APPENDIX J

Visual impact assessment

AMPYR

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Wellington South Battery Energy Storage

Visual Impact Assessment

Prepared for AMPYR

October 2022

Wellington South Battery Energy Storage

Visual Impact Assessment

AMPYR

J210534 RP1

October 2022

Version	Date	Prepared by	Approved by	Comments
V1	28 April 2022	Tadd Andersen	Claire Burnes	
V2	1 June 2022	Tadd Andersen	Claire Burnes	
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Approved by

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17 October 2022

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Executive Summary

AMPYR Energy proposes to develop a battery energy storage system (BESS) along with associated infrastructure approximately 2.2 km northeast of Wellington, and 44 km southeast of Dubbo.

A visual impact assessment (VIA) was completed for the project to assess impacts from ten representative viewpoints surrounding the development footprint. The representative viewpoints were selected based on the following criteria:

- proximity to the project;
- the location of receptors (ie dwellings);
- the positioning of regional and local roads and potential impacts on passing motorists;
- local topography; and
- presence of vegetation with potential to provide screening.

The representative viewpoints have been assessed to demonstrate the potential visual impacts of the project. Due to existing mature vegetation, variable elevation and undulation in the landscape, the BESS and substation infrastructure will be relatively shielded from view from most of the viewpoints. The exception would be the addition of transmission towers, which will be positioned next to existing towers. Even though the proposed BESS and substation has the potential to alter the existing visual amenity of the area, the site selected is adjacent to an existing substation, which has already introduced electrical transmission infrastructure into the landscape. In this context, the visual landscape will not be altered significantly with proposed infrastructure placed adjacent to similar infrastructure that is already a part of the visual character of the area.

The project design and placement has evolved to minimise visual impacts where possible. This includes the alignment of the access drive, location of the BESS compound and the landscape screening. Nonetheless, the project will have the potential for visual impacts on the landscape. These visual impacts will occur during the construction and operational stages of the project.

The visual assessment determined that, of the viewpoints assessed, infrastructure may be visible to varying degrees from all ten viewpoints. Based on variable elevation and undulation in the landscape and the presence of vegetation, combined with the height of the proposed transmission towers, the impact assessment predicts:

- a moderate visual impact from Viewpoint 4 (R15), which reduces to a low impact after mitigation through landscaping around the BESS compound; and
- low visual impacts from the remaining viewpoints.

Landscape screening is proposed around the BESS compound and along the eastern side of the access road to mitigate visual impacts at the following:

- north and east of the site – the proposed landscaping will screen views from the north and east, which includes views from R1, R2, R3, R4, Goolma Road, and Twelve Mile Road;
- west of the site – the proposed landscaping will screen views from the east, including R15; and
- south of the site – the proposed landscaping will screen views from the south, including R23, R20.

Visual impacts from most of the viewpoints are limited to the proposed transformer towers and the transmission towers. Because of the hilly topography and trees existing in the landscape most receptors outside of a 1 km radius of the project site will not see the BESS compound.

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1 Introduction

1.1 Overview

AMPYR Australia Pty Ltd (AMPYR) proposes to develop and operate the Wellington Battery Energy Storage System (the project). This involves the development of a large-scale battery energy storage system (BESS) with a discharge capacity of 500 megawatts (MW) and a storage capacity of 1,000 megawatt hours (MWh). The project also incorporates an on-site substation and connection infrastructure to facilitate transfer of energy to and from the electrical grid, and ancillary infrastructure.

The site proposed to be developed is located within the Dubbo Regional Council local government area (LGA) within privately owned land at 6773 Goolma Road at Wuuluman (Lot 32 DP 622417) and will incorporate either an overhead or underground transmission line and upgrade works to Wellington substation in the adjoining TransGrid owned landholding (Lot 1 DP 1226751). The proposed site is approximately 2.2 km north east of the township of Wellington and 44 km south-east of the township of Dubbo.

The project will complement nearby renewable energy generation assets such as the Wellington Solar Farm and Uungula Wind Farm by smoothing out fluctuations in electricity supply from these new intermittent power sources, potentially also balancing out price increases during peak demand. In operation, the project will one of the largest battery projects in NSW and will contribute to the overall storage capacity and reliability of the National Electricity Market (NEM). The project also supports state and Commonwealth emission commitments by facilitating renewable energy input into the grid network during periods of low renewable energy generation.

1.2 The project

The project will involve the following components:

- construction and operation of the BESS compound, comprising between 1,400–6,200 pre-assembled battery enclosures housing lithium-ion battery packs and related control equipment, and transformers and inverters with a peak maximum generation capacity of 500 MW/1,000 MWh;
- construction and operation of an on-site BESS substation, comprising two 330 kilovolt (kV) transformer bays, 33/0.440 kV auxiliary transformers, and an auxiliary services building to house supporting equipment and systems;
- connection to the adjoining TransGrid Wellington Substation by way of an underground or above ground transmission line and associated easement;
- upgrade of the TransGrid Wellington Substation, which may include an additional 330 kV switch bay with power transformers (which would be installed as an alternative to the transformer bays being located on the BESS site), switchyard bench extension to the south of the existing bench and relocation of security fencing; and
- ancillary infrastructure to facilitate construction and operation of the project, including improvements to the existing access road and a control and office building.

A detailed description of the project is provided in Chapter 3.

Construction of the project is expected to commence in 2023. Construction may be undertaken as a single stage, or over two stages. For the staged construction scenario, Stage 1 would likely include 300 MW installed discharge capacity, all civil and enabling works, installation of batteries, one transformer and switchgear and associated structural, mechanical and electrical works, and connection to the substation. Stage 2 would consist of 200 MW, including installation of a second transformer and associated switchgear and batteries. It is anticipated that construction of Stage 2 would commence approximately 6–12 months following completion of Stage 1 works, with each stage (or construction of the project in a single stage) anticipated to occur over a period of 12–18 months.

TransGrid has advised that the Wellington Substation upgrade works may incorporate installation of one new 330 kV switch bay and multiple transformers (which would be installed as an alternative to the transformer bays being located on the BESS site) and may be installed in stages to coincide with the staged construction of the BESS should a staged approach be adopted.

Operation of the project is expected to commence from 2024 for a period of approximately 20 years at which point the project may be decommissioned. Throughout its operational life, certain components and technologies may be replaced and/or upgraded, however such works are unlikely to be intensive. The BESS would operate 24 hours a day, 7 days a week and be operated remotely.

1.3 Assessment guidelines and requirements

This VIA has been prepared in accordance with the relevant governmental assessment requirements, guidelines and policies, and in consultation with the relevant government agencies.

There are no Commonwealth, NSW or local government planning policies, guidelines or standards directly applicable to this assessment. The VIA was prepared with reference to the methods outlined in:

- *Draft Large-Scale Solar Energy Guideline* (2021) (the Draft Guideline), prepared by the NSW Department of Planning, Industry and Environment;
- *Guidelines for Landscape and Visual Impact Assessment Third Edition* (2013) (the GLVIA), prepared by the Landscape Institute and Institute of Environmental Management and Assessment; and
- *Wind Energy: Visual Assessment Bulletin AB 01 For State significant wind energy development* (2016) (the VA Bulletin) prepared by the NSW Department of Planning and Environment.

It is noted that the VA Bulletin specifically relates to assessment of visual impacts of wind farms in NSW; however, a number of the methods for describing visual sensitivity and landscape character are considered to be relevant to this assessment. In the absence of other directly applicable guidelines/standards, the relevant elements from the VA Bulletin have been adopted for this assessment.

The Draft Guideline was released by the NSW Government in 2021 and provides the community, industry, applicants and regulators with guidance on the planning framework for the assessment and approval of large-scale solar energy development proposals under the *Environmental Planning and Assessment Act 1979* (EP&A Act), which are classified as State Significant Development (SSD).

The Draft Guideline also outlines a proposed visual assessment framework for large scale solar energy development. The acceptability of visual impacts, namely impacts on landscape character and values and the amenity of landholders and communities, along with the adequacy of the measures that are proposed to avoid, reduce or otherwise manage these impacts, are identified as key assessment issues within the draft guideline and have been considered in detail within this VIA.

The draft guideline also recommends consideration of cumulative impacts from other developments (proposed, approved and operating), including potential visual impacts where multiple solar developments may be constructed in close proximity to each other. Cumulative impacts of the project are discussed further in Section 5.5.

This VIA was prepared in accordance with the requirements of the NSW Department of Planning and Environment (DPE), which were set out in the Secretary's Environmental Assessment Requirements (SEARs) for the project, issued on 01 October 2021. The SEARs identify matters that must be addressed in the EIS.

A copy of the revised SEARs is attached to the EIS as Appendix A, while Table 1.1 lists the individual requirements relevant to this VIA and where they are addressed in this report.

Table 1.1 Relevant SEARs

Requirement	Section addressed
Visual – including an assessment of the likely visual impacts of the development (including night lighting) of all components of the project (including transmission lines and any other ancillary infrastructure) on surrounding residences, scenic or significant vistas and road corridors in the public domain.	Chapter 5

To inform preparation of the SEARs, DPE invited other government agencies to recommend matters to be addressed in the EIS. These matters were taken into account by the Secretary for DPE when preparing the SEARs. Copies of the government agencies' advice to DPE were attached to the SEARs.

Transport for NSW (TfNSW) raised matters relevant to the VIA. The matters raised are listed in Table 1.2.

Table 1.2 Government agencies comments: assessment recommendations

Requirement	Section addressed
Transport for NSW Identification and assessment of potential impacts of the project, such as blasting, lighting, visual, noise, dust and drainage on the function and integrity of all affected public roads.	Section 5.4

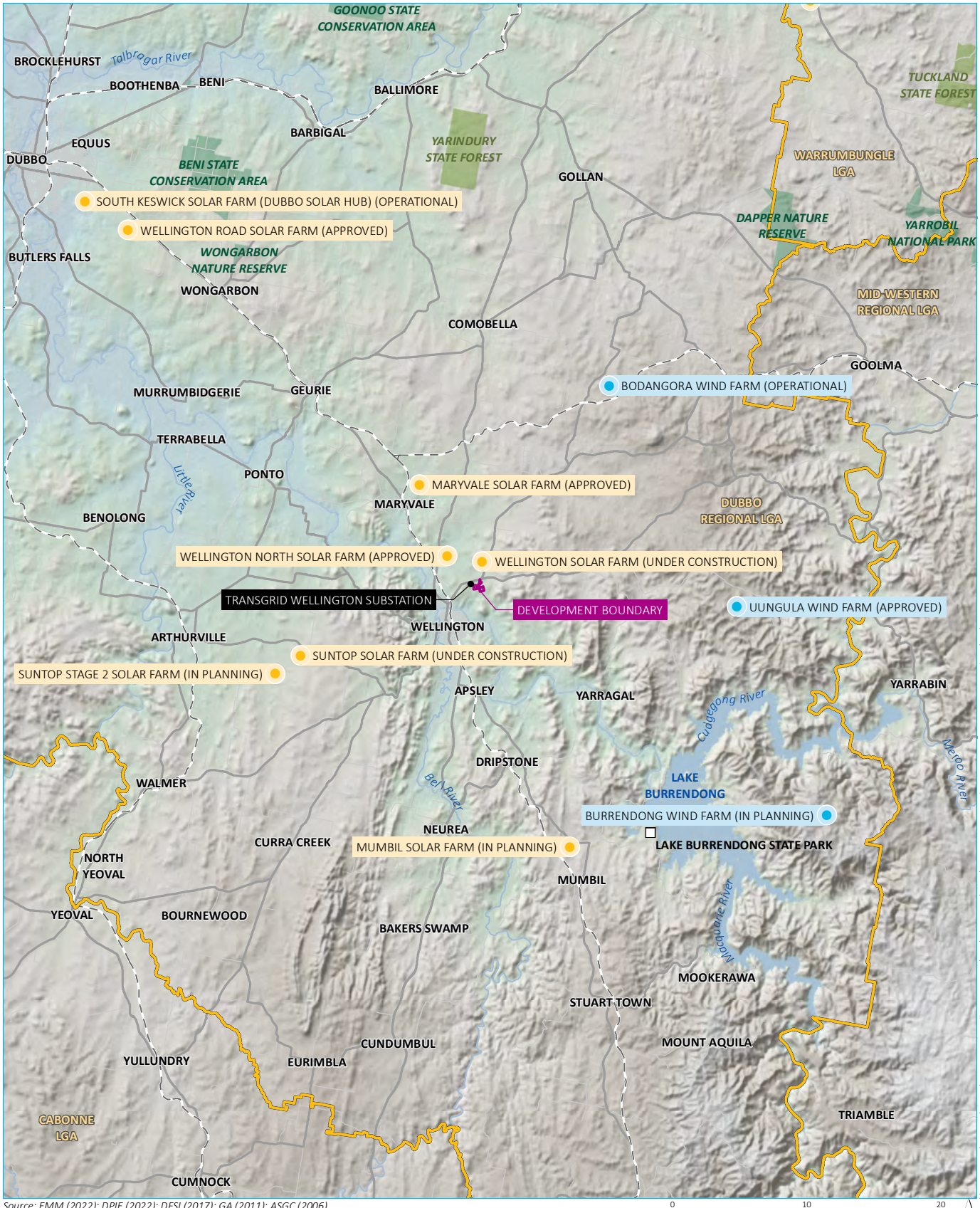
As part of the project's stakeholder engagement strategy, AMPYR has consulted with a number of the project's neighbouring landholders and, more generally, the local community. This VIA responds to a number of the matters raised during this engagement, including:

- potential visibility of project infrastructure from neighbouring residences and the local road network (Section 5);
- potential for reflectivity and glare BESS components (Section 5.4);
- potential for night lighting impacts from project infrastructure (Section 5.6.2); and
- adequacy of any proposed vegetation screening (Section 4.7.1).

1.4 Structure of the report

This report is structured as follows:

- Chapter 2 describes the VIA methodology adopted in the preparation of this report;
- Chapter 3 describes the existing landscape within which the project will be sited;
- Chapter 4 describes the character of the visual components of the project and the staging of project development;
- Chapter 5 describes the impacts of the project from representative viewpoints in and around the site; and
- Chapter 6 provides conclusions.



Source: EMM (2022); DPIE (2022); DFSI (2017); GA (2011); ASGC (2006)

0 10 20 km

GDA 1994 MGA Zone 55

N

KEY

- Development boundary
- Lake Burrendong State Park
- Rail line
- Major road
- Minor road
- River
- Named waterbody
- Local government area
- NPWS reserve
- State forest

Renewable energy project

- Solar farm
- Wind farm

Regional context

Wellington Battery Energy Storage System
Visual impact assessment
Figure 1.1

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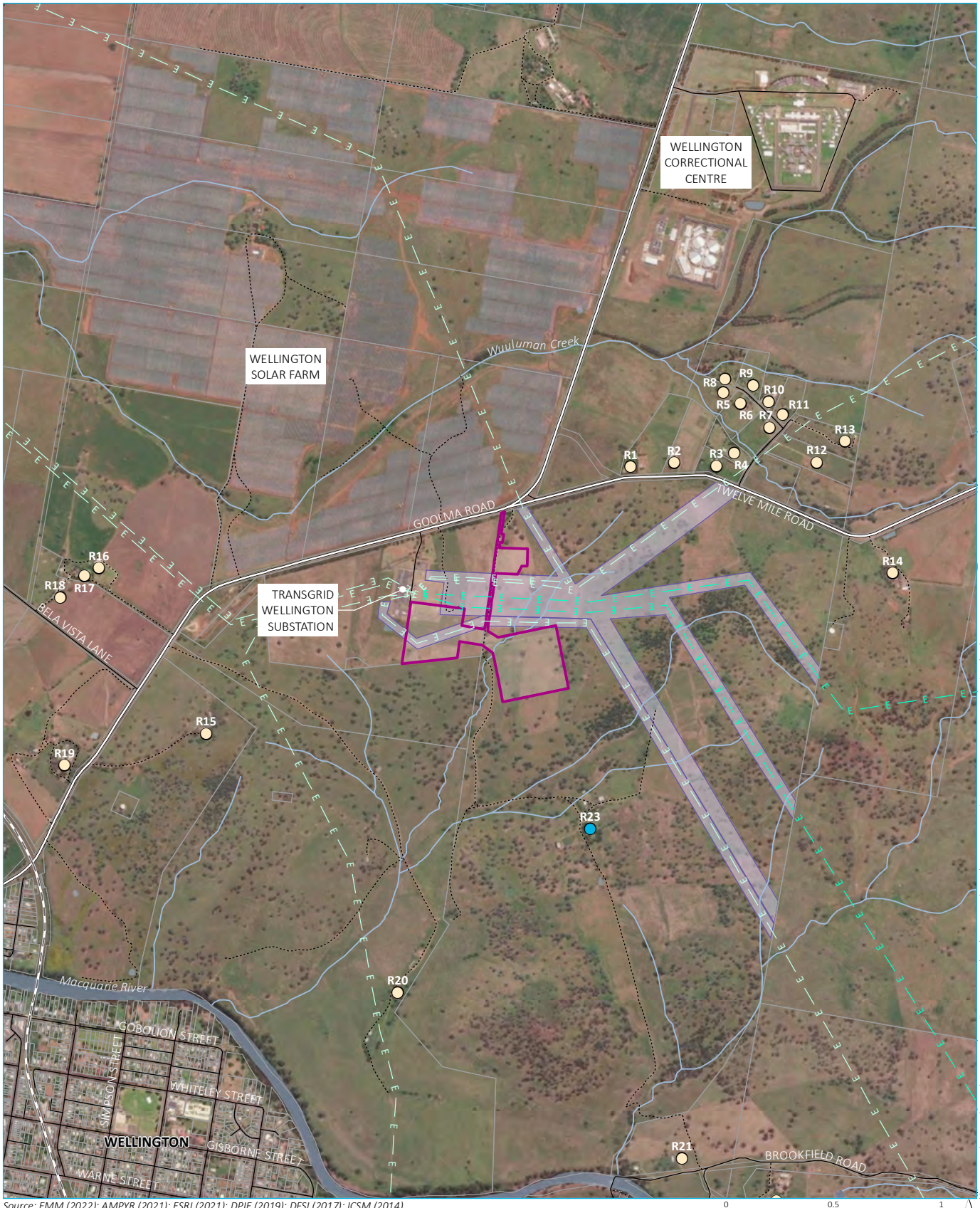

Source: EMM (2022); AMPYR (2021); ESRI (2021); DPIE (2019); DFSI (2017); ICSM (2014)

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GDA 1994 MGA Zone 55

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KEY

- Development boundary
- Rail line
- Major road
- Minor road
- Vehicular track
- Watercourse/drainage line
- Waterbody
- Cadastral boundary
- Freehold easement

Receivers

- Non-project residential receivers
- Project participating landowner

Above ground electricity transmission line

- 132 kV
- 330 kV

Local setting

Wellington Battery Energy Storage System
Visual impact assessment
Figure 1.2

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2 Assessment methodology

2.1 Overview

The assessment method used in this report is that outlined in the GLVIA and VA Bulletin, which involves information review, consultation, field observations and photography, computer-based data processing and analysis, and application of subjective professional judgement. The assessment involves seven key stages:

- **Stage 1: View type and context** – the existing landscape baseline is described noting its character and complexity.
- **Stage 2**: **Visibility baseline assessment** – the zone of visual influence of the project is established, where appropriate, through the use of computer-generated zones of theoretical visibility, based on topographical data, or through fieldwork analysis. This establishes the locations where views of the project may be possible. Fieldwork is undertaken to establish the types and locations of receptors within this theoretical zone.
- **Stage 3: Viewpoint selection** – representative public and private viewpoints of the site are selected and the project's level of exposure to them is determined.
- **Stage 4: Magnitude of change** – the magnitude of visual change and the changes arising from the project are assessed and the need for project modifications or other mitigation measures evaluated.
- **Stage 5: Visual sensitivity** – the capacity of the landscape to absorb change without a loss of quality (its visual sensitivity) is determined.
- **Stage 6: Evaluation of significance** – the significance of change in the landscape is a function of the magnitude of change when considered against the view type/context and the sensitivity of a receptor.
- **Stage 7: Mitigation** – the modified and mitigated project (if applicable) is assessed, the final visual impacts are described and illustrated, and their significance documented.

