Chalumbin Wind Farm

Landscape and Visual Impact Assessment

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Landscape and Visual Impact Assessment

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Executive Summary

Chalumbin Wind Farm Pty Ltd (the Proponent) is proposing the development of a new wind farm within the Tablelands Regional Council in Far North Queensland. This is known as the Chalumbin Wind Farm (the Project). Lat Studios Pty Ltd (trading as Lat27) was commissioned by Attexo Group Pty Ltd (Attexo) to undertake a Landscape and Visual Impact Assessment (LVIA) for this Project.

The Project is located entirely within the Tablelands Regional Council area. The Project Site (Site) is approximately 31,225.0 hectares (ha) in total and is proposed within two properties. The Site is situated approximately 10 km southwest of Ravenshoe and close to the Wet Tropics of Queensland World Heritage Area (WTQWHA). The Project comprises a wind farm with up to 86 turbines with a height of up to 250 m to blade tip, with associated hardstand areas and ancillary infrastructure including:

- Approximately 149 km of unsealed (gravel) access roads
- Eight permanent wind monitoring towers
- Substations (including provision for energy storage)
- Site office, warehouse and workshop
- Overhead electricity lines and ancillary infrastructure (e.g. transformers)
- Underground power and communications cabling (generally co-located with the access roads)
- One permanent site entrance
- Temporary construction compounds, laydown areas and stockpile areas.

The LVIA has been undertaken in accordance with the requirements of PO9 (Character, scenic amenity and landscape values) of State Code 23: Wind Farm Development and associated Planning Guideline (DSDMIP, 2018)[1]. This includes: a description of the potential impacts on scenic amenity or landscape values; inclusion of visualisations demonstrating the anticipated visual impact of the development in the context of the surrounding area and from key public viewpoints; and mitigation measures describing opportunities to minimise visual impacts. The assessment also responds to the Public Environment Report (PER) Guidelines for the Project, received from Department of Agriculture, Water and Environment (DAWE) following their consideration of the referral for the Chalumbin Wind Farm Project as detailed in *Guidelines for the Content of a Draft Public Environment Report, Chalumbin Wind Farm near Ravenshoe, Queensland Reference 2021/8983* (DAWE, 2021). In accordance with the requirements of the State Code and PER guidelines, the assessment has also considered the relevant provisions of Tablelands Regional Council Planning Scheme 2016 – Version 4 (2019).

Four Landscape Character Types (LCTs) were identified within the Site and surrounding landscape (the LVIA Project Study Area). These ranged in sensitivity from Low to High, associated with the combination of landscape elements and characteristics - including areas identified as part of the Wet Tropics of Queensland World Heritage Area (WTQWHA).

The Site extends across three of the LCTs including LCT A, LCT B and LCT C, however the majority of the Site is located within the LCT B; *Undulating and Wooded Uplands* Landscape Character Type. This landscape type is characterised by undulating topography that is typically used for grazing and

[1] Version 3.0 of State Code 23 including the associated Planning Guidance was published by the Department of State Development, Infrastructure, Local Government and Planning (DSDILGP) in February 2022. However, this assessment addresses the requirements of the former State Code 23 (DSDMIP, 2018) that was current at the time of the development application for a Material Change of Use (Wind Farm) to the State Assessment and Referral Agency (SARA)

features open woodland. The Site lies in an area that features predominantly rural landscapes as well as large areas of protected land. As such, much of the surrounding landscape comprises farmsteads, both wooded and cleared agricultural grazing areas as well as denser forested and natural landscapes (including areas designated as World Heritage Area, National Parks and/or State Forests, Conservation Parks and Reserves). There are also numerous settlements in the area.

The landscape impact assessment concluded that there would be a:

- Direct ***Moderate to Major***, ***Significant***, impact on the *Landscape Character Type A: Forested Ranges and Mountains* (only affecting LCA A1: *Wooroora Landscape Character Area*) due to the significant influence of the turbines would have on a largely uncleared and partially protected wooded landscape.
- Direct ***Moderate to Major***, ***Significant*** impact on the *Landscape Character Type B: Undulating and Wooded Uplands* (only affecting LCA B1: *Innot Hot Springs – Glen Ruth Uplands)* due to the clearly evident impact of the turbines and supporting infrastructure on an extensive area of this landscape.
- No further significant impacts have been identified on other surrounding Landscape Character Types within the Study Area, including no significant landscape effects identified on any areas protected as part of the WTQWHA.

The Visual Analysis Maps (VAMs) produced for the Project demonstrate the influence of topography on visibility and identifies areas from which the wind farm turbines would be visible. The potential for views within around 30 km of the Project was considered and sixteen viewpoints were selected to represent the views of identified receptors including:

- Residents living in settlements to the north and west of Site, which includes settlements such as Millstream, Ravenshoe, and Innot Hot Springs.
- Residents living on rural properties and homesteads in the surrounding landscape.
- Agricultural workers in the countryside including farmers.
- Recreational users of the landscape, including those visiting National Parks (including within the WTQWHA), State Forests, Conservation Parks and Forest Reserves.
- Travellers using major and minor roads within the Project Study Area, including motorists on the Kennedy Highway, Wooroora Road, Millstream Parade and other local roads.
- Tourists passing through the Project Study Area by private vehicle, including travellers along designated scenic routes such as the ‘Savannah Way’.

The majority of the receptor groups are located to the north of Site. This includes the settlement of Millstream, which is located close to the Site boundary. Residential receptors are typically considered to have a sensitivity level of up to high (residents) and in this location there is a cluster of residential properties that would experience views of the wind farm. Ravenshoe is the largest settlement in the Study Area and represents a large quantity of receptors, however due its distance from the Project coupled with elevated topography and vegetation obscuring the view to Project, it is considered that the impact of the Project on this town would be negligible.

Recreational users/receptors of the nearby WTQWHA, National Parks, State Forests, Conservation Parks and Forest Reserves are identified as having a sensitivity level of up to high due to the protected statuses of these areas as well as the receptors’ specific interest in their surroundings and views, particularly when undertaking activities such as bushwalking. It was identified that the view from the lookout at Majors Mountain, which is located within the WTQWHA, would experience an impact of moderate to major significance due to the Project. However, it is noted that the area from which views can be experienced is relatively small and this trail does not appear to be heavily trafficked. Similarly, the Bally Knob lookouts would experience extensive panoramic views over the Site with impacts of up to moderate to major significance. Again, the trail to Bally Knob is overgrown, which indicates a low level of usage.

The Kennedy Highway represents a large number of receptors and is identified as part of the Savannah Way, a popular tourist driving route. The Kennedy Highway passes to the north of Site and motorists on this highway would experience clear views of the Project from locations along this alignment. Due to these clear views of the Project from a short to medium distance, there are significant impacts anticipated.

The visual impact assessment has concluded that there would be:

- ***Major, Significant****,* impact on visitors and park rangers who undertake the hike along the Koolmoon Creek track, but only for a very small part leading off the track that is difficult to get to and isn't highly used/defined *(Viewpoint 14)*
- ***Moderate to Major, Significant*****,** impact on residents and visitors to Millstream *(Viewpoint 12)****;*** residents, rural workers and motorists on the Kennedy Highway/Savannah Way *(Viewpoint 10);* residents, rural workers, passing motorists travelling on Herbert River Road *(Viewpoint 11)* and visitors and park rangers who undertake the hikes to Majors Mountain lookout in the WTQWHA and Bally Knob lookout *(Viewpoint 3 and 4).*
- ***Moderate (to no impact), Not Significant*** impact on visitors undertaking boating or kayaking on Koombooloomba Dam (Lake Koombooloomba) *(Viewpoint 15)*
- ***Moderate, Not Significant,*** impact on residents, rural workers and passing motorists on Yourka Glen Gordon Road *(Viewpoint 16);*
- ***Moderate, Not Significant,*** *impact on residents, and workers, visitors and motorists on parts of Kennedy Highway* (*Viewpoint 8*)
- ***Minor to Moderate, Not Significant,*** impact on visitors and park rangers to big Millstream Falls (*Viewpoint 2*)
- ***No impact or Minor, Not Significant,*** impact on residents, workers, visitors and motorists in Ravenshoe; on Cashmere Kirrama Road; Gunnawarra Road and Innot Hot Springs *(Viewpoints 1, 6, 7 and 9)*
- ***No impact, Not Significant,*** impact on visitors (campers) and park rangers at Koombooloomba Camping and day use area *(Viewpoint 5)* and visitors and park rangers to Rhyolite Pinnacle accessed via the Koolmoon Creek track *(Viewpoint 13)*

Two other proposed wind farm projects were identified in the broader landscape that were considered in the cumulative impact assessment. This included the Kaban Green Energy Hub and the High Road Wind Farm. The presence of the existing Windy Hill Wind Farm is also considered. The potential for cumulative impacts was identified when considering the development of these projects in addition to Chalumbin Wind Farm. This included the potential for *combined, successive and sequential* cumulative impacts in the scenario where both the Chalumbin Wind Farm and the Kaban Wind Farm (which already has approval) are developed.

Mitigation of impacts has been considered as part of this assessment. Through the development of the proposed Project, inherent mitigation of both landscape character and visual impacts has already been incorporated into the Project design, specifically through a reduction of the quantity of proposed turbines as well as selective siting away from sensitive locations, resulting in the current Project that this LVIA considers. It is acknowledged however, that even with fewer turbines and selective siting, that screening views of 250 m high turbines is not possible for any wind farm, even if this were to be a desirable outcome. However, further opportunities to enhance the integration of the wind farm into the landscape through the detailed design and construction phases have been described.

In conclusion, the assessment considers that the Chalumbin Wind Farm will result in a significant direct impact on the landscape character of the immediate Site and limited areas of the adjacent landscape. Views from six identified viewpoints are also considered to be significantly impacted by the Chalumbin Wind Farm. These views include the accessible lookouts on Majors Mountain and Bally Knob (within the WTQWHA), a very small and relatively inaccessible part of the Koolmoon Creek

track (in the WTQWHA), views from the Kennedy Highway as well as views from residential properties in Millstream and the few non-participating rural properties west of Site on Herbert River Road.

It is anticipated that there would be no significant direct impact on the landscape character of WTQWHA from the Project and there would be no direct impacts on the superlative scenic features comprising mountains, gorges and waterfalls, which are the key Outstanding Universal Values (OUV) of the WTQWHA. However the view from Majors Mountain lookout and a small part of the Koolmoon Creek track, which are located within this internationally recognised and protected landscape, would be significantly impacted by the introduction of turbines into a natural landscape, including localised impacts on sweeping forest vistas. The Majors Mountain viewpoint is accessed by the Misty Mountains hiking trail, however the trail to the lookout is enclosed by dense vegetation that curtails views. The Koolmoon Creek trail viewpoint similarly is experienced only from a highly limited part of the trail and the Rhyolite Pinnacle, which is the key vantage point/destination on this trail, is not significantly affected by the Project. Therefore the visual impact on the WTQWHA is on a very limited area accessed by a relatively small number of hikers and does not affect the major tourist vantage points for which this part of the WTQWHA is renowned, such as Tully Gorge Lookout.

In conclusion, while there will be a significant change to Site character due to the introduction of wind turbines into a rural and natural landscape and significant impacts on some views towards the Project, which is typical for any wind farm development, the impacts are typically contained. In addition it is noted that people are likely to respond in different ways to the change. Landscape appreciation is relative and individuals of the local community may place higher or lower values on the landscape depending on their personal preferences; some viewers may view the change as positive (creating a point of interest) or neutral, whereas others will consider the change to be a negative impact on rural landscape values. Research (discussed in the LVIA) typically suggests that many viewers find wind farms acceptable even in high quality landscape, and other factors such as previous exposure to wind farms (such as the nearby Windy Hill scheme) or appreciation of wind farms as a means of taking action against climate change can also increase acceptability. Through the selective, generally orderly siting of the turbines along ridges, avoidance of key landscape features on the site (including Arthur's Seat) and through minimising impacts on the adjacent WTQWHA, it is considered that the Project addresses PO9 of the Wind Farm State Code 23 by mitigating and minimising adverse impacts on landscape character and scenic amenity to the greatest extent practicable.

Whilst there will be some significant impacts for individual views obtained from selected locations within the WTQWHA, these locations are infrequent and typically difficult to reach, being located on tracks that are understood to be less popular with visitors and that require high levels of fitness (i.e. grade 4 or 5). The dense foliage of the rainforest vegetation that is typical of the WTQWHA contributes to the fact that there are few publicly accessible vantage points providing views towards the Project from the WTQWHA. When considering the potential for the Project to impact the Outstanding Universal Value (OUV) of the WTQWHA, it is important to consider these values as they apply to the WTQWHA in its entirety. The WTQWHA is approximately 8,940 km2 in size. A conservative estimate would suggest that less than 1% of the WTQWHA property may have views of the Project; with the visual effect of the Project typically diminishing with distance from the Site. Moreover, temporally, the Project has an operational life of 30 years and upon decommissioning no notable visual impact will be evident from anywhere within the WTQWHA. In this context, the Project will have a negligible effect on the OUV of the WTQWHA and it is considered that the OUV that make the WTQWHA so unique will not be significantly impacted by the Project.

1. Introduction

Chalumbin Wind Farm Pty Ltd (the Proponent) proposes the development of the Chalumbin Wind Farm (the Project) within Tablelands Regional Council, Queensland. The Project Site (Site) is approximately totalling 31,225 hectares (ha) and is situated approximately 10 km southwest of Ravenshoe.

LatStudios Pty Ltd (trading as Lat27) was commissioned by Attexo Group Pty Ltd (Attexo) to undertake a Landscape and Visual Impact Assessment (LVIA) for this Project. The purpose of this assessment is to inform a development application for a Material Change of Use (Wind Farm) to be lodged with the State Assessment and Referral Agency (SARA) and assessed against State Code 23: Wind farm development of the State Development Assessment Provisions (DSDMIP, 2018)[2]. This LVIA report provides an assessment of the anticipated landscape and visual effects of the Project during construction, operation and decommissioning / rehabilitation phases. The LVIA:

- identifies and describes relevant designations, policy and supplementary planning guidance in relation to the landscape context of the Site;
- includes a Landscape Character Assessment that describes the character of the Site and its wider landscape context;
- determines the relevant visual catchment of the proposed renewable energy facility (wind farm) and describes potential effects from representative views/visual receptors, including local houses, roads, public areas and more distant catchment areas;
- suggests potential opportunities to reduce or mitigate potential adverse effects.

1.1. Project description

The Project is located 10 km southwest of Ravenshoe and is situated within Tablelands Regional Council. The regional context of the Site is shown in **Figure 1**. The proposed Site and turbine layout of the Chalumbin Wind Farm is shown in **Figure 2**.

The Site is characterised by varied, elevated topography associated with the ridges and valleys of the Black Mountain Range and the western extents of the Cardwell Range. Due to this, the higher elevations with the Site are typically to the northwest and east where these ranges influence the topography. By comparison the lower elevations are generally within the southwest portion of the Site and include Oakey Creek, Blunder Creek, Quimber Creek and Lily Creek and their associated tributaries. Vegetation coverage consists of woodland with an understorey of grasses and the property is currently utilised for grazing.

The Site covers 31,225 hectares (ha), which is described in **Table 1**. The Project footprint (land which the Project infrastructure will be located, allowing for micro-siting) occupying a smaller area within the Site (refer to **Figure 2**).

[2] Version 3.0 of State Code 23 including the associated Planning Guidance was published by the Department of State Development, Infrastructure, Local Government and Planning (DSDILGP) in February 2022. However, this assessment addresses the requirements of the former State Code 23 (DSDMIP, 2018) that was current at the time of the development application for a Material Change of Use (Wind Farm) to the State Assessment and Referral Agency (SARA)

Table 1: Project Description

Real Property Description	Land Size (hectares)	Tenure
Project Site (total)	**31,225.0 ha***	**Freehold**
Lot31 SP288862 (Kyte)	11,285.3 ha	Freehold
Lot1 CWL3298 (Doyle)	19,969.7 ha**	Lands Lease

**Note that the Project Site (total) land size includes the area of the road reserves intersected by the Project footprint (an additional 35.6 ha that is not included in the two lots described in Table 1).*

*** Land Size is smaller than title area due to omission of the component of the lot which overlaps with the Wet Tropics of Queensland World Heritage Area.*

The Project, as assessed in this LVIA, comprises of up to 86 wind turbines and associated infrastructure. The proposed wind turbines have a blade tip height of up to a maximum of 250 m as described in **Table 2**.

Table 2: Turbine Specifications

Feature	Statistic
Number of turbines	Up to 86
Tip height*	Up to 250 m
Height to hub*	Up to 160 m
Rotor diameter*	Up to 180 m
Colour/finish	Light grey or white with a semi-matt/low reflectivity finish
Turbine nameplate capacity	Likely to be around 5-6 MW but could be greater or lesser*

* The actual output of the wind farm will depend on the number, size and type of turbine chosen during the detailed design phase. Regardless of the size of the wind farm generation capacity, the Project will still need to comply with the Queensland Wind Farm State Code and supporting Planning Guidelines. The maximum specifications listed in the table provide flexibility for any innovation in turbine design between now and the time of detailed design and construction

More detail on the Project description is included in the Planning Report prepared by Attexo (2022).

2. Scope of assessment

2.1. Definition of study area

For the purposes of this assessment, the Project encompasses all land within the Site illustrated on **Figure 2**. However, visual effects can extend well beyond the boundary of the Site due to the large size of the turbines and because views are potentially available from distant vantage points. Therefore, a LVIA Project Study Area (Study Area) has been established that extends approximately 30 km beyond the proposed turbines. The Study Area aims to identify the area within which the Project may potentially influence landscape and/or visual receptors. This is illustrated on **Figure 3**.

2.2. Approach to the LVIA

Landscape impacts include physical changes to the fabric of the landscape, as well as perceptual changes in the character of the landscape. They also include impacts on areas designated for their scenic or landscape qualities at a national, regional or local level, for example National Parks, or important recreation areas. Visual impacts relate to changes in views and the appearance of a wind farm in those views. The approach to this LVIA is set out in **Table 3**.

Table 3: LVIA Approach

Baseline Assessment	
Stage 1	**Review of landscape and visual legislative context:** A review of any landscape or scenic amenity designations applying to the Site and/or wider Study Area at national, state, regional or local level; including local planning designations. Designations are considered in relation to the requirements of the Queensland State Code 23: Wind Farm Development and associated Planning Guidelines (June 2018) and other relevant guidelines, such as the Draft National Wind Farm Development Guidelines (July 2010).
Stage 2	**Desktop landscape assessment:** A review of information available describing the landscape characteristics of the Study Area.
Stage 3	**Desktop visual assessment:** Identification of potential key visual receptor audiences (viewers) such as private residences, roads (including any nominated scenic routes), public parks and recreation areas (including any national parks, nominated scenic lookouts and recreation trails) and other properties including farmland, institutions etc. Visual Analysis Mapping (VAM) analyses form the basis of an estimate of the maximum extent of the likely extent of visibility based on the turbine layout. The assessment is also informed by Google Earth, Queensland Globe and other desk-based mapping tools.
Stage 4	**Field survey:** Field survey (during May and June 2021 and May 2022) to confirm baseline findings and obtain photographs of representative viewpoints in the field, including images to use as a base for the preparation of photomontages.
Preparation of the LVIA	
Step 5	**Definition, description and illustration of the landscape and visual baseline:** Including Landscape Character Assessment (LCA) and landscape and visual sensitivity.

Step 6	**Mapping and supporting illustrations:** Preparation of mapping to support the LVIA and compilation of illustrative photomontages/visualisations from selected viewpoints.
Step 7	**Assessment of magnitude of change:** Identification of the magnitude of change of the landscape resource during the construction, operation, and decommissioning phase.
Step 8	**Significance assessment:** Evaluation of the significance of the proposed change on the landscape and visual resource, including in relation to the Outstanding Universal Value (OUV) of the WTQWHA.
Step 9	**Cumulative impact:** Preparation of the cumulative impact assessment.
Stage 10	**Mitigation potential:** This stage comprises a consideration of the opportunity to minimise and mitigate impacts of the Project.
Stage 11	**Residual assessment:** Consideration of impacts of the scheme assuming all recommended mitigation is implemented.

2.3. Report structure

The report is structured as follows:

1. Introduction: describes the intent and purpose of the LVIA

2. Scope of assessment services: describes the study scope

3. LVIA methodology: describes the methodology for undertaking the study

4. Potential Project impacts: describes potential impacts of visible wind farm components on landscape and visual amenity values.

5. Legislative context and standards: identifies the legislative and policy context of the Site with respect to landscape and visual values.

6. Regional landscape context: describes the wider landscape and visual context of the Site, including with reference to published sources and mapping.

7. Landscape assessment: describes the findings of the Landscape Character Assessment, associated landscape values potentially sensitive to wind farm development and Project impacts

8. Visual assessment: describes the findings of the Visual Assessment, associated visual values and viewers potentially sensitive to wind farm development and Project impacts.

9. Construction and decommissioning impact: describes potential impact during construction and decommissioning phases.

10. Cumulative assessment: describes potential wind and other developments proposed in the surrounding landscape that may influence perception of impact.

11. Assessment of impacts on the WTQWHA: Due to the location of the Project in relation to the WTQWHA, this section provides an assessment of the likelihood of significant impacts on the

Outstanding Universal Values (OUV) and associated Matters of National Environmental Significance (MNES) of the WTQWHA.

12. Mitigation measures: explores potential measures to eliminate, reduce or mitigate potential impact.

13. Residual impacts: describes remaining impacts after application of the proposed mitigation measures.

14. Conclusions and recommendations: identifies the key findings of the study.

15. Glossary: defines the key terms and abbreviations used.

16. References: provides detail of any websites, books or reports referred to in the study.

Appendix 1: LVIA Plans: contains the plans (produced using GIS by Attexo) that are referred to and described in the LVIA.

Appendix 2: Viewpoints and Visualisations: contains the representative viewpoints (obtained during the field visit by Lat27) and associated visualisations (produced by Lat27) that are referred to and described in the LVIA.

3. Landscape and Visual Assessment Methodology

3.1. Relevant guidelines and standards

The approach to the LVIA has been developed with reference to accepted guidelines from Australia and elsewhere, including:

- *Best Practice Guidelines: For implementation of Wind Energy Projects in Australia.* (Clean Energy Council, 2018)
- *Queensland State Code 23: Wind Farm Development and Planning Guideline* (DSDMIP, 2018).
- *Draft National Wind Farm Development Guidelines* (Environment Protection and Heritage Council, 2010)
- AILA Queensland *Guidance Note for Landscape and Visual Assessment* (GNLVA) (Australian Institute of Landscape Architects, 2018)
- *The Guidelines for Landscape and Visual Impact Assessment*, Third Edition (GLVIA3) (The Landscape Institute and the Institute of Environmental Management and Assessment, UK, Routledge (Landscape Institute, 2013)
- *The Guidelines for Landscape and Visual Impact Assessment*, Second Edition (GLVIA2) (The Landscape Institute and the Institute of Environmental Management and Assessment, UK, Spon Press, 2002)
- *Landscape Institute Technical Guidance Note 06/19: Visual Representation of Development Proposals* (The Landscape Institute, 2019)
- *Topic Paper 6: Techniques and Criteria for Judging Capacity and Sensitivity* (Scottish Natural Heritage and The Countryside Agency, UK, 2006)
- *Visual Representation of Windfarms: Good Practice Guidance* Version 2.2 (Scottish Natural Heritage, 2017)
- *Siting and Designing of Windfarms in the Landscape* (Scottish Natural Heritage, 2017).

The State Code 23: Wind Farm Development and associated Planning Guideline (2018) states that the assessment should take into consideration the Queensland Government's (2007) *Identifying and protecting scenic amenity values*. The LVIA methodology used in this LVIA addresses the criteria of the code and guideline but does not use the specific methodology described in identifying and protecting scenic amenity values guideline for reasons set out in Section 5.3.

The LVIA also responds to the Public Environment Report (PER) Guidelines for the Project, received from Department of Agriculture, Water and Environment (DAWE) following their consideration of the referral for the Chalumbin Wind Farm Project as detailed in *Guidelines for the Content of a Draft Public Environment Report*, Chalumbin Wind Farm near Ravenshoe, Queensland, Reference 2021/8983 (DAWE, 2021).

3.2. Influence of community perception on LVIA methodology

Community perception of wind farms is an important consideration in assessing the landscape and visual impact of a project, as noted in the Draft National Wind Farm Guidelines (EPHC, 2010). This is related to people's attitudes to 'green' or renewable energy as well as their reaction to the physical presence of wind turbine infrastructure in the landscape.

While community perception of wind farms is an important consideration in assessing the landscape and visual impact of the Project, the research indicates that wind farms evoke a subjective response.

Considerable academic research has been undertaken both in Australia and overseas. This includes a recent paper by Lothian (2020) titled *A survey of the visual impact and community acceptance of wind farms in Australia.* This paper examines responses from an online survey where 556 participants rated the scenic quality of landscapes with and without wind farms. Upon review of survey responses, Lothian concludes that "*While the respondents rated the scenic quality of landscapes with wind farms lower than scenes without them, they rated wind farms acceptable in virtually all cases…The finding suggests that the community is very tolerant of the visual impact of wind farms*". Acceptability included areas judged by participants to be of high scenic quality. It is worth noting that the author understands that there are other influences that may factor into participant preferences such as previous exposure to wind farms or appreciation of wind farms as a means of taking action against climate change. Some interesting observations made by Lothian include that the following factors tended to increase acceptability of wind farm developments from a scenic amenity perspective:

- presence of dense vegetation
- hillier land
- fewer turbines
- larger turbines
- orderly placement of turbines/ placement of turbines along ridges (compared to random layouts)
- increasing distance of viewer from the turbines
- landscapes of higher scenic quality (noting that Lothian acknowledges that this appears counterintuitive).

He notes that "*...Both height and generating capacity had little influence on scenic quality ratings. Both height and number are highly visible attributes, whereas only specialists would discern the difference in the size of the generators*."

In addition, Lothian also acknowledges that positive community opinions regarding wind farms could be attributed to "*to the care with which governments have regulated the industry"* and that therefore the "*challenge for spatial planners is to ensure that wind farms are located in areas without significant visual or other impacts*".

Similarly, Hall, Ashworth and Devine-Wright (2013) in their paper *Societal acceptance of wind farms: Analysis of four common themes across Australian case studies* examined seven case studies which identified strong community support for wind farms generally, but local opposition to specific proposed wind farm schemes based on four key themes including place attachment (and other issues not related to landscape and visual impact). The findings note "*a 'silent majority' of rural residents who do not explicitly demonstrate support through media attention or political engagement*". However, they note research indicating the impact of visual changes to a place or landscape can significantly influence attitudes towards a wind farm and highlight the sense of attachment of participants to their local landscape concluding that "*such amenity concerns are highly subjective, difficult to quantify and to compensate if at all*".

Other types of large infrastructure projects (such as transmission lines, mines and road corridors) tend to have a lower level of acceptance by the community. The greater degree of acceptance of wind farms tends to relate to their sculptural form and their presence as a symbol of renewable energy. By way of contrast, their opponents believe they are unattractive 'industrial' intrusions that clutter the skyline.

Wilson and Dyke (2015) in their research *Pre- and post-installation community perceptions of wind farm projects: the case of Roskrow Barton* identified the complexity of determining and addressing community attitudes to wind farms noting that "*the value that individuals attribute to the countryside varies from person to person depending on experience and memories. Judgement is, thus, subjective with some disliking the appearance of wind farms and finding them ugly, whereas others only see*

graceful structures". Their research concluded that (for this example), "*although negative perceptions can be found both pre-and post-installation, collectively the community have become used to the turbines and that attitudes have generally become more favourable*".

No information is available regarding the likely attitude of the local community to the Chalumbin Wind Farm. Therefore, for the purposes of this assessment, subjective interpretation of the Project has been avoided within the landscape and visual impact assessment, although these factors are considered in more general discussions in relation to the requirements of State Code 23 and the PER Guidelines. The focus has instead been directed to making an assessment of the likely significance of the impact (i.e. a transparent judgement on the sensitivity of the landscape resource, combined with the anticipated magnitude of change) as described further below.

3.3. Desktop analysis

Key information sources have been identified and reviewed as a component of the desktop analysis. These sources include:

- Relevant planning schemes, policies and guidelines from local councils and the State Government (see Section 5)
- Publicly available information on recreation spaces and public visitor areas
- Traffic count data
- Census data
- Digital aerial photography (imagery obtained May 2021 from Google Earth)
- Cadastral data (showing roads, property boundaries and built areas)
- Queensland Interim Biogeographic Regionalisation of Australia (IBRA) bioregion data
- Information available on Queensland Globe (2021)
- Existing infrastructure

A preliminary desktop analysis of existing landscape character and visual amenity for the Site as well as wider Project Study Area was undertaken which included analysis of the underlying topography, land cover and landscape values. These findings were then verified and expanded through the field survey.

3.4. Preparation of visibility analysis mapping (VAM / ZTV)

A Visibility Analysis Map (VAM), sometimes also known as a 'Zone of Theoretical Visibility' (ZTV) study, comprises a digitally mapped representation of the area within which a proposed development may have an influence or effect upon views and visual amenity. It is often used as a tool to select representative viewpoints for more detailed assessment.

ESRI ArcGIS Pro 2.8.1 software has been used to model the VAM using the Viewshed geoprocessing tool. The Viewshed tool is used to determine those cells and their known elevation heights to determine those that are potentially visible from the observation features (wind turbines). A 25 m Digital Elevation Model (DEM) was acquired from the Queensland Department of Resources. Cells in the DEM that are in the theoretical visible line of sight of each wind farm feature are given the value of 1 (visible). Cells that are not in the line of sight of each wind farm feature (turbine) are given the value of 0 (not visible).

It should be noted that the calculation of the VAM does not consider the presence of built development, which can locally reduce the availability of receptors' views. However, based on field observations, it is considered that because built development within the LVIA Study Area is generally minimal, it would be unlikely to significantly affect the extent of the visibility zone. The VAM also

adopts the precautionary principle and is a 'worst case scenario' as it does not incorporate the height of natural vegetation which can significantly affect visibility locally and, particularly, along road corridors, associated with the property boundaries and gardens of residences and over large, forested areas (such as National Parks and State Forests).

The VAMs (**Figure 9**, **Figure 10**, **Figure 11** and **Preliminary** Hub Height VAM (ZTV) Assessment – Visual Analysis Map

Figure 12) included in this LVIA in Appendix 1 are based on the turbine layout within the Project Site shown on **Figure 2** comprising a total of 86 turbines with a height to blade tip of up to 250 m. The four ZTVs included are as follows:

- **Figure 9** Preliminary Blade Tip VAM (ZTV) Assessment – Visual Analysis Map**:** which shows the area from which it is theoretically possible to see *any* blade tip (part or whole turbine) on the Project Site (up to 86 turbines) and, conversely, the area from which it will not be possible to see any turbine blade tips (part or whole turbine).
- **Figure 10** Preliminary Blade Tip VAM (ZTV) Assessment - Number of Turbines**:** : which indicates how many tips (whole or parts of any turbines) would potentially be visible - categorised by 1 to 10 turbines, 11-20 turbines, 21-30 turbines, 31-40 turbines, 41-50 turbines; 51-60 turbines; 61-70 turbines; 71-80 turbines; 81-86 turbines.
- **Figure 11** Preliminary Hub Height VAM (ZTV) Assessment – Visual Analysis Map: which shows the area from which it is theoretically possible to see any turbine hub (hub or whole turbine) on the Project Site (up to 86 turbines) and, conversely, the area from which it will not be possible to see any turbine blade tips (part or whole turbine). Preliminary Hub Height VAM (ZTV) Assessment – Visual Analysis Map
- Figure 12 Preliminary Hub Height VAM (ZTV) Assessment – Number of Turbines**:** which indicates *how many* turbine hubs (junction of turbine blades and turbine) would potentially be visible - categorised by 1 to 10 turbines, 11-20 turbines, 21-30 turbines, 31-40 turbines, 41-50 turbines; 51-60 turbines; 61-70 turbines; 71-80 turbines; 81-86 turbines.

The presence of vegetation in the Study Area would likely considerably reduce visibility of the Project locally and regionally. The effect of existing vegetation on views is discussed further in Section 8 and 11 of this report.

3.5. Field survey

A field visit to assess the Site was carried out on the 31st of May and the 1st and 2nd of June 2021 by a qualified landscape planner and landscape architect both with experience in LVIA, including wind farm development and landscape photography. The weather during the field assessment included periods of rain and heavy cloud cover as well as haze generated by the damp conditions. The cloud cover and haze typically remained throughout the day, particularly in the higher elevations. There were brief periods, typically in the late afternoon, where the haze cleared. The field work photography was taken to avoid the wet, hazy conditions to the greatest extent practical, enabling sufficiently clear views towards the Site for the purposes of undertaking LVIA. However, it is noted that hazy conditions are typical in this locality with the adjacent area of the WTQWHA named the 'Misty Mountains' section.

A supplementary field visit was undertaken by Ark Energy staff on 18th and 19th May 2022 to obtain additional views that could not be obtained due to weather conditions and logistical issues (including heavy mist and road closures) at the time of the original survey.

The assessment included consideration of the potential impact on the WTQWHA and other protected landscapes. The site visit included walking numerous trails and visitor locations within or with potential

views towards the western part of the WTQWHA and National Parks closest to the Project site, including:

- The Cardwell Range track from the Cardwell Range trailhead to Majors Mountain which forms part of the Misty Mountains wilderness tracks (within WTQWHA, Tully Falls NP)
- The Koolmoon Creek track, including the branch leading to Rhyolite Pinnacle, which forms part of the Misty Mountains wilderness tracks (within WTQWHA, Tully Falls NP)
- The Bally Knob trail from Tully Falls Road to Bally Knob which forms part of the Misty Mountains wilderness tracks (not actually within WTQWHA but links Tully Falls NP and Millstream Falls NP)
- Various short trails on the western side of Tully Falls Road including the Wabunga Wayemba rainforest walking track overlooking the Charmillin Creek waterfall (within WTQWHA, Tully Falls NP)
- Tully Gorge Lookout (within WTQWHA, Tully Gorge NP)
- Tracks associated with Millstream Falls NP (not within WTQWHA, including Big Millstream Falls and Little Millstream Falls lookouts)
- Koombooloomba NP camping area (within WTQWHA, Koombooloomba NP)
- Kirrama Range Road Tourist Drive (within WTQWHA, including Kirrama NP and Girramay NP)

A boat had been organised to obtain views from Koombooloomba Dam (Lake Koombooloomba) (within WTQWHA, Koombooloomba Conservation Area). However due to unsuitable weather conditions this did not go ahead and instead an assessment of impacts on this area has been based on digital modelling.

The field assessments were used to ground truth the findings of the desktop assessment and to undertake an on-site assessment of landscape character and visual amenity. Photographs were taken to:

- portray landscape character
- inform the viewpoint assessment from representative viewpoints
- provide base images to produce photographic simulations and visualisations.

The field visit focused on those aspects of the landscape with potential to be of the greatest sensitivity to the Project (including the WTQWHA) and to gain an appreciation of those aspects of the Project most likely to affect landscape character and visual amenity. Viewpoints were recorded on Site using an iPad with a GPS Kit HD App. The camera used also recorded GPS location for each photograph.

3.6. Identification of potential Project impacts

This component of the LVIA includes a review of the Project infrastructure components to inform a description of infrastructure and exemplar imagery that is likely to be associated with the Project, such as the presence of wind turbines, substation, access tracks, meteorological masts, etc. These potential impacts are discussed further in Section 4.

3.7. Landscape assessment methodology

Landscape Character Assessment is a tool for identifying what makes one place different from another. It identifies what makes a place distinctive, without necessarily assigning a value to it. This approach has been used to establish the existing character of the landscape and to provide a framework for measuring the impact of the Project on landscape character. Several Landscape Character Types (LCTs) have been defined that provide a framework for describing these areas

methodically. Where necessary, these have been further subdivided into Landscape Character Areas (LCAs), which are geographically distinct areas. The general character of the landscape is described in Section 6 whilst the identified landscape character types are described in Section 7.1.

The assessment of anticipated sensitivity (and consequent likely impact to) landscape character and amenity is based on the scale and layout of the Project and how this relates to the characteristics of the receiving landscape. For example, simple large-scale landscapes (such as Image A in ***Illustration 1*** below) are likely to be less sensitive to large scale wind farm developments; while landscapes of small scale (e.g. characterised by relatively 'human scale' buildings and features, such as Image B in Illustration 1) would generally be less tolerant of such development proposals. Consideration is also made of designations or landscape policies (as identified, for example, in a local planning scheme) in determining the sensitivity of a landscape to change.

Image A: Turbines create a simple image in the landscape.

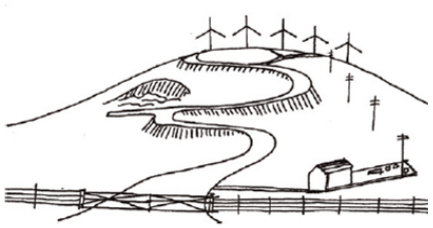
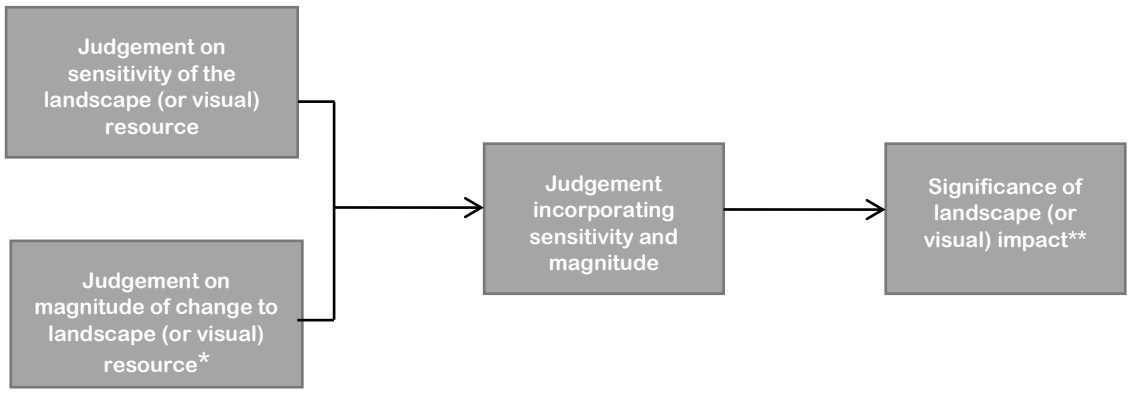


Image B: Turbines create a complex image and conflicts with the small-scale landscape character.

[Image source: SNH (2017) Siting and Designing of Windfarms in the Landscape]

Illustration 1 Comparisons between siting turbines in landscapes of different scale and character

Unlike other technical disciplines, there are no established, measurable thresholds of significance that exist for landscape impacts. The significance of impact is therefore determined by considering the sensitivity of the landscape receptor and the magnitude of change expected because of the proposed development, as shown in the process diagram in **Illustration 2**:



* There is no standard methodology for the quantification of the magnitude of effects; however, it is generally based on the scale or degree of change to the landscape resource, the nature of the effect and its duration.

