

Department of Planning and Environment

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# Bowmans Creek Wind Farm

State Significant Development Assessment Report (SSD 10315)

November 2023





# Acknowledgement of Country

The Department of Planning and Environment acknowledges that it stands on Aboriginal land. We acknowledge the Traditional Custodians of the land and show our respect for Elders past, present and emerging through thoughtful and collaborative approaches to our work, seeking to demonstrate our ongoing commitment to providing places in which Aboriginal people are included socially, culturally and economically.

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# Preface

This assessment report provides a record of the Department of Planning and Environment's (the Department) assessment and evaluation of the State significant development (SSD) application for the Bowmans Creek Wind Farm, located in the Hunter-Central Coast Renewable Energy Zone (REZ), approximately 10 kilometres (km) east of Muswellbrook, lodged by Bowmans Creek Wind Farm Pty Ltd. The report includes:

- an explanation of why the project is considered SSD and who the consent authority is;
- an assessment of the project against government policy and statutory requirements, including mandatory considerations;
- a demonstration of how matters raised by the community and other stakeholders have been considered;
- an explanation of any changes made to the project during the assessment process;
- an assessment of the likely environmental, social and economic impacts of the project;
- an evaluation which weighs up the likely impacts and benefits of the project, having regard to the proposed mitigations, offsets, community views and expert advice; and provides a view on whether the impacts are on balance, acceptable; and
- an opinion on whether the project is approvable or not, along with the reasons, to assist the Independent Planning Commission in making an informed decision about whether development consent for the project can be granted and any conditions that should be imposed.

# Executive Summary

Bowmans Creek Wind Farm Pty Ltd, owned by Ark Energy Project Pty Ltd (Ark), proposes to develop a 347 megawatt (MW) wind farm, approximately 10 kilometres (km) east of Muswellbrook in the Hunter-Central Coast Renewable Energy Zone (REZ).

The proposed project involves the development of up to 56 turbines up to 220 metres (m) high and associated ancillary infrastructure, including a new 330 kilovolt (kV) transmission line to connect to TransGrid's existing network at the Liddell substation.

The Department exhibited the Environmental Impact Statement (EIS) for the project and received 142 public submissions (131 objections and 11 supporting). Advice was also received from 18 government agencies and the three host councils (Muswellbrook Shire, Upper Hunter Shire and Singleton).

The Department consulted with the relevant councils and government agencies on key issues. The Department and its visual expert visited the site in April 2022. None of the councils, agencies or utility providers objected to the project, and they each recommended the implementation of appropriate mitigation and management measures.

In response to agency advice and submissions, Ark undertook additional assessments and made amendments to the project. The amendments included deleting and re-siting turbines, and the removal and relocation of site access tracks to reduce environmental and visual impacts.

The key assessment considerations are energy security, amenity (visual and noise), transport and biodiversity. The Department has also undertaken a comprehensive assessment of the full range of other potential impacts and recommended a range of detailed conditions, developed in conjunction with agencies and councils, to ensure all potential impacts are effectively minimised, managed or offset.

There are 47 non-associated receivers located within 4.4 km of the nearest proposed turbine. The Department is satisfied that the project would not fundamentally change the broader landscape characteristics of the area or result in any significant visual impacts on the surrounding non-associated residences, with the exception of one residence (G17-1). For this residence, the Department considers that with the deletion of two turbines (T64 and T68) and additional vegetation screening at the property, the visual impacts on this residence would not be significant. As a result, the total number of turbines would be 54 and the project capacity would be reduced to 335 MW.

The development footprint includes 280 ha of native vegetation, of which approximately 98 ha is remnant woody vegetation, 179 ha is derived native grassland and 3 ha is poor condition or planted vegetation. The project has been designed and refined to avoid and minimise biodiversity impacts to these areas. The Department considers that the biodiversity impacts of the project would not be

significant, subject to a range of mitigation and adaptive management measures and by offsetting the residual biodiversity impacts.

The noise-affected management level would be exceeded at six non-associated residences on a temporary basis during some road upgrades. Peak noise impacts would be for a limited period of time and can be controlled in accordance with the proposed noise management measures. Both the Department and the Environment Protection Authority consider that the operational noise impacts of the project can comply with the requirements of the *Wind Energy: Noise Assessment Bulletin* and the Department has recommended conditions to this effect.

The Department considers the project would not result in unacceptable impacts on the capacity, efficiency or safety of the road network. Potential traffic impacts would be largely restricted to the 18-month construction period and would be suitably managed through road upgrades, road maintenance and the implementation of a Traffic Management Plan.

The project is consistent with the Commonwealth's Renewable Energy Target and NSW's *Climate Change Policy Framework* and the *Net Zero Plan Stage 1: 2020 – 2030*, as it would contribute 335 MW of renewable energy to the National Electricity Market, enough to power over 172,600 homes and save over 957,800 tonnes of greenhouse gas emissions per year.

The project is located in the Hunter-Central Coast REZ, which was declared by the Minister for Energy under section 19(1) of the *Electricity Infrastructure Investment Act 2020* in 2022. The REZ is aimed at encouraging investment in electricity infrastructure and unlocking additional generation capacity in order to ensure secure and reliable energy in NSW. The Hunter-Central Coast REZ was declared as it has excellent renewable energy resources and can utilise existing power stations, electricity network infrastructure, port and transport infrastructure and a skilled workforce.

The project would also provide other flow on benefits to the local community, including up to 156 construction jobs, 15 operational jobs and \$686 per MW per year (plus CPI) in contributions to local councils through voluntary planning agreements for community enhancement projects. There would be broader benefits to the State through an injection of \$569 million in capital investment into the NSW economy.

The Department considers the project would not result in any significant impacts on the local community or the environment, is located on a suitable site for a wind farm development, and any residual impacts can be managed through the implementation of the recommended conditions.

The project would result in benefits to the State of NSW and is therefore in the public interest and is approvable.



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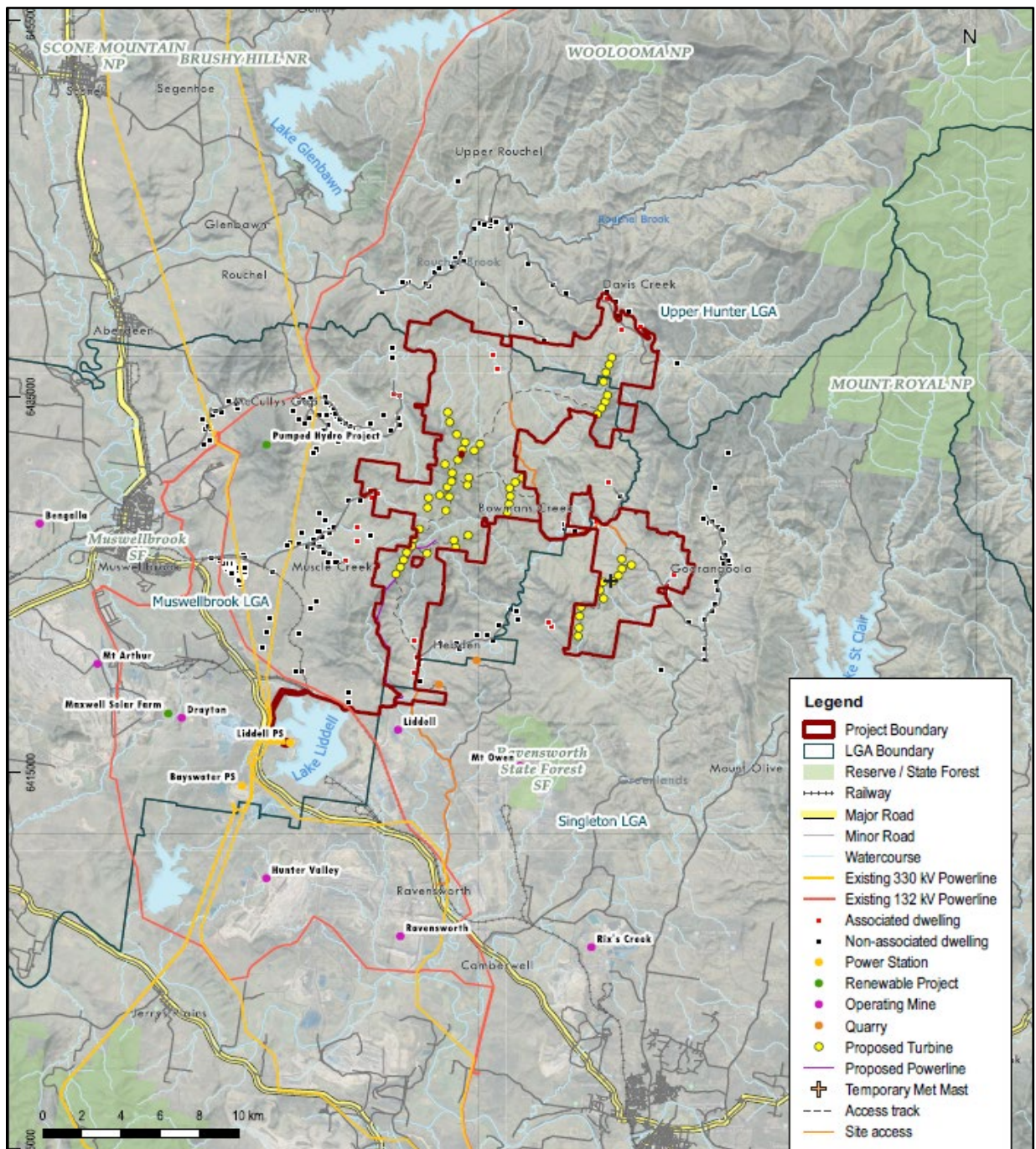
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# 1 Introduction

## 1.1 The Proposal

1. Bowmans Creek Wind Farm Pty Ltd, owned by Ark Energy Projects Pty Ltd (Ark), proposes to develop a State significant development (SSD) wind farm in the Hunter-Central Coast Renewable Energy Zone (REZ), approximately 10 kilometres (km) east of Muswellbrook in the Muswellbrook, Singleton and Upper Hunter local government areas (LGAs) (see **Figure 1** and **Figure 2**).



**Figure 1 | Regional context map**



## 2 Project

### 2.1 Project overview

2. Ark is proposing to develop a wind farm of up to 56 turbines, with a maximum tip height of 220 metres (m) and turbine hub height of 150 m. The project would connect to Transgrid's Liddell substation via a new transmission line.
3. The key components of the project are summarised in **Table 1**, shown in **Figure 3**, and described in the EIS (see **Appendix A**), Submissions Report (see **Appendix D**), Amendment Report (see **Appendix E**), and additional information (see **Appendix F**).

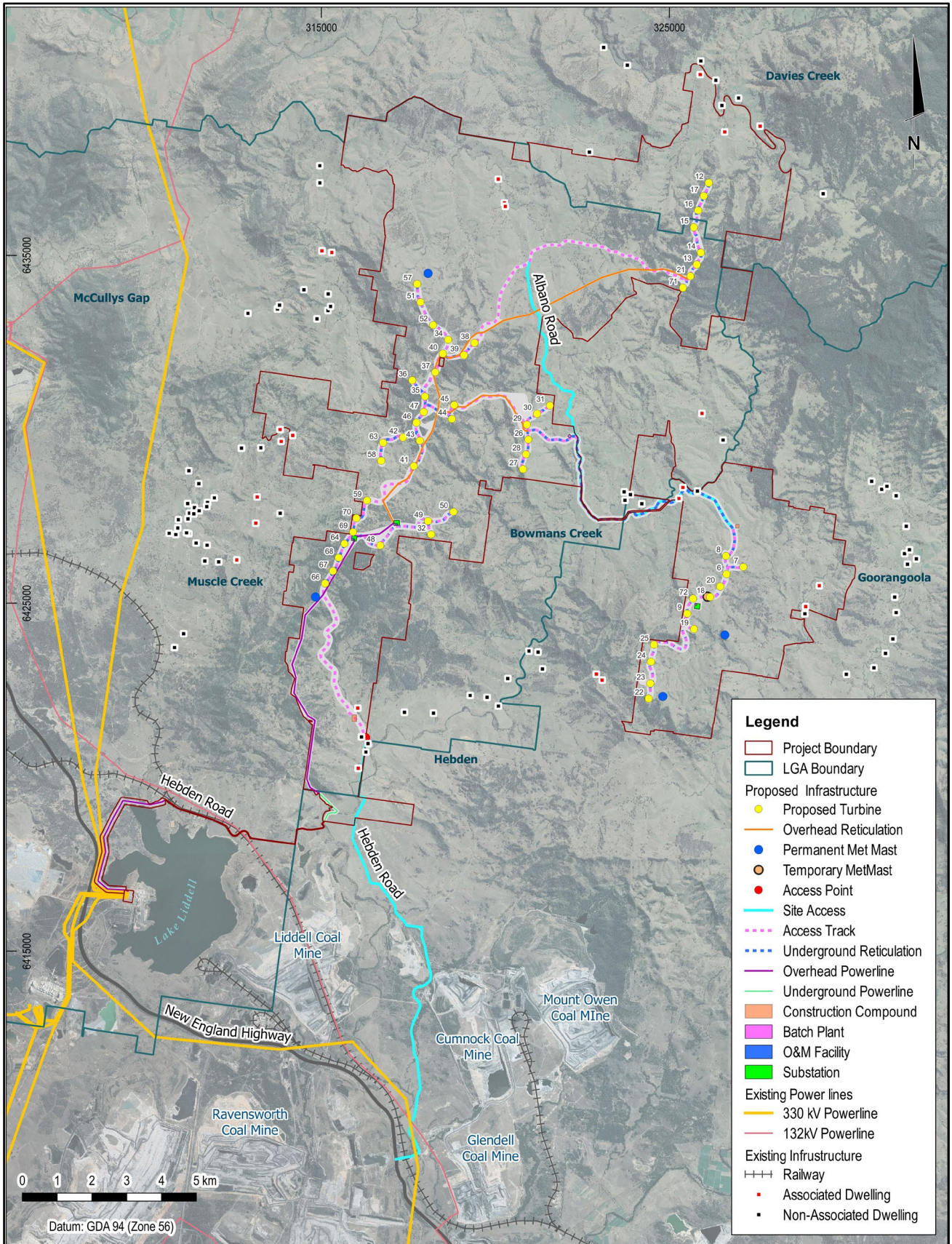


**Figure 2 | Project Site**

**Table 1 | Key aspects of the project as proposed**

Aspect	Description
Project summary	<ul style="list-style-type: none"> <li>Up to 56 turbines (347 MW capacity) and two onsite substations (from three options) connecting to Transgrid’s Liddell substation</li> <li>Temporary and permanent ancillary infrastructure</li> <li>Upgrades to local roads to cater for construction traffic and enable turbines to be delivered to the site</li> </ul>
Wind Turbines	<ul style="list-style-type: none"> <li>Maximum tip height of 220 m / maximum turbine hub height of 150 m</li> <li>Maximum rotor diameter of 160 m / swept area approximately 20,110 m<sup>2</sup></li> <li>Approximate capacity of up to 6.2 MW per turbine</li> </ul>
Electrical transmission infrastructure	<ul style="list-style-type: none"> <li>17 km of overhead and 40 km of underground transmission lines between the turbines and the onsite substations (22 kV or 33 kV)</li> <li>14 km of overhead and 7 km of underground transmission lines from the onsite substation to Liddell substation</li> </ul>
Ancillary infrastructure	<ul style="list-style-type: none"> <li>Operations and maintenance facility, utility services, fencing and signage</li> <li>Up to 52 km of new internal access tracks</li> <li>Up to four permanent and two (existing) temporary meteorological masts</li> </ul>
Construction facilities	<ul style="list-style-type: none"> <li>Two construction compounds, including laydown and storage areas, site offices, staff amenities and car parking</li> <li>Mobile rock crushers and up to three concrete batching plants</li> </ul>
Access route	<ul style="list-style-type: none"> <li>Light vehicles and heavy vehicles: New England Highway, Hebden Road (south) and Scrumlo Road. Light vehicles may also use Hebden Road (north)</li> <li>Heavy vehicles requiring escort: Port of Newcastle via Hunter Expressway, New England Highway, Hebden Road (south) and Scrumlo Road</li> <li>All vehicles: Access the site via the new access point on Scrumlo Road</li> <li>Vehicles entering the north-eastern and south-eastern areas of the site would access the site via the new access point on Scrumlo Road, then use sections of Albano Road and Bowmans Creek Road</li> </ul>
Road works	<ul style="list-style-type: none"> <li>Construction of a new site access point on Scrumlo Road</li> <li>Upgrades and infrastructure works to Hebden Road (south), Scrumlo Road, Albano Road and Bowmans Creek Road</li> </ul>
Construction & Operation	<ul style="list-style-type: none"> <li>Construction would last for approximately 18 months. Hours would be limited to Monday to Friday 7 am to 6 pm, and Saturday 8 am to 1 pm</li> <li>The project would be operational for approximately 25 years (noting infrastructure upgrades may extend the operational life)</li> </ul>
Decommissioning and rehabilitation	<ul style="list-style-type: none"> <li>The project includes decommissioning at the end of the project life, which would involve removing all infrastructure</li> </ul>
Employment	Up to 156 construction jobs and 15 operation jobs
CIV	\$569 million capital investment value
VPA	\$686 per MW per annum per turbine





**Figure 3 | Proposed Project Layout**



# 3 Strategic context

## 3.1 Site and Surrounds

4. The project is located in the Hunter region of NSW, which is a major supplier of coal and energy to national and global markets.
5. The site and surrounds are predominantly a rural landscape, interspersed with infrastructure associated with supplying major towns (transmission lines, roads and rail). Extensive land clearing has occurred within the landscape for agricultural and mining purposes. The site is primarily used for beef cattle grazing and does not include any mapped Biophysical Strategic Agricultural Land (BSAL). The site is zoned RU1 – Primary Production, with part of the transmission corridor zoned SP2 – Infrastructure and passing through a small portion of land zoned RE1 – Public Recreation.
6. The project is located near the localities of Bowmans Creek, Davis Creek, Goorangoola, Greenlands, Hebden, McCullys Gap, Muscle Creek and Rouchel Brook, which are sparsely populated (with a population of approximately 800 to 1,000 in the broader localities) and predominantly include larger rural properties.
7. Within 10 km of the project site there are three operating coal mines, three quarries and one approved (but not yet built) gas pipeline. Liddell and Bayswater Power Stations are located 10 km south-west of the project site. Muswellbrook is located 10 km west of the site and Singleton is located 25 km to the south-east.
8. Four proposed State significant renewable energy and storage projects are located within approximately 15 km of the site, which are Liddell battery energy storage system (BESS) (8 km south-west), Muswellbrook BESS (10 km west), Muswellbrook Solar (10 km west) and Maxwell Solar (11 km south-west).
9. Most of the site and immediate surrounds is privately owned, and is largely cleared for agricultural use, with areas of remnant native vegetation predominantly located on hillslopes and ridges. Native vegetation on site comprises patches of dry rainforest, open forest and woodland, and derived native grassland (that is, native-dominated grassland created from the clearing of forest or woodland).
10. The topography of the site and surrounds is characterised as gently undulating to undulating with numerous valleys and peaks ranging from 135 m to 786 m (AHD). North-south ridge lines, steep slopes and gullies intersperse the north of the site, originating in the Barrington Tops and Mount Royal Range north-east of the site, with lowland valleys common to the Hunter Valley located to the south.



11. The site is within the Hunter River catchment and Bowmans Creek is the major drainage line within the site. The north of the site is located in the catchment of Sandy Creek, an ephemeral stream flowing east-west through the site. Part of the west of the site is in the catchment of Muscle Creek.

### 3.2 Renewable Energy Context

12. In 2022, NSW derived approximately 32% of its energy from renewable sources. The rest was derived from fossil fuels, including approximately 63% from coal and 5% from gas. NSW is one of the nation’s leaders in large-scale wind, with 15 major operational projects and four under construction.
13. The project is located in the declared Hunter-Central Coast REZ, and would have access to the electrical grid at a location with available network capacity.

**Table 2 | Energy Context**

Strategy, plan or policy	Comments
<i>Australia’s Long Term Emissions Reduction Plan (2021) and Nationally Determined Contribution (2022)</i>	Sets a pathway to net zero emissions by 2050 and affirms Australia’s commitment to meeting its revised 2030 target (43% below 2005 levels).
<i>Australian Energy Market Operator’s 2022 Integrated System Plan (ISP)</i>	Notes that: <ul style="list-style-type: none"> <li>without coal, investment is needed to meet significantly increased electricity demand requiring a nine-fold increase in large-scale variable renewable energy generation; and</li> <li>a mix of wind and solar is needed, and they offer complementary daily and seasonal profiles.</li> </ul>
NSW: <i>Climate Change Policy Framework (2016); Transmission Infrastructure Strategy (2018); Electricity Strategy (2019); Electricity Infrastructure Roadmap (2020); Net Zero Plan Stage 1: 2020 – 2030 (2020) and Implementation update (2022); Hunter Regional Plan 2041</i>	Relevant aspects of these policy documents include: <ul style="list-style-type: none"> <li>aim to achieve net zero emissions in NSW by 2050 and reduce emissions by 70% below 2005 levels by 2035;</li> <li>note that all coal fired power plants in NSW are scheduled for closure within the next twenty years;</li> <li>identify REZ’s across NSW, including in the Hunter-Central Coast REZ, aimed at encouraging investment in electricity infrastructure and unlocking additional generation capacity in order to ensure secure and reliable energy in NSW;</li> <li>regional goals to support the State’s transition to lower emissions and take advantage of opportunities to diversify and leverage employment opportunities; and</li> <li>Councils’ goals to support renewable energy generation and benefit from the transition to renewable energy.</li> </ul>

### 3.3 NSW Wind Energy Framework

14. In December 2016, the Department released the *NSW Wind Energy Framework* (the Framework). The Framework seeks to provide greater clarity, consistency and transparency for industry and the community regarding assessment and decision-making on wind energy projects.
15. The Framework provides a merit-based approach to the assessment of wind energy projects, which is focused on the issues unique to wind energy, particularly visual and noise impacts. The key documents comprising the Framework include the Wind Energy Guideline, the Visual Assessment Bulletin and the Noise Assessment Bulletin.
16. The Department's assessment of the project against the requirements of the Framework are detailed in **section 6**.
17. The Department is implementing a new Energy Policy Framework to help achieve the transition to renewable energy, reduce emissions and secure an affordable supply of electricity for the people of NSW. The Framework includes a new Wind Energy Guideline, which includes updates to the existing wind energy guideline. The Framework is currently in draft form and is on public exhibition and will not be finalised until sometime in 2024. The draft Framework, including the Wind Energy Guideline, does not apply to the assessment of this project.