Details of each of the above stages are provided below.

2.2 Assessment stages

2.2.1 Stage 1 – View type and context

This stage involves recording and analysis of existing landscape features, characteristics, the way in which the landscape is experienced, and the value or importance of the landscape and visual resource in the site. The landscape character is determined by the number, size, type and contrast of elements present. Typically the key elements are topography, vegetation, water features and built elements. Other factors that are important are the consistency of these elements and whether they have developed progressively over time and become well integrated into a harmonious landscape. In addition, consideration must be given to the prevalence of change, including whether the landscape is experiencing large-scale development (such as residential growth on the urban fringe).

The context is a primary factor in the visual sensitivity of the view. Generally, sites within higher contrasting landscapes have greater ability to absorb change, whereas sites within a uniform or highly ordered landscape have higher sensitivity and less potential for absorption.

Reference has been made to the landscape characters defined in the VA Bulletin and descriptions provided in the Interim Biogeographic Regionalisation for Australia (IBRA) (Thackway and Cresswell 1995). The GLVIA also sets out guidance in relation to landscape baseline at paragraph 5.3:

> Baseline studies for assessing landscape effects require a mix of desk study and fieldwork to identify and record the character of the landscape and the elements, features and aesthetic and perceptual factors which contribute to it. They should also deal with the value attached to the landscape. The methods used should be appropriate to the context into which the development proposal will be introduced and in line with current guidance and terminology.

2.2.2 Stage 2 – Visibility baseline assessment

Baseline studies for visual effects establish the area in which the project may be visible, who will see the project infrastructure, the viewpoints that will be affected and the nature of the views at those points. Viewshed analysis using geographic information system (GIS) mapping has been used to simulate visibility from viewpoints and the surrounding landscape.

2.2.3 Stage 3 – Viewpoint selection

Viewpoints are selected to provide a representative sample of the likely visual landscape changes on the different users of the areas surrounding the project and their visual exposure to various project elements. Viewpoints that are considered to have potential exposure to various project elements or areas available to public access, such as roads, and private viewpoints from residential properties surrounding the project, have been identified through GIS mapping, fieldwork, stakeholder engagement and desktop analysis.

As well as informing the project refinement process described in Chapter 4, feedback received from neighbouring landholders and the local community as part of stakeholder engagement activities has also informed the selection of the ten viewpoints described in Chapter 5. The viewpoints presented as part of this report are considered representative of potential visual impacts from a number of the locations identified as areas of concern by the local community, including local roads and private viewpoints from residential properties.

2.2.4 Stage 4 – Magnitude of change

The magnitude of change on the visual landscape is one factor in determining the significance of visual impacts of the project. In accordance with the GLVIA, this visual assessment considered the following criteria in determining the magnitude of change on a receptor:

- whether the impact is temporary or permanent – impacts that are for a limited duration are considered less significant than those that occur for an extended period or are permanent;
- distance of the viewer from the altered elements in the landscape – close proximity to an altered landscape will increase the significance for private residences. In the case of motorists, mid ground changes can be greater than foreground elements as they can result in longer viewing times. Glare and reflection has also been considered in regard to motorists;
- length of viewing time – views from a residence are constant, whereas some views from roadways as experienced by motorists may be brief dependent upon speed and viewing direction;
- extent of view affected – impacts that are visible over a greater portion of a view are more significant than those where only a part of the view is impacted. Intervening topography and vegetation will also affect the magnitude of change; and

- scale of change – the loss or addition of features in the view and changes in the proportion of the view affected by the project.

Table 2.1 Magnitude of change - Viewing experience

Duration of view	Distance from site (km)				
	0-0.5	0.5-1.0	1.0-2.5	2.5-4.0	>4.0
Long (>10 minutes)	High	High	Moderate	Moderate	Low
Moderate (1–10 minutes)	High	Moderate	Moderate	Low	Low
Short (<1 minute)	Moderate	Low	Low	Low	Low

Table 2.2 Magnitude of change – Scale

Scale of change	Extent of view affected		
	High	Moderate	Low
High	High	High	Moderate
Moderate	High	Moderate	Low
Low	Moderate	Low	Low

The two sensitivity ratings above are then combined to form the visual sensitivity rating as indicated in Table 2.3. This combined rating is applied to the visual impact rating shown in Table 2.7.

Table 2.3 Magnitude of change

Scale of change	Viewing experience		
	High	Moderate	Low
High	High	High	Moderate
Moderate	High	Moderate	Low
Low	Moderate	Low	Low

2.2.5 Stage 5 – Visual sensitivity

Visual sensitivity is a measure of the landscape's ability to visually absorb development without a significant change in the character. It is a function of the view type and context. In this assessment, the major factor influencing visual sensitivity is the level of contrast between the project-related infrastructure and the rural landscape setting in which it will be set.

The physical characteristics of the landscape, including existing development features, are integral components in determining the visual sensitivity. For example, a low visual sensitivity would enable a modification or addition to be made to the landscape which would only cause minimal contrast and result in a high level of integration with the surrounding landscape. Similarly, a high visual sensitivity would mean the same modification or addition to the surrounding landscape would cause high contrast to the surrounding landscape.

The Draft Guidelines identify the view type as *viewer sensitivity* and the view context as *scenic quality*. Viewer sensitivity relates to the location of the viewer and the relative importance placed on the landscape viewed from that viewpoint by the community or visitors. These viewpoints include public use areas, public travel ways, and private homes.

Visual sensitivity has been assessed based on the viewer sensitivity level classification given in the Draft Guidelines, presented in Table 2.4.

Table 2.4 Viewer sensitivity level classification

Viewer sensitivity	Description
High	Residential areas and rural villages (defined as land zoned R1, R2, R3, R4, R5 and RU5 in the Standard Instrument Local Environmental Plan [LEP]). Recreation, cultural or scenic sites and viewpoints of National or State significance such as National Parks, National reserves, and World Heritage areas. Any buildings, historic rural homesteads/residences on the State or local Government Heritage List.
Moderate	Rural dwelling(s). Tourist and visitor accommodation (definition in Standard Instrument LEP). Recreation, cultural or scenic sites and viewpoints of regional significance.
Low	Interstate and state passenger rail lines with daily daylight services. State highways, freeways and classified main roads, classified tourist roads. Land management roads with occasional recreation traffic. Walking tracks of moderate local significance or infrequent recreation usage. Other low use and low concern viewpoints and travel routes. Navigable waterways.

Scenic quality refers to the relative scenic or aesthetic value placed on the landscape by the community. This is based on the presence of key landscape features known to be associated with community perceptions of high, moderate or low scenic quality. The scenic quality classifications used in this assessment are identified in Table 2.5.

Table 2.5 Scenic quality classification

Scenic quality	Landforms	Vegetation	Waterbodies
High	Isolated peaks, steep rocky ridges, cones or escarpments with distinctive form and/or colour contrast that become focal points. Larger areas of distinctive rock outcrops or boulders. Well defined, steep sided valley gorges.	Strongly defined patterns with combinations of eucalypt forest, naturally appearing openings, streamside vegetation and/or scattered exotics. Distinctive stands of vegetation that may create unusual forms, colours or textures in comparison to surrounding vegetation.	Visually prominent lakes, reservoirs, rivers, streams and swamps.
Moderate	Steep, hilly and undulating ranges that are not visually dominant. Broad shallow valleys. Moderately deep gorges or moderately steep valley walls. Minor rock outcrops.	Predominantly open forest or woodland combined with some natural openings in patterns that offer some visual relief. Vegetative stands that exhibit a range of size, form, colour, texture and spacing.	Intermittent streams, lakes, rivers, swamps and reservoirs.

Table 2.5 Scenic quality classification

Scenic quality	Landforms	Vegetation	Waterbodies
Low	Large expanses of flat or gently undulating terrain. Indistinct, dissected or unbroken landforms that provide little illusion of spatial definition or landmarks with which to orient.	Extensively cleared and cropped areas with very limited variation in colour and texture.	Natural waterbody absent.

Source: Table 3 from VA Bulletin (DPE 2016).

The two visual sensitivity ratings above are combined to form the visual sensitivity rating as indicated in Table 2.6. This combined rating is applied to the visual impact rating shown in Table 2.7.

Table 2.6 Visual sensitivity rating

Viewer sensitivity	Scenic quality		
	High	Moderate	Low
High	High	High	Moderate
Moderate	High	Moderate	Low
Low	Moderate	Low	Low

2.2.6 Stage 6 – Evaluation of significance

The significance of a change in the landscape is a function of the magnitude of that change when considered against the view type/context and the sensitivity of a receptor. Typically, a noticeable change in the landscape in a rural or natural landscape, combined with a high visual sensitivity, would be considered to be significant, whereas a change in an already heavily modified landscape would be considered slight or moderate.

Visual impact refers to the change in the appearance of the landscape because of development. This report addresses a number of factors that contribute to the visual impacts and has presented them in a measurable way.

Table 2.7 provides a matrix that combines the visual sensitivity rating with the magnitude of change rating to determine the visual impact rating. This rating is applied to each viewpoint as a way to measure the impacts of a development from particular locations.

Table 2.7 Evaluation of significance – visual impact rating

Visual sensitivity	Magnitude of change		
	High	Moderate	Low
High	High	High	Moderate
Moderate	High	Moderate	Low
Low	Moderate	Low	Low

The primary assessment tools for determining the significance of impact of the project are the site inspections and photographs of the views from the selected viewpoints. This enables an assessment of potential visual impact, taking into consideration the nature of the landscape, topography, the distance between the viewpoint and the proposed infrastructure, as well as the type of view experienced.

2.2.7 Stage 7 – Mitigation

The final step in the assessment process is to determine additional measures that could be incorporated into the design of the project to ameliorate, or, where possible, eliminate the visual impact of the project.

Mitigation measures can be in several forms including:

- design of project infrastructure to reduce the contrast with the surrounding environment;
- use of visual buffers and screening by planting vegetation (where required); and
- designing infrastructure to screen operations and lighting.

Mitigation measures that have been incorporated into the design of the project are discussed in Section 4.7 of this report.

3 Site description

3.1 Site description

The project will be within the Dubbo Regional Council Local Government Area (LGA). It will be located adjacent to the existing TransGrid Wellington Substation. At its closest, the project boundary is 2 km northeast of the township of Wellington (refer to Figure 1.1).

The development boundary covers up to 19 ha, which includes the area of permanent infrastructure and temporary construction areas. It will be used to house a grid-scale battery operation and upgrades to the Wellington Substation. The batteries will be connected to the Wellington Substation via either underground or overhead transmission lines.

Permanent project infrastructure will occupy up to 13 ha of land. The land outside of this will be restored and landscape screening will be installed around the entire boundary of the BESS compound and along the eastern side of the access road.

The land where the site is located is zoned RU1 – Primary production and SP2 – Electricity Generating Works under the Dubbo LEP (Figure 3.1). The land has historically been used for sheep grazing and continues to be used for grazing. It is characterised as grassland with woodland areas.

The landform surrounding the site can be described as rolling hills with drainage networks and waterways in the lower areas. The site slopes down toward the west and sits at an elevation of approximately 340 m above sea level.

The site will be accessed from Goolma Road, near the intersection with Twelve Mile Road. These are the only roads near the site. Access to the regional road network is via Goolma Road, which connects to Mitchell Highway.

3.2 Surrounding land uses

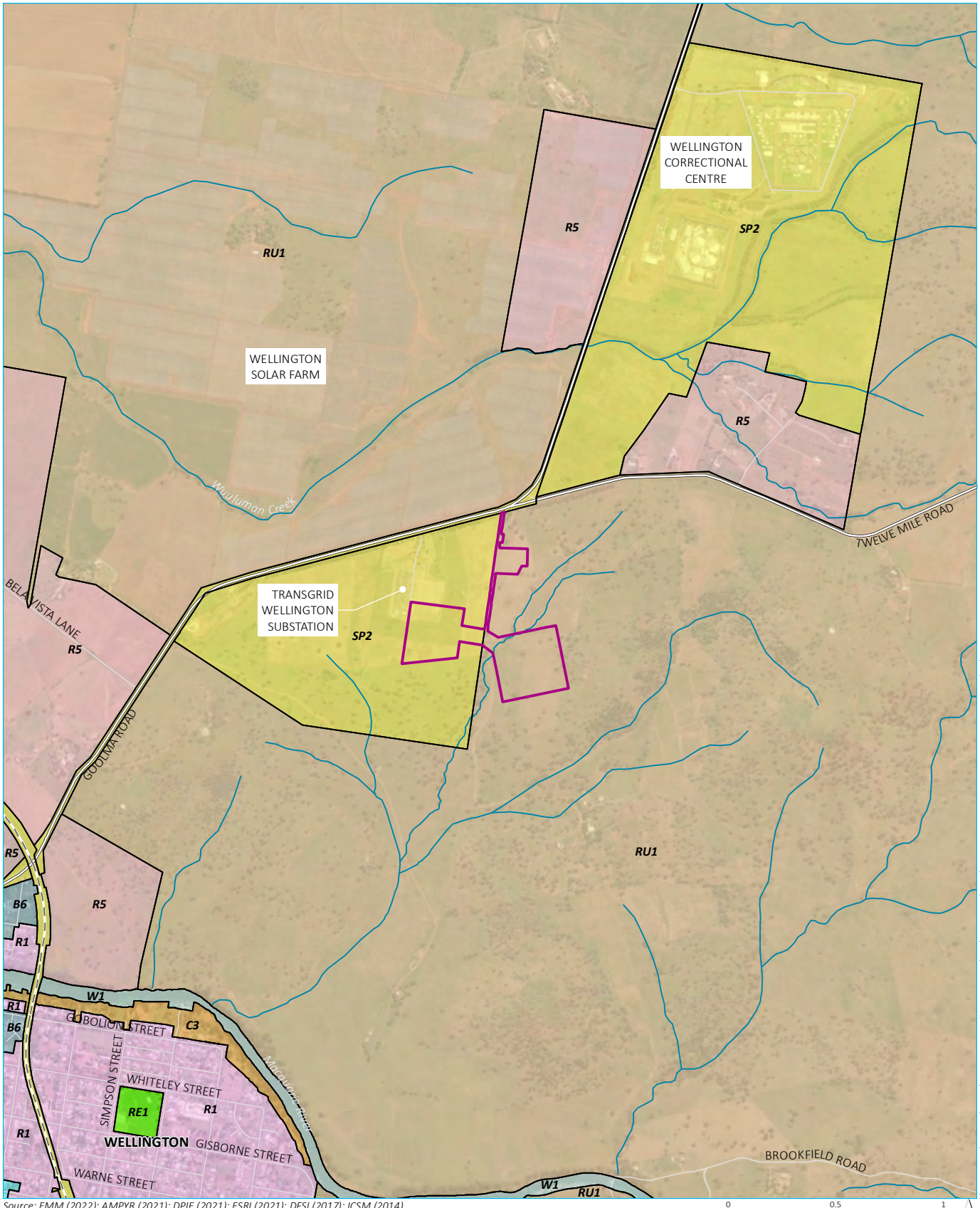
The project is located in a rural setting with the wider region characterised by grazing properties, small-scale farm businesses, natural areas, scattered rural dwellings and towns. The major transport infrastructure is the Dubbo – Orange railway and the Mitchell Highway.

The majority of the land surrounding the project boundary is zoned RU1 primary production and SP2 – Electricity Generating Works under the Dubbo LEP (Figure 3.1). Land uses surrounding the project area are predominantly agricultural (ie livestock grazing). Cattle and sheep grazing for wool, breeding stock and meat dominate agricultural activities.

North of the site, across Goolma Road is the existing Wellington Solar Farm, which covers some 400 ha.

3.3 Electricity transmission infrastructure

The project site is adjacent to an existing TransGrid substation. This has a number of 132 kV and 330 kV above ground transmission lines connecting to it (refer to Figure 1.2). These transmission lines are carried by 50–60 m high steel towers that traverse the landscape toward the east and west from the substation.



Source: EMM (2022); AMPYR (2021); DPIE (2021); ESRI (2021); DFSI (2017); ICSM (2014)

0 0.5 1 km

GDA 1994 MGA Zone 55

N

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KEY

- Development boundary
- Rail line
- Major road
- Minor road
- Watercourse/drainage line

LEP zoning

- B2 | Local Centre
- B6 | Enterprise Corridor
- C3 | Environmental Management
- R1 | General Residential
- R5 | Large Lot Residential
- RE1 | Public Recreation
- RU1 | Primary Production
- SP2 | Infrastructure
- W1 | Natural Waterways

Land use zoning

Wellington Battery Energy Storage System
Visual impact assessment
Figure 3.1

EMM creating opportunities

3.4 Rural dwellings

A number of non-project related dwellings have been identified in the landscape surrounding the project boundary. Non-project related dwellings considered as part of this assessment are identified on and include:

- three dwellings within 1 km of the project site, including dwellings on:
  - Twelve Mile Road;
- 17 dwellings within 2 km of the project site, including dwellings on:
  - Twelve Mile Road, Cadonia Drive, Cadia Place, Goolma Road, Bela Vista Lane;
- two dwellings within 4 km of the project site, including dwellings on:
  - Falls Road and Brookfield Road within the outskirts of Wellington.

A key consideration of the project refinement process has been potential visibility of project infrastructure from the identified rural dwellings.

One rural dwelling (R23) owned by project landholders has not been considered as part of this assessment. However, the design of landscape screening has been negotiated with the resident.

3.5 Settlements and townships

Wellington serves as the regional centre for the southern portion of the Dubbo LGA. The town sits between 2 km and 4 km southwest of the project site (Figure 3.2). There are a range of retail, commercial, professional and personal services available within the town, as well as a number of short-term accommodation options.

3.6 Traffic routes

The only road access to the project site is via Goolma Road. This intersects with Twelve Mile Road near the existing site access driveway.

The closest regional road is the Mitchell Highway, which serves as the main connection between Dubbo and Orange. It runs through Wellington, serving as the main transportation route through the area.