** Overall landscape impact is determined by combining the sensitivity of the landscape resource with the magnitude of landscape change. Professional judgement used to determine the overall significance of impact based on these two elements.

Illustration 2 Approach to evaluating the significance of landscape (or visual) change

Judgement of landscape sensitivity

The sensitivity of a landscape is judged on the extent to which it can accept change of a particular type and scale without adverse effects to existing landscape character. Levels of sensitivity, shown in **Table 4**, vary according to the type of development and the nature of the landscape. Key aspects that have been considered when identifying the level of sensitivity associated with each landscape character type include:

- The landscape's inherent values (e.g. perceptual qualities, cultural importance, and any specific values that may apply such as landscape planning designations).
- The landscape's ability to absorb changes associated with the Project (e.g. the extent to which the Project may fit or be absorbed into the landform, land use, pattern, scale or texture of the existing landscape).

Table 4: Defining landscape sensitivity

Sensitivity of landscape	Attributes of landscape sensitivity categories
High	A landscape protected by national or international designation and/ or widely acknowledged for its quality and value; a landscape with distinctive character and low capacity to accommodate the type of change envisaged.
Medium	A moderately valued landscape, perhaps a regionally important landscape and / or protected by regional/state designation or on a scenic amenity overlay in a local planning scheme, and /or where its character, land use, pattern and scale have limited capacity to accommodate a degree of the type of change envisaged.
Low	A landscape valued to a limited extent, perhaps a locally important landscape or where its character, land use, pattern and scale is likely to have the capacity to accommodate the type of change envisaged.
Negligible	A landscape which is not valued for its scenic quality or where its character, existing land use, pattern and scale are tolerant of the type of change envisaged, and the landscape has capacity to accommodate change.

Magnitude of change to landscape character

The magnitude of change to landscape character depends on the nature, scale and duration of the change that is expected to occur. The magnitude of change also depends on the loss, change or addition of any feature to the existing landscape and is based upon that part of the landscape character type which is likely to be impacted to the greatest extent by the Project before the application of any mitigation.

Magnitude of change is described as Negligible (barely perceptible change), Low (noticeable change), Medium (considerable change) or High (dominant change), as illustrated in **Table 5**. The descriptions of magnitude and sensitivity are illustrative as there is no defined boundary between levels of impacts.

Table 5: Defining magnitude of change to landscape character

Magnitude of Change	Typical Examples
High	Dominant change: A clearly evident and frequent/continuous change in landscape characteristics affecting an extensive area, which is likely to fundamentally change the character of the landscape.
Medium	Considerable change: A considerable change in landscape characteristics, frequent or continuous and over a wide area or a clearly evident change, but over a restricted area.
Low	Noticeable change: A noticeable change in landscape characteristics over a wide area or a considerable change over a restricted area but will not fundamentally change the character of the landscape.
Negligible	Barely perceptible change: An imperceptible, barely or rarely perceptible change in landscape characteristics.

Overall significance of impact on landscape character

An evaluation of overall potential effects on landscape character is based on the sensitivity of the existing landscape to change and the magnitude of change that is likely to occur. No prescribed methods for assessment of significance of landscape impacts exist; therefore, professional judgement and experience are applied to identify the level of significance. Each landscape receptor is assessed on its own merits, as factors unique to each circumstance need to be considered. However, there are general principles which can be used as a guide to this process that provide transparency about how judgements have been made. The overall significance of change to landscape amenity is determined by using **Table 6**.

Table 6: Determining level of effect on landscape character

Level of effect		Magnitude of change in landscape			
		High (Dominant change)	Medium (Considerable change)	Low (Noticeable change)	Negligible (Barely perceptible change)
Sensitivity of landscape	High	Major	Moderate to Major	Moderate	Minor to Moderate
	Medium	Moderate to Major	Moderate	Minor to Moderate	Minor
	Low	Moderate	Minor to Moderate	Minor	Minor to Negligible
	Negligible	Minor to Moderate	Minor	Minor to Negligible	Negligible

Denotes a 'Significant' impact.

Denotes a 'Not Significant' impact.

3.8. Visual impact assessment methodology

Identification and description of visual receptor audiences and viewpoints

Visual receptor audiences are assessed and described in terms of the views which can be obtained from selected representative viewpoints within the LVIA Project Study Area. Potential representative visual audiences have been identified. Visual receptors have been identified based on a range of parameters with reference to the VAM study (described above), including:

- Proximity of the receptor: the most affected visual receptors are typically anticipated to be located within a 5 km radius of the closest turbine unless elevated vantage points are present within the wider landscape surrounding the Project Site where impacts may extend for further distances.
- Type of visual receptor /visual receptor audience: for example:
    - a permanent resident of a residential dwelling or homestead
    - drivers or passengers of vehicles passing through, or alongside, the Project Study Area
    - members of the public accessing marked recreational areas (e.g. in National Parks, State Forests, cycle ways, footpaths and public parks and sportsgrounds)
    - a rural, industrial or commercial worker (excluding those employed as part of the Project).

These visual receptor audiences and representative viewpoints are discussed further in Section 8.2.

Preparation of visualisations

Visualisations (sometimes referred to as photomontages) are artists' illustrations that aim to represent an observer's view of a proposed development. For the purposes of this assessment, visualisations have been compiled to appreciate the potential visual impact of the presence of the Project from a selection of the representative viewpoints, which are described in Section 8.3 and illustrated in A3 format (in Appendix 2).

The methodology for the visualisation production has been based on the Draft National Wind Farm Development Guidelines (Environment Protection and Heritage Council, 2010) and International guidance including the Guidelines for Landscape and Visual Impact Assessment Second Edition (2002) and Third Edition (2013) and the Visual Representation of Windfarms: Good Practice Guidance (SNH, 2017).

The photomontages have been generated using digital photographs stitched from images obtained on site, GIS software, 3D modelling software (Google Sketchup) to geo-locate, generate and render the turbines. Existing points onsite and background terrain is used to reference the position/direction of the photography with the 3D model camera. The rendered outputs are then layered into the existing image where background and foreground of the imagery is separated to allow for the rendered information to be inserted (Adobe Photoshop). It should be noted that every reasonable effort has been made to ensure the images are representative and have not been manipulated to downplay the extent of impact. This has, for example, included ensuring that the rendering provides an adequate 'contrast' between the turbine and background elements (e.g. lighter rendering against a dark backdrop and vice versa**).**

To ensure the photomontages consistently present a view which is representative of the human eye, the field assessment photographs were taken at average human viewing height. The photos were taken using a Canon EOS 6D Mark II body with a Sigma 50mm f/1.4 DG JSM lens (for the first field visit) and a Canon EF 50mm f/1.2L USM (for the second field visit). The Canon EOS 6D is a full sensor lens. Using a 50mm lens it has an equivalent Field of View as a Standard Single Lens Reflex (SLR) using 35mm film and 50mm focal length, which is the standard (albeit technologically outdated) recommendation for obtaining photographs that are representative of the human field of vision (40 degrees).

Photo stitching software and Adobe Photoshop were used to piece together the adjoining images to produce the montage. Although the parameters of human vision when stationary is often quoted as falling between the 45-60° (SNH, 2006), humans generally move their eyes, heads and bodies as necessary to experience a view. Therefore, a wider field of view has been used for the photomontages from which an inset representative field of view (no less than 75°) has been taken that is considered representative of the human field of view which is in line with good practice. For example, The Draft National Wind Farm Development Guidelines (EPHC, 2010) states "*In creating a photomontage... depictions should not exceed 124º horizontal field of view*". In addition, the Visual Representation of Windfarms Good Practice Guidance (SNH, 2006) notes that "*…the size of photograph required to represent a view will vary for different projects and viewpoints, depending on the key characteristics of a view that need to be included within the image (defined by the landscape architect or experienced specialist assessor on site), and the extent of the proposed windfarm which needs to be included*". While these recommendations are acknowledged, as the potential field of view for this project from some selected viewpoints is considerably wider, some of the photomontages presented exceed these recommended extents. While some distortion may result it is felt that this is a more accurate representation of the extent of potential impact and adopts the precautionary principle for impact assessment, in line with best practice.

Judgement of visual sensitivity

The sensitivity of each viewpoint and the visual receptor audiences which it represents is dependent upon the:

- importance of the view, its existing scenic qualities and the presence of other existing man-made elements in the view
- type of the visual receptor audience and their likely interest in the view (e.g. residents, visitors to important/valued landscapes or visitors to non-designated areas, motorists)
- volume of visual receptors and the duration of time that receptors spend experiencing the view.

The Guidelines for Landscape and Visual Impact Assessment (2002) states "*changes affecting large numbers of people are generally more significant than those affecting a relatively small group of users.*" Similarly, The Guidelines for Landscape and Visual Impact Assessment (2013) states the visual receptors most susceptible to change include "… *residents at home…people, whether residents or visitors who are engaged in outdoor recreation, including use of public rights of way whose attention or interest is likely to be focused on the landscape and on particular views; …communities where views contribute to the landscape setting enjoyed by residents in the area*". This guidance is reflected in the method used to assess the sensitivity of the viewpoints to the Project e.g. views from a regionally important location where viewers' interest is specifically focussed on the landscape (such as views from a scenic viewpoint in a national park) have been judged as having a high sensitivity to change as have large numbers of residential viewers.

Levels of sensitivity, shown **Table 7**, vary according to the type of development and the visual receptor audience.

Table 7: Defining viewpoint sensitivity

Sensitivity of viewpoint	Attributes of viewpoint sensitivity categories
High	Large numbers of viewers or those with proprietary interest and prolonged viewing opportunities such as residents and users of attractive and/or well-used recreational facilities and/or views from a regionally important location whose interest is specifically focussed on the landscape e.g. national park.
Medium	Medium numbers of residents (e.g. rural communities and townships) and moderate numbers of visitors with an interest in their environment e.g. visitors to state forests, including bush walkers, horse riders, trail bikers or larger numbers of travellers with an interest in their surroundings e.g. local designated scenic routes and/or views encompassing landscapes valued on account of their scenic amenity values e.g. identified by a scenic overlay in a local planning scheme.
Low	Small numbers of rural residents, receptors with a passing interest in their surroundings or transient views e.g. those travelling along principal roads and/or where scenic quality is already compromised or viewers whose interest is not specifically focussed on the landscape e.g. workers, commuters, truck drivers.
Negligible	Very occasional numbers of viewers with a passing interest in their surroundings e.g. those travelling along minor roads and views from the air.

Magnitude of change to visual amenity from representative viewpoints

The magnitude of change to views and visual amenity depends on the nature, scale and duration of the change that is expected to occur. The magnitude of change also depends on the loss, change or addition of any feature in the field of view of the receptor; or any change to the backdrop to, or outlook from, a viewpoint. The assessment assumes a worst-case turbine height, without mitigation. The level

of effects on a view depend on the extent of visibility, degree of obstruction of existing features, degree of contrast with the existing view, angle of view, duration of view and distance from the Project.

Magnitude of change is described as Negligible (barely perceptible change), Low (noticeable change), Medium (considerable change) or High (dominant change), as illustrated in **Table 8.**

Table 8: Defining magnitude of change to visual amenity

Magnitude of change	Typical examples
High	Dominant change: Major changes in view at close distances, affecting a substantial part of the view, continuously visible for a long duration, or obstructing a substantial part or important elements of view. Generally, short distances (typically < 4 km) to the nearest turbine and/or one or more wind turbines visible in their entirety but may be more distant views where a large number of turbines are visible (such as turbines in elevated locations).
Medium	Considerable change: Clearly perceptible changes in views at intermediate distances, resulting in either a distinct new element in a significant part of the view, or a more wide-ranging, less concentrated change across a wider area. Generally, short to medium views (typically around 4 km - 8 km) to the nearest turbine and/or generally the entire swept path of the blades of one or more wind turbines visible or may be more distant views where multiple turbines are visible (such as turbines in elevated locations).
Low	Noticeable change: Minor changes in views at long distances or visible for a short duration, and/or are expected to blend in with the existing view to a moderate extent, for example due to the presence of existing screening vegetation or existing infrastructure elements. Generally, medium to long distance views (typically 8 km – 12 km) to the nearest turbine and/or at least half the swept path of one or more wind turbines visible.
Negligible	Barely perceptible change: Change which is barely visible at a very long distance or visible for a very short duration, and/or is expected to blend with the existing view. Distant views (generally, >12 km) to the nearest turbine and/or with typically only a small part of one or more wind turbines visible.

Overall significance of impact on visual amenity from representative viewpoints

The evaluation of overall potential impacts on visual amenity is based on the sensitivity of existing views to change and the magnitude of change that is likely to occur. No prescribed methods for assessment of significance of impacts on visual amenity exist; therefore, professional judgement and experience are applied in order to identify the level of significance. Each viewpoint is assessed on its own merits, as factors unique to each circumstance need to be considered. However, there are general principles which can be used as a guide to this process; which provides transparency about how judgements have been made. The overall significance of change to visual amenity and individual viewpoints is determined by using **Table 9**.

Table 9: Determining level of effect on visual amenity

Level of effect		Magnitude of change to visual amenity			
		High (Dominant change)	Medium (Considerable change)	Low (Noticeable change)	Negligible (Barely perceptible change)
Sensitivity of viewer	High	Major	Moderate to Major	Moderate	Minor to Moderate
	Medium	Moderate to Major	Moderate	Minor to Moderate	Minor
	Low	Moderate	Minor to Moderate	Minor	Minor to Negligible
	Negligible	Minor to Moderate	Minor	Minor to Negligible	Negligible

Denotes a 'Significant' impact.

Denotes a 'Not Significant' impact.

Impacts which are graded as being 'Moderate', 'Moderate to Major' or 'Major' are those which are given greatest weight, relative to other levels of visual impact, in decision making. They usually concern immediate landscapes around proposed wind farm sites and close views seen by sensitive viewers. 'Minor to Moderate' levels of impact are of progressively reducing importance. Impacts graded as 'Moderate' or 'Minor' also constitute effects which warrant consideration, but individually carry little weight in the decision-making process.

Impacts on the visual resource have been described by representative views in the Project Study Area. Impacts can be short term (i.e. those occurring during installation/construction of a development) or long term (i.e. those lasting for the lifetime of the Project). In addition, they can be wide-spread (i.e. taking up a large proportional change in the view) or localised.

As stated previously, the impact or effect of a wind farm is a subjective issue. Whilst some people regard wind turbines as attractive, graceful structures that symbolise clean energy; others find wind turbines unattractive and an unwelcome addition cluttering the skyline and adversely affecting rural amenity. For the purposes of this assessment, subjective interpretation of the Project has been avoided; rather, the focus has been directed on the significance of the impact (i.e. a transparent judgement on the sensitivity of the visual resource, combined with the anticipated magnitude of change to the view).

Lighting Assessment

No turbine lighting is proposed for this Project and ancillary security lighting associated with infrastructure/compounds would be minimal. Therefore, it is considered there is no requirement to

undertake a lighting assessment, for example, in line with Australian Standard 4282 – Control of Obtrusive Effects of Outdoor Lighting (1997).

3.9. Cumulative landscape and visual impact assessment

The aim of the cumulative LVIA, described in Section 10, is to describe and assess the ways in which the Project could potentially have additional impacts when considered in combination with other proposed and built developments in the wider area.

Information to inform the cumulative LVIA is based on descriptions of other similar scale projects to the extent that such data was publicly available at the time of this assessment. The cumulative situation may change as applications are made or withdrawn. Therefore, the cumulative assessment is current as of October 2022.

The cumulative impact assessment methodology follows a qualitative method based on a three-step process, as follows:

- Step One: Identification and description of existing projects within the Study Area.

  The projects included in the cumulative assessment are those that have been approved by the Queensland Coordinator-General, State Assessment and Referral Agency or have sufficient information in the public domain (e.g. an environmental impact statement) to enable an assessment of the potential impacts. Projects included for consideration in the cumulative impact assessment also need to be located sufficiently close to the Project for cumulative landscape and visual effects to be possible.

- Step Two: Project screening i.e. exclusion of projects anticipated to generate a negligible cumulative impact on landscape and visual amenity.

  A provisional review has been conducted to streamline the assessment process to eliminate, or scope out projects, which are anticipated to generate negligible landscape and visual impacts. The inclusion of a site is based on a judgement of whether views of the Project and the other development are anticipated at the same time.

- Step Three: Assessment of potential for cumulative landscape and visual impacts.

  This step determines the nature and extent of potential impacts in relation to landscape and visual values of the region, as determined through the assessment criteria in the main LVIA.

  The assessment considers if the identified cumulative impact would be:
  - “Combined” - impacts that occur where a static receptor is able to view two or more developments from a standpoint/viewpoint within the receptors arc of vision (assumed to be 120 degrees for the purpose of this assessment) at the same time
  - “Successive”– impacts that occur where a receptor is able to view two or more developments from a viewpoint, but needs to turn their head to see them
  - “Sequential” – impacts that occur where a receptor is moving from one area to another, for instance when a person is travelling along a road or track and is able to see two or more developments at the same, or at different times as they pass along the route. Sequential effects can potentially affect views from routes over a wide area, but with the exception of the largest developments (e.g. adjacent windfarms) have a limited effect when the developments are 25 km apart or more.

4. Potential Project impacts

4.1. Key sources of potential impact

This section describes the key components of the Chalumbin Wind Farm that are relevant to this LVIA.

This assessment is based upon a 86 turbine layout, for which Chalumbin Wind Farm Pty Ltd is seeking a development permit for a Material Change of Use. The proposed wind turbines, access roads and other associated infrastructure are situated within the Site. It should be noted that development approval for the Chalumbin Wind Farm may allow some 'micro-siting' adjustments of turbine locations, but these will be confined to within the Site unless the development permit is modified.

Key components of the development activities anticipated for the construction/installation, operation, and decommissioning and rehabilitation which are relevant to the assessment of landscape and visual impacts are set out in this section.

In describing wind turbines, it is necessary to understand the following components (described from bottom to top):

- foundations, typically concrete.
- towers, typically steel or concrete.
- nacelles (with gearbox and generator) which are attached to the hub.
- rotors comprising a central hub and three, typically steel blades. The term 'blade tip' refers to the tip of the blade at the outermost point in its rotation.

Construction phase

The construction phase of the Project is temporary and is estimated to be of a duration of 18-24 months, commencing 2022. Site components and activities that may potentially impact on the landscape (including landscape features, character and amenity) and views and visual amenity during construction are described in **Table 10**.

Table 10: Potential impacts during construction phase

Construction activities and infrastructure	Indicative Project imagery
Establishment of the temporary construction compound(s) and fencing and civil works i.e. upgrade of existing and construction of new site access roads (up to approximately 10 m in width), levelling, earthworks, and local vegetation clearance.	 Source: Coopers Gap Wind Farm
Construction of the turbine foundations (excavation estimated to be approximately 15 m in radius).	 Source: Ark Energy
Progressive transportation of the wind farm components (i.e. turbine blades, towers, hubs/nacelles); movement of plant and vehicle movements, including load deliveries to site; and onsite storage of the wind farm components.	

Construction activities and infrastructure	Indicative Project imagery
	Source: Coopers Gap Wind Farm
Construction of high voltage overhead transmission lines and electricity substation.	 Source: Lincoln Gap Wind Farm
Underground cabling (installed adjacent to the access road where possible) and unsealed access roads.	 Source: Ark Energy

Construction activities and infrastructure	Indicative Project imagery
Progressive installation of the turbines and permanent meteorological masts.	 Source: Kennedy Energy Park

Operational phase

The operational phase of the Project is estimated to last approximately 30 years. The potential impacts on the landscape (including landscape features, character and qualities) and visual amenity during operation are outlined in **Table 11.**

Table 11: Potential impacts during operational phase

Operational activities and infrastructure	Indicative Project imagery
Wind turbines and associated turbine hardstands (estimated to be approximately 1 to 1.5 ha). It has been assumed that operational scenarios would include up to 86 turbines at up to 250 m high; rotor diameter of approximately 180 m and hub height of up to 160 m. Access roads to turbines (width is 5 m after construction), approximately 149 km of unsealed roads.	 Source: Kennedy Energy Park

Operational activities and infrastructure	Indicative Project imagery
Up to 8 permanent meteorological masts/wind monitoring towers.	 Source: Ark Energy
Wind farm collector substations (up to 2), switchyard and an operation and maintenance building collecting power from the wind farm and sending it to the grid via the 275kV transmission line.	 Source: Lincoln Gap Wind Farm
High voltage (275kV) transmission lines linking collector substations to the main switchboard in the wind farm substation. Anticipated to be approximately 17 km in length. High voltage (33kV) feeder lines (conductors connecting the cable marshalling points to	 275kV transmission lines. Source: Lat27

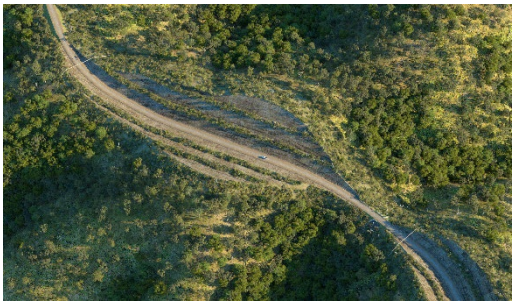
Operational activities and infrastructure	Indicative Project imagery
the collector substations). While predominantly installed underground within or adjacent to access tracks, there may be a need to install these above ground in some locations.	

Progressive rehabilitation

During the construction phase, measures to rehabilitate the landscape, including selective planting, will be progressively implemented that will mature during the operation phase. These are inherent mitigation measures as described in Section 12. These are illustrated in the artist's impressions shown in Table 12.

Table 12: Illustrations showing the effects of progressive restoration activities

Component	Artists illustrations	
Wind turbine (typical situation)	 **Project inception**	 **Construction phase**
	 **Operation phase: Year 5** Source: Lat27	 **Operation phase: Year 30**

<table>
<tr><th>Component</th><th colspan="2">Artists illustrations</th></tr>
<tr><td rowspan="3">Access track (example of widest track required)</td><td> 
Project inception</td><td> 
Construction phase</td></tr>
<tr><td> 
Operation phase: Year 5
Source: Lat27</td><td> 
Operation phase: Year 30</td></tr>
<tr><td colspan="2"></td></tr>
<tr><td rowspan="3">Access track over water course (Oakey Creek example)</td><td> 
Project inception</td><td> 
Construction phase</td></tr>
<tr><td> 
Operation phase: Year 5
Source: Lat27</td><td> 
Operation phase: Year 30</td></tr>
<tr><td colspan="2"></td></tr>
</table>

Decommissioning and rehabilitation phase

At the end of the operational lifetime of the Project's infrastructure, the Proponent may apply to repower the wind farm (replace the wind turbines) or replace the wind turbine components, such as the gearbox and generator.

Alternatively, the Project may be decommissioned, which would involve the turbines and all other above-ground infrastructure on-site being dismantled and removed from the Site, returning the landscape and associated views to their present condition. This includes all the underground infrastructure to a depth of 500mm and overhead interconnection, and possibly the substation infrastructure.

The access roads, if not required for farming purposes or fire access, would be removed and the site reinstated to original condition and use. It is anticipated however that these roads would improve accessibility within the property and therefore would likely be retained. Access gates, if not required for farming purposes, would also be removed. The underground cables occur below 500mm and contain no harmful substances. They can be recovered if economically attractive or left in the ground. Terminal connections would be cut back to below 500mm.

This stage would be of shorter duration to the construction phase, with the dismantling of all above ground structures and the reinstatement of disturbed ground. Typical elements would include temporary contractor compounds, and fencing, plant and vehicle movements (including use of tall cranes), laydown areas and machinery and material storage.

The duration of the decommissioning and rehabilitation activities are only temporary (up to approximately 12 months) and impacts on the landscape (including landscape features and its inherent character and qualities) and visual amenity are considered to be beneficial. Over the longer-term it is anticipated that rehabilitation will reinstate the landscape character, views and visual amenity to their former condition.

5. Legislative context and standards

This section summarises the key planning policies and guidance that have been identified that inform the LVIA process and/or indicate the potential sensitivity of the landscape to change. Additional information on the legislative and policy context for the Project is presented in the Planning Report prepared by Attexo (2021) accompanying the application.

The emphasis of this section is to identify those aspects of landscape or visual amenity that require assessment under legislation or relevant planning schemes so that these can be appropriately identified and assessed within the landscape assessment or visual assessment process. The purpose is to determine the extent to which valued and protected landscape and/or visual aspects may be potentially affected. Notably, it is not a formal assessment of the acceptability of the Project from a planning perspective; this is ultimately the responsibility of those determining any development application; which for this Project is the State Assessment and Referral Agency (SARA). Where a document is in draft, the LVIA has proceeded based on current adopted schemes and accepted national and international practice for wind farm assessment.

The provisions of these guidelines and planning schemes applicable to landscape and scenic amenity are described in **Table 14** to **Table 17** and shown, where applicable, on **Figure 5.**

5.1. International legislation

There are two tracts of land within the Study Area that are designated as part of the Wet Tropics of Queensland World Heritage Area, hereinafter referred to as the Wet Tropics World Heritage Area (WTQWHA). The larger of these two areas within the Study Area is located directly east of Site where it is located adjacent to partial extents of the eastern boundary. A small portion of this area sits within the north-eastern extent of the Site. The other area within the Study Area is located north of the Site and is approximately 22 km from the Site boundary at its closest point. The WTQWHA is a recognised scope of international, national and state conventions and legislation and is included as a relevant matter in the PER Guidelines (DAWE, 2021) for the Project which are considered further in Section 5.2 and assessed in detail in Section 11 below.

Table 13: Review of key international policy and guidance relevant to LVIA

United Nations Educational, Scientific and Cultural Organisation (UNESCO) - Convention Concerning the Protection of the World Cultural and Natural Heritage (1972)
Article 2 of this Convention identifies that the following shall be considered as “natural heritage”: • *“natural features consisting of physical and biological formations or groups of such formations, which are of outstanding universal value from the aesthetic or scientific point of view”* • *“natural sites or precisely delineated natural areas of outstanding universal value from the point of view of science, conservation or natural beauty”* Article 5 of this Convention states that “t*o ensure that effective and active measures are taken for the protection, conservation and presentation of the cultural and natural heritage situated on its territory, each State Party to this Convention shall endeavor, in so far as possible, and as appropriate for each country:”* Including: • *“to adopt a general policy which aims to give the cultural and natural heritage a function in the life of the community and to integrate the protection of that heritage into comprehensive planning programmes;* • *to take the appropriate legal, scientific, technical, administrative and financial measures necessary for the identification, protection, conservation, presentation and rehabilitation of this heritage.”*

Operational Guidelines for the Implementation of the World Heritage Convention (2019)

The Operational Guidelines for the Implementation of the World Heritage Convention aims to facilitate the implementation of the Convention concerning the Protection of the World Cultural and Natural Heritage. This includes identifying areas that have inherent "Outstanding Universal Value":

- *"Outstanding Universal Value means cultural and/or natural significance which is so exceptional as to transcend national boundaries and to be of common importance for present and future generations of all humanity. As such, the permanent protection of this heritage is of the highest importance to the international community as a whole. The Committee defines the criteria for the inscription of properties on the World Heritage List."*

The criteria for determining this is outlined in paragraph 77 and the criterion relevant to this assessment includes:

- (*Criterion vii) contain superlative natural phenomena or* ***areas of exceptional natural beauty and aesthetic importance****;* (our emphasis)

World Heritage Nomination IUCN Summary (Wet Tropical Rainforest (North-East Australia) UNESCO (1988)

Relevant justification for the nomination and inclusion of the Wet Tropics of Queensland on the world heritage list includes:

- *(b) Natural property*
  (iii) Exceptional natural beauty. One of the most significant regional ecosystems in the world, with outstanding features of natural beauty and magnificent sweeping landscapes. Exceptional is the coastal scenery, which combines tropical rainforest, white sandy beaches and fringing reefs just offshore.

Adoption of retrospective Statements of Outstanding Universal Value, UNESCO (2012)

Following nomination, retrospective statement of Outstanding Universal value for inscribed properties including the WTQWHA were developed in 2012, relevant aspects of which are as follows:

Synthesis:

- *The Wet Tropics of Queensland, or Wet Tropics, stretches along the northeast coast of Australia for some 450 kilometres. Encompassing some 894,420 hectares of mostly tropical rainforest, this stunningly beautiful area is extremely important for its rich and unique biodiversity…In addition to its complex array of species and life forms, the Wet Tropics is also recognised as an area possessing outstanding* ***scenic features****,* ***natural beauty*** *and* ***magnificent sweeping landscapes.***

- ***Criterion (vii):*** *The Wet Tropics exhibit* ***exceptional natural beauty,*** *with* ***superlative scenic features*** *highlighted by* ***extensive sweeping forest vistas****, wild rivers, waterfalls, rugged gorges and coastal scenery. This is particularly apparent between the Daintree River and Cedar Bay, where exceptional coastal scenery combines tropical rainforest and white sandy beaches with fringing offshore coral reefs. The winding channels of the Hinchinbrook Channel contain the most extensive mangroves in the region, providing a rich visual mosaic of rainforest and mangroves, and a terrestrial continuum with the Great Barrier Reef.* (our emphasis).

Protection and management requirements:

- *The Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) now provides an additional layer of protection for all World Heritage properties in Australia. Under the EPBC Act, any action that has, will have or is likely to have a significant impact on the World Heritage values of a World Heritage property must be referred to the responsible Minister for consideration. The EPBC Act applies* ***whether the activity is inside or outside of the boundaries of a World Heritage property****. Substantial penalties apply for taking such an action without approval. In 2007, the Wet Tropics was added to the National Heritage List, in recognition of its national heritage significance under the Act.* (our emphasis)

UNESCO website citation, (UNESCO World Heritage Centre, 2021)
The **Wet Tropics World Heritage Area** is identified as meeting *criterion vii*, as follows: • "The Wet Tropics exhibits exceptional natural beauty, with superlative scenic features highlighted by extensive sweeping forest vistas, wild rivers, waterfalls, rugged gorges and coastal scenery. This is particularly apparent between the Daintree River and Cedar Bay, where exceptional coastal scenery combines tropical rainforest and white sandy beaches with fringing offshore coral reefs" (UNESCO World Heritage Centre, 2021) Further information on the application of this international recognition through the national and state planning and legislative framework is presented below.

5.2. National planning and legislative context

There are twelve nationally designated landscapes located within the Study Area, which are the Girramay National Park, Girringun National Park, Herberton Range National Park, Japoon National Park, Kirrama National Park, Koombooloomba National Park, Maalan National Park, Millstream Falls National Park, Mount Hypipamee National Park, Tully Falls National Park, Tully Gorge National Park and Wooroonooran National Park. Some (but not all) of these form part of the WTQWHA.

Tully Falls National Park and Koombooloomba National Park are both large-scale protected landscapes that are located adjacent to the eastern site boundary within the WTQWHA. Tully Gorge National Park is located within the Study Area is also within the WTQWHA and is made up of four separate tracts. The larger portion of Tully Gorge National Park is located east of Site and is approximately 3.5 km at its closest point to the Site. The other three portions of Tully Gorge National Park are located to the northeast of Site. The closest of these is approximately 6.5 km at its closest point to Site, whilst the two portions are approximately 12.5 km and 15.5 km at their closest points to the Site. Millstream Falls National Park (not within the WHA) is located the north of Site and is approximately 7 km at its closest point to the Site. Kirrama National Park (within the WHA) is located to the southeast of the Site and is approximately 6.5 km at its closest point to Site. Maalan National Park (within the WHA) is made up of two separate areas which are located northeast of the Site. The separate areas of Maalan National Park are approximately 500 m apart from each other and are approximately 14.5 km from the Site.

Due to the proximity of these National Parks to the Site and their appeal as a tourist destination, the potential for landscape and/or visual impacts on these National Parks are considered in this LVIA.

The locations of the other National Parks are generally further from the Site compared to those listed above. The other National Parks within the Study Area include:

- Girramay National Park (approximately 20.5 km to the southeast at its closest point to Site)
- Girringun National Park (approximately 24.4 km to the south at its closest point to Site)
- Herberton Range National Park (approximately 22.5 km to the north at its closest point to Site)
- Japoon National Park (approximately 32 km to the east at its closest point to Site)
- Mount Hypipamee National Park (approximately 28.5 km to the north at its closest point to Site)
- Wooroonooran National Park (approximately 14.5 km to the east at its closest point to Site)

As noted in the section above, there are two areas within the Study Area that are designated as parts of the WTQWHA, encompassing the national parks noted above. The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is noted as the key Australian

legislation that is relevant to the WHA designation. It is also worth noting that the majority of the WTQWHA within the Study Area is located within areas also designated as National Parks. The Public Environment Report (PER) Guidelines for the Project (DAWE, 2021) is relevant to matters of national environmental significance (MNES) that require assessment under the EPBC Act and are considered in detail in Section 11.

Assessment guidance for this LVIA has also referred to national and international assessment standards as well as other benchmarks including the Best Practice Guidelines for Implementation of Wind Energy Projects in Australia (Clean Energy Council, 2018) and the Draft National Wind Farm Development Guidelines (Environment Protection and Heritage Council, 2010). It is noted that as a result of the consultation following production of the Draft National Wind Farm Development Guidelines it has been determined that these guidelines will not be developed further to a final report. However, their consideration is suggested by the State Code 23 Planning Guidelines for Wind Farm Development for PO9 so they are considered here.

Table 14: Review of key national policy and guidance relevant to LVIA

Best Practice Guidelines for Implementation of Wind Energy Projects in Australia (Clean Energy Council, 2018)	
The aim of the Guidelines is to describe the environmental, amenity and stakeholder consultation aspects of the planning, approval and operational aspects of wind farms. Consideration of technical/commercial and contractual aspects are also included where the issues are of public interest. The Guidelines do not replace existing energy or environmental planning legislation, policy or regulations at local, state or federal levels but can be used to support these assessments. Project proponents must ensure they are developing their project according to the current legislation, policy and/or regulations relevant to the location of their project.	
Attributes of a Best Practice Wind Farm	The guidelines identify five key attributes of a Best Practice Wind Farm, the following of which are relevant to the assessment of impacts on landscape and visual values: <u>Socially sustainable</u> • The wind farm proponent will actively seek stakeholder participation and support through well-planned, open, inclusive and responsive engagement processes. • The proponent will ensure sound and consistent methodologies are applied to assess and identify the most appropriate siting of the wind farm for landscape, amenity and environmental impacts. <u>Environmentally sustainable</u> • The wind farm will be sensitive to the environment. Any significant negative impacts will be avoided or minimised and appropriately managed or offset as required during its development, construction, operation and decommissioning.
Landscape and visual assessment requirements	The existing landscape must be described, and the potential landscape and visual impact of the proposed wind farm assessed and evaluated. A comprehensive landscape assessment: • Should describe the landscape and evaluate its capacity for change in relation to the visual impact of the proposed development. • Must always consider visual amenity in the context of the existing environment. • Must consider local community values and the value that the local community puts on landscape character and attributes The guidelines reference the Wind Farms and Landscape Values National Assessment Framework (2007) which provides a comprehensive process for assessing, evaluating and managing the visual impacts of wind farms, whilst leaving the actual technical methods, tools and techniques for developers to decide upon.
Future development	As wind farms often have lifespans greater than 20 years, some consideration should also be given to the potential of future dwellings (such as vacant lots upon which a dwelling may be constructed without a planning permit) where required as a result of the planning framework.

Cumulative impacts	Consideration of the cumulative impacts of the wind farm together with other development in the area may also be appropriate although this can be difficult in practice. Cumulative impacts can refer to landscape and visual effects, and a wide range of other environmental, social and economic impacts, both positive and negative. While many regulators require the assessment of cumulative impacts as part of a development application, few give guidance on how this should be undertaken. It can also be difficult for proponents to access information on other developments in the area. The best approach is to understand as far as possible how various impacts may theoretically change with the addition of another wind development in the area, and proactively discuss with regulators to work towards a positive outcome.
Draft National Wind Farm Development Guidelines (Environment Protection and Heritage Council, 2010)	
Appendix C ("Landscape") of the 'Draft National Wind Farm Development Guidelines' provides guidance to ensure the impacts of wind farms on landscape values are fully understood and clearly reported.	
Issue/Concern	**Purpose/Intent**
Landscape character impacts	Advocates reporting on the anticipated *extent* a wind farm development may impact on the existing character of the landscape and its features. In particular, it recommends dividing the study area into "*character units for the purpose of evaluation; and developing strategies to manage and plan for each character unit*".
Landscape significance impacts	Recommends reporting on the *significance* of a landscape and clearly outlining which aspects of significance (if any) a wind farm would impact on. The significance of the impact is dependent on the landscape value and sensitivity (i.e. scenic, character, visual and community values) and the anticipated magnitude of change.
Impacts on viewsheds and views	Encourages reporting on the anticipated impact of the wind farm on visual amenity, through representative viewsheds and views (static and dynamic).
Impacts on community values	Advocates "*direct community input*" into the assessment of landscape and visual impacts, through definition of (predominantly subjective) community landscape values. For example, local people often have strong attachment to the outlook from a particular viewpoint, and this knowledge should inform choice of viewpoints for impact assessment.
Cumulative Impacts	Recommends reporting on the cumulative landscape and visual effects resulting from additional changes to the landscape or visual amenity caused by the proposed development in conjunction with other developments (associated with or separate to it). Cumulative impacts may occur where there are no other wind farms in the area, but by virtue of combination with other major infrastructure or large-scale developments (such as industrial, urban, large-scale agricultural) and/or direct or indirect landscape changes (such as vegetation clearing) which may alter the overall character or values of an area.
Management and mitigation	Management and mitigation refers to recommended actions to reduce anticipated residual impacts. However, the onus should be on the siting, design and layout of the wind farm development, rather than relying on mitigation measures.
Commonwealth Environment Protection and Biodiversity Conservation Act (1999) (EPBC Act)	

Australian legislation which relates to the Wet Tropics World Heritage Area includes the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act). The EPBC Act provides an additional layer of protection for all World Heritage properties in Australia, which include the Wet Tropics World Heritage Area. An example of this protection is identified in Part 3, Division 1, Subdivision A: as per below:
• *12) Requirement for approval of activities with a significant impact on a declared World Heritage property*
  ○ *(1) A person must not take an action that:*
  ▪ *(a) has or will have a significant impact on the world heritage values of a declared World Heritage property; or*
  ▪ *(b) is likely to have a significant impact on the world heritage values of a declared World Heritage property.*	

The Public Environment Report (PER) Guidelines for the Project (DAWE, 2021)
The Public Environment Report (PER) Guidelines for the project (DAWE, 2021) details those specific matters of national environmental significance (MNES) that require assessment under the EPBC Act. This is considered in more detail in Section 11. However, key requirements are to assess the impacts on: ▪ *The world heritage values of a World heritage property* ▪ *The heritage values of a National heritage place* Of particular relevance to LVIA is the requirement to assess impacts on …Criterion vii: ▪ *Interruption to sweeping forest vistas.*

5.3. State planning and legislative context

At the state level, the key relevant guidance is State Code 23: Wind Farm development and associated Planning Guideline (June 2018) produced by the Department of State Development, Manufacturing, Infrastructure and Planning (DSDMIP). This Code, summarised in **Table 15**, requires consideration of local codes.