## 4 Statutory context

### 4.1 State significant development

18. The project is classified as State significant development under section 4.36 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). This is because it triggers the criteria in section 20 of Schedule 1 of *State Environmental Planning Policy (State and Regional Development) 2011* (SRD SEPP), as it is development for the purpose of electricity generating works with a capital investment value of more than \$30 million.
19. Under section 4.5(a) of the EP&A Act and clause 1(b) of section 2.7 of the *State Environmental Planning Policy (Planning Systems) SEPP 2021* (Planning Systems SEPP), the Independent Planning Commission (the Commission) is the consent authority for the development as the project received more than 50 unique public submissions by way of objection.
20. Since lodgement of the EIS, all NSW State Environmental Planning Policies (SEPP) have been consolidated into 11 policies. The consolidated SEPPs commenced on 1 March 2022, with the exception of the *State Environmental Planning Policy (Housing) 2021*, which commenced on 26 November 2021.

21. The SEPP consolidation does not change the legal effect of the repealed SEPPs, as the provisions of these SEPPs have simply been transferred into the new SEPPs. Further, any reference to an old SEPP is taken to mean the same as the new SEPP. For consistency, the Department has considered the development against the relevant provisions of the SEPPs that were in force when the EIS was lodged.
22. As the development application for the project had been made but was not finally determined before 1 March 2022, the *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation) continues to apply to the assessment and determination of this project (instead of the *Environmental Planning and Assessment Regulation 2021*).

## 4.2 Amended Application

23. In accordance with clause 55 of the EP&A Regulation, a development application can be amended at any time before the application is determined. Ark sought to amend its application, the details of which are summarised in **section 5.4** of this report. Under the delegation dated 19 November 2021, the Director, Energy Assessments can agree to amendments to an application.
24. The Department accepted the amended application for the following reasons:
  - the project amendments have reduced the impacts of the project as a whole;
  - the amended application directly responds to the key issues raised in submissions received by the Department during the exhibition of the original application;
  - Ark assessed the impacts of the amended project (see **Appendix E**); and
  - the Department made the additional information available online and sent it to the relevant agencies for comment.

## 4.3 Permissibility

25. The site is zoned as RU1 Primary Production under the Muswellbrook, Singleton and Upper Hunter LEPs, with part of the transmission corridor zoned SP2 – Infrastructure and passing through a small portion of land zoned RE1 – Public Recreation under the Muswellbrook LEP. The RU1, SP2 and RE1 zones include various land uses that are both permitted with and without consent.
26. Electricity generating works are permissible with consent on any land in a prescribed rural, industrial or special use zone, including land zoned RU1, SP2 or RE1, under clause 34 of the *State Environmental Planning Policy (Infrastructure) 2007* (Infrastructure SEPP). Consequently, the project is permissible with development consent.

## 4.4 Integrated and Other Approvals

27. Under section 4.41 of the EP&A Act, several other approvals are included in the SSD approval process, and consequently are not required to be separately obtained for the project.
28. Under section 4.42 of the EP&A Act, a number of further approvals are required, but must be substantially consistent with any development consent for the project (e.g. approvals for any works under the *Roads Act 1993*).
29. Further authorisations are required under the *Crown Land Management Act 2016*, including a Crown lands licence or easements before infrastructure can traverse Crown lands located within the development footprint.
30. The Department has consulted with the relevant government authorities responsible for the integrated and other approvals, considered their advice in its assessment of the project, and included suitable conditions in the conditions of consent to address these matters (see **Appendix G**).

## 4.5 Mandatory Matters for Consideration

31. Section 4.15 of the EP&A Act outlines the matters that a consent authority must take into consideration when determining development applications. The Department has considered these matters, including the suitability of the site for the development and the public interest, in its assessment of the project as well as Ark's consideration of environmental planning instruments in its EIS, as summarised in **section 6** of this report. The Department has also considered relevant provisions of the environmental planning instruments in **Appendix I**.

## 4.6 Renewable Energy Zone

32. The *Electricity Infrastructure Investment Act 2020* (EII Act) coordinates investment in transmission, generation, storage and firming infrastructure in NSW and gives effect to the Electricity Infrastructure Roadmap. Under section 19 of the EII Act, the Minister for Energy may declare a renewable energy zone comprising a specified geographical area of the State, and specified generation, storage or network infrastructure.
33. This project is located in the geographical area specified in the Hunter-Central Coast REZ, which is declared under section 23 of the EII Act.

## 4.7 Application of the Biodiversity Conservation Act 2016

34. The *Biodiversity Conservation Act 2016* (BC Act) applies to the project. In particular:



- under section 7.9 of the BC Act, the EIS for the project must be accompanied by a biodiversity development assessment report (BDAR); and
  - under section 7.14, the Minister must consider the likely impact of the project on biodiversity values as assessed under the BDAR.
35. The EIS for the project included a BDAR, which was prepared in accordance with the Biodiversity Assessment Methodology (see Appendix L of the EIS, which is included in **Appendix A** of this report). The BDAR was updated to address comments raised in submissions on the project and to account for project amendments (see Appendix D3 of the Amendment Report which is included in **Appendix E** of this report).
36. The Department has considered the findings of the updated BDAR and additional information as well as advice from the Biodiversity, Conservation and Science Directorate (BCS) in its assessment (see **section 6.3**). This assessment concluded that the project is unlikely to have significant impacts on any biodiversity values of the area provided a biodiversity offset strategy is implemented for the project.

## 4.8 Commonwealth Matters

37. On 3 June 2020, the project was declared (EPBC 2020/8631) to be a 'controlled action' in accordance with the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) due to likely significant impacts to listed threatened species and communities (sections 18 and 18A) and listed migratory species (sections 20 and 20A).
38. The assessment process under the EP&A Act has been accredited under a bilateral agreement with the Commonwealth Government. Accordingly, the NSW Government has undertaken the assessment on behalf of the Commonwealth and has assessed matters of national environmental significance (see **section 6.5** and **Appendix J**).
39. The Department consulted with the Department of Climate Change, Energy, the Environment and Water (DCCEEW) in accordance with the bilateral agreement and provided draft copies of this assessment report and the recommended conditions of approval to DCCEEW for comment.

## 5 Engagement

40. The Department publicly exhibited the EIS from 31 March 2021 until 11 May 2021, advertised the exhibition in the *Australian*, *Sydney Morning Herald*, *Daily Telegraph*, *Singleton Argus* and *Hunter Valley & North Coast Town and Country Leader*, and wrote directly to landowners near the project site, notifying them of the proposal and exhibition dates.

41. The Department consulted widely with the community, councils and government agencies throughout the detailed assessment of the project. This included meeting with landholders near the project site and engagement with councils and relevant government agencies regarding key assessment issues. The Department notified and sought comment from Transgrid and Transport for New South Wales (TfNSW) in accordance with the Infrastructure SEPP, as discussed further in **section 5.3**.

## 5.1 Summary of Public Submissions

42. During the exhibition period of the EIS, the Department received 142 submissions from the public, of which 131 objected to the project and 11 supported the project. A summary of the proximity of public submissions is provided in **Table 3** below and a link to all submissions in full is provided in **Appendix B**.

**Table 3** | Summary of Public Submissions

Submitter	Total	Support	Object
<5 km	60	1	59
5-15 km	27	0	27
15-50 km	15	1	14
>50 km	40	9	31
<b>TOTAL</b>	<b>142</b>	<b>11</b>	<b>131</b>

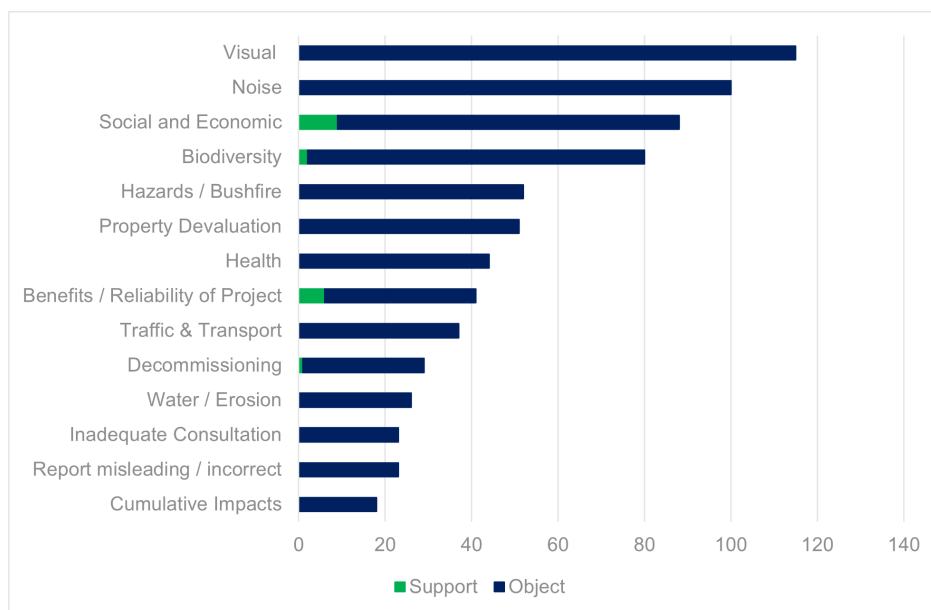
### 5.1.1 Submissions in objection

43. The most common matters raised in submissions objecting to the project included:

- visual impacts on the surrounding landscape and residences, including shadow flicker and night lighting;
- construction and operational noise, including low frequency and traffic noise, infrasound, and noise and vibration from blasting;
- socio-economic factors including property devaluation and lack of local benefit;
- biodiversity impacts, including the adequacy of the biodiversity assessment and survey effort, omission of certain threatened species and bird and bat strike;
- hazards / bushfire risk, including concerns that the wind farm could increase the risk of bushfires in the area;

- adverse impacts on the mental and physical health of some residents, particularly as a result of the potential noise and visual impacts of the development; and
- suitability of the road network to accommodate construction traffic, increased traffic to the area and road safety.

44. Other issues raised in submissions included decommissioning of the project, water and erosion, the adequacy of consultation undertaken, the accuracy of the information presented in the EIS and the cumulative impacts with other SSD projects in the region. The key matters raised in public submissions are summarised in **Figure 4**.



**Figure 4 | Key Issues Raised in Public Submissions**

### 5.1.2 Submissions in support

45. Of the submissions received that support the project, the key matters raised included benefits to the local economy through the creation of local jobs, encouragement of investment in the area, provision of reliable income to host landowners and contributions to councils to invest in the community.

46. Submissions also identified that the project would provide a local source of renewable energy for the community, contribute to the energy sustainability in NSW, and assist in the transition away from fossil fuel powered energy to lower emissions generating technology.

## 5.2 Summary of Council Submissions

47. Muswellbrook Shire, Singleton and Upper Hunter Shire councils each provided comments on the project. A summary of the issues raised by each council is provided in **Table 4** below and a link to the submissions in full is provided in **Appendix B**.

**Table 4 | Summary of issues raised by councils**

Council	Key issues raised in submission
<b>Muswellbrook Shire</b>	Community contributions; Local road impacts; Water supply; Erosion and sedimentation; Habitat loss and adequacy of biodiversity assessment; EMF; Subdivision; Decommissioning.
<b>Singleton</b>	Community contributions; Local road impacts including proposed underground transmission lines within road reserve of Hebden Road; Water supply; Erosion; Adequacy of biodiversity assessment; Biosecurity; Subdivision; Decommissioning.
<b>Upper Hunter Shire</b>	Community contributions; Traffic; Visual; Noise; Biodiversity.

### 5.3 Summary of Agency Advice

48. During exhibition of the EIS, the Department received advice from 18 government agencies. A summary of the agency advice is provided in **Table 5**. A link to the full copies of the advice is provided in **Appendix C**.

**Table 5 5 | Summary of agency submissions**

Agency	Key matters raised
<b>Transport for NSW (TfNSW)</b>	Impacts on the classified and local road network, including road and intersection upgrade requirements.
<b>Biodiversity Conservation and Science Directorate (BCS)</b>	Adequacy of the Biodiversity Development Assessment Report (BDAR), including flora and habitat surveys, impacts on serious and irreversible impact (SAIL) entities, migratory flyways, vehicle strike and legibility of figures. Advice on Matters of National Environmental Significance (MNES).
<b>Heritage NSW – Aboriginal Cultural Heritage</b>	Inclusion of comments from Registered Aboriginal Parties in the Aboriginal Cultural Heritage Assessment. Recommendations for heritage management.
<b>Civil Aviation Safety Authority (CASA)</b>	Risk to aviation safety, including aircraft collision, and aerial firefighting operations. Recommendations for obstacle lighting.
<b>Airservices Australia (ASA)</b>	Requested a Vertical Obstacle Notification (VON) form for tall structures be provided at commencement of construction.



Agency	Key matters raised
<b>Department of Defence (DoD)</b>	Reduction in useable airspace for Defence aircraft for low flying activity in Restricted Area (R583B) and Danger Area (D600). Recommendations for the provision of obstacle lighting and provision of ‘as constructed’ details of tall structures to ASA.
<b>NSW Rural Fire Service (RFS)</b>	Recommendations for bushfire and hazard management measures, including the implementation of a Fire Management Plan (FMP).
<b>Department of Primary Industries – Agriculture</b>	Recommendations for operational and decommissioning measures to maintain the agricultural use and capability of the land.
<b>Department of Primary Industries – Fisheries</b>	Recommendation that development complies with <i>Guidelines for Controlled Activities on Waterfront Land</i> .
<b>DPE Water and NSW Natural Resources Access Regulator</b>	Recommendations regarding works on waterfront land and water entitlements.
<b>Crown Lands</b>	Potential impacts on Crown lands, roads and waterways (including any land subject to Aboriginal Land Claims).
<b>Transgrid</b>	Impact on Transgrid easements; Recommendations for Asset Protection Zones (APZs) and ongoing engagement between Ark and Transgrid regarding Connection Processes Agreement and terms of ownership, maintenance and operation of substations.
<b>WaterNSW</b>	Potential impacts to water monitoring sites along the transport route that require continued access by WaterNSW.

49. Fire and Rescue NSW, Subsidence Advisory NSW, Environment Protection Authority (EPA), Regional NSW – Mining, Exploration and Geoscience and Australian Rail Track Corporation (ARTC) did not raise any concerns.

## 5.4 Response to Submissions and Amendment Report

50. Following the public exhibition period, the Department asked the applicant to respond to the issues raised in submissions and the advice received from government agencies.
51. Following consideration of submissions on the project, Ark provided a submissions report addressing the issues raised in agency advice and community and council submissions (see

**Appendix D**). The applicant also provided an amendment report (see **Appendix E**) to amend its development application including:

- Turbines: deletion of four turbines (10, 33, 60 and 61), re-siting of turbines 8, 9 and 32 and minor micro-siting adjustments to several turbines;
- Ancillary infrastructure: removal and relocation of site access tracks, a net reduction of approximately 10 km in underground power reticulation, a reduction of approximately 14 km in overhead power reticulation; and
- Development footprint: an overall reduction of approximately 98 ha.

52. As the project amendments would not increase the impacts of the project as a whole, the Department did not exhibit the amendment report. The Department published the submissions report and amendment report on the NSW planning portal and provided it to government agencies and local councils for comment.

## 6 Assessment

53. The Department has undertaken a comprehensive assessment of the merits of the development. This report provides a detailed discussion of the key issues, namely energy security (**section 6.1**), visual (**section 6.2**), traffic and transport (**section 6.3**), noise (**section 6.4**) and biodiversity (**section 6.5**).

54. The Department has also considered the full range of potential impacts associated with the project and has included a summary of its assessment of these matters in **section 6.6**.

### 6.1 Energy Security

55. The project aligns with a range of national and state policies, which identify the need to diversify the energy generation mix and reduce the carbon emissions intensity of the grid while providing energy security and reliability.

56. With a generating capacity of 335 MW (for the 54 turbine layout), the wind farm would generate enough electricity to power over 172,600 homes. This is consistent with the *NSW Climate Change Policy Framework* of achieving net zero emissions by 2050 and the *Net Zero Plan Stage 1: 2020 – 2030*.

57. The project is located in the Hunter-Central Coast REZ, a region which has excellent renewable energy resources. The project would have access to the electrical grid at a location with available network capacity, on land where wind development is permissible on RU1 zoned land with consent under the Infrastructure SEPP.

58. The Hunter-Central Coast REZ is an area traditionally associated with supplying coal and energy to national and global markets. As such, there are opportunities for projects in this region to utilise existing power stations, rehabilitated mining land, electricity network infrastructure, port and transport infrastructure and a skilled workforce.
59. As per AEMO's *Integrated System Plan 2022*, current announcements suggest that about 8 gigawatts (GW) of the current 23 GW of coal-fired generation capacity will withdraw by 2030 in the National Electricity Market (NEM). With the closure of Munmorah Power Station in 2012 and Liddell Power Station in April 2023, and a number of planned closures of coal-fired power stations in the Hunter-Central Coast region in the next decade (such as Eraring Power Station, Vales Point Power Station and Bayswater Power Station), the project will contribute to replacing the loss of energy generation within the region and the State.
60. In terms of energy security, the project is in the public interest as it would play an important role in increasing renewable energy generation and capacity and would contribute to the transition to a cleaner energy system as coal fired generators retire.

## 6.2 Visual

61. Concerns about visual impacts were raised in most public submissions, particularly regarding the size and scale of the wind farm in the landscape.
62. Ark commissioned a Landscape and Visual Impact Assessment (LVIA) as part of its EIS and updated its LVIA to address changes to the project as detailed in the Amendment Report. During the Department's assessment, Ark provided additional information, including further assessment of receivers and confirmed additional neighbour agreements.
63. The Department visited the site and several non-associated residences surrounding the project to assess visual impacts and to further understand residents' concerns. The Department also engaged O'Hanlon Design Landscape Architects (OHD) to review the LVIA, visit non-associated residences and provide independent advice (see **Appendix M**).

### 6.2.1 Avoidance and Mitigation

64. The *Visual Assessment Bulletin* (the Bulletin) lists different visual impact mitigation options for consideration, including physical turbine alterations (re-siting, re-sizing and re-colouring), landscaping alterations such as vegetation screening, and landowner agreements for significantly affected landowners.
65. The Department considers that re-siting or removing turbines is generally the most effective mitigation option, given that re-sizing specific turbines is not a viable option for commercial and maintenance reasons.

66. Ark reduced the number of proposed turbines from 72 to 60 throughout its design process prior to submitting the EIS. The Department acknowledges that deletion of 12 turbines has reduced the visual impact on the landscape and at many non-associated residences, particularly those located in Muscle Creek, McCullys Gap and Bowmans Creek.
67. Ark responded to submissions by amending the development application after the EIS exhibition, reducing the maximum number of proposed turbines from 60 to 56. Ark also responded to concerns raised by the Department during its assessment of the project by securing neighbour agreements with six landowners, bringing the total to 23 associated residences (including 17 host landowners).
68. It is important to note that the Department raised concerns about the potential visual impacts of the project from an early stage and throughout the assessment process, including following the exhibition of the Environmental Impact Statement in May 2021. In addition, following receipt of Ark's Submissions Report and Amendment Report in October 2021, the Department raised concerns about the need to address the potential visual impacts of the project in request for information letters as summarised in **Table 6**.

**Table 6 | Correspondence between the Department and Ark**

Department's request	Ark's response
<p><b>October 2021:</b> Requested additional assessment and justification of visual impacts, including further mitigation measures to reduce impacts (such as changes to project design or neighbour agreements).</p>	<p><b>February 2022:</b> No changes to total number of turbines or setback distances. No neighbour agreements.</p>
<p><b>March 2022 and June 2022:</b> Reiterated the Department's request of October 2021, including justification of visual impacts and consideration of mitigation measures. Requested confirmation of updated associated or non-associated receivers</p>	<p><b>October 2022 and January 2023:</b> No changes to total number of turbines or setback distances. No neighbour agreements.</p>
<p><b>October 2022:</b> Repeated previous requests, including consideration of mitigation measures such as project design or neighbour agreements.</p>	<p><b>April 2023:</b> Response provided by Ark which was rejected by the Department as there were no changes to the number of turbines, setback distances or neighbour agreements.</p> <p><b>October 2023:</b> Six neighbour agreements secured by Ark.</p>



69. Ark proposes to address the residual visual impacts by:
- providing vegetation screening at non-associated neighbouring residences where there is an opportunity to further reduce visual impacts from the project;
  - using building materials and treatments for associated infrastructure which visually complement the existing landscape character and reduce glint;
  - avoiding unnecessary lighting, signage on fences and logos; and
  - installing low intensity and shielded aviation night lighting.
70. While the Department supports the proposed avoidance and mitigation measures, further mitigation measures are recommended, including removing two turbines and additional vegetation screening for all impacted non-associated residences, as discussed below.