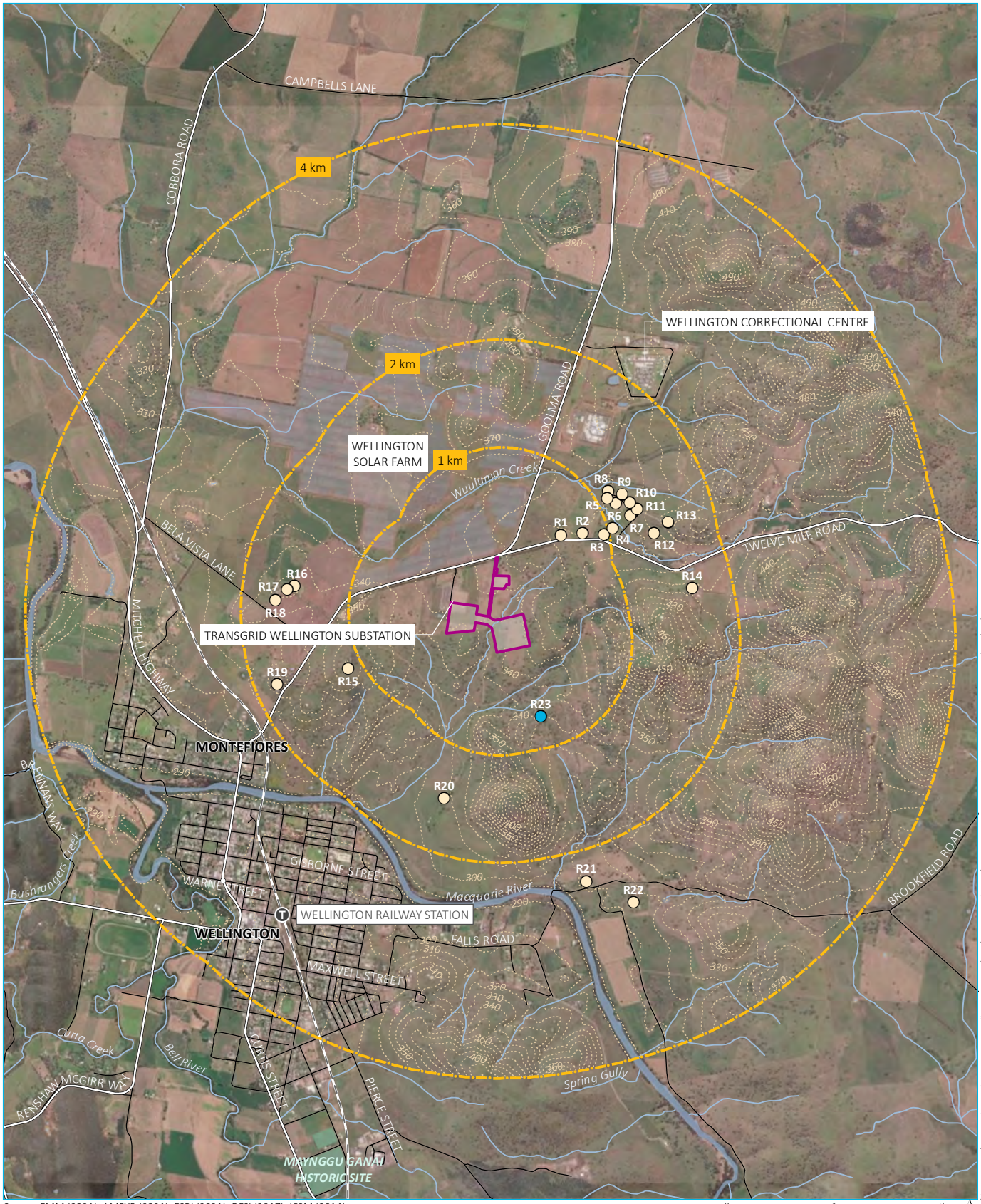
3.7 Air traffic

Wellington Airport is approximately 7.5 km north of the project boundary. The proposed development is not expected to have reflective elements that might generate glint and glare that would impact air traffic.

3.8 Night lighting

Existing sources of night lighting in the immediate vicinity include the existing substation with its adjoining buildings. The substation has pole-mounted area lights and lights on the building as well.

The closest non-project related residence is 500 m from the proposed driveway entry off Goolma Road and 900 m from the proposed BESS location. There is a project related residence 400 m south of the proposed BESS location. These two residences are the closest light sources to the proposed project site.



Source: EMM (2021); AMPYR (2021); ESRI (2021); DFSI (2017); ICSM (2014)

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KEY

- Development boundary
- Viewshed buffer
- Train station
- Rail line
- Major road
- Minor road
- Topographic contour (10 m interval)
- Watercourse/drainage line
- Waterbody
- NPWS reserve

Receivers

- Non-project residential receivers
- Project participating landowner

Location of receptors

Wellington Battery Energy Storage System
Visual impact assessment
Figure 3.2

EMM creating opportunities

3.9 Other developments

There are two existing energy operations nearby. The Wellington Solar Farm is located directly opposite Goolma Road from the proposed BESS. This is still in the final stages of construction and commissioning. The Bodangora wind farm is located 12km north of the project site and is operational.

Two other solar farms northwest of Wellington are approved, including Wellington North Solar Farm, construction of which is due to commence in Q3 2022, and Maryvale Solar Farm, construction of which has not begun.

4 Visual elements of the project

4.1 Project overview

The project consists of the construction and operation of a major grid-scale battery project immediately southeast of the TransGrid Wellington Substation. The project will use lithium-ion battery technology and will have a discharge rate of 500 MW and a storage capacity of 1000 MWh. The project also incorporates an on-site substation and connection infrastructure to facilitate transfer of energy to and from the electrical grid, and ancillary infrastructure. The project includes upgrade works to the TransGrid Wellington Substation, which may include an additional 330 kV switch bay with power transformers (which would be installed as an alternative to the transformer bays being located on the BESS site), switchyard bench extension to the south of the existing bench and relocation of security fencing. The project will be operated by Shell Energy Australia (Shell) who is jointly funding the development of the project.

The site proposed to be developed is located within the Dubbo Regional Council local government area (LGA) at 6773 Goolma Road (battery energy storage system and transmission line) and 6909 Gooolma Rd (transmission line and Wellington Substation upgrade) at Wuuluman. It will be located directly adjacent to the TransGrid owned Wellington Substation and is approximately 2.2 km north-east of the township of Wellington and 44 km south-east of the township of Dubbo.

Part of the project area located on Lot 32 DP 622471, is part of land owned by Shirley Angophora Pty Ltd as trustee for The Second Farm Trust. Land subject to the project is proposed to be subdivided from the remainder of the landholding which will continue to function as a farm and rural residence. The project area located on Lot 32 DP 622471 is owned by TransGrid.

The development boundary occupies an area of up to 19 ha and permanent project infrastructure will occupy up to 13 ha of land.

Vegetation clearing, cut and fill and bulk earthworks will be required to establish desired design levels to facilitate project infrastructure. Gravel cover will be established to allow for a managed surface that is partially permeable. Project infrastructure and equipment will either be established on concrete pads or mounted on skids affixed to the concrete pads. The existing access track will be improved (road base) an extended to project infrastructure.

Limited ground disturbance may also be required to facilitate a temporary construction compound/laydown area at the site entrance. The siting of this area will be clear of established trees and located mostly within previously disturbed areas.

Areas disturbed during construction and not required for the operation of the project would be rehabilitated. An asset protection zone would be established around the BESS compound and maintained on an ongoing basis for bushfire protection purposes.

4.2 Site selection and project refinement

A number of different locations within Lot 32 DP 622471 have been considered for the siting of the BESS and ancillary infrastructure as part of the environmental assessment and design process.

In consideration of the local environment and site conditions, the project layout was selected in response to the following:

- it is sufficiently distanced from nearby sensitive receivers thereby reducing noise and air quality impacts – alternate layouts that positioned project infrastructure in the northern portion of the site adjacent to Goolma Road and Twelve Mile Road were considered and subsequently discounted as part of preliminary environmental assessments, during which noise modelling identified that cumulative noise impacts will likely exceed applicable noise limits for sensitive receptors to the north of the site;

- it minimises interactions and impacts on the landowner's residence and ongoing farmland operations;
- it avoids or minimises impacts to the sensitive features of the site, including the unnamed tributaries and remnant woodland and paddock trees;
- it is located on the lot boundary adjacent to the Wellington Substation and existing transmission lines, thereby reducing the length of connecting transmission infrastructure; and
- it sits at a lower elevation compared to its surrounds and results in fewer visual impacts due to surrounding vegetation and topography.

Once the preferred development footprint was identified, the general layout of the BESS was determined to provide for an efficient operation that is compatible with the surrounding uses. A detailed layout of BESS infrastructure will be developed upon contractor selection and detailed design.

4.3 Construction

4.3.1 Construction activities

Construction is expected to commence in May 2023 (subject to approval). The project will be constructed and commissioned in line with battery supply availability, labour and equipment availability and increasing demand in the network. This may occur in a single stage over a period of 12–18 months. Alternatively, it is considered likely that it may occur over two stages as follows:

- Stage 1 – commencement of construction May 2023 and operations May 2024; and
- Stage 2 – commencement of construction November 2024 and operation November 2025.

Construction of the project, or each stage of it, would be undertaken in four phases, as follows:

- enabling works (ie site establishment) – approximately 2–4 months;
- construction works (civil works, structural works, and electrical works) – approximately 5–8 months;
- commissioning – approximately 4–5 months; and
- demobilisation – approximately 1 month.

For the staged construction scenario, Stage 1 would likely include 300 MW installed discharge capacity, all civil and enabling works, installation of batteries, one transformer and switchgear and associated structural, mechanical and electrical works, and connection to the substation. Stage 2 would consist of 200 MW, including installation of a second transformer and associated switchgear and batteries.

TransGrid has advised that the Wellington substation upgrade works may incorporate installation of one new 330 kV switch bay and multiple transformers (which would be installed as an alternative to the transformer bays being located on the BESS site) and may be installed in stages to coincide with the staged construction of the BESS should a staged approach be adopted.

4.4 Project infrastructure

4.4.1 Battery and energy storage system

The project team has engaged with the supply chain and conducted a preliminary tender process with technology suppliers and has undertaken a formal technology review initially focused on inverter capabilities. Concept designs from numerous suppliers have been relied upon to develop this project description and in some cases, ranges have been provided to allow for different equipment options under consideration. Detailed design of the project will be conducted following contractor selection to allow sufficient flexibility in the selection of technology. This approach will allow the project to maximise potential benefits from the rapid technology advancements currently underway in the BESS industry. Key design features of the BESS are provided in Table 4.1 and illustrated in Figure 4.1.

Table 4.1 Key project features

Feature	Parameter
Power output	500 MW
Energy storage capacity	1,000 MWh
Transmission voltage	330 kV
Charge and discharge cycle	365 days per year and 1–2 cycles per day
Design life	20 years (subject to component replacement and life extension)

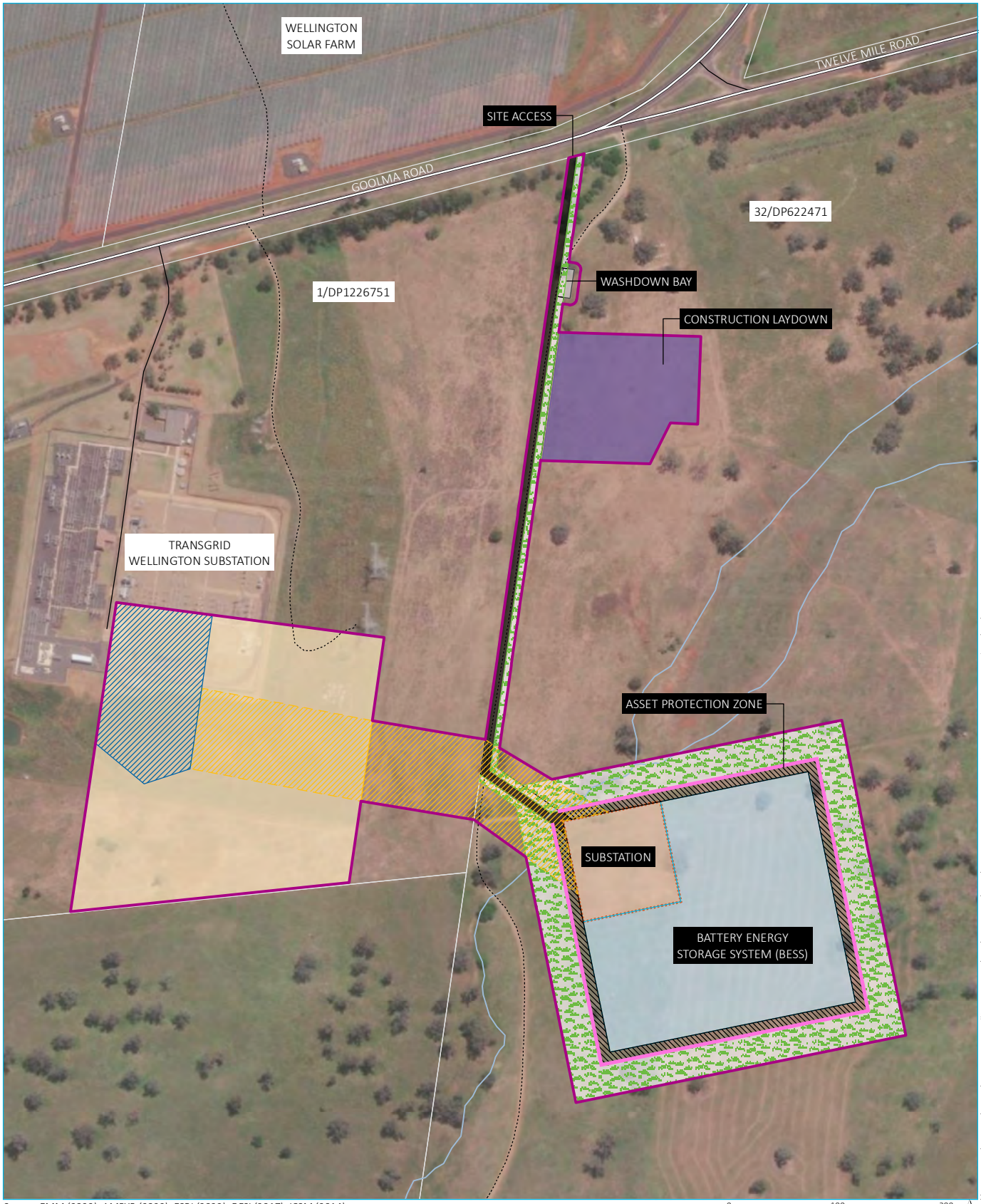
The BESS compound is proposed to be developed within a footprint immediately south-east of the TransGrid Wellington substation.

The project will comprise up to 1,400 to 6,200 battery enclosures. The exact number of enclosures required will be subject to the technology provider selected. The largest enclosure type would be 2.5 x 2.5 x 3 m (length x width x height).

Battery enclosures will be arranged in rows and comprise:

- racks of lithium-ion type batteries;
- a battery management system to protect cells from harmful excesses of voltage, temperature, and current;
- an energy management system which is responsible for system power flow control; and
- a thermal management system which controls all functions related to the heating, ventilation, and air-conditioning of the enclosure system.

Battery enclosures will be integrated with a power conversion system (PCS). A PCS will contain equipment such as inverters and transformers and will function to convert the power flow between battery and grid. The PCS will also house the required control and monitoring components such as voltage sensing units and thermal management of power electronics components.



Source: EMM (2022); AMPYR (2022); ESRI (2022); DFSI (2017); ICSM (2014)

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KEY

- Development boundary

Project components

- Indicative asset protection zone (10 m)
- Indicative transmission connection corridor
- Indicative TransGrid substation upgrade core infrastructure area
- Indicative TransGrid substation upgrade disturbance area
- Battery Energy Storage System (BESS) (battery rows offset at 6 m spacing and setback from substation)
- Substation
- Washdown bay
- Construction laydown
- Indicative landscaping (post construction)
- Access road
- Indicative location of noise bund

Existing environment

- Major road
- Minor road
- Vehicular track
- Watercourse/drainage line
- Cadastral boundary

Project overview

Wellington Battery Energy Storage System
Visual impact assessment
Figure 4.1

EMM creating opportunities

The BESS compound will be supported by ancillary infrastructure, including:

- electrical switch rooms;
- a control and office building and associated parking for operational staff and visitors;
- connection to utilities (telecom, sewerage, etc);
- drainage and stormwater management;
- lighting for security and maintenance;
- closed-circuit television cameras (CCTV); and
- acoustic wall and security fencing.

A single-storey control and office building would be established during construction and kept for the duration of operation to allow for remote operation and facility management.

Battery units would be up to 3 m in height and arranged in rows across the BESS compound area. Batteries will be arranged in groups and mounted on concrete footings or potentially compacted gravel.

The compound will be surrounded by security fencing and accessed from the existing driveway via Goolma Road.

4.4.2 BESS substation

A substation will be established within the site to convert electricity between the high voltage transmission network and medium voltage BESS compound. The substation would be within an indicative footprint of approximately 100 m x 100 m and established on a concrete pad. The substation would be separated from BESS compound infrastructure by security fencing and an asset protection zone. The BESS substation will comprise up to two 330 kilovolt (kV) transformer bays. Transformer bays will be bunded and subject to separation distances in accordance with manufacturer requirements. The BESS substation will also include:

- an auxiliary services building to accommodate secondary protection systems, AC/DC distribution equipment, fire detection systems, a supervisory control and data acquisition (SCADA) system, system dispatch control, CCTV, and intrusion detection;
- 330/440 kV auxiliary transformers;
- high voltage connections between switchgear; and
- other ancillary components including security fencing, lightning protection, lighting poles, security poles and cabling.

The BESS substation will connect to BESS infrastructure by way of underground 33 kV cables.

4.4.3 TransGrid Wellington Substation upgrade

The TransGrid Wellington substation upgrade will comprise an extension to the existing infrastructure elements on that site. The upgrades may include the installation of an additional 330 kV switch bay with power transformers (which would be installed as an alternative to the transformer bays being located on the BESS site), switchyard bench extensions to the south of the existing bench and relocation of security fencing. TransGrid has advised that the upgrades may be installed in stages to coincide with the staged construction of the BESS should a staged approach be adopted.

4.4.4 Network connection

The project will connect to the adjoining TransGrid Wellington Substation by way of a 330 kV underground cable. The following infrastructure is required to connect the battery to the grid:

- medium voltage electrical reticulation to allow the delivery of electricity from the point of connection;
- 33/330kV transformers;
- an overhead or underground tie-in to the TransGrid Wellington substation; and
- protective equipment and connection infrastructure at the switchyard within the TransGrid Wellington substation.

The transmission line would extend approximately 300 m from the BESS substation and if overhead, will be strung on two 330 kV double circuit steel lattice tension structures with 330 kV steel pole terminal structures. The transmission line will require the establishment of an easement up to 60 m wide.

4.4.5 Control and office building

A control and office building will be established within the BESS compound. The building will be established during construction and maintained throughout the project's operational life. The control and office building will be a prefabricated building comprising a lunch room, office and ablutions room and involve the following equipment:

The building will be assembled onsite and built to a height of 5 m tall. The building will be built of Trimclad steel or similar and grey in colour.

4.4.6 Access and internal road network

Plant, equipment, and materials will be transported to the main construction area via an existing access road. This road will be slightly realigned at the intersection with Goolma Road and improved to facilitate the access and egress of larger trucks during construction. Improvements would include gravel coverage, widening to 8 m and additional drainage as required. The road will be maintained during operation to allow for the access and egress of maintenance and operational vehicles to batteries and control and office building.

4.4.7 Lighting

Lighting will be provided via pole mounted installations across the BESS compound. Lighting will only be powered to carry out emergency and routine maintenance operations at night. Building and battery enclosures will also be fitted with internal lighting which will include emergency lighting rated for no less than two hours in the event of a power outage.