There are three State Forests within the Study Area. This includes The Bluff State Forest, Ravenshoe State Forest and the Tumoulin State Forest. The closest of these State Forests to the Site is The Bluff State Forest which is located north of the Site and is approximately 5 km from Site at its closest point. Ravenshoe State Forest comprises three separate areas, the closest (and largest) of which is approximately 5.5 km from Site at its closest point. The additional areas of Ravenshoe State Forest are located within 2 km of the largest section. The Tumoulin State Forest is made up of six separate portions, however these portions are within 2 km of each other and relatively small compared to The Bluff State Forest. The closest portion of Tumoulin State Forest is located north of Site and is approximately 13 km from Site at its closest point.

It is worth noting that the Study Area also includes a number of Conservation Parks including Koombooloomba Conservation Park, Evelyn Creek Conservation Park, Millstream Conservation Park and Jalum Conservation Park. Koombooloomba Conservation Park is located to the east of the Site and is approximately 7 km from Site at its closest point. Evelyn Creek Conservation Park is located to the north of Site and is approximately 12 km from Site at its closest point. Millstream Conservation Park is located to the north of Site and is approximately 18 km from Site at its closest point. Jalum Conservation Park is located southeast of Site and is approximately 28 km from Site at its closest point.

In addition to the State Forests and Conservation Parks, the Study Area also includes a number of Reserves such as Koombooloomba South Forest Reserve, Ravenshoe Forest Reserve and Tumoulin Forest Reserve. Koombooloomba South Forest Reserve is located adjacent to the south-eastern boundary of the Site. Ravenshoe Forest Reserve is made up of several tracts of land within approximately 5 km of each other. The southern most of these tracts is located adjacent to the northern Site boundary. Tumoulin Forest Reserve is located approximately 12 km north of Site at its closest point.

State Forests, Conservation Parks and Reserves are not a landscape designation. However, they are sometimes used for recreation and appreciated for their natural qualities. Therefore, impacts on these landscapes have been considered from both a landscape and visual perspective in this assessment.

Table 15: Review of key state policy and guidance relevant to LVIA

Wind Farm State Code and Planning Guideline (June 2018)[3]	
The current Wind Farm State Code and associated Planning Guideline were released by the Department of State Development, Manufacturing, Infrastructure and Planning in June 2018.	
Policy / Objective	**Purpose / intent**
State Code Performance Outcomes: Character, scenic amenity and landscape values	
PO9 Development avoids, or minimises and mitigates, adverse impacts on the character, scenic amenity and landscape values of the locality and region through effective siting and design.	This Performance Outcome seeks to ensure that wind farm development minimises impacts on landscape and visual amenity values, particularly landscapes recognised as being of local importance. It also seeks to ensure that the wind farm and its component infrastructure are designed to minimise impact. No acceptable outcome is provided.
State Code Planning Guideline: Section 3.6 Meeting acceptable outcomes and performance outcomes: character, scenic amenity and landscape values	
Section 3.6.1 requires that compliance with the codes may include, but is not limited to, the following actions "*Undertake a visual impact assessment report that identifies and proposes measures to avoid or minimise adverse impacts from the development on significant landscape values and scenic amenity, including view corridors and viewpoints. The relevant local government planning scheme or regional plan may assist in identifying scenic amenity and/or landscape values to be addressed."*	Guidelines regarding a range of acceptable actions have been produced. The describes the methodology for undertaking a visual impact assessment which includes: • A description of the potential impacts on scenic amenity or landscape values • Visual simulations or photomontages demonstrating the anticipated visual impact of the development in the context of the surrounding area, and from key public viewpoints • A written statement and/or services The guideline states that the assessment should take into consideration the Queensland Government's (2007) *Identifying and protecting scenic amenity values* and further information from the *Draft National Windfarm Development Guidelines*. It is noted that the LVIA methodology used in this assessment addresses the criteria of the code and guideline but does not use the specific methodology noted in the *Identifying and protecting scenic amenity values* guideline (for reasons described below). It does take into consideration the Draft National Wind Farm Development Guidelines and internationally accepted guidelines for Landscape and Visual Impact Assessment of wind farms.
Queensland Wet Tropics World Heritage Protection and Management Act (1993)	
The Queensland Wet Tropics World Heritage Protection and Management Act 1993 was established as *"an Act to provide for the protection and management of the Wet Tropics of Queensland World Heritage Area"* • Part 2 details the establishment, functions and powers of the Wet Tropics Management Authority • Part 3: details the preparation of management plans that apply to the Wet Tropics Area.	

[3] Version 3.0 of State Code 23 including the associated Planning Guidance was published by the Department of State Development, Infrastructure, Local Government and Planning (DSDILGP) in February 2022. However, this assessment addresses the requirements of the former State Code 23 (DSDMIP, 2018) that was current at the time of the development application for a Material Change of Use (Wind Farm) to the State Assessment and Referral Agency (SARA)

Wet Tropics Management Authority

The Wet Tropics Management Authority is "…*charged with managing the Wet Tropics World Heritage Area according to Australia's obligations under the World Heritage Convention*" and was established under the Wet Tropics World Heritage Protection and Management Act 1993. (Wet Tropics Management Authority, 2021)

Part 2, Division 1, Section 10 describes the functions of the Authority which includes:

- (l) monitor the state of the Wet Tropics Area
- (m) advise and report to the Minister and Ministerial Council on the state of the Wet Tropics Area.

As such, each year the Wet Tropics Management Authority prepares an Annual Report and State of Wet Tropics Report for Australian and Queensland parliaments. It is noted that the State of Wet Tropics 2016-2017 had a focus on Criterion (vii) *Natural Beauty and Aesthetic Value of the Wet Tropics World Heritage Area*.

State of the Wet Tropics 2016-2017: Natural Beauty and Aesthetic Value of the Wet Tropics World Heritage Area, Wet Tropics Management Authority (2016)

A key finding examined in this report (Wet Tropics Management Authority, 2016) identified that the "*The Wet Tropics retrospective Statement of Outstanding Universal Value does not provide an adequate description of criterion (vii) and there is a need for more easily accessible and current documentation for assessment of this criterion"*

As such a recommendation of the report considers an extended description of the Retrospective Statement of Outstanding Universal Value (See **Table 13** above) in relation to the application of criterion (vii), which includes further distinction between superlative natural phenomena and the exceptional natural beauty and aesthetics.

Through input of workshop participants, interviews and background literature the report aims to define 'superlative natural phenomena' and 'the exceptional natural beauty and aesthetics' and how these terms apply within the context of the Wet Tropics. The report identified:

"Superlative natural phenomena relate primarily to the biological attributes of the area and underpin the other three World Heritage natural criteria for which the site was listed. These include the ***diversity of primitive plant species*** *reflecting ancient Gondwanan forests, as well as iconic and spectacular species such as the southern cassowary and distinctive rainforest marsupial fauna. One distinctive element identified as a superlative phenomenon is the* ***intact 'reef to rainforest' landscape*** *rising from sandy beaches adjacent to the Great Barrier World Heritage Area to the summit of the tallest peaks in Queensland."*

Whereas landscape features exhibiting exceptional natural beauty and aesthetic appeal included "***landscape elements such as mountain peaks and gorges that, while often widespread across the region, can be identified to particular locations that are recognised as exhibiting exceptional natural beauty****."*

During a series of workshops, a series of statements were developed with intent to support the understanding of criterion (vii). These recommendations for an extended statement of OUV related to criterion vii include:

- Statements relevant to **superlative natural phenomena** comprising:
    - The **variety of forests** range from tropical rainforest through to tall open forests of *Eucalyptus grandis*. These forests support a range of endemic and rare fauna species that are often **visually spectacular** and unusual to see, providing the visitor with the surprise of discovery
    - **Rugged mountain peaks and gorges** are among the dominating superlative features of the landscape
    - **Spectacular waterfalls** abound…
    - The significance of the property is enhanced and derives from knowledge of **the diversity and variety of vegetation** across the wet/dry ecotone.
    - The superlative natural phenomena of the property are associated with the knowledge of significant cultural sites of importance to the Rainforest Aboriginal people;

- The superlative natural phenomena and aesthetics of the property are associated with the knowledge of the protection of relicts of the lowland and littoral rainforest that were previously more extensive;
- A superlative natural phenomenon of the property is associated with the knowledge of internationally significant wetlands, and the species contained within;
- The superlative natural phenomena of the property are enhanced by knowing that the Wet Tropics abuts the Great Barrier Reef World Heritage Area, which is intact and undisturbed along more than 400km of the coastline; and
- The extensive mangroves and mudflats in the Hinchinbrook channel constitute an element of superlative natural phenomena of the property

- Statements relevant to **exceptional natural beauty and aesthetic importance** comprising:
  - The aesthetic importance of the property is underpinned by **a connection between the naturalness and beauty**, and the **experience of being in an intact natural place**;
  - The aesthetic importance of the property is underpinned by the knowledge of the protected status of the area and **broader knowledge of the landscape and its intactness**;
  - The exceptional natural beauty of the property is associated with the **visual aspect of a vast expanse of intact forest**.
  - The region between Bellenden Ker Range and the Atherton Uplands including Walter Hill Range contains superb gorge scenery with swiftly flowing rivers;
  - The Russell, Mulgrave and Johnstone Rivers have become popular with canoeists;
  - The exceptional natural beauty and aesthetic of the property is associated with the **soundscape of bird and frog calls, rushing water, wind through the trees and silence of the forest**;
  - The exceptional natural beauty and aesthetic of the property is enhanced by **the visual impact of cloud forests, mist on the mountains and the feeling of mist on the skin**;
  - The exceptional natural beauty and aesthetic of the property is associated with **Rainforest Aboriginal people having occupied the country for tens of thousands of years**;
  - The exceptional natural beauty is associated with a stark contrast of deep green of tropical rainforest and the white sandy beaches. The added visual impact of the blue of the fringing offshore coral reefs in the adjacent Great Barrier Reef World Heritage Area complements the green and white of the forests and beaches;
  - The aesthetic importance of the property is enhanced by **interacting with the environment through walking**, cycling and white-water rafting; and
  - The natural beauty and aesthetic importance of the property is enhanced by **interacting with the environment through birdwatching**.

While it is acknowledged in the report that further work is required to test the extended statements, these statements do provide a contemporary understanding of professional, stakeholder and community values of the Wet Tropics World Heritage Area that is relevant to the scope of this LVIA. It is noted that **not all of these extended statements of OUV are relevant to the Misty Mountains section of the WHA** in the vicinity of the Project site. Our emphasis is on factors considered most relevant to this LVIA as considered further, specifically in Section 11.

Wet Tropics Management Plan (1998)

The Wet Tropics Management Plan 1998 (current as of 11 September 2020) was developed under the Wet Tropics World Heritage Protection and Management Act (1993). It is noted that "*this statutory Plan provides for the regulation of potentially damaging activities within the property*"

It is noted that the Site does not fall within the WTQWHA and no infrastructure is proposed within 620 m of the WTQWHA boundary. As per the Wet Tropics Management Plan 1998 – Zoning Map (Edition 3), the area of the WTQWHA closest to the Site is identified as Management Zone A. Division 2 of the Wet Tropics Management Plan describes the purpose of Zone A as follows:

(1) The main management purpose of zone A is to protect and conserve the world heritage values and integrity of land in the zone.

(2) Other management purposes of zone A are—

(a) if land in the zone is disturbed—to restore and enhance the world heritage values and integrity of the land if, and to the extent, it is reasonably practicable; and

(b) to enable visitors to access parts of the land in the zone to appreciate and enjoy the area.

While the Wet Tropics Management Plan does not directly apply to this LVIA it is relevant to the assessment of impacts on OUV to note the provisions of Division 2, principles and criteria for deciding permit applications, which states:

56 World heritage values and integrity of the area
(1) The most important consideration for deciding the application is the ***potential impact of the proposed activity on the world heritage values and integrity*** *of the area.*
(2) The authority must decide the application in a way that minimises the potential impact of the proposed activity, including, in particular, any potential impact relating to existing or proposed community services infrastructure, visitor infrastructure or roads, on the world heritage values and integrity of the area.
(3) Without limiting subsection (2), the authority must have regard to—
…
(b) the extent to which the proposed activity is consistent with the statement of outstanding universal value for the area; and
(c) the potential impact of the proposed activity on—
…
(iii) the scenic amenity of the area, including, in particular, the degree of visual dominance of the activity or of any change to the landscape caused by the activity; *…*
(our emphasis)

Windfarm State Code landscape assessment methodology

State Code 23: Wind Farm Development and associated Planning Guideline (July 2018) states that the assessment should take into consideration the Queensland Government's (2007) *Identifying and protecting scenic amenity values*. The LVIA methodology used in this LVIA addresses the criteria of the code and guideline but does not use the specific methodology described in *identifying and protecting scenic amenity values guideline*.

Identifying and protecting scenic amenity values emerged from the South East Queensland Regional Plan 2005-2026 Implementation Guideline No. 8 and was developed as a tool for regional landscape planning and regional level scenic amenity protection in South East Queensland. As the Site is located beyond South East Queensland, the guide does not directly apply.

It is noted that Tablelands Regional Council has not undertaken an assessment in line with the methodology that would be necessary to form the baseline for any assessment in line with this guideline.

5.4. Regional planning and legislative context

At a regional level, the Site falls within the Far North Queensland Regional Plan. Relevant regional planning policy and guidance are discussed in **Table 16**.

Table 16: Review of key regional policy and guidance relevant to LVIA

Far North Queensland Regional Plan 2009-2031 (February 2009)	
The purpose of the Far North Queensland (FNQ) Regional Plan is to guide and manage the region's development over the next 20 years and address key regional environmental, social, economic and urban objectives. The current version of the plan was published in February 2009 by the State of Queensland Department of Infrastructure and Planning. At a strategic level the FNQ Regional plan identifies the substantial environmental, economic and social benefits of the diverse landscape features of the region. It acknowledges that the regional landscape features include areas of high scenic amenity and landscape heritage value and as such these areas must be protected from inappropriate urban development, urban sprawl and fragmentation so that the regional landscape values are maintained (p.12). The Site is located within the Regional Landscape and Rural Production Area as shown in Map1a: FNQ Regional land use categories. The most relevant Regional Outcomes and Policies relevant for the LVIA is described below.	
2. Regional landscape and natural resources	
The FNQ Regional Plan acknowledges that "*the forested hills, rural landscapes and abundant, tropical greenery make the region's scenery special and distinct from other parts of Australia."* (p.46) As such provides a unique backdrop for tourism, outdoor recreation and spiritual and cultural pursuits.	
Regional Outcome	**Regional Land Use Policies**
The environmental, cultural, social and economic features that comprise the region's unique tropical and rural landscapes are identified, maintained and managed sustainably and are more resilient to the impacts of climate change.	2.1.1 - The value of the landscape for nature conservation, primary production, renewable energy resource areas, priority carbon sequestration, cultural heritage, outdoor recreation and scenic amenity is given appropriate recognition in land use planning and development assessment. 2.3.1 The visual amenity of the region's landscapes and seascapes is protected and enhanced by assessing proposed developments on landscapes that are vulnerable to visual impact due to their prominence, topography or degree of naturalness. 2.3.4 Public access to significant popular viewpoints is retained, and views protected from development that diminishes the scenic values.

5.5. Local planning and legislative context

At the local level the Site extent is located within Tablelands Regional Council as can be seen in **Figure 1**. The Tablelands Regional Council Planning Scheme 2016 was adopted in September 2016, however following amendments the current version (V4) was adopted in September 2019. This version of the plan indicates that the Site is located within Rural (Agricultural Investigation), Rural (Broadhectare) and Conservation Zones.

It is noted that the Site is located approximately 5.5 km from the western boundary of the Cassowary Coast Regional Council Local Government Area. Whilst the extent of Site does not fall within its jurisdiction, the Cassowary Coast Regional Council area covers a significant portion of the Study Area. As such the Cassowary Coast Regional Council Planning Scheme, adopted July 2015, is also considered where relevant to this LVIA.

It is also noted that the Study Area captures a small portion of the Mareeba Shire Council Local Government Area, which is located approximately 18 km northeast of the Site at its closest point. Due to the considerable distance from Site, it is anticipated that there would be no direct impacts on these areas and as such this local planning schemes have not been reviewed or considered further within this LVIA.

The policies relevant to this LVIA are described in **Table 17**.

Table 17: Review of key local policy and guidance relevant to LVIA

Tablelands Regional Council Planning Scheme 2016 – Version 4 (September 2019)
The Tablelands Regional Council Planning Scheme (planning scheme) was prepared in accordance with the *Sustainable Planning Act 2009* and was amended for alignment with the *Planning Act 2016*.
At a strategic level the Planning Scheme identifies specific outcomes related to scenic amenity within the Tablelands Regional Council area. These Include: **3.6.1.4 Landscape qualities** The outstanding landscape qualities, *iconic landscape features* and scenic routes of the Tablelands are conserved and protected from development that diminishes their visual and aesthetic values. The rural character, evidence of geomorphologic history and natural features within the regional landscape are preserved through sensitive development which complements iconic views, forested hill slopes, bushland and rural vistas. **3.6.8 Element - Scenic Amenity** 3.6.8.1.1) Areas of high scenic amenity (including scenic routes) are protected from visually inappropriate and insensitive development. Development ensures scenic amenity values are maintained. 3.6.8.1.2) Forested hill slopes which are visible from scenic routes and residential areas are maintained in their natural state in recognition of their contribution to the region's scenic amenity. 3.6.8.1.3) Development in highly visible and scenic locations minimises its impact on scenic amenity through sensitive location, design, materials, colour schemes, scale, minimising earthworks and retention of native vegetation. 3.6.8.1.4) The following scenic routes are protected from visually obtrusive and unattractive development. The scenic routes include: • Lakes Circuit; • Waterfalls Circuit; • Old Palmerston Highway (Misty Mountains route); • Tully Falls Road; • Savannah Way; • Danbulla Forest Drive; and • Atherton-Herberton Road. There are no scenic amenity overlay maps or associated policies within the Planning Scheme. However, the strategic framework map shows scenic routes and iconic landscape features. It is noted that there are no iconic landscape features on or around the Site. Tablelands Regional Council also support the significance of energy projects to the region: **3.4 Economic Development** **3.4.1.8 Energy generation** *The Tablelands positions itself as a major sustainable energy region of Australia, providing a significant portion of the region's electricity supply through the large scale generation of renewable energy. New power generation facilities are well located to ensure they achieve economic benefits at both the local and regional level without compromising existing urban and rural development.*

Rural Zone (Agricultural Investigation and Broadhectare)	
Policy / Objective	**Purpose / intent**
As per the Tablelands Regional Council Planning Scheme Zone Map, the Glen Gordon portion of the Site and much of its surrounding context is zoned as Rural (Agricultural Investigation and Broadhectare). It is noted that a small portion of the Wooroora Portion of the Site is also zoned as Rural (Agricultural Investigation).	The purpose of the Rural zone includes: (1b) provide opportunities for non rural uses that are compatible with agriculture, the environment, and the landscape character of the rural area where they do not compromise the long-term use of the land for rural purposes; and (1c) protect or manage significant natural features, resources, and processes, including the capacity for primary production; and (2b) protect the rural character and scenic amenity of the region. The purposes of the Rural zone code will be achieved through (but not limited to) the following overall outcomes: (3c) The establishment of extractive industries, mining and associated activities and alternative forms of energy generation is appropriate where environmental impacts and land use conflicts are minimised; and (3i) Visual impacts of clearing, building, materials, access ways and other aspects of development are minimised or appropriately managed; and (3j) Adverse impacts of development both on-site and from adjoining areas are avoided and any impacts are minimised through location, design, operation and management.
Rural Zone Code Table 6.2.1.3.1 It is noted that a wind farm development in not listed as a use within the Rural Zone *Categories of development and assessment -Material Change of Use* (Table 5.5.1.1). However, as a project being assessed by SARA under the State Development Assessment Provisions these requirements do not strictly apply but are included here for reference to the land use intent of Tablelands Regional Council.	
Performance Outcomes	**Acceptable Outcomes**
PO12 Development does not compromise significant views, the visual character of significant landscape features or views from scenic routes.	AO12 Development is situated on site in a way which does not impact upon: • the attributes or values which give rise to the attractiveness of the subject site; and • the visual and landscape setting of the region; and • distant views of prominent natural features or landmarks; and • scenic routes.
PO13 Development does not adversely affect the rural amenity of the zone or of adjoining land uses.	AO13 No acceptable outcome provided.
PO14 Visual impacts of clearing, building, materials, access ways and other aspects of development are responsive to the natural environment, scenic amenity and purpose of the zone. land uses and/or rural landscape character.	AO14 No acceptable outcome provided.
Conservation Zone	
Policy / Objective	**Purpose / intent**
As per the Tablelands Regional Council Planning Scheme Zone Map, the majority of the Wooroora portion of the Site and much of its	The purpose of the Conservation zone code is to provide for the protection and management of areas identified as supporting significant biological diversity and ecological integrity.

surrounding context is zoned as Conservation.	The purpose of the Conservation zone code will be achieved through (but not limited to) the following overall outcomes: (a)The World Heritage listed values of the Tablelands World Heritage Areas are protected; and (b) Development is of an appropriate scale and site cover to minimise impacts on the environmental values of the site; and (d) Development impacts on scenic values of significance are avoided; and (f) Adverse impacts on conservation values from on and off-site development or operation of development are minimised through the location, design and management of development and activities and management practices; and (g) Development is reflective of and responsive to the environmental values of the area
Conservation Zone Code Table 6.2.9.3.1 It is noted that a wind farm development in not listed as a use within the Conservation Zone Categories of development and assessment -Material Change of Use (Table 5.5.9.1). However, as a project being assessed by SARA under the State Development Assessment Provisions these requirements do not strictly apply but are included here for reference to the land use intent of Tablelands Regional Council.	
Performance Outcomes	**Acceptable Outcomes**
PO1 Development does not dominate the natural environment and does not detract from the scenic values of the area.	AO1.1 Building and structure heights do not exceed 8.5m; and Any building does not exceed two storeys above ground level. AO1.2 Development is constructed of materials and finishes compatible with the natural landscape.
PO4 Development is designed, located and constructed to complement the natural, scenic, historical or cultural values of the site and the area generally and do not have adverse impacts on those values.	AO4 Development: • is constructed of materials and finishes compatible with the natural landscape; and • uses natural colours; and • includes appropriate provision for access to natural light and ventilation, landscaping and outlook.
PO6 Development is designed to: • protect the natural features of the site and surrounds; and • maintain the landscape character of the area; and • address site constraints including: - slopes; and - flooding; and - overland flow; and - watercourses; and - wetlands; and - habitats; and - soil erosion; and - ecological values; and - significant vegetation.	AO6 No acceptable outcome provided.
PO8 Development does not affect the amenity of the site or of adjoining land uses.	AO8 No acceptable outcome provided.

Cassowary Coast Regional Council Planning Scheme (July 2015)	
The Cassowary Coast Regional planning scheme has been prepared in accordance with the Sustainable Planning Act 2009 (the SP Act) as a framework for managing development in a way that advances the purpose of the SP Act. The planning scheme was amended for alignment with the *Planning Act 2016*. As the Site is not located within the Cassowary Coast region, no direct impacts are anticipated and therefore development codes have not been considered in this LVIA. It is noted however that the planning scheme includes a scenic amenity code and that locations within the Study Area are identified as Tourist Routes and Visually Significant Areas in the Cassowary Coast Regional Council Scenic Amenity Overlay.	
Scenic amenity code	
The purpose of the scenic amenity code is to *ensure the Region's scenic hill slopes, foreshores and esplanades, visually significant areas, tourist routes, rural landscape and landscape generally are protected and enhanced.* *The purpose of the code will be achieved through the following overall outcomes:* *(a) within the urban footprint, development avoids hill slopes and headlands with a gradient greater than 1:4;* *(b) outside the urban footprint, development avoids hill slopes and headlands with a gradient greater than 1:6;* *(c) the scenic values of the Region's hill slopes are protected from development that may impact on those values;* *(d) the scenic values of visually significant areas are maintained or enhanced;* *(e) views from tourist routes, the State and major road network, scenic esplanades/foreshores, beaches and offshore are maintained or enhanced;* *(f) the scenic values of the rural landscape and the landscape generally are protected.*	
Table 8.2.10.3 – Assessable development	
Performance Outcomes	**Acceptable Outcomes**
General	
PO1 Before development proceeds: (a) the scenic values of the development site must be identified; (b) it must be demonstrated that the development is consistent with and will maintain or enhance those identified scenic values.	No acceptable outcome prescribed.
PO2 Significant popular views are protected from development that diminishes scenic values.	No acceptable outcome prescribed.
PO3 Development is designed, located and constructed to ensure built form does not detract from the integrity of or dominate the natural landscape.	AO3.1 Buildings and other structures are of a height generally less than the height of the existing mature vegetation canopy, where such a canopy exists.
PO4 Buildings and other structures are not visually obtrusive: (a) where located on a hill slope; (b) when viewed from a tourist route or the State and major road network;	No acceptable outcome prescribed.

(c) when viewed from a beach, scenic esplanade/foreshore and offshore; (d) where located in the rural landscape.	
Visually significant areas	
PO6 Development in a visually significant area: (a) does not detract from the scenic amenity of the area; (b) results in the revegetation of degraded natural areas and riparian corridors.	No acceptable outcome prescribed.
PO9 Development adjacent to a tourist route does not obscure or detract from views of visually significant areas.	AO9.1 Buildings and other structures including advertising devices are positioned to ensure views are maintained.
State and major road network and tourist routes	
PO15 Development adjacent to the State and major road network or a tourist route must be designed, located and constructed to maintain a pleasing visual appearance for passing motorists and pedestrians.	No acceptable outcome prescribed.

6. Regional landscape context

The Site and its wider landscape context are illustrated in **Figure 1** and **Figure 3** which are included in Appendix 1.

6.1. Settlement and infrastructure

The Site lies in an area that features predominantly rural landscapes as well as large areas of protected land. As such much of the surrounding landscape comprises farmsteads, both wooded and cleared agricultural grazing areas as well as denser forested and natural landscapes (including areas designated as World Heritage Area, National Parks and/or State Forests, Conservation Parks and Reserves). There are also numerous settlements in the area.

The rural locality of Millstream SSC (population 1,246, ABS Census Data, 2016a) is the closest settlement to Site. It is situated north of the Site with the properties on the southern fringe of this locality, closest to Site, being approximately 3.4 km away from the nearest proposed turbine. The settlement of Innot Hot Springs (population 177, ABS Census Data, 2016b) is a small town located west of the site with the more densely settled area of the town being located approximately 11 km from the nearest proposed turbine. There are also isolated rural properties closer to Site that are situated within the Innot Hot Springs locality; these include properties on Herbert River Road, the closer of which are approximately 6 km from the nearest proposed turbine.

Ravenshoe is the largest town in the Study Area (population 1,400, ABS Census Data, 2016c) and is located to the north of the Site, approximately 11 km from the nearest proposed turbine.

There are other settlements and rural localities within the Study Area that are located further from the Site, these include:

- Millaa Millaa (population 514, ABS Census Data, 2016d)
- Mount Garnet (population 430, ABS Census Data, 2016e)
- Tumoulin (population 109, ABS Census Data, 2016f)

The Kennedy Highway (National Route 1) traverses through the northern portion of the Study Area typically on a west to northeast alignment, where it passes through Mount Garnet, Innot Hot Springs, Millstream and Ravenshoe. At the closest point to Site the Kennedy Highway is approximately 3.5 km from the nearest proposed turbine. The Annual Average Daily Traffic (AADT) of this portion of the Mount Garnet to Ravenshoe potion of the Kennedy Highway measures 1,775 of which 16.28% are heavy vehicles (Queensland Government Traffic Census Data, 2019).

The Palmerston Highway (State Route 25) is located in the eastern portion of the Study Area where links Millaa Millaa to localities east of the Study Area. At its closest point to Site the Palmerston Highway is approximately 27.67 km from the nearest proposed turbine. The section from Millaa Millaa heading east to Innisfail has an AADT of 1,375 (23.66% heavy vehicles). It is worth noting that the Old Palmerston Highway links the Kennedy Highway to the Palmerston Highway on a southwest to northeast alignment. The Old Palmerston Highway is approximately 13.5 km from the nearest proposed turbine. Kirrama Range Road and Cashmere Kirrama Road traverse the southern portion of the Study Area. Kirrama Range Road aligns generally in an east to west alignment where it eventually becomes Cashmere Kirrama Road at a location approximately 25 km from the nearest proposed turbine. Cashmere Kirrama Road also generally has an east west alignment and is approximately 23 km from the nearest proposed turbine at its closest point. At its westernmost extent, Cashmere Kirrama Road extends north and becomes Gunnawarra Road which follows a south to north alignment until it terminates when it intersects the Kennedy Highway. Gunnawarra Road is approximately 20 km from the nearest proposed turbine at its closest point. It was noted during field

work that Kirrama Range Road, Cashmere Kirrama Road and Gunnawarra Road are unsealed roads. It is understood that four wheel drive vehicles are recommended for Kirrama Range Road.

There are numerous nominated ‘tourist drives’ and ‘scenic routes’ (including some noted in the Tablelands Regional Council Planning Scheme) which include sections along these highways and roads within the Study Area. These tourist drives are shown in **Figure 7**. On the Kennedy Highway there is the ‘Savannah Way’ which extends across northern Australia from Cairns to Broome passing through the Study Area. It is promoted by Savannah Way Limited (2021) as well as Tourism & Events Queensland (2021). There is also the Kirrama Range Road tourist drive which follows Kirrama Range Road, Cashmere Kirrama Road and Gunnawarra Road and is promoted by Tropical Coast Tourism (2021).

As shown on **Figure 2** and **Figure 3**, a number of smaller local roads are present within and around the Site, these include:

- Millstream Parade is located north of the Site where it connects the settlement of Millstream to the Kennedy Highway. At its closest point to Site it is approximately 3.2 km from the nearest proposed turbine.
- Tully Falls Road generally follows a north to south alignment and connects Koombooloomba Dam at its southernmost point to the Kennedy Highway at Ravenshoe where it terminates. Tully Falls Road is located east of the Site and is approximately 3.1 km from the nearest proposed turbine at its closest point.
- Wooroora Road generally follows a northeast to southwest alignment. In the northeast Wooroora Road intersects with Tully Falls Road. In the southwest Wooroora Road intersects the Site boundary; it is the proposed access point to the Project.
- Herbert River Road is located to the west of the Site and for a significant portion of its extent follows a north to south alignment. It is located approximately 6.5 km from the nearest proposed turbine at its closest point.
- Gunnawarra Road is located further from Site however represents one of the few public access roads in the western extents of the Study Area. Gunnawarra Road is approximately 20 km from the nearest proposed turbine at its closest point.
- Cashmere Kirrama Road is also located further from Site however represents one of the few public access roads in the southern extents of the Study Area. Cashmere Kirrama Road is located approximately 23 km from the nearest proposed turbine at its closest point.
- Numerous private and semi-private access roads to rural properties such as Yourka Glen Gordon Road, the closest route to the west of the Site, located approximately 3.7 km from the closest turbine.

There are limited operational rail lines within the Study Area; however, it is noted there is the Ravenshoe Steam Railway which links Ravenshoe with Tumoulin. Typically a return passenger service operates as an attraction for visitors to the area. Where this line terminates in Ravenshoe is approximately 12.5 km from the nearest proposed turbine.

There is little built infrastructure within the Site boundary with the exception of both 275 kV transmission lines and a 132 kV transmission line. The 132 kV alignment follows one of the 275 kV alignments which crosses the Site boundary in the east, near the existing Chalumbin substation which is located approximately 500 m east of the Site boundary. These alignments then bisect the Site and head generally northwest until they cross the northern Site boundary. There is an additional 275 kV alignment that extends from the Chalumbin substation and follows a north to south alignment where it follows the eastern Site boundary south before bisecting the southern tip of the Site and crossing the Site boundary.

In the wider landscape, the presence of mining activity is apparent with extraction of limestone being undertaken approximately 18 km west of the Site near Mount Garnet. The extraction of metals is also

being undertaken in this area at approximately 20.5 km west of the Site. Windy Hill Wind Farm, Queensland's first wind farm, commissioned in 2000, is located near Ravenshoe around 17 km from the site. There are 20 turbines each 44 metres high.

6.2. Geology, landform and hydrology

Geology mapping was obtained from the State of Queensland Department of Resources via the Queensland Globe online mapping service (Queensland Government 2021). There are numerous geological formations underlying the Study Area however the dominant formations include the Kennedy Province - Carboniferous-Permian volcanic rocks (dominantly rhyolitic ignimbrite, breccia, lava; subordinate andesitic to basaltic lava; minor volcaniclastic sandstone and siltstone), Kennedy Province - Carboniferous-Permian intrusive rocks (pink to grey or cream, equigranular to porphyritic biotite granite, hornblende-biotite granite and granodiorite; microgranite and leucogranite; subordinate diorite and gabbro), Pliocene-Pleistocene alluvial and lacustrine deposits including Wondoola beds Armraynald beds (poorly consolidated sandstone, mudstone, conglomerate) and North Queensland Tertiary-Quaternary basalts (mostly olivine basalt flows and some plugs; some nephelinite). This geology forms the basis for the landform, topographic and hydrological features of the LVIA study area.

As illustrated on **Figure 4**, landform within the Study Area is varied as it includes the higher elevations typically associated with the Cardwell Range, Walter Hill Range, Table Top Range, Black Mountain Range and the Great Dividing Range as well as the lower alluvial plains to the east. The Black Mountain Range is located within the Site, extending typically west to east across a significant area in the northern portion of the Site. At the western edge of the Black Mountain Range is the mountain Arthurs Seat (898 m AHD), which is a significant feature of the Site. The Cardwell Range is located east of the Site and follows a north to south alignment. The more significant mountain peaks of this range and on its periphery include Majors Mountain (1175 m AHD), Mt Koolmoon (1119 m AHD). The Table Top Range and Walter Hill Range are located further east of Site, but within the Study Area, and follow a generally northwest to southeast alignment. Significant peaks associated with these ranges include Mt Cullumbullum (980 m AHD) and Mt Marquette (1068 m AHD). The Great Dividing Range is located to the northeast of the Study Area where generally follows a southwest to northeast alignment. Larger peaks associated with this range in the Study Area include Mt Misery (1069 m AHD) and Mt Nolan (989 m AHD). These ranges create a varied topography throughout much of the norther part of the Study area as well as to the east. In comparison to this, the alluvial plains associated with the Tully River to the southeast of the Study Area, represent much lower and more consistent topography. The landform to the southwest of the Study Area is generally more consistent elevations compared to that in the north of the Study Area, however, this area is still much more elevated than the lower plains to the southeast.

The majority of the Study Area and all of the Site falls within the Herbert River Drainage Sub-Basin which forms part of the Herbert Drainage Basin. The southeast of the Study Area is part of the Tully River Drainage Sub-Basin which forms part of the Tully Drainage Basin. The north-eastern portion of the Study Area includes parts of both the North Johnstone River Drainage Sub-Basin and the South Johnstone River Drainage Sub-Basin. These two Sub-Basins fall within the Johnson Drainage Basin.

The main watercourses located within the Study Area are the Herbert River to the west and south of Site, the Millstream to the north of Site, the Tully River to the southeast of Site as well as the South Johnstone River and Johnstone River to the northeast of Site. These watercourses have many tributaries that flow from the surrounding ranges, the larger of which include Blunder Creek which runs through Site before flowing into Herbert River and Vine Creek which runs north of Site and flows into The Millstream.

6.3. Soils, vegetation and land use

Existing land use within the Study Area is predominantly rural, characterised by grazing properties for livestock production, particularly within the Site and the surrounding landscape to the west, south and northeast. A significant extent of the eastern half of the Study Area features large areas of protected landscapes and as such there is typically minimal intervention within these areas. There are however rural landscapes, agriculture and cropping, in the lowlands to the southeast.

The soil types found within the elevated range topography in the east of the Study Area are typically dermosols and ferrosols. These soil types in this elevated environment typically support complex notophyll vine forests which include a diverse group of vegetation communities characteristic of the Wet Tropics.

In the more undulating topography west of the Cardwell Range the soil types found through the centre and to the north of the Study Area are generally rudosols, podosols and kandosols. In the context of the study area these soil types support mixed open forest to woodland including *Corymbia* spp. and *Eucalyptus* spp. with a sparse to moderately dense shrubland of *Acacia* spp.

To the western edge of the Study Area the dominant soil types are kandosols, podosols and sodosols. Within this context these soils support open forest and woodland of *Corymbia* spp., *Eucalyptus* spp., *Melaleuca* spp. with a generally open shrub layer of similar species in juvenile form as well as *Acacia* spp.

The soil type found to the southeast of the Study Area, within the lower plains, is typically hydrosols, kandosols and dermosols. In this area much of the landscape is cleared for cropping purposes, particularly sugar cane. However, in this context these soils can support closed forest of *Melaleuca* spp. in poor draining areas as well as open forest dominated with *Eucalyptus* spp. and *Corymbia* spp.

As described in Section 5 and shown on **Figure 5**, the WTQWHA extends into the Study Area, including a small area in the northeast of the Site as shown on **Figure 2**. There are also numerous National Parks included in the Study Area such as Tully Falls National Park and Koombooloomba National Park which are both located adjacent to the Site. Tully Falls National Park is located on the upland areas of the Cardwell and Walter Hill Ranges where water has eroded the underlying geology to create a range of streams and waterfalls of high scenic value. This National Park is known to include plant and animal species of conservation significance (Queensland Government, 2013a). Tully Falls National Park falls within the WTQWHA and includes Majors Mountain, Mt Koolmoon and Koolmoon Creek as well as Cannabullen Creek and Falls. These landscape features are accessed via the Misty Mountains wilderness trails. These trails allow recreational use within the National Park such as hiking, camping and mountain biking (in some instances). The Misty Mountain trail network (which includes Koolmoon Creek track and the Cardwell Range track) extend throughout Tully Gorge National Park and into adjacent National Parks including Tully Gorge National Park and Wooroonooran National Park. The Wabunga Wayemba hiking trail is also located within Tully Falls National Park. Tully Falls National Park and the Misty Mountain and Wabunga Wayemba trail heads are accessed via Tully Falls Road.