### 6.2.2 Impact Assessment Approach

71. The Department assessed the visual impacts of the project against the Bulletin's visual performance objectives. These depend on the visual influence zone (VIZ) of a receiver, which is a combination of viewer sensitivity, visibility distance and scenic quality class, and comprises three zones: high (VIZ1), moderate (VIZ2) and low (VIZ3).
- **Visual Magnitude** – black (3 km) and blue (4.4 km) distance thresholds based on 220 m high turbines indicate where turbines may significantly impact a receiver. In summary, the Bulletin recommends for residences in:
    - VIZ1 within the blue line: avoid turbines or provide detailed justification for turbines;
    - VIZ2 between the blue and black line: consider screening;
    - VIZ2 within the black line: manage impacts as far as practicable and justify residual impacts, describing mitigation measures for turbines; and
    - VIZ3 within the black line: consider screening.
  - **Multiple Wind Turbine Effects** – considers the cumulative landscape and visual impacts. The performance objectives for each receiver is dependent on viewer sensitivity level (rather than VIZ). For level 1 (high sensitivity) receivers, turbines within 8 km should avoid being visible in more than one 60 degree sector, and for level 2 (moderate sensitivity) receivers, avoid more than two 60 degree sectors.
  - **Landscape Scenic Integrity** – considers how the project would alter the current landscape character and scenic quality of the visual catchment. For VIZ1, turbines should be very small or faint, or of a colour contrast that would not compete with major elements in the existing visual catchment. For VIZ2, wind turbines may be visually apparent and

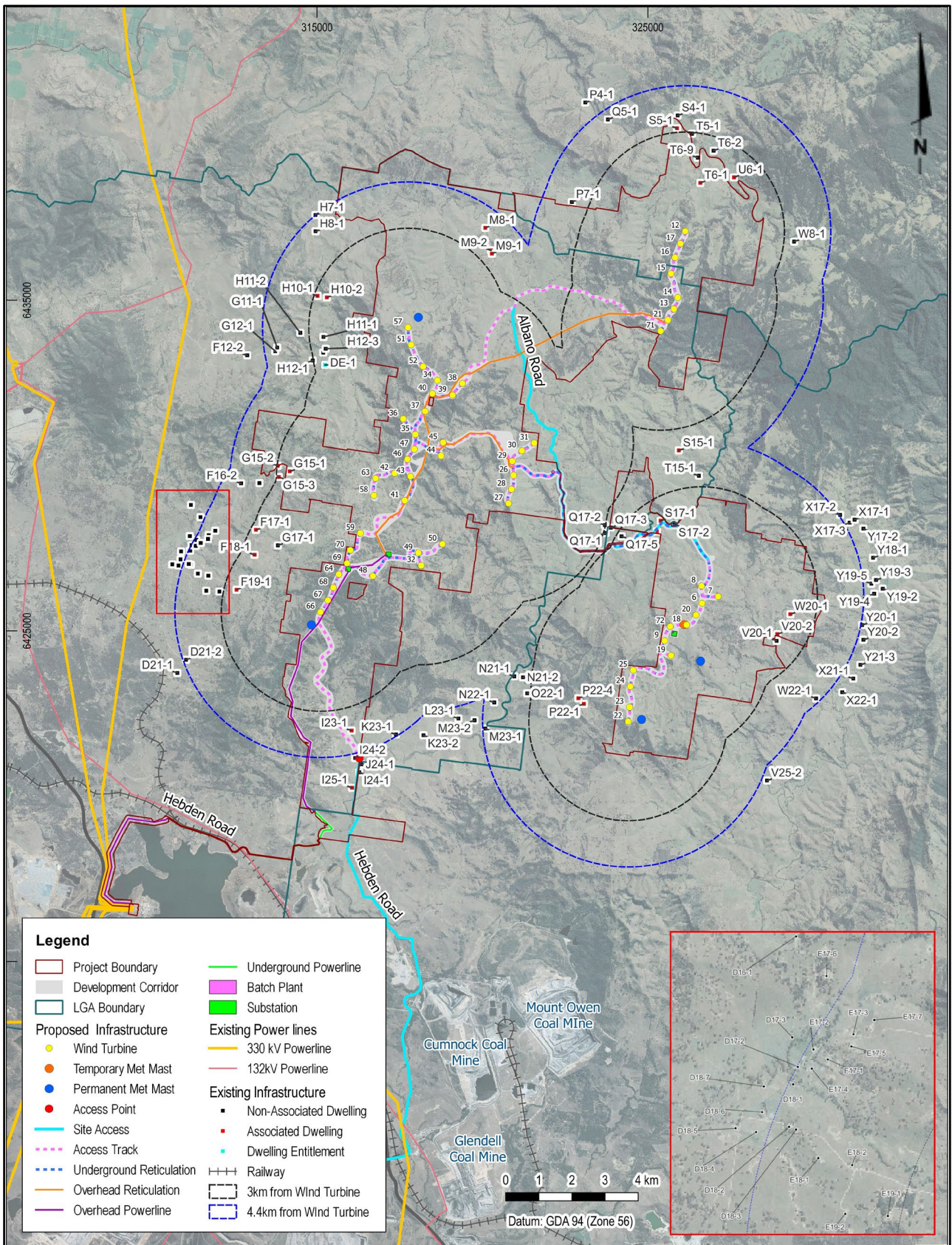
could become a major element, but not dominate the landscape. For VIZ3, turbines may be visually apparent or significantly modify the visual catchment.

- **Key Feature Disruption** – describes how likely turbines are to disrupt the central line of sight and/or the central focal viewing fields surrounding identified key features of a landscape. For VIZ1, turbines should not remove, visually alter or disrupt an identified key landscape feature. For VIZ2, these impacts should be minimised. No objective applies to VIZ3.
- **Shadow Flicker and Blade Glint** – for each VIZ, shadow flicker to be limited to 30 hours per year and turbines finished with a low reflectivity surface treatment to minimise blade glint.
- **Aviation Hazard Lighting** – where required, aviation hazard lighting must meet the requirements of *Australian Standard AS 4282 - 1997* and any prescribed or notified CASA requirement. Shielding of all Aviation Hazard Lighting within 2km of a residence and avoid strobe lighting.

### 6.2.3 Impact Assessment

72. There are 49 non-associated receivers located within 4.4 km of the nearest proposed turbine, all of which are VIZ2 receivers (see **Figure 5**).
73. For ease of assessment, the Department grouped non-associated residences into four clusters based on proximity to the nearest turbine array:
- McCullys Gap and Sandy Creek residences (western turbine array - north);
  - Muscle Creek residences (western turbine array - south);
  - Bowmans Creek, Scrumlo Road and Goorangoola residences (eastern turbine array); and
  - Davis Creek residences (northern turbine array).
74. The Department's assessment of predicted visual impacts on non-associated residences, as well as public viewpoints surrounding the project, is discussed below (including in **Table 6** for residences within the black line as set out in the Bulletin).





**Figure 5 | Surrounding Residences**

**Table 7 | Visual impact assessment: non-associated residences below the black line**

Receiver	Turbines and distance (km) below the black line (<3 km)	No. of turbines between black & blue line (3 – 4.4 km)	VIZ	Complies with visual performance objective (Yes / No)				Recommended Mitigation
				Ark assessment	Department and OHD assessment <sup>1</sup>			
				All objectives	Visual Magnitude	Multiple wind turbine	Landscape scenic integrity	
<b>McCullys Gap / Sandy Creek Cluster</b>								
H11-1	T57 (2.55), T51 (2.67)	8 (T47, T35, T36, T37, T40, T39, T34, T52)	VIZ2	Yes	Yes	Yes	Yes	Vegetation screening
H12-3	T57 (2.57), T51 (2.59), T52 (2.99)	14 (T63, T42, T46, T47, T35, T36, T37, T38, T39, T40, T34, T52, T51, T57)	VIZ2	Yes	Yes	Yes	Yes	Vegetation screening
H12-2	T51 (2.67), T57 (2.67)	12 (T63, T42, T46, T47, T35, T36, T37, T38, T39, T40, T52, T34)	VIZ2	Yes	Yes	Yes	Yes	Vegetation screening
<b>Muscle Creek Cluster</b>								
G17-1	T64 (2.04), T68 (2.11), T69 (2.16), T70 (2.20), T67 (2.25), T66 (2.39), T59 (2.52)	7 (T58, T63, T42, T41, T49, T32, T48)	VIZ2	Yes	Yes	Yes	No, turbines dominate the landscape	- Delete turbines T64 and T68 - Vegetation screening
DE-1 <sup>2</sup>	T68 (2.58), T51 (2.66), T57 (2.73), T36 (2.87), T52 (2.95)	13 (T58, T63, T42, T43, T46, T47, T35, T45, T37, T40, T39, T38, T34)	VIZ2	Yes	Yes	Yes	Yes, dwelling could be oriented with primary views away from project	Vegetation screening



Receiver	Turbines and distance (km) below the black line (<3 km)	No. of turbines between black & blue line (3 – 4.4 km)	VIZ	Complies with visual performance objective (Yes / No)				Recommended Mitigation
				Ark assessment	Department and OHD assessment <sup>1</sup>			
				All objectives	Visual Magnitude	Multiple wind turbine	Landscape scenic integrity	
<b>Bowmans Creek / Scrumlo Road/ Goorangoola Cluster</b>								
S17-2	T8 (2.04), T6 (2.53), T7 (2.55), T20 (2.82)	4 (T9, T8, T19, 72)	VIZ2	Yes	Yes	No, 2 sectors – distance (>5km), topography and existing vegetation would screen views in one sector <sup>3</sup>	Yes	- Micro-siting restrictions - Vegetation screening
V20-1	T7 (2.22), T6 (2.52), T20 (2.56), T18 (2.76), T8 (2.81)	3 (T9, T19, T72)	VIZ2	Yes	Yes	Yes	Yes	Vegetation screening
Q17-5	T8 (2.85)	14 (T26, T27, T28, T29, T30, T31, T25, T29, T9, T72, T18, T20, T6, T17)	VIZ2	Yes	Yes	No, 3 sectors – existing vegetation would partially screen turbines in all sectors, vegetation screening could mitigate residual impact	Yes	Vegetation screening
<b>Davis Creek Cluster</b>								
T6-9	T12 (2.26), T17 (2.65)	3 (T14, T15, T16)	VIZ2	Yes	Yes	Yes	Yes	Vegetation screening
T6-2	T12 (2.58), T17 (2.99)	2 (T15, T16)	VIZ2	Yes	Yes	Yes	Yes	Vegetation screening
T5-1	T12 (2.95)	3 (T14, T15, T16)	VIZ2	Yes	Yes	Yes	Yes	Vegetation screening

Notes:

1. The Department and OHD consider that the performance objectives for key feature disruption, shadow flicker and blade glint, and aviation hazard lighting are achieved at all receivers (discussed further below).
2. Dwelling Entitlement associated with Lot 40 DP1094039.
3. S17-2 is the only Level 1 (high sensitivity) residence due to its heritage listing. All other residences are Level 2 (moderate sensitivity) receivers.

**McCullys Gap / Sandy Creek cluster (western turbine array – north)**

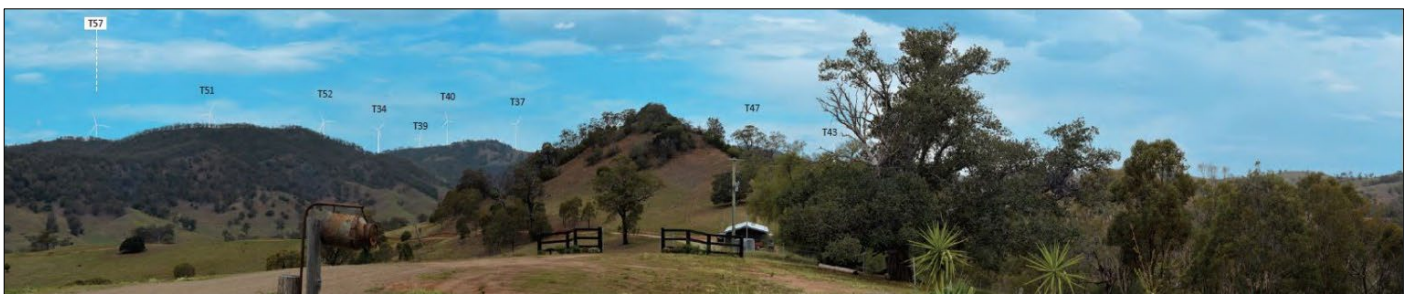
- 75. There are eight non-associated residences in the McCullys Gap and Sandy Creek cluster that are within 4.4 km of the nearest turbine (three within 3 km (see **Table 6**) and five between 3 km and 4.4 km) (see **Figure 5**). The Department notes that two residences (H11-2 and H12-2) are located a short distance above the 3 km black line as identified in the Bulletin and that several turbines would be partially visible.
- 76. Due to distance, intervening topography and existing mature vegetation, the visual impacts would not be significant to warrant additional mitigation measures beyond visual screening at these residences, in line with the Bulletin (see **Figure 6 – 9**).
- 77. Given the visual performance objectives set out in the Bulletin are achieved for all residences in this cluster (see **Table 6** and **Appendix L**), the Department does not consider that mitigation measures beyond visual screening are warranted. In this regard, the Department has recommended conditions requiring Ark to offer visual impact mitigation measures, such as vegetation screening, at these residences if requested by the landowners.



**Figure 6 | Photomontage for H11-1 (looking east)**



**Figure 7 | Photomontage for H12-3 (looking east)**



**Figure 8 | Photomontage for H11-2 (looking east)**



Figure 9 | Photomontage for H12-1 (looking east)

### Muscle Creek (western turbine array – south)

78. There are 18 non-associated residences in the Muscle Creek cluster that are within 4.4 km of the nearest turbine (one within 3 km (see **Table 6**) and 17 between 3 km and 4.4 km). The Department has also considered potential visual impacts on a dwelling entitlement (Lot 40 DP1094039) located within 3 km of the project (see **Figure 5**).
79. During its assessment, the Department raised concerns about the visual impacts of five turbines (T64, T66, T67, T68, T69) on three Muscle Creek residences (F18-1, F19-1 and G17-1) and requested Ark to consider further mitigation, including removal of turbines or neighbour agreements. Ark subsequently secured neighbour agreements with the owners of two of these residences (F18-1 and F19-1).
80. As an agreement was not secured with residence G17-1, the Department considers that four turbines (T64, T66, T67 and T68) would significantly impacts views from this residence and the Bulletin’s performance measure for landscape and scenic integrity would not be achieved due to the dominance of these turbines.
81. **Figure 10** illustrates the direct and open views from G17-1 towards the four highly visible turbines located on an elevated ridgeline within 3 km of the residence. The Department notes that views of T69 from the residence would be screened by existing mature vegetation.
82. The Department considers that the landscape and scenic integrity performance measure could only be achieved through deletion of the two closest visible turbines (T64 and T68), and has recommended deletion of T64 and T68, and visual screening to minimise the residual impacts associated T66 and T67 (see **Figure 11**).
83. However, the Department considers that the impacts on this residence would not be significant if Ark were to secure a neighbour agreement associated with turbines T64 and T68, or acquire the property.
84. Given the visual performance objectives set out in the Bulletin are achieved for all remaining non-associated residences in this cluster (see **Table 6** and **Appendix L**), the Department does not consider that mitigation measures beyond visual screening are warranted. In this regard,



the Department has recommended conditions requiring Ark to offer visual impact mitigation measures, such as vegetation screening, at these residences if requested by the landowners.

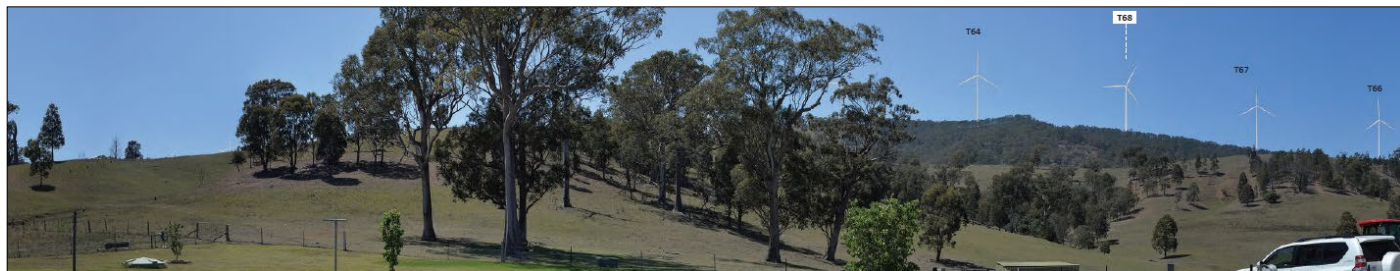


Figure 10 | Photomontages for G17-1 (looking east)

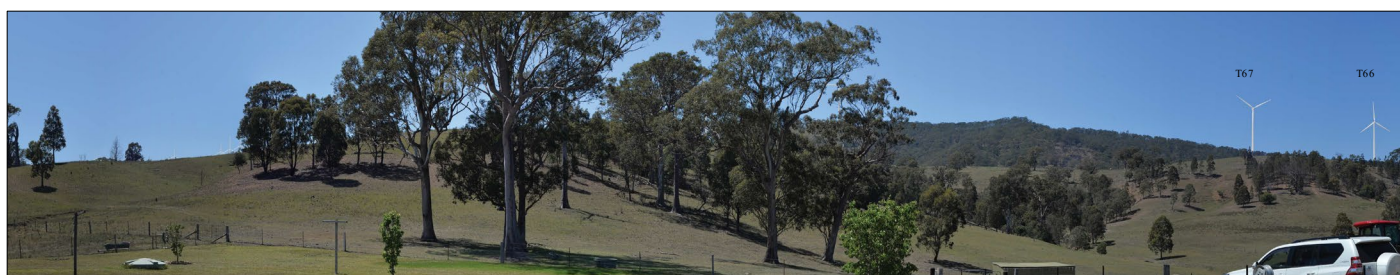


Figure 11 | Photomontage for G17-1 (looking east) – turbines T64 and T68 removed

#### Bowmans Creek, Scrumlo Road and Goorangoola cluster (eastern turbine array)

85. There are 14 non-associated residences in this cluster that are within 4.4 km of the nearest turbine (three within 3 km and 11 between 3 km and 4.4 km) (see **Figure 5**).
86. During its assessment, the Department raised concerns about significant visual magnitude impacts of two proposed turbines (T22, T23) on two residences located in Bowmans Creek (P22-1, P22-4), and requested Ark to consider further mitigation, including removal of turbines or neighbour agreements with these landowners. Ark subsequently secured neighbour agreements with the owners of both residences.
87. S17-2 is a heritage listed residence (VIZ2 / Level 1 sensitivity) located along Bowmans Creek Road. The closest proposed turbine (T8) is located 2.04 km southeast of the dwelling and is partially visible beyond existing vegetation. **Figure 12** shows that intervening topography and existing mature vegetation largely screens views from the residence of the remaining turbines (T6, T7, T20) located within 3 km of S17-2.
88. The Department notes that much of the intervening vegetation is present within the road reserve between the residence (S17-2) and the proposed turbines. Ark has committed to ensure that no mature vegetation within the road reserve would be cleared for road upgrades along this section of Bowmans Creek Road.
89. Both OHD and the Department consider that additional screening could further minimise visual impacts on this residence. Noting that T8 is located close to the 2 km VIZ1 threshold,



the Department has also recommended a condition requiring micro-siting to ensure T8 is not located any closer to S17-2. With the proposed amendments and Ark's commitments, the Department considers that the Bulletin's visual performance objectives at residence S17-2 would be achieved.

90. Given the visual performance objectives set out in the Bulletin are achieved for all remaining residences in this cluster (see **Table 6** and **Appendix L**), the Department does not consider that mitigation measures beyond visual screening are warranted. In this regard, the Department has recommended conditions requiring Ark to offer visual impact mitigation measures, such as vegetation screening, at these residences if requested by the landowners.



Figure 11 | Photomontage for S17-2 (looking southeast)

#### Davis Creek (northern turbine array)

91. There are seven non-associated residences in the Davis Creek cluster that are within 4.4 km of the nearest turbine (three within 3 km and four between 3 km and 4.4 km) (see **Figure 5**).
92. Views of turbines from Davis Creek residences would be screened by intervening topography and vegetation, including views from the closest residence (T6-9), which would be limited to a narrow string of turbines partially visible beyond existing ridgelines (see **Figure 12**). The Department considers that the visual performance objectives would be met for these three non-associated residences and considers that vegetation screening could further mitigate residual visual impacts.
93. Given the visual performance objectives set out in the Bulletin are achieved for all residences in this cluster (see **Table 6** and **Appendix L**), the Department does not consider that mitigation measures beyond visual screening are warranted. In this regard, the Department has recommended conditions requiring Ark to offer visual impact mitigation measures, such as vegetation screening, at these residences if requested by the landowners.



Figure 12 | Photomontages for T6-9 (looking south)

## Key Public Viewpoints

94. Ark identified and assessed the visual impacts of the project from 16 key public viewpoints surrounding the project in accordance with the visual performance objectives in the Bulletin, including:
- VIZ1 viewpoints (eight locations) – Mt Royal National Park (Pieries Point Lookout), Lake Liddell Recreation Park, Lake St Clair and Woodlands Ridge, as well local roads and locations in Rouchel and Muswellbrook;
  - VIZ2 viewpoints (five locations) – Lake Glenbawn State Park and locations in McCullys Gap, Rouchel and Greenlands; and
  - VIZ3 viewpoints (three locations) – local roads and locations in McCullys Gap, Hebden and Monut Royal South.
95. Most viewpoints are more than 8 km from the project, with the exception of two VIZ2 and two VIZ3 viewpoints located between 6.75 km and 7.86 km from the closest proposed turbine.
96. The LVIA considered that the wind turbines would not become a major element in the landscape other than within or immediately surrounding the project site where opportunities to view the project would be limited to associated residences and road users.
97. While wind turbines would be visible from most key public viewpoints, these views would benefit from distance, intervening topography, and existing mature vegetation. The Department recognises that the project benefits from several surrounding ridgelines and densely vegetated areas which generally obstruct views of the turbines from the broader landscape, and considers that the project would not dominate the existing visual catchment.
98. In particular, the Department notes that Mount Royal National Park (listed as part of Gondwana Rainforest of Australia World Heritage Area) is located more than 13 km northeast of the project, and views of turbines from facilities within the park would be screened by dense forest.
99. Three key landscape features were identified in consultation with the community, being Yellow Rock, Well Mountain and Native Dog Mountain.

100. Ark's key feature disruption assessment concluded that whilst the project may impact views from some areas, key features identified through the landscape baseline study are likely to remain undisrupted by the proposal.
101. The Department considers that, given the project's location in a sparsely populated area and away from major transport routes and public viewpoints, the project would not significantly disrupt the central line of sight and/or the central focal viewing fields surrounding it, when seen from viewpoints looking toward key features of the landscape
102. In summary, the Department considers that the visual performance objectives would be achieved for all key public viewpoint locations.