The proposed project will require limited permanent night lighting for the O&M buildings, substation and battery storage units. Temporary, localised night lighting may be required during general maintenance activities conducted during the operation stage of the project. If required, lighting will be managed to minimise impacts on surrounding areas.

All external lighting will be installed as low intensity lighting (except where required for safety or emergency purposes) and will comply with Australian Standard AS 4282 (INT) 1997 – *Control of Obtrusive Effects of Outdoor Lighting*. In addition, all external lighting will not shine above the horizontal.

The site sits within the Dark Sky Region surrounding the Siding Spring Observatory. Developments within this area are required to apply good lighting design principles that eliminate light spill. These principles are illustrated in the *Dark Sky Planning Guideline* (2016), and include:

- eliminating upward spill light;
- directing light downwards, not upwards;
- use of shielded fittings;
- avoiding 'over' lighting;
- switching lights off when not required;
- use of energy efficient bulbs;
- use of asymmetric beams, where floodlights are used;
- ensuring lights are not directed towards reflective surfaces; and
- use of warm white colours.

4.5 Operations

The BESS would operate 24 hours a day, 7 days a week and be operated remotely. Regular maintenance activities will be required throughout the project's operational life. This maintenance may potentially include the replacement of BESS components. Light vehicles will access the site throughout the operations phase for maintenance activities. Heavy vehicles may also occasionally access the site to replace larger components as necessary.

The operation of the project is expected to commence from 2024 for a period of approximately 20 years.

4.6 Decommissioning

At the end of the economic life, AMPYR will evaluate the future use of the site (either to replace or to decommission the project).

Project decommissioning would involve returning the development footprint as close to practicably possible to its pre-existing land use, namely suitable for grazing of sheep and cattle, or another land use as agreed by the project owner and the landholder at that time.

4.7 Mitigation of visual impacts

Development of the project design has included and will continue to include general measures to reduce the degree of contrast between project infrastructure and the surrounding rural landscape, having regard to the form, scale, height, colour and texture of materials incorporated as part of the project.

Where possible, suitable colours and finishes will be chosen for project infrastructure to minimise visual impacts (including glare/reflectivity) including the O&M buildings/facilities and the acoustic wall surrounding the BESS area. These buildings and materials will be designed to blend in with the local rural/farming landscape. If practicable, the wall may be painted in a neutral colour (ie khaki, beige, green or similar) rather than white, so as to better blend in with the local rural landscape. Finishes that minimise glare/reflectivity.

4.7.1 Landscaping

A conceptual landscaping plan is shown in Appendix B, which has been prepared in consultation with the property owners of R23 and in consideration of the outcomes of this visual assessment detailed in the following chapter. The proposed landscaping will be installed along all sides of the BESS compound and along the eastern side of the access road. This will help screen the BESS visually from the roadways and residences to the north and west as well as the residences to the south.

The final location and extent of landscaping will be determined during detailed design and ongoing discussions with the property owners of R23 and as part of preparation of the construction environmental management plan (CEMP).

Subject to local conditions (ie soil quality and water availability), it is anticipated that within two years, proposed landscaping will provide sufficient coverage to partially screen project infrastructure.

Vegetation species used during landscaping will be subject to consultation with the property owners of R23 and local suppliers. Examples of tall trees, large shrubs, medium shrubs and hardy low shrubs are provided in Table 4.2. During consultation with a local supplier, it was noted that these species are capable of providing screening, grow fairly quickly and are readily available within Wellington and surrounds.

Table 4.2 Suggested native shrub species for landscaping

Scientific name	Common name	Potential height range
Tall trees		
Brachychiton populneus	Kurrajong	Up to 20 m
Casuarina cunninghamiana	River Oak	Up to 30 m
Eucalyptus albens	White Box	Up to 30 m
Eucalyptus melliodora	Yellow Box	Up to 30 m
Eucalyptus blakelyi	Blakely's Red Gum	Up to 25 m
Eucalyptus caliginosa	Broad-leaved Stringybark	Up to 25 m
Eucalyptus viminalis	Manna Gum	Up to 30 m
Eucalyptus dalrympleana	Mountain Gum	Up to 25 m
Eucalyptus pauciflora	Snow Gum	Up to 20 m
Eucalyptus stellulata	Black Sallee	Up to 15 m
Melia azedarach	White Cedar	Up to 25 m
Large shrubs		
Banksia integrifolia	Honeysuckle	Up to 12 m
Acacia deanei	Deane's Wattle	Up to 7 m
Acacia penninervis	Mountain Hickory Wattle	Up to 8 m
Acacia dealbata	Silver Wattle	Up to 15 m
Allocasuarina littoralis	Black She-Oak	Up to 12 m

Table 4.2 Suggested native shrub species for landscaping

Scientific name	Common name	Potential height range
Medium shrubs		
Acacia buxifolia	Box Leaf Wattle	Up to 4 m
Acacia decora	Western Silver Wattle	Up to 4 m
Acacia genistifolia	Spreading Wattle	Up to 3 m
Acacia paradoxa	Kangaroo Acacia	Up to 4 m
Acacia siculiformis	*Dagger Wattle*	Up to 4 m
Bursaria spinosa	*Blackthorn*	Up to 4 m
Callistemon sieberi	*River Bottlebrush*	Up to 6 m
Dodonaea viscosa	*Hopbush*	Up to 4 m
Leptospermum polygalifolium	Mountain tea-tree	Up to 3 m
Leptospermum brevipes	Grey tea-tree	Up to 3 m
Hardy low shrubs		
Cassinia aculeata	Common Cassinia	Up to 2 m
Daviesia latifolia	Hop Bitter Pea	Up to 2 m
Hakea microcarpa	Small-fruited Hakea	Up to 2 m
Hibbertia riparia	Erect guinea flower	Up to 1 m
Lomandra longifolia	Spiny Mat Rush	Up to 1.3 m

5 Assessment of impacts

5.1 Assessed viewpoints

As part of the preparation of this VIA, a number of site inspections have taken place between November 2021 and March 2022. The purpose of these site inspections has been to ground-truth the representative viewpoints identified during the initial desktop analysis and discuss potential views of project infrastructure with neighbouring landholders. During these inspections, photographs from these representative viewpoints were captured and a selection of these photographs has been used as representative viewpoints for this assessment. The representative viewpoints were selected based on the following criteria:

- proximity to the BESS;
- the location of receptors (ie dwellings);
- the positioning of regional and local roads and potential impacts on passing motorists;
- local topography; and
- presence of remnant vegetation and wind breaks with potential to provide screening.

The locations of the receptors considered as part of this assessment are provided on Figure 3.2. As part of the preparation of this VIA, a total of 20 non-project related receptors were identified within 2 km of the development footprint.

To determine potential visibility of project infrastructure, a viewshed analysis was completed. The results of the viewshed analysis is presented in Figure 5.1 and Appendix A. The figures identify the potential to see project elements from each viewpoint.

The viewshed analysis has been generated using a digital elevation model (DEM) and a digital surface model (DSM), both of which cover the development footprint, the 10 selected viewpoints and their immediate surrounds. The DEM and DSM were built using publicly available ELVIS spatial data from the Foundation Spatial Data Framework.

The DEM is representative of the bare earth surface and only takes into consideration the topography of the landscape. The DSM is representative of the actual surface of the earth and considers a variety of different features in the landscape, including vegetation and built structures (ie rural dwellings, farm sheds and agricultural infrastructure). Due to inconsistencies found in the vegetation modelling, the viewshed analyses presented in Appendix A have been created using a 'bare earth' surface model. The viewshed analyses therefore illustrate a worst-case scenario, indicating the project elements that would be visible without any vegetation.

The viewshed analysis presented in the figures in Appendix A only considers the height of the dominant project infrastructure, which are the acoustic wall (if required) and transmission towers. As part of the viewshed analysis, the height of the acoustic wall was assumed to be 3.5 m, and the transmission towers 50 m. Other project infrastructure including, substation, O&M facilities have been considered as part of the viewshed analysis where visible.

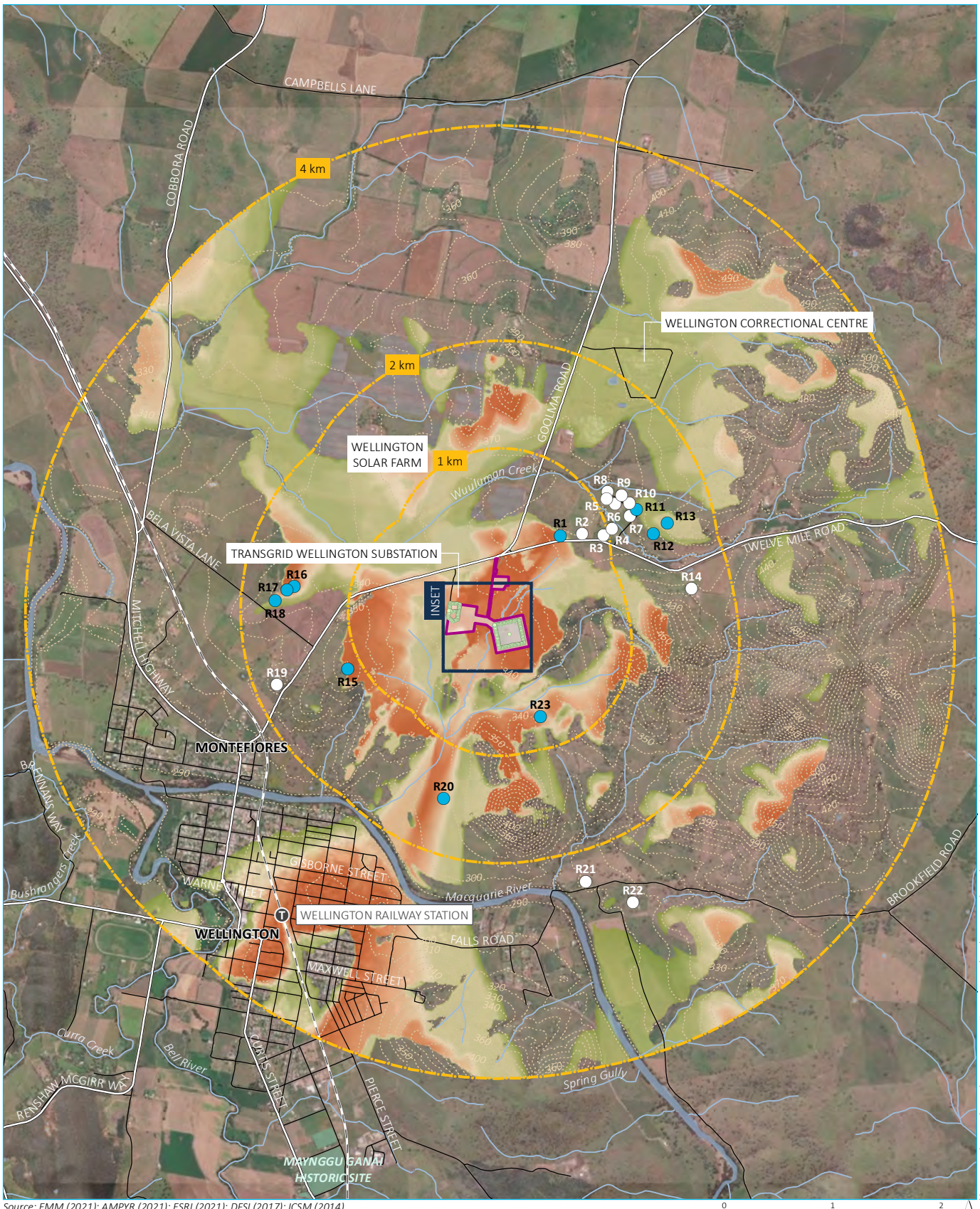
The locations of the 1 viewpoints considered as part of this assessment are illustrated on Figure 5.2. The figure also includes the locations of surrounding receptors, local and regional roads. The figures also include contours, which demonstrate the undulating nature of the landscape surrounding the BESS.

The rationale for the selection of each of the viewpoints analysed as part of this report are summarised in Table 5.1.

Table 5.1 Assessed viewpoints, receptors and rational for selection

Assessment location	Viewpoint type(s)	Representative receptors	Distance to site (km)*	Rationale for selection
Viewpoint 1	Motorists		0.65	This view is potentially the worst-case for motorists on the surrounding roads. Goolma Road lines up with the proposed project site, so when driving southward, the driver would be looking directly at the proposed BESS.
Viewpoint 2	Dwelling	R1, R2, R3, R4	0.78	View is representative of views from dwellings on Twelve Mile Road within proximity of the proposed BESS. There are four residences along this stretch of road that may have similar views.
Viewpoint 3	Dwellings and motorists	R16, R17, R18	1.33	View is representative of views from dwellings on west of the project site within 2 km of the BESS. There are three residences that may have similar views. This view also illustrates the views from Goolma Road, west of the site.
Viewpoint 4	Dwelling	R15	1.10	This is the views from a single dwelling west of the project site. This residence is the closest residence west of the BESS.
Viewpoint 5	Dwelling	R20	1.50	This is the views from a single dwelling south of the project site.
Viewpoint 6	Motorists		2.15	This represents the typical view from Twelve Mile Road travelling west toward the project site.
Viewpoint 7	Motorists		2.52	This represents the typical view from Goolma Road travelling south toward the project site.
Viewpoint 8	Motorists and residents		3.69	This represents the typical view from Saxa Road facing east toward the project site. There are residences along this road that are approximately 3 km from the project site.
Viewpoint 9	People within Wellington		2.67	Views are representative of those from within the township of Wellington. There are locations within Wellington with potential views of the proposed structures
Viewpoint 10	People within Wellington		3.20	Views are representative of those from within the township of Wellington. There are locations within Wellington that area elevated with potential views of the proposed structures like this location.

Note: * The distances shown in the table are taken from the BESS compound, not the access road or towers.



Source: EMM (2021); AMPYR (2021); ESRI (2021); DFSI (2017); ICSM (2014)

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INSET

KEY

- Development boundary
- Train station
- Rail line
- Major road
- Minor road
- Topographic contour (10 m interval)
- Watercourse/drainage line
- Waterbody
- NPWS reserve

Viewshed results

- Viewshed model point
- Viewshed buffer
- 296 visible modelled points
- 1 visible modelled point

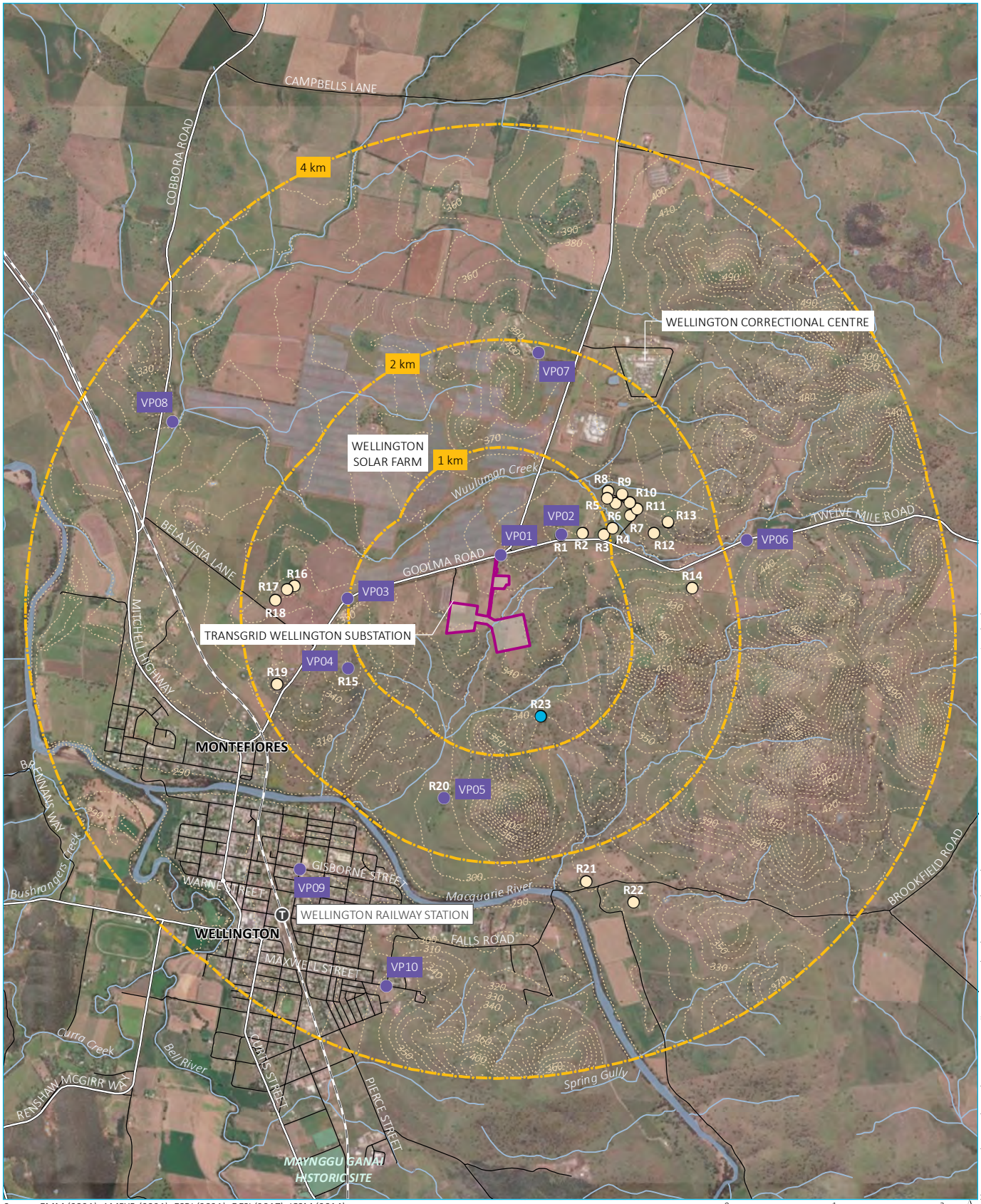
Receivers

- Not visible to any modelled points
- Visible to at least 1 model point

Viewshed analysis

Wellington Battery Energy Storage System
Visual impact assessment
Figure 5.1

EMM creating opportunities



Source: EMM (2021); AMPYR (2021); ESRI (2021); DFSI (2017); ICSM (2014)

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KEY

- Development boundary
- Viewpoint
- Viewshed buffer
- Train station
- Rail line
- Major road
- Minor road
- Topographic contour (10 m interval)
- Watercourse/drainage line
- Waterbody
- NPWS reserve

Receivers

- Non-project residential receivers
- Project participating landowner

Viewpoint locations and receptors

Wellington Battery Energy Storage System
Visual impact assessment
Figure 5.2

EMM creating opportunities

5.2 Construction impacts

A description of the site establishment and construction activities associated with the project is provided in Section 4 and described in more detail in Chapter 3 of the EIS.

The most visible elements of the construction process will be the improvements to the access road and the temporary laydown yard. These are close to the roadways and will be visible. Secondly, the construction of the transmission towers will be visible as the towers are lifted into place.

There will be a need for heavy machinery for the civil works and site preparation. This will include modifying the access road and leveling the BESS area. These works, along with the movement of machinery have the potential of causing visual impacts.

Due to the temporary nature, the site establishment works, and construction activities are considered unlikely to have significant visual impacts on passing motorists or nearby receptors. Subsequently, landscaping is not proposed to mitigate visual impacts during the construction stage of the project.

5.3 Operation impacts

An assessment of the selected viewpoints in accordance with the methodology outlined in Chapter 2 of this report is presented in the following sections.

The identification of visual impacts from the proposed BESS did not rely solely on the electronic modelling. Field work and photographic evidence was used to examine the human experience of the visual changes proposed. Therefore, in determining the visual impact, the viewpoint analyses (Appendix A) should be considered in conjunction with the photographic representation for each viewpoint.

5.3.1 Viewpoint 1 – Goolma Road at intersection of Twelve Mile Road

Viewpoint details	This viewpoint is the closest to the site with motorists travelling south along Goolma Road looking directly at the project site. The project site is at a lower elevation than the viewer. As evident in the photo, there are numerous existing transmission lines and towers visible.
View type and context	Immediate views from this location represent a typical rural setting with large tracts of agricultural land. Other features visible from this location include the Wellington Solar Farm, scattered remnant vegetation, and the Goolma Road and Twelve Mile Road local road corridor.
Project refinement	The access drive alignment and location of the proposed BESS have been adjusted. The resulting project offsets the access drive from the Goolma Road alignment, which eliminates views directly into the site. The BESS has also been located further away from the road, decreasing its visibility.
Visibility baseline assessment	The results of the viewshed analysis indicate project infrastructure will be visible from this location. As illustrated in Figure A.1 (Appendix A), shielding features in the landscape have potential to limit the extent of project infrastructure visible from this viewpoint.
Magnitude of change	**Low** – as a result of the short duration of the view when driving past (moderate viewing experience), and the small portion of the view that is affected (low scale of change). The project infrastructure will add new features to the visual landscape at this location, which will blend in with the existing electrical infrastructure. The roadside grasses and trees also add a screening element, preventing the driver from looking directly into the site.
Visual sensitivity	**Low** – due to roadway location of the viewer (low viewer sensitivity) and the type of landscape (moderate scenic quality).
Visual impact rating	**Low –** the operation of the proposed project would result in a low visual impact from this viewpoint.
Additional mitigation	Trees will be installed around the perimeter of the BESS, adding to the vegetative screening to the view.

5.3.2 Viewpoint 2 – 59 Twelve Mile Road (at R1)

Viewpoint details	This viewpoint represents the closest residence to the site. The site is not visible from the residence itself due to hedge and tree planting within the residential property. The project site is at a lower elevation than the viewer. As evident in the photo, there are numerous existing transmission lines and towers visible.
View type and context	Immediate views from this location represent a typical rural setting with large tracts of agricultural land. Other features visible from this location include the Wellington Solar Farm, scattered remnant vegetation, and the Twelve Mile Road local road corridor.
Project refinement	The access drive alignment and location of the proposed BESS have been adjusted. The resulting project located the BESS further away from this location, decreasing its visibility.
Visibility baseline assessment	The results of the viewshed analysis indicate project infrastructure will be visible from this location. As illustrated in Figure A.2 (Appendix A), shielding features in the landscape have potential to limit the extent of project infrastructure visible from this viewpoint.
Magnitude of change	**Low** – as a result of the long duration of the view from the residential location and short duration when driving past (moderate viewing experience), and the small portion of the view that is affected (low scale of change). The project infrastructure will add new features to the visual landscape at this location, which will blend in with the existing electrical infrastructure. The roadside grasses and trees also add a screening element, preventing the driver from looking directly into the site.
Visual sensitivity	**Moderate** – due to roadway location of the viewer (moderate viewer sensitivity) and the type of landscape (moderate scenic quality).
Visual impact rating	**Low –** the operation of the proposed project would result in a low visual impact from this viewpoint.
Additional mitigation	Trees will be installed around the perimeter of the BESS, adding to the vegetative screening to the view from this location.

5.3.3 Viewpoint 3 – 7035 Goolma Road

Viewpoint details	This viewpoint represents views from the road west of the site. It also represents residences located further west, within the same vicinity. The project site is at a similar elevation as the viewer. As evident in the photo, there are numerous existing transmission lines and towers visible.
View type and context	Immediate views from this location represent a typical rural setting with large tracts of agricultural land. Other features visible from this location include the Wellington Solar Farm, scattered remnant vegetation, and the Goolma Road local road corridor.
Project refinement	The access drive alignment and location of the proposed BESS have been adjusted. The resulting project located the BESS further away from this location, decreasing its visibility.
Visibility baseline assessment	The results of the viewshed analysis indicate project infrastructure will be visible from this location. As illustrated in Figure A.3 (Appendix A), shielding features in the landscape have potential to limit the extent of project infrastructure visible from this viewpoint.
Magnitude of change	**Low** – as a result of the distance from the project, long duration of the view from the residential locations and short duration when driving past (moderate viewing experience), and the small portion of the view that is affected (low scale of change). The project infrastructure will add new features to the visual landscape at this location, which will blend in with the existing electrical infrastructure. The roadside grasses and trees also add a screening element.
Visual sensitivity	**Moderate** – due to roadway and residential location of the viewer (moderate viewer sensitivity) and the type of landscape (moderate scenic quality).
Visual impact rating	**Low –** the operation of the proposed project would result in a low visual impact from this viewpoint.
Additional mitigation	Trees will be installed around the perimeter of the BESS, adding to the vegetative screening.

5.3.4 Viewpoint 4 – 371 Goolma Road (R15)

Viewpoint details	This viewpoint represents the closest residence to the site from the west. The project site is at a lower elevation than the viewer. As evident in the photo, the existing substation is visible and there are numerous existing transmission lines and towers visible as well.
View type and context	Immediate views from this location represent a typical rural setting with large tracts of agricultural land. Other features visible from this location include the Wellington Solar Farm, scattered remnant vegetation, and the Goolma Road local road corridor.
Project refinement	The access drive alignment and location of the proposed BESS have been adjusted. The resulting project located the BESS closer this location.
Visibility baseline assessment	The results of the viewshed analysis indicate project infrastructure will be visible from this location, as illustrated in Figure A.4 (Appendix A). The proposed extension of the substation will also be visible from this location.
Magnitude of change	**Moderate** – As a result of the long duration of the view from the residential location and the distance from the project (moderate viewing experience), and the portion of the view that is affected (moderate scale of change). The project infrastructure will add new features to the visual landscape at this location, which will blend in with the existing electrical infrastructure. The existing trees also add a screening element to the landscape.
Visual sensitivity	**Moderate** – The view is from a rural dwelling (moderate viewer sensitivity) and the type of landscape is hilly and undulating terrain with remnant woodland stands (moderate scenic quality).
Visual impact rating	**Moderate –** The operation of the proposed project would result in a moderate visual impact from this viewpoint. (Mitigated) **Low** - The operation of the proposed project incorporating proposed landscape screening would result in a low visual impact from this viewpoint.

Additional mitigation	Trees and large shrubs installed around the BESS compound may help visually screen the infrastructure. Potential for new towers to be eliminated from design will remove the most visible components.

Photomontage illustrating the proposed BESS and substation expansion.

Photomontage illustrating the proposed landscape screening around the BESS compound.

5.3.5 Viewpoint 5 – R20

Viewpoint details	This viewpoint represents the residence south of the site. The BESS site is not visible from the residence due to the ridgeline between the viewer and the site. Some of the existing transmission towers are visible, which indicate the proposed towers may be visible as well.
View type and context	Views from this location represent a typical rural agricultural setting with grazing or cropped land. Other features visible from this location include hillsides with scattered remnant vegetation.
Project refinement	Changes to the BESS location and design have not resulted in any change in visual impact from this location. There is still the possibility of installing the transmission lines from the proposed BESS to the existing substation underground, which would eliminate any impact from this location.
Visibility baseline assessment	The results of the viewshed analysis indicate project infrastructure will be visible from this location. As illustrated in Figure A.5 (Appendix A), shielding features in the landscape have potential to limit the extent of project infrastructure visible from this viewpoint.
Magnitude of change	**Low** – as a result of the distance from the project and long duration of the view from the residential location (moderate viewing experience), and the small portion of the view that is affected (low scale of change).
Visual sensitivity	**Moderate** – due to rural dwelling location of the viewer (moderate viewer sensitivity) and the type of landscape (moderate scenic quality).
Visual impact rating	**Low –** the operation of the proposed project would result in a low visual impact from this viewpoint.
Additional mitigation	Potential for new towers to be eliminated from the design.

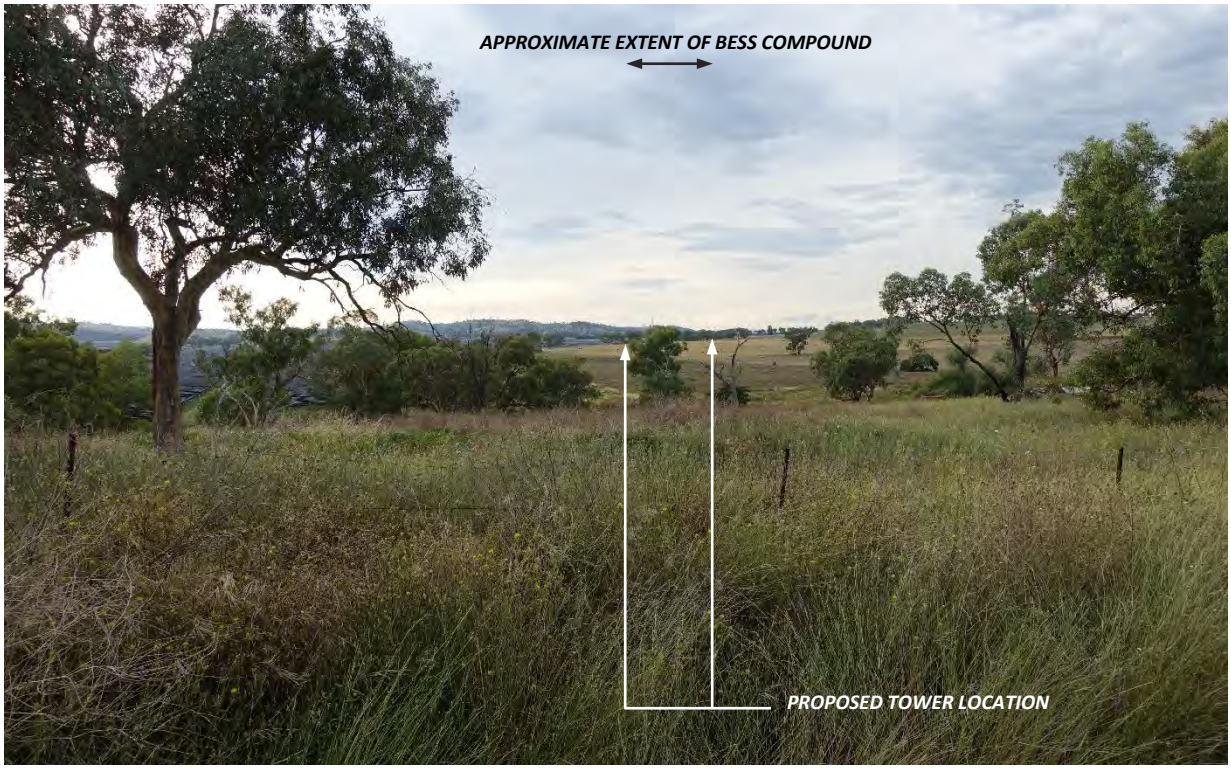
5.3.6 Viewpoint 6 – 243 Twelve Mile Road

Viewpoint details	This viewpoint represents views from a distance when viewing from the east. The site of the BESS is not visible from this distance due to the topography that hides the structures. Some of the existing transmission towers are visible, which indicate the proposed towers may be visible as well.
View type and context	Views from this location represent a typical roadway winding through a rural agricultural area with remnant bushland along the road. Features visible from this location include the scattered remnant vegetation, and the Twelve Mile Road local road corridor.
Project refinement	Changes to the BESS location and design have not resulted in any change in visual impact from this location.
Visibility baseline assessment	The results of the viewshed analysis indicate project infrastructure will not be visible from this location. As illustrated in Figure A.6 (Appendix A), shielding features in the landscape limit the extent of project infrastructure visible from this viewpoint.
Magnitude of change	**Low** – as a result of the moderate duration of view when driving toward the site (moderate viewing experience), and the small portion of the view that is affected (low scale of change).
Visual sensitivity	**Moderate** – due to roadway location of the viewer (moderate viewer sensitivity) and the type of landscape (moderate scenic quality).
Visual impact rating	**Low –** the operation of the proposed project would result in a low visual impact from this viewpoint.
Additional mitigation	Potential for new towers to be eliminated from the design.

5.3.7 Viewpoint 7 – 6561 Goolma Road

Viewpoint details	This viewpoint represents the distant views from the north. The site of the BESS is not visible from this distance due to the topography that hides the structures. Some of the existing transmission towers are visible, which indicate the proposed towers may be visible as well.
View type and context	Views from this location are of existing correctional institutions on the left with residential on the right. Other features visible from this location include the Wellington Solar Farm, distant hills, and the Goolma Road local road corridor.
Project refinement	Changes to the BESS location and design have not resulted in any change in visual impact from this location. There is the possibility of installing the transmission lines from the proposed BESS to the existing substation underground, which would eliminate any impact from this location.
Visibility baseline assessment	The results of the viewshed analysis indicate project infrastructure will be visible from this location. As illustrated in Figure A.7 (Appendix A), existing features in the landscape have potential to limit the extent of project infrastructure visible from this viewpoint.
Magnitude of change	**Low** – as a result of the distance from the site and short duration when driving (low viewing experience), and the small portion of the view that is affected (low scale of change).
Visual sensitivity	**Low** – due to roadway location and the institutional surroundings (low viewer sensitivity) and the highly modified landscape (low scenic quality).
Visual impact rating	**Low –** the operation of the proposed project would result in a low visual impact from this viewpoint.
Additional mitigation	Potential for new towers to be eliminated from the design.

5.3.8 Viewpoint 8 – 104 Saxa Road

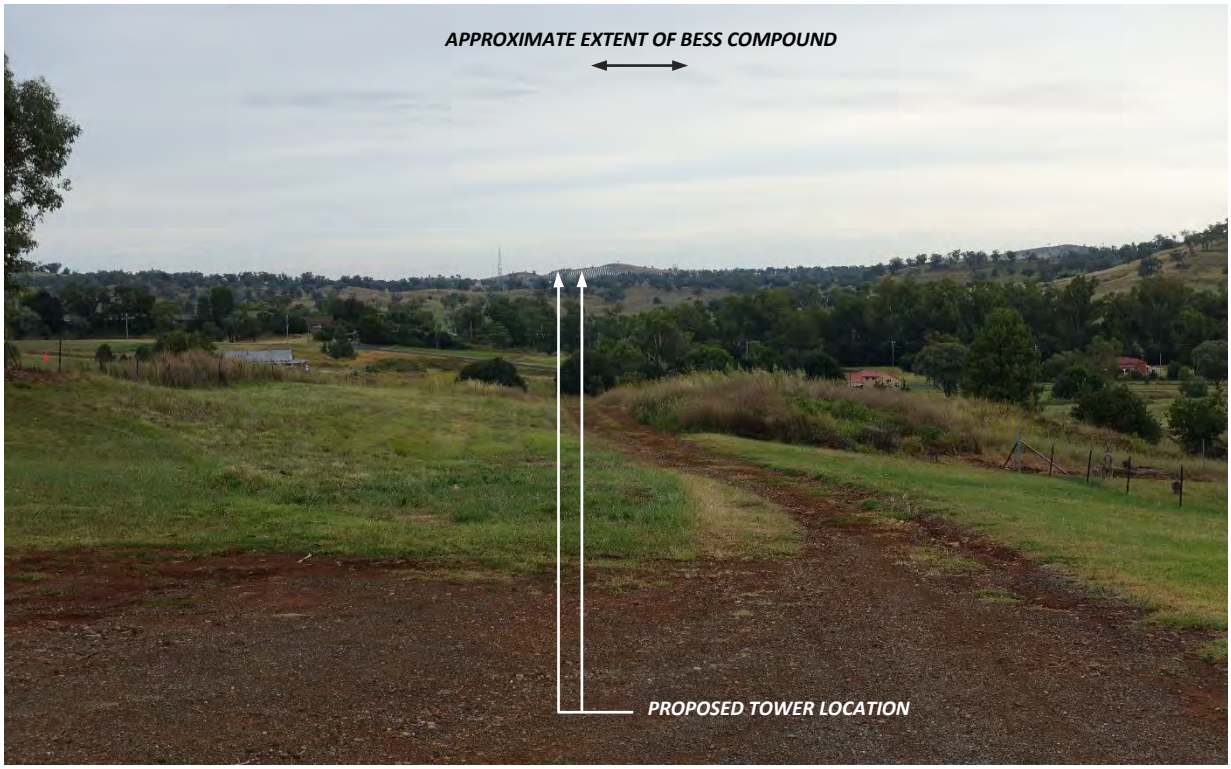


Viewpoint details	This viewpoint represents the distant views from the west. There are residences along Saxa Road with similar views. The site of the BESS is not visible from this distance due to the topography that hides the structures. Some of the existing transmission towers are visible, which indicate the proposed towers may be visible as well.
View type and context	Immediate views from this location represent a typical rural setting with large tracts of agricultural land. Other features visible from this location include the Wellington Solar Farm, scattered remnant vegetation, and the Saxa Road local road corridor.
Project refinement	Changes to the BESS location and design have not resulted in any change in visual impact from this location. There is a possibility of installing the transmission lines from the proposed BESS to the existing substation underground, which would eliminate any impact from this location.
Visibility baseline assessment	The results of the viewshed analysis indicate project infrastructure may be visible from this location. As illustrated in Figure A.8 (Appendix A), shielding features in the landscape have potential to limit the extent of project infrastructure visible from this viewpoint.
Magnitude of change	**Low** – as a result of the distance from the site and short duration when driving (low viewing experience), and the small portion of the view that is affected (low scale of change).
Visual sensitivity	**Moderate** – due to roadway location of the viewer (moderate viewer sensitivity) and the type of landscape (moderate scenic quality).
Visual impact rating	**Low –** the operation of the proposed project would result in a low visual impact from this viewpoint.
Additional mitigation	Potential for new towers to be eliminated from the design.

5.3.9 Viewpoint 9 – Gisborne Street at Simpson Street

Viewpoint details	This viewpoint represents the views from the Wellington township. The site of the BESS is not visible from this distance due to the topography that hides the structures. Some of the existing transmission towers are visible, which indicate the proposed towers may be visible as well.
View type and context	Immediate views from this location represent a typical town setting with residential communities. Other features visible from this location include scattered remnant vegetation.
Project refinement	Changes to the BESS location and design have not resulted in any change in visual impact from this location. There is a possibility of installing the transmission lines from the proposed BESS to the existing substation underground, which would eliminate any impact from this location.
Visibility baseline assessment	The results of the viewshed analysis indicate project infrastructure will be visible from this location. As illustrated in Figure A.9 (Appendix A), shielding features in the landscape have potential to limit the extent of project infrastructure visible from this viewpoint.
Magnitude of change	**Low** – as a result of the distance to the site, the long duration of the view from the residential location (moderate viewing experience), and the small portion of the view that is affected (low scale of change). The project infrastructure will add new features to the visual landscape at this location, which will blend in with the existing electrical infrastructure. Existing trees also add a screening element, which prevent viewers from seeing the proposed BESS.
Visual sensitivity	**Moderate** – due to the residential location of the viewer (high viewer sensitivity) and the type of landscape (low scenic quality).
Visual impact rating	**Low –** the operation of the proposed project would result in a low visual impact from this viewpoint.
Additional mitigation	Potential for new towers to be eliminated from the design. Installation of trees along the south of the BESS will visually break up any views of the BESS.

5.3.10 Viewpoint 10 – McLeod Street at Maxwell Street



Viewpoint details	This viewpoint represents the views from the Wellington township. The site of the BESS is not visible from this distance due to the topography that hides the structures. Some of the existing transmission towers are visible, which indicate the proposed towers may be visible as well.
View type and context	Immediate views from this location represent a typical town setting with residential communities. Other features visible from this location include scattered remnant vegetation on rolling hills.
Project refinement	Changes to the BESS location and design have not resulted in any change in visual impact from this location. There is a possibility of installing the transmission lines from the proposed BESS to the existing substation underground, which would eliminate any impact from this location.
Visibility baseline assessment	The results of the viewshed analysis indicate project infrastructure will be visible from this location. As illustrated in Figure A.10 (Appendix A), shielding features in the landscape have potential to limit the extent of project infrastructure visible from this viewpoint.
Magnitude of change	**Low** – as a result of the distance to the site, the long duration of the view from the residential location (moderate viewing experience), and the small portion of the view that is affected (low scale of change). The project infrastructure will add new features that may be visible from this location. These will blend in with existing electrical infrastructure. The existing trees also screen the project elements.
Visual sensitivity	**Moderate** – due to the residential location of the viewer (high viewer sensitivity) and the type of landscape (low scenic quality).
Visual impact rating	**Low –** the operation of the proposed project would result in a low visual impact from this viewpoint.
Additional mitigation	Potential for new towers to be eliminated from the design.

5.4 Reflectivity and glare

The potential impacts of sunlight reflecting off the proposed BESS elements are glint and glare impacts. Glint refers to short periods and more intense levels of exposure, while glare refers to sustained or continuous periods of exposure to excessive brightness, but at a reduced level of intensity (Morelli 2014).

Reflection in the form of glint and glare will only be possible when direct sunlight occurs. Therefore, in those instances where glint and glare from the project elements may occur, receptors will also likely experience direct sunlight, which will be a significantly brighter and more intense source of light than reflections. Nonetheless, glint and glare may result from the project and may have an impact on receptors, primarily dwellings within proximity of the development, motorists travelling along the local road network.

As discussed in Section 3, undulation within the landscape, favourable topography and existing vegetation in the landscape will reduce the duration and the number of locations from which reflections may be visible. Further, the intention of the proposed landscaping around the BESS compound and along the eastern side of the access road is to reduce the visibility of the project infrastructure, which will also mitigate any potential for glint or glare impacts.

Based on the limited use of reflective elements in the design of the BESS and associated structures, glint and glare from the project infrastructure is not expected to significantly impact the following:

- receptors within the vicinity of the development area;
- people engaged in agricultural activities in the surrounding landscape;
- motorists travelling along the local road network;
- motorists travelling along a number of minor, unsealed rural property access roads and farm tracks; and
- aircraft arriving at or departing from Wellington Airport.

5.5 Cumulative impacts

It is important to consider the effect of multiple projects on the visual character of the landscape. Cumulative visual impacts can arise from the presence of similar projects that may have a low impact individually, but when viewed together, can have a significant visual impact on the landscape.

There are other renewable energy projects in the area, including:

- Wellington Solar Farm, operational and located 600 m from the project site;
- Bodangora Wind Farm, operational and located 10 km from the project site;
- Wellington North Solar Farm, approved and 3.2 km from the project site; and
- Maryvale Solar Farm, approved and 7.5 km from the project site.

Additionally, the proposed BESS is located adjacent to the Transgrid Wellington substation, with multiple 132 kV and 330 kV transmission lines connecting to it. Visually, the proposed BESS will add infrastructure that looks similar to the existing substation infrastructure. Since the visible elements of the proposal are the transmission towers, the cumulative impact will be similar to an expansion of the existing substation by adding a tower.

The cumulative visual impacts from the proposed BESS are expected to be low. The proposed BESS and existing infrastructure will be visible together from very few places. The proposed transmission tower(s) have a potential to be seen from a wider area. However, the additional tower(s) will not increase the visible infrastructure significantly.

5.6 Summary of visual assessment

The anticipated visual impacts resulting from the project have been assessed from ten representative viewpoints. The expected impacts are summarised in Table 5.2.

5.6.1 Glare analysis

Due to the low level of reflectivity of the project structures, they are not expected to cause a distraction to motorists travelling along the nearby roads. Further, glint and glare are not expected to impact any receptors.

5.6.2 Night lighting

The only lighting proposed are for security and maintenance purposes. This night lighting would be inwardly focused and does not result in light spill impacts to neighbouring properties or the dark sky requirements.

Table 5.2 Summary of results of visual impacts at each viewpoint

Viewpoint	Distance to project area	Representative receptors	Residential or public	Project infrastructure visible based on viewshed analysis	Magnitude of change	Visual sensitivity	Visual impact rating	Significant impact	Mitigation proposed	Visual impact rating after mitigation	Potential for cumulative impacts
Viewpoint 1	650 m	Motorists	Public	Yes	Low	Low	Low	No	Yes	Low	No
Viewpoint 2	780 m	R1, R2, R3, R4	Residential	Yes	Low	Moderate	Low	No	Yes	Low	No
Viewpoint 3	1.33 km	R16, R17, R18	Residential	Yes	Low	Moderate	Low	No	Yes	Low	No
Viewpoint 4	1.1 km	R15	Residential	Yes	Moderate	High	Moderate	Yes	Yes	Low	Yes – limited to existing substation and transmission towers
Viewpoint 5	1.5 km	R20	Residential	Yes	Low	Moderate	Low	No	No	Low	No
Viewpoint 6	2.15 km	Motorists	Public	Yes	Low	Moderate	Low	No	No	Low	No
Viewpoint 7	2.52 km	Motorists	Public	Yes	Low	Moderate	Low	No	No	Low	No
Viewpoint 8	3.69 km	Motorists and dwellings	Public and private	Yes	Low	Moderate	Low	No	No	Low	No
Viewpoint 9	2.67 km	Motorists and dwellings	Public and private	Yes	Low	Moderate	Low	No	No	Low	No
Viewpoint 10	3.20 km	Motorists and dwellings	Public and private	Yes	Low	Moderate	Low	No	No	Low	No

Notes: Distance is measured from the BESS enclosure to the viewpoint location.

6 Conclusion

A visual impact assessment is not meant to determine whether the proposal is visible or not. The objective is to determine how the proposed project will impact on the existing visual amenity and landscape character. Any potential negative impacts must be investigated to determine how it can be mitigated and reduced to an acceptable level.

The project design and placement has evolved to minimise visual impacts where possible. This includes the alignment of the access drive, location of the BESS compound and the landscape screening. Nonetheless, the project will have the potential for visual impacts on the landscape.

Visual assessments have been conducted from a number of representative viewpoints surrounding the development footprint. The representative viewpoints were selected based on the following criteria:

- proximity to the project site;
- the location of receptors (ie dwellings);
- the positioning of regional and local roads and potential impacts on passing motorists;
- local topography; and
- presence of vegetation with potential to provide screening.

The representative viewpoints have been assessed to demonstrate the potential visual impacts of the project. Due to existing mature vegetation, variable elevation and undulation in the landscape, the BESS and substation infrastructure will be relatively shielded from view from most of the viewpoints. The exception would be the addition of a transmission tower, which will sit next to existing towers. Even though the proposed BESS and substation has the potential to alter the existing visual amenity of the area, the site selected is adjacent to an existing substation, which has already introduced electrical transmission infrastructure into the landscape. In this context, the visual landscape will not be altered significantly with proposed infrastructure placed adjacent to similar infrastructure that are already a part of the visual character of the area.

The visual assessment determined that, of the viewpoints assessed, infrastructure may be visible to varying degrees from all 10 viewpoints. Based on variable elevation and undulation in the landscape and the presence of vegetation, combined with the height of the proposed transmission towers, the impact assessment predicts:

- a moderate visual impact from viewpoint 4 (R15), which reduces to a low impact after mitigation; and
- low visual impacts from the remaining viewpoints.

Landscape screening is proposed around the BESS compound and along the eastern side of the access road to mitigate visual impacts at the following:

- north and east of the site – the proposed landscaping will screen views from the north and east, which includes views from R1, R2, R3, R4, Goolma Road, and Twelve Mile Road;
- west of the site – the proposed landscaping will screen views from the west, including R15; and
- south of the site - discussions between AMPYR and the project landholder will inform requirements for landscaping to mitigate views at R23.

Visual impacts from most of the viewpoints are limited to the proposed transformer towers and the transmission towers. Because of the hilly topography and trees existing in the landscape most receptors outside of a 1 km radius of the project site will not see the BESS compound.

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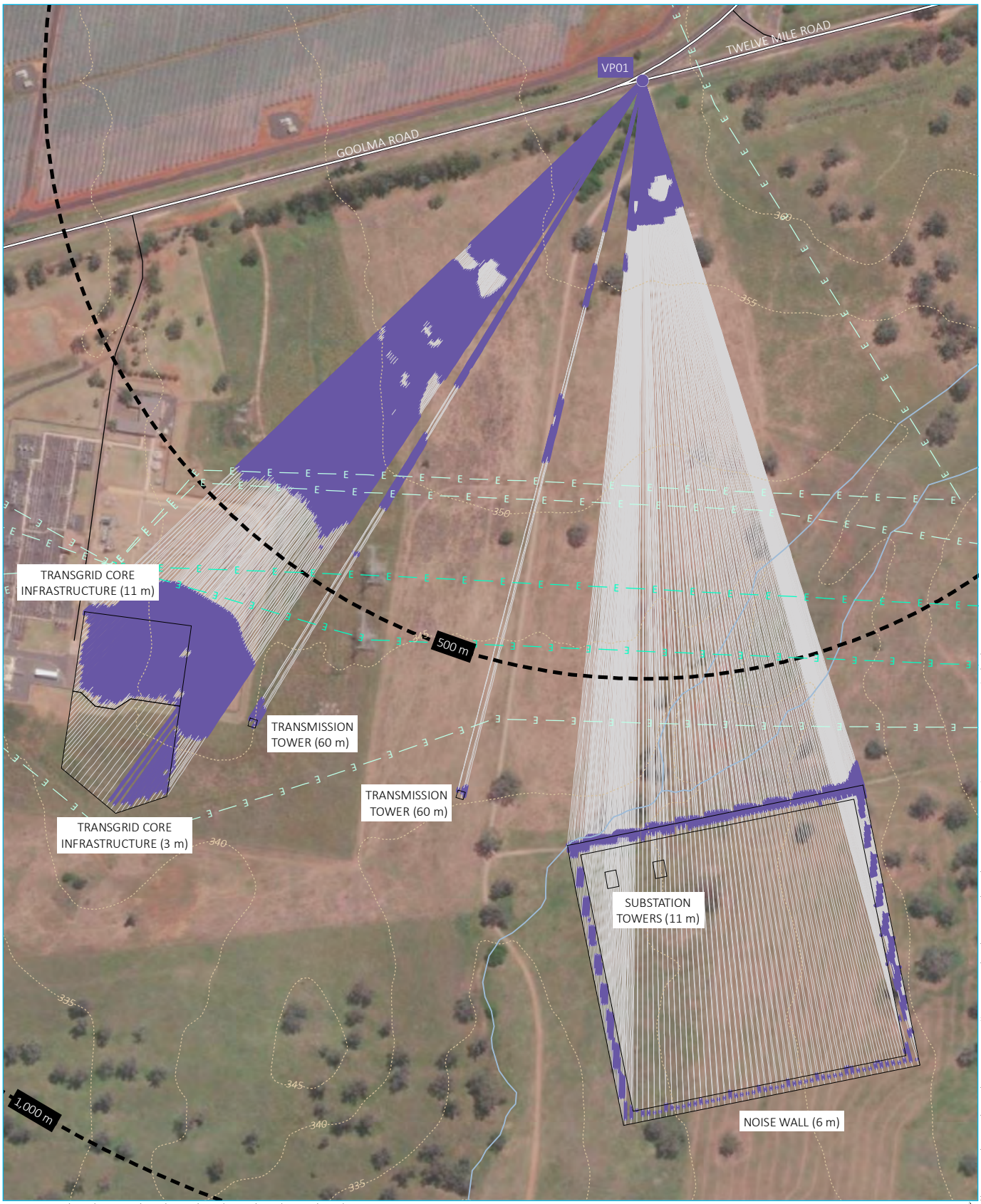
Appendix A
Viewshed analysis figures

EMM
creating opportunities



Source: EMM (2022); AMPYR (2021); ESRI (2021); DFSI (2017); ICSM (2014)

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KEY

- Viewpoint 1
- Distance buffer
- Modelled infrastructure

Line of sight

- Visible
- Not visible

Existing environment

- Major road
- Minor road
- Topographic contour (5 m interval)
- Watercourse/drainage line

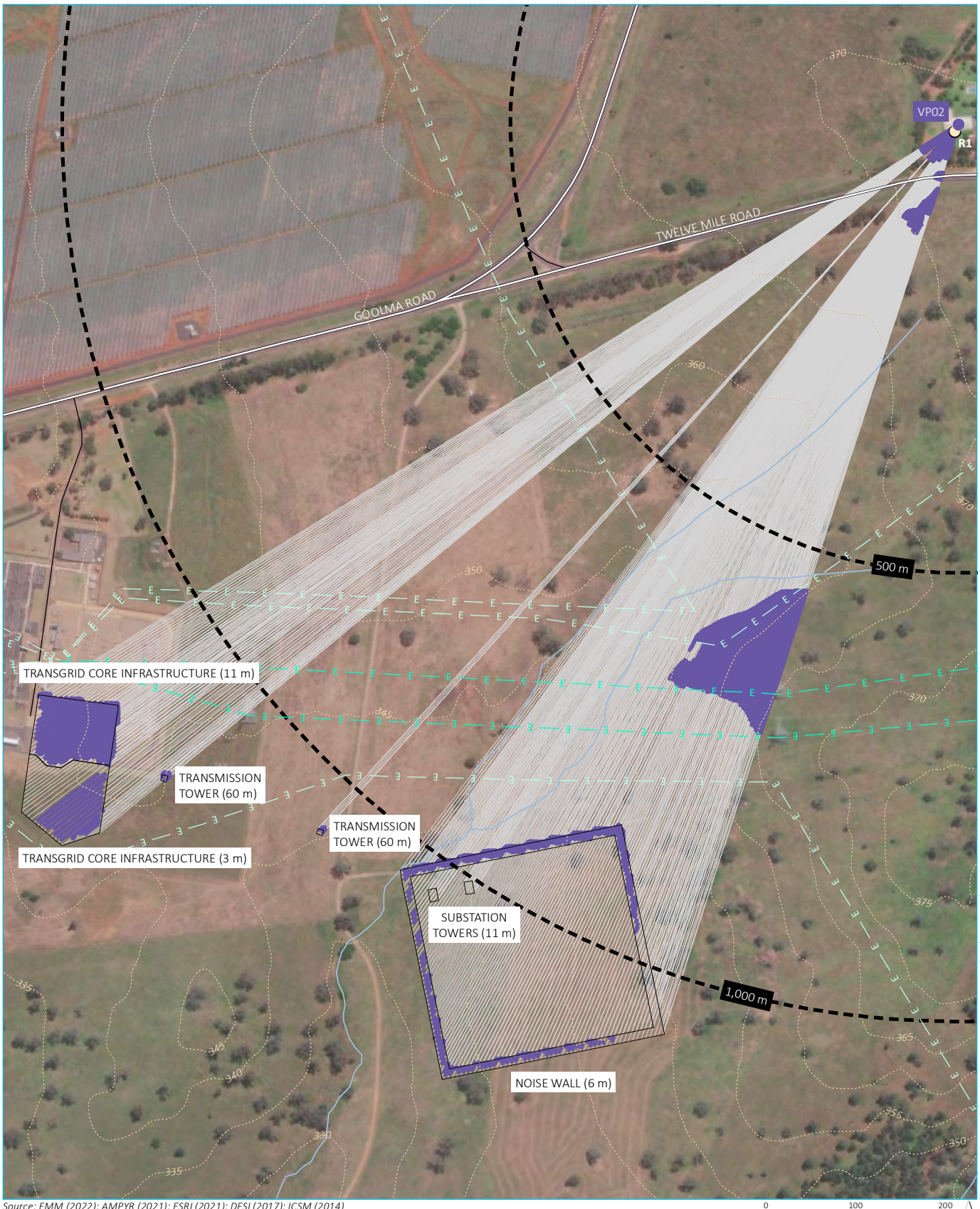
Above ground electricity transmission line

- 132 kV
- 330 kV

Viewshed analysis - Viewpoint 1

Wellington Battery Energy Storage System
Visual impact assessment
Figure A.1

EMM creating opportunities



Source: EMM (2022); AMPYR (2021); ESRI (2021); DFSI (2017); ICSM (2014)

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KEY

- Viewpoint 2
- Distance buffer
- Modelled infrastructure

Line of sight
- Visible
- Not visible

Existing environment
- Major road
- Minor road
- Topographic contour (5 m interval)
- Watercourse/drainage line

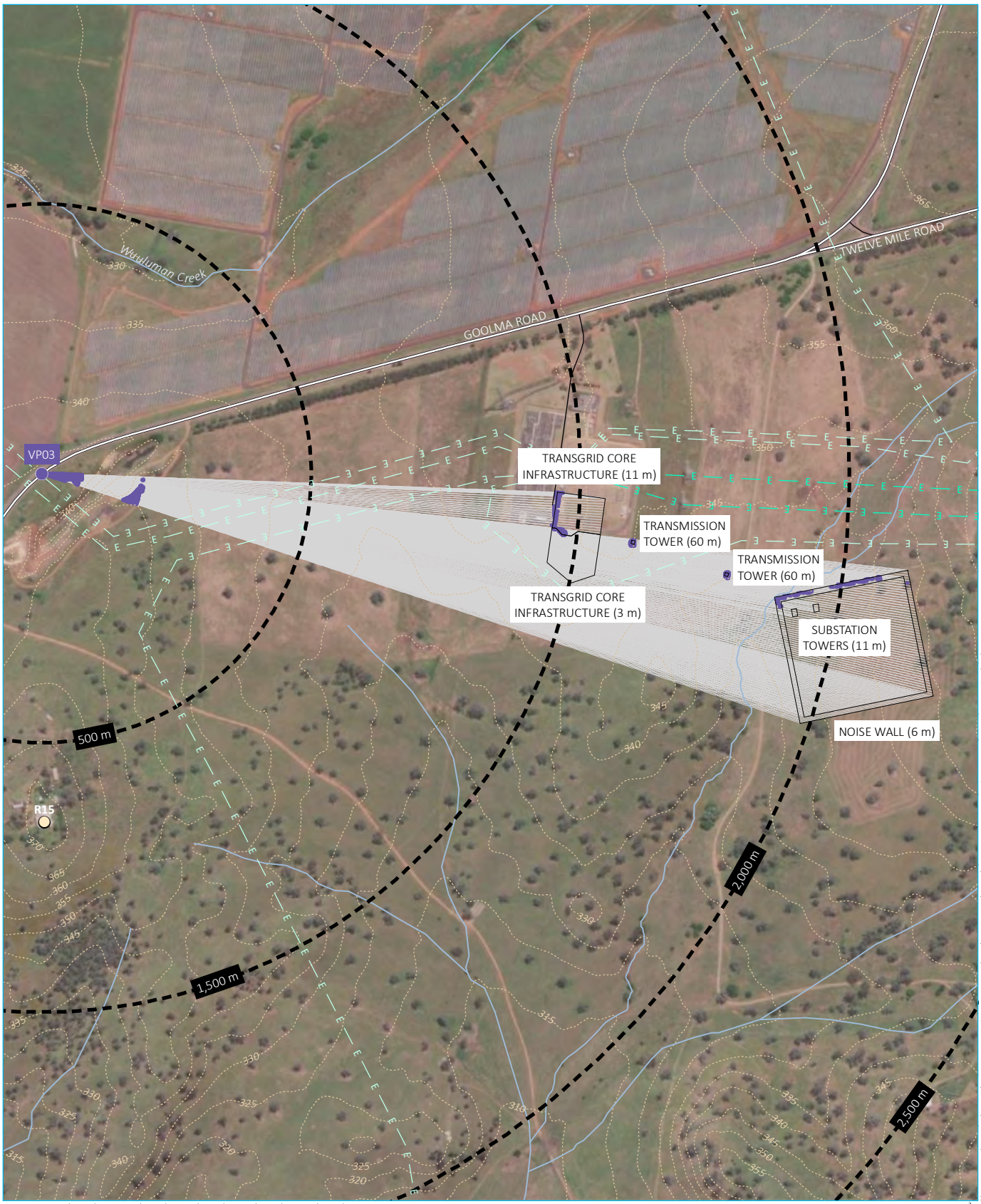
Above ground electricity transmission line
- 132 kV
- 330 kV

Receivers
- Non-project residential receivers

Viewshed analysis - Viewpoint 2

Wellington Battery Energy Storage System
Visual impact assessment
Figure A.2

EMM creating opportunities



Source: EMM (2022); AMPYR (2021); ESRI (2021); DFSI (2017); ICSM (2014)

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KEY

- Viewpoint 3
- Distance buffer
- Modelled infrastructure

Line of sight
- Visible
- Not visible

Existing environment
- Major road
- Minor road
- Topographic contour (5 m interval)
- Watercourse/drainage line
- Waterbody

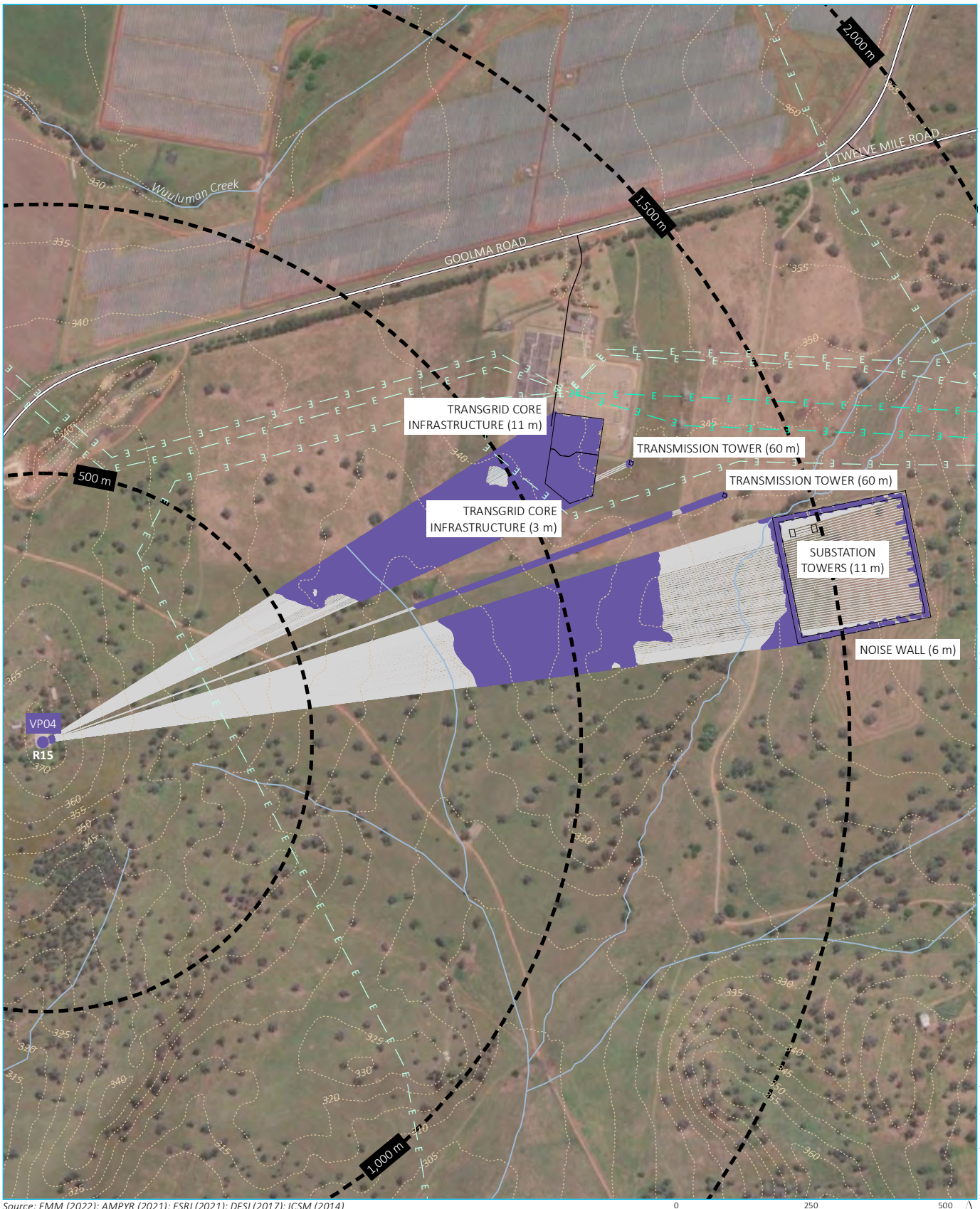
Above ground electricity transmission line
- 132 kV
- 330 kV

Receivers
- Non-project residential receivers

Viewshed analysis - Viewpoint 3

Wellington Battery Energy Storage System
Visual impact assessment
Figure A.3

EMM creating opportunities



Source: EMM (2022); AMPYR (2021); ESRI (2021); DFSI (2017); ICSM (2014)

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KEY

- Viewpoint 4
- Distance buffer
- Modelled infrastructure

Line of sight
- Visible
- Not visible

Existing environment
- Major road
- Minor road
- Topographic contour (5 m interval)
- Watercourse/drainage line
- Waterbody

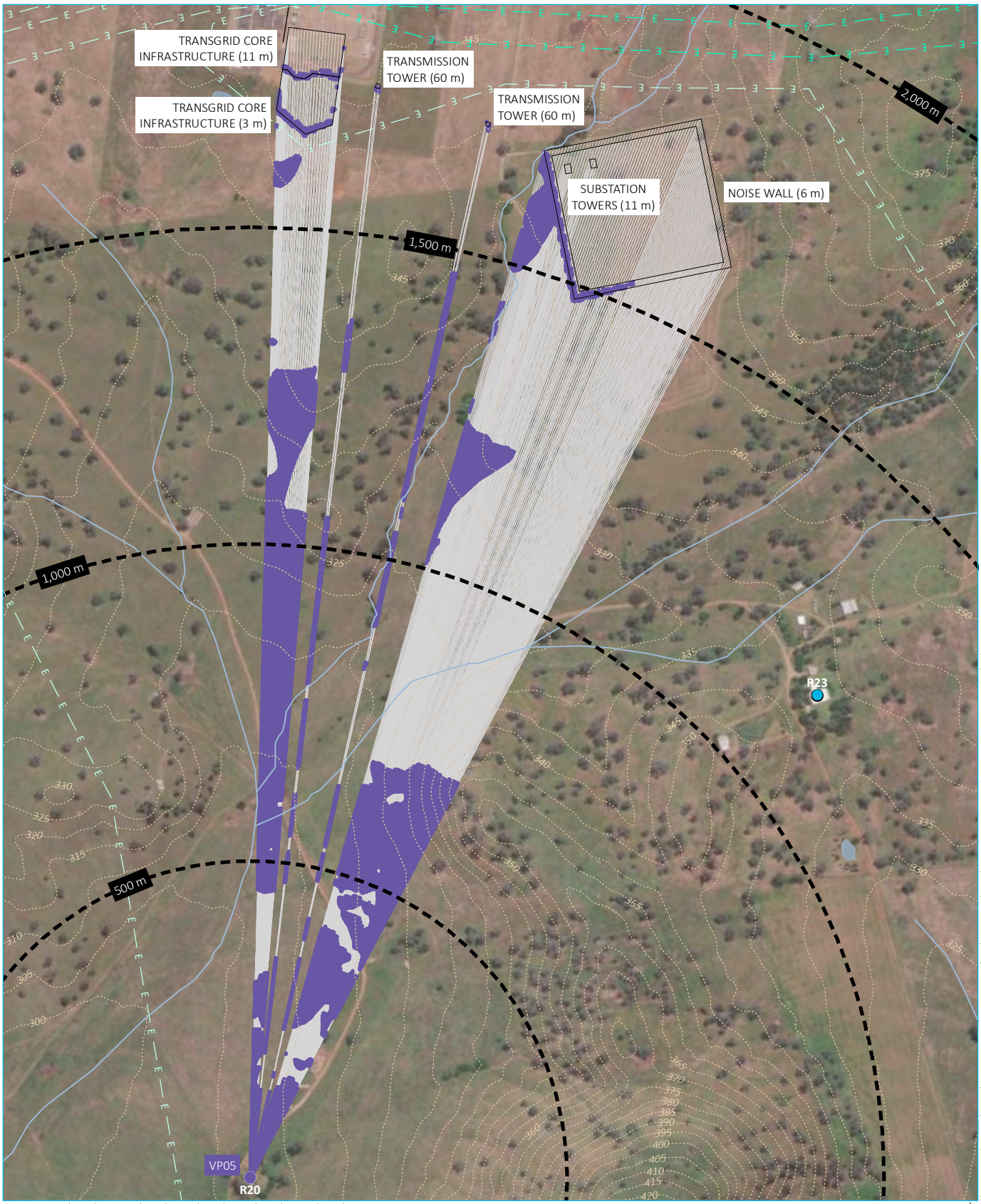
Above ground electricity transmission line
- 132 kV
- 330 kV

Receivers
- Non-project residential receivers

Viewshed analysis - Viewpoint 4

Wellington Battery Energy Storage System
Visual impact assessment
Figure A.4

EMM creating opportunities



Source: EMM (2022); AMPYR (2021); ESRI (2021); DFSI (2017); ICSM (2014)

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GDA 1994 MGA Zone 55

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KEY

- Viewpoint 5
- Distance buffer
- Modelled infrastructure

Line of sight

- Visible
- Not visible

Existing environment

- Minor road
- Topographic contour (5 m interval)
- Watercourse/drainage line
- Waterbody

Above ground electricity transmission line

- 132 kV
- 330 kV

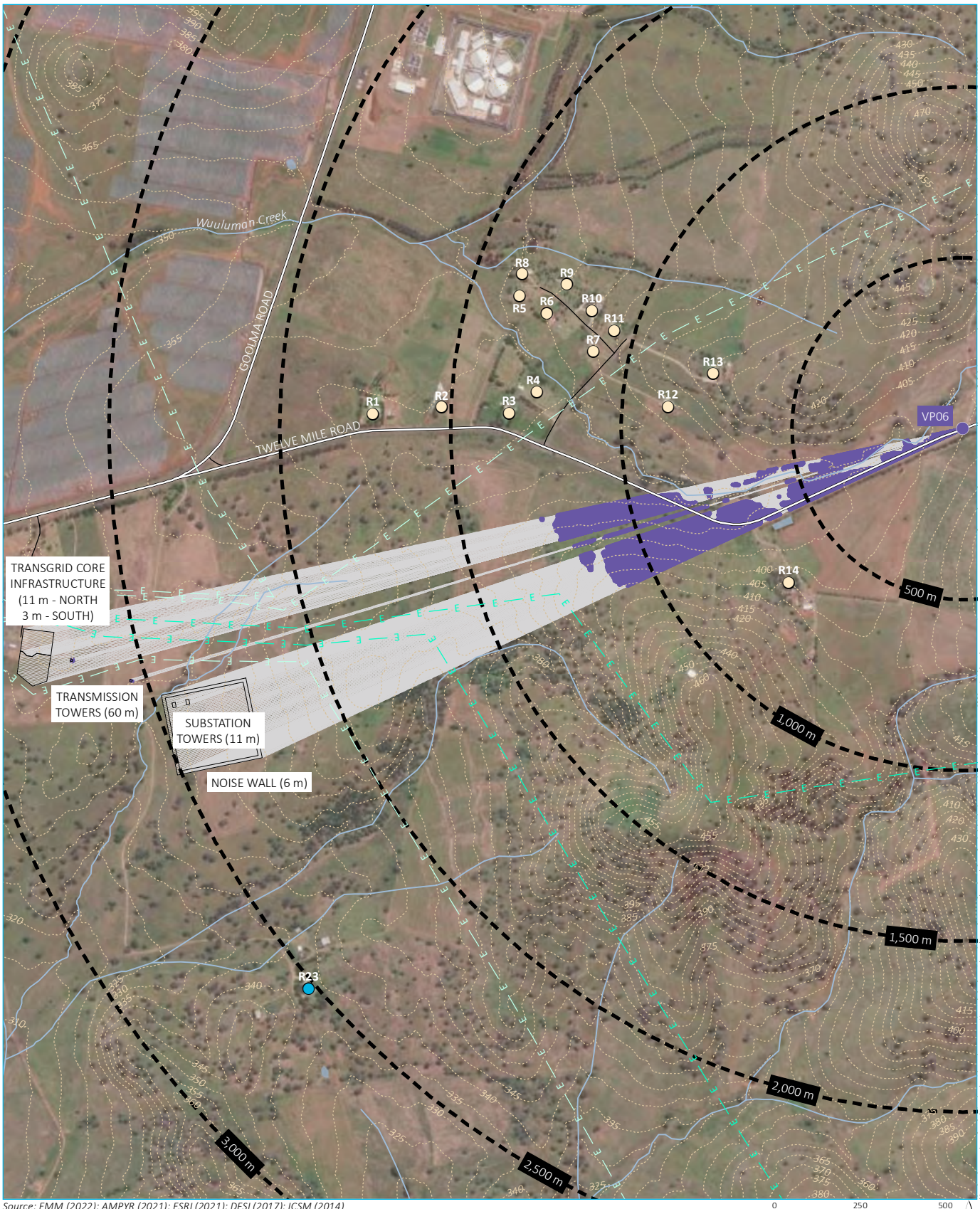
Receivers

- Non-project residential receivers
- Project participating landowner

Viewshed analysis - Viewpoint 5

Wellington Battery Energy Storage System
Visual impact assessment
Figure A.5

EMM creating opportunities



Source: EMM (2022); AMPYR (2021); ESRI (2021); DFSI (2017); ICSM (2014)

0 250 500 m

GDA 1994 MGA Zone 55

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KEY

- Viewpoint 6
- Distance buffer
- Modelled infrastructure

Line of sight

- Visible
- Not visible

Existing environment

- Major road
- Minor road
- Topographic contour (5 m interval)
- Watercourse/drainage line
- Waterbody

Above ground electricity transmission line

- 132 kV
- 330 kV

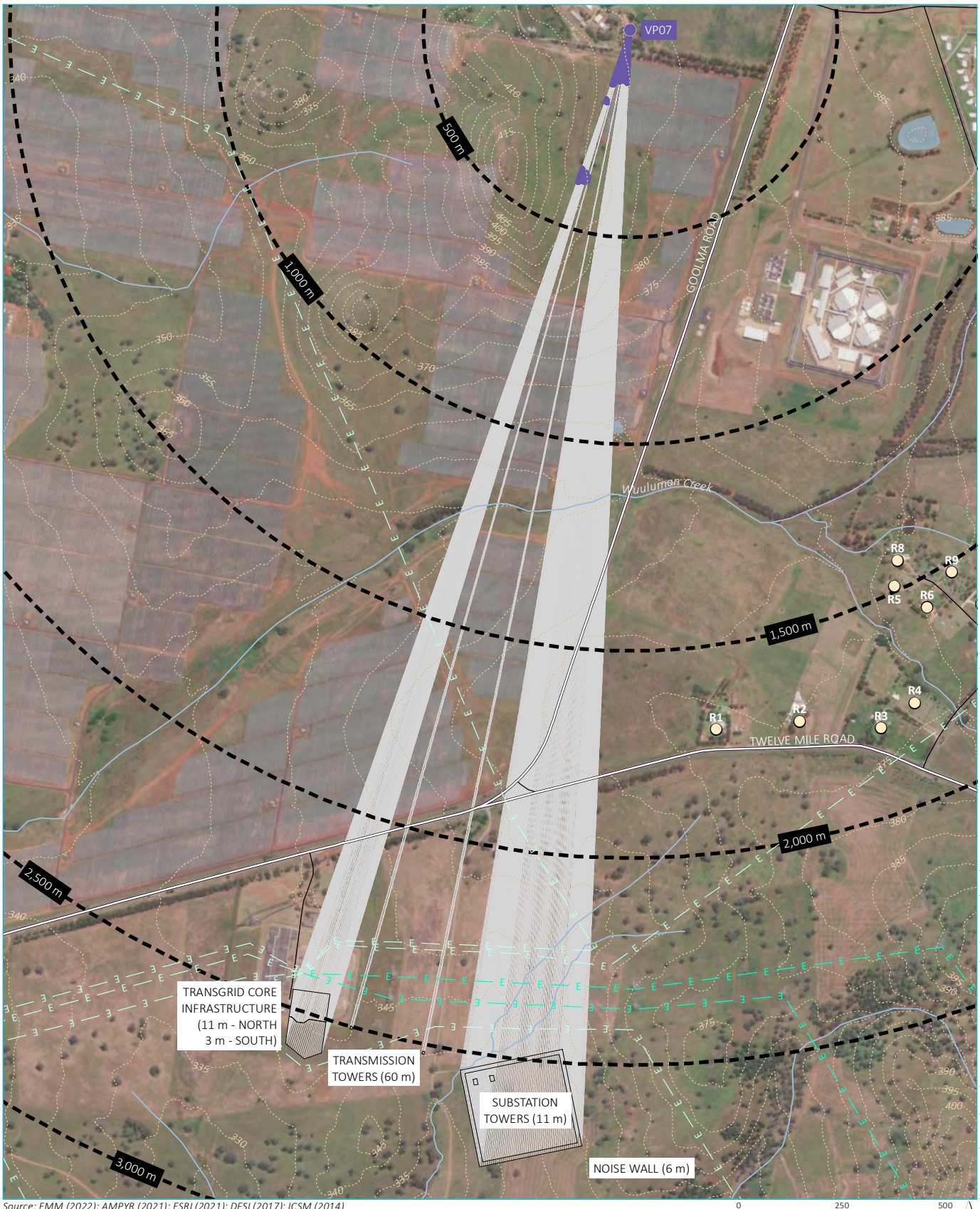
Receivers

- Non-project residential receivers
- Project participating landowner

Viewshed analysis - Viewpoint 6

Wellington Battery Energy Storage System
Visual impact assessment
Figure A.6

EMM creating opportunities



Source: EMM (2022); AMPYR (2021); ESRI (2021); DFSI (2017); ICSM (2014)

0 250 500 m

GDA 1994 MGA Zone 55

N

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KEY

- Viewpoint 7
- Distance buffer
- Modelled infrastructure

Line of sight

- Visible
- Not visible

Existing environment

- Major road
- Minor road
- Topographic contour (5 m interval)
- Watercourse/drainage line
- Waterbody

Above ground electricity transmission line

- 132 kV
- 330 kV

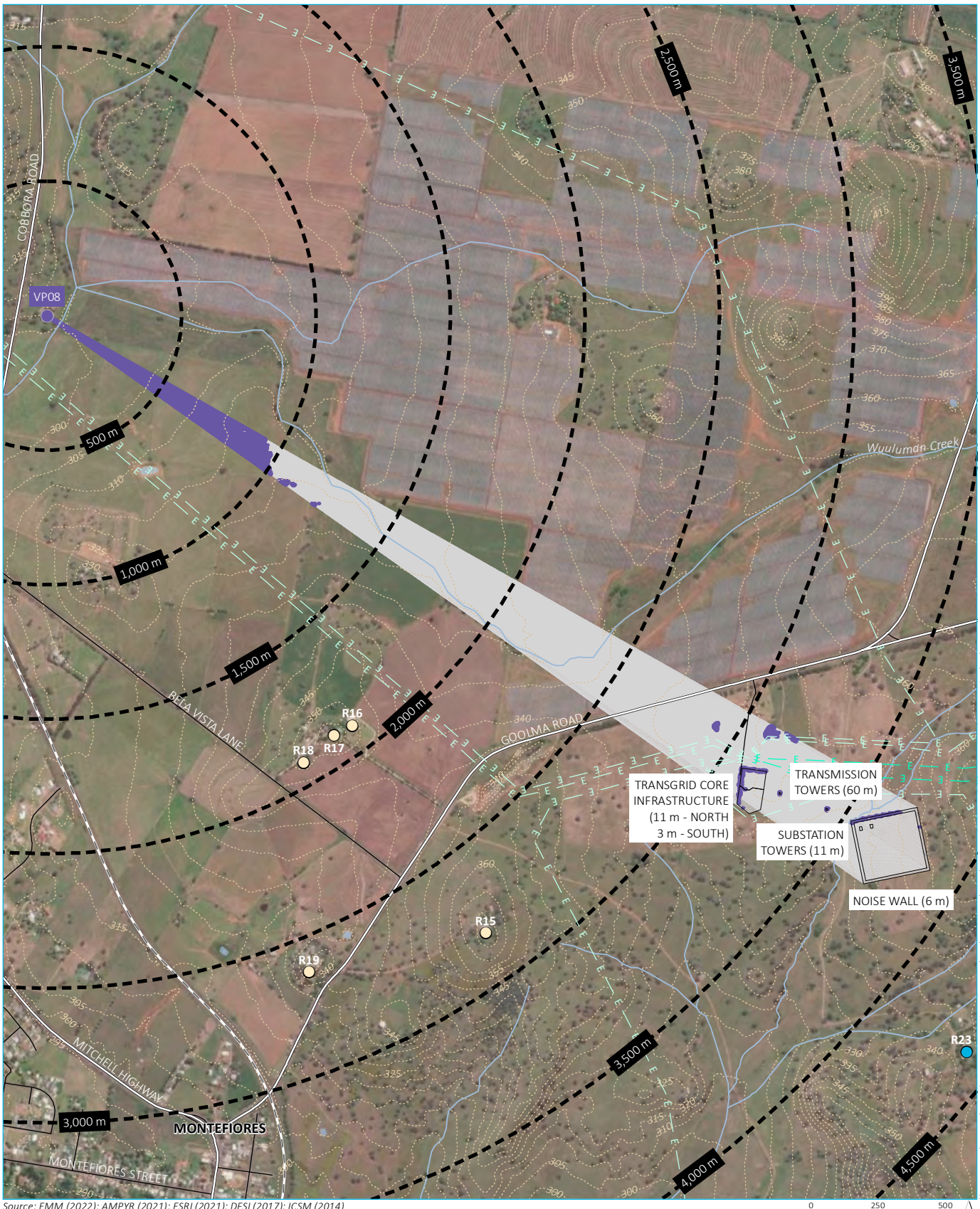
Receivers

- Non-project residential receivers

Viewshed analysis - Viewpoint 7

Wellington Battery Energy Storage System
Visual impact assessment
Figure A.7

EMM creating opportunities



Source: EMM (2022); AMPYR (2021); ESRI (2021); DFSI (2017); ICSM (2014)

0 250 500 m

GDA 1994 MGA Zone 55

N

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KEY

- Viewpoint 8
- Distance buffer
- Modelled infrastructure

Line of sight
- Visible
- Not visible

Existing environment
- Major road
- Minor road
- Topographic contour (5 m interval)
- Watercourse/drainage line
- Waterbody

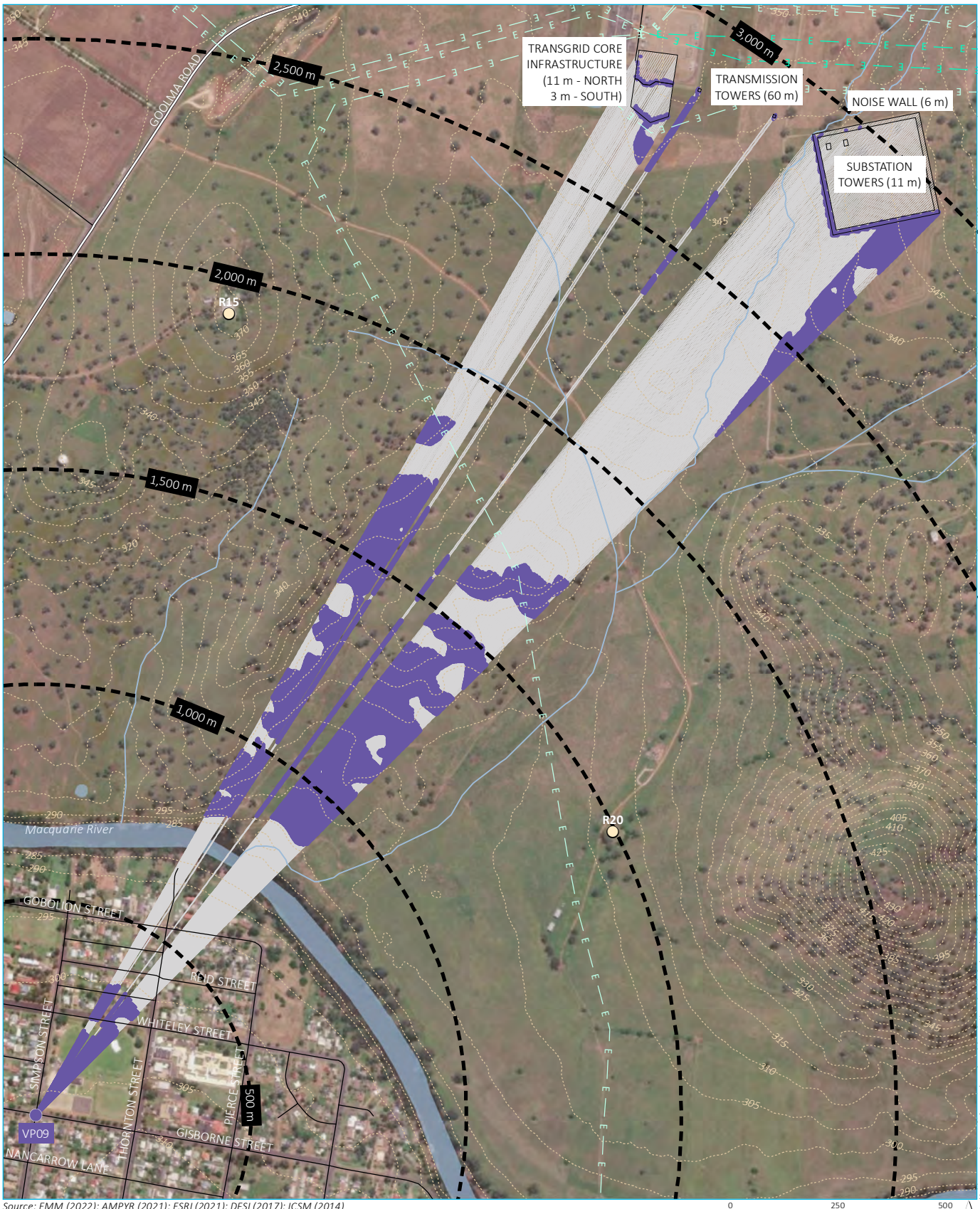
Above ground electricity transmission line
- 132 kV
- 330 kV

Receivers
- Non-project residential receivers
- Project participating landowner

Viewshed analysis - Viewpoint 8

Wellington Battery Energy Storage System
Visual impact assessment
Figure A.8

EMM creating opportunities



Source: EMM (2022); AMPYR (2021); ESRI (2021); DFSI (2017); ICSM (2014)

0 250 500 m

GDA 1994 MGA Zone 55

N

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KEY

- Viewpoint 9
- Distance buffer
- Modelled infrastructure

Line of sight

- Visible
- Not visible

Existing environment

- Major road
- Minor road
- Topographic contour (5 m interval)
- Watercourse/drainage line
- Waterbody

Above ground electricity transmission line

- 132 kV
- 330 kV

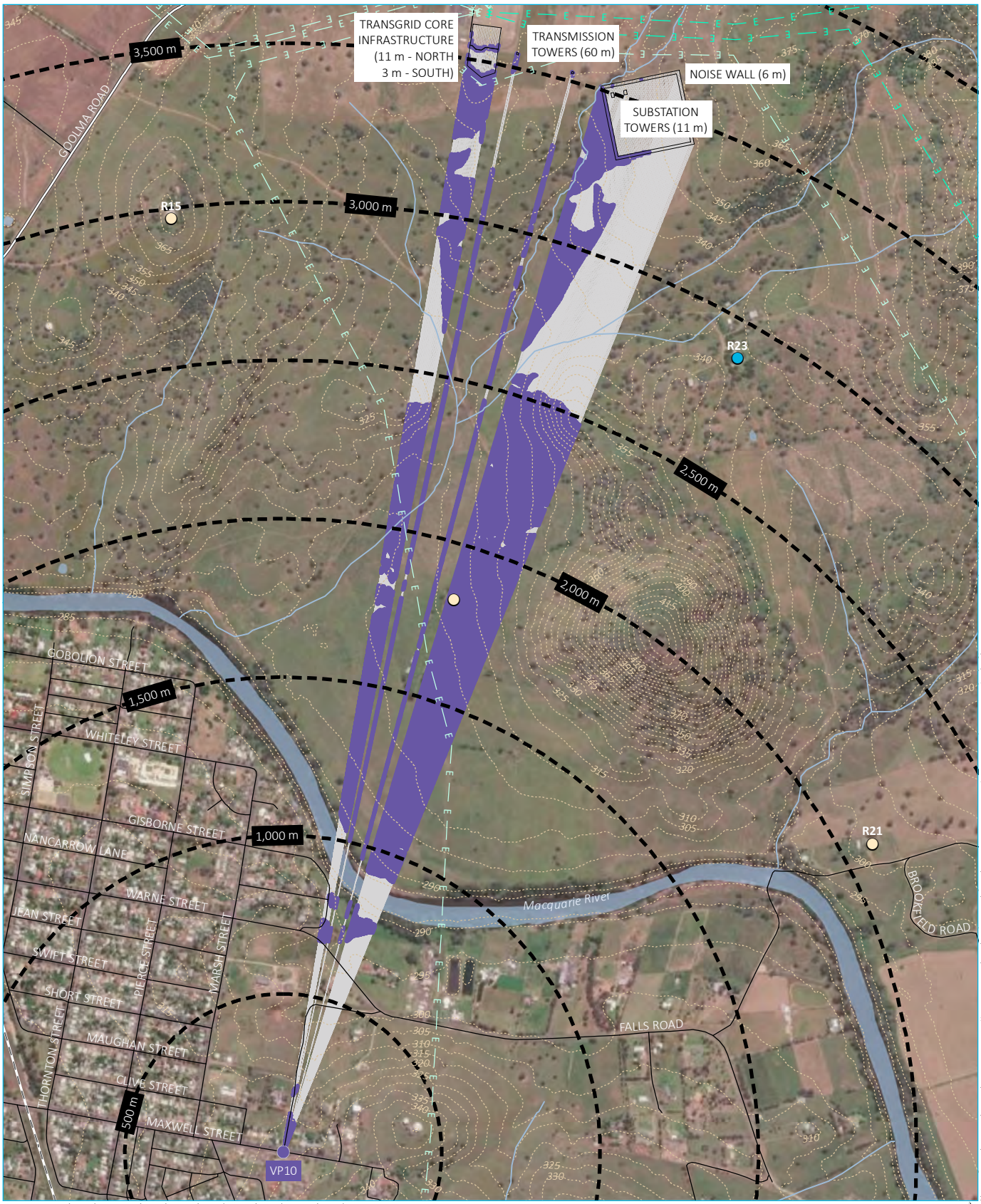
Receivers

- Non-project residential receivers

Viewshed analysis - Viewpoint 9

Wellington Battery Energy Storage System
Visual impact assessment
Figure A.9

EMM creating opportunities



Source: EMM (2022); AMPYR (2021); ESRI (2021); DFSI (2017); ICSM (2014)

0 250 500 m

GDA 1994 MGA Zone 55

N

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KEY

- Viewpoint 10
- Distance buffer
- Modelled infrastructure

Line of sight

- Visible
- Not visible

Existing environment

- Rail line
- Major road
- Minor road
- Topographic contour (5 m interval)
- Watercourse/drainage line
- Waterbody

Above ground electricity transmission line

- 132 kV
- 330 kV

Receivers

- Non-project residential receivers
- Project participating landowner

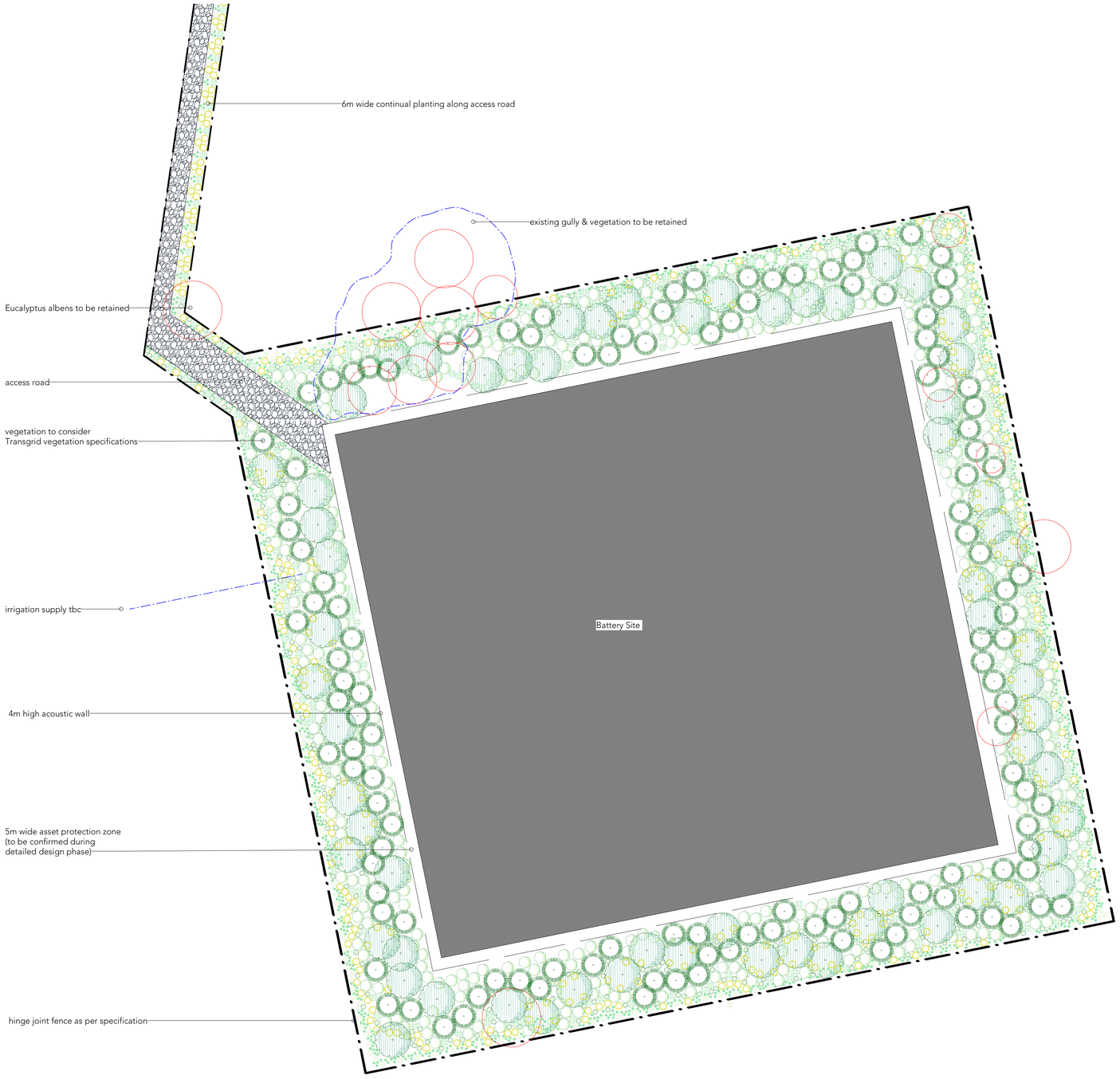
Viewshed analysis - Viewpoint 10

Wellington Battery Energy Storage System
Visual impact assessment
Figure A.10

EMM creating opportunities

Appendix B
Landscape plan

EMM
creating opportunities



N

0 10000 20000 40000 80000

plant schedule:

code	botanical name	common name	pot size	height	width	qty
trees						
	Eucalyptus albens	White Box	Forestry tube	25m	15m	64
	Callitris glaucophylla	White Cypress	Forestry tube	20m	4m	126
	Eucalyptus albens to be retained					
shrubs						
	Acacia implexa	Hickory Wattle	Forestry tube	8m	5m	318
	Bursaria spinosa	Native Blackthorn	Forestry tube	8m	4m	353
	Acacia decora	Western Silver Wattle	Forestry tube	4m	2m	373
	Acacia paradoxa	Kangaroo Thorn	Forestry tube	3m	3m	444
	Lomandra longifolia	Spiny Headed Mat Rush	Forestry tube	1.5m	1m	1098
	Hardenbergia violaceae	Happy Wanderer	Forestry tube	1m	2m	355

material schedule:

code	
	waratah - hinge joint fence to landowner specification - by others
	acoustic fence - material and layout to be confirmed - by others
	indicative bore water irrigation supply line - by others

CONCEPT

barnson
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Bathurst | Coffs Harbour | Dubbo | Mudgee | Orange | Sydney | Tamworth

Client: AMPYR Australia Pty Ltd

Project: WELLINGTON BESS PROJECT @ 6773 GOOLMA ROAD WUULUMAN, NSW

Drawing Title: PLANTING HIERARCHY

Rev	Date	Amendment
A	19.05.2022	CONCEPT
B	25.05.2022	REVISED CONCEPT

Design	Drawn	Check
BP	BP	CR

Sheet 02 of 06

Drawing Number: 36217- LA01

Revision: B

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