winding through the forest	+ Simple muted colours: + Dark green vegetation + Grey exposed rock + Orange soils + Grey / black / brown bark	+ Textured vegetation canopy + Textured leaf litter + Rough bark and rough rock and stony soils
Peaks (natural)				
	+ Distant view: Sloping landform on the horizon + Close view: rolling granite domes	+ Angular peaks + Curved granite rock + Angular shrubs	+ Dark green vegetation + Grey/orange exposed rock + Green/grey shrubs	+ Rough rocky soils and textured granite + Textured shrubby vegetation
Rolling Farmland (modified)				
	+ Rolling landform + Vertical fence posts, power poles + Horizontal fence lines + Vertical and sloping trees + Various built form	+ Curved landform + Straight fences, poles + Straight to curved roads + Straight to angular trees + Straight to angular infrastructure and buildings	+ Distinct bands of colour: + Grey road + Orange gravel + Pale green paddocks (seasonal) + Dark green native vegetation + Various colours within town site but	+ Textured paddocks and remnant vegetation + Smooth roads + Smooth built forms + Smooth waterforms

Visual descriptor /LCU	Form	Line	Colour	Texture
			dark green is dominant	
Plantation (modified)				
	+ Horizontal landform + Vertical trees	+ Straight, rectangular, uniform pattern + Straight to angular trees	+ Vivid green and blue green contrasting with the muted dark green native forest	+ Finer textured pattern compared to Rolling Forest LCU
Mining (modified)				
	+ Distant view: rolling landform + Closer view: sloping infrastructure	+ Straight to curved, follows the landform + Straight to angular lines of infrastructure	+ Pale orange contrasting with muted dark green forest + Blue grey water in the dams, visible at closer distance	+ Smoother textures compared to surrounding textured forest

4 VIEW EXPERIENCE

This section documents how the landscape is viewed and valued, both of which are related to the community's 'sense of place'. The way a landscape is perceived will differ amongst observers but general valued characteristics can be categorised from the extensive desktop research undertaken by CALM (1994) and WAPC (2007). Understanding view experience is an integral part to developing strategies to manage visual landscape character. An analysis of the following components was undertaken using GIS to illustrate the visual landscape:

+ access routes and significance levels
+ viewsheds to determine visibility
+ valued landscape characteristics and view experience.

4.1 VIEWING LOCATIONS

Viewing locations are areas that can be accessed by the public (visual access). The significance of these locations may vary depending on the sensitivity of the viewer travelling in these areas. For example, observers travelling along designated tourist routes will be more aware of the landscape or have a certain expectation of the view experience. Subsequently, public sensitivity is used to help determine the significance of potential visual impacts as indicated in **Table 7** in **Section 6.**

The study area is accessed according to the volume and type of public use. Factors such as road hierarchy and recreational/tourism potential are used to determine the degree of access. The significance levels of accessible areas identified by WAPC (2007) are:

+ Level 1: national/state significance
+ Level 2: regional significance
+ Level 3: local significance.

The significance level of access routes increases with (WAPC, 2007):

+ importance of views including type, features and rarity
+ volume of use of roads, trails and navigable waterways
+ degree of viewer sensitivity, e.g. tourists
+ degree to which viewing the landscape is integral to the enjoyment of the travel route or site, for example a freeway is a level 1 route but the surrounding landscape may not form a significant view
+ duration of view, for example glimpses along roads versus long views from a significant site.

Significance levels are outlined in more detail in **Appendix Two**. The significance levels of travel routes and sites within the study area were initially mapped from the desktop assessment using the supplied cadastral dataset and the Roads dataset (MRWA, 2016) and then confirmed on site. **Table 4** lists the significance levels within the study area.

Table 4: Significance levels of publicly accessible areas within the study area

Sensitivity level	Location	Comment on significance
Level 1	Albany Highway Bibbulmun Track	Main highway from Perth to Albany State/nationally significant walk trail ~1,000km long
Level 2	Bannister Marradong Road Pinjarra Williams Road	Main road with moderate levels of vehicle use Main road with moderate levels of vehicle use
Level 3	Local roads Forestry tracks	Local use Dieback issues, some areas are restricted and require a permit from the DBCA to access.

Locations with a higher view sensitivity were given a high priority for assessment, subsequently the following view locations were identified from the desktop assessment and through liaison with Newmont:

+ Bibbulmun Track (Level 1)
+ Albany Highway (Level 1)
+ Bannister Marradong Road (Level 2)
+ Pinjarra Williams Road (Level 2)

The viewshed analysis from the TDO Project also indicated the target areas to visit on site to undertake photo montage analysis. The results of the viewshed analysis are discussed in **Section 4.2**.

4.2 VIEWSHED ANALYSIS AND VIEW EXPERIENCE

4.2.1 VIEWSHED ANALYSIS

The objective of the viewshed analysis was to determine the potential visible area from areas accessible to the public. Seen area or viewshed analysis is a tool performed using a Geographic Information System computer program, in this case, ArcGIS Pro 3.1.2. It is a conceptual desktop method best complemented by a site visit to confirm the results of the analysis. A seen area analysis calculates the areas that are visible from an observation point using a set of user defined parameters such as height of observer, height of target and the extent and angle of the viewing area. The analysis uses a surface elevation derived from a digital terrain model (TIN). The output is therefore dependent on the quality of the input surface, in this case the TIN was calculated from 10m contour intervals. Vegetation screening and built form are not considered in the seen area calculation.

Viewsheds from the TDO Project

A composite viewshed analysis was done from a series of observer points located around the footprint of the RDA options at the maximum contour height. The viewshed results show the areas that may be able to see the TDO Project. This analysis was used to help target areas during the site assessment for photo montage analysis. The results of the viewshed analysis indicate that all the TDO developments may be seen from high points along the Bibbulmun Track and Albany Highway. As shown on **Maps 7-9**, higher visibility of the RDA (that is, a greater area of the RDA may be seen) correlates with higher points in the landscape. These high points mostly occur on the Bibbulmun Track. The viewsheds also extend to a few sections along Pinjarra Williams Road and Bannister Marradong Road, however the visibility is lower due to the lower position in the landscape. Refer to the following maps for the viewshed results:

+ **Map 7** Phase 1 RDA viewshed
+ **Map 8** Phase 2 RDA 1-X (option 1) viewshed
+ **Map 9** Phase 2 RDA 1-X (option 1) viewshed comparison with the 2012 RDA expansion. The 2023 proposal shows a reduced viewshed compared with the 2012 proposal, most likely a result of the reduced footprint.
+ **Map 10** Phase 2 RDA 2 (option 2) viewshed
+ **Map 11** Phase 2 RDA 2 (option 2) viewshed comparison with the 2012 proposal. The 2023 proposal shows a reduced viewshed compared with the 2012 proposal, most likely a result of the reduced footprint of the new RDA option.

Composite viewshed from the Bibbulmun Track

The composite viewshed from the Bibbulmun Track indicates a broader view extent than the viewshed from the roads. This is due to the higher terrain that the Bibbulmun Track traverses such as Boonering Hill, Kimberling Hill and Mt Wells. The TDO Project is potentially visible from the Track as shown on **Map 12**.

Viewsheds from travel routes

A composite viewshed was also done along the main travel routes within the study area as shown on **Map 13**. The viewsheds are generally restricted to the topography surrounding the road with potential views extending

towards high points in the landscape such as Mt Wells. These viewsheds indicate that the TDO Project may be partially visible from these travel routes as described below:

+ Albany Highway – this viewshed extends to some sections of the TDO project, however the views are likely to be screened by roadside vegetation (**Plate 17**).
+ Bannister Marradong Road – this viewshed extends to a small area on the northeast section of RDA 2.
+ Pinjarra Williams Road – this viewshed extends to a few small areas of the current RDA.

Vegetation Screening

As mentioned previously the viewshed analysis does not account for vegetation screening. The study area is characterised by large areas of tall forest vegetation, subsequently the view extent is restricted where travel routes and the Bibbulmun Track traverse through areas where there is a dense cover of vegetation such as the Rolling Forest LCU. Views in this LCU are predominantly enclosed and focal, subsequently the view extent is more limited than indicated on the viewshed maps.

4.2.2 VIEW EXPERIENCE

From the view locations within the study area five view categories were identified which are related to land use, topography and vegetation:

1. Panoramic: expansive views across the landscape in most directions
2. Open elevated: long distance views from elevated position, vegetation screens panoramic views in some directions
3. Enclosed: views enclosed by the vegetation canopy (experienced along trails)
4. Focal: views enclosed by dense roadside vegetation leading the observer to a focal point (experienced along roads)
5. Open rural: filtered views through roadside vegetation across undulating landform which varies from open paddocks to creekline vegetation and hills covered with remnant vegetation. The level of vegetation screening varies, some views are more open than others.

The view experience within the study area is shown on **Map 14** and is described from the different view locations below.

Bibbulmun Track

Observers along the Bibbulmun Track generally experience enclosed and canopied views where the trail winds through tall forest vegetation (Rolling Forest LCU) (**Plate 11**). Where the Track reaches the summit of the Peaks LCU, the view becomes expansive and panoramic across the landscape. From these high points the predominant view experience is of the Rolling Forest LCU with the Plantation LCU and Mining LCU scattered amongst the uniform deep green undulating landscape.

Within the study area the Bibbulmun Track traverses undulating terrain and traverses several hills which include Boonering Hill, Kimberling Hill and Mt Wells. While the Bibbulmun Track does not directly traverse over the top of Boonering Hill, there is a diversion track which walkers can access to reach the summit, although it is not signed. Since the 2012 study, the Veolia Resource Recovery facility has been constructed and is clearly visible from the summit at close distance (**Plate 12**).

Kimberling Hill is a longer ridgeline where the Track traverses up and down several hills until it reaches the final summit. The view experience is similar to Boonering Hill, however the Mining LCU is at a closer distance and more features become visible such as the Tailings Dam and other mining infrastructure (**Plate 13**). Although Mt Wells is at a higher elevation than Boonering and Kimberling Hills, the views are not as expansive due to the tall forest vegetation that occurs on the summit which restricts views in some directions such as east and southeast (**Plate 14**). A Bibbulmun Track Hut, radio tower and fire lookout tower also occur at Mt Wells. Broad open views to the west are experienced from the fire tower (**Plate 15**) whereas at ground level the view experience is enclosed by vegetation (**Plate 16**).

Plate 11: Canopied view experience along the Bibbulmun Track

Plate 12: Panoramic view from Boonering Hill, with the Veolia landfill site visible.

Plate 13: Panoramic view from Kimberling Hill

Plate 14: Vegetation screening views to the southeast from the fire tower at Mt Wells

Plate 15: Open elevated west view from the fire tower at Mt Wells

Plate 16: Views enclosed by vegetation at Mt Wells

Travel routes

The combination of highway travelling speeds and dense forest results in a focal view experience where the Albany Highway traverses the Rolling Forest LCU (**Plate 17**). The view opens up across undulating paddocks where the Highway traverses the Rolling Farmland LCU near the turn off to Boddington.

The view experience along Bannister Marradong Road and Pinjarra Williams Road is more variable which is related to the change in landuse from State Forest to farmland. Variations in topography and vegetation are more evident because vegetation clearing has resulted in a more open view (**Plate 18**). The vegetation type at the eastern section of Pinjarra Williams Road is dominated by Jarrah and Marri Forest which creates a focal view where the road passes through the State Forest. Where the landuse changes to farmland, the view is filtered through jarrah and marri trees to cleared undulating farmland and hills covered with remnant vegetation on the horizon. Since 2012 there is more evidence of mining on the undulating hills which is associated with the Worsley Bauxite Alumina mine (**Plate 19**). Views are also more enclosed where the road passes close to dense creekline vegetation and where undulating landform is closer to the roadside.

Table 5 summarises the view locations and view experience in the study area which is also shown on **Error! Reference source not found.**

Table 5: View experience summary table

View Location	View Experience	Comments
Bibbulmun Track	Enclosed Open elevated Panoramic	Generally enclosed by surrounding vegetation, starts to open up at higher elevation. Mining and plantation land use is visible from high points.
Albany Highway	Focal Open rural	Generally focal, opens up near Boddington turn off.
Bannister Marradong Road	Open rural	Filtered views across undulating rural landscape.
Pinjarra Williams Road	Focal Open rural	Filtered views across undulating rural landscape. Some visible areas of mining on distant hills.

Plate 17: Focal view along Albany Highway

Plate 18: Open rural view from Bannister Marradong Road – minimal vegetation screening

Plate 19: Open rural view from Pinjarra Williams Road, bauxite mining visible on the distant hills.

4.2.3 KEY VIEWS

The key view locations within the study area were identified as views that encompass landscape values, particularly where a view transitions from a relatively uniform view experience to a different one. The following key view locations were identified within the study area:

+ High points along Bibbulmun Track: Boonering Hill, Kimberling Hill, Mt Wells (**Plate 20**)
+ Albany Highway near the Bannister Marradong Road intersection as the view transitions from a focal view to an open view of undulating rural land use (**Plate 21**)
+ Hotham River crossing on Bannister Marradong Road and Pinjarra Williams Road (**Plate 22**).

Walkers along the Bibbulmun Track, generally experience an enclosed and canopied view. At high points along the Track where the vegetation canopy reduces, a broad vista across the landscape results in a key view experience (**Plate 20**).

A focal view is the typical view for motorists along the Albany Highway, however before the turn off to Boddington, the view transitions to an open view across the undulating rural landscape. This view indicates a change in the landuse from State Forest to rural and also forms an entry statement into the Shire of Boddington (**Plate 21**).

Another key view experience occurs where the Hotham River crosses the Bannister Marradong Road and Pinjarra Road. These views contribute to a varied view experience from the combination of permanent water, the valley landscape and riparian vegetation (**Plate 22**).

Plate 20: Key view experience from high points along the Bibbulmun Track

Plate 21: Rural landscape character, view from Albany Highway

Plate 22: Waterform: Hotham River crossing, Bannister Marradong Road

4.3 LANDSCAPE VALUES

Visual quality is described in *Reading the Remote, Landscape Characters of Western Australia* (CALM, 1994) as "the relative visual character of a landscape, expressed as an overall visual impression or value held by society after perceiving an area of land / water." CALM (1994) identified that visual quality increases with greater:

+ naturalness value, i.e. landscapes that have minimal modification and where natural features are prominent
+ topographic relief and ruggedness
+ vegetation and landscape diversity.

The WAPC (2007) identified key character indicators that can be used as a basis for classifying the landscape into two preference categories; 'most' preferred and 'least' preferred landscapes. These preference categories were established for natural, rural and built landscapes. 'Most' preferred characteristics are defined as landscape features that are highly valued by the community and contribute to the visual character (WAPC, 1997). 'Least' preferred are features not valued by the community and detract from the visual character

(WAPC, 2007). The preference indicators for natural and rural environments are summarised in **Appendix Three**. Within the study area there are a number of preferred characteristics that occur such as:

+ a high degree of topographic variety
+ rock outcrops
+ expansive landforms such as rolling hills
+ presence of water bodies
+ vegetation diversity.