### Aviation hazard lighting

103. Under the National Airports Safeguarding Framework, Guideline D – Managing the Risk to Aviation Safety of Wind Turbine Installations (Wind Farms) / Wind Monitoring Towers, National Airports Safeguarding Advisory Group, 2012 (NASAG Guidelines), CASA is required to be notified if a proposed wind turbine or wind monitoring tower is greater than 150 m in height or infringes on the Obstacle Limitation Surfaces of an aerodrome. CASA may determine, and subsequently advise an applicant and relevant planning authorities, whether it considers obstacle lighting is required.
104. If such lighting is required, the guidelines recommend that to minimise visual impacts “obstacle lights may be partially shielded, provided it does not compromise their operational effectiveness. Where obstacle lighting is provided, lights should operate at night, and at times of reduced visibility. All obstacle lights on a wind farm should be turned on simultaneously and off simultaneously.”
105. Ark initially concluded that no obstacle night lighting would be required. However, CASA advised that the project is considered a hazard to aviation safety and recommended that the wind farm is obstacle lit with steady medium intensity red lighting in accordance with the NASAG Guidelines.
106. Following CASA's advice, Ark prepared a draft night lighting plan proposing to light a total of 31 turbines with lower intensity steady red night-time aviation hazard lighting. CASA reviewed the proposed lighting plan and confirmed that low intensity lighting of no lower than 200 candela, which is well below the 2,000 candela required by international standards, was a suitable mitigation measure for the project and would be sufficient during hours of darkness.
107. The Department notes that the visual performance objectives would be achieved given that no turbines are located within 2 km of a non-associated residence and strobe lighting is not

proposed. Further, CASA supports low intensity lighting and Ark has committed to implement other lighting mitigation options, such as downward light shielding.

108. The Department has recommended conditions requiring Ark to consult with CASA regarding the installation of aviation hazard lighting and operate hazard lighting in accordance with CASA requirements and in a manner that minimises any adverse visual impacts.

### **Ancillary Infrastructure**

109. Regarding the project's ancillary infrastructure (330 kV transmission line and on-site substations), Ark has sited this infrastructure to minimise visibility from residences and key public viewpoints.
110. Potential views of the ancillary infrastructure would be limited to the 330 kV transmission line, including views by motorists travelling along Hebden Road and visitors to Lake Liddell Recreation Park.
111. Ark's LVIA determined that the 330 kV transmission line is similar to existing electrical infrastructure in the locality and would appear as an extension to the existing power lines in the landscape, and concluded that the transmission line would not have a significant visual impact on any non-associated residences or key public viewpoints.
112. During detailed design, Ark has committed to designing and siting all ancillary infrastructure to minimise visual impacts, including measures such as retention of existing vegetation and selecting building materials and finishes to reduce reflectivity and to be sympathetic to existing landscape.
113. The Department considers the project's ancillary infrastructure is unlikely to have a significant visual impact given the limited size of the infrastructure and location of the ancillary infrastructure away from non-associated receivers, the relatively low visual sensitivity of the existing land use and presence of intervening topography and vegetation, as well as Ark's proposed landscape treatments and selection of ancillary infrastructure components with low visual contrast.
114. Notwithstanding, the Department has recommended conditions requiring Ark to ensure the visual appearance of all ancillary infrastructure (including paint colours, specifications and screening) blends in as far as possible with the surrounding landscape.

### **Conclusion**

115. The Department is satisfied that the project is suitable for the site, would meet the visual performance objectives in the Bulletin and would not fundamentally change the broader landscape characteristics of the area or result in any significant visual impacts on the

surrounding non-associated residences, with the exception of one residence (G17-1). The Department considers that with the deletion of two turbines (T64 and T68), and additional vegetation screening at the property, the visual impacts on this residence would not be significant.

116. To minimise and manage the residual visual and lighting impacts as far as practicable, the Department has recommended conditions requiring Ark to:
- offer visual impact mitigation measures, such as landscaping and/or vegetation screening, to all non-associated residences within 4.4 km of any approved turbine;
  - during detailed design and micro-siting, ensure T8 is located no closer to S17-2;
  - implement all reasonable and feasible measures to minimise the impacts of the visual appearance of the development;
  - paint turbines off-white/grey and finish the blades with a treatment that minimises potential for any glare or reflection;
  - implement all reasonable and feasible measures to minimise the off-site lighting impacts of the development; and
  - ensure that shadow flicker associated with turbines does not exceed 30 hours per annum at any non-associated residence.

## 6.3 Traffic and Transport

117. The construction of the project would involve the delivery of plant, equipment and materials, including the movement of heavy vehicles, which has the potential to impact on the local and regional road network.
118. Traffic and transport impacts were raised in submissions from the public, with concerns expressed about the potential impacts of heavy vehicle traffic on local roads. Submissions from councils and TfNSW also raised concerns about the adequacy of the road network to accommodate project related heavy vehicles along Ark's proposed haulage route and road upgrades.
119. Ark assessed traffic and transport impacts in a Traffic Impact Assessment (TIA) accompanying the EIS and provided additional information to the Department during its assessment, including further details about the proposed road upgrades.

### 6.3.1 Transport Route and Site Access

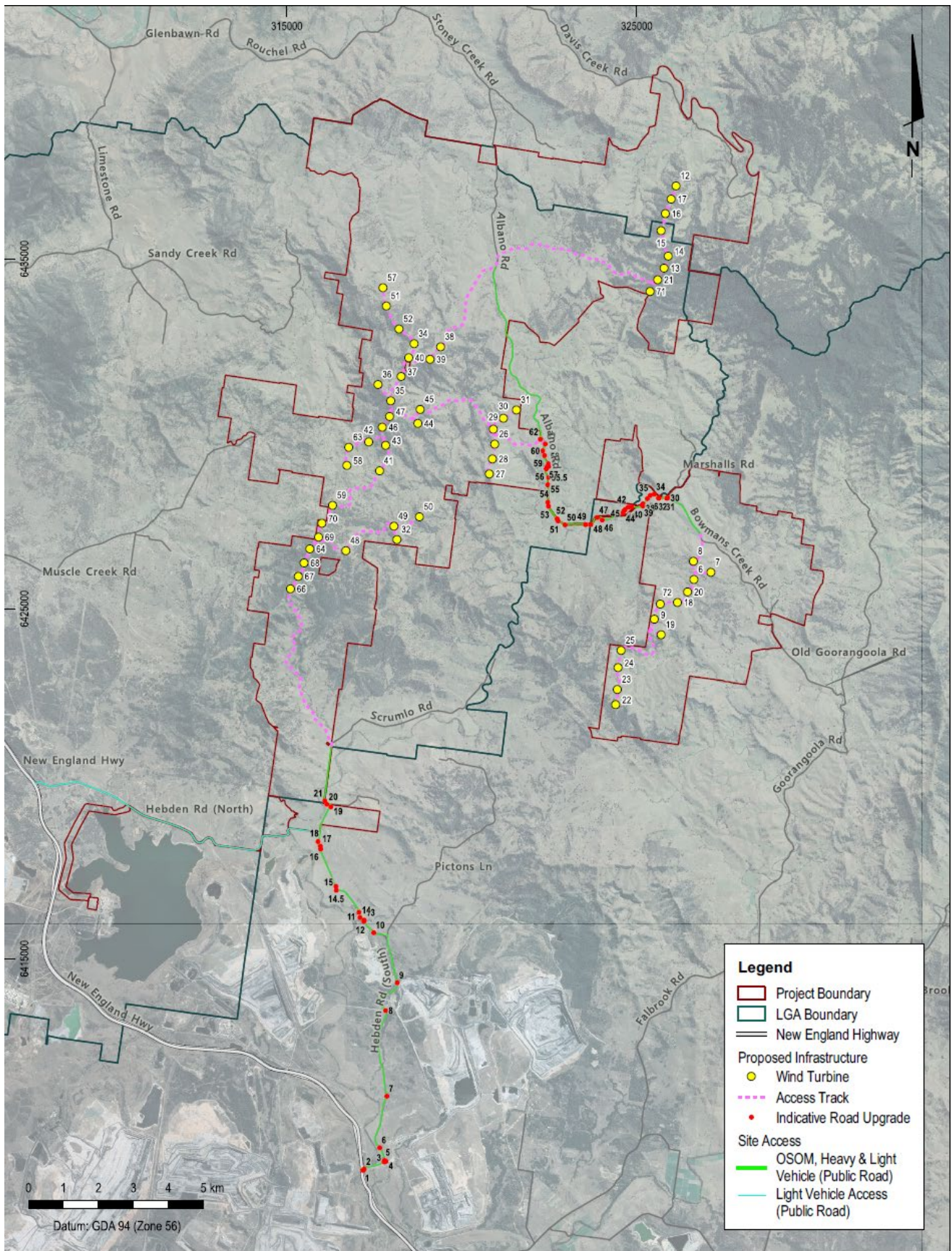
120. During construction, light vehicles and heavy vehicles would access the site via the New England Highway, Hebden Road (south), and a new access point on Scrumlo Road.



121. Ark has confirmed that in response to concerns raised by Council, heavy vehicles would not use Hebden Road (north), and that the use of Hebden Road (north) would be limited to light vehicles only.
122. It is anticipated that half of these vehicles would originate from Singleton and the remainder would originate from Muswellbrook and Scone.
123. Heavy vehicles requiring escort would deliver wind turbine components to site from the Port of Newcastle via Selwyn Street, George Street, Industrial Drive, Maitland Road, New England Highway, John Renshaw Drive, Hunter Expressway, New England Highway, Hebden Road (south) and the new site access point off Scrumlo Road.
124. All vehicles would access the north-eastern and eastern areas of the site via sections of Albano Road and Bowmans Creek Road (see **Figure 11**).
125. Local roads along the transport route between the New England Highway and the project site are under the care and maintenance of two councils, being Muswellbrook Shire Council for Albano Road, Hebden Road (north) and the northern section of Scrumlo Road, and Singleton Council for Bowmans Creek Road, Hebden Road (south) and the southern section of Scrumlo Road.

### 6.3.2 Traffic Volumes

126. Construction traffic would span the 18-month construction period. Light and heavy vehicle movements would peak at up to 75 light vehicles and 66 heavy vehicles per day.
127. Five hundred and sixty (560) heavy vehicles requiring escort would be required for the delivery of wind turbine components to the site during construction (10 per turbine).
128. During operations, approximately 15 employees would access the site per day for routine maintenance works and operational traffic is expected to be minimal.



**Figure 13 | Transport Access Route and Road Upgrade Locations**

### 6.3.3 Road Upgrades and Maintenance Arrangements

129. Ark has identified a series of road upgrades and network improvements to support the movement of project related heavy vehicles and heavy vehicles requiring escort along the transport route.
130. For local roads on the transport route, road upgrades or improvements are required at 75 locations along Hebden Road (south), Scrumlo Road, Albano Road and Bowmans Creek Road (see **Figure 11**), including:
- construction of a new site access point on Scrumlo Road;
  - road widening at four locations along Albano Road;
  - widening six cattle grids and associated fencing on Albano Road;
  - gradient reduction at three causeways along Albano Road;
  - application of a suitable temporary road base (e.g. gravel) at 38 locations to widen Hebden Road (south) and Albano Road;
  - temporary relocation of guardrails at four locations along Hebden Road (South);
  - tree branch trimming or embankment modifications at 26 locations along Hebden Road (south) and Albano Road; and
  - potential works to increase the load capacity of a bridge on Hebden Road (south).
131. Councils support the above proposed road upgrades, subject to the recommended conditions requiring these proposed works, as summarised below.
132. For roads located on the transport route between the Port of Newcastle and the New England Highway / Hebden Road (south) intersection, Ark has identified ten minor road work requirements to accommodate heavy vehicles requiring escort. These works include relocating fencing, traffic lights and median barriers at particular points along the route. TfNSW requested additional information to verify these proposed upgrades are suitable, however the Department notes that consistent with other wind farm developments, this level of detail can be provided at the post-approval stage upon detailed design. Additionally, Ark is required to obtain relevant permits under the Heavy Vehicle National Law (NSW) prior to these vehicles using the road network.
133. During the assessment process, Ark provided further information to TfNSW's satisfaction confirming that the New England Highway / Hebden Road (south) intersection would not require road upgrades. In lieu of any works at this intersection, Ark has committed to installing traffic warning signs and limiting use of the intersection to off-peak times.

### 6.3.4 Monitoring and Management

134. The Department has recommended conditions requiring Ark to:



- undertake all necessary road upgrades to the satisfaction of the relevant roads authority prior to the use of roads for construction;
- undertake dilapidation surveys of the relevant local roads and repair any damage resulting from project traffic;
- ensure heavy vehicles and heavy vehicles requiring escort are scheduled to avoid morning and evening southbound peak hour traffic at New England Highway and Hebden Road (south) intersection; and
- prepare a Traffic Management Plan in consultation with the relevant roads authority.

### 6.3.5 Summary

135. With road upgrades, regular road maintenance, and the implementation of a Traffic Management Plan, the Department considers that the project would not result in unacceptable impacts on the capacity, efficiency or safety of the road network subject to the implementation of the recommended conditions.

## 6.4 Noise

136. The project is located in a rural environment where background noise levels of less than 30 dB(A) during calm weather conditions are typical in the absence of other industrial, rail and road noise.

137. There is potential for noise impacts at nearby receivers during construction and operation of the turbines and ancillary infrastructure.

138. Ark assessed noise impacts in a Noise Impact Assessment accompanying the EIS and provided additional information to the Department during its assessment.

139. Concerns about the potential construction and operational noise impacts of the project were raised in most public submissions, with specific comments regarding low frequency noise and infrasound from wind turbines, traffic noise, and noise and vibration from blasting.

### 6.4.1 Construction Noise

#### 6.4.1.1 Wind Turbines and Batching Plants

140. The 18-month construction period comprises five construction stages, including (1) site set-up and civil works, (2) hard stand construction, (3) excavation and foundation construction, (4) electrical installation and (5) turbine delivery and erection. The predicted noise levels during construction of the wind turbines and ancillary infrastructure would depend on the construction stages.



141. Noise levels are predicted to comply with the recommended 'noise affected' criterion of 45 dB(A) as specified under the EPA's *Interim Construction Noise Guideline (2009)* (ICNG) at all non-associated receivers during standard construction hours during construction of the turbines.
142. Ark proposes to undertake concrete batching and pouring activities at wind turbine locations early in the morning. Minor noise levels above the noise management criterion of 35dB(A) for works occurring outside standard hours are predicted to occur at G17-1 during concrete batching (37 dB(A)).
143. The Department notes that the noise assessment is conservative as it assumes all plant and equipment would be used concurrently under weather conditions most conducive to noise propagation.
144. The Department considers that construction noise can comply with the criteria recommended under the ICNG during standard construction hours at all non-associated receivers. Consequently, the Department has recommended conditions restricting works to standard construction hours (i.e. 7 am to 6 pm Monday to Friday, and 8 am to 1 pm Saturday), with no works permitted on Sundays or NSW public holidays.
145. However, the Department acknowledges that there may be some instances where construction activities, including concrete pouring and batching, may be required to occur outside of standard hours. Where these activities are inaudible at non-associated receivers, or if agreed with the Planning Secretary, the Department has recommended conditions allowing these activities to be undertaken outside of standard hours.
146. To manage construction noise in line with industry best practice, Ark has committed to a range of noise management measures, including:
- increasing separation distances between construction works and residences where practicable;
  - erecting acoustic screens or mounding at fixed crushing, screening and batching sites located within 2.4 km of residences; and
  - selection of less noisy equipment and construction processes, such as hydraulic splitters instead of impact rock breaking, where reasonable and feasible.
147. The Department has recommended conditions requiring Ark to minimise noise during construction by implementing noise mitigation measures set out in the ICNG, including scheduling activities to minimise noise, using quieter equipment, consulting with affected residences prior to undertaking noisy construction works and establishing a complaint handling procedure.

#### 6.4.1.2 Road Works, Access Tracks and Compounds

148. Construction associated with road works would occur near six non-associated residences, being S17-2, Q17-1, Q17-2, Q17-3 (Bowmans Creek Road), I24-2 and K23-1 (Hebden Road).
149. During standard construction hours, noise levels up to the 'highly noise affected' criterion of 75 dB(A) as specified under the ICNG are predicted to occur at one residence (S17-2). Noise levels at the remaining five residences are predicted to exceed the recommended 'noise affected' criterion of 45 dB(A) under the ICNG, with noise levels predicted ranging between 49 dB(A) and 68 dB(A).
150. As the construction works associated with the proposed road upgrades would be short-term and intermittent, and the works associated with access tracks and construction compounds would occur at least 1 km from the closest residence (S17-2), the Department accepts that the proposed construction activities are unlikely to result in significant adverse impacts during daytime hours at most residential receivers.

#### 6.4.2 Construction Vibration

151. The distances required to achieve the construction vibration criteria provided in *Assessing Vibration: A Technical Guideline* (DECC, 2006) are in the order of 2 m to 100 m from the project, with vibration from construction activities unlikely to be detectable to humans at a distance of 100m.
152. With the exception of road works, the proposed construction activities would be located more than 100 m from all receivers and would comply with the criteria provided in *Assessing Vibration: A Technical Guideline* (DECC, 2006).
153. Two non-associated receivers (S17-2 and I24-2) are located between 45 m and 100 m of the proposed road works. Ark proposes to monitor construction activities in proximity to these receivers, and if required, implement measures to ensure compliance with the criteria provided in *Assessing Vibration: A Technical Guideline* (DECC, 2006).
154. To strengthen this commitment, the Department has recommended conditions requiring Ark to implement all reasonable and feasible steps to minimise construction vibration generated by the project.

#### 6.4.3 Construction Blasting

155. Depending on geotechnical conditions, blasting may be required to excavate bedrock for turbine foundations. Ark has committed to ensure that any blasting activities are undertaken in accordance with the Technical Basis for Guidelines to Minimise Annoyance due to *Blasting*

*Overpressure and Ground Vibration* (ANZECC, 1990), and has confirmed that blasting would not occur within 1 km of any receiver.

156. The Department accepts that controlled blasting may be required at some locations and that it has the potential to reduce construction duration and overall noise impacts where conducted in a limited manner.
157. The Department has recommended conditions on blasting, including strict criteria for airblast overpressure and allowable exceedances for any blasting carried out for the project, and requiring Ark to comply with blasting limits at all receivers.

#### 6.4.4 Construction Traffic

158. Construction traffic noise impacts were assessed in accordance with the NSW Road Noise Policy (DECCW, 2011) (RNP). Road noise is predicted to comply with the RNP at all receivers.
159. In accordance with the RNP, Ark has committed to implement all reasonable and feasible noise mitigation measures to minimise road traffic noise, including scheduling of vehicles and consultation with any residents who raise concerns about traffic noise to identify other possible noise mitigation measures.
160. The Department has recommended a condition requiring Ark to take all reasonable and feasible steps to minimise construction traffic noise associated with the project in accordance with the RNP.

#### 6.4.5 Operational Noise

161. Operational noise levels were assessed in accordance with the requirements of the Department's *Wind Energy: Noise Assessment Bulletin* (2016) (the Noise Bulletin).
162. Background noise levels were monitored at four locations in the vicinity of the wind farm site between 28 October 2019 and 16 January 2020 in compliance with the Bulletin. The low background noise levels recorded are characteristic of the rural environment.
163. Consistent with the Noise Bulletin, Ark's noise assessment provided environmental noise criteria for operation of the turbines, based on different wind speeds (wind speeds at each integer from 3 ms<sup>-1</sup> to 12 ms<sup>-1</sup>) modelled at the hub height of the turbines.
164. In summary, the criterion for each integer wind speed is the greater of 35 dB(A), or the background noise level (LA90, 10 minute) plus 5 dB(A).
165. Noise modelling predicts that the project would comply with the relevant environmental noise criteria at all receiver locations during all wind speeds.

166. The operation of all other associated infrastructure, including the substation, would comply with the 35 dB(A) criteria established by the Noise Bulletin.
167. The Department acknowledges that a number of submissions raised concerns about potential low frequency noise.
168. The Department accepts the conclusion of the Sonus report, that the highest predicted low frequency noise level of 50 dB(C) is significantly under the 60 dB(C) level, above which the Bulletin requires further assessment. As such, the Department is satisfied that any low frequency noise impacts would be minor and acceptable.
169. Both the Department and the EPA consider that the operational noise impacts of the project can comply with the requirements of the Noise Bulletin and the Department has recommended conditions to this effect. The EPA has also indicated that it would be able to issue an Environment Protection Licence (EPL) for the project subject to the noise limits as identified Appendix I of the EIS, which is included in **Appendix A** of this report.

## 6.5 Biodiversity

170. The project has the potential to impact biodiversity values during construction of the wind farm through native vegetation clearing and direct and indirect impacts to listed threatened flora and fauna species and communities, and through bird and bat strike during operation of the wind turbines.
171. In NSW (and Australia), the best wind resources are usually associated with hills and ridges at higher elevations, which are often the areas with the least historical vegetation clearing. For that reason, most wind farm projects cannot be developed without a moderate level of vegetation clearing.
172. This project is located on hillslopes and ridges that are characterised by patches of woodlands, dry rainforests, open forests and derived native grassland (DNG). Scattered occurrences of planted vegetation occur within the road reserves and Crown land. The remaining areas have been historically cleared for agricultural purposes, including pasture improvement and grazing, and are dominated by exotic species.
173. The majority of public submissions objecting to the project expressed concerns about the potential impacts on biodiversity, including the clearing of native vegetation, the potential impacts on threatened species and the adequacy of the ecological assessment.
174. Ark commissioned Cumberland Ecology to prepare a Biodiversity Development Assessment Report (BDAR) as part of the EIS. Ark revised its BDAR to address advice from BCS and comments raised in public submissions, and to address the changes to the project identified



in the amendment report. Ark provided additional information during the Department's assessment, including a Biodiversity Addendum Report.