Koombooloomba National Park is located directly south of Tully Falls National Park and shares part of its western boundary with the Site. This National Park represents a "*continuous cross-section of wet tropical forest types from high altitude rainforest to open woodlands over a very steep rainfall gradient. The ecotones along this gradient add significantly to the variety of habitat types and the range of plant and animal species present*" (Queensland Government, 2013b). The National Park surrounds the Koombooloomba Dam, which was built on the upper extent of the Tully River. The dam is not part of the National Park (although does fall within the WTQWHA) and as such is used for boating, water-skiing and fishing. There are no advertised hiking or mountain bike trails within this National Park however there are four-wheel drive tracks, Nitchaga Creek Road and Wall Creek Road, that provide

access to bush camping locations near Koombooloomba Dam. There is a larger campground near Koombooloomba Dam however this sits within Koombooloomba Conservation Park. The Koombooloomba Conservation Park is a small tract of land surrounded by Koombooloomba National Park and Koombooloomba Dam. A larger tract of land on the western side of Koombooloomba National Park is identified as Koombooloomba South Forest Reserve. With the exception of the Red Road, an unsealed road that links Nitchaga Creek Road and Wall Creek Road, there is limited access to Koombooloomba South Forest Reserve and it is not anticipated that this area is heavily used for recreation or has any significant recreational facilities. The management directions for Koombooloomba National Park, Forest Reserve and Conservation Park, identifies as a desired outcome that the "*scenic landscape values of the park are protected, and areas of natural vegetation are maintained and enhanced*" (Queensland Government, 2013b). It is noted that Koombooloomba National Park and Koombooloomba Conservation Park are located within the WTQWHA, however Koombooloomba South Forest Reserve is not.

As described in Section 5, Tully Gorge National Park is made up of four separate portions. The largest of these is located east of the Site and Koombooloomba National Park. This National Park falls entirely within the WTQWHA and its "*landscape plays a significant role in water quality and scenic amenity"* (Queensland Government, 2013c). The Tully River flows through this National Park and there are significant mountain peaks such as Majors Mountain and Mt Cullumbullum. Tully Gorge National Park accommodates a large number of recreational uses such as hiking, mountain biking, rafting, canoeing, fishing and camping as well as access to the Tully Gorge lookout which offers visitors spectacular views of Tully Falls during the wet season. The hiking tracks within Tully Gorge National Park include those identified as the Misty Mountain wilderness trails and in the context of this National Park this includes access to the summit of Majors Mountain.

Millstream Falls National Park is located outside of the WTQWHA and includes two major waterfall features, Big Millstream Falls and Little Millstream Falls, both of which are accessible via a short walk from separate trail heads. The Big Millstream Falls section of the park, accessed directly off the Kennedy Highway, includes a day-use area with barbeques, tables and toilets. Millstream Falls National Park was established for its scenic qualities and recreational opportunities but also now is valued for its role in conserving local history and culture as wells as the forest communities found within the park (Queensland Government, 2013d).

Maalan National Park is situated within the WTQWHA and is made up of two separate areas. This National Park is valued as it contributes to the vista of rainforest covered mountains within the cleared farmlands that surround it (Queensland Government, 2013e). Maalan National Park also protects the significant animal and plant communities found in this part of the WTQWHA. Herberton Range National Park contains steep, forested ridges and rainforest areas on the mountain peaks and in the valleys. The parks primary conservation goal is the protection of the diverse range of animals and regional ecosystems (Queensland Government, 2013f).

As noted in Section 5, there are other National Parks within the Study Area. These include Kirrama National Park, Girramay National Park, Girringun National Park, Japoon National Park, Mount Hypipamee National Park and Wooroonooran National Park. These National Parks are not considered further in this LVIA as they are located further from Site than Tully Falls National Park, Tully Gorge National Park and Koombooloomba National Park and will not be directly impacted by the Project. Any indirect impacts (for example on views from these areas) would be of considerably lower significance than those national park areas that are assessed.

There are three State Forests located within the Study Area as noted in Section 5. These include The Bluff State Forest, Ravenshoe State Forest and Tumoulin State Forest. There is little published information for these State Forests, so it is not anticipated that these areas are heavily used for recreation or have any significant recreational facilities. It is noted however that Tumoulin Forest Reserve, which is situated adjacent to Tumoulin State Forest, includes McKenzie Falls which is

accessible via a short hiking track. There are roads accessible by four-wheel drive vehicles throughout this park and sections of these roads are also used for horse riding.

Other Forests Reserves and Conservation Parks within the Study Area include Ravenshoe Forest Reserve, Jalum Conservation Park, Millstream Conservation Park and Evelyn Creek Conservation Park. There is little published information for these Forest Reserves and Conservation Park, so it is not anticipated that these areas are heavily used for recreation or have any significant recreational facilities.

6.4. Interim Biogeographic Regionalisation for Australia

The Interim Biogeographic Regionalisation for Australia (IBRA) is a biogeographic regionalisation of Australia developed by the Australian Government's Department of Sustainability, Environment, Water, Population and Communities. IBRA represents a landscape-based approach to classifying the land surface of Australia. The IBRA data consists of two datasets: IBRA bioregions, which are a larger scale regional classification of homogenous ecosystems; and sub regions, which are more localised.

Whilst bioregions have been defined mainly for the purposes of ecosystem planning and monitoring, the nominal attributes that make up IBRA are: climate, lithology/geology, landform, vegetation, flora and fauna, and land use which are themes typically used to define landscape character at a high level. IBRA 7.0 was released in 2012, which delineates 89 biogeographic regions and 419 sub regions, each reflecting a unifying set of major environmental influences which shape the occurrence of flora and fauna and their interaction with the physical environment across Australia. The bioregion information enables a high-level desktop understanding of the different landscape settings of the Study Area. The descriptions for the sub-regions that accompany IBRA7 are not currently published. However, upon request, the Queensland Government Environmental Resources Information Network (ERIN) were able to supply descriptions of each of the sub-bioregions in the Study Area for the IBRA5.1 dataset (which follows similar boundaries to the current version in the vicinity of the Site).

As defined by IBRA 7.1 (2012), the majority of the Project Site and the wider Site context is roughly halved with the eastern half of the Site and Study Area falling within the Wet Tropics (WET) Bioregion. The western extent of the Site and the Study Area lie within the Einasleigh Uplands (EIU) Bioregion. Similarly the Site extends over two sub-bioregions which are the Kirrama-Hinchinbrook (WET6) subregion to the eastern portion of the Site and the Herberton-Wairuna (EIU6) subregion to the western portion of the Site. These are described below in **Table 18** as follows (ERIN, 2012):

Table 18 IBRA Sub bioregion descriptions

IBRA Subregion Name, Code and Total Area (Ha)	***Description***
Wet Tropics – Kirrama-Hinchinbrook WET6 239,696 ha	Includes the Cardwell and Kirrama Ranges, Macalister Mountains and the ranges of Hinchinbrook Island. These ranges are bounded by faults trending generally north–west and consist of Carboniferous to Permian granites and upper Carboniferous rhyolites. The Hinchinbrook Channel is relatively shallow, and it is only at times of high sea–level, such as during the past 6000 years, that this mountain range becomes an island. At its northern end acid volcanic rocks form steep ridges rising to Mt Pitt and abut the massive granitic complex of the centre and south of the island, culminating in Mt Bowen (1119m). This massif has steep slopes and is deeply dissected. This subregion is characterised by steep environmental gradients associated with steep slopes, gorges, water falls, shallow rocky soils and a complex pattern of vegetation with rainforest interspersed with tall open forests and woodlands.

Einasleigh Uplands – Herberton-Wairuna EIU6 750,977 ha	Is largely defined by its high altitude and wetter climate. It occurs in the central east adjacent to the Wet Tropics bioregion. It is dominated by extensive areas of Tertiary plateau, but also includes basalt plains and rugged ranges on folded sediments and igneous rocks. It is dominated by grassy woodlands and open forests. Its plateau surface forms the Great Dividing Range between the Undara shield volcano and the Atherton Plateau. Most of the subregion forms the upper catchment of the Herbert River although in the south it also contains the headwaters of the Burdekin River. Its northern parts drain into the Mitchell River and the Gulf of Carpentaria. Seasonal and permanent lakes in this subregion are the most extensive of the bioregion.

*Note: these descriptions were provided directly to Lat27 staff by Queensland Government Environmental Resources Information Network (personal correspondence)

6.5. Project Site

The Project Site is shown on **Figure 2**. The boundary of the Site is defined by Lot and field boundaries including those of adjacent National Parks and Forest Reserves.

As illustrated on **Figure 4**, the majority of the Site is located on the varied, elevated topography associated with the ridges and valleys west of the Cardwell Range as well as the Black Mountain Range. Typically, the lower areas of Site are located towards the south-eastern Site boundaries and are generally associated with Blunder Creek and Lily Creek as well as their tributaries.

The vegetation coverage on the Site is generally moderate throughout consisting of woodland with grassland understory. The density of vegetation is increased on slopes and watercourses. Vegetation clearance is evident and has been undertaken on Site for access tracks, transmission lines, farm infrastructure and grazing areas.

There are limited built structures within the Site boundary. It is noted however that there are both 275 kV transmission lines and 132 kV transmission line alignments that traverse the Site. The 132 kV alignment follows one of the 275 kV alignments which crosses the eastern Site boundary. These alignments then bisect the Site and head generally northwest until they cross the northern Site boundary. There is an additional 275 kV alignment that extends from the Chalumbin substation and follows a north to south alignment where it follows the eastern Site boundary south before bisecting the southern tip of the Site and crossing the Site boundary. There are also powerlines which supply residential properties on and near the Site.

The main access track that passes through the Site extends from Wooroora Road to the north of site through to Mandalee Road (Yourka Glen Gordon Road) to the east of Site. This track is used by residents and workers to access these properties.

Examples of this existing infrastructure and features on the Site are shown on **Illustration 3** below.

The land is currently used for rural purposes, predominantly grazing, where topography allows. Noting the exception of the proposed Project infrastructure such as turbine towers, associated buildings and access tracks, the land will continue to be used for rural purposes such as grazing livestock during operation of the Project. There is no public access within the Site boundary.

Illustration 3 *Existing features on the Site (clockwise from top-left): 275 kV and 132 kV transmission lines; powerlines supplying residential properties; graded access track; clearing for grazing.*

7. Landscape assessment

7.1. Landscape character assessment

Four landscape character types (LCTs) have been identified within the LVIA Project Study Area. These are identified in **Figure 6** (refer Appendix 1). The four landscape character types are:

- Type A: Forested Ranges and Mountains
- Type B: Undulating and Wooded Uplands
- Type C: Rural Uplands and Rivers
- Type D: Lowland Rural Plains

The Site extends across two of the LCTs including parts of LCT A and LCT B. These two LCTs each cover significant areas. The majority of the Site is located within LCT B.

Landscape character types A to D and their associated Landscape Character Areas (LCAs) are described in **Table 19** to **Table 22** below. These tables also assess the likely sensitivities for each identified LCT and LCAs in relation to the proposed wind farm development and assess the likely magnitude of change and consequent likely significance of that effect on landscape amenity values.

Landscape Character Type A

Table 19: Summary description of LCT A: Forested Ranges and Mountains

Type A: Forested Ranges and Mountains	
Landscape Baseline Assessment	
Location and boundaries	This landscape type is typically located through the eastern half of the LVIA Study Area. There are five Landscape Character Areas (LCAs) of this type in the LVIA Study Area – *Wooroora* (LCA A1), *Koombooloomba* (LCA A2), *Tully Falls* (LCA A3), *Tully Gorge* (LCA A4), *Maalan* (LCA A5) and *Herberton Range* (LCA A6).
Relationship to the WTQWHA	The majority of this LCT falls within the Misty Mountains section of the WTQWHA, with the exception of Wooroora (LCA A1) that adjoins the western boundary of the WHA and a small part of Koombooloomba (LCA A2) which largely falls within the WTQWHA with the exception of a small area that falls within the Koombooloomba South Forest Reserve.
Typical character images:	
  	
Key characteristics	• There is mixed geology found in each LCA of the type, predominantly Kennedy Province - Carboniferous-Permian volcanic rocks (dominantly rhyolitic ignimbrite, breccia, lava; subordinate andesitic to basaltic lava; minor volcaniclastic sandstone and siltstone) and Kennedy Province - Carboniferous-Permian intrusive rocks (pink to grey or cream, equigranular to porphyritic biotite granite, hornblende-biotite granite and granodiorite; microgranite and leucogranite; subordinate diorite and gabbro).

	• Soils typically found here comprise kandosols, dermosols and ferrosols. • The landscape is generally steep consisting of the ridges and valleys of the Cardwell and Walter Hill Ranges. The topography typically ranges between 800 and 1000 m AHD however there are some higher elevations within LCAs of this type including Mt Koolmoon (1119 m AHD), Mt Kooroomool (920 m AHD), Mt Cullumbullum (980 m AHD) and Majors Mountain (1175 m AHD). • As described above, the majority of these typically forested landscapes are designated as part of the WTQWHA. LCA A2, LCA A3, LCA A4, LCA A5 and LCA A6 are all identified as part of WTQWHA. As described in Section 5, large parts of this landscape is valued for its exceptional natural beauty, with superlative scenic features. • Much of this LCT is also designated as National Park, State Forest, Forest Reserve or Conservation Park. • This includes Koombooloomba National Park (LCA A2) and Tully Falls National Park and Maalan National Park which all cover a significant portion of LCA A3. LCA A4 includes significant areas of Tully Gorge National Park, Kirrama National Park, Wooroonooran National Park and Girramay National Park while LCA A5 includes a portion of Maalan National Park. LCA A6 includes the southern extent of Herbert Range National Park. • There are areas of State Forest within this LCT including Ravenshoe State Forest (within LCA A3). • There are two Forest Reserves within this LCT. Koombooloomba South Forest Reserve is located in LCA A2 and Ravenshoe Forest Reserve Forest Reserve is partially located within LCA A3. • Vegetation in this LCT is typically dense notophyll vine forest which includes a diverse group of vegetation communities, characteristic of the Wet Tropics. • There are no major transport corridors through this LCT within the Study Area. There are however local access roads within the Study Area such a Tully Falls Road and the Old Palmerston Highway. There are many smaller local access roads, such as Cockram Road that connect these roads to residential properties within this LCT. • The landscape is incised with creek valleys where waterways drain the elevated areas. This includes the Tully River and its tributaries. • This LCT is sparsely settled. This is due to the elevated and heavily vegetated terrain as well as the significant extent of protected landscapes within this LCT. • These forested landscapes often form a backdrop to long distant views from the surrounding landscape due to their elevated nature.
Precedent modifications and infrastructure elements	• There are numerous access roads throughout this LCT. The key roads include Tully Falls Road through LCA A2 and LCA A3 as well as the Old Palmerston Highway through LCA A3. • 275 kV and 132 kV transmission lines pass through LCA A1 and LCA A2. 132 kV and 22 kV alignments pass through LCA A4. • The Chalumbin substation, which is located on the alignment of the 275 kV and 132 kV transmission lines is located within LCA A3. • There are limited residential properties located in this LCT. The majority of residential properties within this LCT are located off Tully Falls Road in LCA A3, just to the northwest of Tully Falls National Park. • Koombooloomba Dam includes a large concrete weir, spillway, vehicle bridge and other infrastructure.
Landscape Character Sensitivity Assessment	• LCT A is typically exposed to views from the wider landscape given the general elevated topography of this landscape type. • Due to the density of the vegetation and the steepness of the topography there is perceived naturalness and inaccessibility through much of this landscape. There is minor intervention in the form of built infrastructure including roads,

	transmission lines, Chalumbin Substation, Koombooloomba Dam and residential properties. • LCA A2, LCA A3, LCA A4, LCA A5 and LCA A6 are all identified as part of WTQWHA. As described in Section 5, large parts of this landscape is valued for its exceptional natural beauty, with superlative scenic features. • Tully Falls National Park is located within LCA A3 and is valued for its streams and waterfalls of high scenic value as well as its plant and animal species of conservation significance. Tully Falls National Park is also visited for its recreational purposes. • Koombooloomba National Park is located within LCA A2. This park is valued for its variety of habitat types which hosts a diverse range of plant and animal species. These features are protected along with the park's scenic values. It surrounds Koombooloomba Conservation Park and Koombooloomba Dam which are recreational destinations. • Tully Gorge National Park is located within LCA A4 and is valued for its contribution to water quality and scenic amenity. Tully Gorge National Park is visited for its range of recreational activities. • Maalan National Park is located within LCA A3 and LCA A5. This park is valued for its contribution to the vista of rainforest covered mountains within the cleared farmlands that surround it. Maalan National Park also protects the significant animal and plant communities found in this part of the WTQWHA. • The southern extent of Herberton National Park is located within LCA A6. This park is valued for its diverse range of animals and regional ecosystems. • Ravenshoe State Forest and Ravenshoe Forest Reserve are located within LCA A3. While these areas are not anticipated to be frequently visited for recreational purposes they are acknowledged for their environmental values within a landscape which is likely to have local scenic value. • Koombooloomba South Forest Reserve is located within LCA A2. While this Reserve is not anticipated to be frequently visited for recreational purposes, it is acknowledged for its environmental values within a landscape which is likely to have local scenic value. • The FNQ Regional Plan acknowledges that the forested hills, rural landscapes and abundant, tropical greenery make the region's scenery special and distinct from other parts of Australia. • Kirrama Range Road is nominated as a tourist drive. • Tully Falls Road is identified in the Tablelands Regional Council Planning Scheme as a scenic route. • The Cassowary Coast Regional Planning Scheme Scenic Amenity Overlay Map identifies a significant extent of LCA A4 as well as smaller areas of LCA A2 and LCA A3 as Visually Significant Areas. • LCA A2, LCA A3 and LCA A4, LCA A5 and LCA A6 are all located within the WTQWHA. This coupled with the National Parks, State Forests and Forest Reserves located in each of these LCAs, results in recognition at an international, national and state level. This combined with the exposed, elevated nature of this LCT results in the sensitivity of these LCAs to be considered ***High***. • While LCA A1 is generally of a consistent character with this LCT, it is not included within the WTQWHA, nor does it include protected landscapes such as National Parks or State Forests. It is however a forested landscape that is located on elevated topography adjacent to the WTQWHA. The extent of precedent infrastructure is limited and only minor vegetation clearing evident. As such LCA A1 is considered to have a ***Medium*** sensitivity.
Landscape Evaluation	
Magnitude of Change Assessment	• There are areas of the Site that are located within this LCT. LCA A1 includes areas of the eastern edge of the Site. LCA A3 includes a small portion of the north-eastern extent of the Site.

	• LCA A1 includes proposed Project infrastructure, including 18 turbines, transmission lines and a substation. The continuous siting of large infrastructure across LCA A1 would represent a clearly evident and dominant change in the character of this landscape. Therefore, it is anticipated that the impact of the Project on LCA A1 would be ***direct of High*** magnitude. • LCA A2 is adjacent to the Site, however there are no direct impacts anticipated. However, LCA A2 is located in close proximity to proposed Project infrastructure, including turbine locations within approximately 600 m. As such it is anticipated that there would be noticeable indirect impacts on the natural character of this area. Therefore, it is anticipated that the impact of the Project on LCA A2 would be ***indirect of Low*** magnitude**.** • LCA A3 is adjacent to the Site, however there is no Project infrastructure proposed within 650 m of LCA A3. It is anticipated that the lack of Project infrastructure within LCA A3 would lower the magnitude of change on this LCA. LCA A3 would however be exposed to the nearby proposed turbines which would influence the natural character of the landscape. As such it is anticipated that the impact of the Project on LCA A3 would be ***indirect of Low*** magnitude. • LCA A4, LCA A5 and LCA A6 do not include any of the Site extents and are all located a considerable distance from the Site. As such there will be no direct impacts on these LCAs and due to the distance from Site it is anticipated that the impacts on these LCAs would be ***indirect of Negligible*** magnitude.
Significance of Effect	• The greatest effect of the Project on LCT A: Forested Ranges and Mountains is on *LCA A1: Wooroora* which is considered to be ***Moderate to Major*** and ***Significant***. • The effect of the Project on LCA A2 and LCA A3 is considered to be ***Moderate*** and ***Not Significant*** • The effect of the Project on LCA A4, LCA A5 and LCA A6 is considered to be ***Minor to Moderate*** and ***Not Significant***

Landscape Character Type B

Table 20: Summary description of LCT B: Undulating and Wooded Uplands

Type B: Undulating and Wooded Uplands	
Landscape Baseline Assessment	
Location and boundaries	This landscape type is found throughout much of the Study Area, typically between the higher elevations of LCT A and the Rural Uplands and Rivers (LCT C). There are two Landscape Character Areas of this LCT in the Study Area – *Innot Hot Springs – Glen Ruth Uplands* (LCA B1), *Mount Garnet – Silver Valley Uplands* (LCA B2)
Relationship to the WTQWHA	This LCT does not fall within the WTQWHA
Typical character images:	
	 

Key characteristics	• The geology found in LCA B1 and LCA B2 is predominantly Kennedy Province - Carboniferous-Permian volcanic rocks (dominantly rhyolitic ignimbrite, breccia, lava; subordinate andesitic to basaltic lava; minor volcaniclastic sandstone and siltstone), Pliocene-Pleistocene alluvial and lacustrine deposits (poorly consolidated sandstone, mudstone, conglomerate), Kennedy Province - Carboniferous intrusive rocks (pink to grey or cream, equigranular to porphyritic biotite granite, hornblende-biotite granite and granodiorite; microgranite and leucogranite; subordinate diorite and gabbro) and Hodgkinson Formation (mainly pale to dark or greenish grey, fine to medium-grained, medium to thick-bedded, quartz-intermediate greywacke, rhythmically interbedded with siltstone and mudstone; minor conglomerate, conglomeratic greywacke). • Soil types found in LCA B1 are mainly sodosols, kandosols and rudosols. Soils in LCA B2 are typically comprised of podosols and rudosols. • LCA B is generally an undulating landscape typically between 600 and 800 m AHD noting that there are higher elevations within the landscape such as Mt Pope (813 m AHD), Bald Rock (1077 m AHD) and Mt Gibson (842 m AHD). • Land use within LCA B is primarily grazing land both cleared and featuring open woodland, and there are denser forested tracts located on the more elevated topography and riparian vegetation along creek lines. • This landscape type is interspersed with creeks where waterways drain the elevated areas both within this landscape or the flows from the more typically elevated LCT A. • LCT B includes protected landscapes. • LCA B1 includes a portion of the Koombooloomba South Forest Reserve and Ravenshoe Forest Reserve. • LCA B2 includes protected areas including State Forests, Conservation Parks and Forest Reserves. These protected areas include Ravenshoe State Forest, Tumoulin State Forest, Tumoulin Forest Reserve, Millstream Conservation Park, The Bluff State Forest, Evelyn Creek Conservation Park. • There are settlements located within LCT B including Ravenshoe and Mount Garnet however typically the landscape is sparsely settled consisting of scattered farmsteads. • In some instances, this landscape is exposed to views from the higher LCA A, however due to the often enclosed nature within LCA these views are limited. • Typically views out of this LCT are likely to be restricted due to the remnant vegetation throughout this LCT. However, there are increased views out of this landscape where vegetation clearing has occurred in the landscape and from the more elevated areas within the LCT. • The productive landscapes and towns within this LCT have a strong rural character.
Precedent modifications and infrastructure elements	• This LCT is typically has characteristics of both a natural and rural landscape. Noting the exception of settlements, roads, transmission lines and farmsteads there is little built infrastructure. • The Kennedy Highway passes through both LCA B1 and LCA B2. • Other roads throughout this LCT include Old Palmerston Highway, Tumoulin Road, East Evelyn Road, Wooroora Road and Cashmere Kirrama Road. • The Ravenshoe Steam Rail passes through LCA B2. • 275 kV and 132 kV transmission lines pass through both LCA B1 and LCA B2. • There is mining activity located in LCA B2 including the extraction of limestone and metals. • The settlements of Ravenshoe and Mount Garnet are examples of the denser settlements within the Study Area and are located in LCA B2. Other settlement within this LCT is typically scattered residential properties and farmsteads.
Landscape Character Sensitivity Assessment	• LCT B includes some large-scale infrastructure including 132 kV and 275 kV transmission lines. • There is mining activity in the western extent of LCA B2.

	• Due to the clearing of vegetation in areas of this LCT, there are opportunities for open views from roads throughout this landscape. • None of the area falls within the WTQWHA. However, LCA B1 extends into Koombooloomba South Forest Reserve and Ravenshoe Forest Reserve. LCA B2 includes areas of Ravenshoe State Forest, Tumoulin State Forest, Tumoulin Forest Reserve, Millstream Conservation Park, The Bluff State Forest, Evelyn Creek Conservation Park. While these State Forests and Reserves are not anticipated to be frequently visited for recreational purposes, they are acknowledged for their environmental values within a landscape which is likely to have local scenic value. • The FNQ Regional Plan acknowledges that the forested hills, rural landscapes and abundant, tropical greenery make the region's scenery special and distinct from other parts of Australia. • The Kennedy Highway passes through LCA B2 and is a popular tourist route and the Tablelands Regional Council Planning Scheme acknowledges this as a scenic route to be protected from visually obtrusive and unattractive development. Old Palmerston Highway is also identified as a scenic route by the Tablelands Regional Council Planning Scheme and traverses through LCA B2. • The Kirrama Range Road tourist drive is also identified as a tourist route and passes through LCA B1. • The Ravenshoe Steam Rail passes through this LCA B2. When in operation this is a tourist attraction of the area. • LCA B1 and LCA B2 are both considered to have a rural character however it is noted that there are areas of remnant vegetation as well as State Forests, Conservations Parks and Forest Reserves within these areas. While there is some precedent large-scale infrastructure and mining activity within this landscape, the sensitivity of both LCA B1 and B2 are considered to be ***Medium***.
Landscape Evaluation	
Magnitude of Change Assessment	• The majority of the Site and proposed Project infrastructure is located within LCA B1 and is located over an extensive area. It is acknowledged that the proposed Project infrastructure will not have a direct impact on the portion of Ravenshoe Forest Reserve located within LCA B1. However, the introduction of the large scale turbines and supporting infrastructure within a largely uncleared landscape would be clearly evident. Therefore, the magnitude of change on LCA B1 would be anticipated to be a ***High (direct)***. • LCA B2 does not include any of the Site extent. The Site is located approximately 1 km at its closest point to LCA B2 however the closest proposed turbine is located approximately 4 km away. Although there would be no direct impacts there would be indirect exposure to the Project affecting the perception of character. Therefore, the impact of this Project would be anticipated to be a ***Low (indirect)*** *magnitude of change.*
Significance of Effect	• The greatest effect of the Project is on LCT B: Undulating and Wooded Uplands is on *LCA B1: Innot Hot Springs – Glen Ruth* which is considered to be ***Moderate to Major*** and, therefore, ***Significant***. • The effect of the Project on LCA B2 is considered to be ***Minor to Moderate*** and, therefore, ***Not Significant.***

Landscape Character Type C

Table 21: Summary description of LCT C: Rural Uplands and Rivers

Type C: Rural Uplands and Rivers	
Landscape Baseline Assessment	
Location and boundaries	This landscape is generally located to the west of the Study Area and is associated with the significant upland water courses and the surrounding landscape. There are four Landscape Character Areas of this type in the Study Area – *Millstream Uplands (LCA C1), Herbert River Uplands* (LCA C2), *Tully Falls Uplands* (LCA C3) and *Kaban Uplands* (LCA C4).
Relationship to the WTQWHA	None of this LCT falls within the WTQWHA.
Typical character images:	
  	
Key characteristics	• The geology of this LCT is typically comprised of Pliocene-Pleistocene alluvial and lacustrine deposits (poorly consolidated sandstone, mudstone, conglomerate), Tertiary-Quaternary basalts (mostly olivine basalt flows and some plugs; some nephelinite) and Tertiary-Quaternary (clay, silt, sand, gravel and soil; colluvial and residual deposits (generally on older land surfaces). • Soil types found in LCT C are predominantly sodosols, kandosols, hydrosols and ferrosols. • Landform is generally gently sloping plains with river valleys and is generally flatter compared to LCT A and LCT B. It is typically at an elevation between 600 and 700 m AHD. • There are larger waterways and creeks that flow into this landscape from the elevated landscapes within the Study Area. The more prominent watercourses include the Herbert River and the Millstream. • Land use within LCA C is primarily grazing land both cleared and woodland. There are however, agricultural uses such as cropping located on the flatter plains adjacent to the major waterways. • The settlements of Innot Hot Springs (LCA C2) and Millstream (LCA C1) are located within this LCT as well as a cluster of residential properties on the southern extent of Ravenshoe (LCA C3). • In areas where cropping and settlement occur, vegetation has largely been cleared. However, there are stands of remnant trees and shrubs adjacent to the linear corridors of the waterways and roads in these areas. • Outside of the larger settlements in this LCT, the landscape is settled with homesteads and farmsteads on large rural properties. • LCA C1 includes Millstream Falls National Park as well as a portion of both Ravenshoe State Forest and Ravenshoe Forest Reserve. • LCA C4 includes a small portion of the Tumoulin State Forest. • Views out of this LCT are likely to be restricted due to the remnant vegetation throughout this LCT. Similar to LCT B, there are increased views out of this landscape where vegetation clearing has occurred in the landscape, however

	due to the flatter topography within this LCT there are less elevated areas providing long range viewpoints. • The productive landscapes and towns have a strong rural character.
Precedent modifications and infrastructure elements	• Innot Hot Springs and Millstream are two of the larger settlements in the Study Area, however the urban footprints are not a dominant feature of this LCT. • The Kennedy Highway passes through LCA C1 and LCA C2. • Other roads in this LCT include Tumoulin Road, Tully Falls Road, Herberton River Road and Gunnawarra Road. • The Ravenshoe Steam Rail passes through this LCT. • The 132 kV and the 275 kV transmission alignments pass through LCA C1.
Landscape Character Sensitivity Assessment	• There are some areas within this LCT offering distant views over agricultural land and of the surrounding, more elevated LCT A and LCT B. • LCA C1 includes Millstream National Park which is valued for its scenic qualities and recreational opportunities (but is not located within the WTQWHA, as sometimes erroneously reported). As described in the Millstream Falls National Park Management Statement, this area was originally established to provide scenic and recreational opportunities for the residents of Ravenshoe (DNPRSR, 2013) • LCA C1 also includes portions of Ravenshoe State Forest and Ravenshoe Forest Reserve. Although these are not anticipated to be frequently visited for recreational purposes, they are acknowledged for their environmental values within a landscape which is likely to have local scenic value. • LCA C4 includes a small portion of Tumoulin State Forest. Although this State Forest is not anticipated to be frequently visited for recreational purposes, it is acknowledged for its environmental values within a landscape which is likely to have local scenic value. • The Kennedy Highway passes through LCA B2 and is a popular tourist route and the Tablelands Regional Council Planning Scheme acknowledges this as a scenic route to be protected from visually obtrusive and unattractive development. • The section of Gunnawarra Road that passes through LCA C2 is part of the Kirrama Range Road tourist drive. • The Ravenshoe Steam Rail pass through this LCA C4. When in operation this is a tourist attraction of the area. • This LCT is considered to be predominantly a rural character. • As LCA C1 includes areas of National Park, State Forest and Forest Reserve it is considered to have a ***High*** sensitivity. • While LCA C2, LCA C3 and LCA C4 are typically of a similar rural character to LCA C1, however they do not include nationally protected landscapes. These are however still landscapes valued for their scenic qualities. As such, LCA C2 LCA C3 and LCA C4 are considered to have a ***Medium*** *sensitivity.*
Landscape Evaluation	
Magnitude of Change Assessment	• The north-eastern portion of the Site is located adjacent to LCA C1. As such, LCA C1 would be exposed to the nearby proposed turbines that would affect the setting of this portion of LCA C1. As such it is anticipated that the impact of the Project on LCA C1 would be ***indirect of Low*** magnitude. • LCA C2 is located further from Site and is approximately 2.5 km from the Site boundary at its closest point. As such the Project will not result in direct impacts on LCA C2. There would however be some exposure to the Project to a limited area of this LCA. As such it is anticipated that the impact of the Project on LCA C2 would be ***indirect of Negligible*** magnitude. • LCA C3 and LCA C4 are located further from the Site and proposed Project infrastructure. It is unlikely there would be exposure to the Project and as such it is anticipated that the impact of the Project on LCA C3 and LCA C4 would be ***indirect of Negligible*** magnitude.

Significance of Effect	• The greatest effect of the Project is on LCT C: Rural Uplands and Rivers is on *LCA C1 – Millstream Uplands* which is considered to be ***Moderate*** and, therefore, ***Not Significant***. • The effect of the Project on LCA C2, LCA C3 and LCA C4 is considered to be ***Minor*** and, therefore, ***Not Significant.***

Landscape Character Type D

Table 22: Summary description of LCT D: Lowland Rural Plains

Type D: Lowland Rural Plains		
Landscape Baseline Assessment		
Location and boundaries	This landscape is located to the southeast of the Study Area. This type is generally associated with the alluvial plains situated between the mountain ranges and coastline. There is one Landscape Character Area of this type in the Study Area – *Tully River Plains* (LCA D1)	
Relationship to the WTQWHA	None of this LCT falls within the WTQWHA.	
Typical character images:		
		
Key characteristics	• The geology of LCA D1 is predominantly quaternary alluvium and lacustrine deposits (sand, silt, mud and gravel). • Soil types found in LCA D1 are predominantly hydrosols, dermosols and kandosols supporting the agricultural uses across the landscape. • Landform is generally flatter, particularly compared to LCT A and LCT B. It is typically at an elevation between 50 and 10 m AHD. • There are numerous rivers and creeks that flow into this landscape from the elevated landscapes within the Study Area. The prominent watercourse in LCA D1 is the Tully River. • The land use within this LCT is predominantly agricultural, typically sugar cane cropping land. • Vegetation in these areas has largely been cleared for agricultural and settlement uses. • There are however, stands of remnant trees and shrubs adjacent to the linear corridors of the waterways as well as on some of the localised elevated locations and slopes throughout this LCT. • This LCT includes the localities of Munro Plains, Dingo Pocket and Cardstone. Throughout these localities the landscape is settled with homesteads and farmsteads on large rural properties. • This LCT is generally exposed and views into and out of are generally unimpeded with the exception of vegetation screening associated with the creek corridors as well as more seasonal screening from sugar cane crops. • The productive landscapes and towns have a strong rural character.	

Precedent modifications and infrastructure elements	• Throughout this LCT there are many sealed and gravel local access roads. The more significant roads in the area include Davidson Road and Tully Gorge Road. These roads provide access between settlements, the surrounding agricultural properties as well as Tully Gorge National Park. • There are rail alignments throughout this LCT to support the sugarcane trains.
Landscape Character Sensitivity Assessment	• This LCT is predominantly visually open, offering distant views over agricultural land and of the surrounding, more elevated LCT A. • This landscape is considered to be predominantly of a rural character and does not include areas of National Park or State Forest. • It is noted however that Tully Gorge Road is used to access Tully Gorge National Park from this direction and is likely to bring visitors to the area. • Based on this it is considered that LCT D has a ***Low*** sensitivity.
Landscape Evaluation	
Magnitude of Change Assessment	• No portion of the Project Site is within this LCT. • LCA C1 is located approximately 14.5 km from the Site boundary at its closest point. • The Project will not result in direct impacts on LCA C1. • Areas within this LCT have open views out towards Site however due to the elevated topography between this LCT and Site, it is unlikely that the Project will be visible. Therefore, it is likely there would be minimal to no impacts on the character of this LCT. As such there the impact from the Project on this LCT is considered to be ***Negligible (indirect)***.
Significance of Effect	• The effect of the Project on LCT D1: *Tully River Plains* is considered to be up to ***Minor to Negligible*** (***indirect***) and, therefore, ***Not Significant***.

8. Visual assessment

8.1. Visibility Analysis Mapping (VAM)

A “Visual Analysis Map” (VAM) also known as a “Zone of Theoretical Visibility” (ZTV) map, “Visual Envelope Map” or “Viewshed” map, has been used as a tool to represent the area, over which the Project may theoretically be seen, based on terrain data (i.e. Digital Terrain Model). The idea of the VAM is to illustrate areas of the landscape from which the turbines would be potentially visible; this is through a process that uses the generation of ‘digital cross sections’ that determine areas where landform would block views of all (or, where stated in some cases, part) of the turbines. A preliminary VAM was also used to inform the selection of representative viewpoints to inform the fieldwork.

Based on the identification of key issues associated with the baseline assessment, a series of VAM maps has been produced based on the site layout and proposed maximum turbine height. The Project is modelled on:

- **Figure 9** Preliminary Blade Tip VAM (ZTV) Assessment – Visual Analysis Map**:** which shows the area from which it is theoretically possible to see *any* blade tip (part or whole turbine) on the Project Site (up to 86 turbines) and, conversely, the area from which it will not be possible to see any turbine blade tips (part or whole turbine).

- **Figure 10** Preliminary Blade Tip VAM (ZTV) Assessment - Number of Turbines: which indicates *how many* tips (whole or parts of any turbines) would potentially be visible - categorised by 1 to 10 turbines, 11-20 turbines, 21-30 turbines, 31-40 turbines, 41-50 turbines; 51-60 turbines; 61-70 turbines; 71-80 turbines; 81-86 turbines.

- **Figure 11** Preliminary Hub Height VAM (ZTV) Assessment – Visual Analysis Map: which shows the area from which it is theoretically possible to see *any* turbine hub (hub or whole turbine) on the Project Site (up to 86 turbines) and, conversely, the area from which it will not be possible to see any turbine blade tips (part or whole turbine).

- **Figure 12** Preliminary Hub Height VAM (ZTV) Assessment – Number of Turbines**:** which indicates *how many* turbine hubs (junction of turbine blades and turbine) would potentially be visible - categorised by 1 to 10 turbines, 11-20 turbines, 21-30 turbines, 31-40 turbines, 41-50 turbines; 51-60 turbines; 61-70 turbines; 71-80 turbines; 81-86 turbines.

In interpreting the VAM mapping, three important issues need to be recognised:

- the accuracy of the VAM is affected by the limitation of the DEM used to establish the surface elevation (AHD), which was based on a 25 m cell raster grid. At this resolution, local scale topographic features such as rocky outcrops may be incorrectly represented by the dataset, but the influence on the results would be minimal relative the extent of the analysis.
- VAM mapping is based on the ground surface elevation only and does not take account of detailed variations in ground plane such as intervening vegetation, buildings or minor changes in topography, such as road cuttings. Where such features intervene between the viewer and the proposed wind farm (e.g. tree belts alongside roads or within fields, vegetation in gardens of rural properties and forested areas such as State Forests or National Parks), then this may reduce the visibility of the Project – often substantially from individual vantage points. Within the Study Area of this LVIA the presence of dense mature forest vegetation substantially curtails views from many locations, particularly within the WTQWHA as described in Section 8.2. As such the VAM mapping is conservative in its method of identifying viewsheds.
- VAM mapping is based on the current turbine layout. Minor adjustments to turbine location and heights may be possible. However, as the mapping is based upon maximum heights and

number of turbines, the mapping is considered to represent a reasonable assessment of potential views of the Project once operational.

Figure 9 to **Figure 12** in Appendix 1 shows that the Project is theoretically visible for a large portion of the Study Area due to the elevated location of the Site relative to parts of the surrounding landscape.