CALM (1994) have described different levels of visual quality for the Darling Uplands Landscape Character Type as indicated in **Table 6** below.

Table 6: Visual Quality Levels for the Darling Uplands LCT (CALM, 1994).

Criteria	HIGH	MODERATE	LOW
Landform	**Variable**	**Gradual**	**Uniform**
	+ isolated peaks or hills that are visually dominant + major granite domes, outcrops, boulders + distinct undulations and steep slopes, abrupt appearance + well defined V-shaped and U-shaped valleys, heavily dissected steep slopes + diverse tributary patterns	+ broad or shallow valleys + rounded hills that are visually similar + minor rock outcrops	+ uniform landscape with few visually distinctive features
Vegetation	**Diverse**	**Less Diverse**	**Uniform**
	+ unusual forms and striking colour + vegetation creating canopied views to watercourses and rock forms + native vegetation displaying diversity in colour, texture, height + gradual and natural transition between land uses	+ open forest and woodland with some structural diversity + evident but regular patterns in height, colour and texture + remnant vegetation exhibiting some structural diversity and colour	+ extensive area of vegetation with repetitive patterns showing little variation
Waterform	**Permanent / variable / natural**	**Intermittent / uniform / natural**	**Absent / Non - natural**
	+ permanent watercourses with variable patterns + permanent river pools + reservoirs, lakes and wetlands with dominant natural characteristics	+ seasonal wetlands, intermittent streams and creek lines + reservoirs with some natural characteristics	+ water forms absent

The study area is generally characterised by an expansive undulating landscape with a uniform cover of deep green woodland vegetation. Visual variation occurs with change in landform or landuse which also marked a change in Landscape Character. These variations include high peaks, pine plantations, mining, cleared farmland areas, watercourses and townsites. Using the criteria identified in **Table 6** and **Appendix Three**, the landscape values within the study area are identified as:

+ isolated **peaks** and granite outcrops within the landscape (**Plate 23** and **Plate 24**). Granite peaks/domes also hold cultural values to the Noongar people as sources of water and navigational markers. They were also focal points for Aboriginal rituals and ceremonies (Bindon, 1997).
+ **permanent waterforms** such as the Hotham River which is evident from Bannister Marradong Road and Pinjarra Williams Road (**Plate 22**).

While the values identified are predominantly 'natural' the undulating rural character along the Bannister Marradong Road has been identified by the Shire as a valued landscape (Shire of Boddington, 2018) (**Plate 21**).

Map 14 illustrates the view experience, key views and landscape values within the study area.

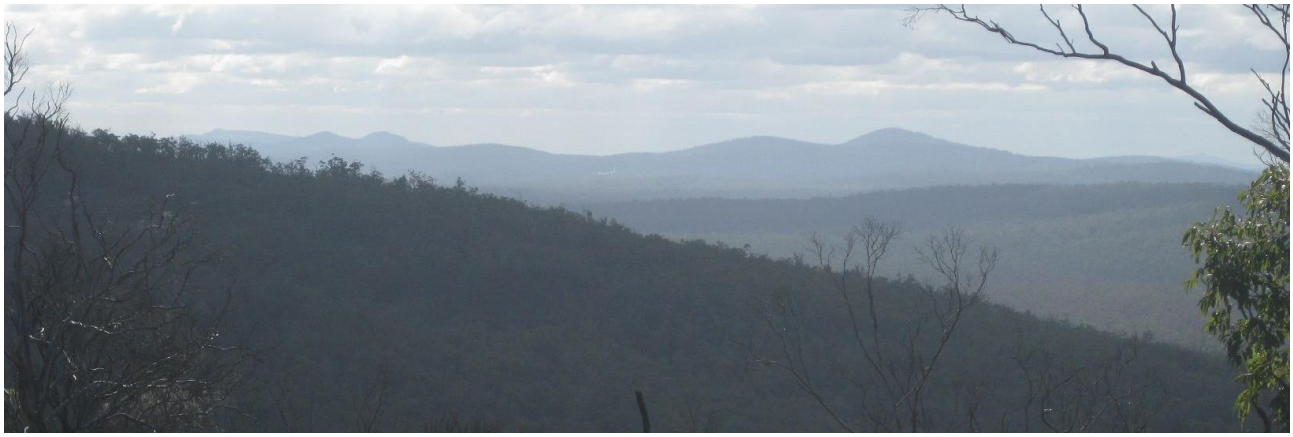


Plate 23: Isolated Peaks: view from Kimberling Hill

Plate 24: Granite outcrop at Kimberling Hill

5 VISUAL MANAGEMENT STRATEGIES

5.1 VISUAL MANAGEMENT OBJECTIVES (VMOS)

Strategies for managing landscape character have been developed through the evaluation and mapping of LCUs, landscape values, key views and viewsheds. By overlaying these factors, particularly landscape values and key views, visual strategies for managing the landscape character become apparent.

The visual management objectives adopted by WAPC (2007) to manage landscape character are:

i. best practice siting and design; which should be the baseline objective for the whole study area
ii. protection and maintenance
iii. restoration of degraded character or enhancement of opportunities.

Best practice siting and design is the baseline objective which should apply to the whole study area, strategies to achieve this objective include:

+ protect, enhance or restore individual landscape features
+ retain dominant visual landscape characteristics
+ apply practical and sensitive design guidelines for different land uses and different landscape character types (WAPC, 2007).

Protection and maintenance is the maximum retention of existing visual character. This objective is likely to apply to highly valued visual landscapes. Therefore future development should be planned and designed in such a way that it has minimal visual impact on landscape character. Strategies to achieve this objective include:

+ development applications to demonstrate a clear understanding of landscape features requiring protection and maintenance and the implications of the proposed development on these features
+ plan development to have minimal visual impact on the landscape by either being ‘not evident’ or ‘blending’ with the landscape setting
+ plan development to ensure individual landscape features and key views retain their character as much as possible
+ new structures should not be located or designed in such a way that obstruct or draw attention from key views
+ plan development to ensure the retention of key views that feature a ridgeline/mountain range directly in front of the viewer ensure that the slope facing viewers retains its current natural character
+ major firebreaks, access drives and other linear features should not be orientated towards the key view direction
+ plant screening vegetation to retain focus views and minimise roadside clearing
+ manage scenic routes to a high standard (WAPC, 2007).

Restoration and enhancement applies to degraded landscapes that require rehabilitation to enhance the visual amenity. This objective also applies to recognising opportunities within the landscape to enhance a view experience, for example, providing a lookout point. Strategies to achieve this objective include:

+ create or enhance viewing opportunities
+ develop new roads or walk trails to improve accessibility
+ restore and enhance established travel routes
+ use planting to screen visually degraded views (WAPC, 2007).

5.2 LANDSCAPE CHARACTER VISUAL MANAGEMENT

From the landscape evaluation of the study area the most apparent landscape values are views from high vantage points along the Bibbulmun Track which overlook the Rolling Forest and Peaks LCUs. Other landscape values within the study area are the undulating rural and riverine landscape (Rolling Farmland LCU) experienced from Bannister Marradong Road and Pinjarra Williams Road.

Elevated landforms such as the Peaks LCU are often prominent features within the landscape. Changes to these features will generally be noticeable and therefore the management objective for elevated landforms should be to retain their prominence within the landscape (WAPC, 2007). The strategies mentioned previously under the protection and maintenance objective would be a key component to retaining the existing view experiences within the study area.

The assessment has focused on Sensitivity Level 1 routes as these would experience a greater number and variety of observers.

The following section discusses the VMOs for the key views locations along these routes within the study area.

5.2.1 VMOS FOR BIBBULMUN TRACK

Key View Locations

+ Boonering Hill
+ Kimberling Hill
+ Mt Wells.

Landscape Character Units

The dominant LCU experienced from the Bibbulmun Track is the Rolling Forest LCU and the Peaks LCU. At higher points along the Track the other LCUs which are visible include the Plantation and Mining LCUs.

View Experience and Landscape Values

The view experience from the Bibbulmun Track is predominantly of a natural landscape with evidence of plantations and mining from high points. Panoramic views are experienced from Boonering Hill and Kimberling Hill and a partial panoramic view from Mt Wells. From these vantage points are views towards isolated peaks which have been identified as a landscape value. Lower in the landscape along the trail the view experience is enclosed by the vegetation canopy.

Visual Management Objectives

The main objective for the view experience for observers along the Bibbulmun Track is the **Protection and Maintenance** of the Rolling Forest and Peaks LCUs by ensuring that the proposed development does not dominate the view experience and that the Peaks remain a focal landscape feature. The existing views from high vantage points are dominated by Rolling Forest however these views are modified with the Veolia Recovery facility in close view to Boonering Hill as well as Newmont's RDAs in the distance. The RDAs are also clearly visible from Kimberling Hill as they are closer to this view location.

5.2.2 VMOS FOR TRAVEL ROUTES

Key View Locations

+ Albany Highway
+ Bannister Marradong Road
+ Pinjarra Williams Road.

Landscape Character Units

The dominant landscape character units experienced from the Albany Highway is the Rolling Forest with occasional views of the Plantation LCU and the Peaks LCU further north of the study area. From Bannister Marradong Road and Pinjarra Williams Road the landscape character transitions to Rolling Farmland, although

the Rolling Forest LCU is also evident from these roads. There are also views of the Mining LCU from Pinjarra Williams Road where the Worsley Bauxite Alumina mine is located.

View Experience and Landscape Values

Focal views are the common view experience for motorists travelling along the Albany Highway. This view transitions to more open views across an undulating rural landscape before the turn off to Boddington. This view experience continues along the Bannister Marradong Road towards Boddington and also along the Pinjarra Williams Road. Key views are also experienced where the road crosses the Hotham River with views towards the waterbody and riparian vegetation.

Visual Management Objectives

The rural character along the Bannister Marradong Road has been identified as a valued landscape in the Boddington Local Planning Strategy 2018. Therefore the visual management objectives along travel routes is the **Protection and Maintenance** of the Rolling Farmland LCU by ensuring the proposed development does not dominate over the rural landscape character. Key views of waterforms should also be maintained by ensuring the proposed development does not restrict views of the riverine landscape.

In summary to maintain the landscape values and view experience for observers, **Protection and Maintenance** has been identified as the appropriate Visual Management Objective for the following view locations as indicated on **Map 14**. For all other areas, Best Practice Siting and Design is recommended:

+ Enclosed views along the Bibbulmun Track
+ Panoramic and Open Elevated view points (Boonering Hill, Kimberling Hill and Mt Wells)
+ Waterform view points (Bannister Marradong Road and Pinjarra Williams Road)
+ Open Rural view experience (Albany Highway, Bannister Marradong Road and Pinjarra Williams Road).

6 VISUAL IMPACT ASSESSMENT

A Visual Landscape Evaluation (VLE) was undertaken for the study area, with the outcomes addressed in the previous section of this report. The purpose of the VLE was to identify visual landscape values and to determine strategies to manage visual landscape character.

This section describes the potential visual impacts associated with the TDO Project and assesses these against the Visual Management Objectives (VMOs) identified for the study area. Through this assessment, the level of visual impact can be identified and described.

The techniques used to identify the extent of potential visual impact of the TDO Project were:

+ viewshed or seen area analysis (**Section 4.2**)
+ photo montages.

6.1 VISUAL IMPACT CRITERIA

To determine the level of visual impact of the TDO Project on the landscape, visual impact criteria are assessed at a selection of view locations that are representative of the visual landscape within the study area. These criteria were developed as a conceptual framework for analysing landscapes (FPA, 1990), they include:

+ dominant elements: visibility, line, form, colour and texture
+ variable elements: travel speed of the observer, light and atmospheric conditions.

Ecoscape has adapted these criteria into an assessment table (**Table 7**) to categorise visual impacts into three levels. These categories relate to how much the proposed change contrasts with the surrounding landscape, they can therefore be described as visual absorbance capacity (VAC) ratings:

1. Not evident: Development is hidden, screened or not visible, from specified viewing locations.
2. Blending: Development is evident, but is not a dominant feature and blends with the existing landscape.
3. Prominent: Development is a dominant feature in the landscape, drawing attention to itself.

The VAC criteria is also assessed in context of the public sensitivity level and the VMO identified for the landscape to identify an overall ‘impact level’ rating which can also be described as the significance of visual impact. The following matrix table (**Table 7**) identifies whether a proposal is likely to be at variance with the VMOs of the landscape. In some cases, a project ‘may’ be at variance such as a Level 2 impact. In these instances the acceptable level of change may need to be determined with the local community and stakeholders.

The impact levels are:

+ Level 1: Visual impact is likely to be at variance with the VMO.
+ Level 2: Visual impact may be at variance with the VMO.
+ Level 3: Visual impact is unlikely to be at variance with the VMO.
+ None: There is no visual impact.

Table 7: Overall impact level matrix table

Visibility		Prominent			Blending			Not Evident
Significance Level rating		1	2	3	1	2	3	1-3
Visual Management Objective	Protection and Maintenance	L1	L1	L1	L2	L2	L2	None
	Best Practice Siting and Design	L1	L1	L1	L3	L3	L3	None
	Restoration and Enhancement	L2	L2	L2	L3	L3	L3	None
		VISUAL IMPACT LEVEL						

The Landscape Institute (1995) has similar criteria to determine the level of impact. The criteria are 'sensitivity' and 'magnitude' which are categorised into high, medium and low. Sensitivity being either the type of travel route or the landscape value. Depending on the sensitivity of the landscape and magnitude of change, the impact can be described as either slight, moderate or substantial. The principle of this criteria is similar to the visual impact levels used in this assessment, where:

+ VAC relates to the magnitude of change
+ Significance Level refers to type of travel route
+ Visual Management Objective relates to the landscape value

The visual impact levels outlined in **Table 7** have been developed by Ecoscape to reflect current assessment guidelines with the aim of providing a clear interpretation of visual impact.

6.2 VISUAL ABSORBANCE CAPACITY

The VAC of a landscape will affect the visual impact level of the TDO Project. VAC is the ability of the landscape to absorb a visual change, which is associated with the dominance and variable elements which have been used to assess the impact from each view point (refer to tables in **Appendix Five**). Views with simple form and line have less VAC compared with views that are more detailed in form, line and colour, such as varied and undulating landform and variable vegetation structure (FPA, 1990). In the latter example, infrastructure can be strategically placed within the landscape using the topography and vegetation to minimise its visual impact. Other factors that affect the level of VAC are listed in **Table 8** (FPA, 1990).