### 6.5.1 Avoidance and Mitigation

175. Ark reduced the number of proposed turbines from 72 to 60 throughout its design process prior to submitting the EIS. The Department acknowledges that deletion of 12 turbines has avoided impacts on threatened ecological communities (TECs), threatened species and woodland areas of high conservation value.
176. The ecological assessments are based on a number of measures to avoid and/or mitigate impacts, including:
- locating turbines in cleared areas, and where this is not possible, locating turbines in areas that avoid TECs, threatened species and woodland areas of high conservation value, as far as practicable;
  - locating the development corridor to avoid impacts on 70% of Box Gum Woodland and 60% of Box Gum Woodland DNG within the 1,190 ha survey area to reduce the risk of serious and irreversible impacts (SAIL);
  - spacing turbines at least 364 m apart (average of 539 m) and locating turbines outside of migratory pathways to reduce the collision risk of birds and bats;
  - co-locating site access tracks and transmission lines within cleared areas or co-locating with existing roads, tracks and creek crossings, as far as practicable;
  - limiting the removal of canopy trees and retaining understory vegetation within overhead transmission line corridors;
  - locating construction compounds, substations and crushing and screening facilities within cleared areas, as far as practicable;
  - locating project infrastructure to avoid impacts on hollow-bearing trees, as far as practicable; and
  - undertaking pre-clearance surveys and micro-siting of turbines and ancillary infrastructure during the detailed design stage to further avoid impacts to any previously unrecorded threatened species and ecologically sensitive areas, as far as practicable.
177. Additionally, Ark's project amendments include deleting four turbines and reducing the extent of access tracks and transmission lines, which has resulted in a 92 ha reduction to impacts on native vegetation.
178. Regarding the Department's recommendation to delete two turbines (T64, T68) due to significant visual impacts, the Department notes that there would be no associated decrease

in the disturbance area as access tracks and transmission lines would continue to traverse this location to connect turbines T67 and T69.

### 6.5.2 Native Vegetation

179. The development footprint (including disturbance associated with road upgrades) is approximately 411 ha, of which 280 ha is native vegetation, comprising 98.4 ha of dry rainforest, open forest and woodland in moderate condition, 178.6 ha of DNG and 3.3 ha of poor condition or planted vegetation.
180. Approximately 232 ha of vegetation comprising four threatened ecological communities listed under the BC Act would be impacted, comprising:
- 215.5ha of White Box-Yellow Box-Blakely's Red Gum Woodland and Derived Native Grassland (Box-Gum Woodland) – Critically Endangered, of which 37 ha is woodland and 178.6 ha is DNG;
  - 11.7 ha of Central Hunter Ironbark-Spotted Gum-Grey Box Forest in the NSW North Coast and Sydney Basin Bioregions – Endangered;
  - 3.5 ha of Central Hunter Grey Box – Ironbark Woodland in the NSW North Coast and Sydney Basin Bioregions – Endangered; and
  - 1.4 ha of Lower Hunter Valley Dry Rainforest – Vulnerable.
181. Approximately 237 ha of vegetation comprising three critically endangered ecological communities (CEEC) listed under the EPBC Act would be impacted, comprising:
- 215.5ha of Box-Gum Woodland, of which 37 ha is woodland and 178.6 ha is DNG; and
  - 22.9 ha Central Hunter Valley eucalypt forest and woodland; and
  - 3.4 ha of Hunter Valley Weeping Myall (*Acacia pendula*) Woodland which occurs within the same area of vegetation associated with Central Hunter Valley eucalypt forest and woodland and has been assumed present on the basis that *Acacia pendula* is present.
182. Table 1 of **Appendix K** provides a summary of the estimated impacts of the project on each vegetation type and the associated ecosystem credit offset requirement.
183. As discussed below, Ark has committed to avoid impacts on three Serious and Irreversible Impact (SII) entities listed under the BioNet Threatened Biodiversity Data Collection, being *Acacia pendula*, Scrub Turpentine and Native Guava. If these flora species are confirmed present by targeted surveys during detailed design, the total clearing of native vegetation would reduce by 6 ha (from 280 ha to 274 ha), 3.3 ha of which is listed under the BC Act and 3.41 ha is listed under the EPBC Act.
184. The BioNet Threatened Biodiversity Data Collection also lists Box Gum Woodland as a potential entity at risk of SII. It is not possible for Ark to completely avoid impacts on Box

Gum Woodland while maintaining a viable wind farm project. Under clause 6.7 of the *Biodiversity Conservation Regulation 2017* (BC Regulation), an impact is to be regarded as serious and irreversible if it is “likely to contribute significantly to the risk of a threatened species or ecological community becoming extinct” on the basis of four principles.

185. BCS stated that the two relevant principles for Box Gum Woodland are (1) and (3) which relate to an ecological community that is currently observed, estimated, inferred or reasonably suspected (1) to be in a rapid rate of decline and (3) to have a very limited geographic distribution. However, the relevant principles for Box Gum Woodland are (1) and (2) which relate to an ecological community (1) in a rapid rate of decline and (2) with a very small population size.
186. Consistent with the transitional arrangements for the *Biodiversity Assessment Method* (BAM), Ark’s accredited ecologist assessed the potential SAll risk in accordance with the nine assessment provisions set out in section 10.2 of BAM 2017, including the *Guidance to assist a decision-maker to determine a serious and irreversible impact*. Ark’s assessment concluded that there would not be a serious and irreversible impact on Box Gum Woodland.
187. While BCS acknowledged that the transitional arrangements apply, it provided advice with consideration to BAM 2020, rather than BAM 2017. It advised that while there is no minimum clearing threshold identified for Box Gum Woodland, there would be a serious and irreversible impact on Box Gum Woodland as “any incremental loss” would contribute to two of the four principles set out in clause 6.7 of the BC Regulation.
188. In accordance with section 7.16(3) of the BC Act, if the Minister for Planning (or their delegate) is of the opinion that there is likely to be a serious and irreversible impact on biodiversity values, they are required to (1) take those impacts into consideration and (2) determine whether there are any additional and appropriate measures that will minimise those impacts if the activity is to be carried out or approved.
189. In terms of forming an opinion about whether there is likely to be a serious and irreversible impact on Box Gum Woodland, the Department notes Ark’s accredited assessor and BCS have come to contrasting conclusions. In the context of these varying positions, it is important to focus on whether the project is “likely to contribute significantly to the risk of a threatened species or ecological community becoming extinct” as required under the BC Regulation.
190. In that regard, the Department has considered the two relevant principles set out in clause 6.7 of the BC Regulation, the nine assessment provisions of BAM 2017, and the *Guidance to assist a decision-maker to determine a serious and irreversible impact*. There are various relevant factors (required under BAM 2017) that indicate the project would not contribute significantly to the risk of Box Gum Woodland becoming extinct, including:

- within the four relevant IBRA subregions, impacts to 215.5 ha of Box Gum Woodland equates to very small portion (0.06%) of mapped Box Gum Woodland (331,064 ha);
  - within 1km either side of the development corridor (10,000 ha area), there is approximately 6,030 ha of mapped Box Gum Woodland; and
  - within the 1,190 ha survey area, Ark has located the development corridor to avoid impacts on 70% of Box Gum Woodland and 60% of Box Gum Woodland DNG.
191. Further, given the abundance of Box Gum Woodland within the locality, any requirement to avoid this SAll entity would result in significant impacts to the proposed alignment such that avoidance is not a reasonable alternative.
192. The Department notes that none of the relevant statutory documents relating to SAll state that “any incremental loss” of a species or community would necessarily contribute significantly to the risk of extinction.
193. The current list of SAll entities contains a wide range of ecological communities (53 in total) with widely variable population sizes, geographic distributions and rates of decline, and the risk of extinction for a specific SAll entity must be assessed on a case by case basis. While Box Gum Woodland has a mapped area of 331,064 ha that is distributed across the Hunter, Upper Hunter, Tomalla and Ellerston IBRA subregions, the Department has been required to assess impacts to other SAll entities with much smaller populations and geographic distributions. For example, the Warkworth Sands Woodland has a total mapped area of 333 ha located solely in the Hunter region and the *melaleuca armillaris* has approximately 164 ha remaining solely within the Illwarra region.
194. Nevertheless, even if the BCS position that there is likely to be SAll impacts is adopted, the Minister for Planning (or their delegate) can consider “additional and appropriate measures” to minimise those impacts (under section 7.16 of the BC Act).
195. Consequently, Ark has offered to implement additional and appropriate measures beyond biodiversity offsets to further minimise potential impacts on Box Gum Woodland. Accordingly, as a precautionary measure, the Department has recommended a condition requiring Ark to enhance and protect, in perpetuity, 37 ha of Box Gum Woodland DNG (PCT 618 - DNG) to a condition state commensurate with Box Gum Woodland (PCT 1608 - Woodland).
196. To this end, Ark has confirmed there is sufficient land within the site comprising Box Gum Woodland DNG (PCT 618) and has committed to secure this land for the purpose of rehabilitating PCT618 to a condition commensurate with Box Gum Woodland (PCT 1608).
197. The Department notes that BCS did not initially raise any concerns about potential SAll for the Box Gum Woodland clearing. As this issue was not raised until October 2023, Ark was not given a sufficient opportunity to undertake additional surveys or formally secure more land



for "additional and appropriate measures" prior to determination. Consequently, the Department has imposed conditions requiring that further details on securing this land are finalised (including the specific land and relevant timeframes) prior to any impacts occurring.

198. In addition to offsetting biodiversity impacts of the project in accordance with the requirements of NSW Biodiversity Offset Scheme, Ark has committed to avoid and minimise clearing of Box-Gum Woodland and all other TECs where feasible via micro-siting during the detailed design stage.

### 6.5.3 Flora Impacts

199. The project has the potential to impact flora species listed under the BC Act and EPBC Act through direct loss from vegetation clearing, and indirect impacts.
200. Twenty candidate threatened flora species listed under the BC Act were identified as potentially occurring within the site and were the subject of targeted surveys. Thirteen of these species are also listed under the EPBC Act identified in **Appendix J**.
201. None of the candidate flora species were recorded on site during targeted surveys and Ark concluded that these species are unlikely to occur. However, BCS advised that the targeted surveys for these species did not meet the requirements of the *Biodiversity Assessment Method 2017* (BAM). In response, Ark prepared an Amended BDAR and Addendum Biodiversity Report in consultation with BCS and has assumed presence of all 20 candidate threatened flora species.
202. Table 2 of **Appendix K** details the impacts and species credit offset requirements for the 17 species assumed present, including the 13 EPBC Act species.
203. As three of these species are SAll entities, being Acadia Pendula, Scrub Turpentine and Native Guava, Ark has committed to avoid impacts on these species if they are confirmed present by targeted surveys during detailed design. The Department has included strict conditions of consent to ensure that there is no clearing of these three entities which is reflected in Table 2 of **Appendix K**.
204. With the avoidance of the three SAll entities (if confirmed present), impacts on two additional threatened flora species would be avoided and impacts on nine species would be reduced.
205. Ark has also committed undertake targeted surveys for the remaining 14 flora species during detailed design, and if confirmed present, the Department has recommended a condition requiring Ark to avoid and minimise impacts where feasible via micro-siting during the detailed design stage.

#### 6.5.4 Fauna Impacts

206. The project has the potential to impact fauna species listed under the BC Act and EPBC Act through direct habitat loss from vegetation clearing, and indirect impacts.
207. Habitat for 47 threatened fauna species identified or predicted to occur as ecosystem credit species would be cleared by the project. Potential impacts on these species would be offset via the ecosystem credit offsets requirement, including eight EPBC Act species identified in **Appendix J**.
208. Ten candidate threatened fauna species were considered to have potential habitat within the site and were the subject of targeted surveys. Of these, one species (Large Eared Pied Bat) was identified during site surveys and one species was assumed present (Brush-tailed Phascogale) due to the presence of suitable habitat and known occurrence of the species in adjacent land.
209. Table 3 of **Appendix K** details the impacts and species credit offset requirements for these species. The Large Eared Pied Bat is also a potential SAll entity and BCS has confirmed that the project is not considered to have a serious and irreversible impact on this species.
210. In addition to offsetting the assumed impacts on the Brush-tailed Phascogale, Ark has committed to undertaking additional targeted surveys. If confirmed present, the Department has recommended a condition requiring Ark to avoid and minimise impacts where feasible via micro-siting during the detailed design stage.
211. While foraging habitat for the Koala, Regent Honeyeater, Swift Parrot, Grey-headed Flying Fox and Osprey (listed under the BC Act and EPBC Act), was identified within the development footprint, these species were not identified during targeted surveys. Additionally, no important mapped habitat for the Critically Endangered Regent Honeyeater and Swift Parrot occurs within the site or wider survey area. The Department and BCS consider that the development corridor is unlikely to support breeding habitat for these species and the potential impact on foraging habitat would be offset via the ecosystem credit offset requirement detailed in Table 1 of **Appendix K**.

#### 6.5.5 Bird and Bat Strike

212. The revised BDAR includes a strike risk assessment for the bird and bat species most at risk of blade strike and barotrauma. The assessment considered conservation status, flight character and distribution across the site, and provided additional information regarding the presence of potential flyways in response to concerns raised by BCS.

213. The site is not located near any wetlands or other critical habitat. No migratory flight paths were recorded or mapped within the survey area and no flocking behaviour was recorded/observed during site surveys.
214. Based on the proposed turbine heights (200 m to 220 m), the rotor swept area (RSA) would be 40 m to 220 m above ground level. Flight height and strike risk assessments determined that most of the bird and bat species occurring within the site occur below the RSA height.
215. Of the 23 birds that regularly occur at the RSA, and the 21 birds that occasionally enter the lower extent of the RSA height, a moderate risk of blade strike is anticipated for the Wedge-tailed Eagle and a low risk is anticipated for three threatened species, being the Regent Honeyeater, Swift Parrot (both critically endangered under the BC Act and EPBC Act) and Spotted Harrier (vulnerable under the BC Act). The risk to other bird species was considered negligible.
216. Of the six bat species considered, a low risk of blade strike and barotrauma is anticipated for the three species, being the Large-eared Pied Bat (vulnerable under the BC Act and EPBC Act), Large Bent-winged Bat (vulnerable under the BC Act) and White-striped Freetail Bat. The risk to other species was considered negligible.
217. BCS raised concerns about the adequacy of the bird and bat utilisation surveys and recommended that additional surveys be completed over a 12-month period to capture all seasonal ecological events to assess the potential impacts on species prone to blade strike.
218. To address this, the Department has recommended conditions requiring Ark to carry out detailed monitoring of the bird and bat strike impacts of the project, and carry out adaptive management if the impacts are higher than predicted or result in adverse impacts on any threatened bird or bat species in the locality, including:
- the collection of relevant baseline data on threatened and 'at risk' bird and bat species and populations in the locality that could be affected by the project;
  - a detailed description of the measures that would be implemented on site for minimising bird and bat strike during operation of the project, including a wind turbine curtailment strategy whereby certain turbines are switched off or slowed down;
  - identifying trigger levels for further investigation of the potential impacts of the project on particular bird or bat species or populations;
  - an adaptive management program that would be implemented if the development is having an adverse impact on a particular threatened or 'at risk' bird or bat species or population;
  - a detailed program to monitor and report on the effectiveness of these measures; and

- provisions for a copy of all raw data collected as part of the monitoring program to be submitted to BCS and the Department.

### 6.5.6 Significance of Impacts on Threatened Species and Communities

219. Ark identified and addressed all threatened species and communities included in the Commonwealth Referral Decision (EPBC 2020/8631) (Referral Decision).
220. Assessments of significance were undertaken for threatened species and communities that were recorded during field surveys or were considered to have a moderate or higher potential to occur on the site, including two TECs, four threatened fauna species and two migratory species. As discussed in **Appendix J**, assessments of significance were not undertaken for the 13 threatened flora species assumed present and potentially impacted by the project.
221. While Ark concluded that there is unlikely to be a significant impact on any EPBC listed species, BCS considers there is likely to be a significant impact on three TECs, one threatened fauna species and the 13 threatened flora species assumed present. As discussed in **Appendix J**, Ark has committed to avoiding impacts on one TEC and two threatened flora species, if confirmed present.
222. The Department considered Commonwealth matters in consultation with BCS and DCCEE, including consideration of Ark's assessments of significance and the relevant approved conservation advice, recovery plans and threat abatement plans (TAPs). A summary of this assessment is provided in **Appendix J**.

### 6.5.7 Biodiversity Offset

223. Under the BC Act, the impact on native vegetation and species would generate 5,450 ecosystem credits and 8,423 species credits.
224. **Table 7** summarises the estimated biodiversity credit liability requirements under the *NSW Biodiversity Offset Scheme* for the project. Tables 1 to 3 of **Appendix K** lists the credit liability for each vegetation community and species.



**Table 8 | Native Vegetation and Threatened Species Biodiversity Offset Liability**

Impact		Total Area (ha)	Credit Liability
Native Vegetation		280.31	5,450
Total Ecosystem Credits			5,450
Threatened Flora	Recorded	0	0
	Assumed Present	185.80	7,679
Threatened Fauna	Recorded	0.18	12
	Assumed Present	20.82	732
Total Species Credits			8,423
Total Credit Liability			13,873

225. Both the Department and BCS are satisfied that the offset credit requirements have been correctly calculated. Ark would offset the residual biodiversity impacts of the project in accordance with the NSW Biodiversity Offset Scheme, which includes the following options.
- acquiring or retiring ‘biodiversity credits’ within the meaning of the BC Act;
  - making payments into an offset fund that has been developed by the NSW Government; or
  - funding a biodiversity conservation action that benefits the entity impacted and is listed in the ancillary rules of the offset scheme.
226. The Department notes that Ark proposes to meet its offset liability through either the purchase and retirement of credits or payment to the Biodiversity Conservation Fund. In accordance with the bilateral agreement, variation rules will not be applied to MNES entities and all credits will be retired on a like-for-like basis. Ark has confirmed the availability of like-for-like credit options.
227. The Department has recommended conditions requiring Ark to retire the required biodiversity offset credits in accordance with the NSW Biodiversity Offsets Policy for Major Projects prior to the commencement of construction.
228. Subject to the recommended conditions, the Department and BCS are satisfied that the project could be undertaken in a manner that improves, or at least maintains, the biodiversity values of the locality over the medium to long term.

### 6.5.8 Recommended Conditions

229. The Department has recommended conditions requiring Ark to:

- minimise the clearing of native vegetation and key fauna habitat, including hollow bearing trees, within the development footprint and protect native vegetation and key fauna habitat outside the approved disturbance area in accordance with limits in the recommended conditions;
- prepare and implement the Biodiversity Management Plan which includes a description of the measures to:
  - avoid and minimise the direct impacts on threatened flora and fauna species confirmed present via targeted surveys, where practicable;
  - minimise the potential indirect impacts on threatened flora and fauna species, migratory species and ‘at risk’ species;
  - secure land comprising 37 ha of Box Gum Woodland DNG (PCT 618) and implement measures to enhance and protect, in perpetuity, this vegetation to condition state commensurate with Box Gum Woodland (PCT 1608);
  - rehabilitate and revegetate temporary disturbance areas and maximise the salvage of resources within the approved disturbance area for beneficial reuse (such as fauna habitat enhancement) during the rehabilitation and revegetation of the site;
  - control weeds and feral pests;
  - provide a program to monitor and report on the effectiveness of these measures.
- prepare and implement a Bird and Bat Adaptive Management Plan in consultation with BCS; retire the applicable biodiversity offset credits in accordance with the NSW Offsets Policy.

### 6.5.9 Summary

230. Overall, the Department considers that the biodiversity impacts of the project would not be significant, subject to recommended conditions, and by offsetting the residual biodiversity impacts of the project.