Within the Study Area the obscured views of the Project are typically located to the north, east and southeast of the Site. It is understood that many of the views of the Project to the east and southeast are obscured due to the Cardwell Range and comparatively the low topography in these areas. This obscuring effect is particularly apparent beyond a 10 km offset from Site in these directions. The Cardwell Range also curtails views to the Project from many locations to the northeast. While viewpoints to the north and south are typically located in the uplands, the elevated, undulating topography between these locations and Site generally obscures views from these areas.

As can be seen in **Figure 10** and **Figure 12**, many of the views of the Project within the Study Area are partial views (1-50 turbines visible). These partial views are particularly apparent from within the Site itself and to the west of the Project. The extent of partial view includes the settlements of Innot Hot Springs and Ravenshoe. It should be acknowledged that the built form and vegetation within these settlements would likely curtail most views from their streetscapes.

The areas with the greatest views of the Project (51-86 turbines visible) are typically located to the southwest of the Site. These generally align to either the Site-facing slopes of surrounding mountains or the broader areas of less undulating topography. It is also noted that this data indicates that there are likely increased views of the Project to the immediate east, typically between 5 km and 15 km of the Site boundary. These often align to Site-facing slopes; however, it is anticipated that the protected dense, tall forest vegetation of the WTQWHA would curtail many of these views.

It is important to recognise that as distance increases the turbines would form a relatively smaller part of the overall landscape view and appear as less-dominant elements than those experienced closer to the Site where fewer, but more dominant turbines may be visible. For example, at distances less than around 4 km, 250 m high turbines could be very dominant elements in the view. From up to around 12 km, in locations where views can be experienced, individual turbines of up to 250 m would be clearly discernible (noticeable) with the naked eye. Beyond 12 km the wind farm could be visible, depending on foreground conditions and relationship of the viewer to the wind farm in terms of elevation, but will typically occupy a very small proportion of the view and turbines are typically unlikely to be individually dominant. It is acknowledged that the majority of the south-western portion of the Study Area with theoretical views of a large number of turbines (51-86 turbines) described above, is located beyond 12 km of the Project.

8.2. Visual audiences and viewpoint selection

The visual baseline has been assessed and is described in terms of potential for views to be obtained by selected visual audiences within the Project Study Area. It is considered that the viewers (visual receptors) who may experience views of the Project are likely to include:

- Residents living in settlements to the north and west of Site which includes settlements such as Millstream, Ravenshoe, and Innot Hot Springs.
- Residents living on rural properties and homesteads in the surrounding landscape.
- Agricultural workers in the countryside including farmers.
- Recreational users of the landscape, including those visiting National Parks, State Forests, Conservation Parks and Forest Reserves.
- Travellers using major and minor roads within the Project Study Area, including motorists on the Kennedy Highway, Wooroora Road, Millstream Parade and other local roads.
- Tourists passing through the Project Study Area by private vehicle, including travellers along designated scenic routes such as the ‘Savannah Way’.

Based on an analysis of the VAM, the types of visual audiences and visual receptors that are likely to be affected by the Project and the field investigation, 16 viewpoints have been selected for detailed assessment. These viewpoints are representative of the potentially affected receptors listed above, and also test the 'worst case' scenario for a range of likely viewers around the Site. These viewpoints are proposed as 'worst case scenarios' because they capture locations where the most receptors are likely to be present and are taken from areas with relatively open views. For example, the representative views from the Kennedy Highway include views from locations with limited roadside vegetation which are also near residential properties that are situated adjacent to the Kennedy Highway.

The selected viewpoints are shown on **Figure 14** to **Figure 25** (Appendix 2) and summarised in **Table 23**.

Table 23: Representative viewpoints selection

Viewpoint	Description	Visual Audience
VP1	**Figure 14** Viewpoint 1: View from Ravenshoe (Moffat Street) looking south to Site	Residents, rural workers, visitors to Ravenshoe, passing motorists on Moffat Street
VP2	**Figure 15** Viewpoint 2*:* View from Big Millstream Falls lookout looking southwest to Site	Visitors to Big Millstream Falls and National Park Rangers
VP3	**Figure 16** Viewpoint 3: View from Bally Knob lookout looking southwest to Site	Visitors who undertake the hike to Bally Knob lookout and Park Rangers
VP4	**Figure 17** Viewpoint 4: View from Majors Mountain lookout looking southwest to Site	Visitors who undertake the hike to Majors Mountain lookout (on the Cardwell Range track) and National Park Rangers
VP5	**Figure 18** Viewpoint 5: View from Koombooloomba Camping and Day-Use Area looking west to Site	Visitors to this section of Koombooloomba Conservation Park and National Park Rangers
VP6	**Figure 19** Viewpoint 6*:* View from the southern entry to Glen Ruth Station on Cashmere Kirrama Road, looking north to Site	Residents, rural workers, passing motorists on Cashmere Kirrama Road including rural residents and visitors undertaking the Kirrama Range Road tourist drive
VP7	**Figure 20** Viewpoint 7*:* View from Gunnawarra Road looking northeast to Site	Residents, rural workers, passing motorists on Gunnawarra Road including rural residents and visitors undertaking the Kirrama Range Road tourist drive
VP8	**Figure 21** Viewpoint 8*:* View from Kennedy Highway looking east to Site	Motorists on the Kennedy Highway including residents, rural workers and visitors undertaking the Savannah Way tourist drive
VP9	**Figure 22** Viewpoint 9*:* View from Innot Hot Springs Community Hall looking southeast to Site	Residents, rural workers and visitors to Innot Hot Springs as well as motorists on the Kennedy Highway
VP10	**Figure 23** Viewpoint 10: View from 15225 Kennedy Highway looking southeast to Site	Residents, rural workers and motorists on the Kennedy Highway including residents, rural workers and visitors undertaking the Savannah Way tourist drive
VP11	**Figure 24** Viewpoint 11: View from Herbert River Road (at Red Bend Farm) looking east to Site	Residents, rural workers, passing motorists travelling on Herbert River Road including local residents and workers

Viewpoint	Description	Visual Audience
VP12	**Figure 25** Viewpoint 12: View from Gordon Earl Drive, Millstream looking southwest to Site	Residents and visitors to Millstream
VP13	**Viewpoint 13:** View from Rhyolite Pinnacle looking east (south to Site)	Visitors who undertake the hike to Rhyolite Pinnacle lookout and National Park Rangers
VP14	**Viewpoint 14:** View from Koolmoon Creek track, leading to Rhyolite Pinnacle, looking west to Site	Visitors who undertake the hike to Rhyolite Pinnacle lookout (on the Koolmoon Creek track) and National Park Rangers
VP15	**Viewpoint 15a:** View from Lake Koombooloomba, looking west to Site **(15 A, 15 B, 15 C, and 15 D)**	Visitors undertaking water-based recreation on Koombooloomba Dam and National Park Rangers
VP16	**Viewpoint 16:** View from Yourka Glen Gordon Road looking east **to Site**	Residents, rural workers, motorists travelling on Yourka Glen Gordon Road comprising local residents and workers (semi-private road).

Residential viewers in rural settlements

As described previously in Section 6, the key towns and settlements located within the wider Study Area include:

- Millstream (population 1,246) which is located approximately 3.4 km north of the closest proposed turbine
- Ravenshoe (population 1,400) which is located approximately 11 km north of the closest proposed turbine.
- Innot Hot Springs (population 177) which is located approximately 11 km west from the closest proposed turbine
- Millaa Millaa (population 514) which is located approximately 27 km northeast from the closest proposed turbine
- Mount Garnet (population 430) which is located approximately 23 km west from the closest proposed turbine

Millstream includes residential properties, typically located on rural lots that are within close proximity to the Site. The following viewpoints assess the potential impact of the Project on these properties:

- **Viewpoint 12***:* View from Gordon Earl Drive, Millstream looking southwest to Site

Whilst located at an increased distance from the Site, some parts of Ravenshoe and Innot Hot Springs will theoretically have views to the Project. The following viewpoints assess the potential impact of the Project on these settlements:

- **Viewpoint 1:** View from Ravenshoe (Moffat Street) looking south to Site
- **Viewpoint 9**: View from Innot Hot Springs Community Hall looking southeast to Site

Due to distance from Site to Mount Garnet and Milla Millaa, coupled with limited to no theoretical views to Site these settlements are not considered further in this assessment.

Residential viewers on rural homesteads

In addition to residents of local towns, the LVIA Study Area also includes rural properties (comprising farmsteads and isolated rural residential properties). Some of these properties are located near the Project Site however typically at relatively low density. The effect on participating properties is not

considered because the landowner has agreed to hosting the wind farm development on their land. However other dwellings are considered, particularly those located close to the Site boundary*.

Non-participating residences located approximately 5 km from the Site can be seen in **Figure 7** .

The following viewpoints assess the potential impacts of the Project on rural properties:

- **Viewpoint 6:** View from the southern entry to Glen Ruth Station on Cashmere Kirrama Road, looking north to Site
- **Viewpoint 7:** View from Gunnawarra Road looking northeast to Site
- **Viewpoint 10:** View from 15225 Kennedy Highway looking southeast to Site
- **Viewpoint 11:** View from Herbert River Road (at Red Bend Farm) looking east to Site
- **Viewpoint 16:** View from Yourka Glen Gordon Road looking east to Site

*It is noted that there are non-participating properties located close to the southern boundary of the Glen Gordon portion of the Site. Due to a road closure during field work Lat27 was unable to access these properties.

Workers

A significant portion of the Study Area is a working rural landscape with agriculture and grazing lands. Rural workers would experience views of the wind farm as they go about their daily activities. The extent of view would change in accordance with the topography and locally depending on the presence of vegetation.

No specific viewpoints have been selected to assess this because views from the rural properties (described above) and local roads (described below) are representative of views of workers on rural properties.

Recreational viewers

Consideration has been given of the potential for recreational viewers to be present in parks and open spaces around the Site, particularly in the National Parks, State Forests, Conservation Parks and Forest Reserves.

Tully Falls National Park, Koombooloomba National Park and Tully Gorge National Park are all within proximity to the Site and are within the WTQWHA. These parks all have recreational offerings and as such attract visitors within their extents.

The following viewpoints specifically assess the potential impacts of the Project from these National Parks/WTQWHA:

- **Viewpoint 4:** View from Majors Mountain lookout looking southwest to Site
- **Viewpoint 5:** View from Koombooloomba Camping and Day-Use Area looking west to Site
- **Viewpoint 13:** View from Rhyolite Pinnacle looking east (south to Site)
- **Viewpoint 14:** View from Koolmoon Creek track, leading to Rhyolite Pinnacle, looking west to Site
- **Viewpoint 15a:** View from Lake Koombooloomba, looking west to Site

In addition, the following viewpoint which includes Misty Mountains trails was used to consider impacts on recreational users:

- **Viewpoint 3:** View from Bally Knob lookout looking southwest to Site

It is noted that many visitors to these parks and recreation trails would undertake hiking and camping within these National Parks in locations that are not close to these viewpoints. This includes Tully Gorge Lookout, most of the Misty Mountain trail network and the extent of Tully Falls Road which is the key access road for these National Park. During fieldwork it was observed that the vegetation

communities within this section of the WTQWHA are typically very dense and feature tall tree species. The resulting enclosed environment limits views available towards the Project from most publicly accessible areas within these National Parks such as roads, hiking trails, campgrounds and day-use areas. As such viewpoints have not been selected for analysis for this reason i.e. views will not be possible. An example of the typical density of this vegetation can be seen in the photograph below, which was taken on Tully Falls Road.

Illustration 4 Typical character of vegetation in the WTQWHA such as along Tully Falls Road

It is noted that the key visitor destination in this section of the WTQWHA is Tully Gorge Lookout. However, views to the Site from this location are highly unlikely due to the elevated topography and dense vegetation between this location and the Site as well as the fact that the lookout faces east away from the direction of Site.

In the eastern extents of these parks, particularly the downstream extents of the Tully River it is not only the vegetation that obscures views, but the intervening landform of the Cardwell Range also curtails views, as can be seen in the ZTV mapping.

Other National Parks in the Study Area include Millstream Falls National Park. While this National Park is not located within the WTQWHA, it includes Big Millstream Falls and Little Millstream Falls and is reasonably accessible given its location near the Kennedy Highway.

The following viewpoints assess the potential impacts of the Project from Millstream Falls National Park:

- **Viewpoint 2:** View from Big Millstream Falls lookout looking southwest to Site*

*This viewpoint was chosen as it is anticipated that most visitors to this National Park would visit this lookout. It is noted that the day-use area near Big Millstream Falls is located at a higher elevation than the lookout. While it may be theoretically possible to experience views of the turbines from the day-use area, it is likely that the vegetation on both sides of the Millstream and on the opposite ridgeline would obscure views of turbines.

There are also State Forests, Conservation Parks and Forest Reserves located within the Study Area as noted in Section 5. These include The Bluff State Forest, Ravenshoe State Forest, Tumoulin State Forest, Ravenshoe Forest Reserve, Koombooloomba South Forest Reserve, Jalum Conservation

Park, Millstream Conservation Park, Evelyn Creek Conservation Park and Koombooloomba Conservation Park. It is worth noting however that there is little published information available for these locations that would suggest frequent recreational use within these areas, with the exception of Koombooloomba Conservation Park which is considered in **Viewpoint 5**: View from Koombooloomba Camping and Day-Use Area looking west to Site.

Potential views from parks and open spaces within Millstream, Ravenshoe and Innot Hot Springs are addressed within the viewpoints listed for *Residential viewers in rural settlements* earlier in this section.

General road users

The roads as described in Section 6 and illustrated in **Figure 3** comprise:

- Kennedy Highway (AADT 1,775; 16.28%), approximately 3.5 km north of the closest turbine
- A variety of small local roads including:
    - Tully Falls Road, approximately 3.1 km east of the closest turbine
    - Gunnawarra Road, approximately 20 km west of the closest turbine
    - Herbert River Road, approximately 6.5 km west of the closest turbine
    - Yourka Glen Gordon Road, approximately 3.7 km west of the closest turbine

Visibility from these roads is highly variable relating to the presence of significant roadside shelterbelts in places. Typically, views are transient, but it is understood that the views of the Project more likely from roads to the north and west of the Project, such as the Kennedy Highway and Herbert River Road. As noted above the presence of dense, tall vegetation within the WTQWHA typically restricts views from Tully Falls Road.

Regarding the quantity of road users, data is not available for most of the local roads. It is anticipated however that these roads would experience comparatively low traffic volumes in comparison to the Kennedy Highway. It is considered though that users of the local roads would likely have an interest in their surroundings.

The following viewpoints assess the impacts on main road users:

- **Viewpoint 8:** View from Kennedy Highway looking east to Site
- **Viewpoint 10:** View from 15225 Kennedy Highway looking southeast to Site

The following viewpoints assess the impacts on users of local roads. It is noted that some of these viewpoints are also assessed through the assessment of residential viewers:

- **Viewpoint 1:** View from Ravenshoe (Moffat Street) looking south to Site
- **Viewpoint 7:** View from Gunnawarra Road looking northeast to Site
- **Viewpoint 6:** View from the southern entry to Glen Ruth Station on Cashmere Kirrama Road, looking north to Site
- **Viewpoint 11:** View from Herbert River Road (at Red Bend Farm) looking east to Site
- **Viewpoint 12:** View from Gordon Earl Drive, Millstream looking southwest to Site
- **Viewpoint 16:** View from Yourka Glen Gordon Road looking east to Site

Drivers on scenic routes

Figure 7 (in Appendix 1) shows the locations of key tourist drives in the area. These include:

- The Savannah Way (Kennedy Highway alignment within the Study Area)

- Great Inland Way (Kennedy Highway alignment within the Study Area and Moffat St, Grigg Road, Tumoulin Road)
- Kirrama Range Road (Kirrama Range Road, Cashmere Kirrama Road, Gunnawarra Road)

Views from these roads are considered in relation to the viewpoints used in the assessment of general road viewers.

8.3. Viewpoint assessment

Using the VAM studies, field surveys and the method for assessing significance described in Section 3.8, a summary of the baseline analysis and overall likely visual impact anticipated during the operation of the Project is provided for each viewpoint in **Table 24** to **Table 35**.

Viewpoint 1

Table 24: Likely visual effect of the Project on Viewpoint 1

Viewpoint 1: View from Ravenshoe (Moffat Street) looking south to Site	
Visual Baseline Assessment	
 **Existing view from Viewpoint 1: View from Ravenshoe (Moffat Street) looking south to Site** *Refer to* **Figure 14,** *Viewpoint 1, in Appendix 2 for appropriate scaled image and wider panoramic view as discussed below.*	
Location and description	• GPS Location: 17°36'46.962" S 145°29'12.078" E • Elevation: 915 m • Southerly view from Moffat Street, Ravenshoe • The nearest proposed turbine is approximately 12 km to the south of this viewpoint • Represents typical views experienced by residents of Ravenshoe, rural workers, visitors to Ravenshoe and passing motorists on Moffat Street • Views to the south from this location are generally open within the foreground and midground with some obscuring from roadside vegetation and tall grasses. Tall woodland to the southern side of the Kennedy Highway and to the south west (right side of view) limits long distance views from this location. • In the distant south of this view (left side of view) elevated, forested topography typical with LCT A: Forested Ranges and Mountains • Precedent infrastructure visible includes Moffat Street (sealed road and footpath) and powerlines. Clearing of vegetation in the foreground for rural use is noted.

Key visual sensitivities	• These views are representative of residents, visitors and workers in Ravenshoe travelling on Moffat Street. These receptors are considered to have a passing interest in their surroundings. • These views are also representative of a number of residents in this vicinity whose properties are close to this viewpoint. It is expected that these residents would have an interest in their surroundings and prolonged viewing opportunities. • As Ravenshoe is a significant settlement it is anticipated that a large number of receptors would experience his view. As such this viewpoint is judged to be of ***Medium*** sensitivity.
Visual Evaluation	
 **Visualisation from Viewpoint 1: View from Ravenshoe (Moffat Street) looking south to Site** *Refer to* **Figure 14,** *Viewpoint 1, in Appendix 2 for appropriate scaled image and wider panoramic view as discussed*	
Magnitude of Change Assessment	• The nearest turbine to this viewpoint is approximately 12 km south of this viewpoint and as such this is considered a long-distance view of Site. • As per the visualisation it is anticipated that the wind farm would be obscured from the view due to the elevated topography and vegetation between the viewpoint and the Site. • Although not visible from this viewpoint, significant tracts of vegetation between this viewpoint and Site are within protected landscapes, including the WTQWHA. • There is existing infrastructure within the viewpoint. • Due to the existing infrastructure coupled with the obscured, long-distance range of the view toward Site, it is anticipated that the magnitude of change would be ***No impact.***
Significance of Effect	• The effect of this development on VP1 is considered to be ***No impact*** and ***Not Significant.***

Viewpoint 2

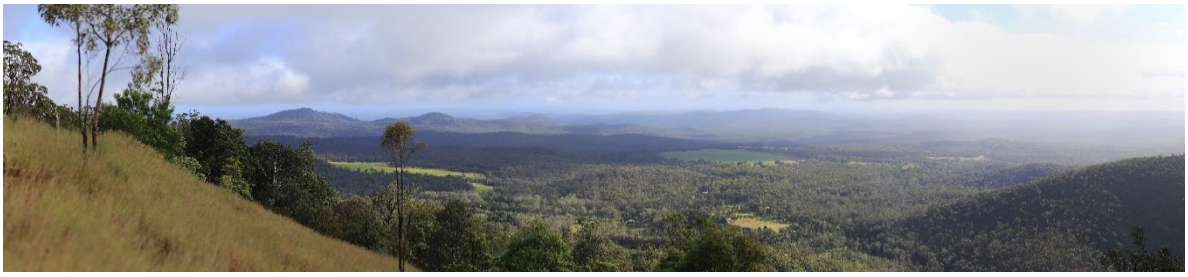
Table 25: Likely visual effect of the Project on Viewpoint 2

Viewpoint 2: View from Big Millstream Falls lookout looking southwest to Site	
Visual Baseline Assessment	
 **Existing view from Viewpoint 2: View from Big Millstream Falls lookout looking southwest to Site** *Refer to* **Figure 15,** *Viewpoint 2, in Appendix 2 for appropriate scaled image and wider panoramic view as discussed below.*	
Location and description	• GPS Locations: 17°38'33.00"S 145°27'27.59"E • Elevation: 762 m • South-westerly view toward from the Big Millstream Fall lookout platform. • Nearest proposed turbine on the Site is approximately 8.5 km southwest of this viewpoint. • Represents typical views of visitors to Big Millstream Falls and National Park Rangers. • The focus from the viewpoint is the Big Millstream Falls to the southwest (centre of view). There is a wooded, elevated ridge on the opposite side of the Millstream. This ridge curtails distance views from this viewpoint. The Millstream valley is also evident to the southeast (left side of view). • The view represents a landscape typical of LCT C: *Rural Uplands and Rivers.* The majority of the landscape in this view is protected as part of the Millstream Falls National Park, which does not fall within the WTQWHA. • A residential house is located on a property to the southeast (left side of view). The sealed footpath to the lockout and interpretive signage is also visible from this viewpoint. • The lookout is located near a day-use area/car park to which it is connected via a short asphalt pathway. The day-use area includes amenities such as a shelter, picnic tables and toilet block and is located at a higher elevation than the lookout. While this is day-use area is not specifically at the same location as the lookout, it forms part of the experience of all visitors to the lookout who need to park their cars in the car park and is therefore considered in this viewpoint assessment.
Key visual sensitivities	• These views are representative of visitors to the Big Millstream Falls as well as National Park workers. These receptors are considered to have an interest in their surroundings. It is anticipated that a large number of visitors to the area would visit this lookout. • This viewpoint is not within the WTQWHA. However, due to the natural character, anticipated large number of visitors combined with the national

	and state protections afforded to the Millstream Falls National Park, it is considered that the sensitivity of this viewpoint is ***High.***
Visual Evaluation	
Magnitude of Change Assessment	• The nearest turbine to this viewpoint is located approximately 8.5 km southwest of this viewpoint and as such this is considered a medium distance view. • Due to the elevated topography and dense, protected woodland opposite the lookout it is unlikely that there would be views of the Project from this viewpoint at the lookout. • The nearby day-use area is located at a higher elevation than the lookout. While it may be theoretically possible to experience views of the turbines from the day-use area, it is considered highly likely that the vegetation on both sides of the Millstream and on the opposite ridgeline would obscure views of turbines • The magnitude of change on this receptor therefore is anticipated to be ***Negligible.***
Significance of effect	• The effect of this development on VP2 is considered to be ***Minor to Moderate*** and ***Not Significant.***

Viewpoint 3

Table 26: Likely visual effect of the Project on Viewpoint 3

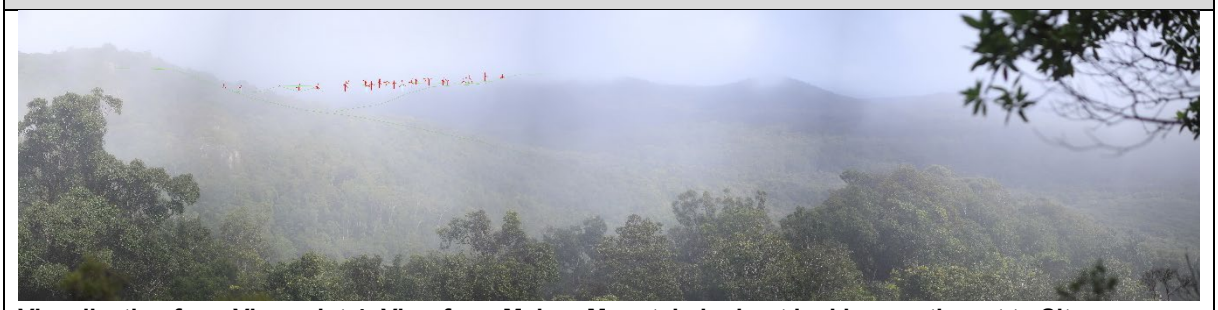
Viewpoint 3: View from Bally Knob lookout looking southwest to Site	
Visual Baseline Assessment	
 **Existing view from Viewpoint 3: View from Bally Knob lookout looking southwest to Site** *Refer to* **Figure 16,** *Viewpoint 3, in Appendix 2 for appropriate scaled image and wider panoramic view as discussed below.*	
Location and description	• GPS Location: 17°38'57.52"S 145°29'49.90"E • Elevation: 1168 m • South-westerly view from the lookout on Bally Knob. • Nearest proposed turbine on the Site is approximately 8.5 km southwest of this viewpoint. • Represents typical views of visitors and Park Rangers who undertake the hike to Bally Knob lookout. • South-westerly views from this positional provide typically unobscured views across the landscape from this elevated viewpoint. The view to the south (left side of view) is obscured by vegetation in the midground as well as the sloping topography in this area. Views to the west (right side of view) are unobscured.

	• In the distant background of this view there are landscapes typical of LCT B: *Undulating and Wooded Uplands* visible to the southwest (centre of view) as well as LCT C: *Rural Uplands and Rivers* to the west-southwest (centre right side of view).
Key visual sensitivities	• These views are representative of visitors who hike to the summit of Bally Knob as well as Park Ranges who maintain the trail. These receptors are considered to have a high level of interest in the surrounds. However, there are very few viewers (evidenced by the overgrown nature of the path to the summit and disrepair of the directional signage). • Bally Knob is not located within a protected landscape and does not form part of the WTQWHA, however one of the trail heads for the hike is located on the edge of Millstream Falls National Park. The hike is also part of the Misty Mountains Wilderness Track network promoted by the Queensland Government and as such is understood to be valued for the scenic view from the summit (albeit experienced by very few receptors), with views towards parts of the WTQWHA available on the hike and from the lookout. • There is some existing infrastructure and structures visible from this view including rural properties on Greys Lane (centre of view) as well as vegetation clearing for agricultural purposes and for a powerline easement. These existing modifications result in a landscape that is not pristine and as such the sensitivity of this viewpoint is lowered. • Overall, this viewpoint is judged to be of ***Medium*** sensitivity.
Visual Evaluation	
 **Visualisation from Viewpoint 3: View from Bally Knob lookout looking southwest to Site** *Refer to* **Figure 16** *Viewpoint 3, in Appendix 2 for appropriate scaled image and wider panoramic view as discussed below.*	
Magnitude of Change Assessment	• The nearest turbine to this viewpoint is located approximately 8.5 km southwest of this viewpoint. As this viewpoint is elevated and offers extensive views across the landscape below, this is considered to be a medium range view. • There would be full swept paths of a large number of turbines, over a substantial part of the view, visible from this location as well as views of the proposed meteorological masts. As such this would represent a major change on this landscape. • While there is existing modification to the landscape, there is currently no large-scale infrastructure clearly visible, meaning that the introduction of turbines into this view would represent dominant infrastructure into this view. • The magnitude of change on this receptor therefore is anticipated to be ***High.***
Significance of Effect	• The effect of this development on VP3 is considered to be ***Moderate to Major*** *and* ***Significant.***

Viewpoint 4

Table 27: Likely visual effect of the Project on Viewpoint 4

Viewpoint 4: View from Majors Mountain lookout looking southwest to Site	
Visual Baseline Assessment	
 **Existing view from Viewpoint 4: View from Majors Mountain lookout looking southwest to Site** *Refer to* **Figure 17,** *Viewpoint 4, in Appendix 2 for appropriate scaled image and wider panoramic view as discussed below.*	
Location and description	• GPS Location: 17°38'26.80"S 145°32'7.77"E • Elevation: 1148 m • South-westerly view from the lookout at Majors Mountain. • The nearest proposed turbine on the Site is approximately 11.2 km south west of this viewpoint. • These views are representative of visitors who undertake the hike to Majors Mountain lookout and National Park Rangers within the WTQWHA. It is anticipated that there is a relatively low number of visitors to this viewpoint as the trail head and track infrastructure are very basic and the trailhead is not well signed from Tully Falls Road. For example, here is no formalised carparking at the trailhead, picnic facilities or amenities. • Views toward the Project Site from this location are partially obscured by elevated topography and vegetation. It is noted that the during fieldwork that weather conditions included a haze which curtailed distant views. It is understood that this condition is quite common in the Misty Mountains section of the WTQWHA, however the assessment on this viewpoint considers likely views when visibility is not affected by haze. • This view represents a natural character generally consistent with LCT A: *Forested Ranges and Mountains*.
Key visual sensitivities	• Majors Mountain lookout is located in Tully Gorge National Park which is located within the WTQWHA, an area that is identified as having areas of exceptional natural beauty and aesthetic importance. Due to the strenuous nature of the Cardwell Range track and climb to Majors Mountain (Grade 4), it is however anticipated that there is a relatively low number of visitors to this viewpoint. • It is unlikely that any modification to the landscape would be visible from this viewpoint. • Due to the natural character as well as international, national and state protections afforded to the WTQWHA, which include OUV parameters relating to sweeping forest vistas it is considered that the sensitivity of this viewpoint is ***High.***

Visual Evaluation	
 **Visualisation from Viewpoint 4: View from Majors Mountain lookout looking southwest to Site** *Refer to* **Figure 17,** *Viewpoint 4, in Appendix 2 for appropriate scaled image and wider panoramic view as discussed below.*	
Magnitude of Change Assessment	• The nearest turbine to this viewpoint is located approximately 11.2 km to the southwest which is considered to be a medium to long distance view. • As can be seen in the visualisation in **Figure 19,** the turbines that would likely not be obscured by topography, have been highlighted in red. While it is anticipated that some of these turbines would be obscured by vegetation it is likely that there would be full swept paths of multiple turbines visible. • As there is unlikely to be views of existing infrastructure within the view, the turbines would be considered a distinct new element in the view. • It is noted that most of the path to Majors Mountain lookout is enclosed in dense vegetation and the lookout is only a very small area, albeit it is the culmination of a relatively long hike and the turbines would partially intrude upon the integrity of the natural 'sweeping forest vistas'. • As such the magnitude of change anticipated on this receptor is considered to be ***Medium.***
Significance of effect	• The effect of the turbines on VP4 is considered to be ***Moderate to Major*** *and* ***Significant.***

Viewpoint 5

Table 28: Likely visual effect of the Project on Viewpoint 5

Viewpoint 5: View from Koombooloomba Camping and Day-Use Area looking west to Site	
Visual Baseline Assessment	
 **Existing view from Viewpoint 5: View from Koombooloomba Camping and Day-Use Area looking west to Site** *Refer to* **Figure 18,** *Viewpoint 5, in Appendix 2 for appropriate scaled image and wider panoramic view as discussed below.*	
Location and description	• GPS Location: 17°50'14.63"S 145°35'47.14"E • Elevation: 729 m • Westerly view to Site from the Koombooloomba Camping and Day-Use Area.

	• Nearest proposed turbine on the Site is approximately 8.6 km to the west. • Represents typical views of visitors to this section of Koombooloomba Conservation Park and National Park Rangers. • While the campground represents a significant clearing, the dense vegetation in the background of the view is typical of LCT A: Forested Ranges and Mountains • There is campground infrastructure and wayfinding visible in this viewpoint. It was noted during field work that there is also a toilet block and chain wire fencing located in the vicinity of this view.
Key visual sensitivities	• This viewpoint would be experienced by visitors camping at Koombooloomba Camping and Day-Use Area. These receptors are considered to have an interest in their surroundings, and it is anticipated that this view represents prolonged views experienced by these receptors. • This viewpoint is located within the Koombooloomba Conservation Park, which is located within the WTQWHA, an area that is identified as being of exceptional natural beauty and aesthetic importance. • There is limited existing infrastructure visible in this view. • Due to the international, national and state protections afforded to the WTQWHA coupled with the prolonged views experienced by visitors to this location, it is considered that the sensitivity of this viewpoint is ***High.***
Visual Evaluation	
Magnitude of Change Assessment	• The nearest proposed turbine is approximately 8.6 km to the west. This distance from the viewpoint to the turbines is considered to be a medium range view. • Due to the elevated topography and dense vegetation between this viewpoint and Site, it is unlikely that there will be any views of the Project. • As such it is anticipated that the impact of the Project on this viewpoint would be ***No impact***.
Significance of effect	• The effect of the turbines on VP5 is considered to be ***No impact*** and therefore ***Not Significant.***

Viewpoint 6

Table 29: Likely visual effect of the Project on Viewpoint 6

Viewpoint 6: View from the southern entry to Glen Ruth Station on Cashmere Kirrama Road, looking north to Site

Existing view from Viewpoint 6: View from the southern entry to Glen Ruth Station on Cashmere Kirrama Road, looking north to Site *Refer to* **Figure 19**, *Viewpoint 6, in Appendix 2 for appropriate scaled image and wider panoramic view as discussed below.*

Visual Baseline Assessment	
Location and description	• GPS Location: 18° 7'0.77"S 145°22'48.73"E • Elevation: 634 m • Northerly view from Cashmere Kirrama Road. • Nearest proposed turbine on the Site is approximately 23.6 km northeast of this viewpoint. • Represents typical views of local residents and rural workers travelling on Kirrama Range Road as well as visitors undertaking the Kirrama Range Road tourist drive. The view would also represent typical views of residents and workers on Glen Ruth Station. • Northerly views from this location provide open views where clearing for rural purposes has occurred. Remnant trees curtail views in the foreground to the north (left side of view) and limit long distance views in the north to northeast of the view (centre to right side of view). • This view is typical of LCT B: *Undulating and Wooded Uplands*. • Cashmere Kirrama Road is an unsealed road. To the east it becomes Kirrama Range Road, which includes terrain that requires a four-wheel drive to navigate. The unsealed road shown to the north (left side of view) is a private access road for Glen Ruth Station. • With the exception of the unsealed private access road and the property fencing, there is limited precedent infrastructure visible.
Key visual sensitivities	• This viewpoint would be experienced by rural workers travelling on Kirrama Range Road. It is understood these receptors would have a passing interest in their surroundings. The view would also be experienced by local residents travelling this road as well as visitors undertaking the Kirrama Range Road tourist drive. It is understood that these receptors would have an interest in their surroundings. It is anticipated that these receptors combined would represent a low volume of traffic. • This viewpoint is also considered to be typical of the residents and workers of Glen Ruth Station. It is considered that these receptors would have prolonged views and have an interest in their surroundings. Although individually, these receptors would be considered to have a high sensitivity to the change, due to the small number of receptors this sensitivity is lowered. • Cashmere Kirrama Road is part of the Kirrama Range Road tourist drive. As per the Tablelands Regional Council Planning Scheme Rural Code, development should not compromise views from scenic routes. While the view is in the direction of the WTQWHA, views of these forested landscapes are curtailed in this viewpoint due to the distance and presence of intervening vegetation. • The viewpoint is located on a local access road that is understood to experience a low number of receptors combined with the low number of residents in the area. However, as the viewpoint is located on a tourist route, the sensitivity of this viewpoint is considered to be ***Medium.***
Visual Evaluation	
Magnitude of Change Assessment	• The nearest turbine to this viewpoint is located approximately 23.6 km northeast of this viewpoint. This would be considered a long distance view of the Project. • While views of the Project are theoretically possible, it is anticipated that the vegetation would limit these views. In addition to this, any turbines that would

	be visible, would be barely perceptible due to the distance from site and only a partial view of turbines. As such the magnitude of change on this viewpoint is anticipated to be barely perceptible and therefore ***Negligible.***
Significance of Effect	• The effect of the turbines on VP6 is considered to be ***Minor*** and therefore ***Not Significant.***

Viewpoint 7

Table 30: Likely visual effect of the Project on Viewpoint 7

Viewpoint 7: View from Gunnawarra Road looking northeast to Site	
 **Existing view from Viewpoint 7: View from Gunnawarra Road looking northeast to Site** *Refer to* **Figure 20,** *Viewpoint 7, in Appendix 2 for appropriate scaled image and wider panoramic view as discussed below.*	
Visual Baseline Assessment	
Location and description	• GPS Location: 1 17°56'55.75"S 145° 9'5.67"E • Elevation: 640 m • North-easterly view from Gunnawarra Road. • Nearest proposed turbine on the Site is approximately 28 km northeast of this viewpoint. • Represents typical views of residents, rural workers on Gunnawarra Station and passing motorists on Gunnawarra Road including rural residents and visitors undertaking the Kirrama Range Road tourist drive. • Views from this located are generally open due to a slight rise in the elevation of the viewpoint combined with vegetation clearing for rural purposes. There is however roadside vegetation to the north (left side of view), remnant vegetation along Rudd Creek to the northeast (centre of view) and remnant vegetation to the west (right of view). • This view is typical of LCT C: *Rural Uplands and Rivers*. • Gunnawarra Road is unsealed local access road. • With the exception of Gunnawarra Road and some farming infrastructure visible on Gunnawarra Station (centre of view), there is limited precedent infrastructure visible.
Key visual sensitivities	• This viewpoint would be experienced by rural workers travelling on Gunnawarra Road. It is understood these receptors would have a passing interest in their surroundings. The view would also be experienced by local residents travelling this road as well as visitors undertaking the Kirrama Range Road tourist drive. It is understood that these receptors would have an interest in their surroundings. It is anticipated that these receptors

	travelling on Gunnawarra Road combined would represent a low volume of traffic. • This viewpoint is also considered to be typical of the residents and workers of Gunnawarra Station. It is considered that these receptors would have prolonged views and have an interest in their surroundings. Although individually, these receptors would be considered to have a high sensitivity to the change, due to the small number of receptors this sensitivity is lowered. • Gunnawarra Road is part of the Kirrama Range Road tourist drive. Elevated parts of the WTQWHA, form a distant forested backdrop to part of the view. As per the Tablelands Regional Council Planning Scheme Rural Code, development should not compromise views from scenic routes. • The viewpoint is located on a local access road that is understood to experience a low number of receptors combined with the low number of residents in the area. However, as the viewpoint is located on a tourist route, the sensitivity of this viewpoint is considered to be ***Medium.***
Visual Evaluation	
Magnitude of Change Assessment	• The nearest turbine to this viewpoint is located approximately 28 km northeast of this viewpoint. This would be considered a long distance view of the Project. • While views of the Project are theoretically possible, it is anticipated that the vegetation would limit the extent of these views, particularly to the west. In addition to this, any turbines that would be visible, would be barely perceptible due to the distance from site. As such the magnitude of change on this viewpoint is anticipated to be barely perceptible and therefore ***Negligible.***
Significance of Effect	• The effect of the turbines on VP7 is considered to be ***Minor*** and therefore ***Not Significant.***

Viewpoint 8

Table 31: Likely visual effect of the Project on Viewpoint 8

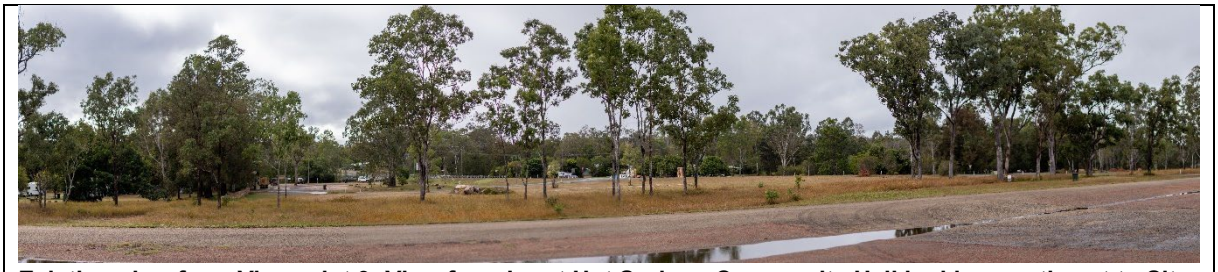
Viewpoint 8: View from Kennedy Highway looking east to Site	
Visual Baseline Assessment	
 **Existing view from Viewpoint 8: View from Kennedy Highway looking east to Site** *Refer to* **Figure 21,** *Viewpoint 8, in Appendix 2 for appropriate scaled image and wider panoramic view as discussed below.*	
Location and description	• GPS Location: 17°41'54.21"S 145°12'22.31"E • Elevation: 670 m • Easterly view from the Kennedy Highway. • The nearest proposed turbine on the Site is approximately 13.3 km east of this viewpoint.