Table 8: Factors that influence the Visual Absorbance Capacity (VAC) of a landscape

FACTOR	Increased VAC	Decreased VAC
Biophysical	+ Landform: variable, undulating landform + Vegetation: greater vegetation diversity in structure, colour and form	+ Slope: increased slope + Soil: greater contrasting soil colour + Site recovery: slower site recovery rate
Perception	+ Increased distance from site + Slope facing away from observer + Lower public sensitivity level	+ Close distance to site + Slope facing the observer + Greater public sensitivity level + Long view duration + Development in direct line of sight
Proposed Development	+ Similar visual elements to surrounding landscape, i.e. shape, colour, texture + Short term activity	+ Large scale development + Longer duration activity

6.3 PHOTO MONTAGE ANALYSIS

A selection of view locations was used for photo montage analysis where the TDO project may be seen, and which were representative of the variety of LCUs and view experience within the study area. Due to topography and vegetation screening along Albany Highway, the TDO Project is unlikely to be visible and therefore photo montages were not done from the Highway. The following montage locations are also shown on **Maps 7-14**:

1. Boonering Hill (Bibbulmun Track)
2. Kimberling Hill (Bibbulmun Track)
3. Mt Wells (Bibbulmun Track)
4. Pinjarra Williams Road
5. Bannister Marradong Road

The analysis of photo montages is indicative only as the photo montage is a representation. In reality, the appearance of the TDO Project may differ from what is indicated on the photo montage, for example the colour may appear duller or brighter. Also various atmospheric conditions can affect the visibility of the development as well as time of day.

From all view locations, the analysis is based on the perceived visual differences between the 'current' view and the proposed views for:

+ **Phase 1 RDA 1**: expands the current F1/F3 RDA to a maximum capacity of 750Mt to extend the deposition life to mid-2029.
+ **Phase 2 - option 1 - RDA 1-X**: this option will increase the current facility to 1.27 Mm^3 beyond 2029
+ **Phase 2 - option 2 - RDA 2**: a new facility located northwest of the current dam in the Saddleback Treefarm which will have a maximum capacity of 600Mt which will be operational beyond 2029.

The following table (**Table 9**) describes the results of the montage analysis from each view location. At Boonering Hill and Kimberling Hill, the photo montages also present the visual changes at construction and operational phase for RDA 2 which is a new development proposed for phase 2 (post 2029). Refer to **Appendix Five** for the visual assessment tables for each montage.

Table 9: Photo montage analysis for each view location.

View Location	Montage	Development	Distance to RDA	Impact Analysis
Boonering Hill (1)	1	Phase 1 **RDA 1**	10-15 kms	The overall visibility rating has been assessed as **blending.** While the RDA is clearly visible from this elevated view point, there is not a great visual change from the existing view as summarised below: + Visibility: similar visibility as the extent of the RDA is not obviously different from the existing RDA. + Form: the horizontal form of the RDA blends with the surrounding landform. + Line: the straight and curved lines of the RDA blend with the surrounding landform. + Colour: there may be more orange coloured embankment visible compared to the existing view which contrasts with the deep green vegetation. + Texture: the smooth texture of the RDA embankment is similar to the existing view.
	2	Phase 2 **RDA 1-X** (option 1)	10-16 kms	Visibility has been assessed as **blending**, as per Montage 1. Despite the larger area of RDA 1-X, the visual change is not prominent.
	3	Phase 2 **RDA 2** (option 2) **Construction**	6-11 kms	Visibility has been assessed as **prominent**. The following factors contribute to this rating: - Visibility: RDA 2 is clearly visible compared to the existing view as it is a new area of development - Form: the horizontal form of the RDA blends with the surrounding landform. - Line: the straight and curved lines of the RDA blend with the surrounding landform. - Colour: the orange colour of the RDA noticeably contrasts with the deep green vegetation.. - Texture: smooth texture of the RDA noticeably contrasts with the textured vegetation.
	4	Phase 2 **RDA 2** (option 2) **Operational**	6-11 kms	Visibility has been assessed as **prominent**, as above, however, the orange colour of the RDA has been replaced by blue (water) which contrasts with the deep green vegetation.
Kimberling Hill (2)	5	Phase 1 **RDA 1**	5-9 kms	The overall visibility rating has been assessed as **blending.** While the RDA is clearly through the treeline, there is not a great visual change from the existing view as summarised below: - Visibility: similar visibility as the extent of the RDA is not obviously different from the existing RDA. - Form: the horizontal form of the RDA blends with the surrounding landform. - Line: the straight and curved lines of the RDA blend with the surrounding landform. - Colour: the orange coloured embankment is similar to the existing view. - Texture: the smooth texture of the RDA embankment is similar to the existing view.
	6	Phase 2 **RDA 1-X** (option 1)	5-11 kms	The colour and texture of the embankment may be more of a prominent change to the existing view. However, the overall visibility rating has been assessed as **blending** as per Montage 5.
	7	Phase 2 **RDA 2** (option 2) **Construction**	4-8 kms	Visibility has been assessed as **prominent**. The following factors contribute to this rating: - Visibility: RDA 2 is clearly visible compared to the existing view as it is a new area of development. - Form: the horizontal form of the RDA blends with the surrounding landform. - Line: the straight and curved lines of the RDA blend with the surrounding landform. - Colour: the orange colour of the RDA noticeably contrasts with the deep green vegetation. - Texture: smooth texture of the RDA noticeably contrasts with the textured vegetation.
	8	Phase 2 **RDA 2** (option 2) **Operational**	4-8 kms	Visibility has been assessed as **prominent**, as above, however, the orange colour of the RDA has been replaced by blue (water) which contrasts with the deep green vegetation.
Mt Wells (3) East ne view	9	All phases and options shown	1-9 kms	The overall visibility rating has been assessed as **not evident**. All development options are screened from view by the topography and existing vegetation.

View Location	Montage	Development	Distance to RDA	Impact Analysis
Pinjarra Williams Rd (4)	10	All phases and options shown	15-25 kms	The overall visibility rating has been assessed as **not evident**. The majority of the development options will be screened from view by the existing topography. The montage analysis revealed that a small portion of RDA 1-X may be visible, however due to the small extent and distance from the observer the visibility is likely to be negligible.
Bannister Marradong Rd (5)	11	All phases and options shown	10-14 kms	The overall visibility rating has been assessed as **not evident**. All development options are screened from view by the existing topography.

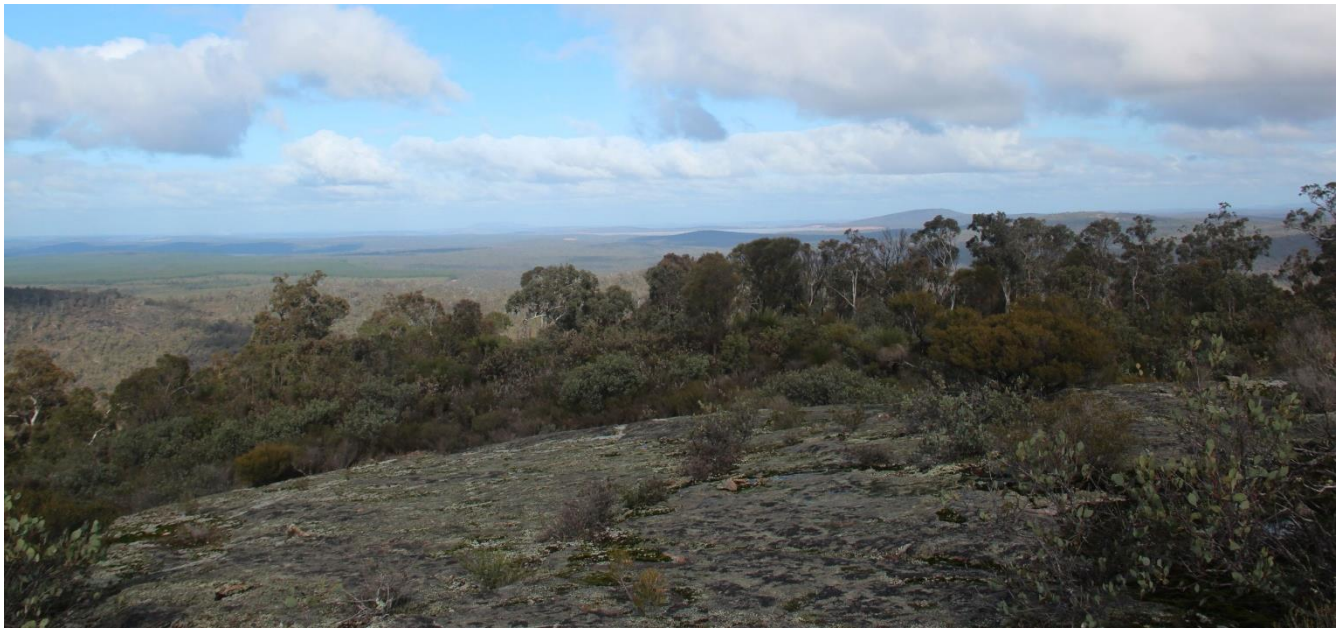
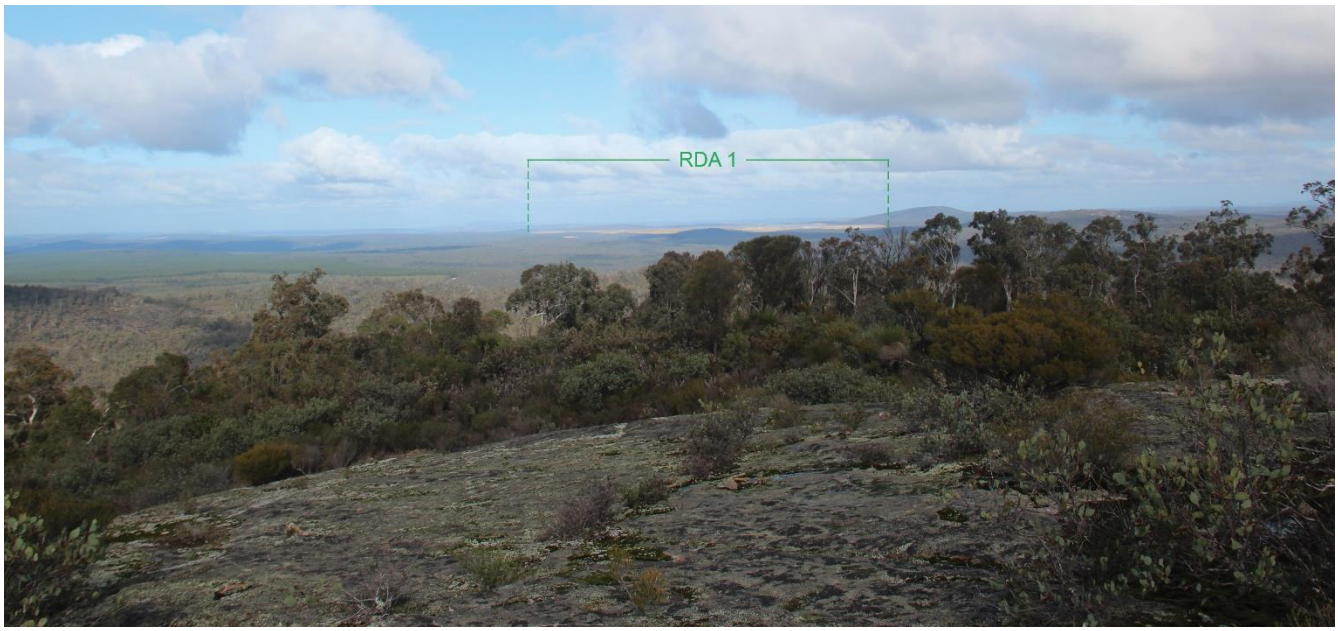
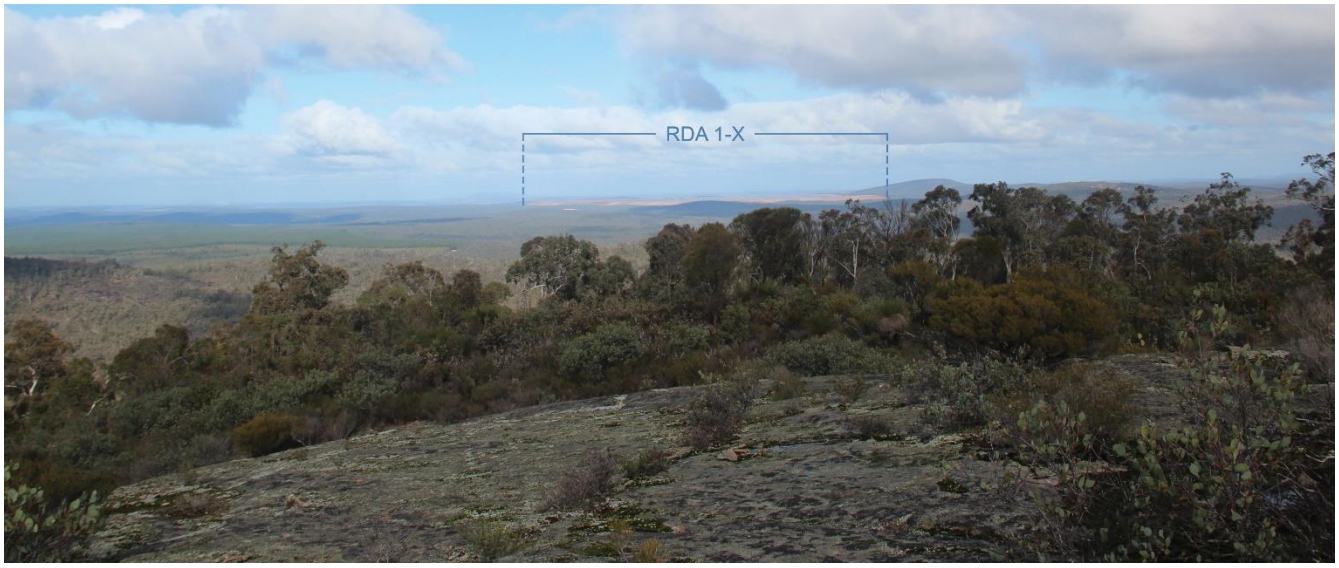


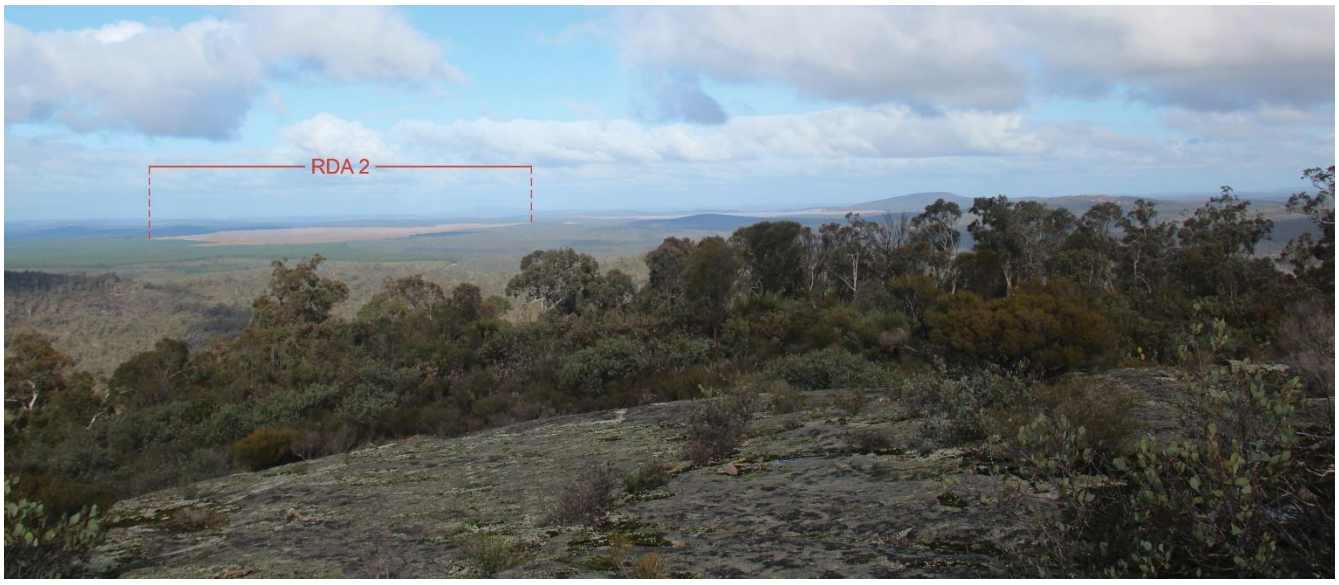
Figure 2: View location 1 (Boonering Hill) – current view