## 6.6 Other issues

231. The Department’s consideration of other issues is summarised in **Table 8**.

**Table 9 | Assessment of other issues**

Issue	Recommended conditions
<b>Aboriginal Cultural Heritage</b>	
<ul style="list-style-type: none"> <li>• Ark prepared an Aboriginal Cultural Heritage Assessment Report (ACHAR) accompanying the EIS and an updated ACHAR during the Department’s assessment of the project addressing concerns raised by Heritage NSW. The updated ACHAR included additional site surveys of land within the amended development corridor undertaken with Registered Aboriginal Parties (RAPs).</li> <li>• Eighteen sites were identified in the ACHARs (15 newly recorded and 3 previously recorded AHIMS site), comprising 7 isolated finds, 6 artefact scatters, 4 potential archaeological deposit (PADs) and a potential ceremonial ring. Most sites were of low overall significance, except for 3 PADs (low to moderate significance) and the potential ceremonial ring (high cultural value).</li> <li>• Ten of the 18 sites would be located outside the proposed development corridor and would not be impacted (4 isolated finds, 5 artefact scatters and 1 PAD).</li> <li>• Of the remaining eight sites located within the development corridor:               <ul style="list-style-type: none"> <li>– two isolated finds (low significance) located along Sandy Creek Road would be impacted by the proposed road upgrades;</li> <li>– three PADs (low to moderate significance) would be partially impacted by construction of the transmission line to Lidell substation and road upgrades along Albano Road; and</li> <li>– three sites may be impacted (high chance of avoidance through design) by construction of the transmission line to Lidell substation, including an artefact scatter and PAD of low significance and the potential ceremonial ring.</li> </ul> </li> <li>• Ark has committed to avoid and minimise impacts on all partially impacted and potentially impacted sites and Heritage NSW has agreed that subsurface testing of PADs is only required if impacts are confirmed at the detailed design. Subsurface testing would then inform the appropriate mitigation and management in consultation with RAPs.</li> <li>• Regarding the potential ceremonial ring, Ark has committed to avoid locating electricity poles and access tracks within 50 m of the site and to ensure that machinery does not enter this 50 m exclusion zone.</li> </ul>	<ul style="list-style-type: none"> <li>• Ensure the development does not cause any direct or indirect impacts on any items located outside the approved development footprint.</li> <li>• Salvage and relocate Aboriginal items identified for impact to suitable alternative locations.</li> <li>• Implement all reasonable and feasible measures to avoid and minimise harm to Aboriginal heritage items located within the development corridor.</li> <li>• Undertake consultation with Aboriginal stakeholders prior to construction.</li> <li>• Prepare and implement a Heritage Management Plan, in consultation with Aboriginal stakeholders, including procedures for unexpected finds and detailed photographic archival records.</li> </ul>

Issue	Recommended conditions
<ul style="list-style-type: none"> <li>• Those sites that cannot be avoided would be salvaged and relocated to suitable alternative locations in consultation with Aboriginal stakeholders, as required.</li> <li>• Accordingly, the Department has recommended a condition requiring Ark to implement all reasonable and feasible measures to avoid and minimise harm to these sites, and provide a detailed justification where impacts cannot be avoided.</li> <li>• One submission raised concerns about potential impacts on Ravensworth Estate. The project would not directly impact any of the features of significance to this item (landscape or mature trees).</li> </ul>	
<b>Historic Heritage</b>	
<ul style="list-style-type: none"> <li>• The project has the potential to impact historic heritage values where project infrastructure is in proximity to three locally listed heritage sites, two newly identified sites and the cultural landscape of the locality.</li> <li>• No heritage items listed on Commonwealth, National or State registers are located within or near the site.</li> <li>• Three locally listed heritage items are located within 1 km of the site. There would be no physical impacts to these sites or their associated curtilages. The sites comprise: <ul style="list-style-type: none"> <li>– ‘Fairview’ and ‘Hillcrest’ homesteads listed under the Muswellbrook LEP, located adjacent to each other and 360 m and 775 m north of the proposed overhead transmission line to Liddell substation, respectively; and</li> <li>– a ‘Former Roman Catholic Church’ listed under the Singleton LEP, located about 40 m north of Albano Road upgrades and underground transmission line.</li> </ul> </li> <li>• Surveys identified two new heritage items within the site, being Rock Lily Gully grave site and Hilliers Creek farmhouse. These sites may be of historical significance, but do not meet the criteria for local or state heritage significance. Ark has committed to avoid impacts on these sites through the installation of exclusion zones.</li> <li>• Some community submissions raised concerns about impacts on listed items and cultural landscape. Ark has committed to undertake photographic archival recording of these items and the surrounding cultural landscape in consultation with the local community prior construction of the project.</li> <li>• The Heritage Council was consulted regarding the project but raised no concerns. Singleton and Muswellbrook Shire Councils raised no concerns regarding the locally listed items.</li> </ul>	<ul style="list-style-type: none"> <li>• Ensure the development does not cause any direct or indirect impacts on any items located outside the approved development footprint.</li> <li>• Prepare and implement a Heritage Management Plan, including procedures for unexpected finds and detailed photographic archival records.</li> </ul>



Issue	Recommended conditions
<ul style="list-style-type: none"> <li>Subject to the implementation of the recommended conditions, the Department considers the potential impacts on heritage values would be appropriately managed. Any unexpected finds of potential heritage significance on site could be appropriately managed by an unexpected finds protocol.</li> </ul>	
<b>Agriculture and Land Use</b>	
<ul style="list-style-type: none"> <li>The project site and surrounds are dominated by agricultural land uses, particularly beef cattle grazing.</li> <li>The site comprises Class 5 (moderate-low capability) and Class 7 (very low capability) land, which is generally not suited to agriculture due to the undulating topography, steep elevations and rugged landscape.</li> <li>Grazing activities are expected to continue concurrently throughout the project lifespan, with land being rehabilitated upon project decommissioning. The project will not compromise or significantly diminish the availability of land for primary production purposes within the project site or surrounding LGAs.</li> <li>The impact to agricultural activity over the life of the project is estimated to be less than 0.01% of the total agricultural productivity within the region. As such, the Department is satisfied that the site is suitable for the development, and agricultural and wind farm activities are compatible land uses that can co-exist in the locality.</li> </ul>	<ul style="list-style-type: none"> <li>No specific condition</li> </ul>
<b>Economic</b>	
<ul style="list-style-type: none"> <li>A number of submissions raised concerns about the potential adverse impacts on property values.</li> <li>In this regard, the Department notes: <ul style="list-style-type: none"> <li>the project is permissible with development consent under both State and local environmental planning instruments;</li> <li>a detailed assessment of the merits of the project has found that the project is unlikely to generate any significant economic, environmental or social impacts;</li> <li>the project would comply with applicable amenity criteria established by the NSW Government for wind farm developments and Ark has entered into agreements to compensate more highly impacted nearby landowners;</li> <li>the impacts of the project can be further minimised by imposing suitable conditions on the project, and requiring a range of standard mitigation measures to be implemented; and</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Enter into a VPA with councils, to support the provision of social infrastructure via a community benefit fund.</li> <li>Prepare and implement an Accommodation and Employment Strategy in consultation with Councils.</li> </ul>

- the Land and Environment Court has ruled on several occasions that the assessment of the impacts of projects on individual property values is not generally a relevant consideration under the EP&A Act, unless the project would have significant and widespread economic impacts on the locality, which is not the case in this instance.
- In particular, the Department notes that *King & Anor v Minister for Planning; Parkesbourne-Mummel Landscape Guardians Inc v Minister for Planning; Gullen Range Wind Farm Pty Limited v Minister for Planning* ([2010] NSWLEC 1102) considers property values for sites adjacent to a wind farm. The judgement determined that there was no loss of property value to which the Court could lawfully have regard, as the wind farm was permissible with consent.
- Four community submissions supporting the project noted positive socio-economic benefits to the local economy as a result of the project creating jobs and supporting local businesses.
- The project would generate direct and indirect benefits to the local community, including:
  - up to 156 jobs during the 18-month construction period and up to 15 ongoing full-time jobs during operation;
  - expenditure on accommodation and business in the local economy by workers who would reside in local LGAs;
  - the procurement of goods and services by Ark and associated constructors; and
  - upgrading and maintenance of roads used by project related traffic.
- Ark has committed to a local participation and procurement approach and the Department has recommended a condition requiring Ark to prepare an Accommodation and Employment Strategy to prioritise these matters.
- The Department considers that the recommended conditions address the material impacts of the project on public services and infrastructure demand in surrounding areas.
- Ark has also committed to enter into a Voluntary Planning Agreement (VPA) with councils, to support the provision of social infrastructure via a community benefit fund. The annual contribution payable is \$686 per MW installed (adjusted annually to increases in CPI), within the relevant LGA over the operational life of the project. Payments would commence when development begins generation and will cease when the development is decommissioned.
- Noting the above, the Department considers that the project is in the public interest as it would provide economic benefits for the local community.

Issue	Recommended conditions
<b>Electric and Magnetic Fields</b>	
<ul style="list-style-type: none"> <li>• Most operational infrastructure (including turbines, substations, transmission lines and interconnecting cables) are sources of electric and magnetic fields (EMF).</li> <li>• The EIS includes an assessment of the EMF levels for operational infrastructure against public exposure guidelines. The results show that the project would comply with the <i>International Commission on Non-Ionizing Radiation Protection</i> (ICNIRP) guidelines for electric, magnetic and electromagnetic fields which indicates that the levels of EMF would be significantly lower than the current internationally acceptable level for human health.</li> <li>• The Department notes that EMF reduces rapidly with distance from its source. The highest EMF emitter would be the substations, located more than 2.25 km away from all non-associated residences.</li> <li>• The Department is satisfied that with the proposed mitigation measures, including setting back electrical infrastructure from receivers, burying electrical infrastructure at sufficient depth to shield electrical fields and exclusion zones around substations, the project is not likely to have any significant EMF related impacts.</li> </ul>	<ul style="list-style-type: none"> <li>• No specific condition</li> </ul>
<b>Radiocommunications</b>	
<ul style="list-style-type: none"> <li>• The EIS includes Radiocommunications Services Impact Assessment. The results show that turbine T70 intersects the 400MHz NSW Rural Fire Service link and may disrupt this service. To avoid potential impacts on this service, Ark has committed to a clearance zone of 160m either side of the ray line.</li> <li>• If concerns are raised about potential interference during operation of the project, Ark has committed to investigate any adverse effects and to implement mitigation measures (e.g. signal booster equipment) if required, developed in consultation with the affected operator.</li> <li>• The Department considers that the project is not likely to have significant impacts on radiocommunications.</li> </ul>	<ul style="list-style-type: none"> <li>• Make good any disruption to radio communication services as soon as possible.</li> </ul>
<b>Aviation Safety</b>	
<ul style="list-style-type: none"> <li>• The project is located within 55 km of Cessnock Airport, Maitland Airport and Scone Airport and partly within Restricted Area R583B and Danger Area D600 associated with the RAAF Base Williamstown.</li> </ul>	<ul style="list-style-type: none"> <li>• Notify CASA, Airservices Australia, DoD, RFS and the RAAF of the final location and specifications of the</li> </ul>

Issue	Recommended conditions
<ul style="list-style-type: none"> <li>• The EIS includes an aviation impact assessment. The results concluded that the project would not pose unacceptable risks to aircraft flying in the vicinity of the site, provided aircraft are operated in compliance with applicable regulatory and operational control requirements.</li> <li>• Airservices Australia advised that project would not have an adverse impact on aviation communications or navigation and surveillance equipment, nor the safety, efficiency or regularity of operations at nearby airports.</li> <li>• Both CASA and DoD recommended obstacle lighting during periods of low visibility during the day. Ark has committed to medium intensity steady lighting when below 5000 lux.</li> <li>• Noting that no low-level flying operations would take place at night, the DoD did not require night lighting. However, CASA noted that civil aircraft and RFS fire fighting aircraft may be in the air at night when the restricted area is not active, and therefore recommended obstacle lighting during hours of darkness. The Department has recommended a condition requiring Ark to consult with CASA regarding night time obstacle lighting requirements and, if required, ensure obstacle lights are energised during hours of darkness in accordance with CASA's recommendations.</li> <li>• CASA also recommended that Ark consider marking overhead transmission lines for aviation safety. This recommendation has not been included in the recommended conditions as hazard marking would be provided in accordance with the relevant safety guidelines and in consultation with the network service provider or powerline owner.</li> <li>• The Department considers that any hazards from the turbines would be appropriately managed as long as the development is carried out in accordance with the <i>National Airports Safeguarding Framework Guideline D: Managing the Risk to Aviation Safety of Wind Turbine Installations (Wind Farms)/Wind Monitoring Towers</i>.</li> <li>• The Department considers that the project is unlikely to result in any significant aviation hazards or impacts to aerial agricultural activities, subject to the recommended conditions.</li> </ul>	<p>wind turbines and any wind monitoring masts.</p> <ul style="list-style-type: none"> <li>• Consult with CASA and RFS regarding night time obstacle lighting requirements and, if required, ensure obstacle lights are energised during hours of darkness in accordance with CASA's recommendations.</li> <li>• Minimise the off-site lighting impacts of the project.</li> <li>• Carry out the development in accordance with the <i>National Airports Safeguarding Frame Guideline D</i>.</li> </ul>
<p><b>Water Use</b></p> <ul style="list-style-type: none"> <li>• The amount of water required for the construction of the wind farm is estimated to be around 95 ML. This includes water for the construction of concrete foundations for the wind turbines, control buildings and substations as well as for road upgrades, dust suppression during construction and in case of fire.</li> </ul>	<ul style="list-style-type: none"> <li>• Ensure the development has adequate water supplies for the project and that it obtains any necessary licences under the <i>Water</i></li> </ul>

Issue	Recommended conditions
<ul style="list-style-type: none"> <li>Ark proposes to source the water required for construction from sources licensed under the <i>Water Management Act 2000</i>, including existing onsite dams or water storages in the region where pumping stations are available.</li> <li>Water required during operation of the project would be sourced from on-site rainwater tanks, existing onsite dams or delivery to site as potable water. Groundwater would not be used during the operation of the project.</li> <li>The Department, including DPE Water Group, are satisfied that the project's water use is unlikely to have any significant impact on water supply and demand in the region.</li> </ul>	<p><i>Act 1912 or Water Management Act 2000.</i></p>
<p><b>Riparian Areas and Erosion Risk</b></p>	
<ul style="list-style-type: none"> <li>Most of the site is located within the catchment of Bowmans Creek, a sixth order stream, with several smaller tributaries running through the site including Cedar Creek, Fish Hole Creek, Lincolns Creek and Alexander Creek.</li> <li>The northern portion of the site is located within the catchment of Sandy Creek, with smaller tributaries running through the site including Limestone Creek, Hilliers Creek and Gins Creek.</li> <li>A small area in the western portion of the site is located within the catchment of Muscle Creek and its tributary Middle Creek.</li> <li>Most waterways within the site are ephemeral and only have surface flows after heavy rainfall events in the catchment.</li> <li>Neither the EPA nor DPE Water have raised concerns about the site's erosion potential, and the Department considers that with the implementation of best practice control measures, any risks can be adequately managed. The Department also notes that it is a strict liability offence to pollute any waters off the site under the <i>Protection of the Environment Operations Act 1997</i>.</li> </ul>	<ul style="list-style-type: none"> <li>Comply with section 120 of the <i>Protection of the Environment Operations Act 1997</i>.</li> <li>Minimise erosion and control sediment generation.</li> <li>Undertake activities in accordance with applicable guidelines including <i>Managing Urban Stormwater: Soils and Construction and Water Guidelines for Controlled Activities on Waterfront Land</i>.</li> </ul>
<p><b>Subdivision</b></p>	
<ul style="list-style-type: none"> <li>Ark proposes to subdivide the two parcels of land that the substations will be located on, including: <ul style="list-style-type: none"> <li>Substation 1, either of: <ul style="list-style-type: none"> <li>part of each of Lot 169 DP 752465 and Lot 12 DP 752465 subdivided into 3.99 ha for the substation, with residual lots of 26.46 ha and 14.69 ha respectively; or</li> </ul> </li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Subdivide the proposed lots in accordance with requirements of the EP&amp;A Act, EP&amp;A Regulation and <i>Conveyancing Act 1919 (NSW)</i></li> </ul>



Issue	Recommended conditions
<ul style="list-style-type: none"> <li>○ Lot 86 DP 752465 subdivided into 3.55 ha for the substation with a residual lot of 46.13 ha; and <ul style="list-style-type: none"> <li>– Substation 2: Lot 473 DP 1240509 subdivided into 2.94 ha for the substation with a residual lot of 55.15 ha.</li> </ul> </li> <li>● The proposed new lots would not meet the minimum lot size for land use zoned RU1 – Primary Production and are prohibited under a strict reading of the Muswellbrook LEP (80 ha) and Singleton LEP (40 ha). Notwithstanding, under section 4.38(3) of the EP&amp;A Act, development consent for the project as a whole can be granted despite the subdivision component of the application being prohibited by the LEPs.</li> <li>● The Department considers that the subdivision be approved as part of the project as the subdivisions are: <ul style="list-style-type: none"> <li>– necessary for the transfer of the substation to TransGrid and the ongoing operation of the wind farm;</li> <li>– would not result in the addition on any dwelling entitlements on the subdivided land;</li> <li>– consistent with the key objectives of the RU1 zone as it would encourage diversity in primary industry enterprises and minimise conflict between land uses; and</li> <li>– the long term leases would be administrative in nature and do not result in any additional impacts.</li> </ul> </li> </ul>	<p>and the NSW Land Registration Services.</p>
<b>Bushfire Safety</b>	
<ul style="list-style-type: none"> <li>● Some submissions raised concerns about the impacts of the project on bush fire management.</li> <li>● The development site is mapped as bushfire prone land. Ark would be required to establish a 10m Asset Protection Zone (APZ) around each turbine, wind monitoring masts and operation and maintenance facilities.</li> <li>● Ark would also be required to comply with the RFS's <i>Planning for Bushfire Protection</i> (2019), provide a 20,000 litre water supply tank fitted with a 65 mm Storz fitting at each substation compound within the APZ and prepare an Emergency Response Plan to manage the fire risk.</li> <li>● Ark has committed to a number of mitigation measures and strategies, including the preparation of a Bushfire Management Plan.</li> <li>● The Department, RFS and FRNSW are satisfied that the bushfire risks can be suitably controlled through the implementation of standard fire management plans and procedures.</li> </ul>	<ul style="list-style-type: none"> <li>● Ensure that the development complies with relevant asset protection requirements in the RFS's <i>Planning for Bushfire Protection 2019</i> for APZs.</li> <li>● Ensure the development is suitably equipped to response to fires on site.</li> <li>● Prepare and implement an Emergency Response Plan.</li> </ul>

**Decommissioning and Rehabilitation**

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|--|---|
| <ul style="list-style-type: none"> <li>• The Department has developed standard conditions for wind farms to cover this stage of the project life cycle, including clear decommissioning triggers and rehabilitation objectives.</li> <li>• Additionally, the Department has provided guidance on how host landowner agreements should consider refurbishment, decommissioning and rehabilitation in the <i>NSW Wind Energy Framework's Negotiated Agreement Advice Sheet</i>.</li> <li>• With the implementation of these measures, the Department considers that project infrastructure would be suitably decommissioned, either at the end of the project life or if the project is not operating for more than a year, and the site appropriately rehabilitated to a standard that would allow the ongoing productive use of the land.</li> </ul> | <ul style="list-style-type: none"> <li>• Decommission turbines (and associated infrastructure) within 18 months of the cessation of operations.</li> <li>• Progressively rehabilitate the site, and minimise total disturbance.</li> <li>• Comply with rehabilitation objectives, including removing above-ground infrastructure, restoring land capability, ensuring public safety and ensuring the site is maintained in a safe, stable and non-polluting condition.</li> </ul> |
|--|---|

## 7 Evaluation

232. The Department has assessed the development application, EIS and supporting documents provided by Ark, advice from councils and government agencies, submissions and considered the relevant objectives of section 4.15 of the EP&A Act.
233. The project is located in the Hunter-Central Coast REZ, an area traditionally associated with supplying coal and energy to national and global markets.
234. Within 10 km of the project site there are three operating coal mines, three quarries and one approved (but not yet built) gas pipeline, the Liddell and Bayswater Power Stations are located 10 km south-west of the project site and Muswellbrook is located 10 km to the west.
235. The wind farm development is a suitable land use for the site as it has good wind resources, access to the existing electricity network at Transgrid's Liddell substation and is in close proximity to the New England Highway which provides ease of access to the Port of Newcastle.
236. Extensive land clearing has occurred within the landscape for agricultural and mining purposes. The site and surrounds are predominantly a rural landscape, interspersed with infrastructure associated with supplying major towns (transmission lines, roads and railway line). The site is primarily used for beef cattle grazing and does not include any mapped BSAL.
237. The project has largely been designed to avoid key constraints, including noise and amenity impacts to nearby non-associated residences, areas of higher biodiversity value, traffic impacts and impacts to Aboriginal cultural heritage sites. Any residual impacts would be relatively minor and can be managed through the recommended conditions of consent.
238. Following concerns raised by the Department regarding the potential visual impacts of the projects, Ark secured several additional neighbour agreements. With the Department's recommendation to delete an additional two turbines (reducing the total number of turbines to 54), the Department considers that there would be no significant visual impacts on surrounding residences, due to distance or intervening topography and existing and proposed vegetation providing screening from non-associated residences and the public road network.
239. The project would not significantly impact threatened species and ecological communities of the locality. The Department is also satisfied that any residual biodiversity impacts can be managed and/or mitigated by imposing appropriate conditions and retiring the required biodiversity offset credits.
240. The Department considered the submissions made through the exhibition of the project and the issues raised by the community and agencies during consultation. These matters have


been addressed through changes to the project and the recommended conditions of consent, including significantly reducing the number of non-associated receivers in close proximity to the project and the deletion of additional turbines.

241. Importantly, the project would assist in transitioning the electricity sector from coal and gas-fired power stations to low emissions sources and is consistent with the goals of NSW's *Climate Change Policy Framework, the Net Zero Plan Stage 1: 2020 – 2030*. It would have a generating capacity of 335 MW of clean electricity, which is enough to power over 172,600 homes.
242. On balance, the Department considers that the site is suitable for a wind farm and the project achieves an appropriate balance between maximising the efficiency of the wind resource development and minimising the potential impacts on surrounding land users and the environment.
243. The project would also provide other flow on benefits to the local community, including up to 156 construction jobs, 15 operational jobs and \$686 per MW per year (plus CPI) in contributions to local councils through voluntary planning agreements for community enhancement projects. There would be broader benefits to the State through an injection of \$569 million in capital investment into the NSW economy.
244. On balance, the Department considers that the project is in the public interest and is approvable, subject to the recommended conditions of consent (see **Appendix G**).
245. This assessment report is hereby presented to the Independent Planning Commission for determination.

**Prepared by:**

Elisha Dunn, Senior Environmental Assessment Officer

**Recommended by:**

 20/11/2023

Iwan Davies  
Director  
Energy Assessments

 20/11/2023

Clay Preshaw  
Executive Director  
Energy, Resource and Industry Assessments

# Appendices

Appendix A – Environmental Impact Statement

Appendix B – Submissions

Appendix C – Agency Advice

Appendix D – Submissions Report

Appendix E – Amendment Report

Appendix F – Additional Information

Appendix G – Recommended Development Consent

Appendices A to G available at: <https://www.planningportal.nsw.gov.au/major-projects/projects/bowmans-creek-wind-farm>

## Appendix H – Consideration of Community Views

The Department exhibited the Environmental Impact Statement (EIS) for the project from 31 March 2021 until 11 May 2021 and received 142 submissions from the community, of which 131 objected to the project and 11 provided support.

The Department consulted with government agencies and Muswellbrook, Singleton and Upper Hunter Shire councils throughout the assessment process.

The key issues raised by the community (including in public submissions) and considered in the Department's Assessment Report include amenity impacts (visual and noise), biodiversity impacts and socio-economic impacts.

Other issues are addressed in detail in the Department's Assessment Report.

Issue	Consideration
Visual impacts	<b>Assessment</b>
<ul style="list-style-type: none"><li>impacts on the surrounding</li></ul>	<ul style="list-style-type: none"><li>Concerns about visual impacts were raised in most public submissions, particularly regarding the size and scale of the wind farm in the landscape.</li></ul>



Issue	Consideration
<ul style="list-style-type: none"> <li>landscape and residences</li> <li>shadow flicker and night lighting</li> </ul>	<ul style="list-style-type: none"> <li>The Department considers that the landscape and scenic integrity performance measure could only be achieved through deletion of the two closest visible turbines (T64 and T68), and has recommended deletion of T64 and T68, and visual screening to minimise the residual impacts associated T66 and T67.</li> <li>A number of residences located within 4.4 km of a proposed turbine may have some views of turbines and the Department considers these impacts could be sufficiently mitigated through the provision of visual impact mitigation measures (such as landscaping and visual screening).</li> <li>The Department considers that subject to the implementation of visual mitigation measures, including visual screening, the residual visual impacts of the project would be acceptable.</li> </ul> <p><b>Recommended Conditions:</b></p> <ul style="list-style-type: none"> <li>Reduce the visual impacts of the project by offering visual impact mitigation measures, such as landscaping and/or vegetation screening, to all non-associated residences within 4.4 km of any approved turbine.</li> <li>Minimise and mitigate the off-site visual impacts of the development.</li> <li>Minimise the impact of aviation hazard or off-site lighting.</li> <li>Ensure shadow flicker does not exceed 30 hours per year at any non-associated residence.</li> <li>Ensure the visual appearance of all ancillary infrastructure (including paint colours) blends in with the surrounding landscape, where reasonable and feasible.</li> </ul>
<p>Noise impacts</p> <ul style="list-style-type: none"> <li>construction and operational noise</li> <li>infrasound and low frequency</li> <li>traffic noise</li> <li>vibration from blasting</li> </ul>	<p><b>Assessment</b></p> <ul style="list-style-type: none"> <li>For construction of the turbines, noise levels are predicted to comply with the recommended 'noise affected' criterion of 45 dB(A) as specified under the EPA's <i>Interim Construction Noise Guideline (2009)</i> (ICNG) at all non-associated receivers.</li> <li>For construction associated with road works, noise levels up to the 'highly noise affected' criterion of 75 dB(A) under the ICNG are predicted to occur at one residence (S17-2). Noise levels at the remaining five residences are predicted to exceed the recommended 'noise affected' criterion of 45 dB(A) under the ICNG.</li> <li>Given works would be short-term and intermittent, the Department accepts that the proposed construction activities are unlikely to result in significant adverse impacts during daytime hours at most residential receivers.</li> <li>Both the Department and the Environment Protection Authority consider that the operational noise impacts of the project can comply with the requirements of the <i>Wind Energy: Noise Assessment Bulletin</i> and the Department has recommended conditions to this effect.</li> <li>The project will require an Environment Protection Licence administered by the EPA to operate.</li> </ul>

Issue	Consideration
	<p><b>Recommended Conditions</b></p> <ul style="list-style-type: none"> <li>Noise generated by the operation of wind turbines must not exceed the higher of 35 dB(A) or the existing background noise level ((LA90 (10-minute)) plus 5 dB(A) for each integer wind speed, measured at hub height, from cut-in to rated wind turbine generator power, at any non-associated residence</li> <li>Take all reasonable steps to minimise the construction or decommissioning noise of the development, including any associated traffic noise.</li> <li>Ensure that the noise generated by any construction or decommissioning activities is managed in accordance with the requirements outlined in the Interim Construction Noise Guideline (DECC, 2009).</li> <li>Require the operation of ancillary infrastructure to comply with the requirements of the Noise Policy for Industry (2017).</li> <li>Restrict construction hours to Monday to Friday 7 am – 6 pm, and Saturday 8 am – 1 pm.</li> </ul>
<p>Biodiversity impacts</p> <ul style="list-style-type: none"> <li>adequacy of the BDAR and survey effort</li> <li>omission of certain threatened species</li> <li>bird and bat strike</li> </ul>	<p><b>Assessment</b></p> <ul style="list-style-type: none"> <li>The project has the potential to impact biodiversity values during construction through native vegetation clearing and direct and indirect impacts to listed threatened flora and fauna species and communities, and through bird and bat strike during operation of the wind turbines.</li> <li>Most of the development footprint is native vegetation (67%) located on hillslopes and ridges with patches of woodlands, dry rainforests, open forests and DNG.</li> <li>The development footprint is approximately 417 ha, of which 280 ha is native vegetation, comprising 98 ha of dry rainforest, open forest and woodland in moderate condition, 179 ha of DNG and 3 ha of poor condition or planted vegetation.</li> <li>The Department is satisfied that the project could be undertaken in a manner that improves, or at least maintains, the biodiversity values of the locality over the medium to long term.</li> </ul> <p><b>Recommended Conditions</b></p> <ul style="list-style-type: none"> <li>Ark must not clear any native vegetation or fauna habitat located outside the development corridor.</li> <li>Offset residual impacts of the project in accordance with the requirements of the <i>NSW Biodiversity Offset Scheme</i>.</li> <li>Prepare and implement a Biodiversity Management Plan, Bird and Bat Adaptive Management Plan and a biodiversity offset strategy.</li> </ul>
<p>Socio-economic</p> <ul style="list-style-type: none"> <li>property devaluation</li> </ul>	<p><b>Assessment</b></p> <ul style="list-style-type: none"> <li>The project would generate direct and indirect benefits to the local community, including:</li> </ul>

Issue	Consideration
<ul style="list-style-type: none"> <li>lack of local benefit</li> </ul>	<ul style="list-style-type: none"> <li>– up to 156 jobs during the 18-month construction period and up to 15 ongoing full-time jobs during operation;</li> <li>– expenditure on accommodation and business in the local economy by workers who would reside in local LGAs;</li> <li>– the procurement of goods and services by Ark and associated constructors; and</li> <li>– upgrading and maintenance of roads used by project related traffic.</li> <li>• Ark has committed to a local participation and procurement approach.</li> <li>• Ark has also committed to enter into a VPA with councils, to support the provision of social infrastructure via a community benefit fund. The annual contribution payable is \$686 per MW installed (adjusted annually to increases in CPI), within the relevant LGA over the operational life of the project. Payments would commence when the development begins generation and will cease when the development is decommissioned.</li> <li>• Under the Infrastructure SEPP, the project is permissible with consent, and the Department’s assessment demonstrates that, with the implementation of the recommended conditions, the project would not result in any significant amenity or environmental impacts.</li> <li>• The Department considers the project would not result in any significant or widespread reduction in land values in the areas surrounding the project.</li> </ul> <p><b>Recommended Conditions</b></p> <ul style="list-style-type: none"> <li>• Prepare an Accommodation and Employment Strategy for the project in consultation with Council, with consideration to prioritising the employment of local workers.</li> <li>• Prior to commencing construction, the Applicant must enter into a VPA with Council.</li> </ul>

## Appendix I – Statutory Considerations

In line with the requirements of section 4.15 of the EP&A Act, the Department’s assessment of the project has given detailed consideration to a number of statutory requirements. These include:

- the objects found in section 1.3 of the EP&A Act; and
- the matters listed under section 4.15(1) of the EP&A Act, including applicable environmental planning instruments and regulations.

The Department has considered all these matters in its assessment of the project and has provided a summary of this assessment below.

## Summary

### Objects of the EP&A Act

The objects of most relevance to the Minister's decision on whether or not to approve the project are found in section 1.3(a), (b), (c), (e) and (f) of the EP&A Act.

The Department considers the project encourages the proper development of natural resources (Object 1.3(a)) and the promotion of orderly and economic use of land (Object 1.3(c)), particularly as the project:

- is a permissible land use on the subject land;
- is located in a logical location for efficient wind energy development;
- is able to be managed such that the impacts of the project could be adequately minimised, managed, or at least compensated for, to an acceptable standard;
- would contribute to a more diverse local industry, thereby supporting the local economy and community;
- would not fragment or alienate resource lands in the LGA; and
- is consistent with the goals of NSW's *Climate Change Policy Framework and Net Zero Plan Stage 1: 2020 - 2030* and would assist in meeting Australia's renewable energy targets whilst reducing greenhouse gas emissions.

The Department has considered the encouragement of ESD (Object 1.3(b)) in its assessment of the project. This assessment integrates all significant socioeconomic and environmental considerations and seeks to avoid any potential serious or irreversible environmental damage, based on an assessment of risk-weighted consequences.

In addition, the Department considers that appropriately designed SSD wind development, in itself, is consistent with many of the principles of ESD. Ark has also considered the project against the principles of ESD. Following its consideration, the Department considers that the project can be carried out in a manner that is consistent with the principles of ESD.

Consideration of environmental protection (Object 1.3(e)) is provided in section 6 of this report. Following its consideration, the Department considers that the project is able to be undertaken in a manner that would at least maintain the biodiversity values of the locality over the medium to long term and would not significantly impact threatened species and ecological communities of the locality. The Department is also satisfied that any residual biodiversity impacts can be managed and/or mitigated by imposing appropriate conditions and retiring the required biodiversity offset credits.

Consideration of the sustainable management of built and cultural heritage (Object 1.3(f)) is provided in section 6 of this report. Following its consideration, the Department considers the project would not significantly impact the built or cultural heritage of the locality, and any residual impacts can be managed and/or mitigated by imposing appropriate conditions.

## Summary

### State significant development

Under section 4.36 of the EP&A Act, the project is considered a State significant development. The Minister for Planning is the consent authority for the development. Under the Minister's delegation of 9 March 2022, the Director, Energy Assessments, may determine the project.

### Environmental Planning Instruments (EPIs)

The Muswellbrook, Singleton and Upper Hunter LEPs apply and are discussed in sections 4.3 and 6.6 of this report, particularly regarding permissibility and land use zoning. As discussed in section 4.3 of this report, electricity generating works are permitted with consent within the relevant land use zoning.

The project is not categorised as potentially hazardous or potentially offensive development under the *State Environmental Planning Policy (Resilience and Hazards) 2021* (Hazards SEPP). The site is not listed as a contaminated site in the NSW EPA Contaminated Land Record or the list of NSW contaminated sites. Given the site has historically been used for predominately agricultural uses, the Department considers the site would be suitable for the proposed development.

The Department has also reviewed the proposal against the Transport and Infrastructure SEPP, and considers the project is permissible under the SEPP. In accordance with the Transport and Infrastructure SEPP, the Department has given written notice of the project to Transgrid as the electricity supply authorities and TfNSW.

The Department has considered the provisions of *State Environmental Planning Policy (Primary Production) 2021*. Of relevance to the project, the SEPP aims to facilitate the orderly economic use and development of lands for primary production, to reduce land use conflict and sterilisation of rural land and to identify State significant agricultural land. While the location of State significant agricultural land has not been finalised, the Department has considered all of these matters in section 6.6 of this report.

The Muswellbrook, Singleton and Upper Hunter LGAs are all listed in Schedule 1 of the *State Environmental Planning Policy (Koala Habitat Protection) 2020*, meaning the Koala habitat protection chapters (3 and 4) of the *State Environmental Planning Policy (Biodiversity and Conservation) 2021* apply. Ark's biodiversity assessment found no evidence of Koala, and the Department has considered biodiversity in section 6.5 of this report.



## Appendix J – MNES

In accordance with the bilateral agreement with the Commonwealth Government, the Department provides the following additional information required by the Commonwealth Minister, in deciding whether to approve a development under the EPBC Act.

The Department's assessment has been prepared based on the assessment contained in the Bowmans Creek Wind Farm Environmental Impact Statement (EIS), Submissions Report, Amendment Report, revised Biodiversity Development Assessment Report (BDAR), Biodiversity Addendum Report and additional information provided during the assessment process, public submissions, and advice provided by the Department's Biodiversity Conservation Directorate (BCS), other NSW government agencies and the DCCEEW.

This Appendix is supplementary to, and should be read in conjunction with, the assessment included in **section 6.5** and **Appendix K** of this assessment report which includes the Department's consideration of impacts to listed threatened species and communities, and mitigation and offsetting measures for threatened species and communities, including Matters of National Environmental Significance (MNES).

### Identifying MNES

The Commonwealth Referral Decision (EPBC 2020/8631) (Referral Decision) was based on likely significant impacts on two threatened ecological communities (TECs) and three threatened fauna species and possible significant impacts two listed migratory species. The Referral Decision also identified three threatened flora species and five threatened fauna species that may be at risk of significant impacts, subject to further investigation by Ark.

The revised BDAR and Biodiversity Addendum Report for the project identified and addressed all of the listed threatened species and communities and migratory species included in the Referral Decision, and considered potential impacts on additional species with predicted or known habitat within the proposal study area and identified in Appendix A of the revised BDAR (section A.1.1).

No other species or communities under the controlling provisions were considered to occur in the project area.

Ark completed assessments of significance for all threatened species and communities and migratory species that were recorded during field surveys or that were identified as having a moderate or higher potential to occur on the site, including two threatened ecological communities, four threatened fauna species and two migratory species. The Department's consideration of the assessments of significance for these species and those identified by BCD and DCCEEW is provided below. The Department notes that Ark concluded that the project is unlikely to have a significant impact on any EPBC Act listed species or communities. However, BCS and DCCEEW advised that that the project would have a significant impact on the listed species or communities identified below.

Ark assessed the significance of the impacts on listed species and communities using the methodology outlined in the *Matters of National Environmental Significance Significant Impact Guidelines 1.1 (2013)* as documented in Appendix A of the revised BDAR.

DCCEEW determined that other matters under the EPBC Act are not controlling provisions with respect to the controlled action. These include listed World Heritage, National Heritage, Ramsar wetlands, Commonwealth marine environment, Commonwealth land, Commonwealth action, nuclear action, Great Barrier Reef Marine Park, Commonwealth Heritage places, overseas and a water resource, in relation to coal seam gas development and large coal mining development.

## Impacts on EPBC Listed Species and Communities

### *Impacts on threatened ecological communities*

Ark considered the potential impacts on all EPBC Act listed TECs with predicted or known habitat within the proposal study area, including:

- two TECs identified in the Referral Decision: White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland – Critically Endangered (Box Gum Woodland) and Central Hunter Valley Eucalypt Forest and Woodland – Critically Endangered (Hunter Valley Eucalypt); and
- two TECs identified in the revised BDAR: Hunter Valley Weeping Myall (*Acacia pendula*) Woodland and Lowland Rainforest of Subtropical Australia.

As discussed in **Section 6.5** of this report, the recommended conditions of consent require Ark to avoid impacts on *Acacia Pendula*, a Serious and Irreversible Impact (SAIL) entity under the BC Act. By avoiding impacts on this SAIL species, impacts on Hunter Valley Weeping Myall (*Acacia pendula*) Woodland would also be avoided.

Ark has confirmed that Lowland Rainforest of Subtropical Australia does not occur within subject land (see Table 36 of Section A.1.1 of Appendix A of the revised BDAR).

While Ark concluded that the project is unlikely to have a significant impact on Box Gum Woodland and Hunter Valley Eucalypt, both BCS and DCCEEW consider that the project is likely to have a significant impact on these TECs. BCS has advised that impacts would be appropriately offset via the ecosystem credit requirements detailed in **Table J1**, and the Department has recommended a condition accordingly. Ark has confirmed that offsets can be provided on a like-for-like basis.

Regarding Box Gum Woodland, which is also identified as is a SAIL entity under the BC Act, the Department has recommended that Ark implement additional and appropriate measures to further minimise impacts on this TECs, including the requirement for Ark to enhance and protect (in perpetuity) 37 ha of Box Gum Woodland DNG to a condition state commensurate with Woodland (see **Section 6.5** of this report).

The Department has identified (see **Table J1**) and considered the relevant Commonwealth guidelines and policy statements including the relevant approved conservation advice, recovery plans and threat abatement plans below.

The revised BDAR (Section A.1.2.1.) provides Ark’s detailed assessments of significance and the Biodiversity Addendum Report (Table 6 of Section A.7.3) provides a summary of Ark’s assessment, including consideration of the relevant conservation advice, recovery plans and threat abatement plans.

**Table J1 | Threatened Ecological Communities**

<b>Threatened Ecological Community</b>	<b>Impact (ha)</b>	<b>Ecosystem Credit Liability</b>	<b>Likely Significant Impact</b>	<b>Relevant Conservation Advice and/or Recovery Plan and/or Threat Abatement Plans</b>
<b>White Box - Yellow Box - Blakely’s Red Gum Grassy Woodland and Derived Native Grassland – Critically Endangered (Woodland)</b>	36.95	1647	Yes	<i>Conservation Advice for the White Box-Yellow Box-Blakely’s Red Gum Grassy Woodland and Derived Native Grassland (2023).</i>  <i>National Recovery Plan for White Box – Yellow Box – Blakely’s Red Gum Grassy Woodland and Derived Native Grassland (2010).</i>
<b>White Box – Yellow Box – Blakely’s Red Gum Grassy Woodland and Derived Native Grassland – Critically Endangered (Derived Native Grassland)</b>	178.59	1796	Yes	<i>Threat abatement plan for the biological effects, including lethal toxic ingestion, caused by cane toads (2011).</i>  <i>Threat abatement plan for predation, habitat degradation, competition and disease transmission by feral pigs (Sus scrofa) (2017).</i>  <i>Threat abatement plan for disease in natural ecosystems caused by Phytophthora cinnamomi (2018).</i>
<b>Central Hunter Valley Eucalypt Forest and Woodland – Critically Endangered</b>	22.86	749	Yes	<i>Approved Conservation Advice (including listing advice) for the Central Hunter Valley eucalypt forest and woodland ecological community 2015).</i>
<b>Hunter Valley Weeping Myall (Acacia pendula) Woodland CEEC</b>	0	0	No	NA

### *Impacts on threatened flora species*

The Department and BCS have considered the potential impacts on all EPBC Act listed flora species with predicted or known habitat within the proposal study area, including the three flora species identified in the Referral Decision and an additional 24 species identified in the revised BDAR and Biodiversity Addendum Report.

Of the 27 threatened flora species with predicted or known habitat within the proposal study area, 13 flora species were considered to have a moderate likelihood of occurrence and were the subject of targeted surveys, including:

- Critically Endangered (two species) – Scrub Turpentine (*Rhodamnia rubescens*), Native Guava (*Rhodomyrtus psidioides*) and Leek-orchid (*Prasophyllum sp. Wybong*)
- Endangered (two species) – Pouched Greenhood (*Pterostylis gibbosa*) and White-flowered Wax Plant (*Cynanchum elegans*); and
- Vulnerable (nine species) – Bynoe's Wattle (*Acacia bynoeana*), Trailing Woodruff (*Asperula asthenes*), Slaty Red Gum (*Eucalyptus glaucina*), Small-flower Grevillea (*Grevillea parviflora* subsp. *Parviflora*), *Ozothamnus tessellatus*, Singleton Mint Bush (*Prostanthera cineolifera*), Heath Wrinklewort (*Rutidosia heterogama*) and Austral Toadflax (*Thesium austral*).

The Department notes that Ark did not complete assessments of significance for these species on the basis that the revised BDAR concluded they are unlikely to occur within the site and have been assumed present as a precautionary measure (see **section 6.5** of this assessment report).

As discussed in **Section 6.5** of this report, the recommended conditions of consent require Ark to avoid impacts on Scrub Turpentine and Native Guava, both Serious and Irreversible Impact (SAIL) entities under the BC Act.

Ark has also committed to avoid and minimise impacts on the remaining 11 species, where practicable, via micro-siting during the detailed design stage.

Advice from BCS considers that there is likely to be a significant impact on all threatened flora species, and that the potential impacts on these species would be appropriately offset via the species credit requirements detailed in **Table K2** of **Appendix K**, and reflected in the recommended conditions of consent.

Advice from DCCEEW considers there is likely to be a significant impact on nine species for which there would be an impact greater than 6 ha. The Department has identified these species in **Table J2** and considered the relevant conservation advice and/or recovery plan and/or threat abatement plans for the species below.

The Biodiversity Addendum Report (Table 6 of Section A.7.3) provides a summary of Ark's assessment of the 13 threatened flora species. Ark has also confirmed that all other flora species with predicted

or known habitat in the locality are not present within the development corridor and would not be impacted by the project (see Table 36 of Section A.1.1 of Appendix A of the revised BDAR).

**Table J2 | Threatened Flora Species**

<b>Threatened Flora</b>	<b>Impact (ha)</b>	<b>Species Credit Liability</b>	<b>Likely Significant Impact</b>	<b>Conservation Advice and/or Recovery Plan and/or Threat Abatement Plans</b>
<b>Leek-orchid</b>	7.64	265	Yes	<i>Approved Conservation Advice for Prasophyllum sp. Wybong (C. Phelps ORG 5269) (a leek-orchid) (2009).</i>
<b>Bynoe's Wattle</b>	6.16	213	Yes	<i>Approved Conservation Advice for Acacia bynoeana (Bynoe's wattle) (2013).</i>
<b>White-flowered Wax Plant</b>	42.85	1611	Yes	<i>Approved Conservation Advice for Cynanchum elegans (White-flowered Wax Plant) (2008). Threat abatement plan for competition and land degradation by rabbits (2017). Threat abatement plan for predation, habitat degradation, competition and disease transmission by feral pigs (Sus scrofa) (2017). Threat abatement plan for competition and land degradation by unmanaged goats (2008).</i>
<b>Slaty Red Gum</b>	9.66	966	Yes	<i>Approved Conservation Advice for Eucalyptus glaucina (Slaty Red Gum) (2008).</i>
<b>Small-flower Grevillea</b>	8.18	278	Yes	<i>Approved Conservation Advice for Grevillea parviflora subsp. parviflora (Small-flower Grevillea) (2008).</i>
<i>Ozothamnus tessellatus</i>	6.16	160	Yes	<i>Approved Conservation Advice for Ozothamnus tessellatus (2008).</i>
<b>Singleton Mint Bush</b>	6.16	213	Yes	<i>Approved Conservation Advice for Prostanthera cineolifera (2008).</i>
<i>Rhodamnia rubescens</i>	0	0	No	NA
<i>Rhodomyrtus psidioides</i>	0	0	No	NA



Threatened Flora	Impact (ha)	Species Credit Liability	Likely Significant Impact	Conservation Advice and/or Recovery Plan and/or Threat Abatement Plans
Heath Wrinklewort	6.25	216	Yes	Approved Conservation Advice for <i>Rutidosia heterogama</i> (Heath Wrinklewren) (July 2008). Threat abatement plan for competition and land degradation by rabbits (2016).
Austral Toadflax	13.59	343	Yes	Approved Conservation Advice for <i>Thesium australe</i> (austral toadflax) (2013). Threat abatement plan for competition and land degradation by rabbits (2016).

#### Impacts on threatened fauna species

The Department and BCS have considered the potential impacts on all EPBC Act listed fauna species with predicted or known habitat within the proposal study area, including the eight species identified in the Referral Decision and additional 19 species identified in the revised BDAR and Biodiversity Addendum Report.