	• These views are representative of those experienced by motorists on the Kennedy Highway including residents, rural workers and visitors undertaking the Savannah Way tourist drive • Views toward the Project Site from this location are partially obscured by vegetation on private property. • This view is taken from a slope toward the Herbert River and one of its tributaries, Little Oaky Creek. As such it is typical of LCT C: *Rural Uplands and Rivers.* There are distant views of LCT B: *Undulating Wooded Uplands* to the east (centre of view). • The Kennedy Highway is a sealed road and powerlines are visible in the foreground of this viewpoint.
Key visual sensitivities	• These views are representative of residents and workers travelling at speed on the Kennedy Highway. These receptors are considered to have a passing interest in their surroundings. Motorists undertaking the Savannah Way tourist drive would also experience this view. These receptors are considered to have an interest in their surroundings. The volume of these combined receptors travelling this road is considered to be high. • The Kennedy Highway in this location is part of the Savannah Way tourist drive. Elevated parts of the WTQWHA form a distant forested backdrop to part of the view. As per the Tablelands Regional Council Planning Scheme Rural Code, development should not compromise views from scenic routes. • Vegetation clearing for the highway, the sealed Kennedy Highway and powerlines are clearly visible and represent existing infrastructure and modification to the landscape. • Overall, this viewpoint is judged to be of ***Medium*** sensitivity.
Visual Evaluation	
Magnitude of Change Assessment	• The nearest turbine to this viewpoint is located approximately 13.3 km to the east. This is considered to be a long range view. • From this viewpoint it is anticipated that the full swept paths of a small number of turbines are likely to be visible. • Vegetation, particularly to the southern side of the Kennedy Highway (right side of view) limit views to most of the proposed turbines. • Although it is a long range view, it is anticipated that there are multiple turbines visible in the direction of travel (centre of view) when driving east on the Kennedy Highway. As such it is anticipated that the magnitude of change would be considerable and therefore ***Medium***.
Significance of Effect	• The effect of the turbines on VP8 is considered to be ***Moderate*** and therefore ***Not Significant.***

Viewpoint 9

Table 32: Likely visual effect of the Project on Viewpoint 9

Viewpoint 9: View from Innot Hot Springs Community Hall looking southeast to Site
Visual Baseline Assessment



Existing view from Viewpoint 9: View from Innot Hot Springs Community Hall looking southeast to Site
Refer to **Figure 22,** *Viewpoint 9, in Appendix 2 for appropriate scaled image and wider panoramic view as discussed below.*

Location and description	• GPS Location: 17°40'1.37"S 145°14'15.04"E • Elevation: 645 m • South easterly view from the car park of the Innot Hot Springs Community Hall on Broken Gully Road. • The nearest proposed turbine on the Site is approximately 11.5 km east of this viewpoint. • Represents typical accessible views of residents and rural workers as well as visitors to Innot Hot Springs including those visiting the Innot Hot Springs Leisure and Camping Park. This view is also representative of motorist travelling on the Kennedy Highway. • This viewpoint is located within LCT C: *Rural Uplands and Rivers* landscape type. • There are existing structures and infrastructure visible from this viewpoint. This includes the Innot Hot Springs Leisure and Camping Park to the northeast (left side of view), a Kennedy Highway bridge crossing nettle creek to the east-northeast (centre left of view) and residential properties to the east (centre of view) • With the exception of the southern lookout platform (left side of view) there is no other precedent infrastructure in the view.
Key visual sensitivities	• These views are representative of local residents of Innot Hot Springs. It is considered that these receptors would have prolonged views and have an interest in their surroundings. • The view is also representative of the views from the Innot Hot Springs Leisure and Camping Park and Community Hall. Visitors staying at the Camping Park would have an interest in their surroundings and would experience views for prolonged durations. • These views are also representative of residents and workers travelling at speed on the Kennedy Highway. These receptors are considered to have a passing interest in their surroundings. Motorists undertaking the Savannah Way tourist drive would also experience this view. These receptors are considered to have an interest in their surroundings. The volume of these combined receptors travelling this road is considered to be high. While the view is in the direction of the WTQWHA, due to elevation and intervening vegetation the WHA is not visible in this viewpoint. • The Kennedy Highway in this location is part of the Savannah Way tourist drive. As per the Tablelands Regional Council Planning Scheme Rural Code, development should not compromise views from scenic routes. • Overall, this viewpoint is judged to be of ***Medium*** sensitivity.

Visual Evaluation	
Magnitude of Change Assessment	• The nearest turbine to this viewpoint is located approximately 11.5 km east of this viewpoint. • This would be considered a medium to long distance view however due to the lower elevation of this viewpoint in comparison with elevated topography in the direction of Site it is likely that the majority of the Project would be obscured from view. • Vegetation, including that associated with the Nettle Creek corridor, is likely to obscure views of the Project. • As it is unlikely that the Project will be visible from this viewpoint, coupled with the distance to Site, the magnitude of change anticipated on this receptor is barely perceptible and therefore ***Negligible.***
Significance of Effect	• The effect of the turbines on VP9 is considered to be ***Minor*** and therefore ***Not Significant.***

Viewpoint 10

Table 33: Likely visual effect of the Project on Viewpoint 10

Viewpoint 10: View from 15225 Kennedy Highway looking southeast to Site	
Visual Baseline Assessment	
 **Existing view from Viewpoint 10: View from 15225 Kennedy Highway looking southeast to Site** *Refer to* **Figure 23,** *Viewpoint 10, in Appendix 2 for appropriate scaled image and wider panoramic view as discussed below.*	
Location and description	• GPS Location: 17°38'51.10"S 145°18'15.71"E • Elevation: 675 m • South-easterly view from the Kennedy Highway. • The nearest proposed turbine on the Site is approximately 6 km southeast of this viewpoint. • Represent typical accessible views of motorists on the Kennedy Highway including residents, rural workers as well as visitors undertaking the Savannah Way tourist drive. • The view is also representative of nearby residents and rural workers including the property visible to the south (right side of view). • South-easterly views from this point provide views across a landscape character typical of LCT C: *Rural Uplands and Rivers.* The background of the view includes a more undulating landscape consistent with LCT B: *Undulating Wooded Uplands.* • Existing infrastructure in this view is limited to small scale rural farmstead structures and fencing as well as power lines.

Key visual sensitivities	• These views are representative of residents and workers travelling at speed on the Kennedy Highway. These receptors are considered to have a passing interest in their surroundings. Motorists undertaking the Savannah Way tourist drive would also experience this view. These receptors are considered to have an interest in their surroundings. The volume of these combined receptors travelling this road is considered to be high. • The Kennedy Highway in this location is part of the Savannah Way tourist drive. The tourist drive includes views to the Misty Mountains section of the WTQWHA that form a forested backdrop to some views from the drive, although the WTQWHA is not a prominent element of this view. As per the Tablelands Regional Council Planning Scheme Rural Code, development should not compromise views from scenic routes. • The view includes a prominent rock formation referred to as Arthurs Seat. As per the Tablelands Regional Council Planning Scheme Rural Code, development should not compromise significant views or the visual character of significant landscape features. • Vegetation clearing for rural purposes is evident and powerlines are also visible and represent modification to the landscape and the presence of existing infrastructure. • This viewpoint is also considered to be typical of the residents and workers of 15225 Kennedy Highway. It is considered that these receptors would have prolonged views and have an interest in their surroundings. Although individually, these receptors would be considered to have a high sensitivity to the change, due to the small number of receptors this sensitivity is lowered. • Overall, this viewpoint is judged to be of ***Medium*** sensitivity.
Visual Evaluation	
 **Visualisation from Viewpoint 10: View from 15225 Kennedy Highway looking southeast to Site** *Refer to* **Figure 23,** *Viewpoint 4, in Appendix 2 for appropriate scaled image and wider panoramic view as discussed below.*	
Magnitude of Change Assessment	• The nearest turbine to this viewpoint is approximately 6 km to the southeast. • This is considered a short to medium distance view. • It is anticipated that the full swept paths of a large number of turbines will be clearly visible from this viewpoint. The turbines will partially affect a small part of the setting of the distant elevated landscapes of the WTQWHA in some views from the tourist drive, although will not meaningfully affect this particular view. • As a substantial part of the Project is likely to be clearly visible across a significant portion of the view, this is considered a dominant change and as such the magnitude of change on this view is anticipated to be ***High.***
Significance of Effect	• The effect of the turbines on VP10 is considered to be ***Moderate to major*** and therefore ***Significant.***

Viewpoint 11

Table 34: Likely visual effect of the Project on Viewpoint 11

Viewpoint 11: View from Herbert River Road (at Red Bend Farm) looking east to Site	
Visual Baseline Assessment	
 **Existing view from Viewpoint 11: View from Herbert River Road (at Red Bend Farm) looking east to Site** *Refer* **Figure 24,** *Viewpoint 11, in Appendix 2 for appropriate scaled image and wider panoramic view as discussed below.*	
Location and description	• GPS Location: 17°42'36.62"S 145°15'38.50"E • Elevation: 640 m • Easterly view from Herbert River Road. • Nearest proposed turbine on the Project Site is approximately 7.3 km east of this viewpoint. • Represents typical views of residents, rural workers on nearby rural properties as well as passing motorists travelling on Herbert River Road including local residents and workers. • Easterly views from this viewpoint are typical of LCT C: *Rural Uplands and Rivers.* The background of the view includes the more undulating landscape consistent with LCT B: *Undulating Wooded Uplands.* The Project Site is the dominant landscape in this view and obscures views to the elevated forested landscapes of the WTQWHA beyond. • Precedent infrastructure in the view is limited to small scale farmstead infrastructure
Key visual sensitivities	• This viewpoint would be experienced by rural workers travelling on Herbert River Road. It is understood these receptors would have a passing interest in their surroundings. The view would also be experienced by local residents travelling this road. It is understood that these receptors would have an interest in their surroundings. It is anticipated that these receptors travelling on Herbert River Road combined would represent a low volume of traffic. • This viewpoint is also considered to be typical of the residents and workers of on the properties visible as well as those in the vicinity. It is considered that these receptors would have prolonged views and have an interest in their surroundings. Although individually, these receptors would be considered to have a high sensitivity to the change, due to the limited number of receptors this sensitivity is lowered. • The viewpoint is located on a local access road that is understood to experience a low number of receptors. There are however multiple farmstead properties in the vicinity of this viewpoint with prolonged views. As such the sensitivity of this viewpoint is considered to be ***Medium.***

Visual Evaluation	
 **Visualisation from Viewpoint 11: View from Herbert River Road (at Red Bend Farm) looking east to Site** Refer **Figure 25** *Viewpoint 11, in Appendix 2 for appropriate scaled image and wider panoramic view as discussed below.*	
Magnitude of Change Assessment	• The nearest turbine to this viewpoint is approximately 7.3 km to the east and this is considered a short to medium view. • It is anticipated that the full swept paths of a large number of turbines will be clearly visible extending across the elevated range seen from this viewpoint • As a large number of turbines are likely to be clearly visible across the majority of the view, this is considered a dominant change and as such the magnitude of change on this view is anticipated to be ***High.***
Significance of Effect	• The effect of the turbines on VP10 is considered to be ***Moderate to major*** and therefore ***Significant.***

Viewpoint 12

Table 35: Likely visual effect of the Project on Viewpoint 12

Viewpoint 12: View from Gordon Earl Drive, Millstream looking southwest to Site	
Visual Baseline Assessment	
 **Existing view from Viewpoint 12: View from Gordon Earl Drive, Millstream looking southwest to Site** *Refer to* **Figure 25,** *Viewpoint 12, in Appendix 2 for appropriate scaled image and wider panoramic view as discussed below.*	
Location and description	• GPS Location: 17°39'56.86"S 145°25'33.80"E • Elevation: 750 m • South-westerly view from Gordon Earl Drive. • Nearest proposed turbine on the Project Site is approximately 4.7 km southwest of this viewpoint. • Represents typical views of residents and visitors to Millstream.

	• South-westerly views from this viewpoint are typical of LCT C: *Rural Uplands and Rivers.* While this view is not directed toward the WTQWHA, the low-lying elevation and intervening vegetation would likely obscure views from this location toward the elevated forested landscapes of the WTQWHA. • Precedent infrastructure in the views includes Gordon Earl Drive, powerlines and housing however a 275 kV transmission tower is visible in the distance to the southwest.
Key visual sensitivities	• These views are representative of residents and visitors to Millstream. It is considered that these receptors would have prolonged views and have an interest in their surroundings. • This view would be typical of a cluster of residential properties in this part of Millstream. • Overall, this viewpoint is judged to be of ***Medium*** sensitivity.
Visual Evaluation	
 **Visualisation from Viewpoint 12: View from Gordon Earl Drive, Millstream looking southwest to Site** *Refer* **Figure 25,** *Viewpoint 12, in Appendix 2 for appropriate scaled image and wider panoramic view as discussed below.*	
Magnitude of Change Assessment	• The nearest turbine to this viewpoint is approximately 4.7 km southwest of this viewpoint and as such this is considered a short to medium range view. • It is anticipated that the full swept paths of multiple turbines will be clearly visible from this viewpoint as well as clear views of multiple turbines to hub height. The upper part of one meteorological mast is also likely to be glimpsed to the right hand side of the view. • While the existing powerlines occupy a portion of the view, it is anticipated that the visible full swept paths of the turbines coupled with the rotating motion of the blades would differentiate these proposed turbines as a distinct new feature. • While the Project is partially obscured by elevated topography and vegetation, the visible portion extends across a substantial extent of the view. Due to the short to medium range view coupled with the extent to which the turbines are visible, this is considered a dominant change. As such the magnitude of change on this view is anticipated to be ***High.***
Significance of Effect	• The effect of the turbines on VP12 is considered to be ***Moderate to Major*** and therefore ***Significant.***

Viewpoint 13

Table 36: Likely visual effect of the Project on Viewpoint 13

Viewpoint 13: View from Rhyolite Pinnacle looking east (south to Site)	
Visual Baseline Assessment	
 **Existing view from Viewpoint 13: View from Rhyolite Pinnacle looking east (south to Site)**. Refer to **Figure 26**, *Viewpoint 13, in Appendix 2* for appropriate scaled image.	
Location and description	• GPS Location Viewpoint 13A: 17°42'54.26"S 145°33'18.17"E • Elevation: 1002 m • Easterly view from the vantage point at Rhyolite Pinnacle which looks in a general eastwards/south-eastwards direction and towards the Site at the southernmost (right hand side) of the view • The nearest proposed turbine on the Site is approximately 8.15 km southwest of this viewpoint, however turbines in this direction are not visible. • These views are representative of visitors who undertake the hike along the Koolmoon Creek track to Rhyolite Pinnace and National Park Rangers within the WTQWHA. It is anticipated that there is a relatively low number of visitors to this viewpoint due to the length of the walk. It is noted that this viewpoint is not notated as a 'Viewpoint' on the QPWS Misty Mountains walking track map. • Views toward the Project Site from this location are predominantly obscured by vegetation and topography. The main view from Rhyolite Pinnacle is orientated away from the site in a more easterly direction. It is noted that during fieldwork the weather conditions included a haze which is quite common in the Misty Mountains section of the WTQWHA (at the time of the original visit views would not have been possible due to the high degree of mist). The assessment on this viewpoint however considers likely views when visibility is not affected by any haze. • This view represents a natural character generally consistent with LCT A: *Forested Ranges and Mountains*.
Key visual sensitivities	• Rhyolite Pinnacle is located in Tully Falls National Park and looks out over Tully Falls National Park and Koombooloomba National Park, all of which are located within the WTQWHA, an area that is identified as having areas of exceptional natural beauty and aesthetic importance. Due to the strenuous nature of the Koolmoon Creek track including the detour to Rhyolite Pinnacle (Grade 5 and 4 respectively), it is anticipated that there is a relatively low number of visitors to this viewpoint. • Due to the natural character as well as international, national and state protections afforded to the WTQWHA, which include OUV parameters

	relating to sweeping forest vistas it is considered that the sensitivity of this viewpoint is ***High.***
Visual Evaluation	
Magnitude of Change Assessment	• This viewpoint includes views to the Site, however there are no views to proposed turbines in the current Project layout (whereas obscured views of turbines were present in a previous project layout). • As such there is expected to be no impact on this viewpoint.
Significance of effect	• There is no effect arising from the Project on Viewpoint 13.

Viewpoint 14

Table 37: Likely visual effect of the Project on Viewpoint 14

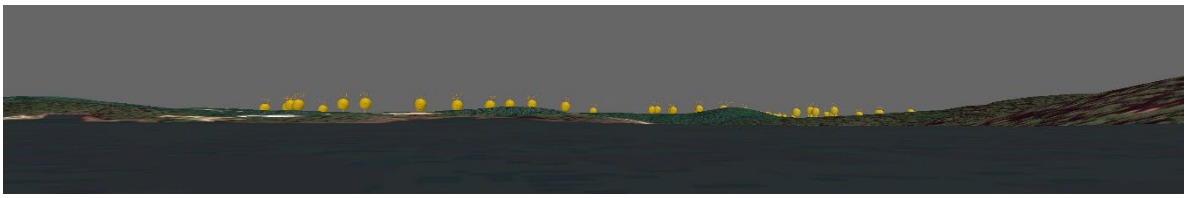
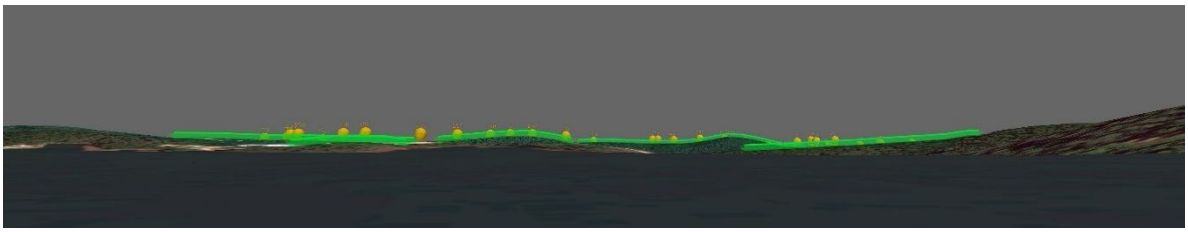
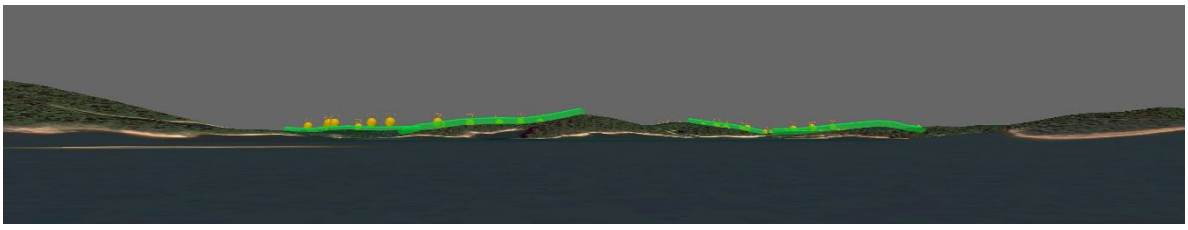
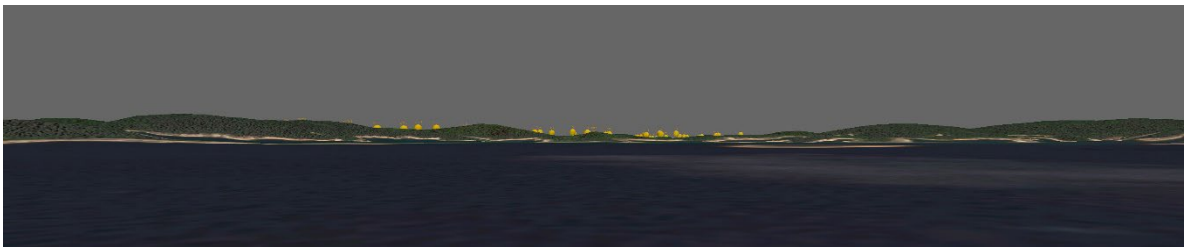
Viewpoint 14: View from Koolmoon Creek track, leading to Rhyolite Pinnacle, looking west to Site	
Visual Baseline Assessment	
 **Existing view from *Viewpoint 14: View from Koolmoon Creek track, leading to Rhyolite Pinnacle, looking west*** to Site Refer to **Figure *27***, *Viewpoint 14, in Appendix 2* for appropriate scaled image and wider panoramic view as discussed below.	
Location and description	• GPS Location Viewpoint 14: 17°42'44.80"S 145°33'21.20"E • Elevation: 1032 m • Westerly view from part of the hiking track leading to Rhyolite Pinnacle that forms part of the Koolmoon Creek track. • The nearest proposed turbine on the Site is approximately 8.4 km southwest of this viewpoint. • This viewpoint is representative of the clearest view to the Site available to visitors who undertake the hike along the Koolmoon Creek track to Rhyolite Pinnace and National Park Rangers within the WTQWHA. It is anticipated that there is a relatively low number of visitors undertaking this hike due to the length and grade of the Koolmoon Creek track. This particular viewpoint is not typical of views from the track, being available from a location of approximately 3 m in extent that is heavily vegetated and generally difficult to access. It is also noted that this location is not a formalised viewpoint and is not notated as a 'Viewpoint' on the QPWS Misty Mountains walking track map. • This location provides fairly open views toward the Project Site from this location from an elevated location on the walking track. It is noted that during fieldwork the weather conditions included a light haze which is common in the Misty Mountains section of the WTQWHA (at the time of the original visit views would not have been possible due to the very high degree of mist).

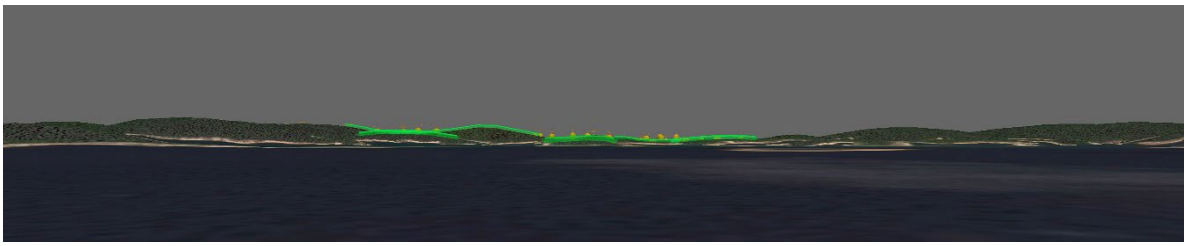
	The assessment on this viewpoint however considers likely views when visibility is not affected by any haze. • This view represents a natural character generally consistent with LCT A: *Forested Ranges and Mountains*.
Key visual sensitivities	• The Koolmoon Creek track to Rhyolite Pinnacle is located in Tully Falls National Park within the WTQWHA, an area that is identified as having areas of exceptional natural beauty and aesthetic importance. Due to the strenuous nature of the Koolmoon Creek track including the detour to Rhyolite Pinnacle (Grade 5 and 4 respectively), the fact that it is not a formal viewpoint, and the dense vegetation and difficulty of accessing this location it is anticipated that there is a relatively low number of visitors to this viewpoint. • Due to the natural character as well as international, national and state protections afforded to the WTQWHA, which include OUV parameters relating to sweeping forest vistas it is considered that the sensitivity of this viewpoint is ***High***.
Visual Evaluation	
 **Visualisation from *Viewpoint 14: View from Koolmoon Creek track, leading to Rhyolite Pinnacle, looking west to Site.*** Refer to **Figure *27***, *Viewpoint 14, in Appendix 2* for appropriate scaled image and wider panoramic view as discussed below.	
Magnitude of Change Assessment	• The nearest turbine to this viewpoint is located approximately 8.4 km west of this viewpoint which is considered to be a medium to long distance view. • As can be seen in the visualisation in Figure 27, multiple turbines would be visible in the view including the full swept paths of many turbines. • There are some existing infrastructure elements within the viewshed (associated with the power lines leading to Chalumbin substation), however, as these are not prominent the turbines would be considered a distinct new element in the view. • It is noted that most of the Koolmoon Creek track is enclosed in dense vegetation or has a lower elevation relative to the surrounding landscape. This view is only available from a small portion (approximately 3 m in extent) located off the track that is difficult to get to and isn't highly used/defined. However as this is located near the culmination of a relatively long hike, on the occasions that this view is accessed, the turbines are considered to affect the natural 'sweeping forest vistas', albeit they have a relatively simple and harmonious layout that matches the large scale of the natural topography. • As such the magnitude of change anticipated on this receptor is considered to be **High**.
Significance of effect	• The effect of the turbines on VP14 is considered to be ***Major*** *and* ***Significant*** *(but noting this view is only obtained for a very short and relatively inaccessible part of the track and the principal view from Rhyolite Pinnacle is as described in VP13 above).*

Viewpoint 15

Table 38: Likely visual effect of the Project on Viewpoint 15

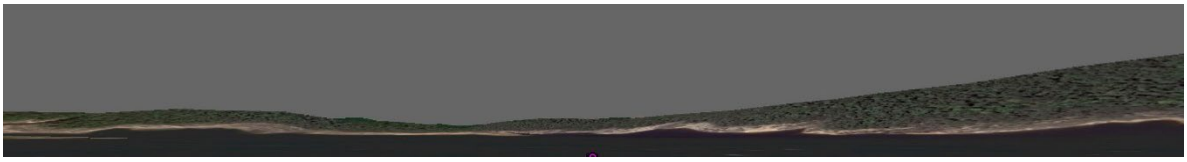
Viewpoint 15a: View from Lake Koombooloomba, looking west to Site	
Visual Baseline Assessment	
No photographs of the existing views were obtained due to inclement weather conditions, unsuitable for taking out a boat on the dam. *For this reason the assessment has been undertaken using digital modelling to test a range of viewing scenarios from the dam. The indicative tree line has been conservatively assessed as 15 m and it is recognised that vegetation may be more or less than 15 m and that there may be local gaps in vegetation coverage.*	
Visual Baseline Assessment	
Location and description	• GPS Location: 17°50'2.27"S 145°36'24.63"E (Location 1/VP15 A) • GPS Location: 17°49'42.58"S 145°37'6.26"E (Location 2/VP15 B) • GPS Location: 17°50'23.84"S 145°38'11.49"E (Location 3/VP15 C) • GPS Location: 17°52'54.32"S 145°38'41.61"E (Location 4/VP15 D) • Elevation: 747 m (water surface - all locations, note this level may fluctuate depending on weather conditions) • Generally westerly views to the Site from Lake Koombooloomba (Koombooloomba Dam) • Nearest proposed turbine to the dam is approximately 8.5 km to the west (approximately 9.75 km from VP15 A, 11.01 km from VP15 B, 12.87 km from VP15 C, and 14.35 km from VP15 D). • Represents a range of typical recreational viewer locations of people boating or kayaking on Koombooloomba Dam within Koombooloomba Conservation Park, part of the WTQWHA, as well as National Park Rangers. • While the dam represents a significant loss of former vegetated landscape and replacement with dam infrastructure, the dense vegetation in the background of the view is typical of LCT A: Forested Ranges and Mountains • From parts of the dam, existing infrastructure including the dam wall, boat ramp and campground infrastructure are visible.
Key visual sensitivities	• These vantage points would be experienced by people undertaking recreation (camping and kayaking) on Koombooloomba Dam. These receptors are considered to have an interest in their surroundings, and it is anticipated that this view represents prolonged views experienced by these receptors. • This viewpoint is located within the Koombooloomba Conservation Park, which is located within the WTQWHA, an area that is identified as being of exceptional natural beauty and aesthetic importance. • There is some existing infrastructure visible from the dam, noting that the dam itself is a man-made element of the landscape. • Due to the international, national and state protections afforded to the WTQWHA, it is considered that the sensitivity of these viewpoints is ***High,*** albeit they would be infrequently accessed by receptors.

Visual Evaluation
Location 1 (Location 15A)
 **Model view (Google Earth) from location 1 Viewpoint 15a: View from Lake Koombooloomba, looking west to Site.** *Refer to* **Figure 28 (VP15A)** *for appropriate scaled image.*
 **Model view (Google Earth) from location 1 Viewpoint 15a: View from Lake Koombooloomba, looking west to Site (showing indicative tree line)** *Refer to* **Figure 28 (VP15A)** *for appropriate scaled image.*
Location 2 (Location 15B)
 **Model view (Google Earth) from location 2 Viewpoint 15b: View from Lake Koombooloomba, looking west to Site.** *Refer to* **Figure 29 (VP15B)** *for appropriate scaled image.*
 **Model view (Google Earth) from location 2 Viewpoint 15b: View from Lake Koombooloomba, looking west to Site (showing indicative tree line)** *Refer to* **Figure 29 (VP15B)** *for appropriate scaled image.*
Location 3 (Location 15C)
 **Model view (Google Earth) from location 3 Viewpoint 15c: View from Lake Koombooloomba, looking west to Site** *Refer to* **Figure 30 (VP15 C)** *for appropriate scaled image.*

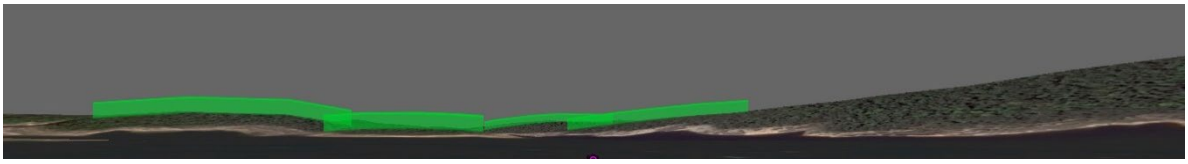


Model view (Google Earth) from location 3 Viewpoint 15c: View from Lake Koombooloomba, looking west to Site *Refer to* **Figure 30 (VP15 C)** *for appropriate scaled image.*

Location 4 (Location 15D)



Model view (Google Earth) from location 4 Viewpoint 15d: View from Lake Koombooloomba, looking west to Site *Refer to* **Figure 31 (VP15 D)** *for appropriate scaled image.*



Model view (Google Earth) from location 4 Viewpoint 15d: View from Lake Koombooloomba, looking west to Site *Refer to* **Figure 31 (VP15 D)** *for appropriate scaled image.*

Magnitude of Change Assessment	• The nearest proposed turbine to the dam edge is approximately 8.5 km to the west, and the closest turbines are approximately 9.75 km from VP15 A, 11.01 km from VP15B, 12.87 km from VP15 C, and 14.35 km from VP15 D. Thus a range of different viewing distances within the dam have been tested to consider the effects of distance on the potential for views of the Project. • These distances are considered to represent medium to long range views. • Across the dam views change considerably due to a combination of the topography and presence of vegetation. Typically, close to the dam edge views are obscured by intervening landform and vegetation, whereas away from the dam edge potential views open up. • Based on the modelled analysis it is considered: o Location 1/VP15 A: From this location, based on landform the upper parts of multiple turbines would be visible. Dam elements including the dam wall are likely to be visible in the vicinity of Location 1, therefore the contrast with the natural setting is lessened. Furthermore, foreground vegetation will have a significant effect in screening parts of the turbines so only the upper parts of many of the turbines would be visible, considered likely to be noticeable of up to ***Low*** magnitude of change. o Location 2/VP15 B: From this location, based on landform the upper parts of multiple turbines would be visible. Foreground vegetation is predicted to obscure lower parts of many, but not all, of the turbines leaving several turbines visible. However, dam elements including the dam wall are likely to be visible in the vicinity of Location 2, therefore the contrast is lessened so the change is considered to be noticeable up to ***Low*** magnitude of change. o Location 3/VP15 C: From this location, based on landform the upper parts of multiple turbines would be visible. However, foreground vegetation will have a significant effect in screening parts of the

	turbines so only the upper parts of many of the turbines would be visible, considered likely to be noticeable of up to ***Low*** magnitude of change. ○ Location 4/VP15 D: From this location, based on landform no turbines would be visible. Therefore the change is considered likely to result in ***No impact***. • As such it is anticipated that the impact of the Project on views on Koombooloomba Dam would range from ***No impact*** through to ***Low*** impact.
Significance of effect	• The effect of the turbines on VP15 is considered to range from ***No impact to Moderate impact*** and therefore ***Not Significant.***

Viewpoint 16

Table 39: Likely visual effect of the Project on Viewpoint 16

Viewpoint 16: View from Yourka Glen Gordon Road looking east to Site	
Visual Baseline Assessment	
 **Existing view from Viewpoint 16: View from Yourka Glen Gordon Road looking east to Site** *Refer* **Figure *32*,** *Viewpoint 16, in Appendix 2 for appropriate scaled image and wider panoramic view as discussed below.*	
Location and description	• GPS Location: 17°45'47.11"S 145°17'43.45"E • Elevation: 634 m • Easterly view from Yourka Glen Gordon Road. • Nearest proposed turbine on the Project Site is approximately 3.7 km east of this viewpoint. • Represents typical views of passing motorists travelling down Yourka Glen Gordon Road which is a fairly private, unsealed, local road used by residents and rural workers accessing the small number of rural properties accessed from this road. • Easterly views from this viewpoint are typical of LCT B: *Undulating Wooded Uplands.* The Project Site is the dominant landscape in this view and obscures all but occasional filtered views to the elevated forested landscapes of the WTQWHA located to the east from views located along this road. • Precedent infrastructure in the view is limited to small scale farm infrastructure such as fencing and the road.
Key visual sensitivities	• This viewpoint would be experienced by rural workers and residents travelling to the small number of rural properties accessed from Yourka Glen Gordon Road. Due to the semi-private nature of this road, and because it does not lead to any destinations, members of the general public are not anticipated to be travelling along this road. It is understood that local

	residents travelling this road would have an interest in their surroundings. However there is anticipated to be a very low volume of traffic. • This viewpoint is also considered to be typical of the residents and workers of the properties visible as well as those rural residents in the vicinity of the road. It is considered that these receptors would have transient views and have an interest in their surroundings. Although individually, these receptors would be considered to have a high sensitivity to the change, due to the limited number of receptors this sensitivity is lowered. • The viewpoint is located on a local access road that is understood to experience a low number of receptors passing at moderate speeds. There are few farmsteads in the vicinity of this viewpoint with prolonged views. As such the sensitivity of this viewpoint is considered to be ***Low.***
Visual Evaluation	
 **Visualisation from Viewpoint 16: View from Yourka Glen Gordon Road looking east** to Site Refer **Figure 32,** *Viewpoint 16, in Appendix 2 for appropriate scaled image.*	
 **Visualisation (wire frame) from Viewpoint 16: View from Yourka Glen Gordon Road looking east** to Site Refer **Figure 32,** *Viewpoint 16, in Appendix 2 for appropriate scaled image.*	
Magnitude of Change Assessment	• The nearest turbine to this viewpoint is approximately 3.7 km to the east with other turbines beyond and this is considered a close (to medium range) view. • Many of the more distant turbines are obscured by the foreground vegetation (see the pink wireframe turbines in the image above). Several of the closest turbines are anticipated to be visible including the full swept paths of some, as highlighted with reference to the red turbines shown on the wireframe diagram above. However, foreground trees also screen and assist to integrate a number of these turbines into their landscape setting. • As several turbines are likely to be visible across this view and when travelling along Yourka Glen Gordon Road. While it is noted that the turbines are integrated into the landscape setting, this is considered a considerable change and as such the magnitude of change on this view is anticipated to be up to ***High***.

Significance of Effect	• The effect of the turbines on VP16 is considered to be ***Moderate*** and therefore ***Not significant.***

9. Construction and decommissioning assessment

9.1. Construction / installation impacts

The wind farm turbine infrastructure will be located predominantly within the *Undulating and Wooded Uplands* landscape character type (LCT B) with a comparatively smaller number within *Forested Ranges and Mountains* (LCT A). Based on the potential construction phase elements identified in Section 4.1, there are likely to be short term (approximately 18-24 months) changes and effects to the landscape character, views and visual amenity during this phase. This includes transportation of the crew between activity sites and nearby towns and the presence of large-scale machinery installing the Project infrastructure on a generally undeveloped landscape. Construction activities (including excavation, trenching, earthmoving, vegetation clearance/trimming, installing the turbines by crane and temporary lighting) would likely be visible to partially visible from the surrounding landscape.

Construction impacts will be visible by people living in rural landscape around the Site and the townships of Millstream, Ravenshoe, Innot Hot Springs and Mount Garnet as well as those working locally (e.g. farmers, graziers, farm-assistants or farming/grazing contractors) and those visiting the local area, particularly those visiting the WTQWHA, the National Parks or travelling the Savannah Way tourist drive.

Because the effects are temporary they are considered to be of lower potential significance than those effects identified in Sections 7.1 and 8.3.

9.2. Decommissioning impacts

At the end of the operational lifetime of the Project (assumed to be at least 30 years) it is assumed the wind farm infrastructure will be decommissioned and the site will be rehabilitated, returning the landscape character wholly to its present condition.

It is anticipated that the impacts that result from decommissioning of the Project Site will be very similar to those during the construction phase, as it is essentially a reversal of the construction process, although a quicker process, likely to take up to around 12-24 months.

Accordingly, there are likely to be short-term, changes and effects on the landscape character, views and visual amenity as a result of the presence of construction crews and large-scale machinery removing the Project components and rehabilitating the affected sites (e.g. localised regrading of landform, spreading topsoil and seeds). Turbine tower bases will be removed down to 500mm or top soil built up over the foundation to achieve a similar result. The access roads, if not required for farming purposes or fire access, will be removed and the site reinstated to original condition and use. It is anticipated however that these access roads would improve accessibility within the property and therefore would likely be retained. Access gates, if not required for farming purposes, would also be removed.

Over time, land associated with the areas around the turbines will be rehabilitated and due to its typically low access would be anticipated to return to predevelopment condition. While the extent of access tracks retained post-decommissioning is not understood at this time, it is expected that following decommissioning, the development would result in a low impact on the appearance of the surface landscape in the long term.