Montage 1: View Location 1 (Boonering Hill) – Phase 1 RDA 1



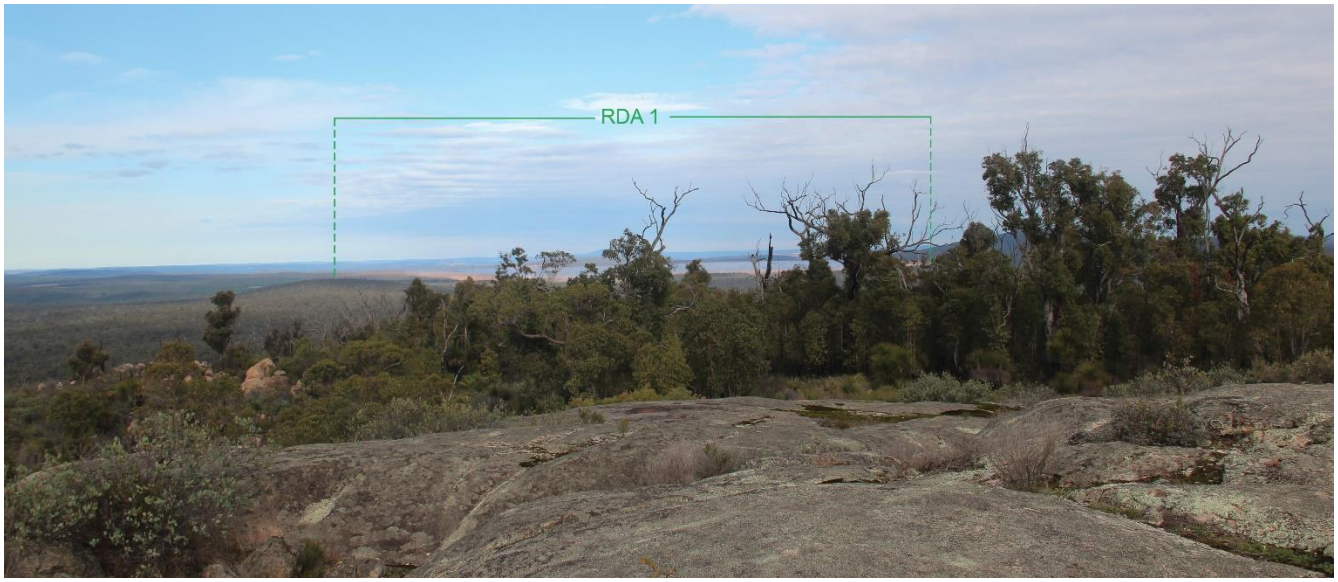
Montage 2: View Location 1 (Boonering Hill) – Phase 2 RDA 1-X



Montage 3: View Location 1 (Boonering Hill) – Phase 2 RDA 2 (construction stage)

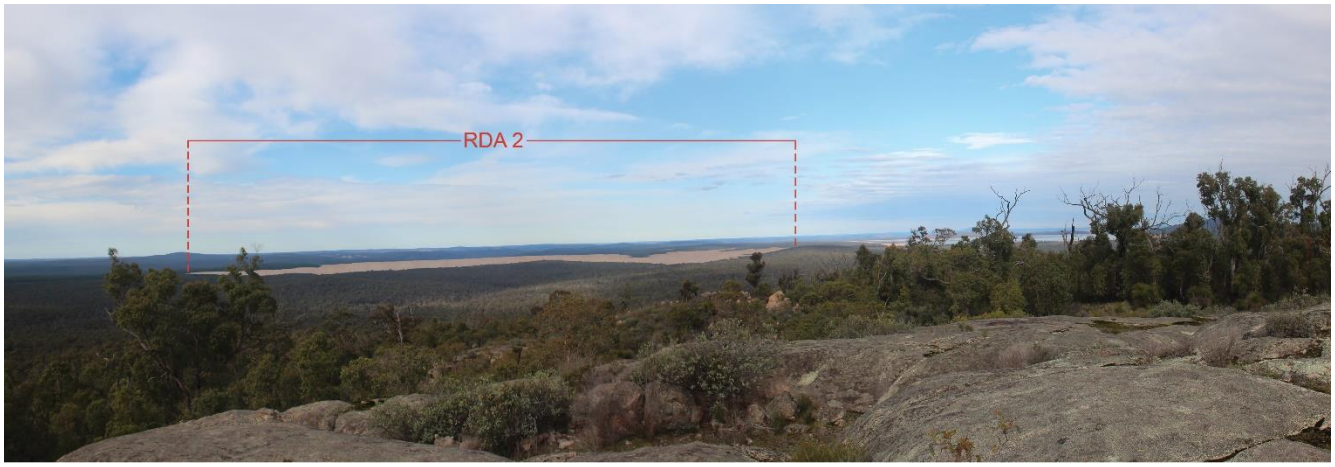
Montage 4: View Location 1 (Boonering Hill) – Phase 2 RDA 2 (operational stage)

Figure 3: View location 2 (Kimberling Hill) – current view

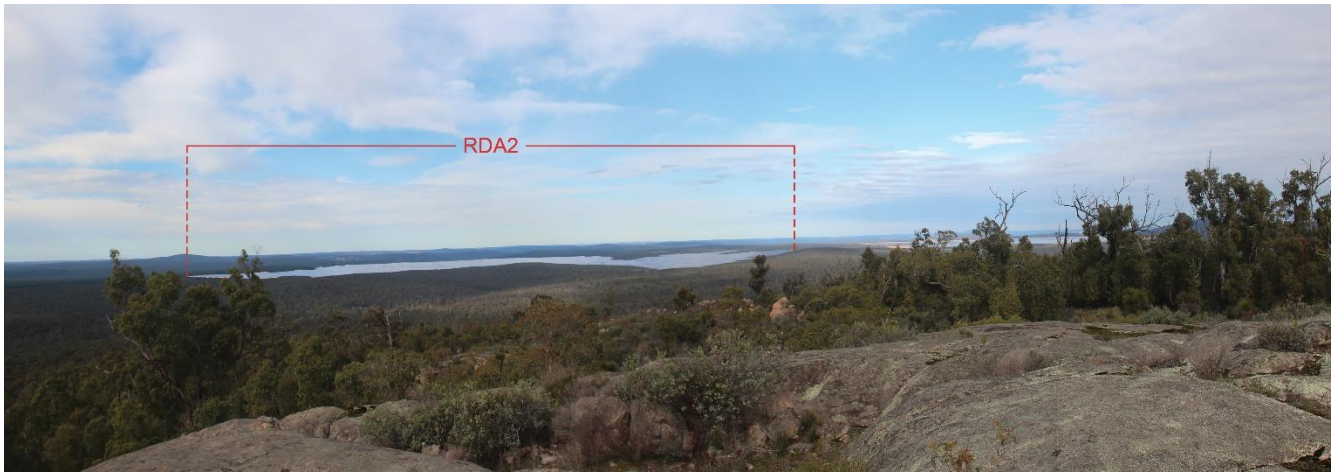


Montage 5: View Location 2 (Kimberling Hill) – Phase 1 RDA 1

Montage 6: View Location 2 (Kimberling Hill) – Phase 2 RDA 1-X



Montage 7: View Location 2 (Kimberling Hill) – Phase 2 RDA 2 (construction stage)



Montage 8: View Location 2 (Kimberling Hill) – Phase 2 RDA 2 (operational stage)

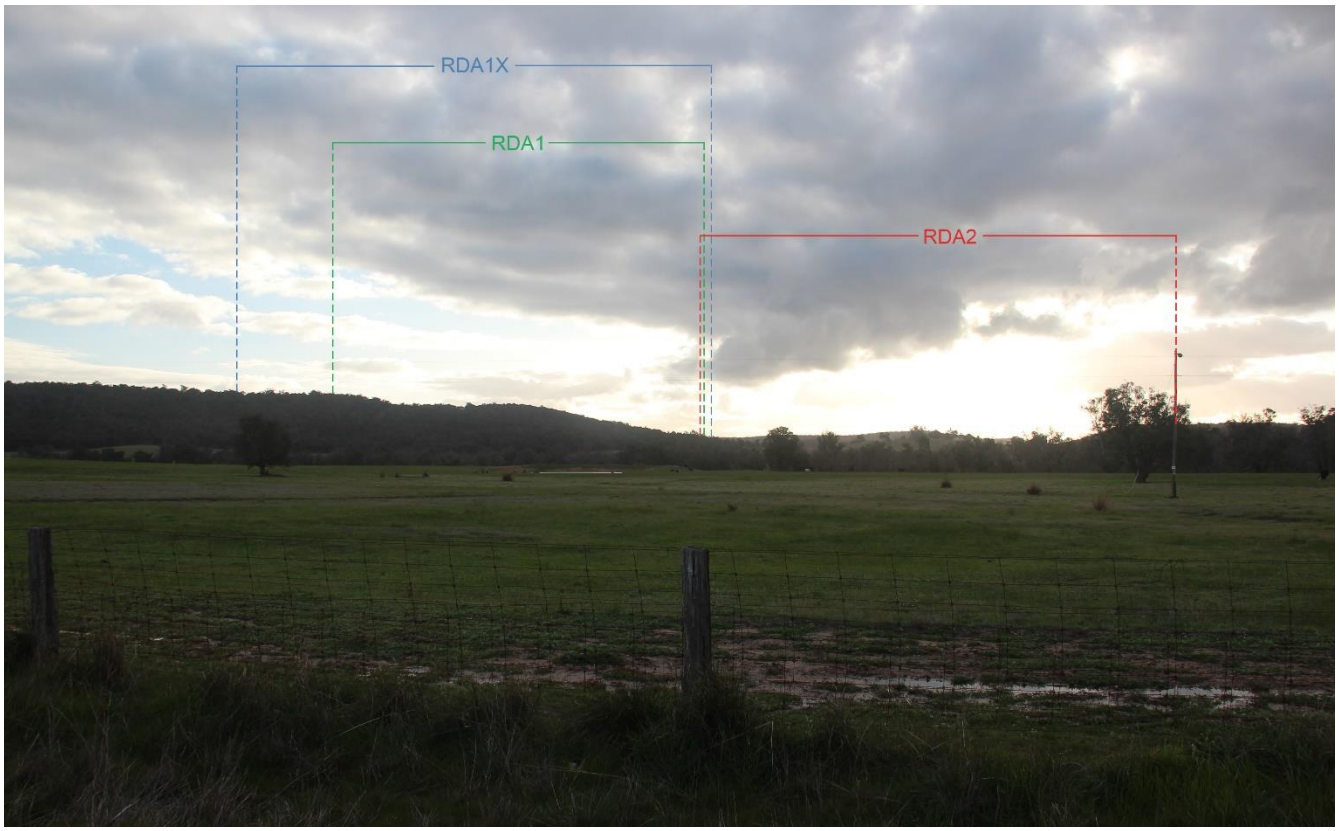
Figure 4: View location 3 (Mt Wells) – current view

Montage 9: View Location 3 (Mt Wells) – All RDA options not visible

Figure 5: View location 4 (Pinjarra Williams Rd) – current view

Montage 10: View Location 4 (Pinjarra Williams Rd) – All RDA options not visible

Figure 6: View location 5 (Bannister Marradong Rd) – current view



Montage 11: View Location 5 (Bannister Marradong Rd) – All RDA options not visible

7 SUMMARY AND EVALUATION

7.1 LANDSCAPE CHARACTER

The study area occurs within the Darling Uplands Landscape Character Type (LCT) which is characterised by an extensive undulating landscape covered with deep green woodland vegetation. The landscape values of this region include deep valleys and rounded hills with granite outcrops and boulders such as the Monadnocks Conservation Park.

Five Landscape Character Units (LCUs) have been identified which are experienced by observers travelling along the main travel routes and the Bibbulmun Track:

+ Rolling Forest LCU
+ Peaks LCU
+ Rolling Farmland LCU
+ Plantation LCU
+ Mining LCU

7.2 LANDSCAPE VALUES

The landscapes within the study area exhibit some of the most preferred landscape characteristics for natural landscapes such as:

+ a high degree of topographic variety
+ rock outcrops
+ expansive landforms such as rolling hills
+ presence of water bodies
+ vegetation diversity.

The mapped landscape values within the study area are:

+ isolated **peaks** and granite outcrops within the landscape
+ **permanent waterforms** such as the Hotham River which is evident from Bannister Marradong Road and Pinjarra Williams Road.

7.3 VIEW EXPERIENCE

The view experience within the study area consists mostly of a natural forest landscape with pockets of pine plantation and cleared rural farmland visible from the roads closer to Boddington. Also visible are areas of mining which is visible from Pinjarra Williams Road and at high points along the Bibbulmun Track.

From the view locations within the study area five view categories were identified which are related to land use, topography and vegetation:

1. Panoramic: expansive views across the landscape in most directions, experienced from high points such as Boonering Hill and Kimberling Hill.
2. Open elevated: long distance view from elevated position, vegetation screens panoramic views in some directions, experienced near the summit of hills and at Mt Wells.
3. Enclosed: views enclosed by the vegetation canopy, experienced along trails.
4. Focal: views enclosed by dense roadside vegetation leading the observer to a focal point, experienced along roads, particularly Albany Highway.
5. Open rural: filtered views through roadside vegetation across undulating landform which varies from open paddocks to creekline vegetation and hills covered with remnant vegetation. The level of vegetation screening varies, some views are more open than others.

7.4 KEY VIEWS

The key view locations within the study area were identified as views that encompass landscape values, particularly where a view transitions from a relatively uniform view experience to a different one. The following key view locations were identified within the study area:

+ High points along Bibbulmun Track: Boonering Hill, Kimberling Hill, Mt Wells
+ Albany Highway near Bannister Marradong Road intersection as the view transitions from a focal view to an open view of undulating rural land use
+ Hotham River crossing on Bannister Marradong Road and Pinjarra Williams Road.

While the key views and landscape values identified are predominantly 'natural' the undulating rural character along the Bannister Marradong Road has been identified by the Shire as a valued landscape.

7.5 VISUAL MANAGEMENT OBJECTIVES

From the landscape evaluation of the study area the most apparent landscape values are visible from high vantage points along the Bibbulmun Track which overlook the Rolling Forest and Peaks LCUs. Other landscape values within the study area are the undulating rural and riverine landscape (Rolling Farmland LCU) experienced from Bannister Marradong Road and Pinjarra Williams Road.

To maintain the landscape values and view experiences within the study area, the VMO of **Protection and Maintenance** has been identified as the appropriate Visual Management Objective for the view categories listed below:

+ Enclosed views along the Bibbulmun Track
+ Panoramic and Open Elevated view points (Boonering Hill, Kimberling Hill and Mt Wells)
+ Waterform view points (Bannister Marradong Road and Pinjarra Williams Road)
+ Open Rural view experience (Albany Highway, Bannister Marradong Road and Pinjarra Williams Road).

For all other areas, Best Practice Siting and Design is recommended.

7.6 SIGNIFICANCE OF IMPACTS

This section describes the likely visual impacts of the TDO Project for observers traversing the Bibbulmun Track and motorists travelling along Albany Highway, Bannister Marradong Road and Pinjarra Williams Road. The acceptability of visual impacts is also discussed in relation to the Visual Management Objectives (VMOs) identified for the study area.

7.6.1 BIBBULMUN TRACK

The VMO identified for managing the visual landscape for observers along the Bibbulmun Track is the **Protection and Maintenance** of Rolling Forest and Peaks LCUs by ensuring the natural character retains its dominance and the Peaks remain a focal point. This VMO is achievable from the Bibbulmun Track where the view experienced is enclosed by the vegetation canopy and also from Mt Wells as there is adequate vegetation screening the TDO Project. From high vantage points with a panoramic view experience the assessed impact ranged from blending to prominent for RDA 2 (Phase 2). Subsequently, the visual impact of RDA 2 on the view experience from Boonering Hill and Kimberling Hill is likely to be at variance with the VMO of Protection and Maintenance as it alters the visual characteristics of the Rolling Forest LCU, however the Peaks LCU remains unaltered and a key feature within the rolling landscape.

RDA 2 may alter the existing character as it is a new development, however, it shares similar visual characteristics to the surrounding landscape such as line and form. Furthermore, there is evidence of modified land uses such as the Plantation and Mining LCUs which allows some capacity for change of a similar nature. RDA2 may contribute to a cumulative visual impact with the addition of the Veolia Resources site that has been constructed to the east of Boonering Hill which has been operational since 2015 and add to the Mining

character from this view point. Future bauxite mining in the region will also expand over the next 25 years resulting in vegetation removal and further cumulative visual impacts.

During the construction stage, movement in the landscape as a result of clearing and building the RDA may result in a greater impact than portrayed on the montages. During the operational stage the impact while prominent may be perceived as a landscape value where the RDA will resemble a waterform that provides some visual diversity amongst the forest landscape.

7.6.2 ROADS

The VMO identified from the assessed roads within the study area is the **Protection and Maintenance** of the Rolling Rural LCU by ensuring rural character is a prominent feature particularly where view experience has been identified as open rural. This VMO should be achievable as minimal visual impacts are expected from Pinjarra Williams Road and Bannister Marradong Road. Subsequently, the Rolling Farmland LCU retains its character. The key views of waterform identified along these roads are also not expected to experience any visual impacts of the TDO Project.

7.7 SUMMARY OF VISUAL IMPACTS

The visibility of the TDO Project ranged from not evident to prominent which was related to landscape character, view experience and distance from the site. The visual impact can be classified according to the view experience shown on **Map 14**:

+ Not Evident for Focal and Enclosed views
+ Not Evident for Open Rural views
+ Not Evident to Blending for Open elevated views
+ Blending to Prominent for Panoramic views.

The analysis has revealed that most visual impacts will be experienced from high points along the Bibbulmun Track that have panoramic views. For most of the Bibbulmun Track however the view experience is enclosed by the forest vegetation and therefore visual impacts are not expected from these parts of the Track. The Track also does not traverse directly over Boonering Hill however there is an optional track to take to the summit if walkers wish to do so. The Track does traverse over Kimberling Hill which is a long ridgeline, however the TDO Project is mainly visible from the southern end of the ridge where the photo montages were prepared. Further north, the Track is positioned to the west of the ridgeline which prevents open views towards the TDO Project to the east and southeast.

The main factors which contributed to the prominent visual impact of RDA 2 from Boonering and Kimberling hill were:

+ elevated observer position with a clear panoramic view across the landscape
+ minimal vegetation screening on the hill tops due to the granite landform
+ proximity to the TDO Project which resulted in the RDAs occupying a larger area in the observers field of view
+ contrasting colour and texture to the surrounding landscape.

The colour and texture were the main dominance variables that resulted in a prominent impact although line and form were considered to blend as the RDAs share similar line and form characteristics with the surrounding landscape. However, the visual change was enough to alter the landscape character from these view locations.

Negligible visual impact is expected along Pinjarra Williams Road or Bannister Marradong Road as the TDO Project is screened by undulating topography.

No visual impact is expected along roads such as Albany Highway due to the focal view experience created by dense vegetation screening.

A summary of visual impacts from travel routes and key view locations is provided in **Table 10**.

7.8 VISUAL MANAGEMENT RECOMMENDATIONS

From most view locations within the study area, the VMO of Protection and Maintenance of the Rolling Forest LCU, Peaks LCU, Rolling Farmland LCU and key views of waterform is maintained. Two view locations; Boonering Hill and Kimberling Hill were the only locations identified to experience a Level 1 visual impact rating during both construction and operation stages of RDA 2.

The acceptability of visual impacts from these panoramic view locations along the Bibbulmun Track can be further determined through discussion with relevant stakeholders. Factors which may be considered for discussion include:

+ that the TDO Project may provide a varied view experience and a source of interest to walkers particularly during the operational stage where the waterform created by the RDAs may be perceived as a landscape value
+ interpretation opportunities of the Mine, particularly during the construction stage. For example, informing walkers of construction, operation and closure timeframes with photo montages, historical changes to the view associated with settlement patterns.
+ additional interpretation opportunities such as geology, indigenous cultural values
+ that the duration of the visual impact is comparatively short for walkers as it is observed once they have reached the summit of the panoramic view locations
+ track diversion opportunities such as the section near the State Forest WRD
+ design constraints of RDAs
+ visual impact mitigation opportunities through rehabilitation.

Table 10: Summary of Visual Impacts at View Locations

View Location	Significance Level	View Experience	VMOs	Montage	Development	Impact Summary	Visibility Rating	Visual Impact Level
1 - Boonering Hill	Level 1 Designated walk track	Panoramic	**Protection and Maintenance** of Rolling Forest and Peaks LCUs	**1**	Phase 1 RDA	There is not a great visual change from the existing view. All dominance characteristics blend with surrounding landscape, i.e. line, form, colour and texture.	Blending	L2
				2	Phase 2 RDA X-1	As per Montage 1	Blending	L2
				3	Phase 2 RDA 2 (construction)	The visual change is prominent as it's a new development, the colour of the orange soil and the smooth texture noticeably contrast with the surrounding landscape.	Prominent	L1
				4	Phase 2 RDA 2 (operational)	As above, however the colour contrast instead of orange (soil) will be blue (water).	Prominent	L1
2 - Kimberling Hill	Level 1 Designated walk track	Panoramic		**5**	Phase 1 RDA	There is not a great visual change from the existing view. All dominance characteristics blend with surrounding landscape, i.e. line, form, colour and texture.	Blending	L2
				6	Phase 2 RDA X-1 (option 1)	Similar to montage 5, however the colour and texture of the embankment may be more prominent.	Blending	L2
				7	Phase 2 RDA 2 (construction)	The visual change is prominent as it's a new development, the colour of the orange soil and the smooth texture noticeably contrast with the surrounding landscape.	Prominent	L1
				8	Phase 2 RDA 2 (operational)	As above, however the colour contrast instead of orange (soil) will be blue (water).	Prominent	L1
3 - Mt Wells	Level 1 Designated walk track	Enclosed to open (west view)		**9**	All phases and options	This view location is the closest to the TDO Project Area (1-5kms) however vegetation screening restricts views to all RDA options.	Not Evident	None
4 - Pinjarra Williams Road	Level 2 - main road, moderate level vehicle use	Rural undulating	**Protection and Maintenance** of Rolling Farmland LCU	**10**	All phases and options	Undulating topography screen all RDA options from view.	Not Evident	None
5 - Bannister Marradong Road	Level 2 - main road, moderate level vehicle use	Rural undulating		**11**	All phases and options	Undulating topography screen all RDA options from view.	Not Evident	None
Albany Highway	Level 1 State Highway	Focal, rural undulating		**n/a**	All phases and options	Vegetation screening and undulating topography screen all RDA options from view.	Not Evident	None

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APPENDIX ONE MAPS

425000 450000

6400000 6400000

6375000 6375000

6350000 6350000

425000 450000

Serpentine National Park
Karnet Nature Reserve
South Western Hwy
North Dandalup Nature Reserve
Jarrahdale State Forest
Mundaring State Forest
Monadnocks Conservation Park
Canning River
Youraling State Forest
Boyagarring Conservation Park
Strange Road Nature Reserve
Lupton Conservation Park
North Dandalup River
Serpentine River
Albany Hwy
Marrinup State Forest
Dwellingup State Forest
South Dandalup River
Bannister River
DWELLINGUP
Pinjarra Williams Rd
Bannister Marradong Rd
Hotham River
Crossman River
BODDINGTON
Lane Poole Reserve
Mooradung Nature Reserve
Murray River
Pinjarra Williams Rd
Dwellingup State Forest
Harvey River
Williams River
Falls Brook Nature Reserve
Harris River State Forest
Harvey River

LEGEND

- Study Area
- Town
- River
- Road
- Bibbulmun Track
- Proposed RDA Development Options
- DBCA - Legislated Lands and Waters

COORDINATE SYSTEM: GDA 1994 MGA ZONE 50
PROJECTION: TRANSVERSE MERCATOR
DATUM: GDA 1994
UNITS: METER

MAP PREPARED BY

ecoscape

AUTHOR: NW
DATE: 12/07/2023
CHECKED: SB
PROJECT NO: 4818-23
SCALE: 1:250,000 @ A3

N 0 2.5 5 7.5 km

DATA SOURCES

SOURCE DATA: PROPOSED RDA DEVELOPMENT OPTIONS (ECOSCAPE 2023), DBCA - LEGISLATED LANDS AND WATERS (DBCA-011) (DBCA2022), ROAD NETWORK (MRWA 2020) AND SURFACE HYDROLOGY LINES (NATIONAL) (GEOSCIENCE AUSTRALIA 2015)
IMAGERY: ESRI BASEMAP (2023)
SERVICE LAYERS: WORLD TOPOGRAPHIC MAP: ESRI, HERE, GARMIN, FAO, NOAA, USGS
WORLD IMAGERY: EARTHSTAR GEOGRAPHICS

Newmont™

STUDY AREA

NEWMONT BODDINGTON GOLD
FUTURE TAILINGS DEPOSITION OPTIONS
VISUAL IMPACT ASSESSMENT

MAP
1

425000
450000
6400000
6375000
6350000

South Western Hwy
Canning River
North Dandalup River
Serpentine River
Albany Hwy
South Dandalup River
Bannister River
Swan Coastal Plain
Darling Plateau
DWELLINGUP
Bannister Marradong Rd
Hotham River
Crossman River
BODDINGTON
Pinjarra Williams Rd
Wheatbelt Plateau
Murray River
Harvey River
Williams River
Harvey River

LEGEND

- Study Area
- Town
- River
- Road
- Bibbulmun Track
- Proposed RDA Development Options

Landscape Character Type and Sub-Type (CALM 1994)

- Darling Plateau: Darling Uplands
- Swan Coastal Plain: Swan Coastal Plain
- Wheatbelt Plateau: Dryandra Uplands

COORDINATE SYSTEM: GDA 1994 MGA ZONE 50
PROJECTION: TRANSVERSE MERCATOR
DATUM: GDA 1994
UNITS: METER
MAP PREPARED BY
ecoscape

AUTHOR: NW
DATE: 11/07/2023
CHECKED: SB
PROJECT NO: 4818-23
SCALE: 1:250,000 @ A3

N
0 2.5 5 7.5 km

DATA SOURCES

SOURCE DATA: PROPOSED RDA DEVELOPMENT OPTIONS (ECOSCAPE 2023), LANDSCAPE CHARACTER TYPES (CALM 1994), ROAD NETWORK (MRWA 2020) AND SURFACE HYDROLOGY LINES (NATIONAL) (GEOSCIENCE AUSTRALIA 2015)
IMAGERY: ESRI BASEMAP (2023)
SERVICE LAYERS: WORLD TOPOGRAPHIC MAP: ESRI, HERE, GARMIN, FAO, NOAA, USGS
WORLD IMAGERY: EARTHSTAR GEOGRAPHICS

Newmont

LANDSCAPE CHARACTER TYPES

NEWMONT BODDINGTON GOLD
FUTURE TAILINGS DEPOSITION OPTIONS
VISUAL IMPACT ASSESSMENT

MAP
2

430000 440000 450000

6390000 6380000 6370000

South Dandalup River
Albany Hwy
Bannister Marradong Rd
Bannister River
Hotham River
Pinjarra Williams Rd
BODDINGTON

LEGEND

- Town
- Bibbulmun Track
- River
- Road

Proposed RDA Development Options

- Phase 1 - RDA
- Phase 2 - Option RDA 1-X
- Phase 2 - Option RDA 2

Soil Land Systems

- Cooke subsystem
- Williams subsystem (Quindanning)
- Yalanbee subsystem

Coolakin Subsystem

- Coolakin Subsystem (Marradong)
- Coolakin (Marradong), rocky phase
- Coolakin (Marradong), very rocky phase

Dwellingup Subsystem

- Dwellingup Subsystem
- Dwellingup rock outcrops phase
- Dwellingup Subsystem (Quindanning)
- Dwellingup Subsystem (Marradong)
- Dwellingup (Marradong), rock outcrop phase
- Dwellingup (Marradong), very rocky phase

Michibin Subsystem

- Michibin Subsystem (Quindanning)
- Michibin (Quindanning), rocky phase
- Michibin (Quindanning), very rocky phase

Norrine Subsystem

- Norrine subsystem (Marradong)
- Norrine subsystem (Quindanning)

Pindalup Subsystem

- Pindalup Subsystem
- Pindalup hillslope phase
- Pindalup rock outcrop phase
- Pindalup swampy valley floor phase

Yarragil Subsystem

- Yarragil Subsystem
- Yarragil DpYGh phase
- Yarragil rock outcrop phase
- Yarragil Swamp phase

COORDINATE SYSTEM: GDA 1994 MGA ZONE 50
PROJECTION: TRANSVERSE MERCATOR
DATUM: GDA 1994
UNITS: METER
MAP PREPARED BY
ecoscape

AUTHOR: NW
DATE: 12/07/2023
CHECKED: SB
PROJECT NO: 4818-23
SCALE: 1:110,000 @ A3

N 0 1 2 3 km

DATA SOURCES

SOURCE DATA: PROPOSED RDA DEVELOPMENT OPTIONS (ECOSCAPE 2023), SOIL-LANDSCAPE MAPPING WESTERN AUSTRALIA - BEST AVAILABLE SOILS (DPRID-027) (DPIRD 2022), ROAD NETWORK (MRWA 2020) AND SURFACE HYDROLOGY LINES (NATIONAL) (GEOSCIENCE AUSTRALIA 2015)
IMAGERY: ESRI BASEMAP (2023)
SERVICE LAYERS: WORLD TOPOGRAPHIC MAP: ESRI, HERE, GARMIN, FAO, NOAA, USGS
WORLD IMAGERY: EARTHSTAR GEOGRAPHICS

Newmont

SOIL LAND SYSTEMS

NEWMONT BODDINGTON GOLD
FUTURE TAILINGS DEPOSITION OPTIONS
VISUAL IMPACT ASSESSMENT

MAP
3

430000 440000 450000

6390000 6380000 6370000

South Dandalup River
Albany Hwy
Bannister Marradong Rd
Bannister River
Hotham River
BODDINGTON
Pinjarra Williams Rd

LEGEND

- Town
- Bibbulmun Track
- River
- Road

Proposed RDA Development Options

- Phase 1 - RDA
- Phase 2 - Option RDA 1-X
- Phase 2 - Option RDA 2

Elevation (m)

- 1 - 39
- 40 - 147
- 148 - 228
- 229 - 288
- 289 - 333
- 334 - 366
- 367 - 411
- 412 - 471
- 472 - 552

COORDINATE SYSTEM: GDA 1994 MGA ZONE 50
PROJECTION: TRANSVERSE MERCATOR
DATUM: GDA 1994
UNITS: METER
MAP PREPARED BY
ecoscape

AUTHOR: NW
DATE: 11/07/2023
CHECKED: SB
PROJECT NO: 4818-23
SCALE: 1:110,000 @ A3

N 0 1 2 3 km

DATA SOURCES

SOURCE DATA: PROPOSED RDA DEVELOPMENT OPTIONS (ECOSCAPE 2023), ELEVATION AND HILLSHADE SURFACES (ECOSCAPE 2023), ROAD NETWORK (MRWA 2020) AND SURFACE HYDROLOGY LINES (NATIONAL) (GEOSCIENCE AUSTRALIA 2015)
SERVICE LAYERS: WORLD TOPOGRAPHIC MAP: ESRI, HERE, GARMIN, FAO, NOAA, USGS
WORLD IMAGERY: EARTHSTAR GEOGRAPHICS

Newmont

ELEVATION

NEWMONT BODDINGTON GOLD
FUTURE TAILINGS DEPOSITION OPTIONS
VISUAL IMPACT ASSESSMENT

MAP
4

430000
440000
450000
6390000
6380000
6370000

Dwellingup State Forest
Youraling State Forest
Albany Hwy
South Dandalup River
Bannister Marradong Rd
Bannister River
Hotham River
BODDINGTON
Pinjarra Williams Rd

LEGEND

- Town
- Bibbulmun Track
- River
- Road
- Cadastre
- Newmont tenement
- DBCA - Legislated Lands and Waters

Proposed RDA Development Options

- Phase 1 - RDA
- Phase 2 - Option RDA 1-X
- Phase 2 - Option RDA 2

COORDINATE SYSTEM: GDA 1994 MGA ZONE 50
PROJECTION: TRANSVERSE MERCATOR
DATUM: GDA 1994
UNITS: METER
MAP PREPARED BY
ecoscape

AUTHOR: NW
DATE: 11/07/2023
CHECKED: SB
PROJECT NO: 4818-23
SCALE: 1:110,000 @ A3

N
0 1 2 3 km

DATA SOURCES

SOURCE DATA: PROPOSED RDA DEVELOPMENT OPTIONS (ECOSCAPE 2023), CADASTRE (NO ATTRIBUTES) (LGATE-001) (LGATE 2019), DBCA - LEGISLATED LANDS AND WATERS (DBCA-011) (DBCA 2022), NEWMONT TENEMENTS (NEWMONT 2023), ROAD NETWORK (MRWA 2020) AND SURFACE HYDROLOGY LINES (NATIONAL) (GEOSCIENCE AUSTRALIA 2015)
SERVICE LAYERS: WORLD TOPOGRAPHIC MAP: ESRI, HERE, GARMIN, FAO, NOAA, USGS
WORLD IMAGERY: EARTHSTAR GEOGRAPHICS

Newmont

TENURE

NEWMONT BODDINGTON GOLD
FUTURE TAILINGS DEPOSITION OPTIONS
VISUAL IMPACT ASSESSMENT

MAP
5

430000 440000 450000

6390000 6380000 6370000

South Dandalup River
Albany Hwy
Bannister Marradong Rd
Bannister River
Hotham River
BODDINGTON
Pinjarra Williams Rd

LEGEND

- Town
- Bibbulmun Track
- Road
- River

Proposed RDA Development Options

- Phase 1 - RDA
- Phase 2 - Option RDA 1-X
- Phase 2 - Option RDA 2

Landscape Character Units

- Mining
- Peaks
- Plantation
- Rolling Farmland
- Rolling Forest

COORDINATE SYSTEM: GDA 1994 MGA ZONE 50
PROJECTION: TRANSVERSE MERCATOR
DATUM: GDA 1994
UNITS: METER
MAP PREPARED BY
ecoscape

AUTHOR: NW
DATE: 11/07/2023
CHECKED: SB
PROJECT NO: 4818-23
SCALE: 1:110,000 @ A3

N 0 1 2 3 km

DATA SOURCES

SOURCE DATA: PROPOSED RDA DEVELOPMENT OPTIONS AND LANDSCAPE CHARACTER UNITS (ECOSCAPE 2023), ROAD NETWORK (MRWA 2020) AND SURFACE HYDROLOGY LINES (NATIONAL) (GEOSCIENCE AUSTRALIA 2015)
IMGAERY: ESRI BASEMAP (2023)
SERVICE LAYERS: WORLD TOPOGRAPHIC MAP: ESRI, HERE, GARMIN, FAO, NOAA, USGS
WORLD IMAGERY: EARTHSTAR GEOGRAPHICS

Newmont

LANDSCAPE CHARACTER UNITS

NEWMONT BODDINGTON GOLD
FUTURE TAILINGS DEPOSITION OPTIONS
VISUAL IMPACT ASSESSMENT

MAP 6

430000 440000 450000

6390000 6380000 6370000

South Dandalup River

Albany Hwy

Bannister Marradong Rd

Bannister River

Hotham River

BODDINGTON

Pinjarra Williams Rd

1 2 3 4 5

LEGEND

- 1 Photo Montage Location
- Town
- Bibbulmun Track
- River
- Road

View Experience

- Infrastructure Corridor
- Open Elevated
- Panoramic
- Town Centre
- Waterform
- Enclosed
- Focal
- Open Rural

Proposed RDA Development Option

- Phase 1: RDA

Viewshed Phase 1: RDA

- High visibility
- Low visibility

PERTH
BODDINGTON
ALBANY
DARLING SCARP

COORDINATE SYSTEM: GDA 1994 MGA ZONE 50
PROJECTION: TRANSVERSE MERCATOR
DATUM: GDA 1994
UNITS: METER

MAP PREPARED BY
ecoscape

AUTHOR: NW
DATE: 12/07/2023
CHECKED: SB
PROJECT NO: 4818-23
SCALE: 1:110,000 @ A3

N 0 1 2 3 km

DATA SOURCES

SOURCE DATA: VIEW EXPERIENCE, VIEWSHED, HILLSHADE AND PROPOSED RDA DEVELOPMENT OPTION (ECOSCAPE 2023), ROAD NETWORK (MRWA 2020) AND SURFACE HYDROLOGY LINES (NATIONAL) (GEOSCIENCE AUSTRALIA 2015)
IMGAERY: ESRI BASEMAP (2023)
SERVICE LAYERS: WORLD TOPOGRAPHIC MAP: ESRI, HERE, GARMIN, FAO, NOAA, USGS
WORLD IMAGERY: EARTHSTAR GEOGRAPHICS

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VIEW EXPERIENCE AND VIEWSHED PHASE 1: RDA

NEWMONT BODDINGTON GOLD
FUTURE TAILINGS DEPOSITION OPTIONS
VISUAL IMPACT ASSESSMENT

MAP 7

430000 440000 450000

6390000 6380000 6370000

South Dandalup River

Albany Hwy

Bannister Marradong Rd

Bannister River

Hotham River

BODDINGTON

Pinjarra Williams Rd

1 2 3 4 5

LEGEND

- 1 Photo Montage Location
- Town
- Bibbulmun Track
- River
- Road

View Experience

- Infrastructure Corridor
- Open Elevated
- Panoramic
- Town Centre
- Waterform
- Enclosed
- Focal
- Open Rural

Proposed RDA Development Option

- Phase 2: Option RDA 1-X

Viewshed Phase 2: Option RDA 1-X

Value

- High visibility
- Low visibility

COORDINATE SYSTEM: GDA 1994 MGA ZONE 50
PROJECTION: TRANSVERSE MERCATOR
DATUM: GDA 1994
UNITS: METER

MAP PREPARED BY

ecoscape

AUTHOR: NW
DATE: 12/07/2023
CHECKED: SB
PROJECT NO: 4818-23
SCALE: 1:110,000 @ A3

N 0 1 2 3 km

DATA SOURCES

SOURCE DATA: VIEW EXPERIENCE, VIEWSHED, HILLSHADE AND PROPOSED RDA DEVELOPMENT OPTION (ECOSCAPE 2023), ROAD NETWORK (MRWA 2020) AND SURFACE HYDROLOGY LINES (NATIONAL) (GEOSCIENCE AUSTRALIA 2015)
IMGAERY: ESRI BASEMAP (2023)
SERVICE LAYERS: WORLD TOPOGRAPHIC MAP: ESRI, HERE, GARMIN, FAO, NOAA, USGS
WORLD IMAGERY: EARTHSTAR GEOGRAPHICS

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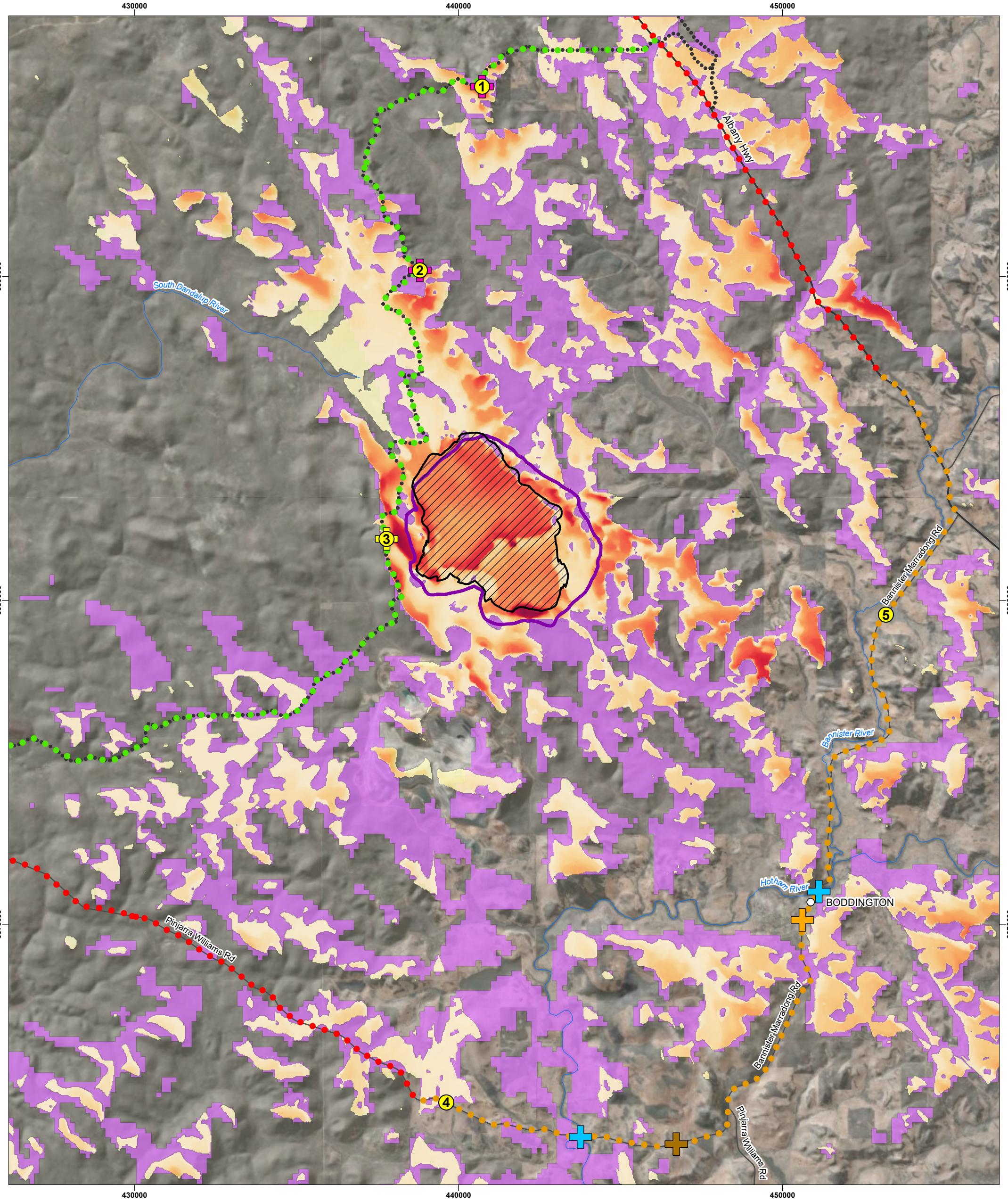
VIEW EXPERIENCE AND VIEWSHED PHASE 2: OPTION RDA 1-X

NEWMONT BODDINGTON GOLD
FUTURE TAILINGS DEPOSITION OPTIONS
VISUAL IMPACT ASSESSMENT

MAP 8



LEGEND

- 1 Photo Montage Location
- Town
- Bibbulmun Track
- River
- Road

View Experience

- Infrastructure Corridor
- Open Elevated
- Panoramic
- Town Centre
- Waterform
- Enclosed
- Focal
- Open Rural

Proposed RDA Development Option

- Phase 2: Option RDA 1-X

Viewshed Phase 2: Option RDA 1-X

Value

- High visibility
- Low visibility

2012 - Proposed RDA Development

- Expanded RDA

2012 - Viewshed Expanded RDA

Value

- Visible

COORDINATE SYSTEM: GDA 1994 MGA ZONE 50
PROJECTION: TRANSVERSE MERCATOR
DATUM: GDA 1994
UNITS: METER
MAP PREPARED BY
ecoscape

AUTHOR: NW
DATE: 12/07/2023
CHECKED: SB
PROJECT NO: 4818-23
SCALE: 1:110,000 @ A3

N 0 1 2 3 km

DATA SOURCES

SOURCE DATA: VIEW EXPERIENCE, VIEWSHED, HILLSHADE AND PROPOSED RDA DEVELOPMENT OPTION (ECOSCAPE 2012 AND 2023), ROAD NETWORK (MRWA 2020) AND SURFACE HYDROLOGY LINES (NATIONAL) (GEOSCIENCE AUSTRALIA 2015)
IMGAERY: ESRI BASEMAP (2023)
SERVICE LAYERS: WORLD TOPOGRAPHIC MAP: ESRI, HERE, GARMIN, FAO, NOAA, USGS
WORLD IMAGERY: EARTHSTAR GEOGRAPHICS

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VIEW EXPERIENCE AND VIEWSHEDS PHASE 2: OPTION RDA 1-X AND 2012 RDA OPTION 2

NEWMONT BODDINGTON GOLD
FUTURE TAILINGS DEPOSITION OPTIONS
VISUAL IMPACT ASSESSMENT

MAP
9

430000 440000 450000

6390000 6380000 6370000

South Dandalup River

Albany Hwy

Bannister Marradong Rd

Bannister River

Hotham River

BODDINGTON

Pinjarra Williams Rd

1 2 3 4 5

LEGEND

- 1 Photo Montage Location
- Town
- Bibbulmun Track
- River
- Road

View Experience

- Infrastructure Corridor
- Open Elevated
- Panoramic
- Town Centre
- Waterform
- Enclosed
- Focal
- Open Rural

Proposed RDA Development Option

- Phase 2: Option RDA 2

Viewshed Phase 2: Option RDA 2

Value

- High visibility
- Low visibility

COORDINATE SYSTEM: GDA 1994 MGA ZONE 50
PROJECTION: TRANSVERSE MERCATOR
DATUM: GDA 1994
UNITS: METER

MAP PREPARED BY

ecoscape

AUTHOR: NW
DATE: 12/07/2023
CHECKED: SB
PROJECT NO: 4818-23
SCALE: 1:110,000 @ A3

N 0 1 2 3 km

DATA SOURCES

SOURCE DATA: VIEW EXPERIENCE, VIEWSHED, HILLSHADE AND PROPOSED RDA DEVELOPMENT OPTIONS (ECOSCAPE 2023), ROAD NETWORK (MRWA 2020) AND SURFACE HYDROLOGY LINES (NATIONAL) (GEOSCIENCE AUSTRALIA 2015)
IMGAERY: ESRI BASEMAP (2023)
SERVICE LAYERS: WORLD TOPOGRAPHIC MAP: ESRI, HERE, GARMIN, FAO, NOAA, USGS
WORLD IMAGERY: EARTHSTAR GEOGRAPHICS

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VIEW EXPERIENCE AND VIEWSHED PHASE 2: OPTION RDA 2

NEWMONT BODDINGTON GOLD
FUTURE TAILINGS DEPOSITION OPTIONS
VISUAL IMPACT ASSESSMENT

MAP 10

430000 440000 450000

6390000 6380000 6370000

South Dandalup River

Albany Hwy

Bannister Marradong Rd

Bannister River

Hotham River

BODDINGTON

Pinjarra Williams Rd

1 2 3 4 5

LEGEND

- 1 Photo Montage Location
- Town
- Bibbulmun Track
- Road
- River

View Experience

- Infrastructure Corridor
- Open Elevated
- Panoramic
- Town Centre
- Waterform
- Enclosed
- Focal
- Open Rural

Proposed RDA Development Option

- Phase 2: Option RDA 2

Viewshed Phase 2: Option RDA 2

Value

- High visibility
- Low visibility

2012 - Proposed RDA Development

- New RDA

2012 - Viewshed New RDA

Value

- Visible

COORDINATE SYSTEM: GDA 1994 MGA ZONE 50
PROJECTION: TRANSVERSE MERCATOR
DATUM: GDA 1994
UNITS: METER

MAP PREPARED BY

ecoscape

AUTHOR: NW
DATE: 12/07/2023
CHECKED: SB
PROJECT NO: 4818-23
SCALE: 1:110,000 @ A3

N 0 1 2 3 km

DATA SOURCES

SOURCE DATA: VIEW EXPERIENCE, VIEWSHEDS, HILLSHADE AND PROPOSED RDA DEVELOPMENT OPTIONS (ECOSCAPE 2012 AND 2023), ROAD NETWORK (MRWA 2020) AND SURFACE HYDROLOGY LINES (NATIONAL) (GEOSCIENCE AUSTRALIA 2015)
IMGAERY: ESRI BASEMAP (2023)
SERVICE LAYERS: WORLD TOPOGRAPHIC MAP: ESRI, HERE, GARMIN, FAO, NOAA, USGS
WORLD IMAGERY: EARTHSTAR GEOGRAPHICS

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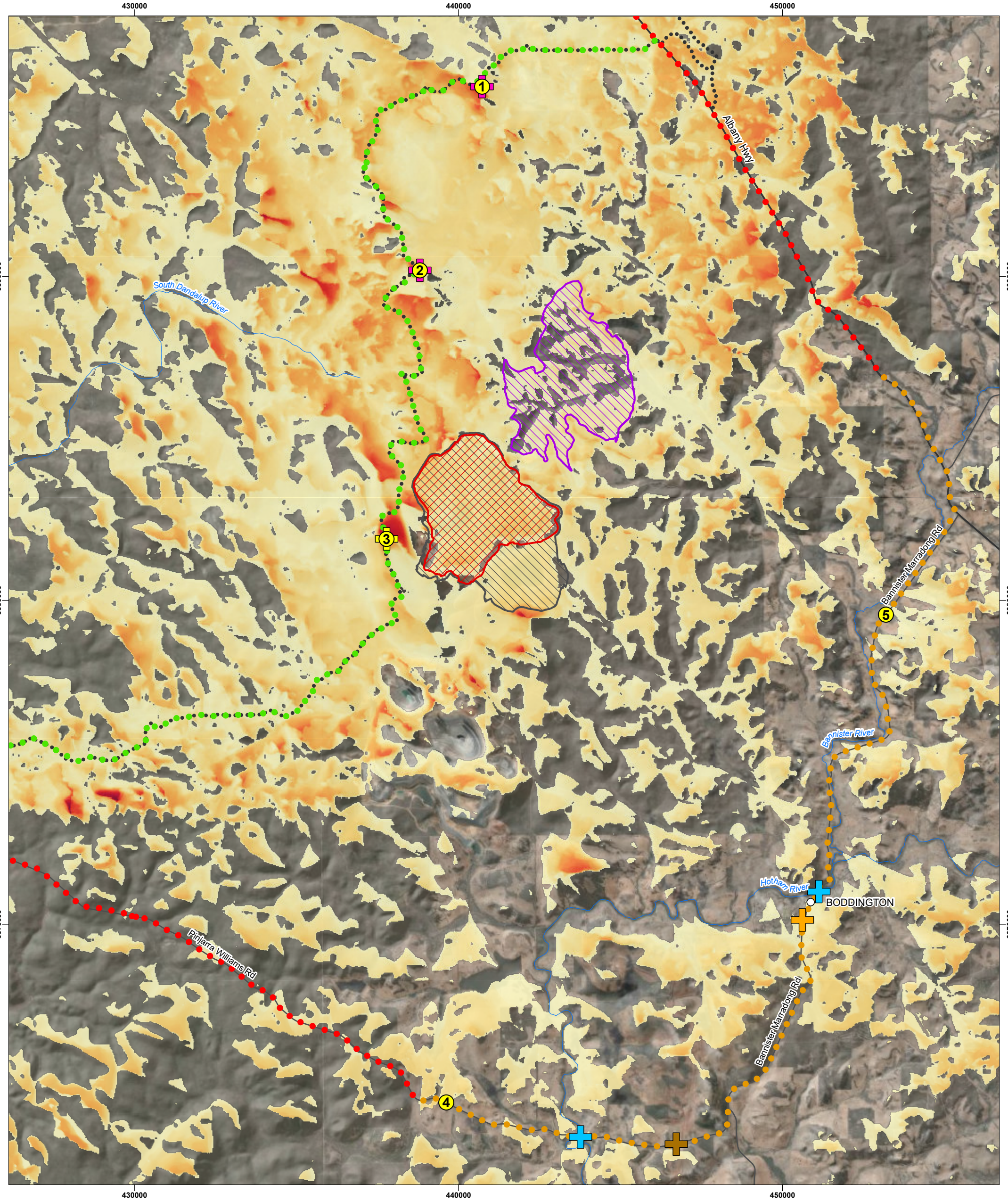
VIEW EXPERIENCE AND VIEWSHEDS PHASE 2: OPTION RDA 2 AND 2012 NEW RDA

NEWMONT BODDINGTON GOLD
FUTURE TAILINGS DEPOSITION OPTIONS
VISUAL IMPACT ASSESSMENT

MAP 11



LEGEND

- 1 Photo Montage Location
- Town
- Bibbulmun Track
- Road
- River

View Experience

- Infrastructure Corridor
- Open Elevated
- Panoramic
- Town Centre
- Waterform
- Enclosed
- Focal
- Open Rural

Proposed RDA Development Options

- Phase 1 - RDA
- Phase 2 - Option RDA 1-X
- Phase 2 - Option RDA 2

Viewshed Bibbulmun Track

- High visibility
- Low visibility

COORDINATE SYSTEM: GDA 1994 MGA ZONE 50
PROJECTION: TRANSVERSE MERCATOR
DATUM: GDA 1994
UNITS: METER
MAP PREPARED BY
ecoscape

AUTHOR: NW
DATE: 13/07/2023
CHECKED: SB
PROJECT NO: 4818-23
SCALE: 1:110,000 @ A3

N
0 1 2 3 km

DATA SOURCES

SOURCE DATA: VIEW EXPERIENCE, VIEWSHED, HILLSHADE AND PROPOSED RDA DEVELOPMENT OPTIONS (ECOSCAPE 2012 AND 2023), ROAD NETWORK (MRWA 2020) AND SURFACE HYDROLOGY LINES (NATIONAL) (GEOSCIENCE AUSTRALIA 2015)
IMGAERY: ESRI BASEMAP (2023)
SERVICE LAYERS: WORLD TOPOGRAPHIC MAP: ESRI, HERE, GARMIN, FAO, NOAA, USGS
WORLD IMAGERY: EARTHSTAR GEOGRAPHICS

Newmont

VIEW EXPERIENCE AND VIEWSHED BIBBULMUN TRACK

NEWMONT BODDINGTON GOLD
FUTURE TAILINGS DEPOSITION OPTIONS
VISUAL IMPACT ASSESSMENT

MAP
12

430000 440000 450000

6390000 6380000 6370000

South Dandalup River

Albany Hwy

Bannister Marradong Rd

Bannister River

Hotham River

BODDINGTON

Pinjarra Williams Rd

1 2 3 4 5

430000 440000 450000

LEGEND

- 1 Photo Montage Location
- Town
- Bibbulmun Track
- Road
- River

View Experience

- Infrastructure Corridor
- Open Elevated
- Panoramic
- Town Centre
- Waterform
- Enclosed
- Focal
- Open Rural

Proposed RDA Development Options

- Phase 1 - RDA
- Phase 2 - Option RDA 1-X
- Phase 2 - Option RDA 2

Viewshed Albany Highway

- Visible

Viewshed Bannister Marradong Road

- Visible

Viewshed Pinjarra Williams Road

- Visible

COORDINATE SYSTEM: GDA 1994 MGA ZONE 50
PROJECTION: TRANSVERSE MERCATOR
DATUM: GDA 1994
UNITS: METER

MAP PREPARED BY

ecoscape

AUTHOR: NW
DATE: 13/07/2023
CHECKED: SB
PROJECT NO: 4818-23
SCALE: 1:110,000 @ A3

N 0 1 2 3 km

DATA SOURCES

SOURCE DATA: VIEW EXPERIENCE, VIEWSHED, HILLSHADE AND PROPOSED RDA DEVELOPMENT OPTIONS (ECOSCAPE 2012 AND 2023), ROAD NETWORK (MRWA 2020) AND SURFACE HYDROLOGY LINES (NATIONAL) (GEOSCIENCE AUSTRALIA 2015)
IMGAERY: ESRI BASEMAP (2023)
SERVICE LAYERS: WORLD TOPOGRAPHIC MAP: ESRI, HERE, GARMIN, FAO, NOAA, USGS
WORLD IMAGERY: EARTHSTAR GEOGRAPHICS

Newmont™

VIEW EXPERIENCE AND VIEWSHED ROADS

NEWMONT BODDINGTON GOLD
FUTURE TAILINGS DEPOSITION OPTIONS
VISUAL IMPACT ASSESSMENT

MAP
13

430000 440000 450000

6390000 6380000 6370000

Albany Hwy

South Dandalup River

Bannister River

Bannister Marradong Rd

BODDINGTON

Pinjarra Williams Rd

Hotham River

1 2 3 4 5

LEGEND

- 1 Photo Montage Location
- Town
- Bibbulmun Track
- Road
- River

View Experience

- Infrastructure Corridor
- Open Elevated
- Panoramic
- Town Centre
- Waterform
- Enclosed
- Focal
- Open Rural

Proposed RDA Development Options

- Phase 1 - RDA
- Phase 2 - Option RDA 1-X
- Phase 2 - Option RDA 2

Landscape Character Units

- Mining
- Peaks
- Plantation
- Rolling Farmland
- Rolling Forest

Valued Landscape Features

- Peaks
- River / waterbody

Elevation (m)

- 1 - 39
- 40 - 147
- 148 - 228
- 229 - 288
- 289 - 333
- 334 - 366
- 367 - 411
- 412 - 471
- 472 - 552

COORDINATE SYSTEM: GDA 1994 MGA ZONE 50
PROJECTION: TRANSVERSE MERCATOR
DATUM: GDA 1994
UNITS: METER
MAP PREPARED BY
ecoscape

AUTHOR: NW
DATE: 13/07/2023
CHECKED: SB
PROJECT NO: 4818-23
SCALE: 1:110,000 @ A3

N 0 1 2 3 km

DATA SOURCES

SOURCE DATA: ELEVATION, LANDSCAPE VALUES, VIEW EXPERIENCE, HILLSHADE AND PROPOSED RDA DEVELOPMENT OPTIONS (ECOSCAPE 2012 AND 2023), ROAD NETWORK (MRWA 2020) AND SURFACE HYDROLOGY LINES (NATIONAL) (GEOSCIENCE AUSTRALIA 2015)
IMGAERY: ESRI BASEMAP (2023)
SERVICE LAYERS: WORLD TOPOGRAPHIC MAP: ESRI, HERE, GARMIN, FAO, NOAA, USGS
WORLD IMAGERY: EARTHSTAR GEOGRAPHICS

Newmont

ELEVATION, LANDSCAPE VALUES AND VIEW EXPERIENCE

NEWMONT BODDINGTON GOLD
FUTURE TAILINGS DEPOSITION OPTIONS
VISUAL IMPACT ASSESSMENT

MAP 14

APPENDIX TWO SIGNIFICANCE LEVELS

The table below categorises travel routes and sites into Significance Levels (WAPC, 2007).

Significance Level
Level 1: national / state significance
+ State highways and other main roads (sealed or unsealed) with high levels of vehicle usage + designated tourist routes, scenic drives + recreation, conservation, cultural or scenic sites, areas, viewpoints and lookouts of state or national significance, including their access routes + walking, cycle or bridle Tracks of national or state significance + towns, settlements or residential areas + passenger rail lines + navigable waterways of national or state recreation importance + ocean sites of national or state recreation importance e.g. surf breaks + views of national or state importance.
Level 2: regional significance
+ main roads with moderate levels of vehicle usage (sealed or unsealed) + recreation, conservation, cultural or scenic sites, areas, viewpoint, and lookouts of regional or high local significance (including their access routes) + navigable waterways of regional recreation significance + walk, cycle or bridle paths of regional significance + views of regional importance.
Level 3: local significance
+ all remaining roads with low levels of vehicle usage + locally significant roads or Tracks + recreation and other use areas of local significance + navigable waterways of local recreational significance + walk, cycle or bridle paths of local significance + views of local importance.
Explanatory note - significance increases with the: + importance of views, including type, features and rarity + volume of use of roads, trails and navigable waterways + degree of sensitivity of viewers; those who are more likely to be more sensitive include wilderness users, other recreational users, tourists, people who choose to live in an area because of its landscape character and views (e.g. assessed by noting how vocal observers are about specific travel routes or use areas, indicated in letters, protests etc.) + degree to which experiencing the landscape is integral to enjoyment of a travel route or site Is it the focus of the use, as in recreational use, or just incidental, as is more likely with people using a route to work? + length of duration of a view; range could include glimpses from a high-speed road, longer duration views obtained from roads used for sightseeing or from recreation sites and lookouts and very long and frequent views from the main living areas of homes.

APPENDIX THREE PREFERENCE INDICATORS

The table below lists the preference indicators for natural and rural landscapes (WAPC, 2007).

Preference indicators – Natural
Most preferred natural characteristics
+ high degrees of perceived naturalness + high degree of topographic variety or vertical relief (dramatic relief, ruggedness, rock outcropping, outstanding ridgelines and beach forms) + vegetative diversity (distinctive patterns, species composition, height, colour and texture) + diversity of vegetation age and density (structural complexity) + unusually expansive landforms or vast horizontal scale (desert landscapes, beach and dune fields, rolling hills) + presence of water bodies (waterfalls, rivers, estuaries, oceans, lakes, inundated areas) + distinctive displays of colour: soils, vegetation (often seasonal), topography, rock formations or water bodies + distinctive landscape features (waterfalls, unique plants, reefs, geological formations such as Ranges, cliff faces and granite outcrops) + outstanding combinations of landform, vegetation patterns and water features in one area + seascapes (combinations of ocean, reefs, beach, dune formation, coastal rocks, coastal vegetation) + areas or sites frequently prone to ephemeral features (fauna, water or wave conditions, beach erosion scarps, climatic conditions).
Least preferred natural characteristics
+ disturbed areas with little evidence of naturalness + areas of diseased, dead or dying vegetation + areas with severe weed infestations in a natural landscape + areas of soil erosion (especially where human-induced) + water bodies with degraded banks, weed infestations, stagnation, eutrophication, algae or litter + evidence of mining (gravel pits, sand mines, limestone).

Preference indicators – Rural
Most preferred rural characteristics
+ unusual diversity in agricultural landscapes (colour and contrast or species diversity of cropping) + agricultural patterns, colours and textures that complement natural features + gradual transition zones between agricultural land and natural landscape + topographic variety and ruggedness + presence of water bodies (dams, lakes, inundated areas) that borrow location, shape, scale and edge configuration from natural elements + areas or sites frequently prone to ephemeral features (presence of fauna, distinctive crop rotations, water conditions and climatic conditions) + significant landscape features (trees and tree stands, historic relics, some windmills and areas of unusual topographic variation) + settlement patterns and individual structures that strengthen the local rural character (silos, windmills, water tanks, historic buildings, bridges, hay bales and dams) + historic features and land use patterns that strengthen the local rural character (historic farm machinery, old shearing sheds, windmills and historic buildings) + distinctive remnant vegetation located along streamsides, roadsides and in paddocks (parkland cleared paddocks).
Least preferred rural characteristics
+ areas of soil salinity/salt scalds or dead, dying or diseased vegetation + areas of extensive weed infestation + eroded areas + tips, dumps and landfill areas + recently harvested areas (stumps, debris, abandoned off-cuts) + land use areas that contrast significantly from natural landscape characteristics (can include plantations, mines, rural settlement and/or housing, utility towers, roads and fencing) + abandoned structures in a state of disrepair or destruction + unmanaged roads and access Tracks + farm structures and buildings in a state of disrepair + jetties and other marine structures that are either closed or not maintained + eutrophied dams, lakes and water bodies.

APPENDIX FOUR LAND SYSTEM DESCRIPTIONS

The table below summarises the land systems that occur within the study area, the dominant subsystems that occur within the study area and contribute to the visual landscape are highlighted.

Land System Name	Summary Description	Study Area Location
Cooke Subsystem	Crests and upper slopes dominated by granite outcrop and very shallow yellow duplex soils.	Associated with the high peaks of the Monadnocks, traversed by the Bibbulmun Track.
Coolakin Subsystem (Marradong)	Minor Valleys bounded by Dwellingup or Norrine units; occasional rock outcrops and laterite spur. Wandoo woodland with some Jarrah, Marri and York Gum; mixed shrub understory	Occurs in the eastern third of the study area, traversed by the Albany Highway and Bannister Marradong Road
Coolakin Subsystem (Marradong), rocky phase	Minor Valleys bounded by Dwellingup or Norrine units; Wandoo woodland with some Jarrah and Marri; Rock Sheoak-Jam understory.	Small units scattered amongst the Coolakin Subsystem (Marradong)
Coolakin Subsystem (Marradong), very rocky phase	Minor Valleys bounded by Dwellingup or Norrine units; Wandoo woodland with some Jarrah and Marri; Rock Sheoak-Jam understory.	Small units scattered amongst the Coolakin Subsystem (Marradong)
Dwellingup (Marradong), rock outcrop phase	Granite rock outcrop with stony soils and shallow gravels.	Small units scattered amongst the Dwellingup Subsystem (Marradong)
Dwellingup Subsystem	Divides, lower to upper slopes and hillcrests. Jarrah-marri forest with some wandoo.	Covers the western and central thirds of the study area and is traversed by the Bibbulmun Track and Pinjarra Williams Road
Dwellingup Subsystem (Marradong)	Divides, lower to upper slopes and hillcrests. Jarrah-Marri-Wandoo woodland; Grasstree-Sheoak or Parrotbush understory	Covers the eastern third of the study area, traversed by the Albany Highway and Bannister Marradong Road
Dwellingup Subsystem (Marradong), very rocky phase	Granite rock outcrop with stony soils and shallow gravels.	Small units scattered amongst the Dwellingup Subsystem (Marradong)
Dwellingup Subsystem (Quindanning)	Divides, lower to upper slopes and hillcrests. Jarrah-marri forest with some wandoo and rock sheoak	Small units scattered in the eastern third of the study area
Dwellingup Subsystem, rock outcrops phase	Granite rock outcrop with stony soils and shallow gravels.	Small units scattered in the central third of the study area
Hester Subsystem (Murray)	Ridges and hill crests on laterite and gneiss. Soils are sandy gravels, loamy gravels and loamy earths.	small unit occurring in the southwest area
Michibin Subsystem (Quindanning)	Hillslopes containing soils formed by the weathering of fresh rock. Rock outcrops are common. Wandoo forest and woodland with Rock Sheoak, Jam and Grasstree understory	Occurs in the eastern third of the study area, traversed by the Albany Highway and Bannister Marradong Road
Michibin Subsystem (Quindanning), rocky phase	Hillslopes containing soils formed by the weathering of fresh rock. Rock outcrop is common.	Small units scattered amongst the Michibin Subsystem (Quindanning)
Michibin Subsystem (Quindanning), very rocky phase	Hillslopes containing soils formed by the weathering of fresh rock. Rock outcrop is common.	Small units scattered amongst the Michibin Subsystem (Quindanning)

Land System Name	Summary Description	Study Area Location
Mornington Hill Subsystem	Low hills on laterite overlying granite. Jarrh-marri forest and woodland with some wandoo.	small units occuring in the west of the study area
Murray Subsystem	Deeply incised valley of the Murray River; occasional rock outcrops; narrow sandy terrace.	occurs in the southwest portion of the study area
Murray Subsystem, rock outcrop phase	Deeply incised valley of the Murray River; areas of shallow soils and scattered rock outcrops.	occurs in the southwest portion of the study area
Norrine Subsystem (Marradong)	A complex of lateritic residuals. Jarrah-Wandoo woodland; Rock Sheoak or Parrotbush understory	occurs in the eastern portion of the study area
Norrine Subsystem (Quindanning)	A complex of lateritic residuals. Jarrah-Wandoo woodland; Rock Sheoak or Parrotbush understory	small scattered units in the eastern portion of the study area
Pindalup hillslope phase	Sideslopes of minor valleys	occurs in the central north portion of the study area, traversed by the Bibbulmun Track
Pindalup Subsystem	Shallow minor valleys with gentle sideslopes and broad swampy floors. Jarrah-marri-wandoo-flooded gum-paperbark forest and woodland.	occurs in the central third of the study area, traversed by the Bibbulmun Track and Pinjarra Williams Road
Pindalup Subsystem, rock outcrop phase	Rocky slopes	small units scattered amongst the Pindalup Subsystem
Pindalup Subsystem, very rocky phase	Very rocky slopes	small units scattered amongst the Pindalup Subsystem
Pindalup swampy valley floor phase	Swampy floors of minor valleys	occurs at the base of the Pindalup Hillslope Phase, traversed by the Bibbulmun Track
Williams Subsystem (Quindanning)	Valley floor. Wandoo-Flooded Gum woodland with some groves of Paperbark and Swamp Sheoak.	drainage line system occurring in the southeastern portion, traversed by the Albany Highway, Bannister Marradong Road and Pinjarra Williams Road
Yalanbee Subsystem	Residual plateau at the top of the landscape with areas of outcropping laterite.	small unit in the northern portion of the study area
Yarragil DpYGh	Very gentle to moderately inclined concave valley sideslopes.	occurs in the northwestern portion of the study area
Yarragil Subsystem	Shallow, narrow, upper valleys of the deeply dissected Murray, Bindoon and Helena units. Woodland of E. wandoo, E. accedens.	Traversed by Bibbulmun Track and Pinjarra Williams Road in the Western Third of the study area
Yarragil Subsystem, rock outcrop phase	Shallow, narrow, upper valleys. Areas of rock outcrop	small unit occuring amongst the Yarragil Subsystem
Yarragil Swamp	Level to very gently inclined valley floors. Swampy river flats and terraces in granitic rocks; loamy and sandy duplex, wet soils, non-cracking clays and loams.	occurs in the northwestern portion of the study area

APPENDIX FIVE VISUAL IMPACT ASSESSMENT TABLES

Montage 1 – Boonering Hill – Phase 1 RDA

Category	Not Visible	Blending	Prominent
Visibility		X	
Line		X	
Form		X	
Colour		X	
Texture		X	
Total Score (%)		**100%**	
Overall Rating	**BLENDING**		

Montage 2 – Boonering Hill – Phase 2 RDA 1-X (option 1)

Category	Not Visible	Blending	Prominent
Visibility		X	
Line		X	
Form		X	
Colour		X	
Texture		X	
Total Score (%)		**100%**	
Overall Rating	**BLENDING**		

Montage 3 – Boonering Hill – Phase 2 RDA 2 (option 2) – construction stage

Category	Not Visible	Blending	Prominent
Visibility			X
Line		X	
Form		X	
Colour			X
Texture			X
Total Score (%)		**40%**	**60%**
Overall Rating	**PROMINENT**		

Montage 4 – Boonering Hill – Phase 2 RDA 2 (option 2) – operational stage

Category	Not Visible	Blending	Prominent
Visibility			X
Line		X	
Form		X	
Colour			X
Texture			X
Total Score (%)		**40%**	**60%**
Overall Rating	**PROMINENT**		

Montage 5 – Kimberling Hill – Phase 1 RDA

Category	Not Visible	Blending	Prominent
Visibility		X	
Line		X	
Form		X	
Colour		X	
Texture		X	
Total Score (%)		**100%**	
Overall Rating	**BLENDING**		

Montage 6 – Kimberling Hill – Phase 2 RDA 1-X (option 1)

Category	Not Visible	Blending	Prominent
Visibility		X	
Line		X	
Form		X	
Colour			X
Texture			X
Total Score (%)		**60%**	**40%**
Overall Rating	**BLENDING**		

Montage 7 – Kimberling Hill – Phase 2 RDA 2 (option 2) – construction stage

Category	Not Visible	Blending	Prominent
Visibility			X
Line		X	
Form		X	
Colour			X
Texture			X
Total Score (%)		**40%**	**60%**
Overall Rating	**PROMINENT**		

Montage 8 – Kimberling Hill – Phase 2 RDA 2 (option 2) – operational stage

Category	Not Visible	Blending	Prominent
Visibility			X
Line		X	
Form		X	
Colour			X
Texture			X
Total Score (%)		**40%**	**60%**
Overall Rating	**PROMINENT**		

Montage 9 – Mt Wells – Phase 1 and 2 – east view

Category	Not Visible	Blending	Prominent
Visibility	X		
Line	X		
Form	X		
Colour	X		
Texture	X		
Total Score (%)	**100%**		
Overall Rating	**NOT VISIBLE**		

Montage 10 – Mt Wells – Phase 1 and 2 – south east view

Category	Not Visible	Blending	Prominent
Visibility	X		
Line	X		
Form	X		
Colour	X		
Texture	X		
Total Score (%)	**100%**		
Overall Rating	**NOT VISIBLE**		

Montage 11 – Pinjarra Willimas Rd – Phase 1 and 2

Category	Not Visible	Blending	Prominent
Visibility	X		
Line	X		
Form	X		
Colour	X		
Texture	X		
Total Score (%)	**100%**		
Overall Rating	**NOT VISIBLE**		

Montage 12 – Bannister Marradong Rd – Phase 1 and 2

Category	Not Visible	Blending	Prominent
Visibility	X		
Line	X		
Form	X		
Colour	X		
Texture	X		
Total Score (%)	**100%**		
Overall Rating	**NOT VISIBLE**		