Of the 27 fauna species with predicted or known habitat within the proposal study area, 10 species were identified to have a moderate likelihood of occurrence and were the subject of targeted surveys or habitat constraint assessments, including:

- Critically Endangered (two species) – Regent Honeyeater (*Anthochaera phrygia*) and Swift Parrot (*Lathamus discolor*);
- Endangered (three species) – Koala (*Phascolarctos cinereus*), Spotted-Tailed Quoll (*Dasyurus maculatus*) and Hastings River Mouse (*Pseudomys oralis*); and
- Vulnerable (five species) – Large-eared Pied Bat (*Chalinolobus dwyeri*), White-throated Needletail (*Hirundapus caudacutus*), Australian Painted Snipe (*Rostratula australis*), Grey-headed Flying-fox (*Pteropus poliocephalus*) and Green and Golden Bell Frog (*Litoria aurea*).

Only one species was identified during targeted surveys, being the Large-eared Pied Bat (*Chalinolobus dwyeri*). **Table K3** of **Appendix K** of this assessment report details the impact and species credit offset requirements for this species.

Habitat for the remaining nine species was confirmed to be sufficiently degraded such that potential impacts on these species would be appropriately offset via the ecosystem credit requirements detailed **Table K1** of **Appendix K** of this assessment report.

Ark completed assessments of significance for the Large-eared Pied Bat, and as a precautionary measure, the two critically endangered species (Regent Honeyeater and Swift Parrot) which

concluded that the project is unlikely to have a significant impact on these species, as detailed in the revised BDAR (Sections A.1.2.2 and A.1.2.3).

Advice from BCS considered there would not a significant impact on any threatened fauna species and has advised that potential impacts on all species identified above would be appropriately offset via the ecosystem and species credit requirements detailed in **Tables K1** and **K3** of **Appendix K** of this assessment report, and reflected in the recommended conditions of consent.

Advice from DCCEEW considers there is likely to be significant impacts on five fauna species. **Table J3** identifies these species and the associated ecosystem credit liability. The Department notes that the ecosystem credit liability detailed in **Table J3** is not an additional offset requirement, but forms part of the total offset requirement detailed in **Table K1**.

The Department has identified (see **Table J3**) and considered the relevant conservation advice and/or recovery plan and/or threat abatement plans for the five fauna species for which DCCEEW considers there would be a significant impact below.

The Biodiversity Addendum Report (Table 6 of Section A.7.3) provides a summary of Ark’s assessment. Ark also confirmed that all other fauna species with predicted or known habitat in the locality are not present within the development corridor and would not be impacted by the project (see Table 36 of Section A.1.1 of Appendix A of the revised BDAR).

**Table J3 | Threatened Fauna Species**

Threatened Fauna	Impact (ha)	Species Credit Liability	Likely Significant Impact	Conservation Advice and/or Recovery Plan and/or Threat Abatement Plans
<b>Regent Honeyeater</b>	62.56	2460	Yes	<i>Conservation Advice Anthochaera phrygia Regent Honeyeater (June 2015).</i> <i>National Recovery Plan for the Regent Honeyeater (Anthochaera phrygia).</i> <i>Threat abatement plan for competition and land degradation by rabbits.</i>
<b>Swift Parrot</b>	19.94	667	Yes	<i>Conservation Advice Lathamus discolor Swift Parrot (May 2016).</i> <i>National Recovery Plan for the Swift Parrot (Lathamus discolor).</i> <i>Threat abatement plan for predation by feral cats.</i>

Threatened Fauna	Impact (ha)	Species Credit Liability	Likely Significant Impact	Conservation Advice and/or Recovery Plan and/or Threat Abatement Plans
<b>Koala</b>	18.39	614	Yes	<i>Conservation Advice for Phascolarctos cinereus (Koala) combined populations of Queensland, New South Wales and the Australian Capital Territory (Feb 2022).</i> <i>National Recovery Plan for the Koala Phascolarctos cinereus (combined populations of Queensland, New South Wales and the Australian Capital Territory).</i>
<b>Spotted-Tailed Quoll</b>	99.69	3571	Yes	<i>National Recovery Plan for the Spotted-tailed Quoll <i>Dasyurus maculatus</i>.</i> <i>Threat abatement plan for predation by feral cats.</i> <i>Threat abatement plan for predation by the European red fox.</i>
<b>Grey-headed Flying-fox</b>	21.34	714	Yes	<i>National Recovery Plan for the Grey-headed Flying-fox <i>Pteropus poliocephalus</i>.</i>

#### *Impacts on migratory species*

Eleven EPBC Act listed migratory species are considered moderately likely to occur within the proposal study, including two species listed in the Referral Decision.

Of these, Ark completed assessments of significance for the Fork-tailed Swift (*Apus pacificus*) and White-throated Needletail (*Hirundapus caudacutus*) (see Section A.1.2.4 of Appendix A of the revised BDAR). Ark's assessments of significance concluded that there is unlikely to be a significant impact on these migratory species. Advice from BCS and DCCEEW agree with this conclusion.

The Department notes that BCS requested more detailed assessments of significance for these species. However, the Department considers that with the recommended conditions, including the requirement to further avoid and minimise impacts during micro-siting and detailed design, and to prepare and implement a Bird and Bat Adaptive Monitoring Program (see **section 6.6** of this assessment report), the potential impacts on these species would be appropriately minimised and managed.

The revised BDAR (Table 36 of Section A.1.1), identifies three species at risk of blade strike, being the Satin Flycatcher (*Myiagra cyanoleuca*), Rufous Fantail (*Rhipidura rufifrons*) and the Eastern Bristlebird (*Dasyornis brachypterus*). As detailed in **section 6.6** of this assessment report, the risk if blade strike to these species was considered negligible.

Ark has confirmed that all other migratory species with potential to occur in locality are not present within the development corridor and would not be impacted by the project (see Table 36 of Section A.1.1 of the revised BDAR).

#### *Conservation Advice, Recovery Plans and Threat Abatement Plans*

The Department has considered the conservation advice, recovery plans and threat abatement plans, where relevant to each species and community as identified in **Tables J1 – J3** above.

#### Conservation Advice

The Department notes the key threats to species and communities include landscape fragmentation, introduction of weeds, competition for land, habitat degradation (particularly by rabbits, unmanaged goats, and feral pigs), climate change, disease transmission (particularly by feral pigs), biological effects associated with invasive species (particularly the cane toad) and predations (particularly by feral cats and foxes).

The Department's recommended conditions require Ark to prepare and implement a Biodiversity Management Plan detailing how these risks would be minimised and managed, including measures to:

- implement fauna management protocols, including undertaking pre-clearance surveys;
- avoid the removal of hollow-bearing trees during spring to avoid the main breeding period for hollow-dependent fauna;
- manage and enhance the remnant vegetation and fauna habitat onsite;
- protect native vegetation and key fauna habitat outside the approved disturbance area;
- implement clearing and operation vegetation management protocols;
- rehabilitate and restore disturbance areas to pre-existing conditions;
- maximise the salvage of resources within the approved disturbance area – including vegetative and soil resources – for beneficial reuse (such as fauna habitat enhancement) during the rehabilitation and restoration of the site;
- control weeds, feral pests, pathogens with consideration of actions identified in relevant threat abatement plans;
- control erosion; and
- bushfire management.

Ark would be required to prepare the Biodiversity Management Plan in consultation with BCS and DCCEEW, and ensure the plan is prepared by a suitably qualified and experienced biodiversity expert.

In addition, Ark is required to ensure impacts on species and communities are avoided and minimised, where practicable during detailed design, and offset the residual biodiversity impacts of the project in accordance with the NSW Biodiversity Offset Scheme.

### Recovery Plans

The Department notes the key objectives of the relevant Recovery Plans include:

- achieving no net loss in extent and condition of Box Gum Woodland and increasing landscape function of the ecological community through management and restoration of degraded sites;
- preventing a further decline in the Swift Parrot and Koala populations and achieving a demonstrable sustained improvement in the quality and quantity of habitat;
- reversing the long-term population trend of decline and increase the number of Regent Honeyeaters to a level where there is a viable, wild breeding population even in poor breeding years;
- enhancing the condition of Regent Honeyeater habitat to maximise survival and reproductive success and provide refugia during periods of extreme environmental fluctuation;
- reducing the rate of decline of the Spotted-tailed Quoll, and ensure that viable populations remain throughout its current range in eastern Australia; and
- improving the national population trends, and identify, protect and increase key foraging and roosting habitat for the Grey-headed Flying Fox.

Ark is required to minimise impacts on all species and communities, offset residual impacts on a like-for-like basis in accordance with the Biodiversity Offsets Scheme, and implement additional measures to enhance and protect 37 ha of Box Gum Woodland.

The Department's recommended conditions, including the requirement to prepare and implement a Biodiversity Management Plan, would also require Ark to manage indirect impacts on MNES, including measures to control weeds, pathogens and predation by feral pests, under a detailed Biodiversity Management Plan.

### Threat Abatement Plans

The Department has included measures for the control of feral animals under the recommended Biodiversity Management Plan for the project, including specific requirements for Ark to consider the actions identified in relevant TAPs. With these measures in place, the Department considers that the action can be carried out in a manner which is compatible with the relevant TAPs.

Subject to the recommended conditions, the Department considers that the project can be carried out in a manner that is consistent with the relevant conservation advice, recovery plans and threat abatement plans.



## Appendix K – Biodiversity Offset Tables

Table K1 | Native vegetation impacts

Vegetation Community	Condition	Conservation Status*		SAIL Entity	Disturbance Area (ha)	Ecosystem Credit Liability
		BC Act	EPBC Act			
PCT 486 - River Oak riparian grassy tall woodland of the western Hunter Valley (Brigalow Belt South Bioregion and Sydney Basin Bioregion)	Moderate	-	-	No	1.05	26
PCT 618 - White Box x Grey Box - red gum - Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley	DNG	CE	CE	Yes	178.59	1796
PCT 618 - White Box x Grey Box - red gum - Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley	Planted	-	-	No	2.03	83
PCT 1071 - Phragmites australis and Typha orientalis coastal freshwater wetlands of the Sydney Basin Bioregion	Poor	-	-	No	0.40	12
PCT 1541 - Whalebone Tree - Red Kamala dry subtropical rainforest of the lower Hunter River	Moderate	V	-	No	1.40	47
PCT 1583 - Thin-leaved Stringybark - Grey Gum - Broad-leaved Apple shrub - grass tall open forest on ranges of the lower North Coast	Moderate	-	-	No	4.80	157
PCT 1584- White Mahogany - Spotted Gum - Grey Myrtle semi-mesic shrubby open forest of the central and lower Hunter Valley	Moderate	-	-	No	27.86	825

Vegetation Community	Condition	Conservation Status*		SAIL Entity	Disturbance Area (ha)	Ecosystem Credit Liability
		BC Act	EPBC Act			
PCT 1602 - Spotted Gum - Narrow-leaved Ironbark shrub - grass open forest of the central and lower Hunter	Moderate	-	CE	No	7.79	240
PCT 1603- Narrow-leaved Ironbark - Bull Oak - Grey Box shrub - grass open forest of the central and lower Hunter	Moderate	E	CE	No	1.93	62
PCT 1604- Narrow-leaved Ironbark - Grey Box - Spotted Gum shrub - grass woodland of the central and lower Hunter	Moderate	E	CE	No	11.66	395
PCT 1607 - Blakely's Red Gum - Narrow- leaved Ironbark - Rough- barked Apple shrubby woodland of the upper Hunter	Moderate	-	-	No	1.70	38
PCT 1608 - Grey Box - Grey Gum - Rough- barked Apple - Blakely's Red Gum grassy open forest of the central Hunter	Moderate	CE	CE	Yes	36.95	1647
PCT 1683 - Silvertop Stringybark - Tussock Grass grassy open forest of the Northern Tablelands escarpment and Barrington Tops	Moderate	-	-	No	1.72	59
PCT 1691 - Narrow-leaved Ironbark - Grey Box grassy woodland of the central and upper Hunter	Moderate	E	CE	No	1.48	52
PCT 1692 - Bull Oak grassy woodland of the central Hunter Valley	Moderate	E	-	No	0.07	1

Vegetation Community	Condition	Conservation Status*		SAIL Entity	Disturbance Area (ha)	Ecosystem Credit Liability
		BC Act	EPBC Act			
PCT 1731 - Swamp Oak – Weeping Grass grassy riparian forest of the Hunter Valley	Poor	-	-	No	0.88	10
<b>Total</b>					<b>280.31</b>	<b>5,450</b>

\* 'CE' denotes critically endangered, 'E' denotes endangered and 'V' denotes vulnerable

**Table K2 | Threatened flora species impacts**

Species		Conservation Significance		SAIL Entity	Impact (ha) *	Species Credit Liability
		BC Act	EPBC Act			
<i>Acacia bynoeana</i>	Bynoe's Wattle	E	V	No	6.16	213
<i>Acacia pendula</i>	-	E	-	Yes	0	0
<i>Asperula asthenes</i>	Trailing Woodruff	V	V	No	1.93	62
<i>Callistemon linearifolis</i>	Netted Bottle Brush	V	-	No	6.25	974
<i>Cynanchum elegans</i>	White-flowered Wax Plant	E	E	No	42.85	1611
<i>Diuris tricolor</i>	Pine Donkey Orchid	V	-	No	9.57	246
<i>Eucalyptus glaucina</i>	Slaty Red Gum	V	V	No	9.66	966
<i>Grevillea parviflora subsp. Parviflora</i>	Small-flower Grevillea	V	V	No	8.18	278
<i>Monotaxis macrophylla</i>	Large-leafed Monotaxis	E	-	No	8.09	275
<i>Ozothamnus tessellatus</i>	-	V	V	No	6.16	160
<i>Pomaderris queenslandica</i>	Scant Pomaderris	E	-	No	39.19	1374
<i>Prasophyllum petilum**</i>	Tarengo Leek Orchid	E	CE	No	7.64	265

Species		Conservation Significance		SAll Entity	Impact (ha) *	Species Credit Liability
		BC Act	EPBC Act			
<i>Prostanthera cineolifera</i>	Singleton Mint Bush	V	V	No	6.16	213
<i>Pterostylis chaetophora</i>	-	V	-	No	11.56	397
<i>Pterostylis gibbose</i>	Illawarra Greenhood	E	E	No	1.93	62
<i>Rhodamnia rubescens</i>	Scrub Turpentine	CE	CE	Yes	0	0
<i>Rhodomyrtus psidioides</i>	Native Guava	CE	CE	Yes	0	0
<i>Rutidosis heterogama</i>	Heath Wrinklewort	V	V	No	6.25	216
<i>Senna acclinis</i>	Rainforest Cassia	E	-	No	0.63	24
<i>Thesium australe</i>	Austral Toadflax	V	V	No	13.59	343
<b>Total</b>						<b>7,679</b>

\* All species assumed present and identified by BC Act listed name

**Table K3 | Threatened fauna species – Direct Impacts**

Species		Conservation Significance		SAll Entity	Impact (ha)		Species Credit Liability
		BC Act	EPBC Act		Recorded	Assumed	
<i>Chalinolobus dwyeri</i>	Large Eared Pied Bat	V	V	No	0.18	0	12
<i>Phascogale tapoatafa</i>	Brush-tailed Phascogale	V	-	No	0	20.82	732
<b>Total</b>						<b>744</b>	

## Appendix L – Visual

Table 10 | Assessment of non-associated receivers between blue and black Line

Receiver	Distance (km) to closest turbine	No. of turbines between blue and black line (3km – 4.4km)	VIZ	Complies with visual performance objective (Yes / No)				Recommended Mitigation
				Ark assessment		Department and OHD assessment *		
				All objectives	Visual Magnitude	Multiple wind turbine	Landscape scenic integrity	
McCullys Gap / Sandy Creek Cluster								
H12-1	T51 (3.02)	13	VIZ2	Yes	Yes	Yes	Yes	Vegetation screening
H11-2	T57 (3.26)	6	VIZ2	Yes	Yes	Yes	Yes	Vegetation screening
H8-1	T57 (4.04)	1	VIZ2	Yes	Yes	Yes	Yes	Vegetation screening
G12-1	T57 (4.08)	1	VIZ2	Yes	Yes	Yes	Yes	Vegetation screening
G11-1	T57 (4.11)	3	VIZ2	Yes	Yes	Yes	Yes	Vegetation screening
Muscle Creek Cluster								
E19-1	T66 (3.12)	6**	VIZ2	Yes	Yes	Yes	Yes	Vegetation screening
F16-1	T59 (3.40)	10**	VIZ2	Yes	Yes	Yes	Yes	Vegetation screening
E19-2	T66 (3.51)	5**	VIZ2	Yes	Yes	Yes	Yes	Vegetation screening

Receiver	Distance (km) to closest turbine	No. of turbines between blue and black line (3km – 4.4km)	VIZ	Complies with visual performance objective (Yes / No)				Recommended Mitigation
				Ark assessment		Department and OHD assessment *		
				All objectives	Visual Magnitude	Multiple wind turbine	Landscape scenic integrity	
E18-2	T66 (3.56)	6**	VIZ2	Yes	Yes	Yes	Yes	Vegetation screening
F16-2	T70 (3.87)	7**	VIZ2	Yes	Yes	Yes	Yes	Vegetation screening
E17-7	T64 (3.96)	7**	VIZ2	Yes	Yes	Yes	Yes	Vegetation screening
E17-5	T66 (4.06)	6**	VIZ2	Yes	Yes	Yes	Yes	Vegetation screening
E17-3	T68 (4.09)	6**	VIZ2	Yes	Yes	Yes	Yes	Vegetation screening
D18-2	T66 (4.20)	2	VIZ2	Yes	Yes	Yes	Yes	Vegetation screening
D18-3	T66 (4.17)	3**	VIZ2	Yes	Yes	Yes	Yes	Vegetation screening
E18-1	T66 (3.88)	4**	VIZ2	Yes	Yes	Yes	Yes	Vegetation screening
E17-1	T66 (4.18)	4**	VIZ2	Yes	Yes	Yes	Yes	Vegetation screening
E17-4	T66 (4.27)	3**	VIZ2	Yes	Yes	Yes	Yes	Vegetation screening



Receiver	Distance (km) to closest turbine	No. of turbines between blue and black line (3km – 4.4km)	VIZ	Complies with visual performance objective (Yes / No)				Recommended Mitigation
				Ark assessment	Department and OHD assessment *			
				All objectives	Visual Magnitude	Multiple wind turbine	Landscape scenic integrity	
D21-2	T66 (4.31)	1	VIZ2	Yes	Yes	Yes	Yes	Vegetation screening
E17-2	T66 (4.34)	3**	VIZ2	Yes	Yes	Yes	Yes	Vegetation screening
D18-1	T66 (4.36)	1	VIZ2	Yes	Yes	Yes	Yes	Vegetation screening
D17-2	T66 (4.39)	1	VIZ2	Yes	Yes	Yes	Yes	Vegetation screening
Bowmans Creek / Scrumlo Road/ Goorangoola Cluster								
Q17-2	T8 (3.03)	15	VIZ2	Yes	Yes	No, 3 sectors – existing vegetation would partially screen turbines in all sectors, vegetation screening could mitigate residual impact	Yes	Vegetation screening
Q17-3	T8 (3.17)	15	VIZ2	Yes	Yes	No, 3 sectors – existing vegetation would partially screen turbines in all sectors, vegetation screening could mitigate residual impact	Yes	Vegetation screening

Receiver	Distance (km) to closest turbine	No. of turbines between blue and black line (3km – 4.4km)	VIZ	Complies with visual performance objective (Yes / No)				Recommended Mitigation
				Ark assessment	Department and OHD assessment *			
				All objectives	Visual Magnitude	Multiple wind turbine	Landscape scenic integrity	
Q17-1	T8 (3.14)	15	VIZ2	Yes	Yes	No, 3 sectors – existing vegetation would partially screen turbines in all sectors, vegetation screening could mitigate residual impact	Yes	Vegetation screening
O22-1	T24 (3.12)	4	VIZ2	Yes	Yes	No, 3 sectors – topography and existing vegetation would screen views in 2 sectors, turbine blades would be visible in 1 sector	Yes	Vegetation screening
T15-1	T8 (3.34)	4	VIZ2	Yes	Yes	No, 3 sectors – turbines would be >4.4 km away in 2 sectors, vegetation screening could mitigate residual impact	Yes	Vegetation screening
N21-1	T24 (3.52)	5	VIZ2	Yes	Yes	Yes	Yes	Vegetation screening
N21-2	T24 (3.26)	4	VIZ2	Yes	Yes	Yes	Yes	Vegetation screening
N22-1	T22 (4.09)	4	VIZ2	Yes	Yes	Yes	Yes	Vegetation screening

Receiver	Distance (km) to closest turbine	No. of turbines between blue and black line (3km – 4.4km)	VIZ	Complies with visual performance objective (Yes / No)				Recommended Mitigation
				Ark assessment	Department and OHD assessment *			
				All objectives	Visual Magnitude	Multiple wind turbine	Landscape scenic integrity	
W22-1	T7 (4.28)	1	VIZ2	Yes	Yes	Yes	Yes	Vegetation screening
M23-1	T22 (4.32)	1	VIZ2	Yes	Yes	Yes	Yes	Vegetation screening
K23-1	T66 (4.36)	1	VIZ2	Yes	Yes	Yes	Yes	Vegetation screening
Davis Creek Cluster								
W8-1	T12 (3.31)	6	VIZ2	Yes	Yes	Yes	Yes	Vegetation screening
S4-1	T12 (3.51)	3	VIZ2	Yes	Yes	Yes	Yes	Vegetation screening
P7-1	T17 (3.52)	5	VIZ2	Yes	Yes	Yes	Yes	Vegetation screening
Q5-1	T12 (4.11)	2	VIZ2	Yes	Yes	Yes	Yes	Vegetation screening

Notes:

\* The Department and OHD consider that the performance objectives for key feature disruption, shadow flicker and blade glint, and aviation hazard lighting are achieved at all receivers (discussed further in section 6.2 of this report).

\*\* With the Department's recommendation to delete two turbines (T64 and T68) the number of turbines in proximity to the identified residences reduces.

## Appendix M – Independent Visual Advice

Available at: <https://www.planningportal.nsw.gov.au/major-projects/projects/bowmans-creek-wind-farm>