10. Cumulative assessment

The aim of the cumulative LVIA is to describe and assess the ways in which the Project may have additional landscape and visual impacts when considered together with other large-scale projects within the wider landscape context of the Site.

Existing projects form part of the baseline so are not assessed here, but it is worth noting that within the study area, the Windy Hill Wind Farm (comprising 20, 44 m high turbines built in 2000) is already in existence located around 17 km from the site, with turbines at Windy Hill located around 1 km west of the WTQWHA. Outside of the study area, the Mount Emerald Wind Farm (comprising 53 148.5 m high turbines, built in 2018) is also already in existence and is located 5 km west of Walkamin around 62 km from the site and 15 km west of the WTQWHA. Due to the distance of Mount Emerald from the Chalumbin Site it is noted that it will take around one hour to drive between the two sites, so the potential for cumulative impact is marginal.

Based on the methodology described in Section 3.9, a review was undertaken of published Coordinated Projects, information on the SARA website public notifications and Department of Transport and Main Roads (TMR) Projects as well as information available on potential proponent's websites.

There are not any relevant coordinated projects in or close to the Study Area. Two wind farm projects being assessed or recently approved by SARA have been identified within the Study Area. These comprise the Kaban Wind Farm (as part of the Kaban Green Power Hub) and the High Road Wind Farm. The location of these proposed wind farms can be seen in **Figure 13.** Available information suggests approvals are currently ongoing so they are assessed below:

- The Kaban Green Power hub is a proposed 157 MW wind farm including 28 turbines, battery storage and ancillary infrastructure (Neoen, 2022). The turbines proposed at Kaban are anticipated to be 226 m high to blade tip (Neoen, 2022). The location of the Kaban Green Power Hub is located approximately 9 km north of the Site and construction is now in progress. It is located around 11 km from the WTQWHA (Maalan National Park and Tully Falls National Park).

- The proposed High Road Wind Farm is located approximately 13 km north of Ravenshoe and approximately 23 km north of the Site. The High Road Wind Farm is proposed to include 18 turbines which are likely to be 150 m high to the tip of the blade (Ratch-Australia Corporation, 2022). It is located around 1 km from the WTQWHA (Herberton Range National Park).

Due to the proposed location of the Kaban Green Power Hub relative to the Chalumbin Site it is likely, that should both projects be given approval, that there would be cumulative impacts. There would be potential for *combined impacts*, that is where a when a static receptor is able to view both projects from a single viewpoint (without moving position). Examples where there is potential for a *combined impact* would be from the lookout at either Bally Knob (**Figure 16**) or Majors Mountain within the WTQWHA (**Figure 17**). A receptor in these locations may experience views of both of these projects when facing west. It is noted however that these would be peripheral views of the projects, with each project located at the outer, opposite extent of the viewshed. Successive impacts are also likely from these locations. A *successive impact* arises where both projects would be visible to a receptor from the viewpoint but not in the same view (e.g. the receptor would need to turn their head to see both projects). In these examples a receptor at either Bally Knob lookout or Majors Mountain lookout could see greater extents of these projects in comparison with the *combined impact* described above. Depending on the height of the proposed turbines at Kaban Green Power Hub, there may also be opportunities for *successive impacts* for receptors travelling along the Kennedy Highway. The development of both of these projects would also have *sequential impacts*. For example, in a scenario where a receptor is travelling south on Tumoulin Road then onto the Kennedy Highway heading

westbound, this receptor would be driving within proximity to both project sites. Therefore, it is likely that this receptor would experience views of Kaban Green Power Hub, followed by views of the Chalumbin Project.

When comparing the proposed High Road Wind Farm with the Chalumbin Project there is less potential for cumulative impacts due to the more substantial distance between the projects. It is unlikely that there is an opportunity for *combined impacts*, however there may be *successive impacts* from higher elevations such as Majors Mountain lookout within the WTQWHA and Bally Knob lookout. In a scenario where the Chalumbin Project, Kaban Green Power Hub and High Road Wind Farm are all developed, this *successive impact* would be increased. It is noted however that in these views, the High Road Wind Farm would be a long distant view of approximately 18 km from these viewpoints. *Sequential impacts* would also be likely in the scenario where the High Road Wind Farm is developed in conjunction with the Chalumbin Project and/or Kaban Green Power Hub. Similar to the scenario above, a receptor travelling south on Tumoulin Road and then westbound on the Kennedy Highway would experience sequential views of these projects.

Other wind farms assessed by SARA that fall outside of the Study Area but lie close to the WTQWHA, so have been given some consideration, are:

- Mt Fox Energy Park Wind Farm. This wind farm has recently been approved (EPBC 2021/8910) and is located near Mount Fox, west of Ingham. It comprises 57 turbines at up to around 230 m to blade tip and associated infrastructure. The Mt Fox Energy Park is located around 20 km from the WTQWHA (Girringun National Park section)

- Upper Burdekin Wind Farm. This is currently being assessed by DAWE (Windlab, 2022) and comprises 136 turbines of up to 300 m to blade tip. This wind farm is located close to the Mt Fox Energy Project. The northernmost part of this site lies within around 2 km of the WTQWHA (Girringun National Park section).

As these wind farms are located around 100 km from the Project site, there will be no opportunities for combined or successive impacts. Due to the large distance no meaningful sequential impacts are likely.

Overall, it is considered that potential cumulative impacts may arise due to the combined effect of the Project with other proposed wind farm developments located in the Study Area around the Site. The impacts experienced when travelling along the Kennedy Highway are likely to be experienced by a larger number of receptors in comparison with those experienced from Majors Mountain lookout or Bally Knob lookout.

Although many other wind farms are proposed outside of the study area, the potential for cumulative landscape and visual impacts would be limited to successive impacts, however these impacts are likely to be minimal given the distance between the Project site and the location of these proposed (and existing/under construction) developments .

11. Assessment of impacts on WTQWHA

11.1. PER Guidelines

This section responds to the Public Environment Report (PER) Guidelines for the Project, received from Department of Agriculture, Water and Environment (DAWE) following their consideration of the referral for the Chalumbin Wind Farm Project as detailed in *Guidelines for the Content of a Draft Public Environment Report, Chalumbin Wind Farm near Ravenshoe, Queensland Reference 2021/8983* (DAWE, 2021). As stated in that document, the proposal was referred under the Environment Protection and Biodiversity Conservation Act 1999 (the EPBC Act) to the Minister for the Environment on 12th July 2021. On 10th August 2021, a delegate of the Minister for the Environment (the Minister) determined that the proposed action is a controlled action due to likely significant impacts on matters of national environmental significance (MNES) that are protected under Part 3 of the EPBC Act, including the following matters of potential relevance to Landscape and Visual Impact Assessment:

- The world heritage values of a World heritage property (s12 & s15A)
- The heritage values of a National heritage place (s15B & s15C)

The delegate therefore determined that the controlled action is to be assessed by a PER. The purpose of this section is to assess specific matters identified in the guideline that relate to LVIA; where appropriate drawing upon information already presented in this report to inform the preparation of the PER.

The assessment has also been undertaken with consideration of the Wet Tropics Management Plan (WTMA, 1998), as described in Table 15. Although it is noted that the Project does not fall within the WTQWHA and no infrastructure is located within 620 m of the WTQWHA boundary, so the assessment criteria do not directly apply, they are useful to consider with regard to determining the level of significance on World Heritage values and integrity of the area:

(1) The most important consideration for deciding the application is the potential impact of the proposed activity on the world heritage values and integrity of the area….(with) regard to—

> (b) the extent to which the proposed activity is consistent with the statement of outstanding universal value for the area; and
>
> (c) the potential impact of the proposed activity on—
>
> > (iii) the scenic amenity of the area, including, in particular, the degree of visual dominance of the activity or of any change to the landscape caused by the activity; …

Aspects of the PER Guidelines that are considered relevant to the LVIA are set out in **Table 40** below, which details where this LVIA addresses these issues.

Table 40: PER guideline relevant to LVIA matters

Section of Guidelines	Requirement	Relevant cross reference to where this issue is addressed in this LVIA
4.1 General Description of the Environment	The PER must contain a description of the existing environment of the proposed action area and the surrounding areas that may be affected by the action (this may include outside	The existing environment of and surrounding the Project site have been described in earlier sections of this LVIA report:

	of the Project site). This should include details of current and historical land use of the area. It is recommended that this includes, but is not limited to, the following information: (b) Details of surveys undertaken to determine impacts of the proposed action on the World Heritage and National Heritage values of the Wet Tropics of Queensland (see section 4.2.1 and 4.2.2 below) including assessments of visual amenities.	**Section 3.5: Field survey:** Describes the LVIA field survey, including in relation to the WTQWHA. **Section 5: Legislative context and standards**: Describes the legislative context, including landscape and visual matters associated with the location of the site in relation to the World Heritage and National Heritage values of the WTQWHA. **Section 6: Regional landscape context**: Describes the context of the landscape around the site, including surrounding settlements, physical landscape features, and land use, including National Parks and the WTQWHA. **Section 7: Landscape assessment**: Describes the findings of a landscape character assessment of the landscape of and around the Project site which subdivides the landscape into four different landscape character types. **Section 8: Visual assessment**: Describes a representative selection of views towards the Project site, five of which are located within the WTQWHA and several others of which encompass views over the Project site in the direction of western parts of the WTQWHA, Misty Mountains section. It is noted that historical land use is not directly relevant to contemporary LVIA. Therefore, this issue is not addressed in this report but is assessed, as appropriate, in the cultural heritage assessment and ecological assessments.
4.2 Wet Tropics of Queensland	Provide a description of the World and National Heritage WTQ within and adjacent to the Project area that may be impacted by the proposed action, including information about location, physical features, condition, historical context and current uses. This must include the following: (a) ecosystems and their constituent parts, including people and communities; (b) natural and physical resources; (c) the qualities and characteristics of locations, places and areas; and (d) the social, economic and cultural aspects of items mentioned in (a), (b) or (c).	Relevant parts of this element (i.e. with the exception of historical context and detailed information on ecological, cultural and economic values which are addressed in other assessments) have been described in the LVIA in the sections noted above. However, for clarity, **Section 11.2: Summary of WTQWHA values in relation to the Project site** provides a consolidated summary of the key values, cross referring to more detailed information elsewhere in the LVIA, as required.

4.2.1 World Heritage Property	The outstanding universal values of WTQ World Heritage Property must be outlined in the PER. Information must be included in the PD that describes the outstanding universal values of the World and National Heritage WTQ site. This may include baseline data derived from field surveys, scientific evidence derived from research papers and expert advice, public consultation, other approval processes, and information collected from desktop research (e.g. Commonwealth and State government databases/websites, outcomes of previous field surveys, modelling, scientific investigations, etc.).	Relevant parts of this element (i.e. with the exception of historical context and detailed information on ecological, cultural and economic values which are addressed in other assessments) have been described in the LVIA in the sections noted above. However, for clarity, **Section 11.2: Summary of WTQWHA values in relation to the Project site** provides a consolidated summary of the key values, cross referring to more detailed information elsewhere in the LVIA, as required.
6.1 General impact information	(c) The PER should identify and address cumulative impacts, where potential Project impacts are in addition to existing impacts of other activities (including known potential future expansions or developments by the proponent and other proponents in the region and vicinity including other wind farm projects (for example, Mt Fox Energy Park Wind Farm EPBC 2021/8910, Mount Emerald Wind Farm EPBC 2011/228, Windy Hill Wind Farm near Ravenshoe).	Cumulative impacts have been described in earlier sections of this report: Section 10: Cumulative assessment. However, **Section 11.3: Assessment of impact on OUV related to identified aesthetic** values (subsection: ***Assessment of cumulative impacts on OUV and MNES***) includes specific commentary on the relevance of the cumulative assessment to WTQWHA values.
6.5.1 Impacts on the World Heritage Values	Outline the potential impacts of the proposed action on the outstanding universal values of the WTQ World Heritage Property outlined in section 4.2.1, including, but not limited to: …Criterion vii: Interruption to sweeping forest vistas. The department acknowledges that a visual amenity assessment was undertaken from within the WTQ. This visual assessment should be included in the PER.	Relevant parts of this element have been described in the LVIA in the following sections: **Section 7: Landscape assessment** and **Section 8: Visual assessment.** However, for clarity, **Section 11.3: Assessment of impact on OUV related to identified aesthetic** values (subsections: ***Potential impact on views and visual receptors*** and ***Summary of impacts on OUV and MNES***) include specific commentary on the relevance of the cumulative assessment to WTQWHA values. Impacts on these values are also summarised in **Section 11.4: Summary of impacts on OUV and MNES**
7 Avoidance, Mitigation and Management Measures	7.1.5 Consideration of turbine placement and potential impacts to the visual amenity value of the World Heritage WTQ. Provide any considerations of painting turbine blades different colours, and/or with different patterns in relation to the visual amenity of the WTQ World Heritage value.	The following section consolidates all proposals to mitigate identified landscape and visual impacts, including on WTQ WHA values: **Section 12: Mitigation measures**

11.2. Summary of WTQWHA values in relation to the Project site

Due to the location of the Project in relation to the WTQWHA, consideration has been made of the potential for the Project to impact factors assessed as likely to contribute to the Outstanding Universal Values (OUV) of the WTQWHA, particularly criterion vii "*to contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance*" which is considered a Matter of National Environmental Significance (MNES) under the EPBC Act 1999. As described in Section 5 and 6, the OUV that led to the WTQWHA being inscribed on the World Heritage Register include a range of landscape and visual values. These have been established and described in a range of legislation, planning and management documents. As the factors contributing to natural beauty and aesthetic values were not specifically defined at the time of WHA nomination these factors have been determined retrospectively and this assessment is based upon relevant criteria defined with reference to sources published by UNESCO and the Wet Tropics Management Authority (WTMA) particularly the *Natural Beauty and Aesthetic Value of the Wet Tropics World Heritage Area* (WTMA, 2016).They have been synthesised and consolidated for the purposes of this LVIA in **Table 41** below, which then considers the extent to which the published values are relevant to this LVIA for further analysis below.

Table 41: Assessment of applicability of WTQWHA values to this LVIA

Guidelines/Requirement	Assessment of relevance of OUV criterion to this LVIA/Assessment Rationale
World Heritage Nomination IUCN Summary (Wet Tropical Rainforest (North-East Australia) UNESCO (1988)	
(Criterion vii) contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance	Impacts to be considered/assessed: • Superlative natural phenomena • Areas of exceptional natural beauty and aesthetic importance.
(b) Natural property (iii) Exceptional natural beauty. One of the most significant regional ecosystems in the world, with outstanding features of natural beauty and magnificent sweeping landscapes. Exceptional is the coastal scenery, which combines tropical rainforest, white sandy beaches and fringing reefs just offshore.	Impacts to be considered/assessed: • Exceptional natural beauty • Magnificent sweeping landscapes *Impacts not requiring assessment within LVIA:* o *Coastal scenery as this part of WTQWHA is not located in a coastal area.*
Adoption of retrospective Statements of Outstanding Universal Value, UNESCO (2012)	
Criterion (vii): The Wet Tropics exhibit exceptional natural beauty, with superlative scenic features highlighted by extensive sweeping forest vistas, wild rivers, waterfalls, rugged gorges and coastal scenery. This is particularly apparent between the Daintree River and Cedar Bay, where exceptional coastal scenery combines tropical rainforest and white sandy beaches with fringing offshore coral reefs. The winding channels of the Hinchinbrook Channel contain the most extensive mangroves in the region, providing a rich visual mosaic of rainforest and mangroves, and a terrestrial continuum with the Great Barrier Reef.	Impacts to be considered/assessed: • Exceptional natural beauty • Superlative scenic features • Sweeping forest vistas • Wild rivers • Waterfalls • Gorges • Magnificent sweeping landscapes *Impacts not requiring assessment within LVIA:* o *Coastal scenery including Hinchinbrook Channel as this part of the WTQWHA is not located in a coastal area.*

State of the Wet Tropics 2016-2017: Natural Beauty and Aesthetic Value of the Wet Tropics World Heritage Area, Wet Tropics Management Authority (2016)	
Statements relevant to superlative natural phenomena comprising	
The variety of forests range from tropical rainforest through to tall open forests of *Eucalyptus grandis*. These forests support a range of endemic and rare fauna species that are often visually spectacular and unusual to see, providing the visitor with the surprise of discovery	*Impacts not requiring assessment within LVIA:* o *No WTQWHA forests will be directly affected by the Project. Therefore, any impacts will be indirect and related to ecological impacts which are addressed elsewhere.*
Rugged mountain peaks and gorges are among the dominating superlative features of the landscape	Impacts to be considered/assessed: • Impact on setting of mountain peaks • Impact on setting of gorges
Spectacular waterfalls abound	Impacts to be considered/assessed: • Impact on setting of waterfalls
The significance of the property is enhanced and derives from knowledge of the diversity and variety of vegetation across the wet/dry ecotone.	*Impacts not requiring assessment within LVIA:* o *This knowledge will not be affected by the Project so therefore does not require assessment. Ecological impacts are considered elsewhere.*
The superlative natural phenomena of the property are associated with the knowledge of significant cultural sites of importance to the Rainforest Aboriginal people;	*Impacts not requiring assessment within LVIA:* o *This knowledge will not be affected by the Project so therefore does not require assessment. Cultural aspects are addressed elsewhere.*
The superlative natural phenomena and aesthetics of the property are associated with the knowledge of the protection of relicts of the lowland and littoral rainforest that were previously more extensive;	*Impacts not requiring assessment within LVIA:* o *This knowledge will not be affected by the Project so therefore does not require assessment. Ecological impacts are considered elsewhere.*
A superlative natural phenomenon of the property is associated with the knowledge of internationally significant wetlands, and the species contained within;	*Impacts not requiring assessment within LVIA This knowledge will not be affected by the Project (and no internationally significant wetland will be affected) so therefore does not require assessment*
The superlative natural phenomena of the property are enhanced by knowing that the Wet Tropics abuts the Great Barrier Reef World Heritage Area, which is intact and undisturbed along more than 400km of the coastline.	*Impacts not requiring assessment within LVIA:* o *This knowledge will not be affected by the Project (and this part of the WTQWHA does not directly adjoin the GBRWHA) so therefore does not require assessment*
The extensive mangroves and mudflats in the Hinchinbrook channel constitute an element of superlative natural phenomena of the property.	*Impacts not requiring assessment within LVIA:* o *This knowledge will not be affected by the Project (and this part of the WTQWHA does not directly adjoin the GBRWHA) so therefore does not require assessment*
Statements relevant to exceptional natural beauty and aesthetic importance comprising:	
The aesthetic importance of the property is underpinned by a connection between the naturalness and beauty, and the experience of being in an intact natural place;	Impacts to be considered/assessed: • Impact on naturalness and sense of intactness

The aesthetic importance of the property is underpinned by the knowledge of the protected status of the area and broader knowledge of the landscape and its intactness;	*Impacts not requiring assessment within LVIA:* o *This knowledge will not be affected by the Project (and this part of the WTQWHA does not directly adjoin the GBRWHA) so therefore does not require assessment*
The exceptional natural beauty of the property is associated with the visual aspect of a vast expanse of intact forest.	Impacts to be considered/assessed: • Vast expanse of intact forest
The region between Bellenden Ker Range and the Atherton Uplands including Walter Hill Range contains superb gorge scenery with swiftly flowing rivers;	*Impacts not requiring assessment within LVIA:* o *The study area does not extend to this area.*
The Russell, Mulgrave and Johnstone Rivers have become popular with canoeists;	*Impacts not requiring assessment within LVIA:* o *The study area does not include these rivers.*
The exceptional natural beauty and aesthetic of the property is associated with the soundscape of bird and frog calls, rushing water, wind through the trees and silence of the forest;	*Impacts not requiring assessment within LVIA:* o *While relevant, noise and ecological impacts are considered elsewhere.*
The exceptional natural beauty and aesthetic of the property is enhanced by the visual impact of cloud forests, mist on the mountains and the feeling of mist on the skin;	Impacts to be considered/assessed: • Visual impact of cloud forests *Impacts not requiring assessment within LVIA:* o *Mist on mountains and feeling of mist on the skin will not be impacted by the Project*
The exceptional natural beauty and aesthetic of the property is associated with Rainforest Aboriginal people having occupied the country for tens of thousands of years;	*Impacts not requiring assessment within LVIA:* o *This value will not be affected by the Project so therefore does not require assessment. Cultural aspects are addressed elsewhere.*
The exceptional natural beauty is associated with a stark contrast of deep green of tropical rainforest and the white sandy beaches. The added visual impact of the blue of the fringing offshore coral reefs in the adjacent Great Barrier Reef World Heritage Area complements the green and white of the forests and beaches;	*Impacts not requiring assessment within LVIA:* o *Coastal scenery including GBRWHA as this landscape is inland.*
The aesthetic importance of the property is enhanced by interacting with the environment through walking, cycling and white-water rafting	Impacts to be considered/assessed: • Aesthetic impact on people undertaking recreation in the WTQWHA
The natural beauty and aesthetic importance of the property is enhanced by interacting with the environment through birdwatching.	*Impacts not requiring assessment within LVIA:* o *While relevant, ecological impacts (including on birds) are considered elsewhere.*

In conclusion it is considered that the following OUV associated with the WTQWHA require further consideration in this assessment in relation to the potential impact of the Project on superlative

natural phenomena or areas of exceptional natural beauty and aesthetic importance within the WTQWHA:

- Magnificent sweeping landscapes: particularly sweeping forest vistas, including the vast expanse of intact forest/cloud forest.
- Wild rivers
- Waterfalls
- Gorges
- Mountain Peaks
- Naturalness and sense of intactness
- Aesthetic value for people undertaking recreation in the WTQWHA

11.3. Assessment of impact on OUV related to identified aesthetic values

This section provides an assessment of the likelihood of significant impacts on OUV and associated MNES, through the consideration of the potential for proposed actions (relevant aspects of the Project) to impact on the World Heritage values of the WTQWHA property. The assessment considers if the proposed action of itself, or in combination with other relevant impacts, is likely to result in the loss or degradation of areas that are essential for maintaining the beauty of the property. For example, the unique, rare or superlative natural phenomena, formations or features or areas of exceptional natural beauty that contribute to its OUV.

In terms of Matters of National Environmental Significance, a significant impact is defined *as* '*an impact which is important, notable, or of consequence, having regard to its context or intensity*. *Whether or not an action is likely to have a significant impact depends upon the sensitivity, value, and quality of the environment which is impacted, and upon the intensity, duration, magnitude and geographic extent of the impacts*' (Australian Government, 2013). All of these factors need to be considered in determining whether an action is likely to have a significant impact on matters of national environmental significance.

Based on the above table, impacts on the key values that are relevant to criteria vii (aesthetics) of the world heritage OUV/MNES values are considered below, drawing upon the previous analysis on general landscape and visual impacts set out in Sections 7:Landscape assessment and 8:Visual assessment, where appropriate.

Magnificent sweeping landscapes: particularly sweeping forest vistas, including the vast expanse of intact forest/cloud forest.

Consideration has been given to the extent to which the Project could impact on 'magnificent sweeping landscapes', particularly the 'sweeping forest vistas' which are nominated as a key OUV in the retrospective Statements of Outstanding Universal Value, UNESCO (2012). These are considered with reference, as appropriate, to the representative viewpoints identified in Section 8.3. Two matters are considered:

- Impacts on views of sweeping forest vistas experienced from outside of the WTQWHA looking towards the forest
- Impacts on views of sweeping forest vistas obtained from within the WTQWHA

The Misty Mountains form a scenic backdrop to some views from outside of the WTQWHA. However, as identified in the visual assessment, the Site and other rolling and elevated forested landscapes of and immediately around the site including those associated with Koombooloomba South Forest Reserve and Ravenshoe Forest Reserve provide some containment to these views as well as more localised curtailment of views by foreground vegetation elsewhere (for example

Viewpoint 6, Table 28 and Viewpoint 16, Table 39). Of the views assessed, the most significant views obtained towards the WTQWHA on the approach to Bally Knob (Viewpoint 3, Table 26) are eastwards as opposed to the views of the site which look in a south-westerly direction. In this instance, while a small portion of the WTQWHA is visible from this viewpoint to the south, the turbines do not significantly interrupt forest vistas of the WTQWHA. Some views towards the WTQWHA are likely to be impacted, for example travelling east on the Kennedy Highway (see for example Viewpoint 8, Table 31). In many of the identified views sweeping forest vistas are affected, however, these relate to land that is not within the WTQWHA (for example Viewpoint 10, Table 33 where the land located around Arthurs Seat relates to the Site and not the WTQWHA which lies beyond, including Mount Koolmoon which is obscured by roadside vegetation in this view and Viewpoint 11, Table 34 and Viewpoint 16, Table 39, where the Site itself forms the forested vista). Consequently, these changes do not impact on the OUV of the WHA, except indirectly as a consequence of viewers experiencing the change without knowledge of where the WHA boundary commences.

From within the WTQWHA, as described previously, views towards the Project Site are highly constrained by the presence of trees and other dense understorey vegetation as well as the undulating and mountainous terrain of Tully Falls and Tully Gorge National Parks. Consequently, views out towards the Site are reliant upon situations where *all* of the following factors apply: the land is elevated sufficiently so views above the surrounding forest canopy are possible; the landscape is orientated in a direction that allows views towards the Project Site; *and*, there is a clearing in trees/vegetation so that there is no localised restriction of potential views. In addition, it is noted that not all of the WTQWHA is readily accessible to viewers, with recreational users expected to stick to marked tracks, some of which are more heavily trafficked than others.

As shown on the VAM models (which do not factor forest cover) and therefore significantly over-estimate the likely visibility of the Project on the ground, landform is a significant factor in curtailing views within the WTQWHA closest to the Site. As shown, views are theoretically possible from a relatively small proportion of the western part of the WTQWHA , and even within this area much of the zone would theoretically only experience views of relatively few turbines and/or including areas at a considerable distance from the Site. As experienced during the site visit, this VAM significantly overestimates the actual visibility observed on the ground, with views observed as not being possible from much of the area theoretically modelled to experience views (for example, Viewpoint 5, Table 28 and Viewpoint 9, Table 32). The key views of sweeping forest vistas identified in this LVIA that would be affected by the Project are the view from Majors Mountain (Viewpoint 4, Table 27) and the view from a very small and relatively inaccessible section of the Koolmoon Creek track (Viewpoint 14, Table 37). Majors Mountain is a highly elevated vantage point, at 1175 m AHD, from which wind turbines would be visible across part of the vista, affecting the natural qualities of the landscape. While the area around the Majors Mountain viewpoint falls within the ZTV in reality dense vegetation obscures the view, with only a small outcrop experiencing views out towards the Project. The impact on this viewpoint is assessed to be moderate to major and is therefore considered significant in the context of a visual impact assessment of impacts on a single view. Other elevated parts of the WTQWHA may experience views of the Project site. These may include Mount Koolmoon (1119 m AHD), depending on the level of vegetation coverage at the summit. However, as there are no marked walking tracks to the summit this could not be verified and would not currently have any significant effect on recreational viewers, noting that the Koolmoon Creek Track passes on the eastern side of Mount Koolmoon so the mountain restricts views westwards. Other potential views from the Koolmoon Creek track that have been considered include Rhyolite Pinnacle and the surrounding area (1036 m AHD). Views from Rhyolite Pinnacle (Viewpoint 13, Table 36) are oriented away from the Site and views of the Project are not expected from this viewpoint. There was however, observed to be a short distance of the Koolmoon Creek track, which is fairly inaccessible and not accessed by many visitors, where – with effort – more prominent views of the Project can be experienced (Viewpoint 14, Table 37) which is considered to be an impact of Major Significance

(albeit very infrequently experienced). Again the majority of the Koolmoon Creek track does not experience views to the Project due to the combination of vegetation coverage and topography.

In conclusion, although significant effects on single viewpoints have been identified (Viewpoints 4 and 14), it is likely that changes to views would only be experienced from a very small number of vantage points and overall a small percentage of the WTQWHA would be affected, conservatively estimated at less than 1% of the WTQWHA. Thus the Project is not visually dominant and would affect a highly geographically localised area. Therefore, while individual vantage points are affected, significant impacts on the WTQWHA OUV associated with views of sweeping forest vistas are not predicted for the broader WTQWHA.

Waterfalls

Consideration has been given to the extent to which the Project could impact on the character and setting of waterfalls within the WTQWHA. Waterfalls close to the site include Big and Little Millstream Falls which are located within Millstream Falls National Park, which is not within the Wet Tropics WHA. The impact of the Project on these has, however, been considered in Viewpoint 2 in Section 8.3, concluding that there is a negligible magnitude of change which is not significant.

Within the WTQWHA, one of the closest waterfalls to the Site is Charmillin Falls on Charmillin Creek within Tully Falls NP which is accessed via the Wabunga Wayemba rainforest walking track located on the western side of Tully Falls Road. This track and waterfall was accessed during the site visit which confirmed that due to the topography and dense vegetation in this area, the Project would not be visible from this location.

The prime attraction is Tully Falls within Tully Gorge (albeit the waterfall has diminished since the damming of the Tully River in the 1950s for the Kareeya Hydro Power Station). As confirmed with reference to Figure 10 (Blade tip ZTV), the incised topography of the gorge in this location limits potential views. In addition, dense vegetation in the WHA, including along Tully Falls Road curtails visibility westwards from this location. Furthermore the lookout is orientated to face in an easterly direction. Therefore significant impacts on Tully Falls are not anticipated.

Other waterfalls, such as Elizabeth Grant Falls (accessed via the Koolmoon Creek Track) and Cannabullen Falls (on the Cardwell Trail) are also not indicated to be intervisible on the Blade Tip ZTV analysis and, are at a much greater distance from the site which, combined with the vegetation makes impacts on their aesthetic value highly unlikely.

Therefore, it is not anticipated that the Project will result in significant impacts on OUV associated with the aesthetic amenity of views or the setting of waterfalls within the WTQWHA.

Illustration 4 *Charmillin Falls on the Wabunga Wayemba rainforest walking track*

Gorges

The main gorge within this part of the WTQWHA is the Tully Gorge which is predominantly located in Tully Gorge NP. As noted above, the Gorge Lookout, which is the most elevated part of the gorge experience, faces in an easterly direction and views westwards are curtailed by topography and vegetation. Walks within the gorge are within the incised landform and, therefore at lower elevation. As a consequence, significant impacts on the gorge or its aesthetic setting are not anticipated.

Therefore, it is not anticipated that the Project will result in significant impacts on OUV associated with the aesthetic amenity of gorges within the WTQWHA.

Illustration 5 *Tully Gorge lookout*

Wild rivers

The key rivers in proximity to the Project site are the Herbert River and The Millstream, neither of which fall within the WTQWHA.

Within the WTQWHA closest to the Project site, the key river is the Tully River, located within Tully Gorge, which includes Tully Falls waterfall. For the reasons discussed above, it is not anticipated that the gorge/river would be intervisible with the Project site.

Therefore, it is not anticipated that the Project will result in significant impacts on OUV associated with the aesthetic amenity of wild rivers within the WTQWHA.

Mountain Peaks

No mountain peaks within the WTQWHA would be directly impacted by the Project. Indirect impacts on views from mountains/their setting (including Majors Mountain and Rhyolite Pinnacle) is as described for sweeping forest vistas above. Therefore, at the level of the WTQWHA, it is not anticipated that the Project will result in significant impacts on OUV associated with the aesthetic amenity of mountain peaks within the WTQWHA.

Naturalness and sense of intactness

There are no direct impacts on landscape and visual characteristics associated with naturalness and sense of intactness of the WTQWHA. There is potential for indirect impacts on naturalness and the integrity of the WTQWHA to arise as a result of the introduction of wind farm infrastructure into the forested ranges and mountains of LCA A1 (in Section 7) which create a natural and rural setting to the WTQWHA. As described in Table 19, these have potential to affect the aesthetic values of adjacent LCAs within the WTQWHA i.e. LCA A2 and LCA A3 and impacts of up to Moderate significance are identified. Other consequential factors e.g. relating to noise and climate change impacts on ecological values that have potential to influence aesthetic values are also worth considering but are assessed elsewhere.

It is noted that the WTQWHA already accommodates some infrastructure including Overhead Transmission Lines, the Powerlink Chalumbin substation and the Koombooloomba Dam. As no wind farm infrastructure is proposed within the WTQWHA (the closest infrastructure is 620 m away), only indirect impacts are anticipated as described above. Therefore it is not anticipated that the Project will result in any direct significant impacts on OUV associated with the naturalness or sense of intactness of the WTQWHA.

Aesthetic value for people undertaking recreation in the WTQWHA

The potential for impacts on the aesthetic value for people undertaking recreation in the WTQWHA have been explored through the site visit, including selected viewpoints included within the visual assessment.

Viewpoint 4, The view from Majors Mountain looking southwest to the Site (Cardwell Range track), and Viewpoints 13 and 14 (Koolmoon Creek track) were included as being representative of the locations with potentially the most significant impacts on views of the Project from within the WTQWHA. Significant visual impacts on Views 4 and 14 have been identified, comprising experiencing continuous views of the northern section of the Project from Major Mountain as described fully in Table 27 and from a small west-facing section of the Koolmoon Creek track as described in Table 37. These impacts relate to the high sensitivity of these locations and the intrusion of the full swept path of multiple wind turbines into the view, albeit of distances around 11 km and 8.4 km respectively, which represent a distinct new element in the view.

As noted in this assessment, there are few locations along the Cardwell Track where such views are possible as, for the most part, the trails are enclosed in dense vegetation and are at a lower elevation which collectively restrict views out towards the site. It is anticipated that relatively few hikers would visit Majors Mountain although those who do would have a very high interest in the quality of the view. Additionally, this track is grade 4 and therefore only accessible by physically fit and experienced hikers.

Similarly, as described above, some localised elevated locations on the Koolmoon Creek track experience significant views of the Project, but the majority of the track is enclosed by vegetation or has views orientated away from the site. The track is grade 4, with sections of grade 5, and only accessible by physically fit and experienced hikers. The Rhyolite Pinnacle, which is a destination on the Koolmoon Creek track is not expected to have views of the Project (as described in Viewpoint 13, Table 36).

The tracks closest to the Site, include various short trails on the western side of Tully Falls Road including the Wabunga Wayemba rainforest walking track. This track is similarly enclosed in thick forest and views out towards the site are curtailed by vegetation.

Impacts upon recreational views were also considered for viewers in the vicinity of Koombooloomba Dam. The key area where such viewers are concentrated is the Koombooloomba Camp area (Viewpoint 5, Table 28), however no views of the project are predicted from this location. Due to the inability to obtain views from the water, potential views from the dam have been tested using computer modelling (based on terrain data, using a similar method to that used for the visualisations). A number of locations on Koombooloomba Dam were explored. While the Project is likely to be visible in some views experienced by boats and kayakers on the dam, these will encompass relatively few turbines, and typically only the upper parts of turbines (see Viewpoint 15, Table 38). It is also noted that those on the water are likely to be focussed on their boating activity and have virtual 360 degree panoramic views available so the Project would contribute a very small proportion of the view.

In conclusion, although significant effects on single viewpoints likely to be experienced by recreational users have been identified, it is likely that changes to views would only be experienced from a very small number of vantage points and overall a small percentage of the walking tracks and recreation areas within the WTQWHA would be affected, many of which are trails of lower popularity and use (due to their difficulty and/or length). Thus the Project would not be seen by most recreational users to the WTQWHA, who typically congregate in more accessible locations such as Tully Gorge. Even in the locations where the wind farm is visible it would not be visually dominant to the majority of recreation users and geographically would affect a highly localised area. Therefore, significant impacts on the WTQWHA OUV associated with the aesthetic value for those undertaking recreation are not predicted for the broader WTQWHA.

Additionally, as described in Section 3.2, community perception of wind farms is an important consideration in assessing the likely attitude of viewers, including recreational viewers, to landscape change. As noted, the aesthetics of wind farms evoke a wide range of opinion with some people regarding wind farms as a symbol of ‘green’ or renewable energy that are important for mitigating the impacts of climate change and protecting biodiversity. It is possible that many recreational users of national parks would share this opinion. However, subjectivity has been avoided to the greatest extent practicable in this assessment.

Assessment of cumulative impacts on OUV and MNES

The potential for the Project to result in cumulative impacts generally has been considered in Section 10. As assessed there, there is potential for some of the existing and proposed wind farm developments in the Study Area (Windy Hill, Kaban and High Road Wind Farms) to result in combined, successive and/or sequential cumulative impacts. This includes from locations within the WTQWHA, including Majors Mountain.

Other identified existing or proposed wind farm developments outside of the Study Area including Mount Emerald Wind Farm, Mount Fox Energy Park and Upper Burdekin Wind Farm have no potential for combined or successive impacts due to the large distances from the Chalumbin Project site.

For this reason, there would be no meaningful sequential cumulative impacts on OUV of the WTQWHA as the likelihood of a viewer travelling in sequence between these locations is low and only small proportions of views from within the WTQWHA would be affected.

However, it is noted that if, over time, other wind farms or large-scale infrastructure developments are proposed on the western side of the WTQWHA that collectively close the gap between adjacent windfarms and decrease the natural setting and integrity of the WHA then this may increase the potential for consequential sequential cumulative impacts on OUV and MNES of the protected area going forward, but this could be assessed as other wind farm developments are proposed.

11.4. Summary of impacts on OUV and MNES

The Wet Tropics of Queensland World Heritage Area (WTQWHA) is identified as having inherent *Outstanding Universal Value* (OUV). It is understood that the WTQWHA meets criteria for OUV due to its "*exceptional natural beauty, with superlative scenic features highlighted by extensive sweeping forest vistas, wild rivers, waterfalls, rugged gorges and coastal scenery*" (UNESCO World Heritage Centre, 2021). Due to this critical importance placed on the scenic features, vistas and scenery of the WTQWHA, for the purpose of the Landscape and Visual Impact Assessment, the WTQWHA within the identified LVIA Study Area (i.e. potential viewshed of the Project infrastructure) is identified as a highly sensitive landscape.

Based on the current Project layout there is no infrastructure proposed within 620 m of the WTQWHA. As such, no direct impact on the WTQWHA landscape is anticipated. However, due to the large scale of the Project infrastructure, coupled with the proximity of the Project to the WTQWHA, it is anticipated that a small area of the WTQWHA landscape within the Project context would be exposed to the Project. This impact would be considered an *indirect impact* on the WTQWHA, arising due to views and consequential impacts on the setting of the WHA.

There would be no direct impacts on the superlative scenic features (mountains, gorges or waterfalls) described above. However there is potential for visual impact associated with views obtained by recreational users from within the WTQWHA looking out to the surrounding landscape as well as impacts associated with views towards the WHA that are anticipated to affect 'sweeping forest vistas' over a highly geographically localised area of the Misty Mountains and surrounding landscape. Based on field work undertaken as described in **Section 3.5** and GIS mapping described in **Section 8.1**, it is considered unlikely that visitors to the WTQWHA will experience any clear, continuous views of the Project. This is due to the following reasons:

- The vegetation communities within this section of the WTQWHA (Misty Mountains) are typically dense and feature tall tree species. The resulting enclosed environment limits views available towards the Project from most publicly accessible areas within the WTQWHA such as roads, hiking trails, camp grounds and day-use areas.
- The topography associated with the Cardwell Range limits views, particularly from the eastern extent of the WTQWHA within the Project context.
- There is limited public access to the westernmost extent of this portion of the WTQWHA.

However, localised areas of intervisibility are identified including parts of the Misty Mountain hiking trail to Majors Mountain and parts of the Koolmoon Creek track to Rhyolite Pinnacle (although not at the pinnacle viewpoint) (as described in full in the visual assessment, Viewpoint 4, Viewpoint 14 and Viewpoint 13 respectively).

In conclusion, the Project will result in localised impacts on select views (including views of sweeping forest vistas), experienced by relatively few recreational users, largely within parts of Tully Falls National Park. However, it is noted that upon cessation of the wind farm Project and removal of the turbines, the rehabilitation works would visually integrate the Project site into its landscape setting and it is likely that no material visual effects on the wider landscape of the WTQWHA would remain. Unlike many other forms of infrastructure, once the turbines are removed and any unwanted access tracks are revegetated, virtually no evidence of the development will remain in views towards the site.

Therefore, in conclusion, whilst there will be some significant impacts for individual views obtained by recreational viewers from selected locations within the WTQWHA, these locations are infrequent and typically difficult to reach, being located on tracks that are understood to be less popular with visitors and that require high levels of fitness (i.e. grade 4 or 5). The dense foliage of the rainforest vegetation that is typical of the WTQWHA contributes to the fact that there are few publicly accessible vantage points providing views towards the Project from the WTQWHA. When considering the potential for the Project to impact the Outstanding Universal Value (OUV) of the WTQWHA, it is

important to consider these values as they apply to the WTQWHA in its entirety. The WTQWHA is approximately 8,940 km^2 in size. A conservative estimate would suggest that less than 1% of the WTQWHA property may have views of the Project; with the visual effect of the Project typically diminishing with distance from the Site. Moreover, temporally, the Project has an operational life of 30 years and, upon decommissioning, no notable visual impact will be evident from anywhere within the WTQWHA. In this context, the Project will have a negligible effect on the OUV of the WTQWHA and it is considered that the OUV that make the WTQWHA so unique will not be significantly impacted by the Project.

12. Mitigation measures

This section outlines the standard operating procedures and other factors considered to reduce and manage the impact of a wind farm on the landscape, views and visual amenity. It is acknowledged that due to the size of the proposed structures, the elevated nature of the Project Site and the open views of the Project Site from numerous surrounding areas it is not possible to 'screen' or 'hide' the turbines or associated infrastructure within the landscape. The measures outlined below could assist in providing a more harmonious appearance to the Project overall.

The mitigation framework seeks, as a first priority, to minimise adverse landscape and visual impacts through careful design and siting of infrastructure, particularly in relation to the WTQWHA – it is noted that these factors have been explored iteratively and are therefore 'inherent' in the current design to the greatest extent possible.

Given that the wind turbines are potentially visible within around 20 km or more (depending on weather conditions), the proposition of providing and maintaining off site planting to manage all views of the Project is not practical. The mitigation framework focusses on managing the impact of construction activities, including post-construction site rehabilitation activities (e.g. reinstating temporary access roads and storage areas) and activities at the decommissioning stage. Tailored mitigation could also be considered in liaison with affected landowners, if required during the detailed design process. **Table 42** describes measures identified to mitigate impact. Many of these are generic and could apply to any wind farm, whereas others specifically relate to Chalumbin Wind Farm.

Table 42: Inherent and potential additional mitigation measures

Proposed mitigation category	Description of measures to minimise landscape and visual effects
Activities undertaken during design (inherent in existing design)	
Facilities siting and design – detailed design	• Preliminary Project design proposed a greater quantity of turbines (approximately 200 turbines) however through selective siting this was reduced to the current proposed number of turbines (86 turbines) to minimise the impacts of the Project. • Selective siting of turbines on the Site has been undertaken to avoid direct impacts on the WTQWHA through an offset of 650 m from the WTQWHA boundary • Selective siting of turbines on the Site has been undertaken to avoid direct impacts/disturbance to landscape features such as Arthurs Seat that have some protection under the Tablelands Regional Council Planning Scheme Rural Code. • Selective siting of the turbines has sought to maximise separation from Millstream township. • Facilities to be designed to minimise impact on the current land use, including minimising land take / loss of productive rural land wherever practicable. • Facilities including micro-siting of turbines and electricity poles/transmission lines will be designed / located to minimise tree and other vegetation removal where practicable. • A semi-matt/low reflectivity finish on the turbine towers, nacelles and blades will be used to avoid potential visual impacts from blade glint caused by reflection of the sun. The wind turbine blades, the nacelle and the upper two thirds of the supporting mast of the wind turbine will be coloured either white, off white, or light grey to enhance the integration of the Project into the landscape including in relation to the Misty Mountains section of the WTQWHA. • Where new access roads are required, these will be aligned and built in consultation with the respective individual landowner(s). They will be tidily maintained and include gates (where necessary).

Proposed mitigation category	Description of measures to minimise landscape and visual effects
	• After-dark construction lighting will be controlled to minimise effects on sensitive visual receptors. • The natural line of the landscape will be used wherever practicable to reduce visibility and assist integration of the Project infrastructure.
Landscape strategy including opportunity for legacy projects	• The site entrance and associated signage is to be tidily presented. • Considering that there are locations where there are clear views of the Project, there may be an opportunity for a legacy project aimed specifically at visitors who wish to view the wind farm. For example, this could consider: ▪ providing increased amenity for those who wish to climb to the Bally Knob summit, specifically for the purpose of viewing the wind farm. ▪ alternative viewing areas in a more generally accessible location close to the Site and the nearby Savannah Way tourist drive. ▪ Interpretive signage educating visitors about the windfarm ▪ working with LGAs to create a wind farm tourist drive, for example linking to the existing Windy Hill to show how wind energy technology has changed since the first wind farm in Queensland was constructed.
Activities undertaken during construction and operation	
Construction management and rehabilitation	A Construction Environmental Management Plan (CEMP) will be developed that will include measures that have the effect of minimising landscape and visual effects. The measures within the CEMP may include: • Conducting design reviews prior to ordering of materials to ensure that low-glare, semi-matt products and the correct colours have been specified. • Locating construction compounds within visually unobtrusive location(s) where practicable. • Ensuring maintenance of tidy and contained construction compound. • Roads providing access to site compounds and installation works areas will be managed for dust and mud, to minimise impact. • Protection of valued features adjacent to works (e.g. remnant vegetation, adjacent watercourses), using fencing or signage to keep contractors out of areas where damage may result. • Where an unacceptable risk to soils and vegetation exists, bulk earthworks will be avoided during, and immediately following heavy rainfall. • Vehicle speed restrictions will apply on site during construction and operations. • The temporary construction compound areas will be formed into hardstand. Prior to forming the hardstand area, the topsoil will be removed and stockpiled adjacent to the hardstand area. Following the completion of the construction phase, the temporary construction compound areas may be reinstated using the stockpiled topsoil depending on the landowner requirements. • The exact locations and nature of the temporary construction laydown will be established in consultation with the relevant landowners when a full construction methodology is determined. • Instigating progressive rehabilitation of disturbed areas using suitably qualified and experienced contractors. • Any rehabilitation tree and shrub planting undertaken will be comprised of local indigenous species with the primary objective of addressing erosion and sedimentation issues, but also to be consistent with the biodiversity values of the existing surrounding vegetation.

13. Residual impacts

Residual impacts relate to any changes in the overall level of effect for potential impacts post the implementation of mitigation. Although a number of reasonable mitigation measures are suggested that may be applied to help reduce the extent of the Project's effect on landscape character and visual amenity, such mitigation measures are considered unlikely to alter the significance of the level of landscape effect assessed in Section 7 or visual effect assessed in Section 8. Even the most thorough mitigation strategy has limited potential to screen views of 250 m high turbines, even if this were to be a desirable outcome.

Subsequently, the residual impact is considered to be as per those impacts identified in **Table 43** and **Table 44** in the conclusions below.

14. Conclusions and recommendations

This Landscape and Visual Impact Assessment (LVIA) has been undertaken with reference to the requirements of PO9 of the State Code 23: Wind Farm State Code and associated Planning Guideline (2018). The LVIA has been undertaken in accordance with the acceptable actions of the Planning Guideline, including: description of the potential impacts on scenic amenity or landscape values; inclusion of visualisations demonstrating the anticipated visual impact of the development in the context of the surrounding area, and from key public view points and consideration of mitigation measures describing opportunities to minimise visual impacts. Additionally, the assessment has assessed the relevance of policies in the relevant local government planning scheme (Tablelands Regional Council) to the assessment of landscape and visual values. However, it is noted that because the site falls outside of South East Queensland Region, *Implementation Guideline No. 8: Identifying and protecting scenic amenity values,* to which the State Code also refers, does not apply to this Project.

There are few landscapes in which a wind farm will not be a new and distinctive element. In order to perform their function effectively, wind turbines are very tall in comparison to most built elements and need to be located in open and/or elevated landscapes. Therefore, they are difficult (virtually impossible) to conceal, even if this were desirable, and are likely to be highly visible. They are also likely to introduce new elements into the landscape that affect the perception of landscape character. Accordingly, *all* wind farms will result in some significant changes to the landscape and visual resource (character and views) due to their size and prominence.

The capacity of a landscape to accommodate wind farm development depends on the degree of impact the development will have on the existing character of the landscape; and the extent to which this impact can be modified and reduced by design.

In undertaking the assessment of visual impacts for the Chalumbin Wind Farm, it is necessary to acknowledge that varying attitudes to wind energy developments and their associated impact on views are expressed by different individuals and constituencies. As discussed in Section 3.2, while the assessment presented here has avoided subjective judgement, research often indicates that many viewers find wind farms acceptable, particularly when viewers have some familiarity with wind energy (as may, for example, be the case in Tablelands region due to the Windy Hill Wind Farm) or are supportive of green energy.

The Landscape and Visual Impact Assessment has used a range of desk based and field-based analysis techniques to assess the impact of the Project on landscape and visual amenity values.

The key issues identified are the changes in the character of the landscape within and adjacent to the Project Site boundaries and visual impacts on accessible elevated lookouts, individual properties and road users nearest the Project; especially within around 10 km of the nearest turbine which includes some elevated locations, where the turbines would have the greatest influence on the visual character of the landscape.

14.1. Summary of landscape impact assessment

The Tablelands Regional Council Planning Scheme (2016) includes specific provisions for landscape character and scenic amenity values, although does not have a scenic amenity overlay. Additionally the strategic intents of the rural zone code seeks to ensure that proposed development does not compromise significant views, the visual character of significant landscape features or views from scenic routes. However, the planning scheme also includes support for renewable energy generation indicating a desire to balance achieving renewable energy outcomes with other outcomes such as maintaining landscape and visual amenity.

Based on the Landscape Character Assessment described in Section 7.1, the method for assessing landscape significance set out in **Table 6**, a summary of the baseline analysis and overall likely landscape impact anticipated during the operation of the Project is provided for each Landscape Character Type in **Table 43** below.

Table 43: Summary of judgement of impacts on landscape character during operation

Landscape Character Type/Areas (LCT/LCA)		**Landscape Sensitivity**	**Magnitude of change**	**Potential Landscape Effect**	**Significance of Effect**
LCT A: Forested Ranges and Mountains	LCA A1: Wooroora	Medium	High (direct impact)	Moderate to Major	**Significant**
	LCA A2: Koombooloomba	High	Low (no direct impact)	Moderate	**Not Significant**
	LCA A3: Tully Falls	High	Low (indirect impact)	Moderate	**Not Significant**
	LCA A4: Tully Gorge	High	Negligible (no direct impact)	Minor to Moderate	**Not Significant**
	LCA A5: Maalan	High	Negligible (no direct impact)	Minor to Moderate	**Not Significant**
	LCA A6: Herberton Range	High	Negligible (no direct impact)	Minor to Moderate	**Not Significant**
LCT B: Undulating and Wooded Uplands	LCA B1: Innot Hot Springs – Glen Ruth Uplands	Medium	High (direct impact)	Moderate to Major	**Significant**
	LCA B2: Mount Garnet – Silver Valley Uplands	Medium	Low (indirect impacts)	Minor to Moderate	**Not Significant**
LCT C: Rural Uplands and Rivers	LCA C1: Millstream Uplands	High	Low (indirect impact)	Moderate	**Not Significant**
	LCA C2: Herbert River Uplands	Medium	Negligible (no direct impact)	Minor	**Not Significant**
	LCA C3: Tully Falls Uplands	Medium	Negligible (no direct impact)	Minor	**Not Significant**
	LCA C4: Kaban Uplands	Medium	Negligible (no direct impact)	Minor	**Not Significant**
LCT D: Lowland Rural Plains	LCA D1: Tully River Plains	Low	Negligible (no direct impact)	Minor to Negligible	**Not Significant**

The Site extends across three of the identified LCTs including LCT A, LCT B and LCT C, however the majority of the Site is located within the LCT B; *Undulating and Wooded Uplands* Landscape Character Type. This landscape type is characterised by undulating topography that is typically used for grazing and typically features open woodland. The landscape surrounding Site features protected areas close to Site such as Koombooloomba National Park, Tully Falls National Park, Millstream Falls National Park, Ravenshoe Forest Reserve and Koombooloomba South Forest Reserve. Koombooloomba National Park and Tully Falls National Park are located within the WTQWHA.

There are settlements within the landscape that feature more dense populations such as Millstream, Ravenshoe and Innot Hot Springs as well as scattered rural properties located throughout the Study Area. The combination of settlements and supporting infrastructure such as roads and 132 kV/275 kV transmission lines, means that human intervention is already apparent within this landscape.

The landscape impact assessment has concluded that there would be:

- Direct **Moderate to Major**, **Significant**, impact on the *Forested Ranges and Mountains* Landscape Character Type A (LCA A1: *Wooroora Landscape Character Area*) due to the

significant influence of the turbines would have on a largely uncleared and partially protected wooded landscape.

- Direct **Moderate to Major**, **Significant** impact on the *Undulating and Wooded Uplands* Landscape Character Type B (LCA B1: *Innot Hot Springs – Glen Ruth Uplands)* due to the clearly evident impact of the turbines and supporting infrastructure on an extensive area of this landscape.
- No further significant impacts have been identified on other surrounding Landscape Character Types within the Study Area, including no significant effects identified on any areas protected as part of the WTQWHA.

14.2. Summary of visual impact assessment

A summary of the baseline analysis and overall likely visual impact anticipated during the operation of the Project (as described in Section 8.3 above) associated with the presence of turbines and ancillary infrastructure is presented in Table 44.

Table 44: Summary visual assessment

Viewpoint name	Anticipated approximate distance to nearest turbine	Key visual receptors	Viewpoint Sensitivity	Magnitude of change	Potential Visual Effect	Significance of Effect
Viewpoint 1: View from Ravenshoe (Moffat Street) looking south to Site	Approximately 12 km to the south of this viewpoint with other turbines at increased distances	Residents, rural workers, visitors to Ravenshoe, passing motorists on Moffat Street	Medium	No impact	No impact	**Not Significant**
Viewpoint 2: View from Big Millstream Falls lookout looking southwest to Site	Approximately 8.5 km to the southwest of this viewpoint with other turbines at increased distances	Visitors to Big Millstream Falls and National Park Rangers	High	Negligible	Minor to Moderate	**Not Significant**
Viewpoint 3: View from Bally Knob lookout looking southwest to Site	Approximately 8.5 km to the southwest of this viewpoint with other turbines at increased distances	Visitors who undertake the hike to Bally Knob lookout and Park Rangers	Medium	High	Moderate to Major	**Significant**
Viewpoint 4: View from Majors Mountain lookout looking southwest to Site	Approximately 11.2 km to the southwest of this viewpoint with other turbines at increased distances	Visitors who undertake the hike to Majors Mountain lookout and National Park Rangers	High	Medium	Moderate to Major	**Significant**
Viewpoint 5: View from Koombooloomba Camping and Day-	Approximately 8.4 km to the west of this viewpoint with other turbines at	Visitors to this section of Koombooloomba Conservation Park	High	No impact	No impact	**Not Significant**

Viewpoint name	Anticipated approximate distance to nearest turbine	Key visual receptors	Viewpoint Sensitivity	Magnitude of change	Potential Visual Effect	Significance of Effect
Use Area looking west to Site	increased distances	and National Park Rangers				
Viewpoint 6: View from the southern entry to Glen Ruth Station on Cashmere Kirrama Road, looking north to Site	Approximately 24 km to the northeast of this viewpoint with other turbines at increased distances	Residents, rural workers, passing motorists on Cashmere Kirrama Road including rural residents and visitors undertaking the Kirrama Range Road tourist drive	Medium	Negligible	Minor	**Not Significant**
Viewpoint 7: View from Gunnawarra Road looking northeast to Site	Approximately 28 km to the northeast of this viewpoint with other turbines at increased distances	Residents, rural workers, passing motorists on Gunnawarra Road including rural residents and visitors undertaking the Kirrama Range Road tourist drive	Medium	Negligible	Minor	**Not Significant**
Viewpoint 8: View from Kennedy Highway looking east to Site	Approximately 13.3 km to the east of this viewpoint with other turbines at increased distances	Motorists on the Kennedy Highway including residents, rural workers and visitors undertaking the Savannah Way tourist drive	Medium	Medium	Moderate	**Not Significant**
Viewpoint 9: View from Innot Hot Springs Community Hall looking southeast to Site	Approximately 11.5 km to the east of this viewpoint with other turbines at increased distances	Residents, rural workers and visitors to Innot Hot Springs as well as motorists on the Kennedy Highway	Medium	Negligible	Minor	**Not Significant**
Viewpoint 10: View from 15225 Kennedy Highway looking southeast to Site	Approximately 6 km to the southeast of this viewpoint with other turbines at increased distances	Residents, rural workers and motorists on the Kennedy Highway including residents, rural workers and visitors undertaking the Savannah Way tourist drive	Medium	High	Moderate to Major	**Significant**
Viewpoint 11: View from Herbert River	Approximately 7.3 km to the east	Residents, rural workers, passing	Medium	High	Moderate to Major	**Significant**

Viewpoint name	Anticipated approximate distance to nearest turbine	Key visual receptors	Viewpoint Sensitivity	Magnitude of change	Potential Visual Effect	Significance of Effect
Road (at Red Bend Farm) looking east to Site	of this viewpoint with other turbines at increased distances	motorists travelling on Herbert River Road including local residents and workers				
Viewpoint 12: View from Gordon Earl Drive, Millstream looking southwest to Site	Approximately 4.7 km to the east of this viewpoint with other turbines at increased distances	Residents and visitors to Millstream	Medium	High	Moderate to Major	**Significant**
Viewpoint 13: View from Rhyolite Pinnacle looking east (south to Site)	Approximately 25 km to the south-southwest of this viewpoint with other turbines at increased distances	Visitors who undertake the hike to Rhyolite Pinnacle and National Park Rangers	High	No impact	No Impact	**Not Significant**
Viewpoint 13: View from Rhyolite Pinnacle looking east (south to Site)	Approximately 8.4 km to the west of this viewpoint with other turbines at increased distances	Visitors who undertake the hike to Rhyolite Pinnacle via the Koolmoon Creek track and National Park Rangers. However, this view is only obtained from a very small part leading off the track that is difficult to get to and isn't highly used/defined.	High	High	Major	**Significant**
Viewpoint 15a: View from Lake Koombooloomba, looking west to Site	Various locations (VP 15 A, 15 B, 15 C, and 15 D) ranging from approximately 8.5 km to 13.60 km to the west of this viewpoint with other turbines at increased distances	Visitors undertaking recreation (boating and kayaking) on Koombooloomba Dam within Koombooloomba Conservation Park and National Park Rangers	High	No impact up to Low.	No impact to Moderate	**Not Significant**

Viewpoint name	Anticipated approximate distance to nearest turbine	Key visual receptors	Viewpoint Sensitivity	Magnitude of change	Potential Visual Effect	Significance of Effect
Viewpoint 16: View from Yourka Glen Gordon Road looking east to Site	Approximately 3.7 km to the east of this viewpoint with other turbines at increased distances	Residents, rural workers, passing in vehicles on Yourka Glen Gordon Road	Low	High	Moderate	**Not Significant**

The visual assessment explored the impact of the wind farm on views and visual receptor audiences present around the site, noting that a substantial portion of the Study Area is sparsely populated. There are however areas where there are increased numbers of receptors such as the settlements of Millstream, Ravenshoe and Innot Hot Springs as well as areas where receptors are likely to visit such as the nearby National Parks, WTQWHA or the Savannah Way tourist drive. The introduction of new wind turbines and associated infrastructure (including access roads, substation and high voltage overhead feeder lines) at the Chalumbin Wind Farm site will inevitably change views experienced by people living in, working in and visiting this area and the surrounding landscape.

The VAM/ZTV indicated that views of turbines would be (theoretically) likely throughout a substantial extent of the Study Area, particularly to the southwest of Site. Due to the nature of the mountainous topography, including the Cardwell Range, the majority of obscured views of the Project were to the north, east and southeast of the Project (particularly beyond 10 km of the Project). Based on the dense vegetation cover observed within the WTQWHA, the ability to obtain views towards the Site are conservatively estimated at less than 1% of the total WTQWHA area.

The majority of the receptor groups are located to the north of Site. This includes the settlement of Millstream, which is located close to the Site boundary. Residential receptors are typically considered to have a have a sensitivity level of up to high (residents) and in this location there is a cluster of residential properties that would experience these views. Ravenshoe is the largest settlement in the Study Area and represents a large quantity of receptors, however due its distance from the Project coupled with elevated topography and vegetation obscuring the view to Project, it is considered that the impact of the Project would be negligible.

Recreational users of the nearby WTQWHA, National Parks, State Forests, Conservation Parks and Forest Reserves are identified as highly sensitive receptors due to the protected statuses of these areas as well as the receptors interest in their surroundings. It was identified that the view from the lookout at Majors Mountain, and the view from a small section of the Koolmoon Creek track, both of which are located within the WTQWHA, would be significantly impacted by the Project, but this impact affects only a very small area (immediately around the lookout in the case of Majors Mountain and in a difficult to access location off the main track in the case of Koolmoon Creek track near Rhyolite Pinnacle) and it is anticipated that a relatively small number of receptors visit these locations.

Other receptors within the WTQWHA include viewers driving along Tully Falls Road, visitors to the Koombooloomba Camping and Day-Use Area, those undertaking recreation in boats and kayaks on Koombooloomba Dam and those visiting Tully Gorge lookout. It is considered that views of the Project from Tully Falls Road would be possible given the topographical relationship with Site, however due to the dense vegetation to the roadside and throughout the WTQWHA it is not anticipated that there would be any clear views of the Project. Similarly, the campsite is highly unlikely to have any views of the Project, due to dense vegetation around the campground, although some views of parts of turbines are likely from the Dam. Views of the Site from Tully Gorge lookout are also highly unlikely due to elevated topography and dense vegetation between this location and the Site as well as the lookout faces east away from the direction of Site. In addition, it is acknowledged that the vegetation that is screening receptors within the WTQWHA is protected and therefore would not be subjected to

clearing and, in the event of a fire, would be encouraged to regenerate to achieve full regrowth. Overall, therefore visual impacts on the WTQWHA are anticipated to be restricted to a highly localised area, visited by very few receptors.

The day use area and lookout at Big Millstream Falls, although not located in the WTQWHA, is a popular destination for visitors to the area. It is noted as a highly sensitive receptor, however it is anticipated that there would be a negligible impact from the Project on this location.

The Kennedy Highway represents a large number of receptors and is identified as part of the Savannah Way, a popular tourist driving route. The Kennedy Highway passes to the north of Site and motorists on this highway would experience views of the Project from locations along this alignment. Due to these clear views of the Project from a short to medium distance, there are significant impacts anticipated.

The visual impact assessment has concluded that there would be:

- ***Major, Significant****,* impact on visitors and park rangers who undertake the hike along the Koolmoon Creek track, but only for an area of approximately 3 m leading off the track that is difficult to get to and isn't highly used/defined *(Viewpoint 14)*
- ***Moderate to Major, Significant*****,** impact on residents and visitors to Millstream *(Viewpoint 12)****;*** residents, rural workers and motorists on the Kennedy Highway/Savannah Way *(Viewpoint 10);* residents, rural workers, passing motorists travelling on Herbert River Road *(Viewpoint 11)* and visitors and park rangers who undertake the hikes to Majors Mountain lookout in the WTQWHA and Bally Knob lookout *(Viewpoint 3 and 4).*
- ***Moderate (to no impact), Not Significant*** impact on visitors undertaking boating or kayaking on Koombooloomba Dam (Lake Koombooloomba) *(Viewpoint 15)*
- ***Moderate, Not Significant,*** impact on residents, rural workers and passing motorists on Yourka Glen Gordon Road *(Viewpoint 16);*
- ***Moderate, Not Significant,*** *impact on residents, and workers, visitors and motorists on parts of Kennedy Highway* (*Viewpoint 8*)
- ***Minor to Moderate, Not Significant,*** impact on visitors and park rangers to big Millstream Falls (*Viewpoint 2*)
- ***No impact or Minor, Not Significant,*** impact on residents, workers, visitors and motorists in Ravenshoe; on Cashmere Kirrama Road; Gunnawarra Road and Innot Hot Springs *(Viewpoints 1, 6, 7 and 9)*
- ***No impact, Not Significant,*** impact on visitors (campers) and park rangers at Koombooloomba Camping and day use area *(Viewpoint 5)* and visitors and park rangers to Rhyolite Pinnacle accessed via the Koolmoon Creek track *(Viewpoint 13)*

14.3. Summary of construction, rehabilitation and cumulative impact assessment

In addition to the long-term operational impacts of the wind farm, other impacts include short-term impacts arising during construction, decommissioning (rehabilitation) and cumulative impacts when viewed with other projects in the area.

Because construction effects are temporary they are considered to be of lower potential significance than the operational landscape and visual impacts identified.

Similarly, decommissioning impacts would also be temporary and would ultimately result in returning the landscape to its current rural character so would be of lower significance than the operational landscape and visual impacts identified.

Two other proposed wind farm projects were identified in the broader landscape that were considered in the cumulative impact assessment. This included the Kaban Green Energy Hub and the High Road Wind Farm. The presence of the existing Windy Hill Wind Farm was also considered. The potential for cumulative impacts was identified when considering the development of these projects in addition to Chalumbin Wind Farm. The cumulative impacts identified were more likely when considering the relationship between Chalumbin Wind Farm and the Kaban Green Energy Hub due to the closer proximity between these projects. This included the potential for *combined, successive and sequential* cumulative impacts in the scenario where both these projects are developed. When considering the development of the High Road Wind Farm, it is unlikely that there would be *combined impacts* due to the distance of these projects. There is the potential for *successive* and *sequential impacts* between Chalumbin Wind Farm and the High Road Wind Farm. There would also be the potential for *successive* and *sequential impacts* between the three projects in the scenario where all are developed.

14.4. Conclusions

In comparison with other, well-established, forms of development in the rural landscape (e.g. associated with arable farming and grazing industries), wind turbines are relatively unfamiliar (although noting residents of the Tablelands Region will have familiarity due to the presence of Windy Hill Wind Farm), prominently vertical and have the unique characteristic of movement. Individually or in groups, they will be distinctive features in the landscape. However, the anticipated landscape and visual impacts need to be considered in parallel with other matters, such as the limited locational flexibility of wind farms (e.g. require windy locations, feasible connection to the grid and/ or supply network) and the need to find a balance between maximising energy capture whilst minimising impacts (i.e. siting can be influenced by non-operational factors, including local landscape characteristics).

The Landscape and Visual Impact Assessment has been undertaken in accordance with the requirements of PO9 of the Wind Farm State Code and Planning Guideline (2018).

Four Landscape Character Types with associated Landscape Character Areas were identified within the Project Site and surrounding landscape. These ranged in sensitivity from Low to High, associated with the combination of landscape elements and characteristics. The landscape character of LCT B is anticipated to change to a moderate to major extent (significant) in the area where the Site is located (related to LCA B1: *Innot Hot Springs – Glen Ruth*). The landscape character of parts of LCT A is also anticipated to change to a moderate to major extent (significant) in the eastern area of the Site and the landscape adjacent. Due to the selective siting of proposed infrastructure, it is anticipated however that there are no direct or significant landscape character impacts on the WTQWHA resulting from the Project.

Because of the undulating, typically elevated, topography of the Site coupled with the 250 m turbines proposed, it is considered that the Project will be visible to a range of receptors. These receptors include residents, visitors and workers in nearby settlements and rural properties, motorists on local roads and highways as well as visitors to the WTQWHA and National Parks, State Forests, Conservation Parks and Forest Reserves.

Mitigation of impacts has been considered. Through the development of the proposed Project, inherent mitigation of both landscape character and visual impacts has already been incorporated into the Project design, specifically through a reduction of the quantity of proposed turbines as well as selective siting, resulting in the current Project that this LVIA considers. It is acknowledged however, that even with fewer turbines and selective siting, that screening views of 250 m high turbines is not possible, even if this were to be a desirable outcome. However, opportunities to enhance the

integration of the wind farm into the landscape through the detailed design and construction phases have been described.

In conclusion, the assessment considers that the Chalumbin Wind Farm will result in a significant direct impact on the landscape character of the immediate Site and limited areas of the adjacent landscape. Views from six identified viewpoints are also considered to be potentially significantly impacted by the Chalumbin Wind Farm. These views include the accessible lookouts on Majors Mountain and Bally Knob, view from a small part of the Koolmoon Creek track, views from the Kennedy Highway as well as views from residential properties in Millstream and the few rural properties west of Site on Herbert River Road. It is noted that some of these views (particularly from Bally Knob, Majors Mountain and the localised affected part of the Koolmoon Creek track) would be experienced by very few receptors due to the strenuous nature of the hike to these locations.

It is anticipated that there would be no significant direct impacts on the landscape character of the WTQWHA due to the Project and there would be no direct impacts on the superlative scenic features comprising mountains, gorges and waterfalls, which are the key Outstanding Universal Values (OUV) of the WTQWHA, However, the view from Majors Mountain lookout and a small part of the Koolmoon Creek track, which are located within this internationally recognised and protected landscape, would be significantly impacted by the introduction of turbines into a natural landscape, including localised impacts on sweeping forest vistas.. It is acknowledged however that these viewpoints represent a single localised viewpoint condition that is not typical of the surrounding WTQWHA and is understood to be experienced by a low number of receptors. Therefore, the visual impact on the WTQWHA is on a very limited area accessed by a relatively small number of hikers and does not affect the major tourist vantage points for which this part of the WTQWHA is renowned, such as Tully Gorge Lookout and also would not have a significant effect on localised vantage points within Tully Falls National Park close to the Project, such as Rhyolite Pinnacle.

In conclusion, there will be a significant change to Site character and some views due to the introduction of wind turbines into a rural and natural landscape which is typical for any wind farm development (noting that The Tablelands Regional Council Planning Scheme notes that the Tablelands positions itself as a major sustainable energy region of Australia), the impacts are typically contained.

In addition it is noted that people are likely to respond in different ways to the change. Landscape appreciation is relative and individuals of the local community may place higher or lower values on the landscape depending on their personal preferences; some viewers may view the change as positive (creating a point of interest and enjoying the contrast of the turbines with the forested backdrop of the WTQWHA) or neutral, whereas others will consider the change to be a negative impact on rural landscape values. Research (discussed in Section 3.2) typically suggests that many viewers find windfarms acceptable even in high quality landscape, and other factors such as previous exposure to wind farms (such as the nearby Windy Hill scheme) or appreciation of wind farms as a means of taking action against climate change can also increase acceptability. However, through the selective, generally orderly siting of the turbines along ridges and avoidance of key landscape features on the Site (including Arthur's Seat) and through minimising impacts on adjacent protected areas such as the WTQWHA, it is considered that the Project addresses PO9 of the Wind Farm State Code 23 by mitigating and minimising adverse impacts on landscape character and scenic amenity to the greatest extent practicable.

Whilst there will be some significant impacts for individual views obtained from selected locations within the WTQWHA, these locations are infrequent and typically difficult to reach, being located on tracks that are understood to be less popular with visitors and that require high levels of fitness (i.e. grade 4 or 5). The dense foliage of the rainforest vegetation that is typical of the WTQWHA contributes to the fact that there are few publicly accessible vantage points providing views towards the Project from the WTQWHA. When considering the potential for the Project to impact the Outstanding Universal Value (OUV) of the WTQWHA, relating to landscape and visual amenity, it is important to consider these values as they apply to the WTQWHA in its entirety. The WTQWHA is

approximately 8,940 km^2 in size. A conservative estimate would suggest that less than 1% of the WTQWHA property may have views of the Project; with the visual effect of the Project typically diminishing with distance from the Site. Moreover, temporally, the Project has an operational life of 30 years and upon decommissioning no notable visual impact will be evident from anywhere within the WTQWHA. In this context, the Project will have a negligible effect on the OUV of the WTQWHA and it is considered that the OUV that make the WTQWHA so unique will not be significantly impacted by the Project.

15. Glossary

15.1. Acronyms

AADT	Annual Average Daily Traffic
AHD	Australian Height Datum
AS 4282	Australian Standard 4282 (1997) Control of Obtrusive Effects of Outdoor Lighting
Client	Attexo Group Pty Ltd
DAWE	Department of Agriculture, Water and the Environment
DRO	Desired Regional Outcome
DSDMIP	Department of State Development, Manufacturing, Infrastructure and Planning
DTMR	Department of Transport and Main Roads
EIS	Environmental Impact Statement
ERIN	Queensland Government Environmental Resources Information Network
IBRA	Interim Biogeographic Regionalisation for Australia
kV	Kilovolt
LCA	Landscape Character Area (i.e. a geographically discrete area of a nominated LCT)
LCT	Landscape Character Type
LVIA	Landscape and Visual Impact Assessment
MNES	Matters of National Environmental Significance
OUV	Outstanding Universal Value
the Project	Chalumbin Wind Farm as shown on **Figure 2**
Proponent	Chalumbin Wind Farm Pty Ltd
PER	Public Environmental Report
The Site	Land within the site ownership boundaries of 'the Project' as shown on **Figure 2**
SARA	(Queensland) State Assessment and Referral Agency
Study Area	LVIA Study Area; comprising land within the potential viewshed of and forming the wider landscape context of the Project Site as shown on **Figure 3**

UNESCO	United Nations Educational, Scientific and Cultural Organization
VAM	Visual Analysis Map
WHA	World Heritage Area
WTQWHA	Wet Tropics of Queensland World Heritage Area
ZTV	Zone of Theoretical Visibility (see explanation for VAM)

15.2. Glossary of Assessment Terms

Amenity	The pleasantness of a place as conveyed by desirable attributes including visual, noise, odour etc.
Character	A distinct, recognisable and consistent pattern of elements in the landscape that makes one landscape different from another, and often conveys a distinctive sense of place. This term does not imply a level of value or importance.
Effect	The landscape or visual outcome of a proposed change. It may be the combined result of sensitivity together with the magnitude of the change.
Impact	The categorisation of effects. Legislative context should be considered in defining impacts and their significance.
Landscape	Landscape is an all-encompassing term that refers to areas of the earth's surface at various scales. It includes those landscapes that are: urban, rural, and natural; combining bio-physical elements with the cultural overlay of human use and values.
Magnitude of change	The extent of change that will be experienced by receptors. This change can be adverse or beneficial. Factors that could be considered in assessing magnitude are: the proportion of the view / landscape affected; extent of the area over which the change occurs; the size and scale of the change; the rate and duration of the change; the level of contrast and compatibility.
Mitigation	Measures to avoid, reduce and manage identified potential adverse impacts.
Receptor	A place, route, viewer audience or interest group which may require assessment.
Sensitivity	Susceptibility of a landscape or receptor to change without losing valued attributes.

State Forest	Land reserved by the Department of Natural Resources and Mines for State Forest purposes
Values	Any aspect of landscape or views people consider to be important. Landscape and visual values may be reflected in local, state or federal planning regulations, other published documents or be established through community consultation and engagement, or as professionally assessed.
Visual Analysis Map (VAM)	A map illustrating areas of land with views to a particular feature. This may be modelled or field-validated, and assumptions must be stated. A digitally modelled analysis is usually based on a digital terrain model and may also incorporate the screening effect of vegetation and built form. Other approximately equivalent terms include Zone of Theoretical Visibility (ZTV), Zone of Visual Influence (ZVI), Potential Visibility Zone and Visual Envelope.
View	Any sight, prospect or field of vision as seen from a place, and may be wide or narrow, partial or full, pleasant or unattractive, distinctive or nondescript, and may include background, mid ground and/or foreground elements or features.
Viewpoint	The specific part of a wider view obtained from a viewpoint used for assessment purposes (typically up to around 75° but can be wider or narrower as required).
Viewpoint	The specific location of a view, typically used for assessment purposes.
Viewshed	Areas visible from a particular location (may be modelled or field-validated).
Visual catchment	Areas visible from a combination of locations within a defined setting (may be modelled or field-validated).
Visual audience	Groups of visual receptors with common attributes and sensitivities to changes in views (e.g. residents, golfers, road travellers, walkers, shoppers, beach goers, farmers, recreational users).
Visual absorption capacity	Potential for a landscape or scene to absorb a particular change without a noticeable loss of valued attributes.
Visual amenity	The attractiveness of a scene or view.
Visual representation	Graphic representation of a proposal in context showing its likely appearance and scale.
Zone of Theoretical Visibility Map (ZTV)	See VAM above.

Photomontages/ Visualisations	A visual representation of a proposal from a particular receptor viewpoint, on a photographic base. The methodology for the preparation of any photomontage and its accuracy should be defined.
Scenic amenity	A measure of the relative contribution of each place in the landscape to the collective appreciation of open space as viewed from places that are important to the public. (Department of Natural Resources, 2001).

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APPENDIX 1: LVIA PLANS

The following GIS plans have been prepared by Attexo to support the Landscape and Visual Impact Assessment:

Figure 1 Regional Context Map

Figure 2 Project Site and Layout Map

Figure 3 LVIA Study Area Map

Figure 4 Landform and Hydrology Context Map

Figure 5 Landscape Planning Designations Map

Figure 6 Landscape Character Types Map

Figure 7 Key Visual Receptors and Tourist Drives

Figure 8 Representative Viewpoint Locations

Figure 9 Preliminary Blade Tip VAM (ZTV) Assessment – Visual Analysis Map

Figure 10 Preliminary Blade Tip VAM (ZTV) Assessment - Number of Turbines

Figure 11 Preliminary Hub Height VAM (ZTV) Assessment – Visual Analysis Map

Figure 12 Preliminary Hub Height VAM (ZTV) Assessment – Number of Turbines

Figure 13 Cumulative Assessment

APPENDIX 2: VIEWPOINTS AND VISUALISATIONS

The following viewpoint figures and visualisations have been prepared based on field photography by Lat27 and Ark Energy: