LIVERPOOL RANGE WIND FARM

Modification Assessment Report (Mod-1)

(Development Consent State Significant Development SSD 6696)

September 2022

Liverpool Range Wind Farm

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Certification

I certify that I have prepared the contents of this Modification Assessment Report (Environmental Impact Statement) in accordance with Schedule 2 of the Environmental Planning and Assessment Regulations 2021. To the best of my knowledge, this report contains all available information that is relevant to the environmental assessment of the development, activity or infrastructure, and that information in the EIS is neither false nor misleading.

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Matt Stafford (Senior Environment and Development Planner)

1 September 2022

Executive Summary

The approved Liverpool Range Wind Farm (the Project) is a large scale renewable energy project which extends over a very large site of approximately 51,336.7 ha in area, extending some 67.5 km from top to bottom (Project site).

The Project site spans the Warrumbungle, Upper Hunter and Mid-western local government areas (LGAs) and is located approximately six kilometres (kms) east of Coolah township and approximately 230 kms northwest of Newcastle, New South Wales (NSW). The Project is located within, and forms a key component of, the Central-West Orana Renewable Energy Zone (REZ) declared under the *Electricity Infrastructure Investment Act 2020* (NSW).

This Modification Assessment Report has been prepared to support a request to modify development consent SSD 6696 (Development Consent) granted for the Project under section 4.55(2) of the *Environment Planning and Assessment Act 1979* (EP&A Act) on 27 March 2018.

The Development Consent authorises the construction, operation and decommissioning of up to 267 wind turbines, with a maximum blade tip height of 165 metres (m), and associated infrastructure subject to detailed conditions (Approved Project).

The Project is owned by Liverpool Range Wind Farm Pty Ltd (the Applicant), as part of a subsidiary of a portfolio of companies that are trading as Tilt Renewables. The Project was originally developed by Epuron Pty Ltd and was subsequently acquired by Tilt Renewables in March 2019.

Since the Development Consent was granted in 2018 there have been significant advances in wind turbine technology which enable more renewable energy to be generated using a smaller number of larger wind turbines. In addition, Tilt Renewables, on behalf of the Applicant, has reviewed and updated the layout of the Project to optimise its design and address constructability issues.

This application to modify the Development Consent (Modification Application) seeks to update the Project layout so as to enable the use of a smaller number of larger more efficient wind turbines and optimise the design of the Project so as to address constructability issues (Proposed Modification). This Modification Application contains a detailed assessment of the potential environmental impacts associated with the Proposed Modifications and updates a number of the measures proposed to effectively mitigate and manage these.

Pending assessment and determination of this Modification Application and finalisation of offtake agreements for the Project, that the Applicant currently proposes to commence construction of the Project in 2024. This will enable the Project, as a key component of the Central-West Orana REZ, to significantly contribute to addressing, soon as practicable, the predicted shortfall in NSW's generation capacity which will otherwise arise following the scheduled retirement of Liddell Power Station in April 2023, Eraring Power Station in 2025 and other coal-fired generators over coming years. In particular, the modifications proposed to the approved Project will:

- increase the indicative renewable energy generation capacity of the Project from approximately 962 MW to approximately 1,320 MW while reducing the total number of turbines required; and
- increase the estimated greenhouse gas benefits of the Project from approximately 2.1 million tonnes of CO2 savings per year to approximately 2.9 million tonnes CO2 savings per year.

The detailed layout review and design optimisation process (described in Appendix A) identified that various changes to the Approved Project are required (collectively referred to as the Proposed Modifications). The key changes forming the Proposed Modification are:

- the removal of 47 wind turbines forming part of the Approved Project so that the maximum number of turbines proposed will be 220 (as opposed to the currently approved up to 267 wind turbines);

- an increase in the maximum turbine envelope proposed to enable the use of newer more efficient wind turbine technology with a maximum blade tip height to 250 m above ground level (as opposed to the currently approved up to 165 m tip height) as well as updates to the locations of a number of the wind turbines; and
- updates to the associated infrastructure to accommodate the revised turbine layout and the other design optimisations identified as necessary to ensure the constructability of the Project.

The changes proposed to the Approved Project as part of the Proposed Modification (Modified Project) are summarised in detail in the table below. Each of the Proposed Modifications are set out and assessed in detail in this Modification Assessment Report.

Summary of Proposed Modifications

Themes	Proposed Modifications
Turbine Parameters	- Removal of a total of 47 approved turbines, reducing the maximum number of turbines proposed from 267 to 220. - Increasing the maximum blade tip height to 250 m above ground level (AGL) (currently approved up to 165 m AGL). - Updating the locations of a number of the turbines to accommodate the revised turbine spacing required for the larger turbines. - Increasing the distance by which turbines may be micro-sited to within 250 m of their updated approved locations (currently a micro-siting limit of 100 m is specified).
Permanent Wind Farm Infrastructure	- Updates to the locations of wind farm infrastructure such as on-site collector substations, access tracks, operation and maintenance (O&M) facilities, overhead power lines and underground cabling, and temporary infrastructure such as concrete batch plants, laydown areas, and construction compounds, to reflect the revised turbine numbers and locations and an improved understanding of site constraints and constructability. - Minor amendments to the alignment of the portion of the transmission line internal to the Wind Farm Site to reflect the revised turbine layout and based on an improved understanding of site constraints and constructability. - The inclusion of up to 14 permanent Power Curve Validation (PCV) meteorological masts (referred to as permanent met masts) to the final hub height (currently approved for up to 10) at 40 indicative locations. - Inclusion of up to 7 on-site collector substations (currently approved for up to 4) at 10 indicative locations within the Wind Farm Site. - Inclusion of up to 3 permanent O&M facilities (currently approved for up to 1) at 6 indicative locations. - Inclusion up to 47 site access points from nearby public roads to facilitate construction and ongoing maintenance of the wind farm components located north of the Golden Highway.
External Transmission Line and Connection Infrastructure	- Amend a short section of the external transmission line alignment near Durridgere State Conservation Area to minimise potential visual impact to nearby Non-associated residence. - Include an optional alternate transmission line alignment to avoid a portion of the Durridgere State Conservation Area. - Relocation of temporary construction compound/laydown area/concrete batch plant within the External Transmission Line Site to a location near Cliffdale Road. - Amend a short section of the External Transmission Line alignment located near the Hands on Rock cultural heritage site to avoid/minimise impacts to this site. - Include potential upgrade works to Transgrid's transmission line infrastructure at the proposed point of connection at Ulan. - Include up to 43 site access points from nearby public roads to facilitate construction and ongoing maintenance of the proposed External Transmission Line located south of the Golden Highway. - Remove Approved Site Access Point #9 off Vinegaroy Road as it is no longer required.

Themes	Proposed Modifications
Temporary Ancillary Infrastructure	- Inclusion of up to 9 temporary concrete batch plants operational at any given time (currently approved for up to 4) at 18 indicative locations within the Wind Farm Site. - Inclusion of up to 9 temporary construction compounds and material laydown areas (currently approved for up to 6) at 18 indicative locations within the Wind Farm Site. - Inclusion of up to 28 temporary site calibration met masts to the final hub height, to be located at a subset of the turbine locations and removed prior to erection of each relevant turbine.
Preferred Transport Route	- Modify the Approved Over Dimensional (OD) and Heavy Vehicle Access Route to remove the southern section of Rotherwood Road (which is no longer required) and enable the eastern portion of Gundare Road (located within the Modified Site Boundary) to be used for Light and Heavy vehicles (Modified OD and Heavy Vehicle Access Route). The western portion of Gundare Road outside of the Modified Site Boundary is no longer proposed to be used. - Update the indicative Over-size/over-mass (OSOM) Haulage Route to enable the transportation of longer blades and larger wind farm components from the Port of Newcastle to the Project site (Modified OSOM Haulage Route).
Public Road Upgrades	- Identify and assess the public road upgrades which are anticipated to be required to construct and maintain the Project. - Update the road upgrade standards to reflect matters agreed with the relevant Councils, and include a mechanism to review the applicable road upgrade standards if required at highly constrained locations
Potential Staging	- Allow for potential sequencing of the delivery of the public road upgrades and on-site construction activities to allow on-site construction works to commence progressively.
Development Corridor and Indicative Development Footprint	- Modify the approved Project Site Boundary and Development Corridor to reflect the changes to the wind farm layout and transmission line alignment proposed (referred to as the Modified Site Boundary and Modified Development Corridor, respectively). - Only minimal changes are proposed to the Modified Site Boundary which will continue to cover an area of approximately 52,123.6 ha, extending some 67.5 km from top to bottom. - The Modified Development Corridor and indicative development footprint has been informed by the detailed design work completed, 3D terrain modelling and construction experience from other projects, overall leading to a more realistic estimate of the construction impacts of the Project. In particular the Modified Development Corridor within which all on-site infrastructure and works will be located is proposed to be updated to a total area of 12,601.7 ha consisting of: ○ the external transmission line, with an area of 2,906.2 ha; and ○ the balance of the Project (including wind turbines, substations and other ancillary infrastructure, referred to collectively as the Wind Farm), with an area of 10,317.1 ha.
Conditions of Consent	- Updates to the conditions of the Development Consent to reflect the updated indicative development layout. - Updates to the conditions of the Development Consent related to micro-siting, Aboriginal cultural heritage, noise, traffic and transport, and visual impact to reflect the Proposed Modifications and incorporate the key recommendations of the further technical assessments included as part of this modification application. - Update native vegetation and habitat clearance limits as required to reflect the Modified Project layout including the public road upgrades.
Subdivision of Land	- Include subdivision of additional land to create new separate lots for the connection and collector substations, and associated ancillary facilities.

Justification for the Proposed Modifications

The Proposed Modifications are required to enable the Project to utilise recent improvements in wind energy technology that allow the Project to generate significantly more renewable energy using fewer, larger wind turbines and to reflect the outcomes of the ongoing design optimisation and assessment carried out as the Project and ensure the Project remains constructible.

The key justifications for the Proposed Modification and the associated benefits can be summarised as follows:

- The Proposed Modification will materially increase the indicative renewable energy generation capacity of the Project while reducing the total number of turbines required. The renewable generation capacity of the Project will increase from approximately 962 MW to approximately 1,320 MW which represents an increase of approximately 358 MW per annum of renewable energy. This is enough to power an additional 185,000 average homes each year. Accordingly, the Proposed Modification will materially assist in preventing forecast energy shortfalls and managing rising energy costs to benefit energy consumers as coal fired power stations are retired in coming years.
- The Proposed Modification will also materially increase the estimated greenhouse gas benefits of the Project. The CO2 emissions savings from the Modified Project will increase from approximately 2.1 million tonnes of CO2 emissions savings per year to 2.9 million tonnes CO2 emissions savings per year. This represents an additional 800,000 tonnes of CO2 emissions savings per year which is equivalent to removing the emissions from an additional approximately 261,000 cars per year. If the Modified Project is approved it could be constructed and fully operational well before 2030, with all carbon emissions associated with the construction and manufacturing of the Project offset within the first year of operations. In doing so, the Project will make a positive contribution to the achievement of the 35% reduction in CO2 emissions by 2030 which is generally regarded as being critical to contain climate change impacts. The Modified Project will also materially assist NSW and Australia in meeting their greenhouse gas reduction targets of net-zero by 2050.
- The Project layout changes and updated design assumptions incorporated in the Proposed Modification have been informed by experiences in recent wind farm construction and the extensive use of 3D terrain modelling which has resulted in more accurate estimates of the extent of ground disturbance required to construct the Project and enabled a more detailed assessment of associated environmental impacts. The changes proposed to the Project layout have been carefully designed and located based on an evidence-based environmental constraints-driven approach to ensure impacts are minimised to the extent practicable.
- The Modified Project will provide full time employment for approximately 800 staff during construction and approximately 47 full-time jobs during its operational life, providing increased employment opportunities.
- The Modified Project will also result in a direct injection of approximately $6-7 million per annum to the local community through direct payments to landholders, Voluntary Planning Agreement (VPA) contributions, and other benefit sharing programs, providing better diversification of income and a drought-proof and post-retirement income for farmers.
- The Modified Project is also expected to provide a material boost to the local, regional and state-wide economies, particularly through flow-on economic activity during the construction phase, as follows:
    - **State level:** an estimated $685.57 million of added value over entire construction period ($221.4 million per year) and 4,608 person years (FTE) of employment over entire construction period (1,488 jobs per year)

- **Regional level:** an estimated $95.47 million of added value over entire construction period ($30.83 million per year) and 712 person years (FTE) of employment over entire construction period (230 jobs per year).

Potential Environmental Impacts

Detailed assessments by a team of appropriately qualified technical specialists have been completed to confirm the potential environmental impacts associated with the Modified Project and enable these to be compared to the Approved Project. These detailed assessments are included in Appendixes G.1 to G.9 of this Modification Assessment Report. Each of these detailed impact assessments:

- identify and assess the potential environmental impacts associated with the Modified Project;
- evaluate the change in potential impacts when compared with the Approved Project based on the findings of the Liverpool Range Wind Farm Environmental Assessment dated July 2014 (Original EIS), as modified and supplemented by the Liverpool Range Wind Farm Response to Submissions dated May 2017 (Original RTS); and
- where required, propose updated and additional mitigation and management measures to address the impacts of the Modified Project during the construction and operation phases.

Summaries of the key findings of these detailed impact assessments are provided in Section 7.0.

The table below summarises the key changes in the potential environmental impacts of the Project as a result of the Modified Project and the additional mitigation strategies and updates to the Development Consent conditions proposed to address these.

The environmental impact assessments prepared for the Modified Project confirm that the Proposed Modification will result in some increased impacts but that most of these will continue to be appropriately managed by the existing mitigation and management measures required by the conditions of the Development Consent and the measures set out in the Statement of Commitments (SoCs) contained in the Original RTS. However, a number of amendments are proposed to the SoCs to ensure full alignment with the conditions of the Development Consent and to include additional commitments to address the impacts arising from the Modified Project, including additional benefit sharing commitments.

The Applicant is strongly committed to ensuring that the mitigation and management measures reflect and are implemented in accordance with best practice as informed by the detailed assessment of the Modified Project so as to ensure the best possible outcomes for the Project and for the local and wider community.

Summary of changes to the potential environmental impacts and updated mitigation strategies

Specialist assessment type	Changes in impacts between the Approved Project and the Modified Project	Changes to mitigation strategies	Changes to Development Consent
Visual Impact	The magnitude of change to the surrounding visual landscape resulting from the Modified Project is largely consistent with the level of change that was deemed acceptable for the Approved Project. In accordance with the visual magnitude tools contained in the NSW 'Wind Energy: Visual Assessment Bulletin', the proposed increase in maximum blade tip height results in: - the 'black line' of visual magnitude varying from 2,200 m for the Approved Project to 3,350 m for the Modified Project; and	**Yes** See Appendix D for a description of the changes to the Statement of Commitments	**Yes** See Section 4.0 for the description of the Proposed Modifications. See impact assessment in Section 7.3 and Appendix G.1.

Specialist assessment type	Changes in impacts between the Approved Project and the Modified Project	Changes to mitigation strategies	Changes to Development Consent
	- the 'blue line' of visual magnitude varying from 3,300 m for the Approved Project to 4,950 m for the Modified Project. A total of 57 Non-associated residences are located within 4,950 m of a turbine proposed by the Modified Project. Of these: - a total of 12 Non-associated residences (an increase of 10) are included within the 'black line' required more detailed assessment as a result of the Modified Project. Following detailed ground-truthing surveys, 10 out of the 12 Non-associated residences now have reduced visual impact ratings compared to the Approved Project. - a total of 45 Non-associated residences (an increase of 36) are included between the 'black line' and the 'blue line' as a result of the Modified Project. There are no changes to the visual impact ratings at all other Non-associated dwellings within the 'black line' or 'blue line' that were previously assessed as part of the Original EIS/RTS. Five Non-associated residences located within 4,950 m of a turbine that were not previously assessed in the Original EIS/RTS have now been assessed as Very Low (Dwelling ID: 12 and 13), Low to Medium (Dwelling ID: 1 and 11), Medium (Dwelling ID: 2). - the Modified Project results in the distance to the nearest turbine being: ○ reduced for 32 of the Non-associated dwellings; ○ increased for 23 of the Non-associated dwellings, and ○ remaining the same for 2 of the Non-associated dwellings. Changes to the turbine layout and dimensions proposed by the Modified Project would be discernible from some surrounding and proximate view locations. Overall, the number of visible wind turbine hubs and blade tips (as modelled) would be subject to marginal increases and decreases from Non-associated residences within 4,950 m of a turbine proposed by the Modified Project: - 30 Non-associated residences are likely to have increased number of turbines visible. - 25 Non-associated residences are likely to have a reduced number of turbines visible. - Two Non-associated residences are likely to have no variation in the number of turbines visible. Due to the revised turbine layout proposed by the Modified Project, the application of the Multiple Turbine Tool identified an increase of five Non-associated dwellings where the number of 60 degree sectors increase from two 60 degree sectors to three		

Specialist assessment type	Changes in impacts between the Approved Project and the Modified Project	Changes to mitigation strategies	Changes to Development Consent
	60 degree sectors) as a result of the Modified Project. However, this tool is based on a 2D assessment and further detailed assessment of these dwellings identified topography and vegetation would likely reduce the number of sectors with turbines visible. Changes are proposed to mitigation strategies and consent conditions to enable visual mitigation measures to be made available to all non-associated residences within 4,950 m of an approved turbine (an increase of 950 m to the 4 km currently required under the conditions of the Development Consent).		
Shadow Flicker and Blade Glint	The Modified Project will result in no increased shadow flicker impacts at any Non-associated residences and no blade glint impacts on any Non-associated residences (see Section 7.4 and Appendix G.2). Accordingly, impacts will continue to be managed in accordance with the existing conditions imposed on the Development Consent.	No	No
Noise	The noise levels associated with the turbines, substations and ancillary equipment forming the Modified Project are predicted to achieve the relevant noise criteria at all nearby residences. This is consistent with the noise impacts of the Approved Project. The noise levels associated with construction traffic and construction activities as part of the Modified Project are predicted to be consistent with the Approved Project. However, the noise levels associated with the concrete batch plant proposed to be relocated off Cliffdale Road, along the External Transmission Line, may result in six Non-associated residences being considered 'Noise Affected' in relation to batching operations that occur outside of standard hours (i.e. during the evening and nighttime). Mitigation measures for evening and nighttime works will be implemented in accordance with the NSW *Interim Construction Noise Guideline, 2009* as required by the existing conditions of the Development Consent	No	**Yes** See Section 4.0 for the description of the Proposed Modifications. See impact assessment in Section 7.5 and Appendix G.3.
Biodiversity including Bird and Bat Impacts	A detailed Biodiversity Development Assessment Report (BDAR) has been prepared for the Modified Project in accordance with the assessment criteria in the Biodiversity Assessment Method (BAM), including more detailed and updated ecological surveys across the Modified Development Corridor. This confirms that there will be some additional impacts associated with the indicative development footprint for the Modified Project but that the nature of the impacts and the biodiversity values to be	No	**Yes** See Section 4.0 for the description of the Proposed Modifications. See impact assessment in Section 7.6 and Appendix G.4.

Specialist assessment type	Changes in impacts between the Approved Project and the Modified Project	Changes to mitigation strategies	Changes to Development Consent
	impacted is considered to be consistent with the Approved Project. The BDAR identifies that the more material additional impacts resulting from the Modified Project relate to White-Box-Yellow Box-Blakely's Red Gum Woodland and to birds and bats. In particular, the Modified Project results in: - impacts to 427.0 ha of *White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions* listed under the BC Act (increase of 226.15 ha). Approximately 90% of the impacted CEEC is considered to be in either derived native grassland or low condition. - impacts to 42.1 ha of *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland Ecological Community* listed under the EPBC Act (increase of 31.7 ha). This community has been assessed as Moderate to Good quality. In addition, the Modified Project is anticipated to have the following impacts to relevant Matters of National Environmental Significance (MNES) listed under the EPBC Act: - 577.8 ha of potentially suitable habitat for the regent honeyeater (threatened species) - 471.7 ha of potentially suitable habitat for the swift parrot (threatened species) - 284.5 ha of potentially suitable habitat for the large-eared pied bat (threatened species), and - 672.3 ha of potentially suitable habitat for the koala (threatened species). None of the potentially impacted threatened species have been recorded in the Modified Development Corridor. The Development Consent already contains detailed conditions requiring the minimisation and offsetting of impacts to protected vegetation, including via the preparation and implementation of a detailed Biodiversity Management Plan and the retirement of biodiversity offset credits. The biodiversity credit requirements for the Project are proposed to be updated to reflect the revised offset calculations contained in the BDAR. The Modified project will also result in an increased number of bird and bat species at risk of blade strike, due to the increased size of the turbines, the application of the criteria in the BAM, increased level of protection for certain species (e.g. white-throated		

Specialist assessment type	Changes in impacts between the Approved Project and the Modified Project	Changes to mitigation strategies	Changes to Development Consent
	needletail) since the Original EIS/RTS were prepared, and findings of recent bird/bat utilisation surveys. Despite this, the overall impact of blade strike and barotrauma is considered to be consistent with the Approved Project (see Section 7.7 and Appendix G.4). The Development Consent conditions already include requirements for a detailed Bird and Bat Adaptive Management Plan which will be developed and implemented to ensure impacts remain acceptable and additional mitigation measures are adopted if required.		
Aboriginal Cultural Heritage	Additional Aboriginal heritage items were identified in new areas included in the Modified Development Corridor and along public road reserves (which were not previously assessed). The Development Consent includes detailed conditions relating to the protection of Aboriginal heritage items, including a requirement for the development and implementation of a Heritage Management Plan. Additional mitigation measures have been proposed to be included in the Heritage Management Plan to manage these new heritage items. With the implementation of existing and proposed mitigation measures, the Modified Project would result in a similar level of impact to Aboriginal heritage items as the Approved Project.	No	**Yes** See Section 4.0 for the description of the Proposed Modifications See impact assessment in Section 7.8 and Appendix G.5. See Appendix C.4 for the updated Development Consent schedule.
Historic (Post-contact) Heritage	The Project will not impact on historic heritage listings of Commonwealth, National, or NSW State Significance. The Modified Development Corridor intersects with the curtilages of local heritage places 'Dalkeith' (Item I141) and 'Yarrawonga' (Item I140) identified in the Upper Hunter Local Environmental Plan 2013. The Development Consent includes detailed conditions relating to the protection of historic heritage items, including a requirement for the development and implementation of a Heritage Management Plan. The Heritage Management Plan will include measures to ensure that impacts on Historic Heritage are minimised and remain similar to the Approved Project (see Section 7.9 and Appendix G.6).	No	No
Traffic and Transport	The Modified Project is estimated to result in a 12% reduction in Heavy and OSOM vehicle movements during construction and an overall minor reduction (5%) in total combined (Light, Heavy and OSOM) construction vehicle movements. Additional site access points from nearby public roads have been identified as being required to construct the wind farm and transmission line and	**Yes** See Appendix D for a description of the changes to the Statement of Commitments	**Yes** See Section 4.0 for the description of the Proposed Modifications. See impact assessments in Section 7.10 and

Specialist assessment type	Changes in impacts between the Approved Project and the Modified Project	Changes to mitigation strategies	Changes to Development Consent
	have been assessed to meet the relevant safe sight distance criteria. No major ecological or heritage constraints have been identified at impact areas along the updated indicative OSOM Haulage Route.		Appendix G.7.1, G.7.2, G.7.3, and G.7.4. See Appendix C.6 for the updated Development Consent schedule.
Public Road Upgrades	The Modified Project includes greater detail on the public road upgrades required to accommodate the construction traffic associated with the Project and assesses the impacts of the anticipated public road upgrades within Warrumbungle, Upper Hunter and Mid-western local government areas (LGAs). These were not previously assessed for the Approved Project. Revised road upgrade standards have also been agreed with each of the Warrumbungle, Upper Hunter and Mid-western councils. The existing Development Consent conditions are proposed to be updated to reflect the revised road upgrades and standards.	**Yes** See Appendix D for a description of the changes to the Statement of Commitments	**Yes** See Section 4.0 for the description of the Proposed Modifications. See impact assessment in Section 7.10. See Appendix C.5 for the updated Development Consent schedule.
Electromagnetic Interference	The Modified Project has been assessed as having impacts that were not identified for the Approved Project, as follows: - Potential for interference with Bureau of Meteorology's Namoi weather radar. - Potential impact with a point-to-point communications link recently proposed by NSW Telco. - Potential interference with one nearby land mobile licence. A range of mitigation options are available to appropriately address these impacts (see Section 7.11 and Appendix G.8).	**Yes** See Appendix D for a description of the changes to the Statement of Commitments	No
Aviation	The Modified Project will have no impact on any Obstacle Limitation Surface (OLS) or Procedures for Air Navigation Services – Aircraft Operations.(PANS OPS) surfaces. Little to no impact upon local flying activities or military flight operations, and unlikely to affect air traffic control (ATC) surveillance. Aviation hazard lighting is not recommended as required for the Modified Project. Infringement into the grid Lowest Safe Altitude (LSALT) protection surface will require an increase of the LSALT surface from existing 5,400 ft to 5,500 ft (increase of 100 ft). This is a routine activity and considered to be an adequate mitigation strategy (see Section 7.12 and Appendix G.9). The Development Consent already includes detailed conditions to appropriately address any aviation impacts of the Project.	No	No

Stakeholder engagement

Since Tilt Renewables acquired the Project in 2019, the Applicant has consulted extensively with key stakeholders, including relevant agencies and the local community, and will continue to do so as the Project progresses through to construction and into the operational phase.

The Applicant has engaged extensively with landowners and neighbours, community members, councils where the Project is located and along the haulage route from the Port of Newcastle, as well as State and Commonwealth government to seek feedback on the Proposed Modifications. Community and stakeholder engagement has occurred via a variety of methods, including the following:

- Project newsletter updates
- Project webpage updates
- Community Consultative Committee (CCC) meetings, generally held quarterly(most recently held in March 2022)
- Pre-lodgement community drop-in information sessions held in Cassilis and Coolah between 26-28 October 2021
- Responses to enquiries made through the general 1800 number (1800 WE TILT) and project email address (liverpoolrangewindfarm@titlrenewables.com)
- Regular meetings with State and Commonwealth government departments and local councils

As outlined above, pre-lodgement community consultation drop-in sessions were held in Coolah and Cassilis in October 2021 via both in-person attendance and webinar information sessions. Despite extensive efforts made by the Applicant to promote the drop-in sessions – which included sending out newsletters, publishing advertisements in local newspapers, and placing updates on the Project webpage – attendance at these sessions (in-person or virtually) was relatively low and the number and extent of questions or concerns raised by community members attending was also low. Where issues or queries were raised they generally related to the following themes:

- Native bird and bat impacts
- Weed control and attraction of illegal hunters
- Visual impact of turbines
- Electromagnetic Interference
- Proximity of turbines to residences
- Impacts to aerial agricultural activities
- Operational noise
- Construction noise
- Construction traffic noise
- Disruptions due to public road upgrades
- External Transmission Line alignment
- Cumulative impact of nearby proposed wind farms
- Impact upon property values
- Voluntary Planning Agreement (VPA)
- Other benefit sharing opportunities

The key questions and concerns raised by State and Commonwealth agencies have been grouped into the following themes:

- Potential impact to the Bureau of Meteorology's Namoi weather radar
- Potential impact to point-to-point communications link recently proposed by NSW Telco
- Use of local roads within Muswellbrook local government area (LGA) by OSOM haulage vehicles
- Road upgrade standards

- Biodiversity survey approach and effort
- Voluntary Planning Agreement (VPA)

A summary of pre-lodgement consultation with relevant agencies and the community that was undertaken as well as an explanation on how the Modified Project responds to questions and concerns raised is provided in Section 6.0.

All relevant questions and concerns raised through consultation with the community and relevant agencies are discussed in this Modification Assessment Report and are appropriately addressed through the existing and proposed modifications to the Conditions of Consent and Statement of Commitments.

Conclusion

The Project is a key component of the Central-West Orana REZ and will significantly contribute to addressing the predicted shortfall in NSW's generation capacity and managing rising energy costs to benefit energy consumers while meeting the NSW and Commonwealth greenhouse gas reduction targets of net zero by 2050.

While the Modified Project is considered to remain substantially the same development as that authorised by the Development Consent, it includes a number of changes to the Approved Project. These changes are required to enable more renewable energy to be generated using a smaller number of larger wind turbines, optimise the design of the Project layout and address constructability issues so as to enable the Project to deliver these key benefits

While there will be some additional impacts associated with the Modified Project, the majority of the impacts will remain generally consistent with the Approved Project. In some cases, the potential impacts of the Modified Project have been reduced from the Approved Project based on the outcomes of further assessment. For example, further detailed ground-truthing has confirmed that the visual impact ratings are reduced for the majority of Non-associated residences located within 3,350 m of a turbine and remain unchanged for all other Non-associated residences located within 4,950 m of a turbine. In addition, peak construction traffic volumes associated with the Modified Project are expected to be slightly less than the Approved Project. However, it is acknowledged that the Modified Project will result in some additional impacts, most notably on native vegetation and bird and bat species. These additional impacts are considered justified in light of the material benefits arising from the Proposed Modification and can be appropriately managed through the implementation of additional reasonable and feasible mitigation measures as outlined in this Modification Assessment Report.

The Modified Project is consistent with the objectives of the EP&A Act. It adheres to ecologically sustainable development principles through the integration of relevant economic, environmental and social considerations. It will also make a positive contribution to the protection of the environment, including by materially assisting in the clean energy transition and greenhouse gas reductions, and delivering material benefits to the social and economic welfare of the local and regional community. Overall, the Modified Project is expected to deliver positive net benefits for the community and environment and is strongly aligned with NSW and Commonwealth government energy and climate change policies. It is considered that the Modified Project is strongly in the public interest and that the benefits it brings will outweigh any additional impacts arising in comparison to the Approved Project.

1.0 Introduction

This report has been prepared to support a request to modify Development Consent State Significant Development (SSD) 6696 (Development Consent) that was granted for the Liverpool Range Wind Farm (LRWF) project, under Section 4.55(2) of the *Environment Planning and Assessment Act 1979* (EP&A Act).

The Development Consent was granted under delegation from the Minister for Planning on 27 March 2018 for the construction, operation and decommissioning of up to 267 wind turbines with a maximum tip height of 165 m and associated infrastructure including a transmission line with an indicative capacity of 330 kV from within the wind farm to the proposed connection point at Ulan.

The Liverpool Range Wind Farm project (the Project) is located approximately 6 km east of Coolah township within the Central-West Orana Renewable Energy Zone (REZ), New South Wales (NSW).

In the years since the Development Consent was determined, there have been significant advances in wind turbine technology. Upon acquiring the Project in 2019 the Applicant has undertaken a detailed layout review and design optimisation process to progress the Project towards construction. This application to modify the Development Consent (Modification Application) has been pursued in order to take advantage of these technology changes and to reflect the key findings of the layout review and design optimisation process, and in doing so provide greater certainty with regards to the constructability of the Project and associated potential environmental impacts.

Pending assessment and determination of the Modification Application, the Project could commence in 2024.

1.1 Purpose and Structure of this Report

This Modification Assessment Report has been prepared to support the Modification Application and provides the context to the Proposed Modification, outlines and assesses the Proposed Modification, including by attaching detailed technical assessments of the key impacts as compared to the Approved Project. .

This Modification Assessment Report has been prepared in accordance with the *State significant development guidelines – preparing a modification report: Appendix E to the state significant development guidelines* (DPIE, 2021a) (SSD Modification Report Guidelines).

Table 1 below outlines the structure of this report and the purpose of each section, including a list of environmental impact assessments and other supporting documents included as appendices to this Modification Assessment Report.

Table 1: Report content

Section	Purpose / Content
Section 1.0: Introduction	*This section.*
Section 2.0: Background	Provides the background to the Project including an overview of the original Development Consent assessment process and details of the progression of the Project following the grant of the Development Consent.
Section 3.0: Existing Conditions	Describes the Approved Project, the Project site and surrounds, and the planning context, including relevant planning instruments and policies.
Section 4.0: The Proposed Modifications	Provides a detailed description of the Proposed Modification and how they have been developed so as to minimise impacts wherever practicable. Includes a brief summary of the layout review and design optimisation process and key assumptions (further details are contained in Appendix A). Provides an outline of the changes sought to the conditions of the Development Consent to reflect the Proposed Modification (further details are contained in Appendix B).

Section	Purpose / Content
Section 5.0: Justification	Provides the rationale and justification for the Proposed Modifications.
Section 6.0: Stakeholder and Community Engagement	Describes the stakeholder and community engagement undertaken for the Approved Project and Proposed Modifications.
Section 7.0: Modification Environmental Assessment	Provides a summary of the detailed technical assessments contained in Appendix G.1 to G.9 of the environmental impacts associated with the Modified Project, and an evaluation of the change in impacts compared to the Approved Project.
Section 8.0 Statement of Commitments	Provides a short summary of the assessment of the Modified Project against the Statement of Commitments (SoCs). The detailed assessment is provided in Appendix D.
Section 9.0: Other Legislation	Provides an overview of the key State and Commonwealth environmental legislation and policies relevant to the Project in addition to the EP&A Act.
Section 10.0: Conclusion	Presents the overall conclusions of this report.
References	Provides a list of all key documents referenced in this report.
Key Terms and Definitions	Provides a list of the key terms and definitions used in this report.
Appendices	A. Design Review and Layout Optimisation Process B. Assessment Against Development Consent C. Updates to the Development Consent - C.1 Schedule of Land - C.2 Development Layout - C.3 Wind Turbine Coordinates - C.4 Heritage Items List and Map - C.5 Schedule of Road Upgrades - C.6 Over-Dimensional and Heavy Vehicle Access Route Restrictions D. Assessment Against Statement of Commitments E. Infrastructure Changes F. Indicative Development Footprint – Public Road Upgrades G. Specialist Assessments: - G.1 Visual Impact Assessment - G.2 Shadow Flicker Assessment (inc. Blade Glint) - G.3 Predictive Noise Impact Assessment - G.4 Biodiversity Development Assessment Report (Vegetation/Habitat and Birds/Bats) - G.5 Aboriginal Cultural Heritage Assessment - G.6 Historic (Post-contact) Heritage Assessment - G.7.1 Traffic Impact Assessment - G.7.2 Over-size/Over-mass Haulage Route Assessment - G.7.3 Ecology Due Diligence Assessment – Indicative OSOM Haulage Route - G.7.4 Heritage Due Diligence Assessment – Indicative OSOM Haulage Route - G.8 Electromagnetic Interference Assessment - G.9 Aviation Impact Assessment H. Stakeholder and Community Engagement Plan

1.2 The Applicant

The applicant for the Project is Liverpool Range Wind Farm Pty Ltd (the Applicant), a subsidiary of a portfolio of companies that are trading as Tilt Renewables.

At the time the Development Consent was granted, the Project was owned by Epuron Pty Ltd.

In March 2019 Tilt Renewables subsequently acquired the Project from Epuron Pty Ltd.

Tilt Renewables' objective is to be a leading investor in, and owner of, large-scale renewable generation in Australia and, in doing so, to support Australia's transition to a clean energy economy.

Tilt Renewables has a strong track record of developing, building, owning and operating wind assets in Australia. It is committed to ensuring that its projects are designed sensitively and are constructed so as to minimise environmental impacts and maximise public benefits, and to developing and maintaining strong relationships with the communities where its projects are located.

On 3 August 2021 Tilt Renewables was acquired by PowAR (Powering Australian Renewables). Tilt Renewables is now the largest owner of wind and solar generation projects in Australia – and the largest mainland renewable energy generator after Snowy Hydro.

Tilt Renewables has developed, owns and operates more than 1,313 MW of renewable generation capacity, with eight operating wind and solar farms, one project in the final stages of commissioning, and one NSW wind farm (Rye Park Wind Farm, near Yass) having commenced construction in November 2021.

Tilt Renewables' Australian energy projects which are operating or under construction or commissioning include the following:

New South Wales

396 MW Rye Park Wind Farm (under construction)

199 MW Silverton Wind Farm

10 MW Blayney Wind Farm

5 MW Crookwell Wind Farm

102 MW Nyngan Solar Plant

53 MW Broken Hill Solar Plant

Queensland

453 MW Coopers Gap Wind Farm (commissioning)

Victoria

336 MW Dundonnell Wind Farm

54 MW Salt Creek Wind Farm

South Australia

101 MW Snowtown Wind Farm

Tilt Renewables has significant construction management experience and understands how contemporary wind farm projects need to be designed and delivered. The Proposed Modification has been informed by our detailed delivery-phase knowledge and experience to ensure that the Project layouts is constructible and that all potential environmental impacts such as native vegetation clearance, traffic generation, and water resource requirements, are accurately estimated and appropriately assessed.

1.3 Technical Specialists

This report has been prepared by the Applicant supported by technical assessments and advice from a team of highly qualified technical specialists as outlined in Table 2.

Table 2: Technical specialists

Technical Area/Subject	Technical Specialist
Visual Impact	Moir Landscape Architecture Pty Ltd
Noise	Sonus Pty Ltd
Ecology	Umwelt Pty Ltd
Aboriginal Cultural Heritage	Umwelt Pty Ltd
Historic (European) Heritage	Umwelt Pty Ltd
Electromagnetic Interference	WSP Pty Ltd

Technical Area/Subject	Technical Specialist
Shadow Flicker	WSP Pty Ltd
Traffic and Transport	GTA Consultants Pty Ltd (now Stantec)
Public Road Upgrades	iCubed Consulting Pty Ltd
Infrastructure Design Assumptions	- Zenviron Pty Ltd (preliminary civil and electrical design) - UDCS Pty Ltd (overhead line design) - Lumen Pty Ltd (transmission line design)
Socio-Economic Impact Assessment	Hudson Howells
Water Availability Assessment	Water Resource Drilling Pty Ltd

2.0 Background

2.1 Planning and Environmental Approvals

The Project is State significant development (SSD) under the EP&A Act and was accordingly assessed in accordance with what is now Division 4.7 of the EP&A Act.

A chronology of the key NSW environmental assessments, regulatory review and approval events is summarised below:

- **Part 3A Major Project Declaration:** On 10 December 2010 the Project was declared to be a Major Project and 'critical infrastructure' subject to the former Part 3A of the EP&A Act.
- **Preliminary Environmental Assessment and Director General's Requirements:** On 11 February 2011 a Major Project Development Application (No: MP10_0225), accompanied by a Preliminary Environmental Assessment report, was lodged under the former Part 3A of the EP&A Act. Director General's Requirements (DGRs, now referred to as Secretary's Environmental Assessment Requirements (SEARs)) were issued for the Project on 31 March 2011. provided the assessment requirements for the Project. Supplementary DGRs were issued on 16 August 2011 and 25 March 2014.
- **Transition of the Project to SSD:** Following the repeal of Part 3A of the EP&A Act, on 21 March 2014 the Project was transitioned to be SSD under what is now Division 4.7 of the EP&A Act. The relevant transitional provisions in force at the time operated so that all steps taken previously we deemed to have been taken under the equivalent SSD provisions.
- **Lodgement of Original EIS:** The Original EIS for the Project was lodged in July 2014. The Original EIS proposed a wind farm project with a maximum of up to 288 turbines, each with a maximum blade tip height of 165 m AGL.
- **First Public Exhibition:** The Original EIS was placed on public exhibition between 1 August 2014 and 1 October 2014. A total of 42 submissions (17 of which were objections, of which approximately 50% were from residents and local interest groups located within 5 kilometres of the project site) were received.
- **Lodgement of Original RTS:** Following the public exhibition period, a number of changes were made to the Project in response to the issues raised in submissions, including biodiversity, visual, noise and traffic impacts. The Original RTS was lodged in May 2017 and included a number of changes to the Project, including the removal of 6 turbines, resulting in a proposal for a maximum of up to 282 turbines. On 2 June 2017, the Applicant provided an additional letter confirming that it was proposed to remove an additional 10 turbines, resulting in a proposal for a maximum of up to 272 turbines (Amendment Letter).
- **Second Public Exhibition**: The Original RTS and Amendment Letter were publicly exhibited between 16 June 2017 and 18 July 2017. A total of 23 submissions (either as new submissions or updates to submissions made in relation to the Original EIS) were received. Of these, six were objections from members of the community. In total, 20 separate objections were received from the general public during the Original EIS and Original RTS exhibition periods.
- **Development Assessment:** The Department of Planning and Environment (DPE) carried out an assessment of the Project and prepared an assessment report. The assessment report recommended that the Project be approved subject to detailed conditions and noted that:

  > *The Department acknowledges there is some community opposition from local landowners and special interest groups to the project. However, the Department considers that the project would achieve a reasonable balance between maximising the use of the site's wind resources, and minimising the potential impacts on the local community and environment.*

To address the residual impacts of the project, the Department has recommended a range of detailed conditions to ensure these impacts are effectively minimised and/or offset. These conditions use a risk-based approach that focuses on performance-based outcomes. This reflects current government policy, and the fact that wind farms require relatively limited ongoing environmental management once the turbines have been commissioned.

Importantly, taking into consideration the amendments made to the project through the assessment process, the project would still be the largest approved wind farm in NSW with an installed capacity of up to 960 megawatts, consistent with both the Commonwealth Government's Renewable Energy Target and NSW's Renewable Energy Action Plan, with all the associated benefits to the wider community, including job creation, capital investment, reduction in greenhouse gases, and community funding contributions of up to approximately $800,000 a year (plus CPI) through a voluntary planning agreement with Warrumbungle and Upper Hunter Shire Councils.

As such, following on from its assessment of the project, the Department considers that the project is approvable, subject to the recommended conditions of consent.

- **Development Consent:** Development Consent for the Project was granted under delegation by the Deputy Secretary, Planning Services under Part 4 of the EP&A Act on 27 March 2018. The Development Consent authorises the construction, operation and decommissioning of up to 267 turbines with a maximum blade tip height of 165 m AGL, and associated infrastructure subject to detailed conditions.

The detailed conditions imposed on the Development Consent (Conditions of Consent) regulate all impacts of the Project.

A table containing a summary of all of the current Conditions of Consent is contained in Appendix B.

Condition 2 of the Development Consent requires the Project to be carried out:

(a) generally in accordance with the EIS; and
(b) in accordance with the conditions of this consent.

The EIS is defined by the Development Consent to relevantly include the Original EIS and RTS.

The Original RTS included a Statement of Commitments (SoCs) which set out a suite of mitigation measures proposed to be implemented during the construction and operational phases of the Project. The SoCs have been updated to reflect the Modified Project and are contained in Appendix D.

On 29 June 2018, the Project was subsequently granted approval under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) subject to conditions (EPBC Approval). Further details on the EPBC Approval are contained in Section 9.2.

A summary of the other key State legislation which applies to the Project is set out in Section 8.0.

2.2 Project Development

Since the Development Consent was granted, the Applicant has undertaken a significant amount of work to progress the Project towards construction. This includes:

- undertaking a design review of the Project to make necessary refinement to the layout and design of the Project, including to enable the use of newer more efficient and larger wind turbine technology and ensure it remains constructible;
- taking steps towards satisfying the pre-construction Conditions of Consent;
- preparing a connection agreement application;
- entering into negotiations for procurement and offtake agreement contracts; and
- ongoing stakeholder engagement.

These key activities are summarised as follows:

- **Layout review and design optimisation:** A detailed layout review and design optimisation process has been undertaken to enable the use of newer more efficient and larger wind turbine technology and confirm constructability of the Project, including to more accurately estimate the extent of required ground disturbance and assess potential environmental impacts, and to inform financial modelling.

  The design progression has been informed by recent wind farm construction experience, including in relation to Tilt Renewables' Dundonnell Wind Farm in Victoria and the detailed design work that has been undertaken for the Rye Park Wind Farm project (currently under construction).

  The revised infrastructure layout the subject of the Proposed Modification has been informed by detailed wind energy assessments, extensive 3D digital terrain modelling and civil engineering design, and multiple site visits to ground-truth civil and electrical infrastructure locations and anticipated public road upgrades.

  A key driver for the majority of the layout changes has been to ensure constructability of the Project and to avoid and minimise environmental impacts as far as practicable. Significant effort has been invested into reducing impacts to biodiversity values, in particular to the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions listed under the under the *Biodiversity Conservation Act 2016* (NSW) (BC Act) and White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland Ecological Community listed under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act).

  Further details on the layout review and design optimisation process undertaken to date to derive the Modified Project is provided in Appendix A. The Applicant will continue to undertake ongoing detailed design of the Project as it proceeds towards construction, including having regard to the micro-siting limits permitted under the Development Consent (and any modifications made to these as part of any approval granted to the Proposed Modification).

  Section 4.9.1 provides details on the updated indicative disturbance footprints related to the Wind Farm, External Transmission Line, and Public Road Upgrades. A series of changes have been made to these to further avoid/minimise impacts to biodiversity and heritage values (see Section 7.6, 7.7 and 7.8 for details).

- **Condition compliance:** The Applicant is progressing activities towards complying with the pre-construction conditions of the Development Consent. This includes (but is not limited to):

  - **Baseline vegetation mapping:** In response to the requirements set out in the Development Consent (Condition 19(a) of Schedule 3) updated baseline vegetation mapping has been prepared as part of the Modification BDAR. The updated vegetation mapping has been undertaken in accordance with the rigorous requirements contained in the BAM and extends across the entire Modified Development Corridor and along the public roads anticipated to require upgrading.

  - **Bird and Bat Adaptive Management Plan (BBAMP):** In response to the requirements set out in the Development Consent (Condition 22 of Schedule 3), the Applicant has commenced collection of the baseline data on 'threatened and 'at risk' bird and bat species and populations in the locality that could be affected by the development'. As required by the relevant condition, the Applicant consulted with the Biodiversity Conservation and Science (BCS) Division within the Department of Planning and Environment (DPE) on the development of the monitoring program. The bird and bat utilisation data collected as part of these surveys has been used to inform the bird and bat impact assessment prepared for this Modification Application (see Section 7.7 and Appendix G.4).

  - **Noise compliance**: In response to the operational noise monitoring requirements set out in the

Development Consent (Conditions 12 and 13 of Schedule 3), additional background noise monitoring has been completed, which has been used to inform the updated predictive noise impact assessment prepared for the Modified Project (see Section 7.5 and Appendix G.3).

- **Biodiversity offsets**: In order to ensure that biodiversity offsets can be delivered as required by the Development Consent and EPBC Approval, surveys of potential land-based biodiversity offset sites are being progressed to identify suitable potential offset sites to satisfy the estimated offset obligations associated with the Modified Project. Currently the Applicant is working closely with several landholders BAM accredited assessors)and has identified a number of potentially suitable sites which are continuing to be assessed(see Section 7.6).
- **Public road upgrades**: The Development Consent (Condition 28 of Schedule 3 and Appendix 6) requires the carrying out of a number of road upgrades. The environmental impacts associated with these were not assessed as part of the Original EIS or RTS and limited detail was provided as to the standard of upgrading required. Revised road upgrade standards have been agreed with the relevant councils and detailed 3D digital terrain modelling has been completed to accurately estimate the extent of ground disturbance and potential environmental impacts associated with construction of the anticipated public road upgrades (see Section 4.7).
- **Neighbour agreements for turbines within 100 m of the Site Boundary**: In response to the requirement set out in the Development Consent (Condition 6 of Schedule 2) the Applicant is currently negotiating with adjoining landholders where turbines are proposed to be located within 100 m of the Site Boundary.
- **Voluntary Planning Agreement (VPA)** - The Applicant has executed a VPA with Upper Hunter Shire Council and Warrumbungle Shire Council in accordance with the requirements set out in the Development Consent (Condition 17 of Schedule 2).

- **Commercial:** The Applicant is currently determining the optimal wind turbine model based on the upgraded technology options now available from multiple wind turbine suppliers to prepare for a formal procurement process to select a wind turbine supplier and balance of plant (BOP) contractors for the Project. The Applicant currently anticipates that it will commence this procurement process in late 2022, with the final selection of the turbine supplier and BOP contractors for the Project being confirmed shortly thereafter. In addition, the Applicant has commenced power purchase agreement discussions with several potential offtakers.
- **Community:** Ongoing engagement with the community has continued since the Development Consent was granted. Section 6.0 provides details of the further engagement that has been undertaken post-approval and specifically for the Modification Application.
- **Central West Orana Renewable Energy Zone (CWO REZ) Transmission Line Investigations:** The Applicant was recently shortlisted as a Candidate Foundation Generator (CFG) by EnergyCo (who are responsible for the overall coordination of the REZs). The Applicant has been working closely with EnergyCo to explore potential alternate connection opportunities including the opportunity to connect into the CWO REZ transmission infrastructure. This is discussed in further detail in Section 2.3 below.
- **Connection Agreement:** The Applicant will submit the Project into the CWO REZ Access Tender in 2022 to secure access to the CWO REZ transmission infrastructure. Once the Applicant is granted Access Rights, the Project will participate in a streamlined REZ connections process designed to improve certainty of connection timeframes and reduce costs. The associated connection application work streams are progressing and a formal selection as part of the Access Tender is expected in 2023 to enable the Project to connect into the CWO REZ and the National Electricity Market (NEM) more broadly.

2.3 Central-West Orana Transmission Line Infrastructure and Potential Alternate Connection Point

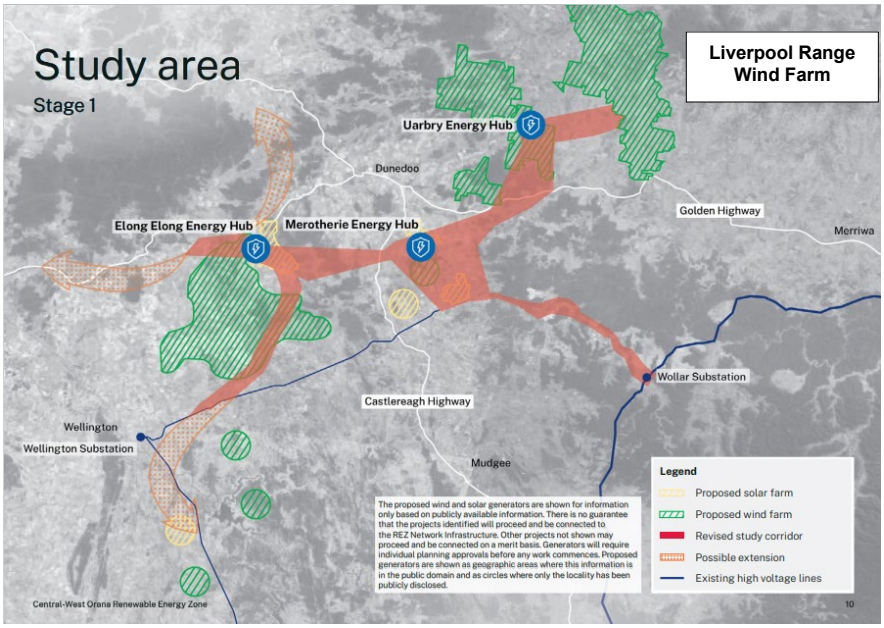
EnergyCo is currently undertaking investigative work to identify and secure various transmission line alignments and substations locations (Energy Hubs) within the Central-West Orana Renewable Energy Zone (CWO REZ). In February 2022 EnergyCo released an information package for community feedback which shows the indicative locations of the transmission infrastructure relative to existing and proposed renewable energy projects, including the Project. In particular, EnergyCo has confirmed that it has "identified 11 major renewable generation projects that we will work with as we develop the Central-West Orana REZ Transmission Project". The Liverpool Range Wind Farm is one of these identified 11 major renewable generation projects and is currently the only one of these projects to have planning approval. As such, it represents a key project for the CWO REZ and its successful delivery is critical to the success of the CWO REZ.

EnergyCo is currently proposing a transmission line corridor which extends from the proposed Uarbry Energy Hub (located south of Coolah township and approximately 16 kms to the west of the Project site) into the Project site (see Figure 1 below).

The Applicant will continue to work closely with EnergyCo and assist in their efforts to identify an optimal CWO REZ transmission line alignment.

In the event a proposed CWO REZ transmission line between Uarbry Energy Hub (or any other Energy Hub) and the Project site becomes a viable option, the External Transmission Line and Connection Infrastructure not utilised by EnergyCo would no longer be required, and all associated impacts (as described in Section 4.5), would be removed. Whilst the CWO REZ transmission line alignment remains uncertain (location and delivery timeframe), and the connection access tender is yet to commence, the Applicant is continuing to pursue the existing approved connection point at Ulan as part of the Project. Accordingly, should it ultimately be determined to connect the Project to the grid via the CWO REZ transmission line then this will be separately assessed under the EP&A Act.

Figure 1: Central-West Orana REZ Infrastructure Overview Map (EnergyCo)



3.0 Existing Conditions

3.1 The Approved Project

3.1.1 Overview

The Approved Project consists of up to 267 wind turbines, each with a maximum tip height of 165 m above ground level (AGL), and associated infrastructure. The Approved Project is proposed to connect into the National Electricity Market (NEM) at Transgrid's (the Transmission Network Service Provider or TNSP) existing 330 kV Wollar-to-Wellington Line via a proposed approximately 50 km long External Transmission Line which extends from near Rotherwood Road, Cassilis to the proposed point of connection at Ulan.

As detailed in the Original RTS, in addition to the wind turbines and External Transmission Line, the Approved Project also includes the following associated infrastructure:

- **Turbine Infrastructure:** for each wind turbine, an adjacent pad mounted turbine transformer, crane hardstand area, construction lay down area, access track and underground cabling;
- **Connection Substation:** a 330 kV switchyard located near Ulan, allowing connection to the existing Transgrid 330 kV Wellington - Wollar transmission line;
- **Main Powerline:** a single or double circuit overhead powerline of up to 330 kV running from the Connection Substation at Ulan to the wind farm site, and then on to the wind farm Collection Substations;
- **Collection Substations:** up to 4 collection substations located on the wind farm site to increase the voltage from the wind turbine reticulation voltage (22 kV or 33 kV) to the main powerline voltage (330 kV);
- **Site Reticulation:** underground and overhead 22 kV or 33 kV electrical reticulation cabling and conductors linking the wind turbines to the Collection Substations;
- **Access Tracks:** access tracks to connect each of the wind turbines and the related facilities, and for the purpose of building other infrastructure;
- **Operations and Maintenance (O&M) Facilities:** operation and maintenance facilities including site parking, a control room, maintenance and equipment storage facilities;
- **Construction Facilities:** temporary construction facilities including concrete batch plants, rock crushing equipment, laydown facilities, and construction compounds;
- **Road Upgrades:** minor upgrades to local roads, intersections and street furniture, as required for the delivery, installation and maintenance of the project;
- **Wind Monitoring:** temporary and permanent wind monitoring masts for wind speed verification, weather and general monitoring purposes; and
- **Subdivision of Land:** subdivision of land owned by Ulan Coal Mine Ltd (UCML) required for the Connection Substation, and removal of this land from UCML's mining area, as required.

The approved indicative wind turbine locations are shown in the Development Layout and corresponding GPS Coordinates contained in Appendix 2 of the Development Consent.

3.1.2 Development Corridor and Micro-siting Restrictions

The Approved Project includes a Development Corridor which is a defined corridor within which all proposed wind farm and transmission infrastructure must be located. [1] The Approved Development Corridor is shown in the figure in Appendix 2 of the Development Consent.

The Development Consent contains specific limits in relation to micro-siting the wind turbines and ancillary infrastructure. In particular, Condition 8 of Schedule 2 relevantly specifies the following (emphasis added):

> *The Applicant may micro-site the wind turbines and ancillary infrastructure without further approval provided:*
>
> *……*
>
> *b) no wind turbine is moved more than **100 metres** from the relevant GPS coordinates shown in Appendix 2;*
>
> *…….*

The estimated Development Footprint [2] as described in the Original EIS refers to the estimated ground disturbance required for construction of the then proposed 282 turbine wind farm and transmission line (the development application was later amended to reduce the turbine numbers to 272, but the estimated Development Footprint was not re-calculated as part of the RTS Report or subsequently). A breakdown of the assumptions used in the Original EIS and RTS to assess each component for the Approved Project is included in Table 10 (see Section 4.1 below) and Table 17 (see Section 4.9.1 below).

3.1.3 Site Access Points and Approved Heavy and Over-Dimensional Vehicle Routes

Appendix 7 to the Development Consent specifies the particular Local and Regional roads and site access points that can be used by Over-dimensional (OD) and Heavy vehicles to access the Project site (Over-dimensional and Heavy Vehicle Access Route Restrictions). A total of 28 site access points were explicitly identified in Appendix 7 to the Development Consent. However, in addition to these 28 site access points, a detailed review of the Approved Project infrastructure layout confirms that an additional 18 site access points within the Wind Farm Site (totalling 41) and additional 15 site access points along the External Transmission Line (totalling 20) would have been required to provide access to proposed wind farm access tracks and to account for transmission line crossings of public roads. Accordingly, it is considered that the Approved Project included a total of 61 site access points from public roads.

The roads currently permitted by the Development Consent to be used by OD and Heavy vehicles to access the Project are listed in Table 3 below.

Condition 26 of Schedule 3 of the Development Consent specifies that a number of roads, including Cooks Drive and Gundare Road, cannot be used by OD or Heavy vehicles.

In addition, Condition 27 of Schedule 3 of the Development Consent includes restrictions on the use of Approved Site Access Point #9 located along Vinegaroy Road, as follows:

> *Access Point #9 from Vinegaroy Road is only to be used during construction and decommissioning of the turbines and only when a Traffic Control Plan prepared to the satisfaction of RMS is in place.*

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[1] The Development Consent refers to this area as the "Development Corridor" whereas the Original RTS used the term "Development Envelope". For consistency and clarity, the term "Development Corridor" is used throughout this Modification Assessment Report.

[2] The Original EIS/RTS used the term "Estimated Development Footprint" to refer to ground disturbance and vegetation removal within the transmission line easement. This Modification Application uses the term "Indicative Development Footprint" and further categorises this into Wind Farm, External Transmission Line, and Public Road Upgrades as described in Section 4.8.1.

At the completion of construction and decommissioning, the access point is to be removed, and any gates to be replaced with fencing.

Table 3: Approved OD and Heavy Vehicle Access Route – List of approved public roads

Road Category			
Local		**Regional**	**State**
Warrumbungle LGA			
Coolah Creek Road Oakdale Road Barragundy Road Pandora Road Pandora Pass Road	State Forest Road Turee Vale Road Rotherwood Road Warung Road Norfolk Road	Vinegaroy Road	
Upper Hunter LGA			
Rotherwood Road Yarrawonga Road Bounty Creek Road	Coolah Road Summerhill Road	Vinegaroy Road Ulan Road	Golden Highway
Mid-western LGA			
Phelps Lane Cliffdale Road	Unnamed Crown Road	Ulan Road	

3.1.4 Public Road and Intersection Upgrades

The Development Consent requires that the public roads and intersections set out in Appendix 6 (Schedule of Road Upgrades) to be implemented in accordance with the relevant timing requirements specified to the standard and satisfaction of the relevant roads authority.

The table of road upgrades in Appendix 7 of the Development Consent includes an annotation that specifies the following road upgrade standards for unsealed to unsealed, and Regional roads proposed to be used by the Project:

- where upgrading from an unsealed local road to a sealed road – pavement depth in accordance with Austroads Standards or 300 mm road base, 6.0 m seal and 8.0 m formation width, topped with 14/10 double/double bitumen seal;
- where upgrading an unsealed local road to remain unsealed – construction width 8.0 m, pavement thickness 150 mm; and
- where upgrading a regional road – pavement depth in accordance with Austroads Standards, 7.5 m seal and 9.5 m formation width, topped with 14/10 double/double bitumen seal.

The EIS did not quantify the ground disturbance required for the road upgrades and therefore the associated impact on native vegetation or cultural heritage values were not assessed. As a result, the Development Consent does explicitly impose any native vegetation clearance limits or cultural heritage values to be avoided, minimised or impacted in these areas.

3.2 Project Site and Surrounds

3.2.1 Project Location

The Approved Project is located within, and forms a key component of, the declared Central-West Orana

REZ. NSW Government legislation and policy encourages renewable energy development within declared REZs. A summary of the REZ policy framework is provided in Section 9.1.

The Project site is approximately 230 km northwest of Newcastle and 120 km east of Dubbo, New South Wales (see Figure 2). The Project spans across the Warrumbungle, Upper Hunter and Mid-western local government areas (LGAs).

The closest townships include Coolah (approximately 6 km to the west of the Wind Farm Site) and Cassilis (located adjacent to the south of the Wind Farm Site). The land surrounding the Project site is a mixture of freehold and leasehold land within rural agricultural landscape that is predominantly used for grazing sheep. Coolah Tops National Park is located adjacent to the northeast of the Project.

The Project is located across three Local Land Service (LLS) regions (formerly known as Catchment Management Authority regions), those being the Central West, Hunter and Central Tablelands LLS regions.

Figure 2: Project location

3.2.2 Nearest Wind Farm Projects

The nearest operating wind farm to the Project is the Bodangora Wind Farm (located approximately 90 km to the southwest), whilst the nearest approved wind farm is the Upper Hunter Energy Park (located approximately 70 km to the east near Scone township).

The nearest wind farm under development is the Valley of the Winds Wind Farm, which is currently in the pre-approval phase and is proposed to be located approximately 10 km west of Coolah township (16 km west of the Project site).

Table 4 lists the nearest proposed, constructed or operating wind farms. The locations of these wind farms and the indicative boundaries of the Central-West Orana REZ are shown on Figure 2.

Table 4: Nearest wind farm projects

Wind Farm	Status	Location and Distance from the Project
Valley of the Winds Wind Farm Up to 154 turbines, 250 m tip height	Under development (Public exhibition complete, not yet approved)	West of Coolah township, approximately 16 km to the west of the Project
Barneys Reef Wind Farm Up to 63 turbines, 280 m tip height	Under development (SEARs issued, not yet approved)	West of Ulan, approximately 36 km southwest of the Project
Upper Hunter Energy Park Up to 34 turbines, 150 m tip height	Approved	West of Scone township, approximately 70 km to the east of the Project
Bodangora Wind Farm 33 turbines, 150 m tip height	Operational (since 2019)	Gillinghall Road, Bodangora, approximately 90 km to the southwest of the Project
Uungala Wind Farm 97 turbines, 250 m tip height	Approved	Ilgingery Road, Yarragal approximately 100 km to the southwest of the Project

3.2.3 Land Use and Tenure

Wind Farm and External Transmission Line Sites

The Approved Project is a large scale project which extends over a very large site of approximately 51,337 ha in area, extending some 67.5 km from top to bottom. There are a total of 495 individual freehold and Crown land lots within the Approved Project site boundary (Approved Site Boundary)_.

Only minimal changes are proposed to the Approved Site Boundary as part of the Proposed Modification which will continue to cover an area of approximately 52,123 ha, extending some 67.5 km from top to bottom (Modified Site Boundary). There are a total of 508 individual freehold and Crown land lots within the Modified Site Boundary (+13). The proposed changes to the land parcels within the Modified Site Boundary are summarised in Section 4.9.3. A full list of all freehold and Crown land parcels that are located within the Modified Site Boundary is provided in the updated Schedule of Land contained in Appendix C.1.

The wind farm portion of the Project site generally north of Rotherwood Road, Cassilis (generally referred to as the Wind Farm Site) occupies approximately 46,539 ha and spans across a series of ridgelines and valleys that are used typically for agricultural purposes such as wool production, sheep and cattle agistment, and cropping. The Wind Farm Site is primarily located on freehold land but intersects with several Crown land parcels including road reserves and waterways.

The External Transmission Line portion of the Project site (External Transmission Line Site) extends approximately 5,584 ha generally from near Rotherwood Road, Cassilis (i.e. just north of the Golden Highway) south to the proposed connection point at Ulan. The External Transmission Line Site traverses a

mix of freehold and Crown land parcels across relatively flat and undulating landscape forms with a mix of sparsely and densely vegetated areas, including conservation areas, road reserves and waterways.

The private landowners associated with the Project typically own large rural holdings and are generally either live on their property and run agricultural enterprises or lease their land to other local residents and/or operate agricultural enterprises while living in other parts of the region/State. The Applicant has entered into agreements with all private landowners within the Modified Site Boundary to secure the tenure required for the Project.

Access rights over the Crown land required for the Project will be obtained via a licence or the closure of some Crown road reserves (where the land is not used for public access) in consultation with the Crown Lands Division and in accordance with the requirements of the *Crown Land Management Act 2016.*

Public Road Upgrades

Construction of public road upgrades required within and around the Project site (discussed in Section 4.7) are anticipated to be contained within the existing road reserves. However, 3D terrain modelling of the anticipated road upgrades indicate that some sections of public road upgrades extend into adjacent private properties, some of which are owned by participating landholders. This is due in main part to the inconsistencies between the publicly available cadastral boundaries and the constructed public road reserves and fenced property boundaries.

During the detailed design phase the precise extent of construction impacts associated with the public road upgrades will be determined in consultation with the relevant roads authorities, and physical boundary surveys will be completed wherever necessary. Wherever required the Applicant will enter into agreements, or otherwise, to secure access with relevant adjacent landholders prior to commencing construction of the relevant sections of the public road upgrades.

Based on the publicly available cadastral boundaries, all freehold and Crown land parcels that are potentially impacted by the anticipated public road upgrades are listed in the updated Schedule of Land contained in Appendix C.1.

Modified Indicative Over-size/over-mass Haulage Route

At various locations along the modified indicative Over-size/over-mass (OSOM) Haulage Route between the Port of Newcastle and the Project site (discussed in Section 4.6.3) localised upgrade works such as infrastructure upgrades, signage and lighting removal, and vegetation clearing are anticipated to be required.

Noting the above-mentioned inconsistencies with the publicly available cadastral boundaries, localised upgrade works may be required within private and public land adjacent to public roads at identified locations to enable the haulage vehicle turning movements (see Appendix G.7.2). The Applicant has entered into negotiations with all relevant landholders along the modified indicative OSOM Haulage Route. The list of all relevant land parcels that are potentially impacted along the modified indicative OSOM Haulage Route is included in the updated Schedule of Land contained in Appendix C.1.

3.2.4 Nearby Dwelling Approvals

A search of relevant development application registers has been undertaken to identify all development applications for a new dwelling within the wind farm portion of the Project site or within 5 km of a proposed turbine location that have been approved since January 2017 (i.e. the year the Original RTS was prepared). The 5 km buffer from each proposed turbine extends into the Warrumbungle, Liverpool Plains, and Upper Hunter local government areas (LGAs). The search was undertaken using each council's online Development Application Tracking systems.

The search revealed the two following development applications for a new dwelling that have been approved within the 5 km buffer since January 2017 (see Table 5 below).

Table 5: Approved Development Applications for dwellings within 5 km of a proposed turbine

DA Number	Address	Lot/DP	Landholder Status	Approval date
Warrumbungle LGA				
DA2021/44.1	1170 Coolah Creek Road, Coolah	Lot 2 /DP1107124	Associated	20/8/2021
Upper Hunter LGA				
66/2017-1	40 Ancrum Street, Cassilis (located within Cassilis township)	Lot 7 / Section 2 / DP37604	Non-associated (The nearest turbine (F8) is located approximately 4,600 m away)	23/8/2017

No development applications for a new dwelling have been lodged on land within the 5 km buffer within the Liverpool Plains LGA since January 2017.

Based on the above review, it is considered that there are no new dwellings that have received development approval in the years since the Original RTS was prepared that are anticipated to be materially affected by the Modified Project.

3.3 Associated and Non-associated Residences

Within and around the Wind Farm, there are 115 residences located within 5 km of a proposed wind turbine. Of these, 58 are Associated residences which are owned by landholders who have agreed to either host Project infrastructure (total = 52) or have already entered into a neighbour agreement (total = 6) for the Project. An Associated Residence is a residence where an agreement has been reached between the owner of the residence and the Applicant in relation to the development [3].

Along the External Transmission Line component of the Project south of the Golden Highway there are 9 Associated residences (all hosting infrastructure).

No Non-associated residences are located within 1 km of a turbine proposed by the Modified Project, and only one Non-associated residence is within 1-2 km of a turbine proposed by the Modified Project. There are also 8 Non-associated residences within 2-3 km of a proposed wind turbine. Please refer to Table 6 for details.

Table 6: Residences with 5 km of turbines proposed by the Modified Project

Distance from the Modified Project Turbines	Number of Residences	How many are Associated
Within 1 km	1	1
1 – 2 km	32	31
2 – 3 km	26	18
3 – 4 km	25	4
4 – 5 km	31	4
Total (within 5 km)	**115**	**58**

[3] Associated Residences are classified as either being a 'host' agreement if a landowner has a lease or infrastructure agreement in relation to their property or a participating 'neighbour' agreement where the residence is within proximity of the Project and there is an agreement in relation to potential impacts from the wind farm (e.g., noise, visual, shadow flicker, or a turbine is located within 100 m of the property boundary). As described in the Development Consent the agreement may have restrictions that only cover certain aspects of the development (such as the noise or visual impacts) or may limit the extent of any such impact (by setting absolute noise levels at a residence, for instance). In these cases, the residence is only Associated to the extent that the impact is covered by the agreement and is considered to be Non-associated for any impacts that exceed the limits specified in the agreement.

The location of each of these residences and their status as either an Associated Residence or Non-associated Residence is shown in the updated Development Layout contained in Appendix C.2.

3.4 Planning Context

3.4.1 Approvals Process

This Modification Application is being submitted as an “Other Modification’ in accordance with Section 4.55(2) of the EP&A Act. Section 4.55(2) of the EP&A Act provides that a Development Consent can be modified where the consent authority:

- is satisfied that the development to which the consent as modified relates is substantially the same development as the development for which consent was originally granted;
- has notified the application as required; and
- has considered any submissions made concerning the proposed modification.

On 18 December 2020, the Applicant submitted a letter outlining its intent to modify the Development Consent to the DPE. This letter outlined the proposed changes to the Project, the level of assessment proposed and the legislative context for the proposed modification application as well as the proposed approach to community consultation.

In its letter of response dated 2 February 2020, DPE confirmed that the level of assessment and community engagement proposed was appropriate, and that the appropriate approval pathway for the Modification Application would be Section 4.55(2) of the EP&A Act.

The Applicant requested that the modification be designated by the Planning Secretary as "State significant development on land with multiple owners" which is "public notification development" for the purposes of clause 98(3) of the *Environmental Planning and Assessment Regulation 2021* (NSW) (EP&A Regulation) due to the substantial number of involved landowners. In March 2022 the Project was designated under delegation from the Planning Secretary to be a project with multiple owners for the purposes of clause 23(2) of the EP&A Regulation.

3.4.2 Substantially the Same Development Test

Before a consent authority may validly modify a development consent under section 4.55(2) of the EP&A Act, it must relevantly be satisfied that the development as modified will remain "substantially the same development" as the development for which development consent was initially granted (referred to as the Substantially the Same Development Test).

A comparative assessment of the Approved Project and Modified Project against all relevant considerations has been undertaken to assess whether the Modified Project is ‘substantially the same development’ as the Approved Project having regard to the key principles from relevant case law (see Table 7).

The case law makes it clear that:

- The question of whether a modified development is substantially the same as an approved development is a question of fact – in other words, it is incumbent on the consent authority to conclude whether, on the facts before it, the modified development is substantially the same as an approved development; and
- as the provisions creating the power to modify a development consent are beneficial and facultative, to the extent of any ambiguity they should be construed so as to "give the fullest, largest and most liberal relief which the fair meaning of its language will allow".

The assessment confirms that having regard to the extremely large scale of the Approved Project, the inherent flexibility which necessarily applies which conditioning SSD projects in general and wind farm projects in particular, the Modified Project remains ‘substantially the same development’ as that for which

Development Consent SSD 6696 was originally granted.

Table 7: 'Substantially the same development' Assessment

Considerations	Response
A modification to a development consent must effect some change to the development the subject of the development consent	The Proposed Modification includes a number of changes to the Approved Project include a reduction in wind turbine numbers, the use of more efficient and large wind turbines and other layout changes.
"Substantially" means "essentially or materially" or "having the same essence."	The material essence of the Project as approved remains unchanged by the Modified Project. The Modified Project remains: - development for the same purpose as the Approved Project, being a utility-scale wind farm and associated infrastructure of the type , as the Original EIS and RTS, including access tracks, transmission infrastructure and transport route upgrades; and - generally consistent with the Approved Project in terms of location, scale and outputs. In the context of a utility-scale renewable energy project which sits within a Project site covering some 50,000 ha which extends some 67.5 km from top to bottom, it is considered that the overall extent of changes to the Approved Project proposed by the Modified Project are of a relatively low magnitude. This is evidenced by comparing the layout of the Approved Project and the layout of the Modified Project as shown in Figure 11 and Figure 12 below. Such a comparison confirms the relatively minor nature of the changes proposed when compared to the overall scale and scale and design of the Project which remain largely unchanged. In particular, the removal of 47 turbines, reducing the maximum number of turbines proposed from 267 to 220 larger turbines with a greater tip height, is the most visually prominent change proposed as part of the Modified Project. However, this does not change the material essence of the Project.
The consent authority must undertake a comparison between two developments – the development as modified and the development as originally approved. The comparative task does not involve a comparison of the physical features or components of the development as currently approved and modified in some type of sterile vacuum. Rather, the comparison involves a qualitative and quantitative appreciation of the developments being compared in their proper contexts, including the circumstances in which the development consent was granted.	The Modified Project will, in some respects, increase the overall footprint and environmental impacts of the Project. However, it is not the case that any increase in the impacts associated with the Modified Project automatically offends the Substantially the Same Development Test. - It is considered that the Modified Project remains substantially the same development as the Approved Project, considering the Project is SSD which is recognises as requiring a level of flexibility; - the Approved Project is of an extremely large scale across a very large Project site; - the Proposed Modification includes a material reduction in turbine numbers; and - the nature of impacts remains of the same type and generally the same magnitude, From a purely quantitative perspective, the Modified Project will have a materially larger indicative disturbance footprint as summarised in this Modification Assessment Report. As a result, the Modified Project is likely to result in greater impacts to biodiversity. However, the BDAR prepared for this Modified Project confirms that:

Considerations	Response
	- the biodiversity values impacted are consistent with those identified for the Approved Project. In particular, in areas where the Modified Project will impact critically endangered ecological communities, more than 90% of the vegetation impacted is considered to be derived native grassland or of low quality; - Not all of the increased impacts are associated with changes made to the Approved Project, but rather are outcomes of more accurate construction assumptions and updated vegetation mapping as well as quantification and assessment of the impact of the required public road upgrades. As a result, some 85% of the additional ground disturbance is considered to be associated with elements of the Modified Project which are not materially different from those the subject of the Approved Project - The Modified Project will result in an increased number of bird and bat species at risk of blade strike, due to the increased size of the turbines, the application of the criteria in the BAM, increased level of protection for certain species (e.g. white-throated needletail) since the Original EIS and RTS were prepared, and findings of recent bird/bat utilisation surveys. Despite this, the overall impact of blade strike and barotrauma is considered to be consistent with the Approved Project. - The Modified Project will result in potential changes to noise impacts. However: ○ The Predictive Noise Impact Assessment (PNIA) confirms that the Modified Project results in either a reduction or negligible increase (not noticeable) in predicted noise levels from the operation of turbines at all Non-associated residences. ○ The noise criteria are predicted to be easily achieved at all Non-associated residences in the vicinity of the proposed substations. ○ Accordingly, the Modified Project will not impact the ability of the Project to continue to comply with Conditions 5 - 13 of Schedule 3 of the Development Consent which relate to construction noise, including noise associated with construction traffic along relevant public roads. - The detailed visual assessment of the Modified Project confirms that the magnitude of change to the surrounding visual landscape resulting from the Modified Project is largely consistent with the level of change that was deemed acceptable for the Approved Project. In particular, ○ In accordance with the NSW 'Wind Energy: Visual Assessment Bulletin', the proposed increase to the maximum blade tip height to 250 m AGL results in the ‘blue line’ of visual magnitude varying from 3,300 m for the Approved Project to 4,950 m for the Modified Project, and the ‘black line’ varying from 2,200 m for the Approved Project to 3,350 m for the Modified Project. ○ A total of 57 Non-associated residences are located within the ‘black line’ and ‘blue line’. Of these 57 Non-associated residences, the Modified Project results in the distance to the nearest turbine being reduced for 32 of the Non-associated residences, increased for 23 of the Non-associated residences and remaining the same for 2 of the Non-associated residences.

Considerations	Response
	○ Due to the revised turbine layout, the Modified Project results in an increase of five Non-associated residences where the number of 60 degree sectors increase from two 60 degree sectors to three 60 degree sectors. However, this assessment is based on a 2D assessment and further detailed assessment of these residences identified topography and vegetation would likely reduce the number of sectors with turbine visible. ○ A visual impact assessment was undertaken of all 57 non-associated residences within 4,950 m of the nearest wind turbine This confirmed that: ▪ 30 Non-associated residences are likely to have an increased number of turbines visible; ▪ 25 Non-associated residences are likely to have a reduction in the number of turbines visible; and ▪ 2 Non-associated residences are likely to have no variation to the number of visible turbines. ○ Detailed assessment and ground-truthing surveys were undertaken for the 12 Non-associated residences located within the 'black line', which confirmed that the orientation and existing vegetation surrounding these Non-associated residences would minimise views to wind turbines for 10 of these 12 Non-associated residences. As a result, 10 of these 12 Non-associated residences now have reduced visual impact ratings when compared to the Approved Project. In many aspects, only modestly different impacts are expected, such as electromagnetic interference, traffic, Aboriginal and post-contact heritage, shadow flicker and aviation safety. Each of these impacts were assessed by detailed assessments which confirm that the qualitative impacts arising from the Modified Project remain generally consistent with those resulting from the Approved Project and that, in each instance, the increase or decrease in impact associated with the modification of the Project is relatively negligible.
A development can still be substantially the same even if the development as modified involves land that was not the subject of the original consent.	Several new land parcels have been added to the Modified Site Boundary to allow for layout changes and infrastructure required to construct the Modified Project. In addition, a parcel of land off Vinegaroy Road has been removed as it is no longer required. All newly added and deleted land parcels are listed in Section 4.9.3. The new parcels of land that have been included as part of the Modified Project constitute a very small proportion of the entire Project site (less than 5%). In addition, the indicative Modified OSOM Haulage Route and anticipated public road upgrades will potentially impact on additional road reserves and land parcels that were not considered in the Original EIS/RTS but constitute a very small proportion of the Project. The proposed changes to the public road upgrades (see Section 4.7 and Appendix F) are minor and generally consistent with the Schedule of Road Upgrades included as Appendix 6 of the Development Consent.
If the development as modified, involves an ''additional and distinct	The Modified Project does not include any additional and distinct land uses.

Considerations	Response
land use'', it is not substantially the same development.	

3.4.3 Local Government Instruments and Policies

Local Environmental Plans (LEPs)

The Project is located within the Warrumbungle, Upper Hunter and Mid-western LGAs, and accordingly there are three Local Environmental Plans (LEPs) which apply to parts of the Project site. The proposed wind farm and ancillary infrastructure can be wholly characterised as development for the purpose of Electricity Generating Works.

The Original EIS assessed the Project against the Coolah LEP 2000, Merriwa LEP 2000, Liverpool Plains LEP 2011, and Mid-western Regional LEP 2012 that were in place at the time. Since the Original EIS was lodged the applicable LEPs and zones have been amended. The applicable LEPs and zones are summarised in Table 8 below.

Table 8: Applicable Local Environmental Plans (LEPs)

Local Environmental Plan (LEP)	Zoning
Warrumbungle LEP 2013	RU1 Primary Production
Upper Hunter LEP 2013	RU1 Primary Production
	C1 National Parks and Nature Reserves
	SP2 Infrastructure
Mid-western Regional LEP 2012	RU1 Primary Production
	RU3 Forestry
	C3 Environmental Management
	SP2 Infrastructure

Under section 2.36 of the *State Environmental Planning Policy (Transport and Infrastructure) 2021*development for the purposes of Electricity Generating Works may be carried out by any person with consent on any land in a 'prescribed rural, industrial or special use zone'. As zones RU1, RU3, SP2 are each a 'prescribed rural, industrial or special use zone, the Project is therefore permissible in these zones.

The short section of transmission line through land zoned C1 within the Upper Hunter LGA is consistent with the Approved Project and has been authorised under the *National Parks and Wildlife Act 1974,* by way of Deed of Agreement executed on 8 November 2018 and assigned to the Applicant on 22 February 2019. The proposal is therefore permissible in the C1 zone under the Upper Hunter LEP 2013.

The short section of transmission line through land zoned C3 within the Mid-western LGA is consistent with the Approved Project. In its assessment report prepared for the Approved Project, DPE noted that this land is under the management of National Parks and Wildlife Services (NPWS) and that NPWS did not advise against placing the transmission line within the land zoned C3. As Section 4.38(3) of the EP&A Act enables SSD projects to be approved even if they are "partially prohibited" by an environmental planning instrument, DPE considered that the Development Consent could be granted notwithstanding this issue.

As outlined in Section 3.4.1, the Modified Project is considered to remain substantially the same development as the Approved Project and remains generally consistent with the relevant LEP provisions as outlined below:

- The Approved Project and Modified Project are generally consistent with the relevant zoning objectives (RU1) under the *Warrumbungle Local Environmental Plan 2013*, and, while not permissible under this LEP, the Project does not rely on the provisions of this LEP for permissibility.
- The Approved Project and Modified Project are generally consistent with the relevant zoning objectives (RU1, C1, and SP2) under the *Upper Hunter Local Environmental Plan 2013*, and, while generally not permissible under this LEP, the Project does not rely on the provisions of this LEP for permissibility.
- The Approved Project and Modified Project are generally consistent with the relevant zoning objectives (RU1, RU3, C3, and SP2) under the *Mid-western Local Environmental Plan 2013*, and, while generally not permissible under this LEP, the Project does not rely on the provisions of this LEP for permissibility.

Development Control Plans (DCPs)

The Project site is subject to the following Development Control Plans (DCPs): Warrumbungle DCP 2015, Upper Hunter DCP 2015, and Mid-western Regional DCP 2013.

Under section 2.10 of the *State Environmental Planning Policy (Planning Systems) 2021* Development Control Plans (DCPs) do not apply to SSD projects. Given that the Project is SSD, the DCPs do not apply

4.0 The Proposed Modifications

4.1 Summary of Proposed Modifications

Since the Development Consent was determined in 2018 there have been significant advances in wind turbine technology. The Proposed Modifications are required to take advantage of these technology changes and to provide greater certainty with regards to the constructability of the Project and the associated potential environmental impacts and mitigation/management measures.

This Modification Application has been prepared based on a detailed layout review and design optimisation process that has been undertaken for the Project, which provides greater certainty on the indicative location of proposed infrastructure, the constructability of the Project, and the extent of potential environmental impacts associated with the Modified Project. The Modification Application therefore replaces some of the earlier design assumptions that were used to inform the Original EIS/RTS. Further detail on this design review and layout optimisation process and key assumptions adopted for the Modified Project are provided in Appendix A.

The Proposed Modifications are summarised in Table 9 below. Each aspect/component comprising the Proposed Modifications is discussed in detail in the following sub-sections, whilst Section 5.0 outlines the justification for the Proposed Modifications.

The revised infrastructure layout proposed by the Modified Project is shown in Figure 3 and Figure 4 further below, with more detail provided in the updated Development Layout in Appendix C.2. A high level comparison of the Approved Project and Modified Project infrastructure layouts is shown in Figure 11 and Figure 12 further below. Detailed maps showing the comparison between the Approved Project and Modified Project infrastructure layouts are contained in Appendix E.

Table 9: Summary of Proposed Modifications

Themes	Proposed Modifications
Turbine Parameters	- Removal of a total of 47 approved turbines, reducing the maximum number of turbines proposed from 267 to 220. - Increasing the maximum blade tip height to 250 m above ground level (AGL) (currently approved up to 165 m AGL). - Updating the locations of a number of the turbines to accommodate the revised turbine spacing required for the larger turbines. - Increasing the distance by which turbines may be micro-sited to within 250 m of their updated approved locations (currently a micro-siting limit of 100 m is specified).
Permanent Wind Farm Infrastructure	- Updates to the locations of wind farm infrastructure such as on-site collector substations, access tracks, operation and maintenance (O&M) facilities, overhead power lines and underground cabling, and temporary infrastructure such as concrete batch plants, laydown areas, and construction compounds, to reflect the revised turbine numbers and locations and an improved understanding of site constraints and constructability. - Minor amendments to the alignment of the portion of the transmission line internal to the Wind Farm Site to reflect the revised turbine layout and based on an improved understanding of site constraints and constructability. - The inclusion of up to 14 permanent Power Curve Validation (PCV) meteorological masts (referred to as permanent met masts) to the final hub height (currently approved for up to 10) at 40 indicative locations. - Inclusion of up to 7 on-site collector substations (currently approved for up to 4) at 10 indicative locations within the Wind Farm Site. - Inclusion of up to 3 permanent O&M facilities (currently approved for up to 1) at 6 indicative locations.

Themes	Proposed Modifications
	- Inclusion up to 47 site access points from nearby public roads to facilitate construction and ongoing maintenance of the wind farm components located north of the Golden Highway.
External Transmission Line and Connection Infrastructure	- Amend a short section of the external transmission line alignment near Durridgere State Conservation Area to minimise potential visual impact to nearby Non-associated residence. - Include an optional alternate transmission line alignment to avoid a portion of the Durridgere State Conservation Area. - Relocation of temporary construction compound/laydown area/concrete batch plant within the External Transmission Line Site to a location near Cliffdale Road. - Amend a short section of the External Transmission Line alignment located near the Hands on Rock cultural heritage site to avoid/minimise impacts to this site. - Include potential upgrade works to Transgrid's transmission line infrastructure at the proposed point of connection at Ulan. - Include up to 43 site access points from nearby public roads to facilitate construction and ongoing maintenance of the proposed External Transmission Line located south of the Golden Highway. - Remove Approved Site Access Point #9 off Vinegaroy Road as it is no longer required.
Temporary Ancillary Infrastructure	- Inclusion of up to 9 temporary concrete batch plants operational at any given time (currently approved for up to 4) at 18 indicative locations within the Wind Farm Site. - Inclusion of up to 9 temporary construction compounds and material laydown areas (currently approved for up to 6) at 18 indicative locations within the Wind Farm Site. - Inclusion of up to 28 temporary site calibration met masts to the final hub height, to be located at a subset of the turbine locations and removed prior to erection of each relevant turbine.
Preferred Transport Route	- Modify the Approved Over Dimensional (OD) and Heavy Vehicle Access Route to remove the southern section of Rotherwood Road (which is no longer required) and enable the eastern portion of Gundare Road (located within the Modified Site Boundary) to be used for Light and Heavy vehicles (Modified OD and Heavy Vehicle Access Route). The western portion of Gundare Road outside of the Modified Site Boundary is no longer proposed to be used. - Update the indicative Over-size/over-mass (OSOM) Haulage Route to enable the transportation of longer blades and larger wind farm components from the Port of Newcastle to the Project site (Modified OSOM Haulage Route).
Public Road Upgrades	- Identify and assess the public road upgrades which are anticipated to be required to construct and maintain the Project. - Update the road upgrade standards to reflect matters agreed with the relevant Councils, and include a mechanism to review the applicable road upgrade standards if required at highly constrained locations
Potential Staging	- Allow for potential sequencing of the delivery of the public road upgrades and on-site construction activities to allow on-site construction works to commence progressively.
Development Corridor and Indicative Development Footprint	- Modify the approved Project Site Boundary and Development Corridor to reflect the changes to the wind farm layout and transmission line alignment proposed (referred to as the Modified Site Boundary and Modified Development Corridor, respectively). - Only minimal changes are proposed to the Modified Site Boundary which will continue to cover an area of approximately 52,123.6 ha, extending some 67.5 km from top to bottom. - The Modified Development Corridor and indicative development footprint has been informed by the detailed design work completed, 3D terrain modelling and construction experience from other projects, overall leading to a more realistic estimate of the construction impacts of the Project. In particular the Modified Development Corridor within which all on-site

Themes	Proposed Modifications
	infrastructure and works will be located is proposed to be updated to a total area of 12,601.7 ha consisting of: ○ the external transmission line, with an area of 2,906.2 ha; and ○ the balance of the Project (including wind turbines, substations and other ancillary infrastructure, referred to collectively as the Wind Farm), with an area of 10,317.1 ha.
Conditions of Consent	- Updates to the conditions of the Development Consent to reflect the updated indicative development layout. - Updates to the conditions of the Development Consent related to micro-siting, Aboriginal cultural heritage, noise, traffic and transport, and visual impact to reflect the Proposed Modifications and incorporate the key recommendations of the further technical assessments included as part of this modification application. - Update native vegetation and habitat clearance limits as required to reflect the Modified Project layout including the public road upgrades.
Subdivision of Land	- Include subdivision of additional land to create new separate lots for the connection and collector substations, and associated ancillary facilities.

An overview of the Modified Project infrastructure layout is shown in Figure 3 and Figure 4 below and in the detailed series of maps contained in Appendix E.

The key infrastructure layout changes proposed by the Modified Project are shown in Figures 5 to 9 below.

Figure 3: Modified Project Layout (northern section)

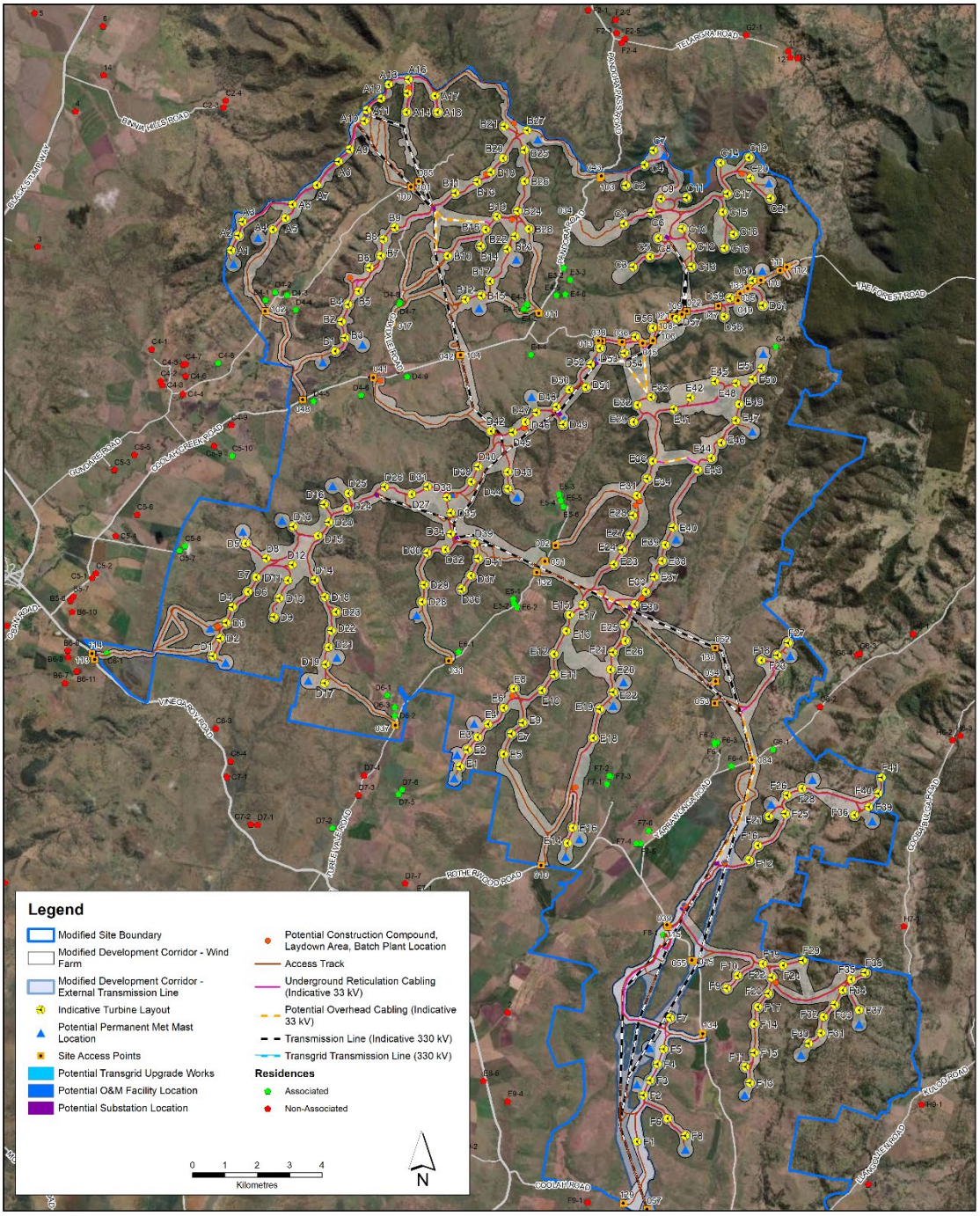


Figure 4: Modified Project layout (southern section)

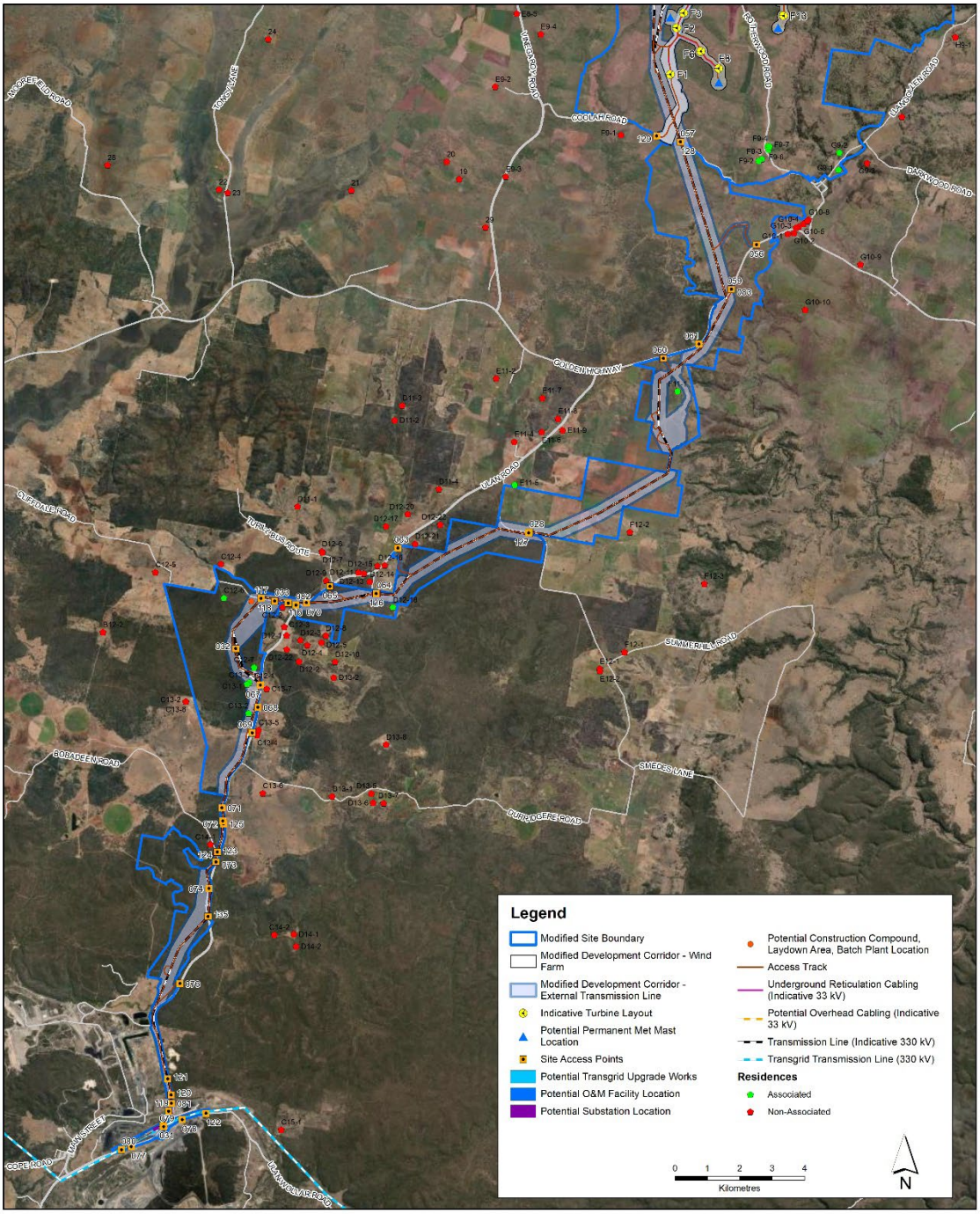


Figure 5: Key layout changes - turbine movements

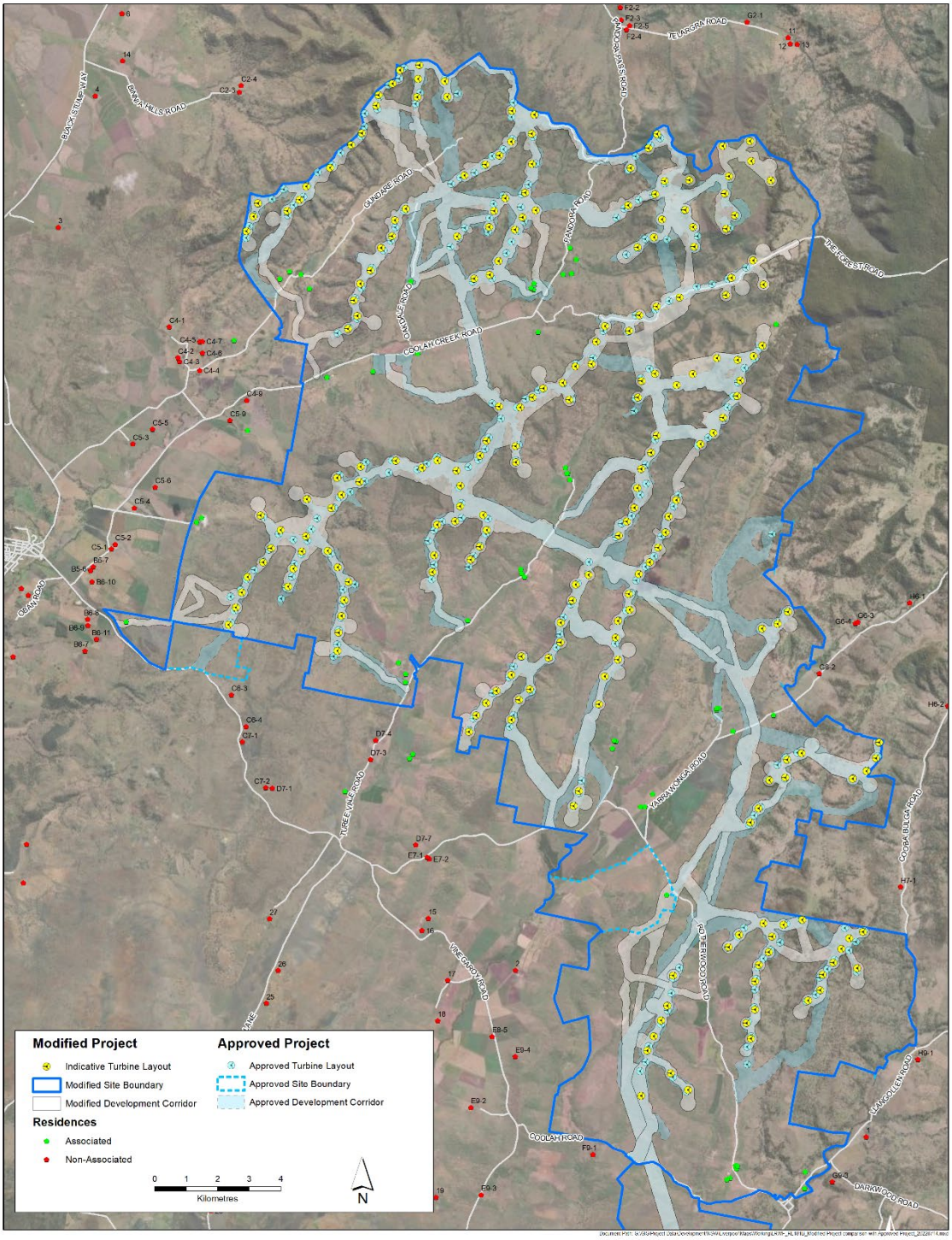


Figure 6: Key layout changes - overhead transmission and reticulation lines

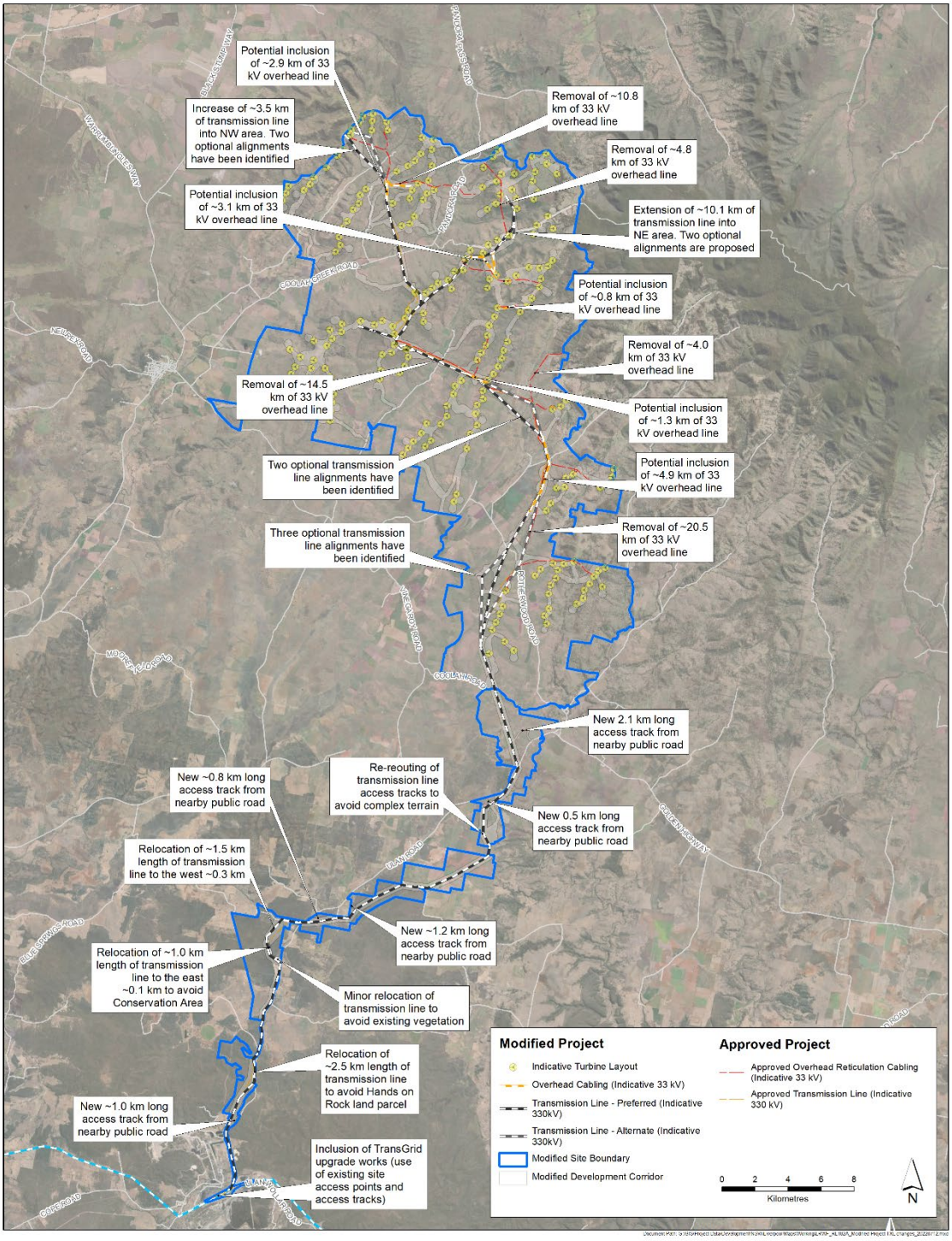


Figure 7: Key layout changes – substations

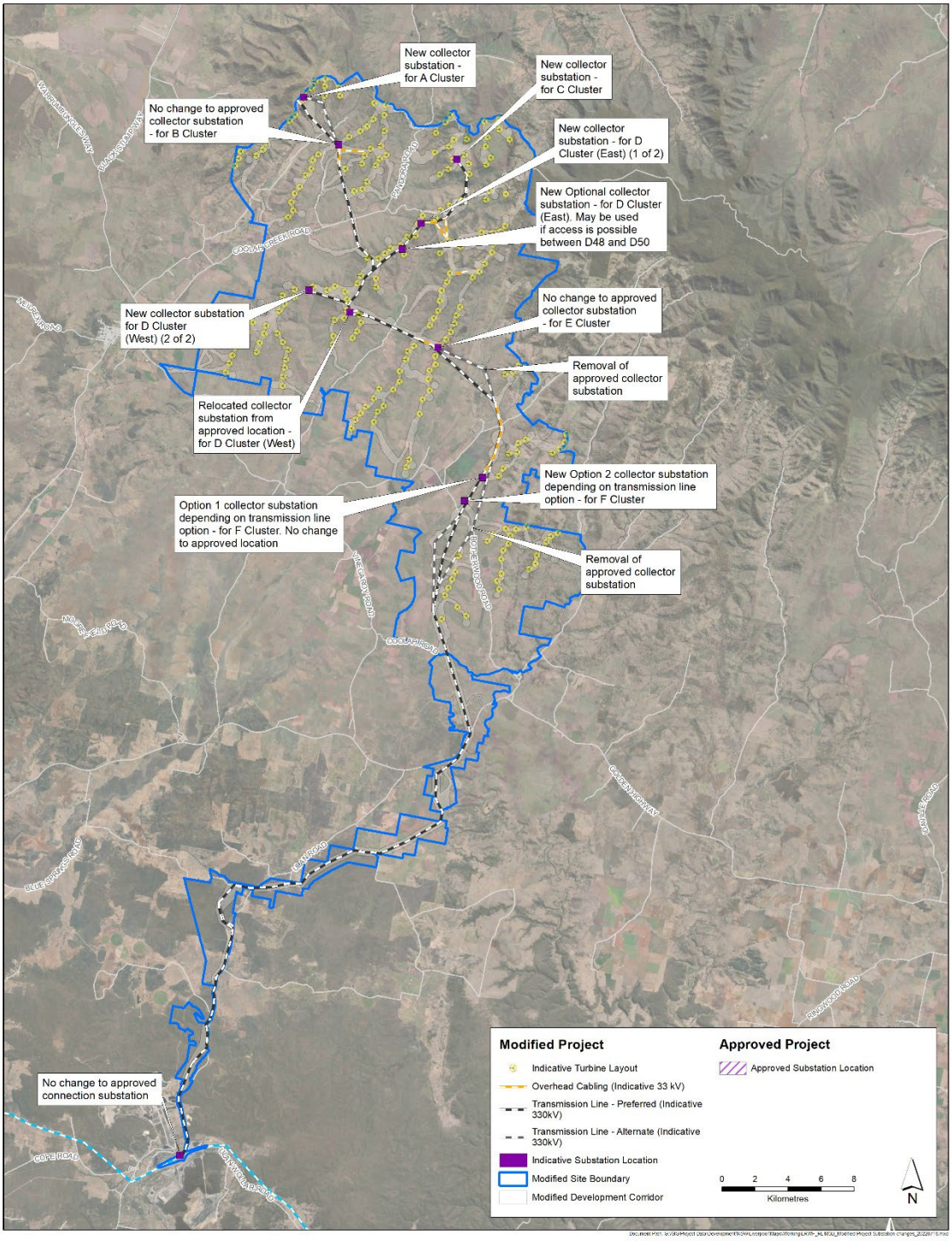


Figure 8: Key layout changes – access tracks

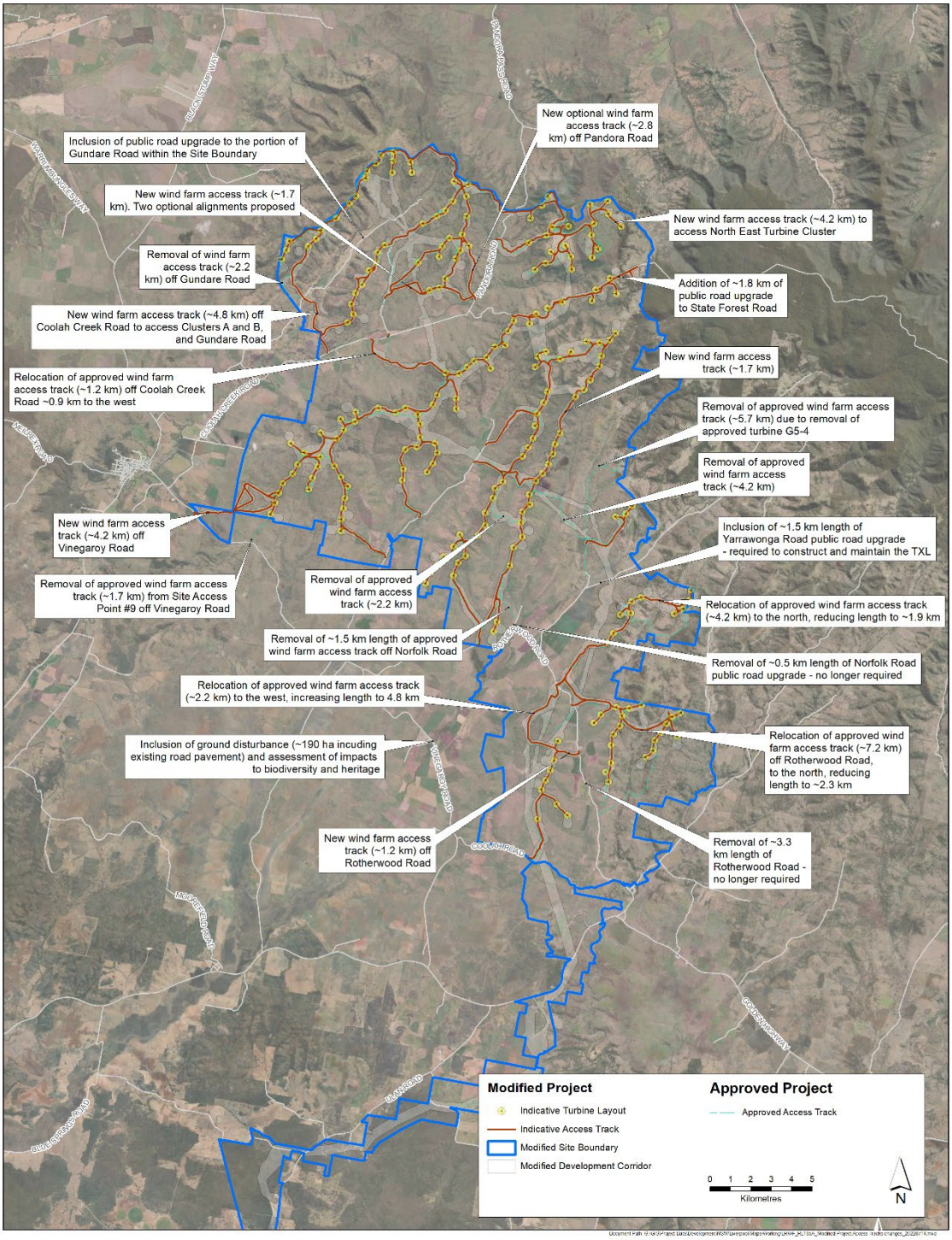


Figure 9: Key layout changes – other ancillary infrastructure

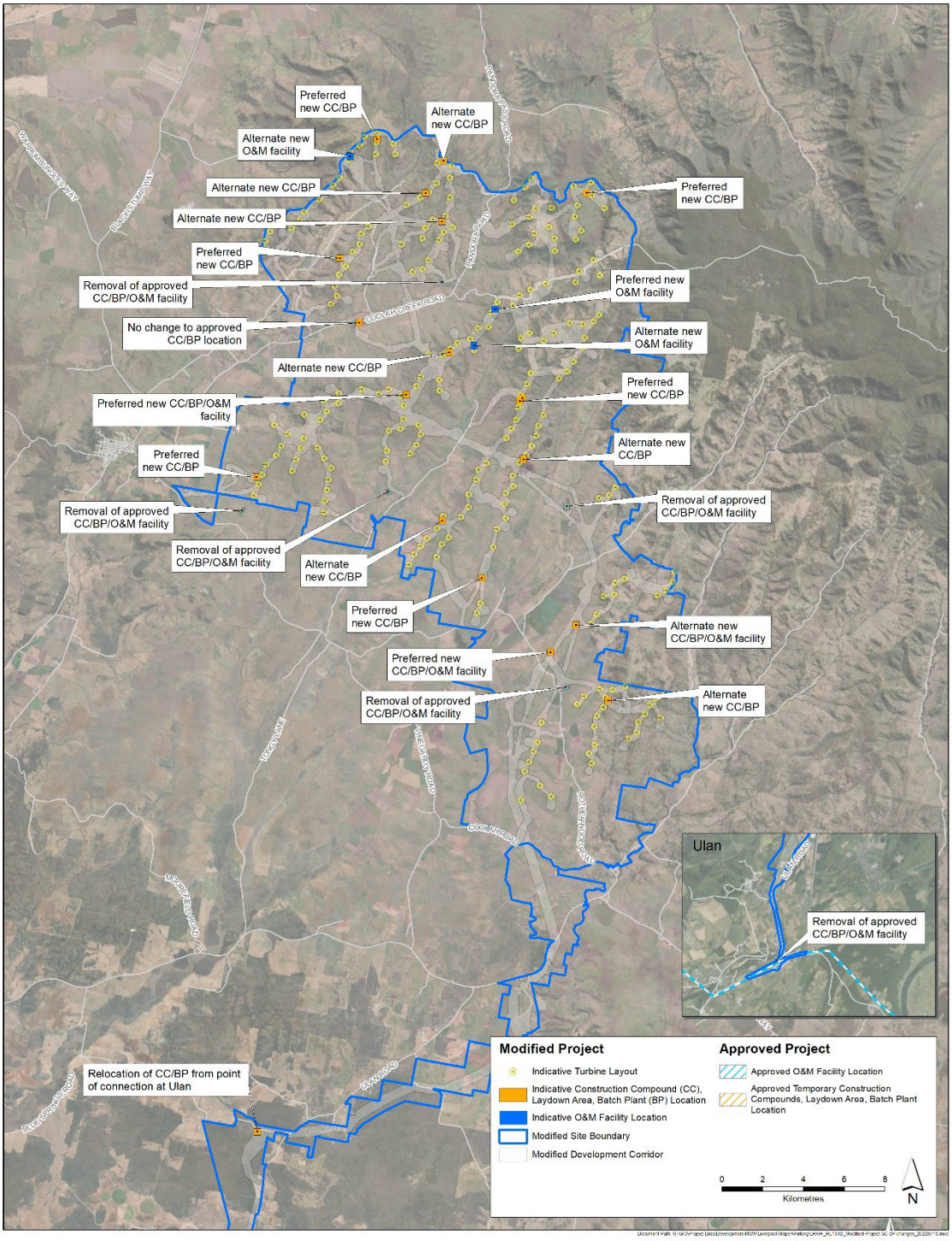


Table 10 below provides a comparative summary of the changes to the key parameters and assumptions adopted by the design and layout of the Approved Project and the Modified Project. The indicative parameters and assumptions provided in the table have been used to inform the specialist studies supporting this Modification Application, which are described in detail in Section 7.0.

Table 10: Key Indicative Parameters of the Modified Project compared to Approved Project

Parameter	Approved Project	Proposed Modifications	Extent of Change
Site Boundary and Development Corridor			
Site Boundary Area	51,336.6 ha	Total of 52,122.9 ha, comprised of: - 46,539 ha (Wind Farm Site) - 5,583.9 ha (External Transmission Line Site)	Increase of 786.3 ha (+1.5%)
Development Corridor	Total 12,405 ha	Total 12,601.6 ha, comprised of: - Wind Farm: 10,317.1 ha - External Transmission Line: 2,906.2 ha *Note: the combined area exceeds 12,601.6 ha due to partial overlap of the Wind Farm and External Transmission Line portions of the Modified Development Corridor.*	Increased by 196.6 ha (+1.6%)
Turbine Parameters and Wind Farm Layout			
Number of Turbines			
Number of wind turbines	267	220	Reduced by 47 wind turbines (or 17%)
Turbine Height			
Maximum blade tip height above ground level (AGL)	165 m	250 m	Increased by 85 m (or 52%)
Indicative rotor diameter	130 m	210 m [4]	Increased by 80 m (or 62%)
Indicative minimum blade ground clearance	35 m	40 m	Increased by 5 m (15%)
Indicative Rotor Swept Area (RSA) per wind turbine	13,273 m^2	34,636 m^2	Increased by 21,363 m^2 (or 161%)
Indicative Total RSA for wind farm	3,543,891 m^2	7,619,920 m^2	Increased by 4,076,029 m^2 (or 115%)

[4] The environmental impact assessments prepared for the Modified Project assume different blade lengths/rotor diameters to ensure a worst-case impact scenario for each environmental aspect (e.g. visual impact, birds/bat impacts, transport impacts) was assessed. These key turbine assumptions used in each environmental impact assessment are summarised in Section 7.1.2.

Parameter	Approved Project	Proposed Modifications	Extent of Change
Ancillary Infrastructure			
Wind Farm Access Track Length	256.5 km	259.9 km	Increased by 3.4 km (less than 1.5%)
Internal Transmission Line Length	28.19 km	43.93 km	Increased by 15.74 km (or 56%)
Internal Transmission Line Access Track Length	28.19 km *Note: this value is assumed based on the mapping in the Original EIS/RTS*	38.24 km	Increased by 10.05 km (or 36%)
Reticulation Cabling Length	Underground cabling: 274.1 km Overhead line: 46.7 km	Underground cabling: 196.39 km Overhead line (potential): 13.11 km	Decrease in underground cabling by 77.71 km (or 28%) Decrease in potential overhead line by 33.5 km (or 72%)
Permanent PCV Met Masts	10	Up to 14, to final hub height (40 indicative locations)	Increased by 4
Collector Substations	Up to 4	Up to 7 (10 indicative locations)	Increased by 3
Operations and Maintenance (O&M) Facility	1	Up to 3 (6 indicative locations identified)	Increased by 2
Temporary Site Calibration Met Masts	N/A	Up to 28, to final hub height	Not included in Original EIS/RTS
Temporary Concrete Batch Plants	Up to 4	Up to 9 (18 indicative locations identified)	Increased by 5
Temporary Construction Compound/Laydown Areas	Up to 6	Up to 9 (18 indicative locations identified)	Increased by 3
External Transmission Line and Connection Infrastructure			
External Transmission Line Length	56.82 km	56.24 km	Decrease of 0.58 km (or 1%)
Access Track Length	56.82 km *Note: this value is based on the mapping in the Original EIS/RTS*	Within easement: 54.7 km To easement from public roads: 8.82 km	Decrease of 2.12 km (or 3%) within easement Access tracks to easement from public roads not assessed in Original EIS/RTS
Temporary Concrete Batch Plants	Up to 1 (Ulan connection point)	Up to 1 (off Cliffdale Road, Turill)	Change to indicative location
Temporary Construction Compound/Laydown Areas	Up to 1 (Ulan connection point)	Up to 1 (off Cliffdale Road, Turill)	Change to indicative location
Connection Substation/Switchyard	Up to 1	Up to 1	No change
Indicative Development Footprints			

Parameter	Approved Project	Proposed Modifications	Extent of Change
Indicative Development Footprints (Wind Farm and External Transmission Line)	Combined total 752.82 ha	Combined total 1,599.4 ha, comprised of: - Wind Farm: 1,367.4 ha - External Transmission Line: 232.0 ha	Increased by 846.58 ha (or 112%)
Indicative Development Footprint – Public Road Upgrades	Not assessed in Original EIS/RTS	190.7 ha (includes existing road pavement)	Not assessed in Original EIS/RTS
Preferred Transport Route and Road Upgrades			
Over-dimensional (OD) and Heavy Vehicle Access Route	Preferred route identified	Revised preferred route identified	Minor changes Inclusion of eastern portion of Gundare Road (i.e. portion within Modified Site Boundary only) and removal of short section of Rotherwood Road
Indicative OSOM Haulage Route (between Port of Newcastle and Project site)	Preferred route identified	Revised preferred route identified Port of Newcastle remains the preferred port location.	Minor change to the use of State roads. Deviation along State roads required to avoid constraints such as built-up areas in Maitland. Inclusion of Edderton Road, Bengalla Road and Wybong Road, all of which are Local roads within Muswellbrook LGA. Use of Local roads within Muswellbrook LGA required to avoid low height clearance bridge at Denman.

Modified Project Turbine Identification Numbering System

The turbine identification numbering system has been amended to better reflect the configuration of ridgelines at the Project site and the proposed clustering of turbines along those ridgelines, and in doing so improves the ability to efficiently locate turbines of interest. Under the revised system, each turbine is allocated a letter (A to F) that corresponds to the particular ridgeline/cluster it is located on/within as well as a specific identification number (1 or greater). Accordingly, the Modified Project turbines are grouped and labelled in clusters as follows (see also Figure 10 below):

- **A Cluster (Turbines A1 to A21):** located along the north-western-most ridgeline, north of Gundare Road
- **B Cluster (Turbines B1 to B28):** located in the north-western portion of the Wind Farm Site, south of Gundare Road, west of Coolah Creek Road and Pandora Pass Road
- **C Cluster (Turbines C1 to C21):** located in the northeastern portion of the site, generally east of Pandora Pass Road and north of State Forest Road, and west of Coolah Tops National Park
- **D Cluster (Turbines D1 to D61):** central ridgeline that runs generally east-west across the site south of Coolah Creek Road, east of Vinegaroy Road and along State Forest Road
- **E Cluster (Turbines E1 to E51):** dual ridgelines generally located east of Turee Vale Road and north of Rotherwood Road

- **F Cluster (Turbines F1 to F41):** made of dual turbine clusters in the southern-most portion of the Wind Farm Site, located generally south of Yarrawonga Road on the eastern and western sides of Rotherwood Road

A list of Approved Project and Modified Project turbine identification numbers (including the distances moved) is provided in Appendix C.3.

Figure 10: Turbine clusters

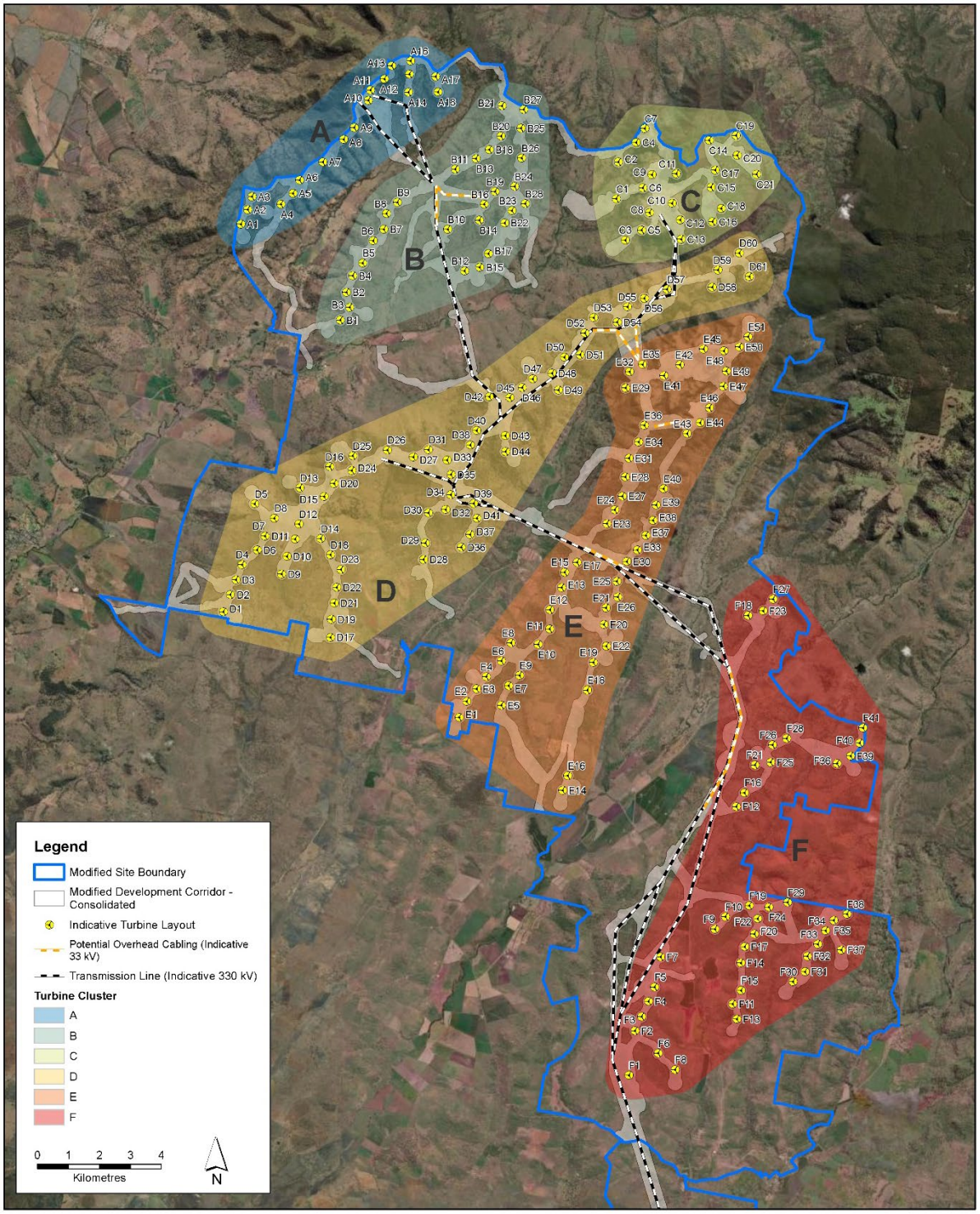


Figure 11: Comparison between Approved and Modified project layouts (northern section)

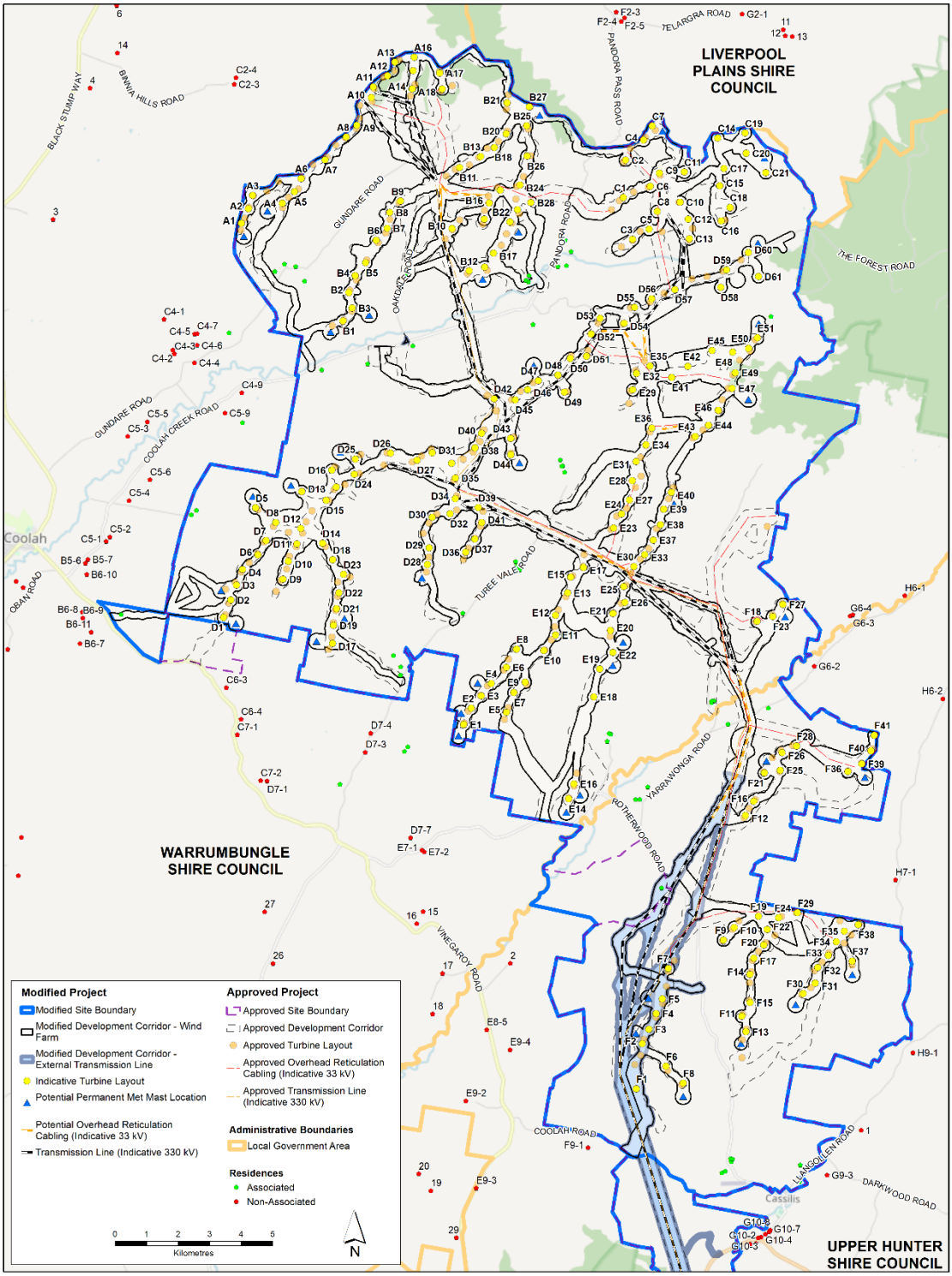
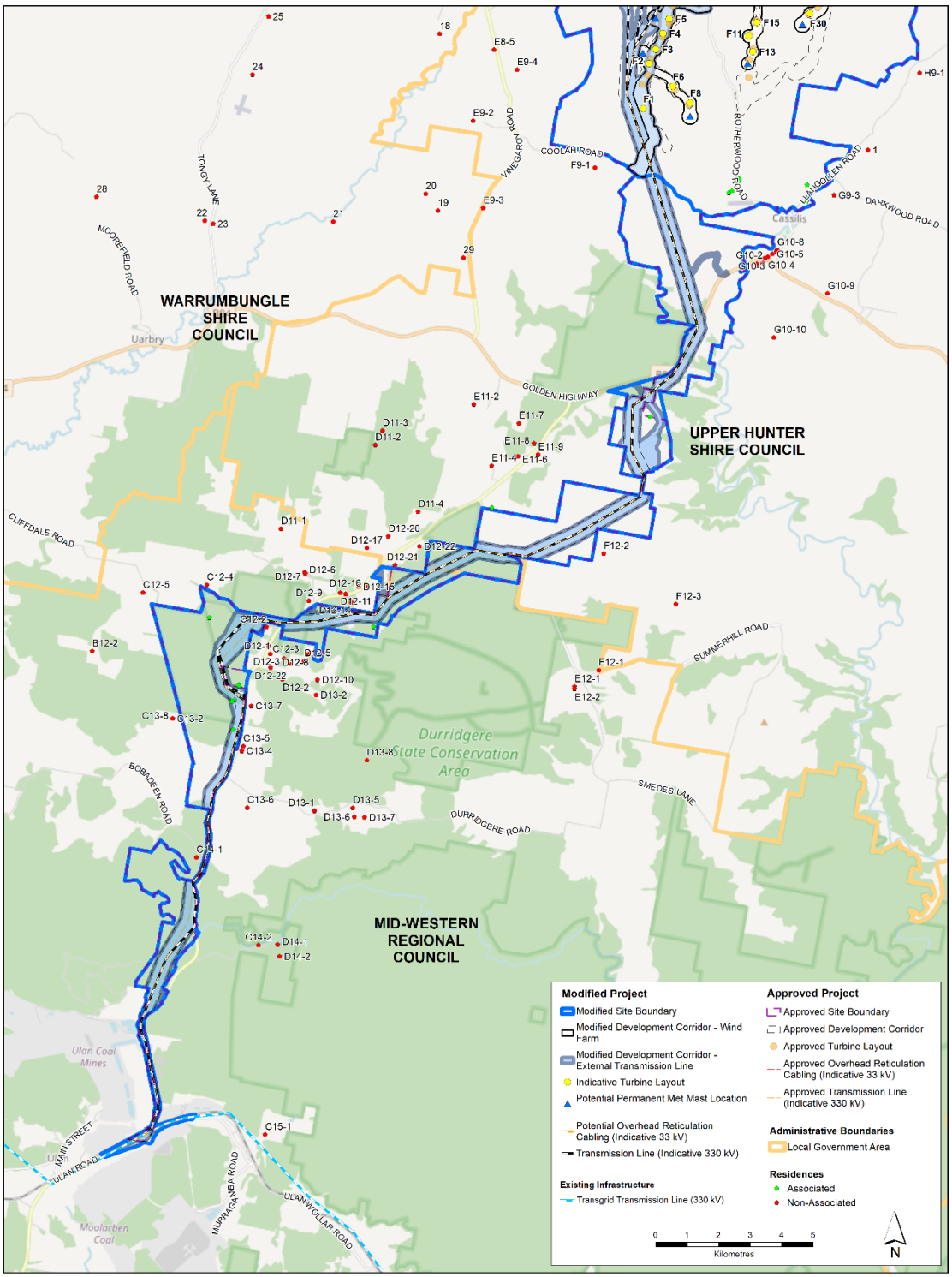


Figure 12: Comparison between Approved and Modified project layouts (southern section)



4.2 Updated Project Description

Following from the Proposed Modifications summarised in Section 4.1 and presented in further detail in the following sub-sections, an updated consolidated description of the Modified Project is provided below (Updated Project Description), in accordance with DPE's SSD Modification Report Guidelines (DPIE, 2021a).

The Modified Project is broadly described as the construction, operation, replacement or upgrade, and decommissioning of a wind farm, including transmission line and ancillary infrastructure, consisting of the following key components:

- **Wind Turbines:** up to 220 wind turbines with a maximum blade tip height of 165 metres, including an adjacent hardstand area for lift cranes and a material laydown;
- **Collector Substations:** up to seven collection substations that step-up the voltage of the reticulation cabling (typically 22 kV or 33 kV) to the transmission line voltage (anticipated to be 330 kV). The collector substations are comprised of multiple components including transformers, circuit breakers, bus bars, and gantries, and are anticipated to occupy a 3D envelope approximately 70 m long x 60 m wide x 9 m high. The steel gantries that support the incoming/outgoing power lines are anticipated to be approximately 25 m high;
- **Connection Substation (also referred to as Switchyard):** a single 330 kV connection substation located at the southern end of the Modified Site Boundary at Ulan, to facilitate connection into the existing Transgrid 330 kV Wellington - Wollar transmission line. Similar to substations, switching stations typically contain bus bars, circuit breakers and steel gantries. The switching station is anticipated to occupy a 3D envelope approximately 150 m long x 100 m wide x 9 m high. Steel gantries that support the power lines are anticipated to be approximately 25 m high;
- **Internal Transmission Line:** overhead powerline of up to 330 kV, supported by poles or towers and located within a 60 m wide easement, that extends from the northwest of the Project site to the southern-most collector substation proposed near Rotherwood Road, Cassilis. The supporting poles are anticipated to be of a steel construction with an indicative height of approximately 30 - 50 m, generally located at intervals of approximately 300 m wherever practicable. Steel towers may need to be used, particularly in complex terrain, as they allow for longer spans and less tower structures. Steel towers are anticipated to have an indicative height of approximately 40-50 m;
- **External Transmission Line:** overhead powerline of up to 330 kV, supported by poles or towers and located within a 60 m wide easement, that extends from the southern-most collector substation proposed near Rotherwood Road, Cassilis south to the connection substation proposed at Ulan. The anticipated design is as described above for the Internal Transmission Line;
- **Reticulation cabling:** underground electrical reticulation cabling, and potentially some overhead powerlines, that provide an electrical connection between the wind turbines and the collector substations. Reticulation cabling is typically rated at 22 kV or 33 kV;
- **Access Tracks:** access tracks, typically with a trafficable width of 5.5-6 m, to provide access from the public road network to wind farm and transmission line infrastructure and meteorological masts;
- **Site Access Points:** provision of the following site access points off public roads:
    - up to 47 site access points from nearby public roads to facilitate construction and ongoing maintenance of the wind farm components located north of the Golden Highway;
    - up to 43 site access points from nearby public roads to facilitate construction and ongoing maintenance of the proposed External Transmission Line located south of the Golden Highway;
- **Operation and Maintenance (O&M) Facilities:** up to three O&M facilities incorporating a control room, maintenance and equipment storage facilities. The O&M facility is used to store spare parts and other

equipment used for ongoing maintenance of the wind farm. The O&M facility is anticipated to occupy a 3D envelope approximately 45 m long x 30 m wide x 15 m high;

- **Temporary Construction Compound/Laydown Area/Concrete Batch Plants:** Up to 10 temporary construction facilities, including temporary concrete batching plants, rock crushing equipment, temporary laydown facilities, and construction compounds, of which nine are located within the Wind Farm Site and one located off Cliffdale Road, Turill within the External Transmission Line Site;
- **Public Road Upgrades:** upgrades to Local and Regional public roads in proximity to the Project site required for the delivery, installation and maintenance of wind turbines, transmission lines, and related infrastructure, in accordance with road upgrade standards as agreed with the relevant Roads Authorities;
- **Permanent Wind Monitoring Masts (Met Masts):** up to 14 permanent Power Curve Validation (PCV) met masts to the final hub height, and associated access tracks;
- **Temporary Site Calibration Met Masts:** up to 28 temporary site calibration met masts to the final hub height, to be located at a subset of the turbine locations and removed prior to erection of each relevant turbine; and
- **Subdivision of Land:** subdivision of land within the Modified Site Boundary to create new separate lots for the connection and collector substations, and associated ancillary facilities.

Further detailed information supporting this Updated Project Description is provided in Table 11 below, in accordance with DPE's Modification Report Guidelines.

Table 11: Modified Project Description Key Aspects (SSD Modification Report Guidelines, DPE 2021a)

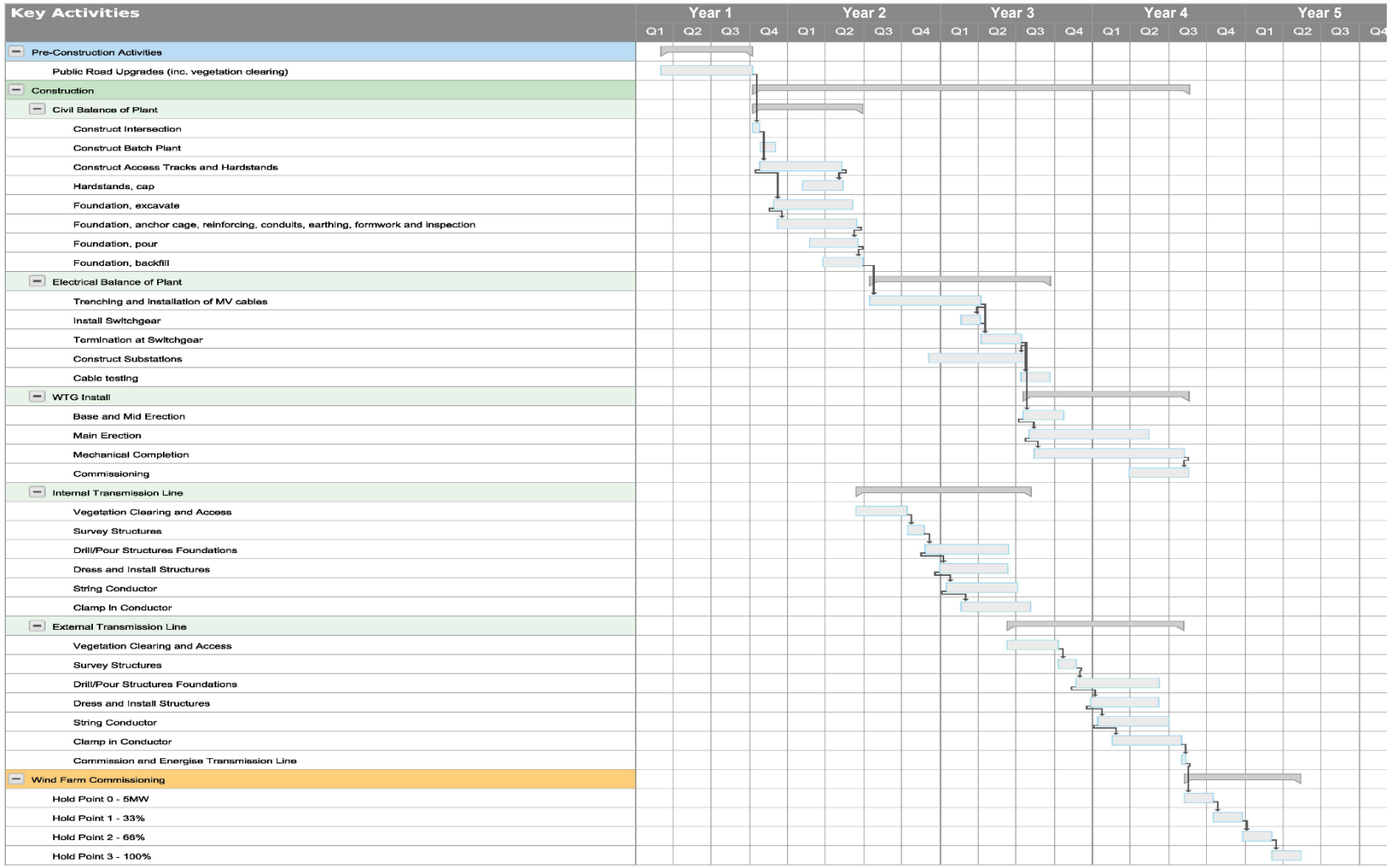
Key Aspects	Description	Section of this Report or Original EIS/RTS
Project area	The land on which the project will be located, including any land required as a buffer area	A brief description of the land on which the Modified Project is located is provided in Section 3.2.3 A list of all the lots that form part of the Modified Project is provided in Appendix C.1.
	The land that will be physically disturbed within the project area, and any changes to this disturbance area over time	A comparative summary of the disturbance areas is provided in Section 4.9.1. No further expansion of disturbance areas is expected over time. Areas subject to temporary ground disturbance (e.g. cut/fill batters) will be rehabilitated over time.
	The land within the project area with environmental constraints (e.g. high conservation value, subject to flooding) where no development will occur, or development will be minimised	All environmental constraints are summarised in Section 7.0, with further detailed provided in the detailed environmental impact assessments contained in Appendix G.
	Maps / plans showing the project area, disturbance area and any constraints in plan-view and cross section	Overview maps are provided in Figure 11, Figure 12, and Appendix C.2. A detailed map series is provided in Appendix E. Maps showing environmental constraints are provided in the detailed environmental impact assessments contained in Appendix G.
Physical layout and design	The layout of all the physical elements of the project within the project area, including all buildings, structures,	An overview of all physical elements are shown in Figure 11, Figure 12, and Appendix C.2, and in

	works, landscaping, open space and biodiversity offsets (if applicable)	further detail in the detailed map series provided in Appendix E.
	All mitigation measures that will be built into the physical layout and design of the project (such as noise walls)	Mitigation measures as they relate to each environmental aspect are detailed in Section 7.0 wherever relevant.
	Any ancillary infrastructure for which approval is being sought (such as upgrades to utilities or surrounding roads)	All ancillary infrastructure for which approval is sought is detailed in Section 4.0.
	The design of the various physical elements of the project, including the form, materials and finishes	Section 3.3 of the Original EIS provides a summary of the design of key infrastructure such as turbine, towers, blades, and nacelles, which, for the main part, continue to generally apply to the Modified Project. Sections 4.3, 4.4 and 4.5 and Appendix A of this Modification Assessment Report provide updated design assumptions for turbines, wind farm infrastructure (e.g. access tracks, substations, operations and maintenance facilities) and transmission line infrastructure (e.g. access tracks, towers/poles, string pads), respectively, that specifically apply to the Modified Project.
	Identify those components of the physical layout and design that may change during the detailed design of the project, and set clear limits within which this change may occur without requiring amendments to the DA or modifications to the development consent if the project is approved	Access track alignments, turbine locations, and locations for O&M facilities, concrete batch plants/construction compounds/laydown areas may change through the detailed design process once a turbine model has been selected. This is described further in Section 4.0 and Appendix A. Any changes to the number and location of wind farm and transmission line infrastructure will be undertaken within the Modified Development Corridor and in accordance with limits and requirements specified in the Development Consent.
	Plans showing the layout and design in plan-view and cross section	Overview maps are provided in Figure 11, Figure 12, and Appendix C.2. A detailed map series is provided in Appendix E.
Uses and activities	The land uses e.g. (residential, commercial, mixed use, mining, waste, warehouses, schools, hospitals, intensive agriculture) that characterise the project	The proposed land use is a wind farm with transmission line and connection infrastructure, and ancillary infrastructure, consistent with the Approved Project. A consolidated summary description of the proposed land use is provided in Section 4.2.
	The activities (e.g. demolition, cut and fill, resource extraction, processing, storage and handling of materials, waste disposal, parking) that will be carried out on site	The key construction and operational activities are summarised in Section 3.10 of the Original EIS, which continue to generally apply to the Modified Project.
	The scale and intensity of these activities (e.g. extraction rates, rates of production, hours of operation)	Despite a reduction in the maximum number of turbines, the scale and intensity of construction activities are expected to be generally similar to the Approved Project.
	the transport of materials and people to and from the site (e.g. raw	Transport of materials and labour to/from the site is summarised in Section 7.10, with further detail

	materials, equipment, products, waste, employees)	provided in the Traffic Impact Assessment contained at Appendix G.7.1 and the OSOM Haulage Route Assessment contained at Appendix G.7.2.
	Process flow diagrams of these uses and activities.	A general process flow diagram is provided in Figure 13 below.
Timing Stages	The description should include each stage of the project if the delivery of the project is to be staged.	The Modified Project may be delivered in stages, as detailed in Section 4.8.
Timing Phases	The description should include each phase (e.g. demolition, construction, operation, decommissioning and rehabilitation) of the project. However, if the delivery of the project is to be staged, then describe the phases of each stage	The Modified Project, including public road upgrades, may be delivered in stages, as detailed in Section 4.8.
Timing Sequencing	The description should include the order in which the stages and phases of the project will be carried out and identify snapshots of the project at key points in time that will be used to assess the impacts of the project (see discussion below). This description should be supported by a simple graphic showing the planned sequencing of the project, and concurrent delivery of the various stages and phases of the project.	The Modified Project, including public road upgrades, may be delivered in stages, as detailed in Section 4.8.

A high level overview of the key activities (and indicative timeframes and interdependencies) anticipated to be required to construct and commission the wind farm, transmission line, and public road upgrades components proposed by the Modified Project, is shown in Figure 13 below.

Figure 13: Overview of Key Activities to Construct and Commission the Modified Project



4.3 Turbine Parameters

4.3.1 Maximum Blade Tip Height

The Proposed Modifications include an increase to the maximum blade tip height to 250 m above ground level (AGL), which equates to an increase of 85 m.

Wind speeds are typically much higher at greater distances from the ground level, and the increase in maximum blade tip height to 250 m AGL will provide the flexibility for the Project to adopt longer blades (whilst maintaining a minimum ground clearance height of 40 m, consistent with the Approval Project) to more efficiently capture and convert the wind resource into electricity.

Indicative wind turbine model parameters reflecting the wind turbine technology available at the time were used to inform the technical assessments prepared in support of the Original EIS/RTS. However due to continued advancements in technology the wind turbine models currently on the market provide greater generation capacity and in doing so provides opportunities to increase the efficiency of the Project and reduce the number of turbines required.

A final wind turbine model has not yet been selected, with several wind turbine models to be considered as part of a commercial tender process. Each wind turbine model will have varying characteristics, including physical dimensions, technical attributes, and generation capacity.

A maximum blade tip height of 250 m AGL tip height will enable flexibility in the selection of the most appropriate and efficient model for the Project through the commercial tender process, maximising the number of participating suppliers and will enabling the selection of the most appropriate wind turbine model on the market.

The proposed 250 m AGL maximum blade tip height is consistent with the proposed Valley of the Winds Wind Farm project, located approximately 15 km to the west of the Project site.

Details of the indicative wind turbine parameters within this envelope which have been used for the purpose of the environmental assessments is included in Table 10.

4.3.2 Maximum Number of Turbines and Changes to Turbine Layout

The Proposed Modifications include a reduction in the maximum number of turbines to 220 turbines, which equates to a reduction of 47 approved turbines. The proposed reduction in the number of turbines has been informed by a detailed turbine layout review. The key changes to the Approved Project turbine layout proposed by the Modified Project involve the optimisation of approved turbine locations and deletion of approved turbine locations, as summarised in Table 12 below.

The indicative wind turbine layout proposed by the Modified Project is shown in Figure 3 and Figure 5 above and in Appendix C.2. A detailed comparison between the Approved Project and Modified Project layouts is shown in the map series contained in Appendix E. The coordinates of the Approved Project turbines and Modified Project turbines as well as a breakdown of the distances at which turbine locations have been optimised are contained in Appendix C.3.

A summary of the key considerations that has informed the changes to the approved turbine layout is contained in Appendix A.

Non-associated residences where the nearest turbine has moved closer are listed in Section 7.2 along with the respective distances.

Final wind turbine locations will be confirmed once a wind turbine model has been selected as part of ongoing detailed design and in compliance with the Development Consent as amended by this Modification Application.

Table 12: Summary of Proposed Changes to Approved Turbine Locations

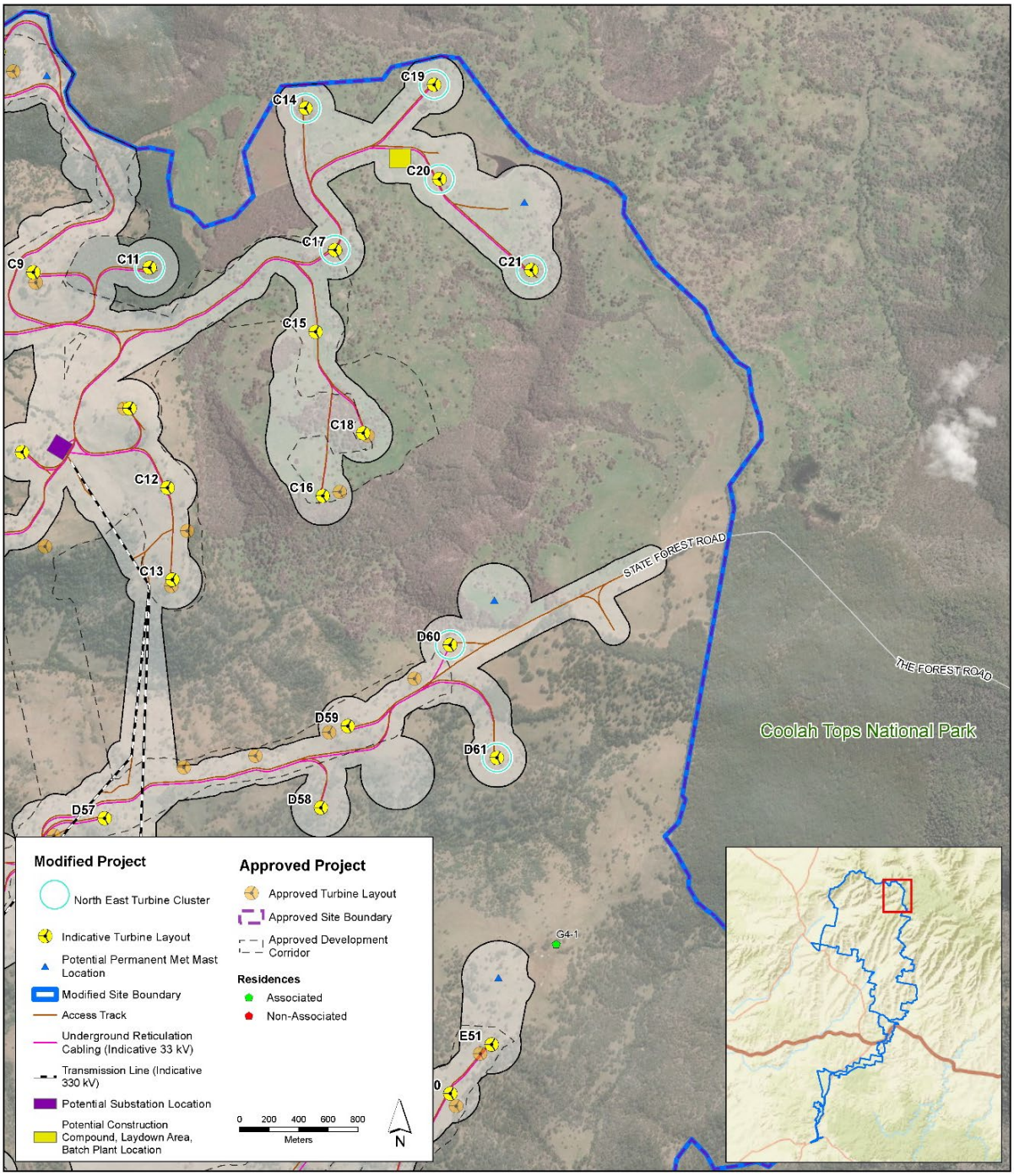
Proposed Changes	Description
Optimised turbine locations	Total of **220 turbines** have been moved the following distances: - 1-49 m (note remains within the currently approved 100m micro-siting allowance): 32 turbines - 50-99 m (note remains within the currently approved 100m micro-siting allowance): 56 turbines - 100-249 m: 90 turbines - 250-499 m: 16 turbines - 500-999 m: 5 turbines - 1,000-1,999 m: 7 turbines - 2,000-4,999 m: 14 turbines
Deleted turbine locations	Total of **47 x turbines**

North East Turbine Cluster

Eight of the optimised turbine locations listed in Table 12 are proposed to be moved to the northeast portion of the Project site which currently does not contain any turbines. These are turbines C11, C14, C15, C17, C19, C20, C21, and D61 which are referred to as the North East Turbine Cluster for ease of reference (see Figure 14).

Recent wind modelling data indicates that the northeast portion of the Project site has excellent wind resources. The terrain in this area of the site is generally undulating and favourable for access tracks and turbine hardstands, minimising the need for extensive ground disturbance associated with cut and fill batters. In addition this portion of the Project site has been largely cleared of native vegetation and there are no areas of Box Gum Woodland CEEC that would be impacted. Detailed assessments have been undertaken of potential impacts including noise, native vegetation/habitat and birds/bats, heritage, visual, and aviation, as well as a consideration of potential impacts to park assets and management activities within the nearby Coolah Tops National Park (see Section 7.0).

Figure 14: The North East Turbine Cluster



4.3.3 Micro-siting Limit

The Proposed Modification include a proposed increase to the turbine micro-siting limit specified in Condition 8 of Schedule 2 of the Development Consent from 100 m to 250 m.

No other changes are proposed to the turbine micro-siting requirements, such that any micrositing of turbines must ensure that they are wholly contained within the Modified Development Corridor, comply with the currently specified minimum distance (50 m) from existing hollow-bearing trees, [5] and not result in a non-compliance with other existing Conditions of Consent.

The key rationale for the proposed increase to the turbine micrositing limit to 250 m for the Modified Project is as follows:

- It will provide additional flexibility for the Project to microsite turbines during the detail design phase to further minimise potential environmental impacts such as vegetation clearing and impacts to cultural heritage values. This is particularly relevant for the larger turbines (which require larger hardstands) proposed to be used, and the particular topography of the Wind Farm Site which is characterised by a series of predominantly narrow and steep ridge lines.
- In its Assessment Report for the Approved Project, the Department of Planning and Environment confirmed that the rationale for the 100 m turbine micro-siting limit was based on concerns raised on other wind farm projects in NSW, but did not cite any particular micro-siting concerns specifically related to the Project. No specific concerns related to the proposed increase in the micro-siting limit to 250 m have been raised through stakeholder and community engagement to-date.
- The proposed indicative turbine layout has been defined by a range of factors including the requirement to achieve minimum recommended separation distances between turbines in dominant and non-dominant wind directions. The increased micro-siting limit to 250 m would provide greater flexibility to consider a range of different turbine makes and models, and to microsite turbines to optimise energy yield specific for the turbine model selected for the Project.

The proposed increase to the turbine micro-siting limit to 250 m would also ensure the Development Consent is consistent with other approved SSD wind farm approvals, including the Rye Park Wind Farm Development Consent SSD 6693.

4.4 Wind Farm Infrastructure

4.4.1 On-site Collector Substations and Ancillary Infrastructure

The Proposed Modifications seek to include up to up to seven (7) on-site collector substations, an increase of up to three (3) compared to the Approved Project. A total of 10 indicative locations have been assessed for the Modified Project, and are shown in Figure 7 and Appendix C.2. A detailed comparison between the Approved Project and Modified Project layouts is shown in the map series contained in Appendix E.

As detailed within the Original EIS/RTS, the collector substations are anticipated to have an indicative capacity of 330 kV. Ancillary infrastructure such as a statcom, synchronous condenser or small battery (i.e. not utility scale) may also be included within the substation site to meet grid connection standards and requirements. [6] The primary function of this infrastructure, which is typically co-located at substations, will be to improve stability, system strength and to maintain voltage levels within required limits under changing load

5 The Applicant understands that the specified minimum distance from existing hollow-bearing trees (HBTs) requirement excludes those HBTs that have already been approved for removal.

6 A utility-scale Battery Energy Storage System (BESS) was originally proposed to be included as part of this Modification Application, but has since been removed. Any future proposal to include a utility-scale BESS at the Project site would be subject to a separate assessment under the EP&A Act.

conditions.

These changes to the collector substation layout are largely driven by an overarching requirement to ensure the electrical system performs efficiently and electrical losses are minimised. Typically, electrical losses are most prominent along reticulation cabling which is rated at lower voltages typically 33 kV, and increase as the length of the reticulation cabling between turbines and the collector substation increases. To minimise electrical losses, the distance between turbine clusters and collector substations should be minimised, so that the power is stepped-up to higher voltages as close as practicable to turbine clusters which therefore requires additional collector substations to be considered.

4.4.2 Internal Transmission Line Alignment

The Proposed Modifications include several changes to the internal 330 kV transmission line alignment (i.e. the portion of the transmission line located generally north Rotherwood Road, Cassilis).

The proposed revisions to the internal transmission line alignment have been driven by the changes to the turbine layout and associated separation distances from turbines, the findings of the constructability review, and to ensure efficient operation of the electrical system (see Appendix A). The key changes proposed are summarised as follows:

- Approximately 3.7 km of additional transmission line included in the northwest portion of the site between the A and B Clusters. This additional length of transmission line and associated collector substation are largely driven by the number of turbines in the northwest portion of the Project site (A Cluster) and the need to minimise electrical losses. This section of the transmission line is located within complex terrain, and therefore two route options have been identified.
- Approximately 12 km of additional transmission line included along the central ridgeline south of State Forest Road. This additional length of transmission line and associated collector substation are largely driven by the number of turbines in the northeast portion of the Project site (C Cluster) and the need to minimise electrical losses.
- Inclusion of two optional routes along an approximately 5 km long section of the transmission line between the E Cluster and the F Cluster. This section of the transmission line is located within complex terrain.
- Inclusion of three optional routes along an approximately 9 km long section of the transmission line within the F Cluster. This section of the transmission line is located within complex terrain.

The proposed changes to the transmission line alignment are shown in Figure 6 above and Appendix C.2. A detailed comparison between the Approved Project and Modified Project layouts is shown in the map series contained in Appendix E. A preferred route will be determined during the detailed design phase as more information, including geotechnical conditions, becomes available.

Together with the proposed changes to the 33 kV reticulation infrastructure (see Section 4.4.4) the proposed changes to the transmission line will reduce the electrical transmission losses and improve efficiency, ensuring that the Project is able to export the maximum amount of renewable energy to the National Electricity Market (the Grid).

4.4.3 Temporary and Permanent Met Masts

Permanent Power Curve Validation (PCV) Met Masts

The Approved Project allows for up to 10 permanent PCV met masts with a height equal to the final hub height, however potential locations were not identified in the EIS.

The Proposed Modifications include up to 14 permanent met masts with a height equal to the final hub height of the turbines, an increase of up to 4 permanent met masts compared to the Approved Project.

Given the large geographic area and complex topography of the Project site, and that the final turbine locations will not be determined until the detailed design phase, 40 indicative locations for the permanent met masts have been identified to ensure their potential impacts can be appropriately assessed, and so that the optimal locations (largest wake free sector and lowest impact on construction schedule) can be selected when the detailed design and construction schedule is known.

All permanent met masts will be located within the Modified Development Corridor (discussed in Section 4.9.2) generally in accordance with the 40 identified indicative locations. All indicative permanent met mast locations are shown in Appendix C.2 and Appendix E.

Temporary Site Calibration Met Masts

The Proposed Modifications include up to 28 temporary site calibration met masts with a height equal to the final hub height of the turbines. The temporary site calibration met masts will be installed at selected turbine locations and are decommissioned prior to the installation of the turbine. The location of the temporary site calibration met masts will be determined during the detailed design phase once final turbine locations have been determined and construction schedule is defined.

Further information on the purpose of temporary site calibration met masts is provided in Appendix A.

4.4.4 Other Ancillary Infrastructure

The Proposed Modifications include changes to other temporary and permanent ancillary wind farm infrastructure required to construct and operate the Project as follows:

- Reticulation infrastructure
- Access tracks
- Operations and maintenance facilities
- Temporary concrete batch plants, laydown areas, and construction compounds
- Ancillary infrastructure for grid-support purposes

These are discussed in more detail below.

Reticulation Infrastructure

The Proposed Modifications include revisions to the indicative underground and overhead reticulation cabling (33 kV or 66 kV) layout. The key reasons for the changes are to ensure cable lengths are reduced as much as possible to maximise energy efficiency, that the cable can be installed safely while other construction work is underway (e.g., if located in parallel with the access tracks, it is important to have width sufficient enough to account for passing vehicles), disturbance to vegetation is minimised and construction costs are optimised.

Multiple layout options for the reticulation infrastructure have been identified for the Modified Project which assume either complete underground of cabling or a combination of underground cabling and overhead powerlines.

The revisions to the indicative underground cabling and overhead reticulation layout are shown in Appendix C.2 and Appendix E.

During detailed design further analysis will be undertaken to determine whether purely underground or a combination of underground and overhead reticulation infrastructure will be constructed. During detailed design consideration of all relevant factors will be undertaken, including the relative costs and constructability, geotechnical conditions and electrical performance, and opportunities to reduce the extent of ground disturbance and associated potential impacts to native vegetation and cultural heritage.

Internal Wind Farm Access Tracks

The Proposed Modifications include several revisions to the access track layout to reflect the reduction in

wind turbine numbers, realignment of ancillary infrastructure and design optimisation. Notwithstanding these proposed changes, the access track layout is generally consistent with the Approved Project.

The indicative access track layout proposed by the Modified Project is generally consistent with the Approved Project. The key changes to the indicative access track layout are shown in Figure 8 above and in Appendix C.2. A detailed comparison between the Approved Project and Modified Project layouts is shown in the map series contained in Appendix E.

Permanent O&M facilities and temporary concrete batch plants, laydown areas, and construction compounds

Given the large geographical area of the Project site, complex topography and multiple constrained access points off the public road network, the number of construction compounds/laydown areas and O&M facilities have been increased to ensure construction and long-term maintenance requirements can be achieved.

Similarly, given the large area and complex topography of the Project site, longer access tracks at steeper grades are required at the Project site. The Modified Project requires additional concrete batch plants to ensure concrete can be efficiently delivered to the turbine foundations within strict cure times.

The proposed changes are summarised in Table 13 below.

Table 13: Proposed changes to other ancillary infrastructure

Other Infrastructure	Approved Project	Modified Project	Change
Operations and Maintenance (O&M) Facility	Up to 1	Up to 3 (6 indicative locations identified)	+2
Construction Compound/Laydown Area	Up to 6	Up to 9 (within Wind Farm Site, 18 indicative locations identified) Up to 1 (within External Transmission Line Site, 1 indicative location identified)	+4
Temporary Concrete Batch Plant	Up to 4	Up to 9 operational at any given time within Wind Farm Site (18 indicative locations identified) Up to 1 operational at any given time within External Transmission Line Site (1 indicative location identified)	+6

4.5 External Transmission Line and Connection Infrastructure

4.5.1 External Transmission Line Alignment

The Modified Project largely adopts the indicative alignment of the 330 kV external transmission line proposed by the Approved Project.

In response to stakeholder feedback, the Proposed Modifications include minor changes along a 3.8 km long section of the external 330 kV transmission line alignment near the Durridgere State Conservation Area (DSCA) located south of Turill, and along an approximately 1 km long section near the Hands on Rock cultural heritage site located off Bobadeen Road, Turill.

The proposed changes are described in further detail below, and are shown in Figure 6 above and in Appendix C.2. A detailed comparison between the Approved Project and Modified Project layouts is shown in the map series contained in Appendix E.

Proposed changes near Cliffdale Road and DSCA

The Proposed Modifications include changes to an approximately 2 km length of the approved transmission line alignment located on a land parcel off Cliffdale Road, Turill which is owned by Tilt Renewables (Lot

72/DP750736). It is proposed to shift the indicative transmission line alignment west approximately 300 m to increase the separation distance to the Non-associated residence (ID#: C12-3) located to the east on Lot 1/DP750736 and minimise potential visual impacts to that residence (see Figure 15).

The Proposed Modifications also include an alternate optional transmission line alignment approximately 800 m in length to minimise direct impacts to the DSCA. The DSCA is public land located on Lot 164/DP750748 near Cliffdale Road, Turill under the management of the NSW National Parks and Wildlife Service (NPWS). The Modified Project therefore proposes the two following alternate transmission line alignments along the DSCA boundary:

- **Option 1:** adopt the currently approved transmission line alignment which directly impacts approximately 5 ha of the DSCA. An agreement with NSW National Parks and Wildlife Services is already in place for this option.
- **Option 2:** shift an approximately 800 m length of the approved transmission line alignment slightly east so that it is located on freehold land and avoids direct impacts to a portion of the DSCA. An agreement has been secured with the relevant landholder to progress this alternate optional alignment. This option results in an increase of approximately 445 m to the length of the external transmission line proposed by the Approved Project, avoids direct impacts to approximately 5 ha of the DSCA.

The final alignment for the transmission line alignment will be determined during the detailed design phase, in consultation with NSW NPWS and the relevant landholders.

Proposed changes near Hands on Rock cultural heritage site

A portion of the approved external transmission line alignment is located adjacent to the car park entrance to the Hands on Rock cultural heritage site off Bobadeen Road, Turill, which is approximately 400 m from the Hands on Rock cultural heritage site itself. During pre-lodgement consultation (as discussed in Section 6.0) t concerns that have been raised about the proximity of the approved transmission line alignment to the Hands on Rock cultural heritage site.

In response, the Applicant proposes to shift the portion of the transmission line alignment just south of the Hands on Rock car park entrance to the east, onto Crown land parcels Lot 7300/DP1136299 and Lot 7008/DP1030463, to completely avoid the land parcel that Hands on Rock heritage site is located (Lot 751/DP1270886) (see Figure 16). Negotiations with Crown lands division of DPE, Mudgee Local Aboriginal Land Council, and the NSW Aboriginal Land Council are at an advanced stage to ensure all relevant agreements are in place.

4.5.2 Connection Substation and Connection Works

Connection Substation/Switchyard

The Proposed Modifications include a minor change to the indicative location and area of the proposed connection substation/switchyard at Ulan and the inclusion of ancillary infrastructure for grid-support purposes (discussed in Section 4.4.4), and as shown in Figure 17 below and in more detail in Appendix C.2 and Appendix E.

Potential Upgrade Works to Transgrid Infrastructure

Transgrid, as the TNSP for the 330 kV Wellington-to-Wollar line, has advised that strengthening works are potentially required to the six existing transmission towers located on the eastern and western sides of the proposed connection substation/switchyard at Ulan. Transgrid has advised that access tracks from the nearby public roads and construction pads of approximately 40 m x 30 m at each candidate tower location will be required. Transgrid also advised that new optical ground wire (OPGW) and earth wires are likely to be required which will most likely be strung above ground between existing transmission tower structures.

At the request of Transgrid, the Proposed Modifications include the potential tower strengthening works and

associated access tracks and construction pads, as well as the potential stringing of new OPGW and earth wire cabling between existing transmission tower structures. The ground disturbing works are shown generally in Appendix C.2 and Appendix E. The potential upgrade works to the Transgrid infrastructure is shown in more detail in Figure 17.

Figure 15: Proposed changes to transmission line alignment near Durridgere State Conservation Area

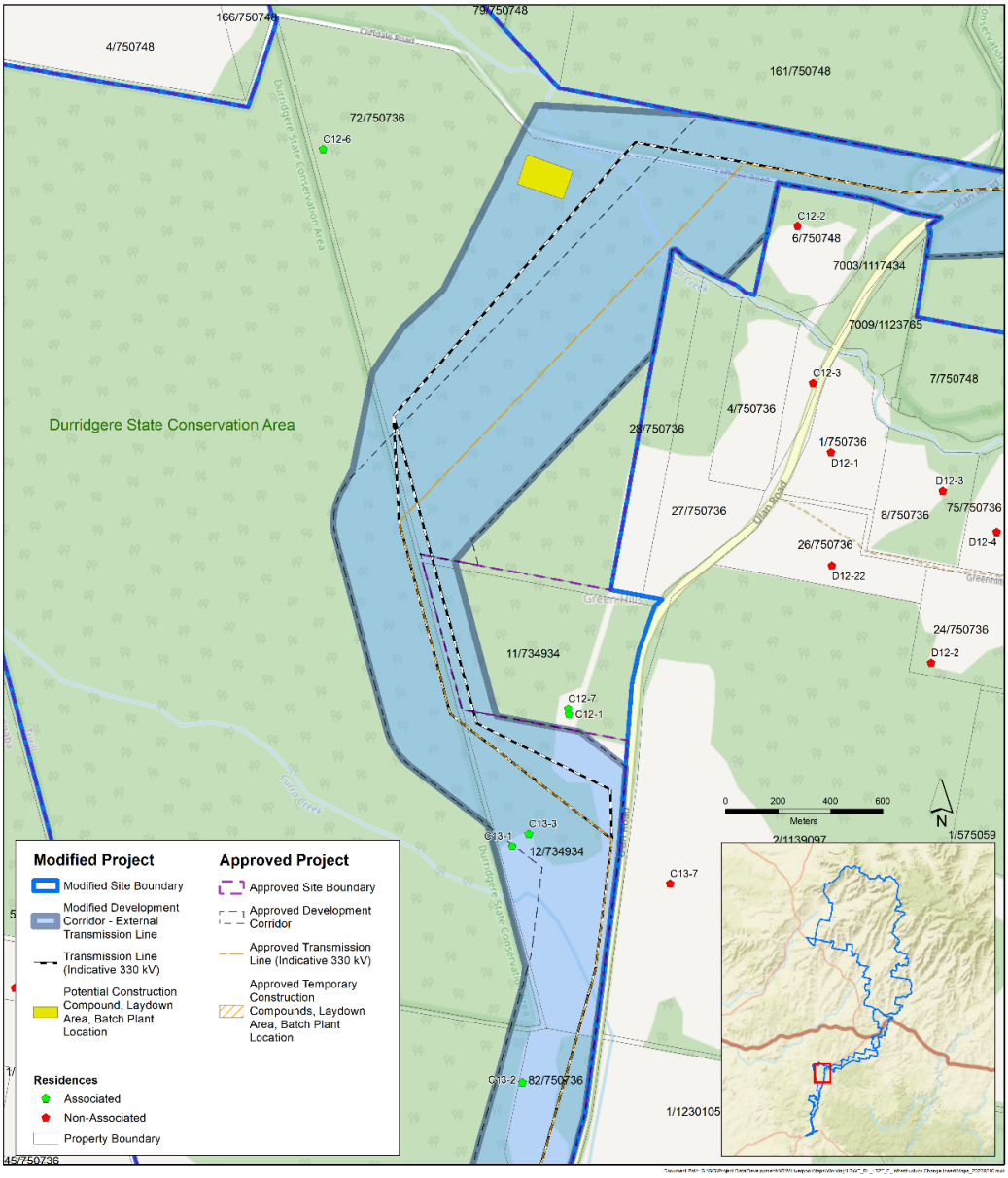


Figure 16: Proposed changes to transmission line alignment near Hands on Rock

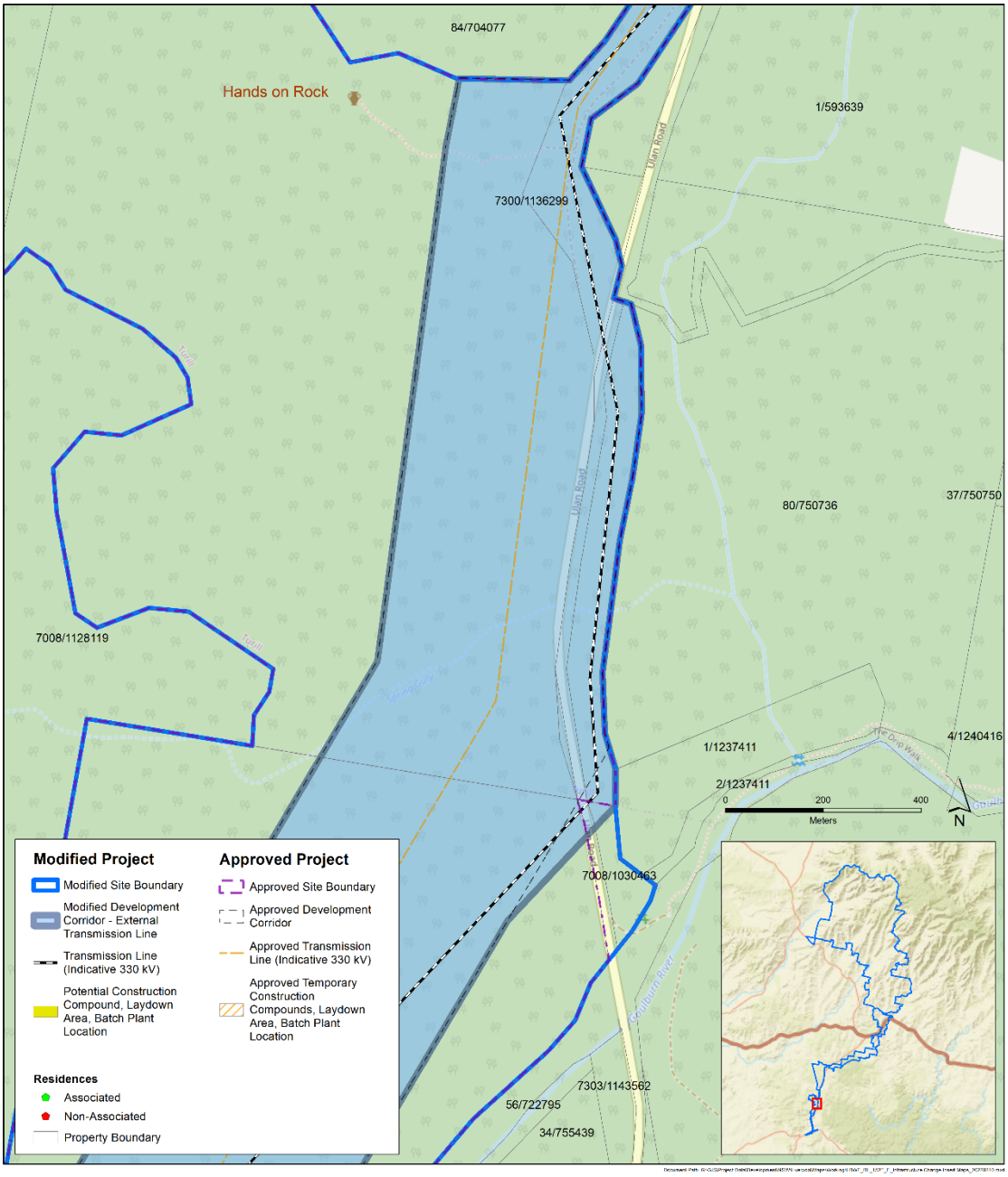
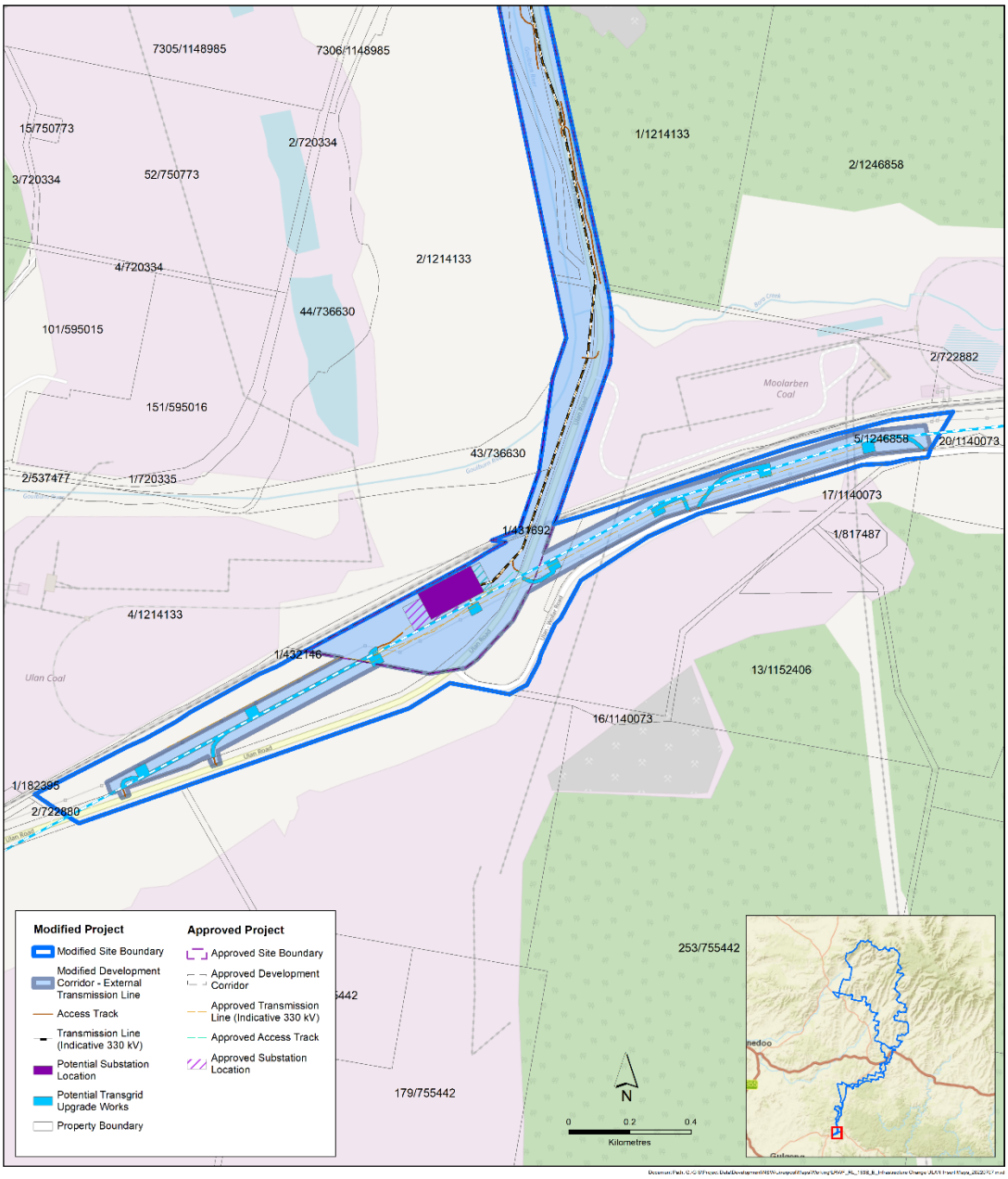


Figure 17: Connection substation and upgrade works to Transgrid infrastructure at Ulan



4.5.3 Access tracks and other ancillary infrastructure

Access tracks

The Proposed Modifications include revisions to the indicative access track layout, including additional access tracks from nearby public roads such as Ulan Road, to facilitate efficient construction and maintenance of the approximately 50 km length of External Transmission Line and connection works at Ulan. For the most part the indicative access track layout proposed by the Modified Project is generally consistent with the Approved Project. The key revisions are shown in Figure 8 above.

In several locations along the External Transmission Line there is complex topography that creates substantial challenges for continuous vehicular access along the transmission line easement. A number of modified site access points off public roads have been identified as discussed in Section 4.6.1 below.

These access tracks (and site access points) are predominately located on already cleared, disturbed or degraded land.

Construction compound/laydown area/concrete batch plant

The Approved Project proposed a construction compound/laydown area/concrete batch plant adjacent to the connection substation at Ulan. This location is no longer required for the Modified Project.

The Proposed Modifications include a construction compound/laydown area/concrete batch plant location near Cliffdale Road, Turill. This is a land parcel owned by the Applicant, and is shown in Figure 15 above, and in Appendix C.2.

The proposed bench area is approximately 2.1 ha and would be utilised for the construction and maintenance of the External Transmission Line. At this location the construction compound/laydown area/concrete batch plant would be more centrally located along the transmission line providing flexibility for multiple construction work fronts to proceed in opposite directions along the transmission line and potentially shorten the construction timeframe required.

4.6 Preferred Transport Route and Road Upgrades

4.6.1 Site Access Points

As summarised in Section 3.1.3, the Approved Project proposed a number of access points off public roads to both the Wind Farm Site and External Transmission Line alignment, [7] including:

- Wind Farm Site – 41 site access points, including:
    - 23 site access points specifically defined within the Original EIS/RTS for the purpose of accessing the Wind Farm Site.
    - 18 site access points within the Wind Farm Site to where internal access tracks (wind farm or internal transmission line) cross public roads.
- External Transmission Line Site – 20 site access points, including:
    - 5 site access points specifically defined within the Original EIS/RTS for the purpose of accessing the External Transmission Line.
    - 15 site access points along the External Transmission Line where the transmission line (and

[7] 28 site access points were explicitly identified in Appendix 7 to the Development Consent. However, a detailed review of the Approved Project infrastructure layout confirms that an additional 18 site access points within the Wind Farm Site (totalling 41) and additional 15 site access points along the External Transmission Line (totalling 20) would have been required to provide access to proposed wind farm access tracks and to account for transmission line crossings of public roads. Accordingly, it is considered that the Approved Project included a total of 61 site access points from public roads.

associated access track) crosses public roads.

Following the detailed layout review and design optimisation process (described in Appendix A) the Proposed Modifications seek approval to modify the number and indicative location of site access points within the Wind Farm Site and External Transmission Line Site, as discussed below.

Wind Farm Site

The Proposed Modifications seek approval for up to 47 site access points (out of a total of 50 which have been identified), representing an increase of six compared to the combined total number of site access points required for the Approved Project. This is described further in Section 7.10.2 below and assessed in the TIA contained in Appendix G.7.1.

22 of these potential site access points either adopt an Approved Project site access point or are within 250 m of an Approved Project site access point.

The large proportion of newly identified site access points within the Wind Farm Site are located along State Forest Road to provide efficient access to turbines located a short distance from the road reserve, and therefore avoiding the need for additional ground disturbance and potential impacts to biodiversity and heritage values.

The identified site access points now account for all potential crossings of public roads by wind farm access tracks or access tracks required to construct the internal transmission line.

External Transmission Line

The Proposed Modifications include up to 43 site access points, which includes a site access point for the connection substation and four site access points potentially required to construct the connection infrastructure upgrade works as requested by Transgrid (as described in Section 4.5.2). This represents an increase of 23 site access points compared to the combined total number of site access points required for the External Transmission Line component of the Approved Project. This is described further in Section 7.10.2 below and assessed in the TIA contained in Appendix G.7.1.

The large proportion of newly identified site access points within the External Transmission Line Site are located off Ulan Road, to provide efficient access to the transmission line easement and therefore minimising the need for additional ground disturbance and potential impacts to biodiversity and heritage values.

The identified site access points account for all potential crossings of public roads by access tracks required to construct the External Transmission Line.

The site access points required for access into the transmission line easement are generally small in scale (similar to a typical farm access point), as they need only to accommodate the safe and efficient movement of a relatively small volume of Light and Heavy vehicles required to construct and maintain the transmission line. During operations site access points to the transmission line easement will only be accessed periodically to complete inspections and maintenance. An example of a site access point for a transmission line (constructed for the Dundonnell Wind Farm) is shown in Figure 18 below.

The final number and precise location of site access points for both the Wind Farm Site and External Transmission Line Site will be determined in the detailed design.

Figure 18: Example Site Access Point for Transmission Lines

Deletion of Approved Site Access Point #9

The Modified Project proposes to remove Site Access Point #9 located off Vinegaroy Road as it is no longer required. Following the detailed layout review and optimisation process Site Access Point #9 was deemed to be in a sub-optimal location and its use would be heavily constrained by the requirements of Condition 27 of the Development Consent which would in effect prevent it from being used during operations.

An alternate site access point (ID#: 113/114) has been identified approximately 3 km to the west of Approved Site Access Point #9 which makes use of an existing access point into the adjacent property and is considered to be a more optimal location that will provide safe and direct access to the wind farm infrastructure during construction and operational phases.

4.6.2 Over-dimensional (OD) and Heavy Vehicle Access Route

The Development Consent limits the movement of Over-dimensional (OD) and Heavy vehicles near the Project site to only those public roads and site access points shown in the Over-dimensional (OD) and Heavy Vehicle Access Route Restrictions map included at Appendix 7 of the Development Consent. The Development Consent does not impose any specific requirements related to the movement of Light vehicles which will be managed in accordance with the Traffic Management Plan required to be development and implemented by the Development Consent. .

Following the detailed layout review and design optimisation process (see Appendix A) several changes are required to the Approved OD and Heavy Vehicle Access Route. This is referred to as the Modified OD and Heavy Vehicle Access Route. The Proposed Modifications include updates to the map at Appendix 7 of the Development Consent to reflect the following changes:

- Allow for an additional approximately 2.2 km length of Pandora Pass Road to be used by OD and Heavy vehicles. The additional length of road is required to access the newly proposed Site Access Points #43 and #103, and is wholly contained within the Modified Site Boundary.

- Allow for approximately 6.7 km length of Gundare Road to be used by Heavy vehicles for the construction of a short section of the transmission line. The portion of Gundare Road proposed to be used is unsealed and in very poor condition. It is wholly located within the Modified Site Boundary and would be accessed from Coolah Creek Road via a new wind farm access track. Cooks Road and the western portion of Gundare Road, both of which are located outside of the Modified Site Boundary, are not proposed to be used.
- Allow for an additional approximately 1.6 km length of State Forest Road to be used by OD and Heavy vehicles to access the newly proposed Site Access Point #112.
- Allow for an additional approximately 1.3 km length of Yarrawonga Road to be used by Heavy vehicles for the construction of a short section of the transmission line.
- Removal of approximately 500 m length of Norfolk Road, as it is no longer required.
- Removal of approximately 3.4 km length of Rotherwood Road south of newly proposed Site Access Point #134, as it is no longer required.

The Modified OD and Heavy Vehicle Access Route is illustrated on the plans contained at Appendix C.5. These changes are also reflected in the proposed revisions to the anticipated public road upgrades and Schedule of Public Road Upgrades discussed further in Section 4.7.1.

4.6.3 Indicative Over-size/Over-mass (OSOM) Haulage Route

The Development Consent does not identify a particular freight port from which large wind farm components will be transported or limit the movement of OD and Heavy vehicles further away from the Project site.

The EIS did however assess an indicative Over-size/over-mass (OSOM) Haulage Route [8] (for loads such as turbine components and substation transformers) from the Port of Newcastle to the Project site via the Pacific Highway (through Maitland), New England Highway, Golden Highway and Vinegaroy Road. From Vinegaroy Road the OSOM loads would then be transported to the Project site via the Local road network including Coolah Road, Rotherwood Road, Turee Vale Road, and Coolah Creek Road.

The Applicant engaged GTA Consultants (now Stantec) to prepare an OSOM Route Assessment that examined the indicative OSOM Haulage Route assessed by the EIS and modelled the travel and turning movements of a haulage vehicle transporting an indicative 90-metre long turbine blade and 35-metre-long and 5-metre-wide diameter base tower section (summarised in Section 7.10 and contained at Appendix G.7.2).

The OSOM Haulage Route Assessment identified significant constraints and conflicts through Newcastle, Maitland, Greta, Mount Thorley and Denman. To avoid these constraints and enable larger turbine components such as longer blades and taller/wider loads to be transported safely and efficiently to the Project Site from the Port of Newcastle the following key changes to the indicative OSOM Haulage Route have been considered

- Exit the Port of Newcastle via Selwyn Street/George Street onto Industrial Drive, to avoid significant constraints along Howden Street/Young Street, Carrington. Some intersection upgrades are likely to be required.
- Access Hunter Expressway from the John Renshaw Drive off-ramp (via a contra-flow movement), Beresfield, to avoid built-up areas in Maitland and Rutherford and significant conflicts at the Greta

[8] The indicative OSOM Haulage Route specifically refers to the anticipated route between the Port of Newcastle and the Project site for the transport of large turbine components including blades, towers and nacelles. Despite some geographical overlap near the Project site the indicative OSOM Haulage Route has a different scope and purpose to the Over-dimensional and (OD) Heavy Vehicle Access Route described in Section 4.5.2. The key difference between the two routes is that the indicative OSOM Haulage Route is not governed by the provisions of the Development Consent.

Interchange, Greta.

- Access the Golden Highway from Putty Road, Mount Thorley (via contra-flow movement along the off-ramp) to avoid significant conflict with overpass infrastructure along Putty Road
- To avoid potential conflict with the low-clearance Denman Bridge, Denman (maximum 5.3 m vertical clearance), three (3) route options are considered:
    - **Option 1:** Enable lower-height OSOM loads with combined load height of less than 5.3 m (allowing for safe clearance distances to bridge structures) to be transported left from the Golden Highway onto Denman Road and cross Denman Bridge.
    - **Option 2:** Enable taller OSOM loads that cannot safely pass over Denman Bridge within the height clearance limits to be transport right from the Golden Highway onto Denman Road, turn left onto Bengalla Road and follow Bengalla Road and Wybong Road to the intersection with the Golden Highway at Sandy Hollow.
    - **Option 3:** Exit the Golden Highway at Edderton Road, Coolmore, follow Edderton Road, and turn right onto Denman Road. This is followed by a left turn into Bengalla Road, following Bengalla Road and Wybong Road to the intersection with the Golden Highway at Sandy Hollow.

The swept path diagrams included in the OSOM Route Assessment prepared for the Modified Project identify all potential impact areas along the modified indicative OSOM Haulage Route where localised upgrades, vegetation removal or encroachment into land adjacent to the road reserve may be required to facilitate blade haulage vehicle turning movements.

Potential ecology and heritage impacts at the identified impact areas have been assessed (see summary in Section 7.10 and the detailed reports contained in Appendix G.7.3 and G.7.4). Similarly, all potentially affected land parcels at the identified impact areas have been included in the updated Schedule of Land (see Appendix C.1).

The final OSOM Haulage Route and precise extent of impacts to ecology and heritage values or private properties (if any) will be determined once a turbine model has been selected and as part of the preparation of the Traffic Management Plan (TMP), including appropriate mitigation measures implemented to avoid/minimise impacts.

4.7 Public Road Upgrades

The Schedule of Road Upgrades contained at Appendix 6 of the Development Consent lists all the Local and Regional roads and intersections that may require upgrading prior to their use by Heavy or Over-dimensional (OD) vehicles, and the specific road upgrade standards that shall apply.

Following a detailed review of the public road upgrades anticipated to be required for the Modified Project, the Proposed Modifications include revisions to the Development Consent to reflect the public road upgrade standards agreed in consultation with Warrumbungle, Upper Hunter and Mid-western Councils, and to ensure the Schedule of Road Upgrades accurately reflects the Modified Project layout and the public roads proposed to be used. These proposed updates are outlined in the following sub-sections.

4.7.1 Schedule of Public Road Upgrades

The Schedule of Road Upgrades (Appendix 6 of the Development Consent) list the public roads and intersections that are required to be upgraded (if used, and as necessary), the estimated length of public road to be upgraded, and timing for the public road upgrades to occur.

The Schedule of Road Upgrades reflect the list of public roads and intersections shown on the OD and Heavy Vehicle Access Route contained at Appendix 7 of the Development Consent.

For the most part, the Schedule of Road Upgrades included at Appendix 6 of the Development Consent

remain valid for the Modified Project, however some minor updates are required to reflect the Modified Project layout, as follows:

- Update the upgrade lengths of several currently listed public roads, including Pandora Pass Road, State Forest Road, and Rotherwood Road.
- Update references to site access points to reflect the Modified Project layout (see Section 4.6.1).
- Removal of references to Site Access Point #9 as it is no longer required for the Project (see Section 4.6.1).
- Update the list of public roads to include the portion of Gundare Road that is located within the Modified Site Boundary, include Phelps Lane, and remove Norfolk Road as it is no longer required.
- Replace existing public road upgrade standards with the revised public road upgrade standards as agreed with the relevant councils (discussed in the following sub-section).
- Replace specific references to intersections at particular site access points off Ulan Road with a streamlined reference that captures all potential site access points off Ulan Road.
- Inclusion of the intersections along the indicative Modified OSOM Haulage Route between the Port of Newcastle and the Project site that may require upgrading to facilitate OSOM vehicle movements.

The Modified Schedule of Road Upgrades is contained at Appendix C.5.

The applicable road upgrade standards are specified as a notation within the Schedule of Road Upgrades contained at Appendix 6 of the Development Consent, which set out required road base depths, seal and formation widths, and seal finishes for unsealed-to-unsealed, unsealed-to-sealed, and regional road upgrades.

The Applicant engaged iCubed Consulting Pty Ltd (an experienced civil engineering firm with road design capabilities) to prepare a Preliminary Road Upgrade Investigation (PRUI) with the aim of assessing ways to minimise the extent of ground disturbance associated with anticipated road upgrades, and to quantifying the extent of ground disturbance so that impacts to ecology and heritage values could be appropriately assessed.

Based on a detailed review of relevant Austroads standards, physical inspections of key roads, and 3D terrain modelling, the PRUI identified a series of revisions to the public road upgrade standards currently specified in the Development Consent.

Following extensive consultation with Warrumbungle, Upper Hunter and Mid-western councils the proposed changes to the applicable road upgrade standards have now been agreed. The proposed changes primarily relate to public road upgrade standards on the local road network, and clarify the default road formation width, pavement width and cut and fill batter design that shall apply for each road upgrade category in each respective local government area. As agreed with each of the relevant local councils, the Proposed Modifications include a mechanism to reduce the default agreed road upgrade standards in highly constrained locations (for instance adjacent to waterways, intact native vegetation, cultural heritage values, or private land holdings) to minimise impacts associated with the construction of the public road upgrades. Any proposed reduction in the agreed road upgrade standards must be undertaken in consultation with the relevant council.

The proposed changes to the road upgrade standards are detailed in Table 14.

Ultimately, the proposed changes to the road upgrade standards will provide the local community with a consistent standard of roads of higher quality than the current local road conditions, that are designed in accordance with all relevant Austroads guidelines and do not comprise the safety and efficiency of the public road network.

Table 14: Proposed Revisions to the Public Road Upgrade Standards

Council	Description of Requirements
Warrumbungle Shire Council (WSC)	- Road upgrade standards as per the agreed standards as follows: o *Unsealed local road to a sealed road:* pavement depth in accordance with Austroads Standards or 300mm road base, 6.0 m seal and 8.0 m formation width, topped with 14/10 double/double bitumen seal. o *Unsealed local road to remain unsealed:* construction width 8.0 m, pavement thickness 150mm. o *Regional road upgrade:* pavement depth in accordance with Austroads Standards, 7.5 m seal and 9.5 m formation width, topped with 14/10 double/double bitumen seal. o *Atypical, unsealed road upgrade standard for lowest order Local roads (i.e., Warung Road):* trim and repair existing pavement, 5.5 m formation width o *Gundare Road:* the Applicant will enter into an agreement with Council that will set out the applicable upgrade standard (anticipated to be approximately 4 m wide unsealed trafficable area) and require the Applicant to be responsible for ongoing maintenance throughout the operational life of the Project. - Council will accept a cut and fill batter slope of 1(V):3(H) on Local and Regional roads subject to geotechnical assessment. - Council will consider requests to vary the upgrade treatment standards on Local rural roads for specific sections of the road, subject to documentation of physical and environmental constraints where application of road width standards, described in the Consent Conditions, will cause unreasonable ground disturbance.
Upper Hunter Shire Council (UHSC)	- Road upgrade standards as per the agreed standards as follows: o *Unsealed local road to a sealed road:* pavement depth min 300 mm road base, 6.2m (14/10 double/double) bitumen seal, 8.0m formation o *Unsealed local road to remain unsealed:* pavement depth min 150 mm road base, 7.0m formation o *Regional road upgrade:* pavement depth min 400 mm road base, 7.0m (14/10 double/double) bitumen seal, 9.0m formation width - Generally, a standard 1(vertical):4(horizontal) fill batter slope design and a standard 1(vertical):3(horizontal) cut batter design to be used. - Council will accept steeper batter design where significant ground disturbance occurs.
Mid-western Regional Council (MWRC)	- Road upgrade standards as per the agreed standards as follows: o *Unsealed local road to a sealed road:* pavement depth in accordance with Austroads Standards, 6.2 m seal and 7.2 m formation width o *Unsealed local road to remain unsealed:* pavement depth min 150 mm road base, 7.0m formation o *Regional road upgrade:* pavement depth in accordance with Austroads Standards, 7.5 m seal and 9.5 m formation width - Intersections with Ulan Rd to be upgraded to an appropriate standard and a short section of gravel road to be sealed to minimise edge break maintenance and tracking of gravel/ mud onto Ulan Rd. - Subject to verification and approval of detailed design MWRC acknowledges there may be instances where a reduction in the typical cross section may be required. - Council will consider requests to vary the upgrade treatment standards where it can be demonstrated that the agreed cross section would result in an inappropriate extent of ground disturbance and/or environmental impacts.

4.8 Potential Staging

Schedule 2 Condition 9 (Staging of the Development) of the Development Consent allows the Applicant to "construct, operate and decommission the development in stages" and clarifies that "where staging of the development is proposed, the conditions of this consent are only required to be complied with at the relevant time and to the extent that they are relevant to the specific stage(s)."

Any staging of the development will be determined as the project progresses.

Given the large scale and complexity of the Project there is the potential that the wind farm, transmission line and public road upgrades could be delivered in stages, noting that stages may be undertaken in parallel and do not necessarily need to be undertaken sequentially. These are discussed in-turn in the following sub-sections.

4.8.1 Wind Farm and External Transmission Line

As is typical for most wind farm projects the wind farm stage and external transmission line and connection infrastructure stages may be constructed by different contractors and owned and maintained by different corporate entities.

For instance, the Applicant may control the delivery and ongoing maintenance of the wind farm and internal transmission line components of the Project and a TNSP may control the delivery and ongoing maintenance of the external transmission line component of the Project, including compliance with the distinct environmental management and compliance requirements.

In the event the alternate transmission line alignment proposed by EnergyCo is adopted by the Project and connection via this option is separately approved (as discussed in Section 2.3), the External Transmission Line and Connection Infrastructure stage proposed by the Modified Project (or part thereof), would no longer be required.

In addition, the wind farm component itself could potentially be delivered in stages, either sequentially or concurrently. The Wind Farm Site is intersected by a series of Local roads that provide access to well-defined ridgelines (or groups of ridgelines), which enable the Project to be contemplated as a series of discrete stages. Figure 20 below shows an indicative scenario for the staged delivery of public road upgrades that has been developed for illustration purposes, which generally shows construction of the wind farm progressing from the southern turbine clusters (Clusters F and E) north towards the northern turbine clusters (Clusters D, C, B and A). However this indicative scenario is subject to change as the Project progresses through detailed design and into construction.

A determination on whether the wind farm and external transmission line will be constructed in stages and how those stages may be defined will be made once a turbine model has been selected and preferred contractors have been engaged.

4.8.2 Indicative Sequenced Delivery of Road Upgrades (Works in Parallel)

The final staging of the Project will likely include sequenced delivery of public road upgrades.

The anticipated road upgrades and associated timing for their construction is specified in Schedule 3 Condition 28, which specifies the following:

> *The Applicant must:*
>
> *a) implement the road upgrades identified in Appendix 6 in accordance with the relevant timing requirements; and*
>
> *b) upgrade or relocate cattle grids along the designated over-dimensional and heavy vehicle route, as necessary, prior to the commencement the use of the relevant road for any over-dimensional or heavy vehicle traffic associated with the construction of the development, to the standard and*

satisfaction of the relevant roads authority

If there is a dispute about the road upgrades to be implemented, or the implementation of these upgrades, then either party may refer the matter to the Secretary for resolution.

The Proposed Modifications request that flexibility is provided within the condition to, subject to further consent from the Planning Secretary, allow for the staged delivery of public road upgrades, concurrent with a restricted commencement of road use and the commencement of on-site wind farm construction works. This is also referred to as 'works in parallel'.

In order to demonstrate that staging of road upgrades/works in parallel is appropriate an indicative scenario that sets out the sequenced (staged) delivery of road upgrades is presented below. An assessment of potential traffic impacts has been undertaken as part of the Traffic Impact Assessment prepared by GTA Consultants (now Stantec) (see Appendix G.7.1). A summary is provided in Section 7.10.2 below.

Indicatively, the Project may be constructed in its entirety including pre-construction and construction (including road upgrades, wind farm construction and commissioning) activities over an approximately 3-year period. The commencement of wind farm construction activities could be sequenced in multiple stages triggered by the completion of road upgrades. Figure 19 below shows an indicative construction schedule for the Project.

In this indicative works in parallel scenario the public road upgrades scope has been defined in relation to four milestones [9] (shown as M1-M4 in Figure 19 below), with the commencement of works on the Wind Farm Site, excluding Pre-construction minor works (as defined in the Development Consent), linked to the completion of key upgrade works within each stage, including:

- **Milestone 1:** Completion of required site entry intersections to facilitate access to the Wind Farm Site;
- **Milestone 2:** Completion of the required road upgrades to Vinegaroy Road;
- **Milestone 3:** Completion of road upgrades from Vinegaroy Road to site entry intersections on Rotherwood Road and Turee Vale Road; and
- **Milestone 4:** Completion of road upgrades for all remaining roads to be used by the Project.

Table 15 below provides a summary of the public road upgrade scope and wind farm construction scope (including peak/maximum Heavy vehicle traffic movements) within each road upgrade stage, and the associated milestone. Figure 20 further below illustrates spatially how the stage delivery of public road upgrades could potentially be delivered under the indicative works in parallel scenario presented here.

A number of assumptions have been used to estimate the indicative timelines presented here. These assumptions are based on Tilt Renewables' recent experience on similar projects and in consultation with relevant contractors and are considered appropriate at this stage. However, it should be noted that these assumptions have a material impact on the project timeframes and will need to be confirmed as part of the preparation of a Staging Plan for the Project.

For the purpose of this indicative schedule it has been assumed that:

- At any given time there are up to three work crews mobilised for the public road upgrades. In reality this may increase or decrease after various milestones are completed and dependent on the final construction layout and roads requiring upgrade for access into the site;
- Assumptions have been made around the productivity of work crews for the public road upgrades and

[9] Under this indicative 'works in parallel' scenario Public Road Upgrades Stages 1-4 relate to the completion of all road upgrades required to address Heavy vehicle movements (in accordance with the Development Consent). The indicative fifth stage of road upgrades 'Public Road Upgrades Stage 5' includes all the road upgrades which are not required to facilitate Heavy vehicle movements to the site.

for construction works within the wind farm site in order to estimate the number of Heavy vehicle movements per day;

- It is anticipated that construction on the wind farm will commence simultaneously within the three southernmost wind turbine clusters, being the D Cluster, E Cluster and F Cluster;
- Once the public road upgrades are completed to a site entry intersection then there are no restrictions on construction activities and component deliveries for that site entry intersection; and
- Bridges and culverts which are required to be upgraded as necessary will be undertaken either concurrently with their respective road upgrades or as required to facilitate Heavy and OSOM vehicle movements (e.g. prior to turbine component deliveries). Details of the upgrade requirements will be determined through the next phase of the development of the Project, once a turbine has been selected, and will be detailed within the final Staging Report and Traffic Management Plan.

Figure 19: Indicative construction schedule

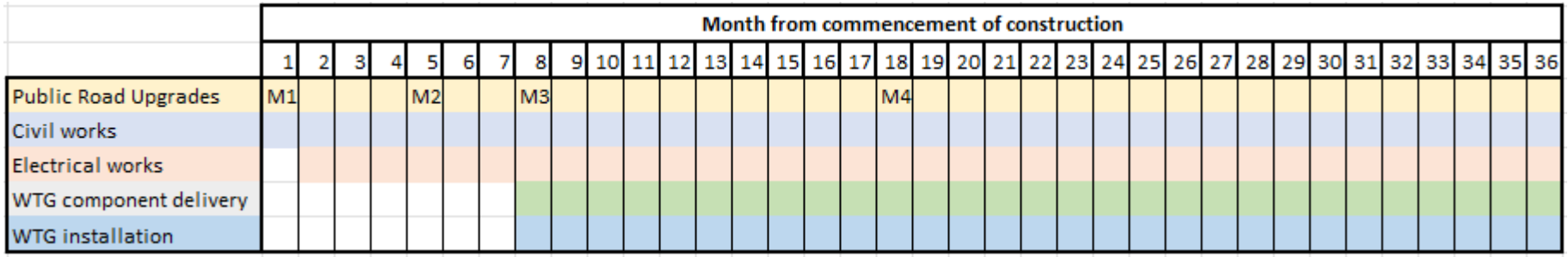


Table 15: Indicative staged delivery of public road upgrades

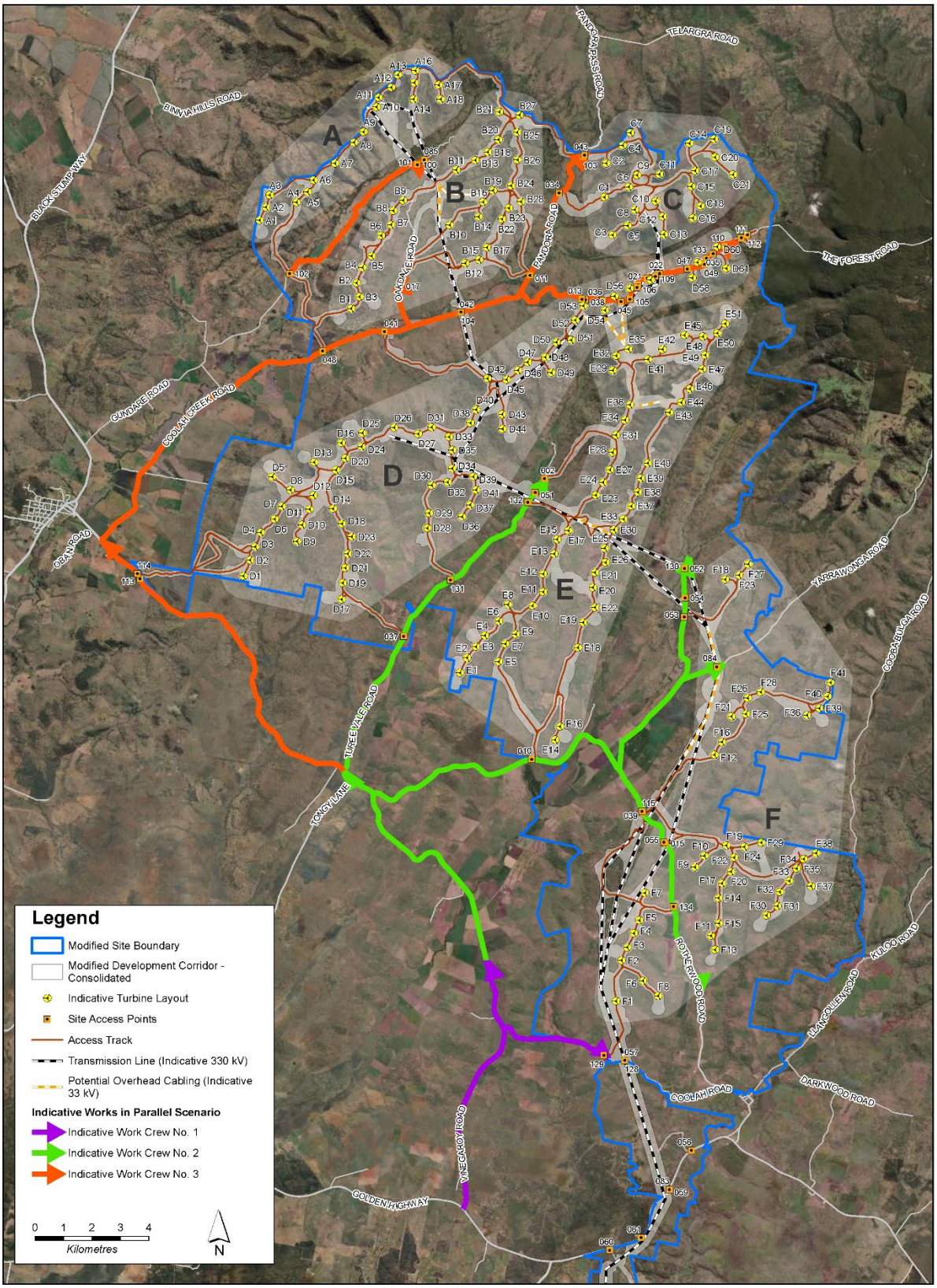
Road Upgrade Stage	Indicative Time Period	Road Upgrade Scope		Wind Farm Construction Scope		Milestone
		Indicative Activities	Indicative Road Upgrade Daily HV Traffic Movements (one-way)	Indicative Activities	Indicative Wind Farm Construction Daily HV Traffic Movements (one-way)	
Stage 1	For the period between the commencement of construction and Milestone 1	- Maintenance of all roads used by the Development in accordance with the Development Consent – Ongoing - Site entry intersections commence for nominated entry points to southern wind turbine clusters being D Cluster, E Cluster and F Cluster	50	Nil (excluding pre-construction minor works as defined in the Development Consent, e.g. vegetation removal, site establishment, site compound)	0	**M1 - Completion of the required site entry intersections (Site Access Points)**

Road Upgrade Stage	Indicative Time Period	Road Upgrade Scope		Wind Farm Construction Scope		Milestone
		Indicative Activities	Indicative Road Upgrade Daily HV Traffic Movements (one-way)	Indicative Activities	Indicative Wind Farm Construction Daily HV Traffic Movements (one-way)	
Stage 2	For the period between Milestone 1 and Milestone 2	- Maintenance of all roads used by the Development in accordance with the Development Consent – Ongoing - Project commences road upgrade scope on Vinegaroy Road: o Construction will include upgrade of bridges, causeways and culverts as required based on load assessments to be conducted prior to construction. o Three crews will commence work along Vinegaroy road. o Vinegaroy road upgrades completed.	75	- Wind Farm construction works commence. It is anticipated that 3 work fronts will be mobilised simultaneously. One work front per each of the southern WTG clusters (D Cluster, E Cluster, F Cluster). Construction activities will include: o Access track construction o Batch plant construction o Installation of Underground cabling o Hardstand construction o Foundation construction o Substation construction	200	**M2 - Completion of Vinegaroy Road**
Stage 3	For the period between Milestone 2 and Milestone 3	- Maintenance of all roads used by the Development in accordance with the Development Consent – Ongoing - Three crews commence work simultaneously. Works will include upgrades to causeways and culverts as required based on load assessments to be conducted prior to construction:	75	- Wind farm construction works continue (D Cluster, E Cluster, F Cluster): o Access track construction o Batch plant construction o Installation of underground cabling o Hardstand construction	200	**M3 - Completion of:** - **Rotherwood Road** - **Turee Vale Road**

Road Upgrade Stage	Indicative Time Period	Road Upgrade Scope		Wind Farm Construction Scope		Milestone
		Indicative Activities	**Indicative Road Upgrade Daily HV Traffic Movements (one-way)**	**Indicative Activities**	**Indicative Wind Farm Construction Daily HV Traffic Movements (one-way)**	
		○ Rotherwood Road upgrades – commenced ○ Turee Vale Road upgrades - commenced ○ Coolah Creek Road upgrades – commenced ○ Site entry intersections commence for additional entry points required by the Development		○ Foundation construction ○ Substation construction		
Stage 4	For the period between Milestone 3 and Milestone 4	- Coolah Creek road upgrades – continue - Maintenance of all roads used by the Development in accordance with the Development Consent – Ongoing - Works commence on remaining roads required by the project based on the final preconstruction design: ○ Pandoras Pass Road – commenced ○ State Forest Road – commenced ○ Gundare Road – commenced ○ Yarrawonga Road – commenced ○ Bounty creek Road – commenced ○ Oakdale Road – commenced	75	- Wind Farm construction works continue (D Cluster, E Cluster, F Cluster) and commence (A Cluster, B Cluster, C Cluster): ○ Access track construction ○ Batch plant construction ○ Installation of Underground cabling ○ Hardstand construction ○ Foundation construction ○ Substation construction - OSOM component delivery and WTG erection commence to areas where required road	200-300	**M4 - Completion of all remaining public road upgrades required by the Development**

Road Upgrade Stage	Indicative Time Period	Road Upgrade Scope		Wind Farm Construction Scope		Milestone
		Indicative Activities	**Indicative Road Upgrade Daily HV Traffic Movements (one-way)**	**Indicative Activities**	**Indicative Wind Farm Construction Daily HV Traffic Movements (one-way)**	
				upgrades are complete (D Cluster, E Cluster, F Cluster): ○ Delivery of OSOM components commences via site entry intersections accessible from completed sections of public road upgrades		
Stage 5	Post completion of Milestone 4	- Public Road upgrades complete	0	Wind Farm construction continues with no restrictions on HV vehicle movements and construction activities.	As per indicative traffic movements specified in the Modification Application/Traffic Impact Assessment	**N/A**

Figure 20: Indicative staged delivery of public road upgrades / 'works in parallel' scenario



The Applicant will further develop the staged approach to delivering the required road upgrades prior to the commencement of construction, and will work closely with the relevant road authorities to ensure the relevant safety, performance and longevity outcomes for the relevant public roads are maintained and disruptions to other road users is minimised as far as practicable.

Any proposal to sequence the road upgrade works would aim to minimise impacts to existing road users and nearby residents, with particular attention paid to ensuring the combined impact of simultaneous public road upgrades and on-site construction work fronts does not result in unreasonable delays or inconvenience for road users. The Applicant would continue to consult with the wider community to ensure they are informed of key planned construction activities and road upgrade works and associated timing via a range of methods including:

- Community 'drop in' information sessions and 'meet the contractors' session prior to the commencement of construction;
- Continued distribution of newsletters (bi-monthly frequency during construction);
- Construction updates (fortnightly);
- Public advertisements in the local newspapers prior to and during the first few months of construction; and
- Ongoing communication at regular CCC meetings;
- Maintenance of the 1800 phone number for the Project and ensuring this number is clearly stated on all communication material;
- Implementation of a Project-specific Complaints Management Plan which will be made available on the Project website prior to the commencement of construction

Ultimately, all road upgrade works and on-site construction would be managed in compliance with the relevant Project approvals (e.g. Development Consent and EPBC Approval requirements), including the implementation of management plans (e.g., Traffic Management Plan, Biodiversity Management Plan, Emergency Plan etc.).

Any proposal to undertake the public road upgrades in a staged manner, and concurrent with wind farm site works, will be undertaken in consultation with the relevant road authorities.

Consultation

The Applicant presented the works in parallel approach to the relevant road authorities (Warrumbungle Shire Council and Upper Hunter Shire Council) during consultation regarding this Modification Application. The relevant road authorities were accepting of the approach as it addressed the concerns and matters the road authorities consider important with respect to the road upgrade requirements detailed in Appendix 6 of the Development Consent. Further detail on this consultation is provided in Section 6.4.3.

The Applicant has also consulted with the community regarding the potential works in parallel approach. In particular, information was included in the Transport and Traffic fact sheets that were made available at the community consultation drop-in sessions held in October 2021 and the webinar presentation delivered by the Applicant at those drop-in sessions. The fact sheets and webinar presentation were made available on the Project website. No major issues related to the works in parallel approach have been raised by the community through the various consultation channels (see Appendix H).

4.9 Development Corridor and Indicative Development Footprint

4.9.1 Indicative Development Footprints

The Proposed Modifications have been informed by revised estimates of the extent of ground disturbance associated with all infrastructure proposed by the Modified Project, including:

- **Indicative Development Footprint – Wind Farm**: refers to the estimated ground disturbance associated with the construction of the wind farm infrastructure (outlined in Section 4.4) and is wholly contained within the Modified Development Corridor (Wind Farm).
- **Indicative Development Footprint – External Transmission Line**: refers to the estimated ground disturbance associated with the proposed external transmission line, connection infrastructure, and Transgrid works at Ulan (see Section 4.5) and is wholly contained within the Modified Development Corridor (External Transmission Line).
- **Indicative Development Footprint – Public Road Upgrades:** refers to the areas of roadside where it is anticipated that construction works will be required to deliver the anticipated public road upgrades along the Modified OD and Heavy Vehicle Access Route (described in Sections 4.6 and 4.7 and illustrated in Appendix F).

The Indicative Development Footprints (Wind Farm, External Transmission Line, and Public Road Upgrades) are briefly summarised in Table 16 below and shown in Appendix C.2, Appendix E and Appendix F. [10]

Table 16: Summary of Indicative Development Footprint Categories

Ground Disturbance Category	Description

Indicative Development Footprint – Wind Farm	The total indicative ground disturbance associated with permanent and temporary infrastructure within the Wind Farm Site, including:
	- turbine hardstands
	- internal access tracks
	- internal transmission line easement (preferred options only):
	  o internal access tracks, pole/tower locations, string pads
	  o clearance of trees with heights above 4 m at full maturity within the 60 m wide 'balance of easement'. Where no vegetation clearance is required, those areas are excluded.
	- all indicative locations for temporary construction compounds/ laydown areas/concrete batch plants
	- all indicative locations for permanent Operations & Maintenance (O&M) facility
	- 14 (of the 40) indicative locations for permanent met masts
	- all indicative locations for collector substations and ancillary equipment

Indicative Development Footprint – External Transmission Line	The total indicative ground disturbance associated with the external transmission line and connection works at Ulan, including:
	- external transmission line easement (preferred options only):
	  o internal access tracks, pole/tower locations, string pads
	  o clearance of trees with heights above 4 m at full maturity within the approximately 60 m wide 'balance of easement'. Where no vegetation clearance is required, those areas are excluded.
	  o access tracks into easement from nearby public roads
	- potential strengthening works to Transgrid infrastructure at Ulan
	- indicative connection substation location and ancillary equipment
	- indicative temporary construction compound/laydown area/concrete batch plant location near Cliffdale Road

Indicative Development Footprint – Public Road Upgrades	The total indicative ground disturbance associated with the anticipated upgrades to public roads proposed to be used by the Project, to the standards agreed with relevant councils.

[10] These figures are based on publicly available cadastre information. During the detailed design process relevant property boundaries and road reserves will be verified through topographic surveys.

The Modified Project infrastructure layout including turbine locations, access track alignments and External Transmission Line alignment is generally consistent with the Approved Project. Overall, the length of linear infrastructure such as access tracks and transmission line associated with the Modified Project has only marginally increased compared to the Approved Project.

The Proposed Modifications results in an increase to the extent of ground disturbance required to construct the Project (see Table 17) as a result of updated and more realistic assumptions adopted based on experience in constructing contemporary wind farm projects. The largest proportion of the increase to ground disturbance is attributable to the two following aspects of the development, which together account for nearly 85% of the additional ground disturbance:

- Wind farm access tracks and adjacent underground cabling, which account for an additional ~604 ha of ground disturbance (or 64% of the total increase); and
- Internal and External Transmission Line access tracks, string pads, and pole/tower construction areas, which account for an additional 178 ha of ground disturbance (or 19% of the total increase).

Additionally, approximately 190 ha of ground disturbance has been assessed as associated with the anticipated public road upgrades required to deliver the Project. The Approved Project did not assess the extent of ground disturbance or the associated environmental impacts) required to construct the anticipated road upgrades. The Modified Project includes largely the same extent of public road upgrades as those identified for the Approved Project, and as such a largely equivalent extent of ground disturbance would have also applied to the Approved Project.

The increase in ground disturbance and associated impacts to native vegetation/habitat is due primarily to more accurate and realistic assumptions informed by recent construction experience and extensive use of detailed 3D terrain modelling, as opposed to any material change in the proposed infrastructure layout. As a result, there is now a higher degree of certainty around the efficiency and constructability of the Project and that the potential impacts to native vegetation and heritage values are adequately accounted for and assessed. Notwithstanding this, all reasonable and viable efforts will be made to reduce ground disturbance including bulk earthworks and avoid/minimise impacts to biodiversity and heritage values through the detailed design phase and throughout construction.

A comparative summary of all project infrastructure and their disturbance areas (temporary and permanent) proposed by the Approved Project and Modified Project is presented in Table 17 (including increases and reductions). Further details on the changes to the design assumptions and justification for the increase in ground disturbance is provided in Appendix A.

Table 17: Refined Design Assumptions and Indicative Disturbance Areas

Parameter	Approved Project [11]	Modified Project	Extent of Change
Site Boundary and Development Corridor			
Site Boundary	51,336.6 ha	Total of 52,122.9 ha, comprised of: - 46,539 ha (Wind Farm Site) - 5,583.9 ha (External	Increased by 786.3 ha (+1.5%)

[11] The areas calculated for the Approved Project in this table are derived from a combination of sources including development plans and associated spatial files provided by Epuron Pty Ltd to the Applicant upon acquisition of the Project and the Original RTS. As the Original RTS assessed a 282 turbine proposal, wherever relevant the areas have been scaled down to reflect the 267 turbine layout that was approved under Development Consent SSD 6696 granted on 27 March 2018.

Parameter	Approved Project [11]	Modified Project	Extent of Change
		Transmission Line Site)	
Development Corridor	12,405 ha	Total 12,601.6 ha, comprised of: - Wind Farm: 10,317.1 ha - External Transmission Line: 2,906.2 ha [12]	Increased by 196.6 ha (+1.6%)
Total Indicative Development Footprint			
Indicative Development Footprint (Wind Farm)	Combined total: 752.82 ha	1,367.4 ha	Increased by 846.58 ha (+112%)
Indicative Development Footprint (External Transmission Line)		232.0 ha	
Indicative Development Footprint – Public Road Upgrades	Not defined	190.7 ha (includes existing road pavement)	Public road upgrades were not assessed in the Original EIS/RTS.
Indicative Development Footprint (Wind Farm)			
Turbine Foundations and Crane Hardstands			
Turbine locations	267	220	Decrease of 47 locations (-17%)
Assumed area / turbine	Total: 0.15 ha / turbine: - Turbine foundation: 25 m x 25 m - Crane hardstand: 22 m x 40 m - Lattice boom assembly area: Not defined - Tower and blade storage area: Not defined	Total: 0.57 ha / turbine: - Turbine foundation: 30 m x 30 m - Crane hardstand: 30 m x 50 m - Lattice boom assembly area: 100 m x 17 m - Tower and blade storage area: 20 m x 80 m	Increased by 0.42 ha / turbine *Note: lattice boom assembly and tower/blade storage areas were not included in Original EIS/RTS*
Combined total ground disturbance area	40.05 ha (scaled to a 267 turbine layout. Note: 42.61 ha is specified in the Original EIS/RTS for the 282 turbine layout)	125.4 ha	Increased by 85.35 ha (+213%) *Note: lattice boom assembly and tower/blade storage areas were not included in Original EIS/RTS*
On-site Collector Substations (inc. ancillary equipment)			
Collector substations	Up to 4 – maximum area of 4 ha at any indicative location	Up to 7 substations (depending on layout option) – ranging between 0.92 ha and 1.9 ha	Increase by up to 3 collectors substations. Decrease in indicative footprint area.

[12] This combined area exceeds the total of 12,601.6 ha due to partial overlap of the Wind Farm and External Transmission Line portions of the Modified Development Corridor.

Parameter	Approved Project [11]	Modified Project	Extent of Change
Combined total ground disturbance area	13.63 ha	11.11 ha (7 indicative locations assessed)	Decreased by 2.52 ha (-18%)
Internal Transmission Line			
Total length (preferred alignment)	28.2 km	43.9 km	Increased by 15.7 km
Easement width	60 m	60 m	No change
Total easement area	169.2 ha	263.4 ha	Increased by 94.2 ha
Total length of access track within easement	Not defined	38.2 km	Not defined in the Original EIS/RTS
Average width (access track, poles and string pads) within easement	Not defined	12 m for access tracks 35 m x 35 m for poles 35 m x 35 m for string pads	Not defined in the Original EIS/RTS
Combined total ground disturbance area (access tracks, poles and string pads) along internal transmission line easement	Not defined	101.66 ha	Not defined in the Original EIS/RTS
Total area of vegetation clearance within the balance of easement (i.e. > 4 m in height at full maturity)	Not defined [13]	101.6 ha *Note: the combined area for internal and external transmission line components is 220.1 ha*	Not defined in the original EIS/RTS *Note: the Modified Project results in an increase of 27.34 ha of vegetation clearance within the combined internal and external transmission line components*
Permanent Met Masts			
Number proposed	Up to 10	Up to 14 (40 potential locations identified)	Increased by 4
Combined total ground disturbance area (all indicative locations, including access tracks)	Not defined	11.1 ha (includes lead-in access tracks) (14 locations assessed)	Not assessed in the Original EIS/RTS
Wind Farm Access Tracks and Underground Reticulation Cabling			

[13] The Original EIS/RTS did not provide a breakdown of the extent of vegetation clearance required within the balance of easement for the internal transmission line vs external transmission line components. For simplicity, all vegetation clearance within the balance of easement has been apportioned to the external transmission line component.– see relevant row further below in this table.

Parameter	Approved Project [11]	Modified Project	Extent of Change
Average ground disturbance width (access tracks and underground cabling) [14]	15 m	37.4 m	Increased by 22.4 m
Average access track trafficable width	5.5 m	6.5 m	Increased by 1 m
Total length of access track	274.1 km	260.1 km	Decreased by 14 km
Total length of underground reticulation cabling	155.8 km [15]	196.4 km	Increased by 40.6 km
Total ground disturbance (combined access track and underground cabling)	392.73 ha	996.86 ha	Increased by 604.13 ha (+154%)
Overhead Reticulation Cabling (Potential Alternate Layout)			
Total length of overhead line	60.57 km	10.62 km	Decreased by 49.95 km
Easement width	25 m	25 m	No change
Total easement area	151.43 ha	26.55 ha	Decreased by between 124.88 ha (alternate) and 151.43 ha (preferred)
Length of access track	46.73 km	10.27 km	Decreased by 36.46 km
Ground disturbance width (track, poles and string pads) within easement	4 m total width (access tracks)	12 m for access tracks 35 m x 35 m for poles 35 m x 35 m for string pads	Increased by 8 m (access tracks) Poles and string pads were not assessed in the Original EIS/RTS
Combined total ground disturbance area (access tracks, poles and string pads) along easement	17.9 ha (access tracks only – string pads and poles not defined)	Total of 14.7 ha, comprised of: - 11.0 ha (access tracks) - 3.7 ha (string pads and poles)	Decreased by 3.2 ha (-18%)
Total area of vegetation clearance within the balance of easement (i.e. > 4 m in height at full maturity)	34.67 ha	11.85 ha	Decreased by 22.82 ha (-66%)
Other Ancillary Infrastructure			
Operation and Maintenance (O&M) Facility	Up to 1 facility	Up to 3 facilities	Increase by up to 2 facilities

[14] The Original EIS/RTS assumed a nominal width of 15 m for new wind farm access tracks, however this did not sufficiently account for the cut and fill required and to construct the Project. Based on a detailed constructability assessment and 3D modelling (as described in Appendix A), the average ground disturbance width for wind farm access tracks estimated for the Modified Project (37.4m) appropriately accounts for the earthworks required to construct the access tracks as well as the adjacent underground cabling wherever relevant.

[15] This value is calculated based on the development plan spatial files for the Approved Project, as no specific total length of underground cabling was identified in the Original EIS/RTS report. This length of underground cabling is independent of the length of internal access tracks.

Parameter	Approved Project [11]	Modified Project	Extent of Change
		6 x indicative locations (each ranging between 0.62 ha and 1.86 ha)	
Total ground disturbance area – O&M facilities	1 ha (1 x indicative location)	Combined total: 3.61 ha (3 x indicative locations assessed)	Increased by 2.61 ha (+261%)
Temporary construction areas (construction compounds, laydown areas, and/or concrete batch plants) (Wind Farm Site)	Up to 4 x temporary concrete batch plants Up to 6 x construction compounds/laydown areas	Up to 9 x temporary construction compounds/laydown areas/concrete batch plants (19 x indicative locations identified, ranging between 1.19 ha and 3.44 ha)	Increase of 5 x temporary concrete batch plants Increase of 3 x construction compounds/laydown areas
Total ground disturbance area – temporary construction areas	Total of 35.73 ha comprised of: - Temporary concrete batch plants: 4.13 ha - Construction compounds: 31.6 ha	Combined total for temporary concrete batch plants and construction compounds: 18.9 ha (9 x locations assessed)	Decreased by 16.83 ha (-47%)
Indicative Development Footprint – External Transmission Line			
External Transmission Line			
Total length (preferred alignment)	56.82 km	56.24 km	Decreased by 0.58 km
Easement width	60 m	60 m	No change
Total easement area	340.92 ha	337.44 ha	Decreased by 3.48 ha
Total length of access track within easement	56.45 km	54.73 km	Decreased by 1.72 km
Total length of access track to easement from nearby public roads	Not defined	8.83 km	No access tracks from nearby public roads were proposed by the Approved Project
Average width (access track, poles and string pads) within easement	4 m access track width (poles and string pads not assessed)	12 m for access tracks 35 m x 35 m for poles 35 m x 35 m for string pads	Increased by 8 m (access track width only) Poles and string pads were not assessed in the Original EIS/RTS
Total ground disturbance area (access tracks, poles and string pads) along transmission line easement	19.53 ha (access tracks only) [16]	96.26 ha (includes access tracks, poles and string pads)	Increased by 76.73 ha (+393%)

[16] The Original EIS/RTS assumed no ground disturbance would be associated with the use of existing farm access tracks to access the transmission line easement. Following a detailed constructability assessment and extensive 3D terrain modelling, the Modified Project includes the ground disturbance required to upgrade existing farm access tracks to enable their use during construction and operational phases.

Parameter	Approved Project [11]	Modified Project	Extent of Change
Total ground disturbance area for access tracks to easement from nearby public roads	Not defined	15.21 ha	Not defined in the Original EIS/RTS
Total area of vegetation clearance within the balance of easement (i.e. > 4 m in height at full maturity)	192.76 ha (combined Internal and External Transmission Line components) [17]	118.5 ha (External Transmission Line component only) *Note: the combined area for internal and external transmission line components is 220.1 ha*	Increased by 27.34 ha (14%) (combined External Transmission Line components)
Temporary construction compounds/laydown area/concrete batch plant			
Temporary construction areas (construction compounds, laydown areas, and/or concrete batch plants) (External Transmission Line Site)	Up to 1 (at Ulan) (construction compound only)	Up to 1 x temporary construction compounds/laydown areas/concrete batch plants (near Cliffdale Road)	No change
Total ground disturbance area – temporary construction areas	Total of 0.85 ha	Combined total for temporary concrete batch plants and construction compounds: 2.15 ha	Increased by 1.3 ha (+152%)
Connection Substation and Transgrid Tower Strengthening Works at Ulan			
Connection substation (Switchyard)	1	1	No change
Total ground disturbance area (Connection substation)	1.41 ha	1.85 ha	Increased by 0.44 ha (+31%)
Total ground disturbance area – Transgrid Tower Strengthening Works (access tracks and construction pads)	Not defined	3.09 ha	Not defined in the Original EIS/RTS
Indicative Development Footprint – Public Road Upgrades			
Length of anticipated public road upgrades	Local roads: up to 81.16 km Regional roads: Not defined	Total 110.41 km: Local roads: up to 89.7 km Regional roads: 20.71 km	Local roads: length increased by 8.54 km Regional roads: Not defined in the Original EIS/RTS
Total ground disturbance area	Not defined	190.7 ha (includes existing road pavement area)	Not defined in the Original EIS/RTS

Further details on the key assumptions and changes to the ground disturbance estimates associated with

[17] As noted above, this value is the combined area of vegetation clearance required within the balance of easement for both the internal and external transmission line components, as no breakdown was provided in the Original EIS/RTS.

the Proposed Modifications are described in Appendix A.

4.9.2 Development Corridor

The Development Corridor provides flexibility to micro-site infrastructure as more in-depth and accurate information about on-the-ground conditions and other constraints at the Project site become known, particularly during the detailed design process and during construction.

The Proposed Modifications include revisions to the Approved Development Corridor to accommodate the revised infrastructure layout and footprints proposed by the Modified Project, including:

- **Modified Development Corridor (Wind Farm):** this encompasses the Indicative Development Footprint – Wind Farm and associated buffer areas (as described in Section 4.9.1)
- **Modified Development Corridor (External Transmission Line):** this encompasses the Indicative Development Footprint – External Transmission Line and associated buffer areas (as described in Section 4.9.1)

The Modified Development Corridor (Wind Farm), in combination with the turbine micro-siting limits set out in the Development Consent, provides greater certainty around where turbines and ancillary infrastructure are permitted to be located within the broader Modified Site Boundary. The Modified Development Corridor (Wind Farm) will enable further optimisation during detailed design including further endeavours to reduce ground disturbance and allow for avoidance of areas of sensitivity in accordance with turbine and ancillary infrastructure micro-siting restrictions. Similarly, the Modified Development Corridor (External Transmission Line) provides this certainty within the broader Modified Site Boundary together with flexibility for design optimisation.

The Development Corridors have been defined as two separate and partially overlapping areas that each encompass the relevant land areas required to deliver the wind farm and the external transmission line and connection infrastructure stages of the Project, respectively. This approach will assist with the delivery of the Project by different contractors and operators (e.g. clear compliance during construction and operations phases) or for this stage to not be constructed if the Project is able to connect into the Central-West Orana REZ transmission line proposed by EnergyCo (as discussed in Section 2.3 and Section 4.4.1 and confirmed to not form part of the Proposed Modification).

A Development Corridor does not apply to the public road upgrade areas as the alignment of the public roads proposed to be used are largely fixed and there are limited opportunities for micro-siting and/or substantial realignment of public roads.

The Modified Development Corridors (Wind Farm and External Transmission Line) are shown in Figure 3 and Figure 4 above and in Appendix C.2. Further detail is provided in the map series contained in Appendix E.

4.9.3 Site Boundary

The Proposed Modifications include revisions to the Site Boundary to reflect the Modified Development Corridors (referred to as the Modified Site Boundary).

The proposed changes to the Approved Site Boundary are illustrated in Appendix C.2 and Appendix E. A list of the land parcels that have been added to and removed from the Approved Site Boundary is provided in Table 18. Appendix C.1 provides an updated Schedule of Land which lists all of the relevant land parcels contained within the Modified Site Boundary.

All agreements with owners of land within the Modified Site Boundary are either in place or at an advanced negotiation stage and will be finalised prior to relevant works commencing.

Table 18: Changes to land parcels included within the Modified Site Boundary

Summary	Lot/Plan
Additional of two (2) adjacent land parcels adjacent to Vinegaroy Road, to accommodate newly proposed Site Access Points #113 and #114 and associated access track into the Wind Farm Site	Lot 160/750744 Lot 161/750744
Removal of one (1) land parcel adjacent to Vinegaroy Road, as the Approved Site Access Point #9 is no longer required	Lot 45/750744
Addition of three (3) land parcels adjacent to Rotherwood Road to accommodate a section of access track to the internal transmission line	Lot 4/883170 Lot 89/750749 Lot 97/750749
Addition of one (1) adjacent land parcel along the proposed transmission line to avoid impacts to a portion of Durridgere Conservation Area (DCA)	Lot 11/734934
Addition of five (5) land parcels to provide vehicular access from the Golden Highway to construct and maintain a section of the external transmission line	Lot 4/254128 Lot 6/254128 Lot 7008/1026534 Lot 1/191804 Lot 60/750771
Addition of one (1) land parcel to realign a short section of the external transmission line south of Hands on Rock, Turill	Lot 7008/DP1030463 (part only)
Addition of one (1) adjacent land parcel adjacent to Ulan Road to provide vehicular access required to construct and maintain a section of the external transmission line.	Lot 139/750748
Addition of three (3) adjacent land parcels to the east and west of the proposed switching station at Ulan, to incorporate potential strengthening works to Transgrid's existing transmission tower infrastructure, at Transgrid's request	Lot 4/1214133 (part only) Lot 3/1214133 (part only) Lot 5/1246858 (part only)
To include small sections of adjacent road reserves to ensure appropriately designed public road upgrades and site access points can be constructed	Various short sections of public road reserve, as shown in Appendix F and listed in Appendix C.1.

4.10 Subdivision

The Approved Project includes the subdivision of land to create a new lot for the connection substation/switchyard and associated facilities and ancillary equipment within the External Transmission Line Site at Ulan (Lot 4 / DP1214133).

In addition to this subdivision, the Proposed Modification also includes:

- any deemed subdivision of land arising from the grant of long term leases for the Project; and
- additional subdivision of land to create a new lot for the collector substations and associated facilities and ancillary equipment within the Wind Farm Site. The specific land parcels that would be subject to subdivision have not yet been identified, as the current locations for collector substations and associated infrastructure proposed by the Modified Project are indicative only. The proposed subdivision of land for this infrastructure will be for land parcels located within the Modified Development Corridor, generally in

accordance with the indicative locations shown in Appendix C.2 and Appendix E. Formal plans of subdivision will be prepared at the detailed design phase when precise locations of infrastructure, sizing of subdivision areas, and the affected lots will be known with more certainty. The plans of subdivision will then be lodged with a registered certifier who is responsible for granting subdivision certificates under the EP&A Act. Once granted, the subdivision certificates and plans of subdivision will then be lodged with the NSW Land Registry Services (LRS) to create the new lots and to update the relevant land titles accordingly.

4.11 Conditions of Consent

A number of changes are proposed to the Conditions of Consent to reflect the Proposed Modifications and ensure consistency with recently granted SSD development consents for wind farmprojects. [18]

The proposed updates to the Development Consent are summarised in Table 19 below, and the relevant updated schedules are contained in Appendix C. Minor administrative changes, including updated references to statutory agencies, standards or guidelines have not been included in Table 19, and it is anticipated that these will be addressed by DPE as part of their assessment of this Modification Application.

An assessment of the Modified Project against all existing Conditions of Consent is set out in Appendix B.

Table 19: Proposed Modifications to Conditions of Consent

Development Consent SSD 6696	Updates Required and Reference in this Modification Assessment Report
Definitions	- Definition of "Applicant" to be updated to " Liverpool Range Wind Farm Pty Ltd or any person carrying out the development approved under this consent" - Definition of "EIS" to be updated to include this Modification Assessment Report. - Definition of "existing hollow-bearing trees" to be included to clarify that this excludes any hollow-bearing tree within the approved disturbance footprint which will be removed to construct the Project.
Appendix 1	- Schedule of Land to be updated to reflect Appendix C.1
Appendix 2	- Development Layout to be updated to reflect Appendix C.2 - Wind Turbine Coordinates to be updated to reflect Appendix C.3
Appendix 5	- Heritage items to be updated to reflect Appendix C.4 - Archaeological Constraints plan to be updated to reflect Appendix C.4
Appendix 6	- Schedule of Road Upgrades to be updated to reflect Appendix C.5 - Road Upgrade Standards to be updated as agreed with Councils – refer to Appendix C.5 and agreed standard set out in Section 4.7.1.
Appendix 7	- Over-dimensional and Heavy Vehicle Access Route Restrictions to be updated to show all Local and Regional roads proposed to be used and identified Site Access Points and reflect Appendix C.6.
Schedule 2 LIMITS ON CONSENT	**Condition 5 (Wind Turbines)** to be updated to allow for the construction, operation and replacement or upgrade of up to 220 wind turbines.
	Condition 7 (Wind Turbine Height) to be updated to allow for a maximum blade tip height of up to 250 m above ground level (AGL).
	Condition 8(b) (Micro-siting Restrictions) to be amended to allow for turbines to micro-sited within 250 m of the turbine coordinates contained in updated Appendix 2.

[18] Wherever relevant the proposed modifications to the Conditions of Consent detailed in this Modification Application have been developed to be consistent with DPE's updated template conditions and recent SSD wind farm approvals, for instance Development Consent SSD 6693 (MOD 1) granted 15 April 2021 for the Rye Park Wind Farm project located near Yass, NSW.

Development Consent SSD 6696	Updates Required and Reference in this Modification Assessment Report
Schedule 3 **ENVIRONMENTAL CONDITIONS – GENERAL**	**Condition 1(b) (Visual Impact Mitigation)** to be amended to increase the distance to 4,950 m from an approved turbine location within which visual mitigation measures are made available to Non-associated residences.
	Conditions 3(b) (Lighting) to be amended to require any aviation hazard lighting to be implement to the satisfaction of the CASA and to include a dispute resolution mechanism led by the Planning Secretary, consistent with recently approved SSD wind farm projects.
	Condition 10 (Operational Noise Criteria – Wind Turbines) to be amended to reference the standard noise compliance limit of 35 dB(A) or the existing background noise level (LA90 (10-minute)) plus 5 dB(A) at any Non-associated residence, consistent with recently approved SSD wind farm projects.
	Insertion of new **Condition 14 and 15** to require a **Noise Management Plan** that sets out, amongst other things, compliance monitoring measures, noise management measures, and audit processes, consistent with recently approved SSD wind farm projects.
	Condition 18(a) and (b) (Restrictions on Clearing and Habitat) to be amended to update the specified clearance limits, as follows: - **427.0 hectares (ha)** of White-Box-Yellow Box-Blakely's Red Gum Woodland CEEC, including native pasture. - **42.1 ha** of EPBC Act listed White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland Ecological Community.
	Condition 26 (Designated Heavy and Over-Dimensional Vehicle Routes) and associated notes to be amended to allow for the portion of Gundare Road within the Modified Site Boundary to be used by Heavy vehicles. The Modified Project proposes to access the portion of Gundare Road located within the Modified Site Boundary by Light and Heavy vehicles for the construction and maintenance of a short section of transmission line that crosses the eastern end of Gundare Road. The Modified Project does not propose to access the portion of Gundare Road external to the Modified Site Boundary by any class of vehicles.
	Condition 27 (Designated Heavy and Over-Dimensional Vehicle Routes) to be deleted as Site Access Point #9 located off Vinegaroy Road is no longer required.
	Condition 28(a) (Road Upgrades) to be amended to allow for the potential to sequence the delivery of public road upgrades and on-site construction activities so that on-site construction works may commence progressively throughout the initial stage of the construction program, consistent with recently approved SSD wind farm projects.
	Condition 31(a) (Traffic Management Plan) to be amended to remove reference to Site Access Point #9, as it is no longer required.

5.0 Justification

5.1 Overview

The Proposed Modifications are required to enable the Project to utilise improvements in wind energy technology to enable significantly more renewable energy production to be achieved with fewer, larger wind turbines and to reflect the outcomes of the ongoing design optimisation and assessment carried out as the Project progresses towards construction.

This Modification Application is based on extensive additional site and design information and reflects the outcomes of additional consultation with near neighbours, the broader community and agencies. The assumptions on ground disturbance are based on recent wind farm experience and quantified through detailed 3D terrain modelling. Together, this provides certainty around the proposed layout and potential environmental impacts identified in this Modification Application and to the constructability of the Modified Project.

The benefits from the Proposed Modifications include better energy yields and higher generation capacity making best use of the available resources, maximising the environmental benefits and improving the cost of energy generated by the Modified Project. Furthermore, the Proposed Modifications will result in greater economic benefits at the local, regional and state level from increased employment opportunities and better diversification of income for agricultural areas. The Proposed Modifications will also result in a more competitive cost of energy supply, and larger positive contributions to addressing the adverse effects of climate change.

The key justifications for the Proposed Modification and the associated benefits can be summarised as follows:

- The Proposed Modification will materially increase the indicative renewable energy generation capacity of the Project while reducing the total number of turbines required. The renewable generation capacity of the Project will increase from approximately 962 MW to approximately 1,320 MW which represents an increase of approximately 358 MW per annum of renewable energy. This is enough to power an additional 185,000 average homes each year. Accordingly, the Proposed Modification will materially assist in preventing forecast energy shortfalls and managing rising energy costs to benefit energy consumers as coal fired power stations are retired in coming years.
- The Proposed Modification will also materially increase the estimated greenhouse gas benefits of the Project. The CO2 emissions savings from the Modified Project will increase from approximately 2.1 million tonnes of CO2 emissions savings per year to 2.9 million tonnes CO2 emissions savings per year. This represents an additional 800,000 tonnes of CO2 emissions savings per year which is equivalent to removing the emissions from an additional approximately 261,000 cars per year. If the Modified Project is approved it could be constructed and fully operational well before 2030, with all carbon emissions associated with the construction and manufacturing of the Project offset within the first year of operations. In doing so, the Project will make a positive contribution to the achievement of the 35% reduction in CO2 emissions by 2030 which is generally regarded as being critical to contain climate change impacts. The Modified Project will also materially assist NSW and Australia in meeting their greenhouse gas reduction targets of net-zero by 2050.
- The Project layout changes and updated design assumptions incorporated in the Proposed Modification have been informed by experiences in recent wind farm construction and the extensive use of 3D terrain modelling which has resulted in more accurate estimates of the extent of ground disturbance required to construct the Project and enabled a more detailed assessment of associated environmental impacts. The changes proposed to the Project layout have been carefully designed and located based on an evidence-based environmental constraints-driven approach to ensure impacts are minimised to the extent practicable.

- The Modified Project will provide full time employment for approximately 800 staff during construction and approximately 47 full-time jobs during its operational life, providing increased employment opportunities.
- The Modified Project will also result in a direct injection of approximately $6-7 million per annum to the local community through direct payments to landholders, Voluntary Planning Agreement (VPA) contributions, and other benefit sharing programs, providing better diversification of income and a drought-proof and post-retirement income for farmers.
- The Modified Project is also expected to provide a material boost to the local, regional and state-wide economies, particularly through flow-on economic activity during the construction phase, as follows:
    - **State level:** an estimated $685.57 million of added value over entire construction period ($221.4 million per year) and 4,608 person years (FTE) of employment over entire construction period (1,488 jobs per year)
    - **Regional level:** an estimated $95.47 million of added value over entire construction period ($30.83 million per year) and 712 person years (FTE) of employment over entire construction period (230 jobs per year).

5.2 Technology Advancement

The key changes in technology of relevance to this Modification Application are the availability of newer, more efficient and larger wind turbine models that enable significantly more renewable energy to be generated using a smaller number of turbines on the same area of land.

The height of the wind turbines forming part of the Approved Project (up to 165 m tip height AGL) included some of the largest wind turbine models on the market at the time of the Original EIS was prepared. However, wind turbine technology, and the broader renewable energy generation sector, is a rapidly evolving industry. Increased global uptake continues to drive investment in research and development to optimising turbine design and operations resulting in much more efficient and larger wind turbine models that can produce energy at a lower cost per unit.

The proposed increase in maximum blade tip height to 250 m AGL will enable the Project to generate significantly more renewable energy by utilising newer more advanced wind turbines models which have blades approximately 90 m in length. This will increase the greenhouse benefits of the Project while reducing the cost of energy production, providing clear public interest benefits and enabling the most beneficial use of the land.

Whilst a wind turbine model has not yet been selected for the Project, modelling of indicative wind turbines suggests that by using the more efficient wind turbine models now available, [19] the Modified Project has the potential to generate substantially more benefits than the Approved Project in terms of the renewable energy produced, number of equivalent households powered and greenhouse gas benefits, as detailed in Table 20 below.

The proposed maximum blade tip height of 250 m AGL is consistent with recently approved wind farm projects, such as the Uungula Wind Farm (located near Wellington approximately 100 km to the southwest of the Project site), and the nearby proposed (not yet approved) Valley of the Winds Wind Farm project (located approximately 15 km to the west of the Project site).

[19] The increase to the maximum turbine tip height proposed as part of the Proposed Modification would allow for the installation of the latest turbine models which currently are rated to approximately 6 MW capacity, as compared to the turbine models which were previously considered for the Approved Project whose capacity ratings ranged between 1.5 and 3.5 MW.

Table 20: Comparative Output Benefits

Project component	Approved Project	Modified Project	Change
Maximum number of turbines	267	220	-47 (17% decrease)
Indicative generation capacity (MW)	Approx. 962 MW [20]	Approx. 1,320 MW [21]	+358 MW (37% increase)
Indicative generation GWh per year	Approx. 2,615 GWh per year	Approx. 3,630 GWh per year	+1,015 GWh per year (39% increase)
Estimated average households powered per year	Approx. 477,000 households	Approx. 662,000 households	+185,000 households
Estimated greenhouse gas benefits	Approx. 2.1 million tonnes of CO2 savings per year. Estimated to be the equivalent of removing approx. 672,000 cars per year off the roads.	Approx. 2.9 million tonnes of CO2 savings per year. Estimated to be the equivalent of removing approx. 933,000 cars per year off the roads.	+800,000 tonnes of CO2 savings per year. Estimated to be an increased benefit equivalent of removing approx. 261,000 additional cars per year

5.2.1 Supported by Additional Investigations

Since the Project was approved and subsequently acquired by the Applicant, a detailed layout review and design optimisation process has been undertaken by the Applicant to ensure the Project is economically viable and can be constructed in a safe and efficient manner (see Appendix A). As a result, new information is now available and has been used to inform the Proposed Modifications, including:

- Additional and updated information regarding community interests and concerns, developed through extensive additional community consultation.
- Updated biodiversity surveys (including bird and bat utilisation surveys) and impact assessments within the wind farm, along the external transmission line, and along public roads anticipated to be used to ensure the Project minimises impacts on biodiversity.
- Updated heritage field surveys and assessments within the wind farm, along the external transmission line, and along public roads proposed to be used to ensure the Project minimises impacts on Aboriginal cultural heritage and post-contact historic heritage values.
- Engineering designs for internal access tracks and other associated infrastructure including underground cabling and overhead powerlines, collector substations, and public road upgrades, using 3D terrain modelling capabilities.
- An updated OSOM haulage route options assessment and swept path analysis, in the context of transporting larger wind turbine components from the Port of Newcastle, including longer wind turbine blades.

This information has informed the Modified Project layout and the potential environmental impacts presented in this Modification Application. Appendixes G1 to G9 contain the detailed technical environmental impact assessments that have been prepared by appropriately qualified experts for the Modified Project. Summaries of the key findings of each of these are provided in Section 7.0.

[20] This indicative generation capacity is based on an assumed 3.6 MW turbine.

[21] This indicative generation capacity is based on an assumed 6.0 MW turbine.

5.2.2 Industry Maturation / Learnings

The additional information provided in this Modification Application reflects a level of maturation of the wind industry in NSW. The growing wind farm industry now includes several large-scale projects that have completed construction with many lessons learned, particularly in terms of constructability.

The Applicant is familiar with the wind industry in NSW as it owns and operates the 5 MW (8 wind turbines) Blayney Wind Farm near Lake Corcoar, south of Blayney and the 10 MW (15 wind turbines) Crookwell Wind Farm near Goulburn, two of the first utility scale wind farms to be connected in Australia. In 2020 the Applicant successfully progressed the Rye Park Wind Farm (located near Yass, NSW) through a modification process and recently commenced construction in December 2021. The Applicant has also been able to apply recent construction experience to this Project as the company recently completed construction, testing and commissioning of the 336 MW Dundonnell Wind Farm in Victoria and the 133 MW Waipipi Wind Farm in New Zealand. Lessons learnt at an industry wide level and through the Applicant's direct experience have been used to inform the construction assumptions detailed in this Modification Application (see Appendix A).

Where relevant, the learnings gained from each of these other projects, have been incorporated into the design review undertaken for the Liverpool Range Project to confirm the modifications required.

For example, in comparison to the Original EIS and RTS, this Modification Application includes provision and assessment of :

- Appropriate cut and fill allowances to ensure tracks in steep landscapes are constructible.
- Improved underground cabling design by locating the cabling outside of the access track footprint so as to and avoid the efficiency losses and the safety and operational issues which may otherwise arise.
- Vegetation clearing requirements for transporting wind turbine blades along haulage routes and internal access tracks which was not assessed as part of the Approved Project.
- Ground disturbance associated with anticipated public road upgrades and associated potential impacts to native vegetation, cultural heritage, and potential encroachments into adjacent private property which was also not considered as part of the Approved Project .

The updated disturbance footprints set out in Section 4.9.1 reflect these learnings and are required to ensure the Project is constructible.

5.3 Government Policy

The Modified Project remains strongly aligned with the updated NSW Government and Commonwealth energy and climate policies implemented since the Development Consent was granted as summarised in Table 21. The Project will provide 100 percent emissions free, renewable energy and help NSW lead the clean energy transition away from its current reliance on fossil fuels which in 2020-21 provided approximately 80% of NSW's electricity needs [22] contributing to human induced climate change impacts. In particular the Project will contribute meaningfully to the NSW and Commonwealth Government's goal of net zero emissions by 2050.

Table 21: NSW Energy and Commonwealth Climate Policy

Policy	Summary
Electricity Infrastructure Roadmap December 2020	The *Electricity Infrastructure Roadmap (*the Roadmap) (DPIE, 2020) is the NSW Government's plan to transform the electricity system into one that is cheap, clean and reliable.

[22] Source: *NSW State of the Environment Report, 2021* prepared by the NSW Environment Protection Authority (EPA).

Policy	Summary
	The Roadmap is enabled by the Electricity Infrastructure Investment Act 2020 (Act), which passed into law in December 2020 with the objective: *(a) to improve the affordability, reliability, security and sustainability of electricity supply, and* *(b) to co-ordinate investment in new generation, storage, network and related infrastructure, and* *(c) to encourage investment in new generation, storage, network and related infrastructure by reducing risk for investors, and* *(d) to foster local community support for investment in new generation, storage, network and related infrastructure, and* *(e) to support economic development and manufacturing, and* *(f) to create employment, including employment for Aboriginal and Torres Strait Islander people, and* *(g) to invest in education and training, and* *(h) to promote local industry, manufacturing and jobs, and* *(i) to promote export opportunities for generation, storage and network technology* The Roadmap coordinates investment in transmission, generation, storage and firming infrastructure as ageing coal-fired generation plants retire. The Roadmap will deliver at least five Renewable Energy Zones (REZs) across NSW, which are modern-day power stations that combine renewable energy generation such as wind and solar, storage such as batteries, and high-voltage poles and wires to deliver energy to the homes, businesses and industries that need it. By connecting multiple generators and storage in the same location, REZs capitalise on economies of scale to deliver cheap, reliable and clean electricity for homes and businesses in NSW. The approved Liverpool Range Wind Farm project is located within, and forms a key component of, the Central-West Orana REZ (CWO REZ), which was formally declared on 5 November 2021. The declaration of the CWO REZ was made because the Minister: *(a) [was] satisfied that it is consistent with the objects of this Act, and* *(b) has considered the following—* *(i) existing network infrastructure in the renewable energy zone and the rest of the State,* *(ii) land use planning, environmental and heritage matters,* *(iii) the views of the local community in the renewable energy zone,* *…* Accordingly, the declaration of the CWO REZ provides formal recognition that the CWO REZ is the right location for renewable energy projects in NSW. The CWO REZ is expected to unlock up to 3 gigawatts of new network capacity by the mid-2020s, enough to power 1.4 million homes. It is expected to bring up to $5.2 billion in private investment to the Central-West Orana region by 2030. The CWO REZ is expected to support around 3900 construction jobs in the region. The NSW Government chose the Central-West Orana region because the region benefits from relatively low transmission build costs due to its proximity to the existing backbone transmission network. It also has a strong mix of energy resources and there is significant investor interest. EnergyCo has confirmed that it has "identified 11 major renewable generation projects that we will work with as we develop the Central-West Orana REZ Transmission Project". The Liverpool Range Wind Farm is one of these identified 11 major renewable generation projects and is currently the only one of these 11 major renewable generation projects to have planning approval. As such, it represents a key project for the CWO REZ and its successful delivery is critical to the success of the CWO REZ.

Policy	Summary

Electricity Strategy
November 2019
	A core pillar of the NSW Government's policy settings is the NSW *Electricity Strategy*, 2019 (DPIE, 2019). This is summarised as follows:
	- The NSW Electricity Strategy is the NSW Government's plan for a reliable, affordable and sustainable electricity future that supports a growing economy.
	- We recognise the NSW electricity system must change. Traditional generators are aging, and our transmission system is congested. Electricity prices are putting pressure on households and businesses.
	- This strategy will respond to these challenges and support a new affordable and reliable energy system – one that meets both our generation needs and our emissions reduction target.
	- It will do this by:
	  o delivering Australia's first coordinated Renewable Energy Zone;
	  o saving energy, especially at times of peak demand;
	  o supporting the development of new electricity generators;
	  o setting a target to bolster the state's energy resilience; and
	  o making it easier to do energy business in NSW.
	- The strategy encourages an estimated $8 billion of new private investment in NSW's electricity system over the next decade, including $5.6 billion in regional NSW. It will also support an estimated 1,200 jobs, mostly in regional NSW.

Net Zero Plan (Stage 1: 2020 – 2030) March 2020	Most recently, in March 2020, the NSW Government also unveiled its Net Zero Plan (Stage 1: 2020 – 2030) (DPIE, 2020). The NSW State Government has set a goal of net zero emissions by 2050, and the first stage of this plan is targeted at fast-tracking emissions reduction over the next decade and establishing a platform for the decades to follow. The Plan sets out four priority areas for action: - Drive update of proven emissions reduction technologies that grow the economy, create new jobs or reduce the cost of living – this is focused on providing a pathway to deploy firmed renewable generation (including the pilot REZ), home energy efficiency products and electrification of transport and industry; - Empower consumers and businesses to make sustainable choices – providing consumers with information about the carbon impact of key goods and services and give them opportunities to offset that impact; - Invest in the next wave of emissions reduction innovation to ensure economic prosperity from decarbonisation beyond 2030 – to accelerate the research, development and demonstration of low emissions technologies that show potential for becoming scalable, replicable and cost-effective. Investment in this area will be focused on linking research with industry, including through grants, low-interest loans and a new clean technology innovation hub; - Ensure the NSW Government leads by example – for the NSW Government to play a leading role by bringing sustainable goods, services and practices into the market and maximising the environmental value of the assets it oversees.
NSW Transmission Infrastructure Strategy November, 2018	The NSW Transmission Infrastructure Strategy (DPE, 2018) was introduced in November 2018. NSW is undergoing an energy sector transformation not seen for several decades, which will transform how we generate and use energy. The NSW Transmission Infrastructure Strategy is the NSW Government's plan to unlock private sector investment in priority energy infrastructure projects, which can deliver least-cost energy to customers to 2040 and beyond. The Strategy forms part of the government's broader plan to make energy more affordable, secure investment in new power stations and network infrastructure and ensure new technologies deliver benefits for consumers. Building on existing programs to reduce household and business energy bills and secure energy supplies, the Strategy aims to: - Boost our interconnection with Victoria, South Australia and Queensland, and unlock more power from the Snowy Hydro Scheme.

Policy	Summary
	- Increase NSW's energy capacity by prioritising Energy Zones in the Central-West, South West and New England regions of NSW, which will become a driving force to deliver affordable energy into the future. - Work with other states and regulators to streamline regulation and improve conditions for investment.

NSW and Commonwealth MOU
January 2020
	On 31 January 2020, a memorandum of understanding (MOU) between the NSW and Commonwealth governments was signed with the aim of setting out a clear, long-term path to help the state meet its target of net zero emissions by 2050. The MOU targets reduced emissions across key sectors, including agriculture, mining and transport.
	As well as reducing emissions, the initiatives set out in the MOU aim to improve the affordability and reliability of the NSW electricity system, benefiting households, businesses and communities.
	Key initiatives in the MOU include:
	- improving transmission interconnection and network access, including accelerating and delivering:
	  o NSW's first Renewable Energy Zone (per above);
	  o the HumeLink project to unlock existing and future generation from Snowy Hydro; and
	  o upgrades to the Queensland to NSW interconnector;
	- keeping existing electricity generation plants available and reliable until they close;
	- setting a target to inject an additional 70 petajoules of gas per year into the NSW market, and agreeing to a gas market review if this target is not met by 2022;
	- ensuring emissions reduction in the electricity sector stays on track;
	- committing to invest $2 billion in reducing emissions in NSW; and
	supporting new generation investment in NSW.

Commonwealth Climate Policy	Australia has a range of initiatives aimed at meeting its climate change targets, improving the environment and supporting an effective international response. The Paris Agreement is a symbol of countries' commitment to a low-carbon, climate resilient future. On 10 November 2016, Australia ratified the Paris Agreement and the Doha Amendment to the Kyoto Protocol, reinforcing its commitment to action on climate change. Australia has a suite of policies to reduce domestic emissions, support effective international efforts without compromising economic growth and driving up energy prices. The Government's climate change plan includes (but is not limited to): - Commitment to net zero emissions by 2050; - Reducing emissions by 26 to 28 per cent below 2005 levels by 2030; - Doubling Australia's renewable energy capacity to be achieved in 2020 which is driving innovation, creating jobs and providing a cleaner future; - Encouraging the uptake of renewables through the Renewable Energy Target to deliver over 23 per cent of Australia's electricity supply in 2020; - Helping improve energy productivity by 40 per cent, by 2030; - Ensuring big business and Australia's largest emitters do their part and continue to reduce emissions; - Helping expand and protect green spaces and iconic places such as the Great Barrier Reef; - Spurring businesses, communities, households and individuals into ongoing action to reduce emissions; - Investing in innovation and clean technology to help capture the opportunities of a cleaner future; and - Managing climate risks by building resilience in the community, economy and environment. The Project is well aligned with the Commonwealth Government's climate policy objectives, and will make a meaningful contribution to emissions target reductions.

Furthermore, the Australian Energy Market Operator (AEMO) noted in its December release of the Draft 2022 Integrated System Plan (ISP) (AEMO, 2021) that:

> *"The NEM must triple its overall generation and storage capacity if it is to meet the economy's electricity needs in the most likely scenario. Today, NEM installed capacity of nearly 60 GW delivers just under 180 TWh of electricity to industry and homes per year. In Step Change, utility-scale generation and storage capacity would need to grow to 170 GW and deliver almost 400 TWh per year by 2050 to cater for existing loads and replace the gas and petrol currently consumed by much of our transport, industry, office and domestic use."*

As noted, AEMO assumes that approximately 15 GW of generation (14 GW of coal fired and about 1 GW of GPG) will reach its end of technical life by 2040 and retire across the National Electricity Market (NEM). This is projected to result in an overall reduction in the energy generated from coal, with the coal-fired power stations retiring currently generating approximately 70 TWh, equivalent to around one-third of current total NEM consumption (i.e. very significant).

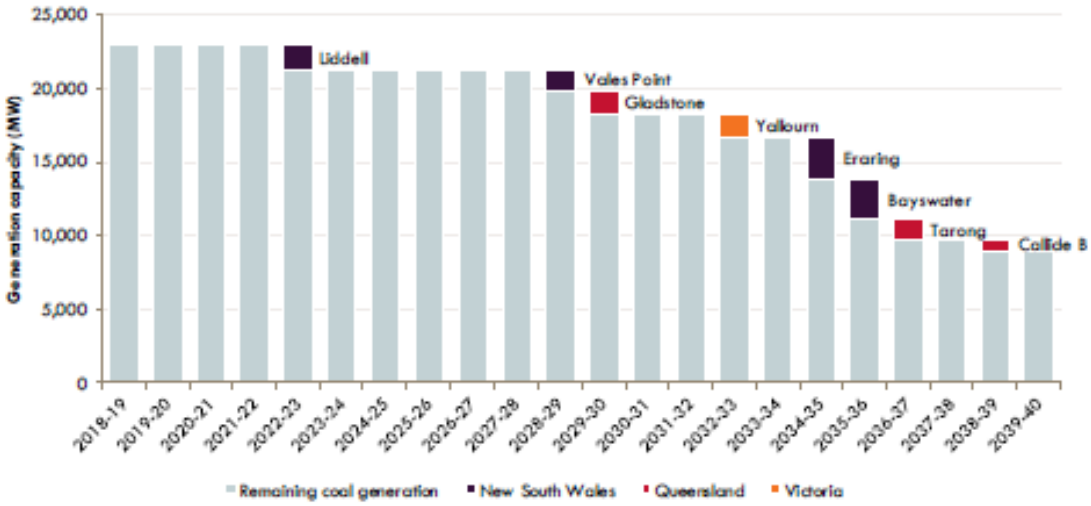
As set out in the 2018 AEMO ISP (see Figure 21 below), NSW faces more age-driven retirement of coal fired generation than any other State, with closure of the Liddell Power Station (located approximately 100 km southeast of the Project site) scheduled to occur at the end of April 2023, Eraring Power Station scheduled to close in 2025 and other coal-fired generators also likely to bring forward their closure dates over coming years with the majority of the remainder of its coal-fired fleet expected to be retired by 2040 at the latest. The period over which these closures will occur, is well within the expected 30-year life of the Project. Clearly, the Project will make a significant contribution to the shortfall in generation that will arise with the imminent retirement of Liddell and other coal-fired generators in the near future.

AEMO also notes in its August 2019 Electricity Statement of Opportunities:

> *"…following the gradual closure of Liddell, a combination of high summer demand and unplanned generator outages will leave New South Wales exposed to significant supply gaps and involuntary load shedding if no mitigation action is taken. In 2023-24, AEMO forecasts a risk to between 135,000 and 770,000 households in New South Wales being without power for three hours during an extreme heat event (that is, a 1-in-10 year peak demand event)."*

Renewable energy contributed 27.7% of total electricity generation in Australia (more than 35% of which is generated by wind energy) in 2020 and represents the lowest-cost form of new electricity generation (Clean Energy Council, 2021). As of March 2021, 10,395 MW of renewable energy projects were under construction or financially committed, creating more than 13,500 jobs and $18.6 billion of investment in Australia.

Figure 21: NEM coal-fired generation fleet operating life to 2040 (AEMO, 2018)



5.4 Local Benefits

In addition to the benefits listed in the above sections, other key local benefits are briefly summarised below.

Wise use of natural resources

The Proposed Modifications have been informed by additional environmental assessments (see Section 7.0 and Appendix G) and consultation with local stakeholders (see Section 6.0 and Appendix H). The Modified Project represents the best project design to make use of the available energy resources to a significantly higher level than is possible as part of the Approved Project while minimising environmental impacts associated with the construction and operation of the Project. Wise use of the site's resources is both in the broader public interest and also reflects local community concerns and benefits the locality.

Drought proofing and diversification of income streams

In 2019, NSW experienced one of the hottest and driest years on record. Droughts, while crippling local agricultural output and driving up prices for consumers, also place additional pressure on natural resources. Pastures are overgrazed, dams dry up and habitat is lost or at best degraded. Wind farms occupy a small percentage of the overall agricultural land that host them (typically less than 2% of the total land area) and allow a significant additional income stream to the involved landowners. In times of drought this can be particularly important when considering stocking rates and when to destock or rest paddocks.

It is anticipated that the Modified Project will rely on locally-sourced groundwater for most, if not all, of the water required during construction of the Modified Project, and that the existing reserves and the expected yields will be adequate. No other water users in the region are expected to be worse-off as a res.

Economic benefits

During construction, approximately 800 jobs would be created along with an additional 47 jobs during long-term operation across an estimated 30 year operational period. Using data extrapolated from the '*Wind Farm Investment, Employment and Carbon Abatement in Australia'* report prepared by Sinclair Knight Merz (SKM) in June 2012, the Original EIS estimated that the direct impact for the State and the local region during the construction phase would be approximately $856 million and $256 million, respectively during the construction phase.

The Applicant engaged Hudson Howells Pty Ltd to prepare an economic impact assessment for the Modified Project, which provides a conservative estimate of direct and indirect economic benefits that are anticipated to flow to the Local, Regional and State economies throughout the construction and operational phases. The

results are summarised in Table 22 below.

Table 22: Summary of economic impacts associated with the Modified Project

	Construction Phase (3 years)	Operations Phase (25 years)
State Level (New South Wales)	- $685.57 million of added value over entire construction period ($221.4 million per year) - 4,608 person years (FTE) of employment over entire construction period (1,488 jobs per year)	- $88.89 million of added value per year - 491 direct and indirect jobs per year
Regional Level (combined Warrumbungle, Upper Hunter and Mid-western LGAs)	- $95.47 million of added value over entire construction period ($30.83 million per year). - 712 person years (FTE) of employment over entire construction period (230 jobs per year)	- $33.8 million of added value per year - 190 direct and indirect jobs per year

The Modified Project is expected to create local employment and economic stimulus within the townships of Coolah and Cassilis and the broader Warrumbungle, Upper Hunter and Mid-western LGAs. These areas would provide accommodation, food, fuel and trade equipment and services, mostly during the construction phase.

During the operation of the wind farm, economic benefits would be less than the construction phase, focusing on monitoring and inspections, maintenance, repair and upgrade of infrastructure, much of which is likely to be provided by the local labour force.

In addition to the economic benefits associated with the operations and maintenance of the Project, while in operation the Project will deliver a range of other direct benefits via proposed benefit sharing arrangements as described in Section 6.5 below.

6.0 Stakeholder and Community Engagement

6.1 Overview

Upon acquisition of the Project in 2019 the Applicant has engaged regularly with key agencies, Associated and neighbouring landholders, and members from the broader community. This engagement will continue throughout the Modification Application process, during construction and operations, and during decommissioning at the end of operations.

A Stakeholder and Community Engagement Plan (SCEP) has been prepared to inform and support engagement activities related to the proposed changes to the Approved Project and this Modification Application (see Appendix H). Additionally, the SCEP provides more detail on the engagement undertaken, including a summary of engagement to-date, engagement action plan and summary of feedback received.

The following sections provide a summary of the engagement undertaken throughout the development of the Project, specifically the engagement and feedback received that has helped inform this Modification Application.

6.2 Engagement Undertaken – Original Approvals Phase

A range of consultation and engagement activities were undertaken by the previous developer in relation to the Project prior to and during the Original EIS/RTS phases. The key topics raised in the submissions received in relation to the Original EIS and Amended DA are summarised as follows:

- Socio-economics
- Health and safety
- Noise
- Visual
- Bushfire
- Property values
- Consultation
- Biodiversity
- Micrositing
- Traffic and transport

In response to these submissions, amendments were made to the Project to further reduce its impacts, including a reduction in the number of wind turbines. A total of 21 of the 288 turbines proposed as part of the Original EIS were removed.

The Original RTS was publicly exhibited in June/July 2017, receiving a total of 20 objections from the public. No government agencies, including councils, objected to the Project.

Consultation with a range of State and Commonwealth government agencies was undertaken during the preparation and exhibition of the Original EIS and RTS. Most of the agencies provided comment directly to DPE and all comments were addressed prior to Development Consent being granted for the Project.

6.3 Engagement Undertaken – Post-Approval Phase

Since the Development Consent was granted in March 2018, community consultation has continued to use a range of methods including one-on-one meetings where required, meetings with key stakeholders and community groups, six project newsletters distributed by email and post, fact sheets, and maintaining up-to-date information about the Project on the Project webpage.

The Community Consultative Committee (CCC) has continued to operate, with a total of seven CCC meetings held for the Project since the Applicant acquired the Project in 2019. The CCC meetings generally occur three times per year. The most recent CCC meeting was held in March 2022 to present the key observations from the pre-lodgement community consultation drop-in sessions held between 26-28 October 2021 (discussed further below).

In addition to this, the Applicant has undertaken several activities that involve direct participation from

community members, such as:

- Distribution of Project Newsletters via regular mail (all mailboxes in and around Coolah and Cassilis), email (currently there are approximately 600 online subscribers), and copies left at Coolah, Cassilis and Merriwa Post Offices.
- Consulting and sponsoring local community organisations such as the Men's Shed, a local theatre group and local sporting clubs.
- Scoping the broader Benefit Sharing Plan (BSP) for the Coolah and Cassilis communities.
- Responding to Project related enquiries regarding the provision of goods or services during construction.
- Consulting with government agencies such as Regional Development Australia and education organisations such as TAFE NSW and Country Education Foundation to explore partnership opportunities for educational programs and scholarships.
- Consulting with local and regional landholders regarding potential biodiversity offset sites as well as potential for carbon market opportunities.
- Participating in the Central West Orana REZ Industry Roundtable to share information and explore opportunities to collaborate for better community outcomes.
- Consulting with the Coolah and Cassilis District Development Groups to understand the key obstacles facing the community as well as benefit sharing opportunities.

6.4 Engagement Undertaken – Modification Application

Throughout the design review and layout optimisation process undertaken throughout 2019-21 the Applicant has continued to consult with key stakeholders and the local community in relation to the Proposed Modifications. The key activities and outcomes are set out in the sub-sections below.

6.4.1 Associated and Neighbouring Landowners

Consultation activities with Associated landowners has been undertaken via telephone, email and face-to-face meetings with representatives of the Applicant. Discussions with Associated landowners have centred around the status of the Project, timeline for delivery of the Project, construction planning and matters regarding specific landowner agreements for the Project.

The Applicant has ensured that all Associated landowners have a designated contact person for the development of the Project and regular communication with landowners is undertaken to ensure they are informed and can continue to provide valuable input into the development of the Project.

The Applicant also continues to engage and consult with all relevant landholders immediately adjacent to the Modified Site Boundary with a view to entering into neighbour agreements to enable turbines within 100 m of the property boundary, as required by the Development Consent.

The Applicant also consulted with relevant landholders along the indicative Modified Over-size/over-mass (OSOM) Haulage Route with a view to entering into option agreements for licences to enable the transport of large turbine components through constrained intersections and road sections which may involve encroachment into private property adjacent to the road reserve to facilitate OSOM vehicle turning movements.

6.4.2 Community

The Applicant has made substantial effort to share information and receive feedback on the Proposed Modifications and benefit sharing opportunities to ensure all relevant questions and concerns within the community are clearly understood and appropriately addressed. Most recently the Applicant held pre-lodgement drop-in information sessions in Coolah and Cassilis between 26-28 October 2021 to provide a

comprehensive suite of information and elicit feedback. To this end, the Applicant adopted a range of methods and undertook various activities to reach as many in the community as possible including, but not limited to, the following:

- Attendance by the Applicant at all CCC meetings
- Mail-out of Project Newsletters
- Advertisements were placed in local newspapers: Mudgee Guardian, Coolah Diary and Merriwa Ringer
- Community radio announcements (3 Rivers Radio)
- ABC Radio Upper Hunter interview with the Applicant (accessible here: https://www.abc.net.au/radio/upperhunter/programs/breakfast/coolah-windfarm/13605800)
- Regional Development Australia Orana promoted consultation activities to its network

Pre-lodgement Drop-in Consultation Sessions

In-person consultation activities took place in Coolah and Cassilis during the week of Monday 25 to Friday 29 October 2021. Semi-structured drop-in information sessions were held between 26-28 October 2021 (see Figure 22 below), and informal one-on-one discussions were held on 25 and 29 October 2021.

The Applicant engaged C7EVEN Communications and Farm Renewables Consulting to facilitate the drop-in sessions, as the Melbourne-based Project team was unable to attend the drop-in sessions due to COVID-19 travel restrictions. Where further information was required, attendees were put in contact with members of the Melbourne-based Project team via videoconference or telephone.

The drop-in sessions included live webinars (see Figure 22) that were recorded and uploaded to the Project website.

Figure 22: Pre-lodgement Community Consultation, 26-28 October 2021

A comprehensive suite of high-quality printed and digital consultation material was presented at each of the drop-in sessions, including:

- Detailed fact sheets were prepared to cover each environmental impact assessment prepared for the Modified Project, broader benefits of the Project, potential benefit sharing opportunities, and general wind farm FAQs. These were sent directly to 23 Registered Aboriginal Party (RAP) contacts, host landowners, neighbours, prior submitters, relevant councils and local Members of Parliament, and were made available in hardcopy format at the pre-lodgement drop-in sessions and via the Project webpage.
- An interactive website was built to provide the community with detailed information on the Proposed Modifications. The website included 180-degree photomontages, slider views of photomontages to illustrate the Approved vs Modified Project, an ArcGIS project map with interchangeable layers, and direct links to the fact sheets and FAQs.
- Webinars were held on each day of the pre-lodgement drop-in sessions – one on noise (delivered by

Sonus Pty Ltd), one on visual impact (delivered by Moir Landscape Architecture Pty Ltd) and one on the Project and Proposed Modifications more broadly (delivered by the Applicant). The webinars were recorded and uploaded to the Project webpage.

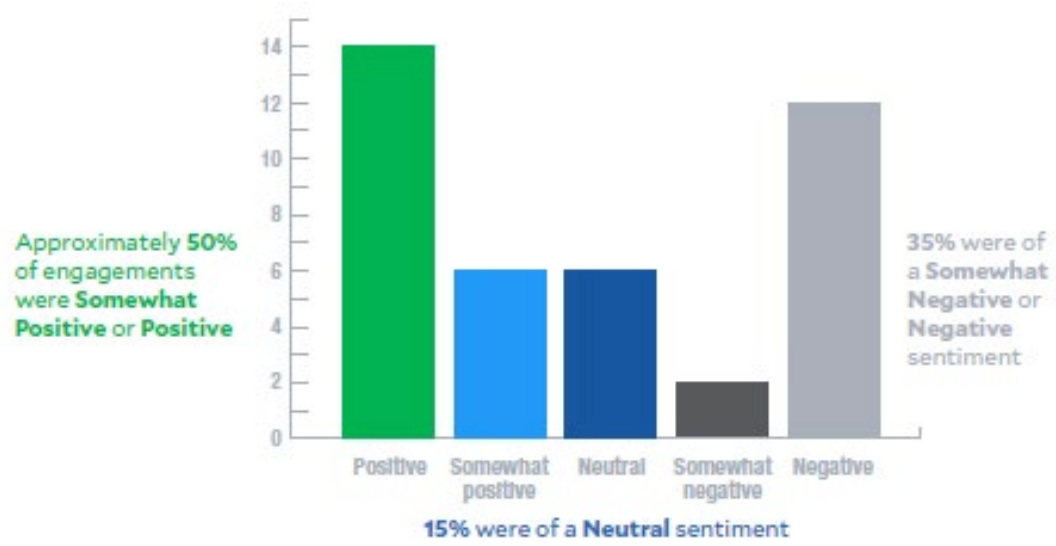
- Hard copy feedback forms were made available at each pre-lodgement drop-in session, as well as the online feedback form via the Project webpage (only five completed forms have been received thus far).

These materials are described further in the Stakeholder and Community Engagement Plan (SCEP) contained in Appendix H.

Following the consultation week, a number of follow-up activities were undertaken (including advertisements in local newspapers, leaving consultation material behind at Coolah, Cassilis and Merriwa post offices, and mail-out of a 'what we heard' newsletter in February 2022) to continue to circulate information to the community to capture anyone who was not able to attend the drop-in sessions.

A total of 86 individual consultations took place across the various engagement channels and 52 different topics were discussed with the community across the three drop-in sessions. The sentiment from the consultation sessions was generally positive (see Figure 23 below), and many residents and locals expressed keenness to see the Project commence and to see socio-economic benefits start to flow into the community.

Figure 23: Pre-lodgement consultation sentiment



Most conversations and feedback from the community centred on traffic impacts associated with construction and operation of the wind farm (23%). Community benefit topics accounted for 9% of conversations and feedback, as well as Goods and Services opportunities for local businesses also accounting for 9% of conversations. Noise and visual impacts accounted for 7% each of the topics discussed. The remaining 45% of conversations were centred on a range of matters, including biodiversity impacts, and general economic impacts.

Figure 24 below shows the number of interactions for each key topic of interest.

A summary of the key topics of interest and the Applicant's responses to each key topic is provided in Table 23 further below.

More detailed information related to the pre-lodgement drop-in sessions is provided in the Liverpool Range Wind Farm Pre-lodgement Community Consultation Report that was prepared by C7EVEN Communications, which forms an appendix to the Stakeholder and Community Engagement Plan (SCEP) (see Appendix H).

Figure 24: Summary of key topics of interest

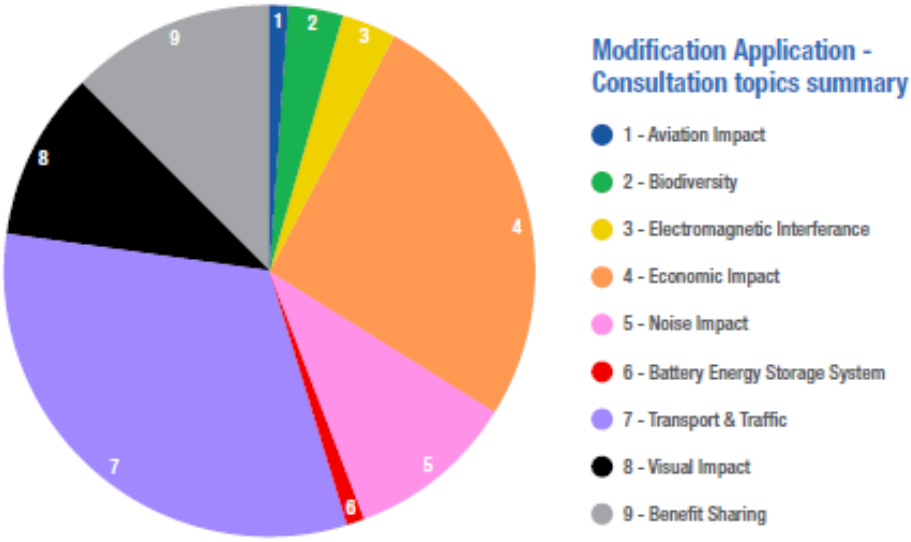


Table 23: Response to key topics of interest – Community

Topic	Response
Modification Application	
Native bird and bat impacts	***Concern was raised about potential impacts to bird and bat species, including eagles, that forage and nest in the nearby Coolah Tops National Park. Concern was also raised about the potential cumulative impacts from increasing number of wind farms proposed within the Central-West Orana REZ.*** A Bird and Bat Strike Risk Assessment has been undertaken as part of the Biodiversity Development Assessment Report (see Section 7.7and Appendix G.4). The Bird and Bat Strike Risk Assessment has been informed by substantial bird and bat utilisation surveys undertaken over multiple years and across all seasons. In addition, A Bird and Bat Adaptive Management Plan (BBAMP) will be developed for the Modified Project in consultation with DPE and BCS prior to operations, in accordance with the Development Consent. The BBAMP will set out detailed mitigation measures to minimise impacts to bird and bat species that are at risk of collision with turbines. In terms of cumulative impacts, there are no approved, under-construction or operational wind farms in proximity to the Project. As such, there is no requirement to undertake a cumulative impact assessment as part of this Modification Application. Nearby proposed wind farms, including the Valley of the Winds project to be located west of Coolah, will need to consider the cumulative impacts associated with the Project as part of the development applications for those proposed projects.
Weed control and attraction of illegal hunters	***Concern was raised about the spread of weeds and pests by vehicles entering properties during construction and operations.*** The Applicant will prepare a Biodiversity Management Plan (BMP) in consultation with BCS prior to construction in accordance with the Development Consent. The BMP will set out detailed biosecurity measures and weed management protocols that will be implemented during construction and operations.

Topic	Response
	Concern was also raised about the new improved wind farm roads might attract illegal hunters into the region. Once upgraded, the relevant public roads will be handed back to the relevant councils for ongoing management and maintenance. The Applicant has no jurisdiction or authority to restrict the use of public roads. However, all access points into the wind farm site from public roads will have lockable gates to prevent unlawful entry to the site.
Visual impact of turbines	***Concerns were raised about the efficacy of screen planting to mitigate visual impact of the wind turbines and potential visual impact along the Gundare Road Loop scenic drive. Concern was also raised about the quality and integrity of visual impact assessment.*** A detailed Visual Impact Assessment (VIA) has been prepared for the Modified Project by Moir Landscape Architects who are suitably qualified and experienced technical specialists, in accordance with the NSW Visual Assessment Bulletin (see Section 7.3 and Appendix G.1). The VIA employed a range of widely accepted methodologies and tools to holistically assess potential visual impact from Non-associated resident locations and key public viewpoint locations. The VIA compares the Approved Project and Modified Project turbine and associated infrastructure layouts, includes a detailed discussion on mitigation measures such as screen and supplementary planting, and includes an assessment of the Gundare Road Loop scenic drive including a photomontage near the intersection of Black Stump Way and Gundare Road. In addition, the Applicant is committed to providing visual impact mitigation measures in accordance with the requirements of the Development Consent.
Electromagnetic Interference	***Concerns were raised around potential electromagnetic interference with mobile communications (mobile phone and UHF radio), EPIRB safety beacons, and the 3 Rivers Radio which is transmitted from Dunedoo.*** An Electromagnetic Interference (EMI) Assessment has been prepared for the Modified Project (see Section 7.11 and Appendix G.8) which specifically addresses all of these matters. In addition, the Development Consent conditions require the Applicant to make good any disruption to any radio communications services as soon as possible following the disruption. The Applicant follows a robust Complaints Handling Procedure, available on the Applicants website, and will prepare a tailored, fit-for-purpose Complaints Management Plan for the Project. The Complaints Management Plan will include specific protocols to address any complaints regarding electromagnetic interference in accordance with the Conditions of Consent.
Proximity of turbines to residences	***A question was raised about the proposed change in location of turbines and proximity to Non-associated residences.*** The Modified Project turbine layout will result in the distance to the nearest turbine being: - reduced for 32 of the Non-associated dwellings; - increased for 23 of the Non-associated dwellings, and - remaining the same for 2 of the Non-associated dwellings Of the 32 Non-associated residences where the distance to the closest turbine will reduce, the shortest distance between a Modified Project turbine and a Non-associated residence is approximately 1,860 m (Dwelling H7-1 / Turbine F38). Despite the Modified Project resulting in turbines being located closer to some Non-associated residences compared to the Approved Project, *the distance between a turbine and the closest Non-associated residences* has not reduced.
Impacts to aerial agricultural activities	***Concerns related to potential impacts on aerial agricultural activities on adjacent properties, due to physical obstruction or wake turbulence.***

Topic	Response
	The Aviation Impact Assessment addresses these matters specifically (see Section 7.12 and Appendix G.9) and the existing Conditions of Consent require the Applicant to implement mitigation measures for situations where pre-existing aerial agricultural activities on properties immediately adjacent to the site are affected by the erection and/or operation of wind turbines. The Applicant will work with immediately adjacent landholders to implement reasonable and feasible mitigation measures to minimise impact on existing aerial spraying operations caused by the erection/operation of wind turbines, in accordance with the requirements of the Development Consent.
Operational noise	***Concerns that noise from the wind turbines would cause sleep disturbance at nearby Non-associated residences, and could impact the amenity of the nearby Coolah Tops National Park in particular for campers.*** The Predictive Noise Impact Assessment (PNIA) has been prepared for the Modified Project (see Section 7.5 and Appendix G.3). The PNIA includes predicted noise levels associated with the operation of wind turbines at all surrounding residences and at high use areas within the National Park such as campgrounds and lookouts. The PNIA concludes the highest predicted noise level from the operation of the 220 revised wind turbines layout at a Non-associated residence is 34 dB(A) (at dwellings G6-2, C5-10 and D7-6), and is therefore compliant with the applicable noise criteria. The predicted noise levels are well below the recommended day-evening-night sound pressure level of 45 dB L_{den} specified in the World Health Organisation (WHO) noise guidelines, and unlikely to cause any sleep disturbance. The PNIA also concludes that the highest predicted noise levels at lookouts, campgrounds and historic locations within the National Park are less than 35 dB(A). This is consistent with the noise level assigned to protect residential living amenity during the night and is less than the noise level which may be expected from other naturally occurring sources such as wind in trees, birds and insects at the same locations. Additionally, similarly to the electromagnetic interference, specific protocols to address any complaints regarding noise will be included in the Complaints Management Plan.
Construction noise	***Concerns were raised about the noise associated with concrete batch plants proposed near Coolah Creek Road.*** The Predictive Noise Impact Assessment (PNIA) prepared for the Modified Project predicted the noise levels of all potential concrete batch plants in operation (see Section 7.5 and Appendix G.3). The PNIA concludes that there are no Non-associated residences in proximity to Coolah Creek Road with a predicted noise level of greater than 35 dB(A). Therefore, there are no Non-associated residences near Coolah Creek Road that could be considered to be “noise affected” under the ICN Guideline, for the operation of concrete batching plant operations that may occur outside recommended standard hours.
Construction traffic noise	***Concerns were raised about construction traffic noise along Coolah Creek Road.*** The Predictive Noise Impact Assessment (PNIA) prepared for the Modified Project concludes that the noise associated with construction traffic is expected to be similar to the Approved Project, as the estimated traffic generation for the Modified Project is similar to what was estimated for the Approved Project (see Section 7.5 and Appendix G.3).
Disruptions due to public road upgrades	***Concerns were raised about traffic delays resulting from the anticipated public road upgrades, and disruption mitigation plans for State Forest Road which provides vehicular access to Coolah Tops National Park.*** During the construction of public road upgrades and on-site wind farm works, particularly in the vicinity of State Forest Road, it is anticipated that there may be some disruption to road users as is typical with any major project. The Applicant will work closely with relevant landholders, including NSW National Parks and Wildlife Service

Topic	Response
	(NPWS), to develop reasonable feasible mitigation measures to minimise disruptions and delays. To reduce disruptions to road users, the Applicant is investigating ways to condense the construction program by undertaking road upgrades concurrently with on-site wind farm construction works. The preferred approach will be determined through the detailed design phase in consultation with the relevant councils. The anticipated traffic movements and associated scheduling and mitigation measures will be detailed in the Traffic Management Plan (TMP) that will be prepared for the Modified Project prior to commencement of construction, in accordance with the Development Consent. In addition, the local community will be advised of upcoming public road upgrades through a range of communications methods so that they can factor in potential delays and plan their journeys accordingly.
External transmission line alignment	***Concern was raised about the proximity of the external transmission line to the Hands on Rock cultural heritage site off Ulan Road.*** The Modified Project adopts the vast majority of the approved transmission line alignment south of the Golden Highway. The approved transmission line alignment is located adjacent to the entrance to the Hands on Rock car park, and is in excess of 350 m from the Hands on Rock cultural heritage site. The Applicant has made all reasonable attempts to investigate alternate routes to minimise impacts at the car park entrance to Hands on Rock, including discussions with a number of private and public landowners of adjacent land parcels. As an outcome of these discussions the Applicant proposes to shift the portion of the transmission line alignment just south of the Hands on Rock car park entrance to the east onto Crown land parcels Lot 7300/DP1136299 and Lot 7008/DP1030463 to completely avoid the broader land parcel within which the Hands on Rock heritage site is located (Lot 751/DP1270886) ***A question was raised about potential impact from the transmission line alignment on an existing mining lease and existing vehicular access to a quarry business located on the eastern side of Ulan Road.*** South of the Golden Highway the Modified Project adopts the same transmission line alignment that was proposed by the Approved Project. In the location of the quarry in question, the transmission line is proposed to be located on the western side of Ulan Road, and therefore will not have any direct impacts on the existing vehicular access point to the quarry business located on the eastern side of Ulan Road.
Cumulative impact of nearby proposed wind farms	***Concern was raised about the potential cumulative impact of wind farms in the local area.*** The Applicant is aware of the Valley of the Winds wind farm project proposed approximately 10 km west of Coolah township. It is understood that the Valley of the Winds project has not yet been granted Development Consent. As such, it is inherently difficult to assess potential cumulative impacts as turbine numbers, turbine layout, and maximum blade tip height may be subject to changes through the development assessment process. As the Project has been granted development consent, it is understood that the Valley of the Winds project and any other nearby proposed wind farm proposal must assess cumulative impacts as part of the Environmental Impact Statement (EIS) that will be prepared for those projects.
Impact upon property values	***Concern was raised regarding the impact of wind farms and property values.*** Relevant impacts that may affect property values, such as visual and noise, have been considered through the updated Visual Impact Assessment and Predictive Noise Impact Assessment (see Sections 7.3 and 7.5, and Appendix G.1 and G.3 respectively).

Topic	Response
	Moreover, many studies by independent organisations around the world have failed to find a clear correlation between wind farm developments and declining property values. The most recent report, prepared by Urbis Pty Ltd in 2016, undertook a literature review of Australian and international studies on the impact of wind farms on property values which "revealed that the majority of published reports conclude that there is no impact or a limited definable impact of wind farms on property values".
Benefit Sharing	
Voluntary Planning Agreement (VPA)	***There were specific concerns raised regarding the contribution to the VPA considering the proposed reduction in turbines.*** The VPA commits $3,000 per constructed wind turbine per year to be allocated 77% to the Community Enhancement Fund (CEF) and 23% to the Road Maintenance Fund. While the Modified Project includes a reduction of turbine numbers the Applicant will review submissions made through the Modification Application process to inform whether revisions to the VPA are warranted. The Applicant is committed to contribute funds to the local communities (in addition to the VPA) that will enable the sharing of additional benefits to be realised during the construction period and in the early years of operations. This is detailed further in Section 6.5 below and in the updated Statement of Commitments in Appendix D. ***Concerns were also raised about the councils' involvement in the management of the VPA funding and whether funds would be spent in Coolah and Cassilis communities.*** While the Warrumbungle and Upper Hunter councils have casting votes on how the CEF funding is spent, the Applicant understands that funding will be allocated to the local communities and immediate region surrounding the Project site. The Applicant has consulted with community groups in the region and understands there has been significant effort made to develop community enhancement projects that cover public art, sport, health and wellbeing, tourism, environment and social inclusion. The Applicant is aware that both the Coolah and Cassilis District Development Groups have a list of proposed projects to enhance their communities. The Applicant supports the CEF funds being used to pursue these projects.
Other Benefit Sharing Opportunities	***The Coolah Men's Shed organisation was interested to see if Tilt Renewables would be interested in sponsorship opportunities.*** Following consultation, the Applicant approved the $3,000 sponsorship for the Men's Shed ute to assist in covering the cost of insurance and registration for the 2022 year. The Men's Shed acknowledged this contribution by creating a magnetic sign with the Tilt Renewables logo. A Benefit Sharing Plan will be prepared to ensure benefits of the Project are shared with the community. Ideas have been sought at all consultation events, on the Project website and within all Project material where appropriate.

6.4.3 Councils

Warrumbungle Shire, Upper Hunter Shire, and Mid-western Regional Councils have been consulted extensively throughout the preparation of the Modification Application.

Additional consultation has been held with councils along the indicative Modified OSOM Haulage Route from the Port of Newcastle, including City of Newcastle, Singleton Council and Musswellbrook Shire Council.

Since mid-2019 numerous briefing sessions have been held with the Warrumbungle, Upper Hunter and Mid-western councils to encourage deeper understanding and engagement with the Project. The key issues raised by the three councils included potential transport impacts, upgrades to council-managed roads, approach to community consultation, and benefit sharing with neighbours and the broader community, as

summarised in .

Table 24: Response to key topics of interest – Councils

Topic	Response
Proposed Modifications	In August 2020, April 2021, and October 2021 meetings were held with Warrumbungle, Upper Hunter and Mid-western Regional councils to discuss the Proposed Modifications and the proposed approach to stakeholder engagement and benefit sharing. In addition, officers from Warrumbungle Shire Council and Upper Hunter councils attend the regular CCC meetings where they have received detailed briefings on the Proposed Modifications. No major issues were raised during these consultation meetings.
Public Road Upgrades Standards	Consultation with Warrumbungle Shire, Upper Hunter Shire, and Mid-western Regional councils was undertaken from mid-2020 and through to late 2021 to discuss road upgrade standards and requirements. Following preliminary results from the Public Road Upgrade Investigation (PRUI) prepared by icubed Consulting Pty Ltd in mid-2020, meetings were held with officers from Warrumbungle, Upper Hunter and Mid-western councils to discuss the potential for optimised road upgrade standards to be applied on all relevant Local and Regional roads within each LGA. Follow-up meetings was held in early 2021 with officers from the three councils to present the key findings of the finalised PRUI. In late 2021 all three councils confirmed the preferred road upgrade standards in mid-2021, which are reflected in the discussion provided in Section 4.7.
Potential staging of road upgrades	The Applicant has also discussed with officers from the relevant road authorities (Warrumbungle Shire Council and Upper Hunter Shire Council) the potential staged delivery of public road upgrades (also referred to as works in parallel) as generally described in Section 4.8.2. The relevant road authorities were accepting of the approach as it addressed the concerns and matters the road authorities consider important with respect to the road upgrade requirements detailed in Appendix 6 of the Development Consent. The matters raised and how the indicative example addresses them are summarised below: - **Road Maintenance:** Warrumbungle Shire Council (WSC) advised that their major concern is the maintenance of the public roads that traffic associated with the Project would use. The Applicant confirmed that the maintenance obligations set out in the Development Consent would remain unchanged in the event of any proposal being made regarding the staging. The indicative works in parallel scenario presented in Section 4.8.2 above specifically states that roads used by the development during construction would be maintained by the Applicant in accordance with the Development Consent. - **Road user safety:** Discussions with both WSC and Upper Hunter Shire Council (UHSC) included an explanation of how the Applicant would ensure road user safety is maintained. The Applicant outlined that any proposal would ensure that areas where road upgrades are being undertaken and are subject to Project related traffic, would be undertaken in accordance with the relevant Section 138 (Roads Act 1993) permit issued by the road authority, and that this would include the implementation of an approved Traffic Guidance Scheme that would ensure traffic management practices are in place to ensure interactions between road users, Project related traffic and road works is safe. The benefits of a proposal similar to the indicative works in parallel scenario presented in Section 4.8.2 was also discussed with the relevant road authorities and both agreed that the benefit of a significantly reduced construction period duration provides significantly improved outcomes for the councils and their communities. The key

Topic	Response
	benefits discussed included: - Reduced duration of traffic and Project construction impacts, of approximately 30 weeks. - Extended life of fully constructed road assets – a portion of the Project related traffic will traverse the public roads whilst they are being constructed (i.e. a lower volume of construction traffic will use the fully constructed road pavements) , prolonging the expected life of the final road pavements. - Earlier delivery of 100% emissions free, renewable energy and help NSW with its transition away from its current reliance on fossil fuels.
Use and maintenance of Gundare Road	An additional meeting was held in December 2021 with Warrumbungle council officers to discuss the proposed use of the portion of Gundare Road within the Modified Site Boundary as described in Section 4.7. It was agreed that the Applicant would enter into an agreement with Warrumbungle Shire Council to construct relevant section of Gundare Road to a fit-for-purpose standard and maintain it throughout the operational life of the Project. This has been reflected in the updated Statement of Commitments (see Appendix D). The Applicant and Warrumbungle Shire Council officers are currently negotiating the terms and conditions of the draft agreement.
Indicative Modified OSOM Haulage Route	Consultation was undertaken with the following relevant councils along the indicative Modified OSOM Haulage Route between the Port of Newcastle and the Project site: - City of Newcastle - Singleton Council - Cessnock Council - Musswellbrook Shire Council (MSC) The key findings and swept path analysis contained in the OSOM Haulage Route Assessment prepared by GTA (now Stantec) (see Section 7.10 and Appendix G.7.2) were presented to each council. As the Modified OSOM Haulage Route proposes to use the State road network within the City of Newcastle, Singleton and Cessnock LGAs, no major issues were raised. Within the Warrumbungle, Upper Hunter, and Mid-western LGAs no changes to the Approved OSOM Haulage Route are proposed, and therefore no major issues have been raised during consultation with those councils. Musswellbrook Shire Council (MSC) was consulted specifically in relation to the potential use of Bengalla Road, Wybong Road and Edderton Road by tall OSOM vehicles to avoid the low height clearance bridge at Denman and potential constraints at the Golden Highway/Denman Road intersection. Bengalla Road, Wybong Road and Edderton Road are Local roads under the management of MSC. Throughout consultation MSC officers acknowledged that Denman Bridge is a significant constraint for the Project, and understood the need to use these Local roads to transport OSOM loads between Port of Newcastle and the Project site. On 26 November 2021 MSC officers advised the Applicant that the Council's State Significant Development Committee resolved to authorise council officers to object to all State Significant Development (SSD) proposals that nominate the use of local roads within the MSC LGA for transport of components to another LGA, until EnergyCo, TfNSW and DPE find a more strategic solution to managing transport issues that is acceptable to MSC. It is understood that TfNSW and MSC are currently working together to resolve this matter which is critical for the delivery of the broader Central-West Orana Renewable Energy Zone (REZ).

6.4.4 State and Commonwealth Government

The Applicant has over the course of 2020 and 2021 undertaken targeted engagement with the following State and Commonwealth agencies:

- NSW Department of Planning and Environment (DPE)
    - Crown lands
    - Biodiversity, Conservation and Science Directorate (BCS)
    - Planning Division
- NSW Transport for NSW (TfNSW)
- NSW National Parks and Wildlife Service (NPWS)
- Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW)

A response to the key issues raised by each government agencies is summarised in the following sub-sections.

Department of Planning, Industry and Environment

Crown Lands

The Applicant met with the Crown Lands Division of DPE on 5 February 2020. Following this meeting the Applicant provided the Crown Lands Division with a list of the relevant Crown land within the wind farm site boundary that may be affected by the proposed wind farm infrastructure to assist with the Division's assessment of the potential application of licensing Crown land in respect to the Project. The Applicant also provided a map to identify the location of the Crown land that intersects with the broader wind farm site. The Applicant is continuing consultation with Crown Lands Division to secure tenure as required for construction and operation over the Crown land within the Project site.

Biodiversity, Conservation and Science Directorate (BCS)

Meetings were held with BCS on 13 February 2020 and 22 October 2021 to discuss the approach to field surveys and preparation of the Modification BDAR, including biodiversity offsets, and Bird and Bat Adaptive Management Plan (BBAMP) required by the Development Consent.

The key issues raised by BCS relate to the newly proposed turbines in the northeast portion of the site and the potential impacts to fauna species that inhabit the adjacent Coolah Tops National Park. All potential impacts associated with the newly proposed turbines have been assessed in detail in the attached BDAR contained at Appendix G.4.

A subsequent pre-lodgement meeting was held on 13 April 2022 to brief BCS on the Modification Application.

No major issues have been raised during these consultation meetings.

Planning Division

The Applicant has consulted regularly with the Planning division of DPE to discuss the Proposed Modifications, most recently on 21 June 2022, and multiple times throughout 2020, 2021 and early 2022.

The discussions with the DPE have related to the level of assessment required for the Proposed Modifications, specific issues (such as biodiversity and transport), and approach to community engagement.

No major issues have been raised during these consultation meetings.

Transport for NSW (TfNSW)

The Applicant has met and liaised regularly with TfNSW to discuss the Modified OSOM Haulage Route and identified constraints along the route, including the low height clearance bridge at Denman within the

Musswellbrook LGA.

TfNSW has acknowledged the significant constraint that Denman Bridge poses to the delivery of tall OSOM loads not only for the Project, but for other projects within the Central-West Orana Renewable Energy Zone (REZ), and that it generally supports the Modified OSOM Haulage Route.

Consultation with TfNSW will continue through the modification application process, detailed design phase and throughout construction to ensure the required infrastructure upgrade works are designed and constructed in accordance with relevant standards and the necessary permits are in place.

National Parks and Wildlife Service (NPWS)

The Applicant has met with representatives from the National Parks and Wildlife Service (NPWS) on several occasions to discuss potential impacts associated with the Modified Project, in particular with regards to Coolah Tops National Park (Coolah Tops NP) located adjacent to the northeast of the Project site. The main issues raised by NPWS were as follows:

- Potential impacts associated with aerial operations within Coolah Tops NP, including baiting and fire-fighting
- Potential visual impact from key public viewpoint locations within Coolah Tops NP, such as Pinnacle Lookout, including from any aviation hazard lighting that may be required
- Potential wind turbine noise impacts at existing facilities, such as campgrounds, within Coolah Tops NP

The issues raised have been addressed in the Aviation Impact Assessment (contained at Appendix G.9), the Visual Impact Assessment (contained at Appendix G.1) and the Predictive Noise Impact Assessment (contained at Appendix G.3) that have been prepared for the Modified Project.

No major issues have been raised during these consultation meetings.

Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW)

The Applicant met with officers from DCCEEW on 16 July 2020 and 30 November 2021 to discuss the key changes to the Approved Project. The key matters raised were:

- Expectation that the Modified Project will undertake additional field surveys relating to Matters of National Environmental Significance (MNES) protected by the EPBC Act, in particular for koala, regent honeyeater, swift parrot and grey falcon.
- The Birdlife record of grey falcon within the wind farm site was raised, with an expectation that the Modified Project would consider it.
- The survey approach for the Modified Project was discussed in relation to the application of BAM and priority of threatened species surveys in areas where the Modified Project was substantially different from the Approved Project.
- A re-referral for the Modified Project under the EPBC Act was considered the most suitable option due to the extent of proposed changes to the Approved Project and the lack of any formal modification mechanism under the EPBC Act.

All key issues raised by DCCEEW have been addressed by the Modified Project, and are detailed in the Biodiversity Development Assessment Report (see Appendix G.4). A re-referral for the Modified Project under the *Environment Protection and Biodiversity Conservation Act 1999* is currently being finalised, and will be lodged with the DCCEEW in due course.

6.5 Benefit Sharing

The Applicant is committed to sharing the benefits generated by the Project with the local communities in and around where the Project is located. A tailored Benefit Sharing Plan (BSP) is being prepared for the

Project. The Plan will endeavour to capture the needs of the community by seeking their input in its development.

The objectives of the BSP are to:

- Ensure that the immediate communities directly benefit from the presence of the Project in their communities;
- Contribute towards broader public benefits and economic development that address the needs of the region throughout the lifecycle of the Project;
- Build on strategic opportunities to drive local innovation; and
- Create a legacy beyond the immediate benefits of the Project.

A key program within the BSP will include the funds as outlined within the formal Voluntary Planning Agreement (VPA) (which has been entered into with both Warrumbungle and Upper Hunter Councils). The VPA currently involves a contribution by the Project of $3,000 (increased by CPI) per installed turbine per year (or a minimum of $100,000) to each Council (77% towards a Community Enhancement Fund and 23% for a Road Maintenance Fund) from the commencement of construction.

Other benefit sharing activities will include neighbour benefit programs and local employment opportunities, whilst the Applicant will develop in addition to the development of other tailored local, regional and educational programs to address the above listed objectives of the BSP, as well as contributions through any REZ access schemes.

The BSP will be prepared in consultation with the CCC, the Coolah and Cassilis District Development Groups, Chambers of Commerce, along with broad consultation with the overall community, in order to identify areas of need and opportunities.

So far, the Applicant is investigating a regenerative farming program through a workshop to identify the interest in establishing a carbon farming cooperative in the immediate region. In addition to this, the Applicant has also been in consultation with the District Development Groups to understand priority community driven projects to improve social cohesion, health and wellbeing, education and tourism.

The programs developed in addition to the VPA will enable the sharing of additional benefits to be realised during the construction period and in the early years of operations. Should all 220 turbines be constructed, the financial benefit sharing commitments would equate to approximately $1.2 million per annum during the construction period (including the VPA), approximately $1.2 million per year for the first 5 years of operations (including VPA and other commitments), and approximately $800,000 per year (through the VPA) for the rest of the life of the Project. If the Project is staged, so will the programs within the BSP.

7.0 Modification Environmental Assessment

7.1 Overarching assessment approach

7.1.1 Overview

This section summarises the key findings of the detailed technical assessments carried out by suitably qualified specialists on the environmental impacts of the Modified Project, and includes an assessment of the potential change in impacts associated with the Modified Project compared with the Approved Project. This Environmental Assessment has taken into consideration the relevant environmental issues identified in the Original EIS/RTS.

Following an assessment of potential risks associated with the Modified Project, the following environmental aspects were identified as requiring further detailed assessment:

- Visual Impact
- Shadow Flicker and Blade Glint
- Electromagnetic Interference (EMI)
- Noise
- Biodiversity: impacts to native vegetation
- Biodiversity: bird and bat impacts
- Aboriginal Cultural Heritage
- Historic (Post-contact) Heritage
- Traffic and Transport
- Aviation Impacts

On 18 December 2020 the Applicant submitted to DPE a letter detailing the intent to modify the development consent, which outlined a broad summary of the proposed modifications, the key potential risks, and assessment approach. In its response letter dated 2 February 2021 DPE confirmed that they were satisfied with the level of assessment proposed which specifically included the specialist studies listed above, and requested that the following matters are specifically addressed: [23]

- comprehensive impact assessment of the proposed new wind turbine locations;
- aviation hazard risk assessment based on the proposed turbine tip heights and locations;
- justification for the additional site access points and wider internal access tracks; and
- justification for the increase in disturbance areas and impacts on biodiversity values.

It is important to note that the battery energy storage facility referenced in DPE's letter dated 2 February 2021 is no longer proposed as part of the Modification Application, and therefore a Preliminary Hazard Analysis (PHA) is no longer required.

All of the abovementioned matters have been addressed in this Modification Report and within the relevant environmental impact assessments contained in Appendix G. The following sub-sections provide a high level summary of the key findings of the environmental impact assessments.

7.1.2 Key Turbine Assumptions

A suite of environmental impact assessments have been prepared by suitably qualified specialists that assess the quantum of change in potential impacts between the Approved Project and the Modified Project. For the purpose of this Modification Application the environmental impact assessments have assessed more realistic impact scenarios. For example, the noise impact assessment conservatively assumed that the ultimate turbine model selected was one of the least quiet models currently available on the market, whilst

[23] In its response letter DPE also requested a Preliminary Hazard Analysis (PHA) to be prepared for a utility-scale battery energy storage system (BESS) that was initially proposed to be included as part of this Modification Application. As the utility-scale BESS is no longer proposed, a PHA is no longer required and therefore has not been prepared.

the operational bird and bat assessment is based on the largest rotor diameter for the turbine models which are currently being considered. Accordingly, the environmental impact assessments adopt different turbine parameters in order to assess a worst-case impact scenario associated with the Modified Project, as summarised in Table 25 below.

Table 25: Indicative turbine parameters adopted by environmental assessments

Environmental Assessment	Adopted Turbine Parameter
Visual Impact Assessment (Moir Landscape Architecture Pty Ltd)	Blade tip height: 250 m AGL Hub height: 160 m Blade length: 90 m / Rotor diameter: 180 m
Bird and Bat Turbine Strike Assessment (part of the BDAR) (Umwelt Pty Ltd)	Blade tip height: 250 m AGL Hub height: 145 m Blade length: 105 m / Rotor diameter: 210 m Blade ground clearance height: 40 m
Predictive Noise Impact (PNIA) Assessment (Sonus Pty Ltd)	Blade tip height: 250 m AGL Hub height: 150m Nominal turbine model: GE 158 5.5 MW
Electromagnetic Interference (EMI) Assessment (WSP Pty Ltd)	Blade tip height: 250 m AGL Hub height: 150 m Blade length: 100 m / Rotor diameter: 200 m
Shadow Flicker Assessment (WSP Pty Ltd)	Blade tip height: 250 m AGL Hub height: 150 m Blade length: 100 m / Rotor diameter: 200 m Blade chord width: 5.5 m
OSOM Haulage Route Assessment (GTA Consultants, now Stantec)	Longest load: 90 m (wind turbine blade) to assess worst-case vehicle swept path movement Tallest combined load: 5.7 m (wind turbine blade) to assess vertical constraints Widest combined load: 5.0 m (base tower section) to assess horizontal constraints Heaviest combined load: 235 tonne (transformer) to assess potential structural constraints

Additionally, to adequately assess the potential change in impacts compared with the Approved Project a number of project iterations (and their corresponding environmental assessment) have been considered, i.e. the Original EIS, Original RTS, Approved Project and Modified Project.

The environmental impact assessments prepared in support of the Original EIS/RTS reflected and assessed the Project as it continued to evolve in response to ongoing assessment and consultation and accordingly made different infrastructure assumptions, to ensure that a 'worst case' but realistic assessment was carried out.

For example, the Original EIS assessed a 288 wind turbine layout but by the time the RTS was prepared the Project was reduced to 282 wind turbines which were assessed in the RTS. As 267 wind turbines were ultimately approved under the Development Consent, no environmental impact assessments were prepared for the reduced 267 wind turbine layout. As such, to quantify and assess the differences between the Approved Project (consisting of 267 wind turbines) and the Modified Project (consisting of 220 wind turbines), different comparison strategies have been undertaken in this Modification Application.

A summary of the different project iterations is provided below:

- **Original EIS Project:** A 288 wind turbine project, with a maximum blade tip height of 165 m AGL. However, following DPE's assessment process a number of revisions were made to reduce the potential impacts.
- **Original RTS Project:** A 282 wind turbine project, with a maximum blade tip height of 165 m AGL. The number of turbines was reduced during the RTS phase due to community and regulator feedback.
- **Approved Project:** A 267 wind turbine project, with a maximum blade tip height of 165 m AGL. The Development Consent limited the maximum wind turbines to 267. No environmental impact assessments were undertaken for the reduced 267 wind turbine layout at the time of approval. Wherever relevant and practicable the environmental impact assessments prepared for the Modified Project have re-baselined the Approved Project to enable a comparison of potential environmental impacts (e.g. shadow flicker, traffic and transport, etc.) and construction material assumptions between the Approved Project and Modified Project.
- **Modified Project**: A 220 wind turbine project, with a maximum blade tip height of 250 m AGL. The Proposed Modifications are described in Section 4.0.

Table 26 below details where the Proposed Modifications would result in a potential change in impacts compared to the Approved Project, if further assessment is required as part of the Modification Application, and how they will be addressed.

The methodologies and key findings of each of the environment impact assessments prepared in support of this Modification Application are summarised in the sub-sections below. Each environment impact assessment is included at Appendix G.

Table 26: Assessments Required to Address Potential Change in Environmental Impact

Environmental Issue	Potential for Change in Impacts	Assessment of Proposed Modifications Required	Addressed By	
Visual Impact	**Yes.** The proposed use of larger turbines have the potential to result in increased visual impact. The proposed reduction in turbine numbers may reduce the extent of potential visual impact. The potential use of transmission line towers was proposed as part of the Approved Project and permissible under the Development Consent, however the potential visual impact was not specifically assessed. Consideration should be given to undertaking a visual impact assessment of transmission line towers as part of the Modified Project. The character of the landscape remains the same as when the Approved Project was approved and therefore does not need to be re-assessed for the Modified Project.	**Yes.** Updated assessment required.	**Visual Impact Assessment (VIA)** completed by Moir Landscape Architecture Pty Ltd for the wind farm and transmission line.	Summarised in Section 7.3 and provided in full in Appendix G.1.
Shadow Flicker	**Yes.** The proposed use of larger turbines and reduction in turbine numbers affect the assessment assumptions and may result in a change in shadow flicker impacts.	**Yes.** Updated assessment required.	**Shadow Flicker Assessment (SFA)** completed by WSP Pty Ltd for the wind farm.	Summarised in Section 7.4 and provided in full in Appendix G.2.
Noise	**Yes.** The proposed use of larger wind turbines has the potential to result in increased noise impacts. The reduced wind turbine numbers and varied hub height also affect the noise modelling assumptions of the previous assessment. The change in potential locations for substations and temporary concrete batch plants may result in a change in potential noise impacts. Construction traffic volumes and construction equipment anticipated for the Modified project are expected to be similar to the Approved Project and no greater noise impacts are anticipated. Therefore, construction traffic noise and general construction noise (excluding concrete batch plant noise) does not need to be re-assessed for the Modified Project.	**Yes.** Updated assessment required for operational turbine, substation, and construction noise associated with concrete batch plants.	**Predictive Noise Impact Assessment (PNIA)** completed by Sonus Pty Ltd for noise related to wind turbines, substations, and temporary concrete batch plants.	Summarised in Section 7.5 and provided in full in Appendix G.3.

Environmental Issue	Potential for Change in Impacts	Assessment of Proposed Modifications Required	Addressed By	
Biodiversity (Vegetation/habitat)	**Yes.** The proposed reduction in wind turbine numbers and changes to the infrastructure layout, and inclusion of ground disturbance required for the anticipated public road upgrades may affect the previous native vegetation clearing assumptions and impact assessments for threatened species. Offset commitments and clearing limits that were approved require updating to reflect the revised Biodiversity Assessment Method (BAM) assessment methodology under the *Biodiversity Conservation Act 2016* (BC Act).	**Yes.** Updated field survey, impact assessment, and offset calculations are required.	**Biodiversity Development Assessment Report (BDAR)** completed by Umwelt Pty Ltd for the wind farm, transmission line and public road upgrades.	Summarised in Section 7.6 and provided in full in Appendix G.4.
Biodiversity (Bird and Bat)	**Yes.** The proposed use of larger wind turbines and reduction in turbine numbers may affect the potential bird and bat collision risk assessment assumptions.	**Yes.** Updated risk assessment required.	Risk assessment forms part of the BDAR completed by Umwelt Pty Ltd for the wind farm.	Summarised in Section 7.7 and provided in full in Appendix G.4.
Aboriginal Cultural Heritage	**Yes.** The proposed reduction in wind turbine numbers and changes to the infrastructure layout, and inclusion of ground disturbance required for the anticipated public road upgrades may result in a change in potential impact to Aboriginal cultural heritage values.	**Yes.** Updated field survey and assessment required.	**Aboriginal Cultural Heritage Assessment (ACHA)** report completed by Umwelt Pty Ltd for the wind farm, transmission line and public road upgrades.	Summarised in Section 7.8 and provided in full in Appendix G.5.
Historic (Post-contact) Heritage	**Yes.** The proposed reduction in wind turbine numbers and changes to the infrastructure layout, and inclusion of ground disturbance may result in a change in potential impact to historic heritage values.	**Yes.** Updated field survey and assessment required.	**Historic Heritage Assessment (HHA)** completed by Umwelt Pty Ltd for the wind farm, transmission line and public road upgrades.	Summarised in Section 7.9 and provided in full in Appendix G.6.
Traffic and Transport	**Yes.** The identification of an indicative Modified Over-size/over-mass (OSOM) Haulage Route, changes to the turbine numbers and infrastructure layout, inclusion of new and micro-sited site access points, and potential for sequenced delivery of road upgrades, affect the assessment assumptions and may result in a change in potential impacts to the safety and efficiency of the public road network. Identified locations along the indicative Modified OSOM Haulage Route where ground disturbing upgrade works are	**Yes.** Updated assessments required.	**OSOM Haulage Route Assessment** completed by GTA Consultants (now Stantec) **Traffic Impact Assessment (TIA)** completed by GTA Consultants (now Stantec) **Ecology Due Diligence Assessment – OSOM Haulage Route** completed by Umwelt Pty Ltd	Summarised in Section 7.10 and provided in full in Appendix G.7.1, G.7.2, G.7.3 and G.7.4

Environmental Issue	Potential for Change in Impacts	Assessment of Proposed Modifications Required	Addressed By	
	anticipated to be required may result in potential ecology and heritage impacts.		**Heritage Due Diligence Assessment – OSOM Haulage Route** completed by Umwelt Pty Ltd	
Electromagnetic Interference	**Yes.** The proposed use of larger turbines and reduction in turbine numbers affect assessment assumptions and require further assessment.	**Yes.** Updated assessment required.	**Electromagnetic Interference (EMI)** Assessment completed by WSP Pty Ltd.	Summarised in Section 7.11 and provided in full in Appendix G.8.
Aviation	**Yes.** The proposed use of larger turbines and reduction in turbine numbers affect assessment assumptions and require further assessment.	**Yes.** Updated assessment required.	**Aviation Impact Assessment (AIA**) completed by Aviation Projects Pty Ltd.	Summarised in Section 7.12 and provided in full in Appendix G.9.
Fire and Bushfire	**No.** for the most part, the Modified Project does not differ in terms of ignition risks or management strategies to combat fire.	**No**	N/A	N/A
Blade Throw	**No.** The Modified Project does not differ in terms of blade throw risks. Any potential change to blade throw distance due to increased size of blades is considered likely to be offset by their increased weight. Risk remains low and strategies remain justifiable in this context.	**No**	N/A	N/A
Water supply, water quality and hydrology	**Yes.** Changes to water requirements that may result from the Modified Project is described in Appendix A. This issue is considered in the context of the changes in design assumptions for the proposed Modified Project.	**No**	N/A	Further detail provided in Appendix A.
Soils and landforms	**Yes.** The Modified Project will require additional ground disturbance than was estimated for the Approved Project. The requirement for cement, sand and aggregates is likely to increase due to the changes to wind farm infrastructure (e.g. increase in wind turbine footing size). This issue is considered in the context of the changes in design assumptions for the proposed Modified Project.	**No**	N/A	Further detail provided in Appendix A.

Environmental Issue	Potential for Change in Impacts	Assessment of Proposed Modifications Required	Addressed By	
Climate and air quality	**No.** The Modified Project will result in a change to the anticipated renewable generation capacity. These changes, and ongoing policy developments in relation to climate change, make it appropriate to provide an update on the climate impacts of the Modified Project. This is considered a project benefit and included in Section 5.0. The Modified Project does not affect the assumptions regarding health impacts and air quality impacts related to dust generation**.**	**No**	N/A	Further response provided in Section 5.0.
Mineral and petroleum exploration	**No.** Only minor changes are proposed to the Approved Site which will not impact on additional exploration licences.	**No**	N/A	N/A
Social and economic impacts	**Yes**. The Proposed Modification results in some changes to the economic impacts of the Project. This issue is considered as a project benefit and in the context of a topic of interest for the community. .	**No**	N/A	Further detail provided in Sections 5.4 and 6.0.
Property values	**No.** Concerns regarding property values were raised during consultation regarding the Proposed Modification. The Modified Project does not affect the assumptions regarding property value impacts. Issues that may affect property values such as visual and noise impacts are considered above. This issue is considered in the context of stakeholder and community engagement.	**No**	N/A	Further response provided in Section 6.0.

7.2 Turbine Movements and Non-associated Residences

[insert]

The revised turbine layout proposed by the Modified Project will result in either turbines being located closer or further away from Non-associated residences as follows:

- 25 Non-associated residences within 5 km of a turbine where the closest turbine is now located further than was proposed by the Approved Project (see Figure 3 and Appendix C.2). At 14 of these Non-associated residences the nearest turbine has shifted further away by between 200 and 622 m.
- 34 Non-associated residences within 5 km distance of a turbine where the closest turbine is now located closer than was proposed by the Approved Project (see Figure 3 and Appendix C.2). The Non-associated residences where at least one proposed turbine has been shifted closer and the distances the turbine has shifted are listed in Table 27 below.

Table 27: Non-associated residences where a Modified Project turbine is located nearer

Distance closer (m)	Number of Non-associated residences	Non-associated residences
0-99	25	G6-2,G6-4,C6-3,G6-3,H6-2,H6-3,D7-4,C5-9,D7-3,C6-4,C5-6,C7-1,H6-1,D7-7,C5-4,E7-1,B6-11,H8-1,E7-2,C5-5,B6-9,B6-8,B6-7,C5-3,2*
100-199	4	F2-3, F2-4, F2-2, F2-5
200-399	0	N/A
400-799	1	F9-1
800-1599	1	G2-1
1600-1900	3	11*, 12*, 13*
TOTAL	**34**	

** Note: these Non-associated dwellings were identified for the Modified Project and were not assessed as part of the Original EIS/RTS.*

The key impacts associated with one or more turbines shifting closer to a Non-associated residence are likely to relate to a visual impact and operational noise impacts, both of which are considered in detail in the Visual Impact Assessment (prepared by Moir Landscape Architecture Pty Ltd) (see Appendix G.1) and the Predictive Noise Impact Assessment (prepared by Sonus Pty Ltd) (see Appendix G.3) for the Modified Project and summarised in the following sub-sections.

7.3 Visual Impact Assessment

7.3.1 Approach

A Visual Impact Assessment (VIA) (contained at Appendix G.1) was prepared by Moir Landscape Architecture Pty Ltd (MLA) to assess the change in potential visual impact between the Approved Project and the Modified Project, and wherever relevant, to recommend appropriate mitigation strategies to minimise identified potential visual impacts.

The Wind Energy Guidelines (DPE, 2016a) state:

"…The consent authority will give consideration to the acceptability of impacts on landscape values and the amenity of landholders and community, and the adequacy of the measures which are proposed to avoid, reduce or otherwise manage these impacts, having regard to the Visual Assessment Bulletin."

Accordingly, the VIA was prepared with regard to the *NSW Wind Energy: Visual Assessment Bulletin for State significant wind energy development* (DPE, 2016b) (the Visual Assessment Bulletin) wherever relevant to the Modified Project [24].

The VIA was also undertaken having regard to with the relevant conditions of the Development Consent that relate to visual impact as outlined in Table 28.

Table 28: Relevant Visual Impact Conditions

Development Consent Condition	Description
Condition 1 of Schedule 3 (Visual Impact Mitigation)	This Condition requires that mitigation measures (such as landscaping and vegetation screening) are made available to the following residences to minimise visual impact: - non-associated residences that would have moderate or moderate/high visual impacts, which are: C4-2, C4-3, C4-4, C5-1, C5-2, C5-3, C5-4, C5-5, C7-2, D7-1, D7-7, E7-1, E7-2 and 121 Cooinda Road located within Zones L2, L3 and L4 between 4 km and 5 km of a turbine); and - all non-associated residences located within 4 km of any turbine.
Condition 2 of Schedule 3 (Visual Appearance)	This Condition outlines general controls to minimise the off-site visual impacts of the Project, in particular the visual appearance of turbines and ancillary infrastructure.
Condition 3 of Schedule 3 (Lighting)	This Condition outlines the requirements for lighting to minimise off-site impacts. The Condition requires that any aviation hazard lighting must comply with CASA requirements.

The VIA focuses on the observable differences between the Modified Project and Approved Project, and compares the findings of the previous Landscape and Visual Impact Assessment (and Addendum) prepared by Green Bean Design Pty Ltd in 2014 (and 2017) in support of the Original EIS/RTS.

A comparison of the indicative wind turbine dimensions for the Approved Project and Modified Project used to assess 'worst case' impact scenarios is shown in

Figure 25 and outlined in Table 29 below.

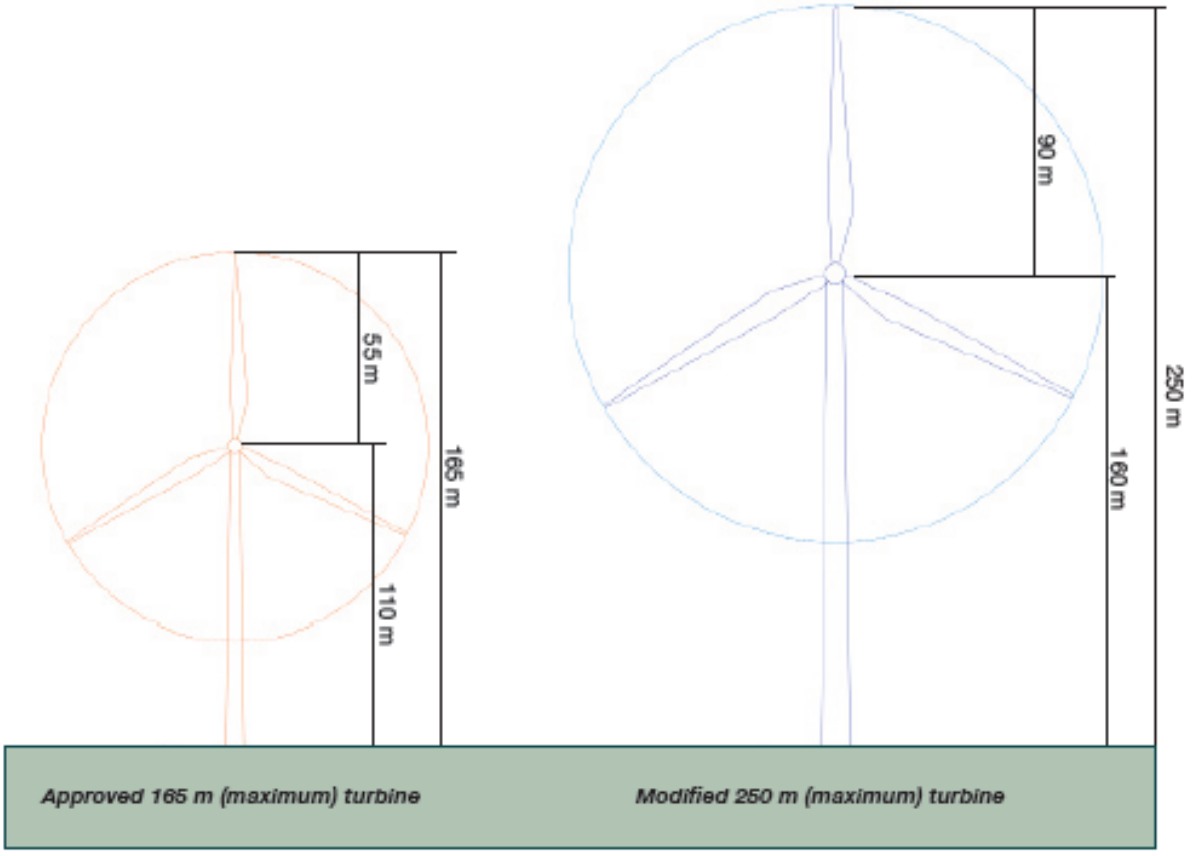
Proposed changes to the layout of ancillary infrastructure are summarised in Section 4.4.4.

[24] Stage 1 and 2 of the Visual Assessment Bulletin were not addressed as they relate specifically to non-consented projects.

Table 29: VIA Indicative Turbine Dimensions

Turbine Design Component	Approved Project [25]	Modified Project	Extent of Change	Percentage difference
Number of turbines	267	220	-47	-17%
Tip height	165 m	250 m	+85 m	+52%
Modelled hub height	110 m [26]	160 m	+50 m	+45%
Modelled rotor diameter	110 m [27]	180 m	+70 m	+64%

Figure 25: VIA Indicative Wind Turbine Dimensions Comparison



25 The LVIA prepared by Green Bean Design (GBD) in 2014 for the Original EIS assessed 288 turbines. It is unclear how many turbines were assessed by GBD in the Addendum report prepared in 2017 for the Original RTS. The VIA prepared by Moir Landscape Architecture Pty Ltd (MLA) in support of this Modification Application undertook an assessment of the 267 turbine layout approved under Development Consent SSD 6696. To model a worst-case comparison between the Approved Project and Modified Project, the VIA prepared by MLA for this Modification Application assumes a higher hub height and reduced rotor diameter than was assessed in the Addendum report prepared by GBD in 2017 for the Original RTS.

26 The Addendum report prepared by GBD in 2017 for the Original RTS assessed a 101 m hub height.

27 The Addendum report prepared by GBD in 2017 for the Original RTS assessed a 130 m rotor diameter.

In accordance with the Visual Assessment Bulletin a range of methodologies were used to undertake a comparative analysis of the potential visual impacts associated with the Approved Project and Modified Project, including the following:

- Zone of Visual Influence (ZVI) modelling showing the increase/decrease in the extent of theoretical visibility of the Project.
- Application of the Visual Magnitude Thresholds tool which determines the distances from turbines within which more focused assessment is required of the potential visual impacts of wind turbines, referencing the 'black line' and 'blue line' of visual magnitude.
- Comparison of distance to nearest wind turbine and number of visible turbine hubs and blade tips when viewed from Non-associated residences within 4,950 m of a proposed turbine (i.e., the combined 'black line' and 'blue line' of visual magnitude).
- An analysis of the number of visible turbines in each of the 6 x 60 degree sectors (i.e. within a 360 degree view) around each Non-associated residence location within the 'black line' and 'blue line' of visual magnitude was undertaken for the Modified Project and the Approved Project turbine layouts and configurations.
- Graphic representations (wire frame diagrams and photomontages) comparing the wind turbines proposed by the Approved Project and Modified Project, when viewed from representative Non-associated residence locations within the 'black line' and 'blue line' of visual magnitude and from selected public viewpoint locations, including various public roads and Coolah Tops National Park.
- Detailed ground-truthing surveys of Non-associated residences located within the 'black line' of visual magnitude to identify key views from residences and existing intervening structures, vegetation, or topography that may influence potential visual impact.
- Development of visual impact ratings at all relevant Non-associated residences within the 'black line' and 'blue line' of visual magnitude, and comparison against the visual impact ratings developed for the Approved Project.

In accordance with the Visual Assessment Bulletin an assessment of cumulative visual impact associated with nearby wind farms is not required, as there are no approved, under construction or operating wind farm projects within 8 km of the Project site. The nearest approved, under construction or operating wind farm projects are located approximately 90 kms from the Project site (see Section 3.2.2). The VIA prepared by Moir Landscape Architecture (MLA) for the Modified Project undertook a preliminary review of the Valley of the Winds Wind Farm project proposed to be located approximately 11 km west of the Liverpool Range Wind Farm project, west of Coolah township. The Valley of the Winds Wind Farm project is in a preliminary design stage, and recently completed public exhibition. Approval has not yet been granted. In accordance with the Visual Assessment Bulletin, a cumulative impact assessment is not required as the Valley of the Winds Wind Farm project is located in excess of 8 km away and is not an existing operational wind farm or has been granted approval.

7.3.2 Assessment

Original EIS/RTS

The Landscape and Visual Impact Assessment (and Addendum) prepared by Green Bean Design Pty Ltd (GBD) in 2014 (and 2017) in support of the Original EIS/RTS determined that the Project would result in visual impact ratings ranging from Low to Moderate/High at nearby Non-associated residence locations.

Considering issues raised in public submissions and the Original RTS, in its Assessment Report DPE identified visual amenity as a key impact of the Project and concluded that:

- As a result of the varying landscape characteristics and proximity to residences the landscape to the

south and west of the site has a higher sensitivity.

- The reduction in turbines from 288 (proposed in the Original EIS) to 267 would result in a reduced visual impact on the landscape values at some Non-associated residences.

DPE in its assessment report generally agreed with the conclusions of the LVIA (and Addendum) prepared by GBD in 2014 (and 2017), in particular considered that:

- No Non-associated residences have the potential to experience high visual impacts from the Project.
- 1 x Non-associated residence (i.e., C4-8) [28] has the potential to experience moderate/high visual impacts.
- 22 x Non-associated residences have the potential to experience moderate visual impacts, all of which are located in either Zone L2, L3 or L4 to the south and west of the project site.
- Visual impact from public viewpoint locations such as public roads would not be significant.
- Potential views of the ancillary infrastructure (e.g., collection substations, connection substation, transmission line and cabling), would be limited to road users and a number of rural residences, mostly on either side of the proposed 330 kV transmission line.
- Due to distance and intervening topography, no Non-associated residences would have views of either the connection or collector substations.
- The transmission line is unlikely to have a significant visual impact on both landscape character and individual residences and is not inconsistent with other land uses in the area which include existing transmission lines, and agricultural and mining infrastructure.
- Five of the 22 non-associated residences (C4-4, C4-5, C4-9, D5-3, D7-4) assigned a moderate visual impact rating objected to the Project due to visual impacts.
- Visual impact mitigation measures should also be offered to the 14 non-associated residences located between 4 km and 5 km of a turbine that are predicted to experience moderate visual impacts from the Project.

Following the DPE's recommendation, the Development Consent was granted for a 267 wind turbine project subject to conditions to further minimise and mitigate impacts on visual amenity to nearby Non-associated residences.

Proposed Modifications

The VIA prepared by MLA for the Modified Project includes photomontages to illustrate the different indicative turbine layouts and parameters proposed by the Modified Project and Approved Project from 18 representative public viewpoint locations surrounding the Wind Farm Site. In addition one photomontage was prepared to illustrate the potential use of lattice towers along the external transmission line (near Summerhill Road), which was provided in the original LVIA prepared by GBD. The locations were selected to represent a range of distances and view angles to illustrate the potential influence of distance on visibility of turbines and transmission line towers. All photomontages are contained in the VIA in Appendix G.1.

In addition, the VIA includes a detailed assessment of potential visual impacts for all 12 Non-associated residences located within 3,350 m of a proposed turbine (i.e. the 'black line' of visual magnitude). This assessment was informed by both a ground-truthing survey of each viewpoint including intervening vegetation, topography or structures, and the preparation of photomontages and wire frame diagrams

[28] Residence C4-8 has since been designated as an Associated residence, as a Neighbour Agreement has been entered into with the Applicant.

wherever relevant. The detailed 'black line' visual impact assessment is set out in Appendix D of the VIA (see Appendix G.1).

The VIA also includes an assessment of potential visual impact associated with aviation hazard night lighting. The VIA acknowledges the Project site is located within a designated Dark Sky region related to the Siding Spring Observatory and is adjacent to Coolah Tops National Park, and that the Aviation Impact Assessment prepared for the Modified Project concludes that aviation hazard lighting is not warranted (see Appendix G.9).

The key conclusions of the comparative analysis of potential visual impact associated with the Modified Project and the Approved Project as follows:

- An increase to the 'black line' of visual magnitude from 2,200 m to 3,350 m (increase of 1,150 m). An additional 10 Non-associated residences are located within the 'black line' of visual magnitude (total=12). A detailed private view analysis was completed for these 12 Non-associated residences, involving site visits and preparation of photomontages and wire frame diagrams. Landholder consent to access was granted at 9 of the 12 properties. The key findings of this analysis are as follows:
    - The majority of Non-associated residences are likely to have very limited or no views to the Modified Project due to topography and / or other screening factors such as vegetation.
    - As a result, the visual impact rating at 10 of the 12 Non-associated residences has been reduced.
    - The visual impact rating at two Non-associated residences (C6-3 and C6-4) remain unchanged from the findings of the desktop assessment as no access was granted to enable a detailed site inspection.
- An increase to the 'blue line' of visual magnitude from 3,300 m to 4,950 m (increase of 1,650 m). An additional 36 Non-associated residences are located within the 'blue line' of visual magnitude (i.e. between 3,350 m – 4,950 m of a turbine) (total=45). [29]
- Excluding the 10 Non-associated residences located within the 'black line' of visual magnitude where visual impact ratings have now been reduced, there are no changes to the visual impact ratings at all other Non-associated dwellings within the 'black line' or 'blue line' that were previously assessed as part of the Original EIS/RTS.
- Five additional Non-associated residences are located within 4,950 m of a turbine proposed by the Modified Project that were not previously assessed in the Original EIS/RTS have now been assessed as Very Low (ID: 12 and 13), Low to Medium (ID: 1 and 11), Medium (ID: 2).
- Changes to the turbine layout and dimensions proposed by the Modified Project would be discernible from some surrounding and proximate view locations. Overall, the number of visible wind turbine hubs and blade tips (as modelled) would be subject to marginal increases and decreases from Non-associated residences within 4,950 m of a turbine proposed by the Modified Project:
    - 30 Non-associated residences are likely to have increased number of turbines visible.
    - 25 Non-associated residences are likely to have a reduced number of turbines visible.
    - Two Non-associated residences are likely to have no variation in the number of turbines visible.
- The key findings associated with the 8 x relocated turbines in the North East Turbine Cluster are as follows:
    - A total of five Non-associated residences (F2-1, F2-2, F2-3, F2-4, and F2-5) have an additional 60

[29] Two residences (C4-8 and E2-1) previously assessed as Non-associated as part of the Original EIS/RTS are now Associated residences as Neighbour Agreements have been entered into with the Applicant.

degree sector with one or more turbines visible.

- There is no increase to visual impact ratings at any Non-associated residence.
- Views to the Modified Project from nearby Coolah Tops National Park are limited by existing vegetation which surrounds most picnic areas and campgrounds. Views to the North East Turbine Cluster are likely to be available from Pinnacle Lookout (see Photomontage 12 in the VIA report), but the degree of impact is minimal. The key landscape features and scenic quality of the view from the lookout will remain largely undisrupted as the visible turbines will occupy a very small extent of the overall view (up to 15 degrees).

- Potential visual impact associated with ancillary infrastructure associated with the Modified Project would be low due to their location relative to existing residences together with the screening influence of the surrounding topography and vegetation. Changes to ancillary infrastructure proposed by the Modified Project would not result in any additional visual impact compared to the Approved Project.

A summary of the key findings related to potential visual impact of turbines at Non-associated residences is provided in Table 30 below.

The visual impact ratings at all Non-associated residences within 4,950 m of a turbine proposed by the Modified Project are shown in Figure 26 further below.

Table 30: Summary of comparative analysis of potential visual impacts

Parameter	Approved Project	Modified Project	Variation
Visual magnitude of layout	Black Line: 2,200 m Blue Line: 3,300 m	Black Line: 3,350 m Blue Line: 4,950 m	+1,150 m (Black Line) +1,650 m (Blue Line)
Number of Non-associated residences within 'black line' of visual magnitude:	2	12	+10
Number of Non-associated residences within 'blue line' of visual magnitude:	9	45	+36
Number of Non-associated residences with multiple 60º sectors within which a turbine is visible	Up to 3 x 60º sectors: 19 Up to 4 x 60º sectors: 4 Up to 5 x 60º sectors: 0 Up to 6 x 60º sectors: 0	Up to 3 x 60º sectors: 24 Up to 4 x 60º sectors: 4 Up to 5 x 60º sectors: 0 Up to 6 x 60º sectors: 0	Increase in five (5) Non-associated residences with turbines in three (3) 60º sectors.
Visual Impact Rating (Dwelling Zone 1) *Approved Project: 9 Non-associated residences* *Modified Project: 10 Non-associated residences*	**Low to Medium** visual impact rating at 8 x Non-associated residences **Low** visual impact rating at 1 x Non-associated residence	**'***Black line' residences (total=6)* Visual impact ratings reduced to **Negligible**, **Negligible to Low**, or **Low** at 5 x Non-associated residences **Negligible** visual impact rating at 1 x Non-associated residence (not previously assessed)	Reduction in visual impact ratings at 5 x Non-associated residences. Two newly identified Non-associated residences assessed as Negligible or Low to Medium visual impact rating. No change in visual impact ratings for all other previously assessed Non-

Parameter	Approved Project	Modified Project	Variation
		'Blue line' residences (total=4) **Low to Medium** visual impact rating at 4 x Non-associated residences (includes one newly identified Non-associated residence - Dwelling ID: 1).	associated residences. Mitigation measures recommended.
Visual Impact Rating (Dwelling Zone 2) *Approved Project: 11 Non-associated residences* *Modified Project: 9 Non-associated residences*	**Medium** visual impact at 7 x Non-associated residences **Low to Medium** visual impact rating at 4 x Non-associated residence	**'***Black line' residences (total=3)* Visual impact ratings reduced to **Negligible to Low**, **Low,** or **Low to Medium** at 3 x Non-associated residences *'Blue line' residences (total=6)* **Medium** visual impact at 3 x Non-associated residences **Low to Medium** visual impact rating at 3 x Non-associated residences	Reduction in visual impact ratings at 3 x Non-associated residences. No change in visual impact ratings for all other previously assessed Non-associated residences. One newly identified Non-associated residence assessed as Medium visual impact rating. Mitigation measures recommended.
Visual Impact Rating (Dwelling Zone 3) *Approved Project: 9 Non-associated residences* *Modified Project: 9 Non-associated residences*	**Medium** visual impact at 9 x Non-associated residences	**'***Black line' residences (total=2)* **Medium** visual impact at 2 x Non-associated residences [30] *'Blue line' residences (total=7)* **Medium** visual impact at 7 x Non-associated residences	No change in visual impact rating. Mitigation measures recommended.
Visual Impact Rating (Dwelling Zone 4) *Approved Project: 19 Non-associated residences* *Modified Project: 18 Non-associated residences*	**Medium** visual impact at 19 x Non-associated residences	**'***Black line' residences (total=1)* Visual impact rating reduced to **Negligible to Low** at 1 x Non-associated residence *'Blue line' residences (total=17)*	Reduction in visual impact at 1 x Non-associated residence. No change in visual impact rating at 17 x Non-associated residences. Mitigation measures recommended.

[30] Consent to access the two Non-associated residences (C6-3 and C6-4) in Dwelling Zone 3 located within the 'black line' of visual magnitude was not granted, and therefore a detailed viewpoint assessment could not be undertaken at those residence locations. MLA conclude that the visual impact ratings for those two Non-associated residences remain consistent with those identified by GBD in 2014 (and 2017) as part of the Original EIS/RTS.

Parameter	Approved Project	Modified Project	Variation
		Medium visual impact at 17 x Non-associated residences	
Visual Impact Rating (Dwelling Zone 5) *Approved Project: 2 Non-associated residences* *Modified Project: 2 Non-associated residences*	**Low to Medium** visual impact at 2 x Non-associated residences	**'***Black line' residences (total=0)* *'Blue line' residences (total=2)* **Low to Medium** visual impact at 2 x Non-associated residences	No change in visual impact rating. Mitigation measures recommended.
Visual Impact Rating (Dwelling Zone 6) *Approved Project: 7 Non-associated residences* *Modified Project: 9 Non-associated residences*	**Low to Medium** visual impact at 7 x Non-associated residences	**'***Black line' residences (total=0)* *'Blue line' residences (total=9)* **Low to Medium** visual impact at 7 x Non-associated residences (includes 1 newly identified Non-associated residence - Dwelling ID: 11). **Very Low** visual impact rating at 2 x newly identified Non-associated residences (Dwelling ID: 12 and 13).	No change in visual impact ratings for previously assessed Non-associated residences. 3 x newly identified Non-associated residences assessed as Very Low or Low to Medium visual impact rating. Mitigation measures recommended.

Aviation Hazard Lighting

As discussed in Section 7.12 an Aviation Impact Assessment (AIA) was prepared for the Modified Project which concludes that aviation hazard lighting is not warranted at the Project site. Despite this the VIA includes an assessment of potential visual impact associated with aviation hazard night lighting, which concludes the following:

- Aviation lighting has the potential to impact on receptors who view the landscape at night, in particular night-sky enthusiasts, photographers, star gazers and campers.
- Coolah Tops National Park is densely vegetated and as a result, the potential to view aviation lighting is limited and will likely be negligible from the campgrounds. There is potential for aviation lighting to be visible from cleared areas within the National Park, such as Pinnacle Lookout.
- The impact of night lighting at rural residences surrounding the Project site is unlikely to be experienced from inside the residence as internal lights reflect on windows and limit views to the exterior at night time.
- If aviation hazard night lighting is ultimately required, the principles outlined in the Dark Sky Planning Guideline will need to be considered to assist in protecting the night sky from artificial sky glow attributable to light from human-made sources.

Conclusion

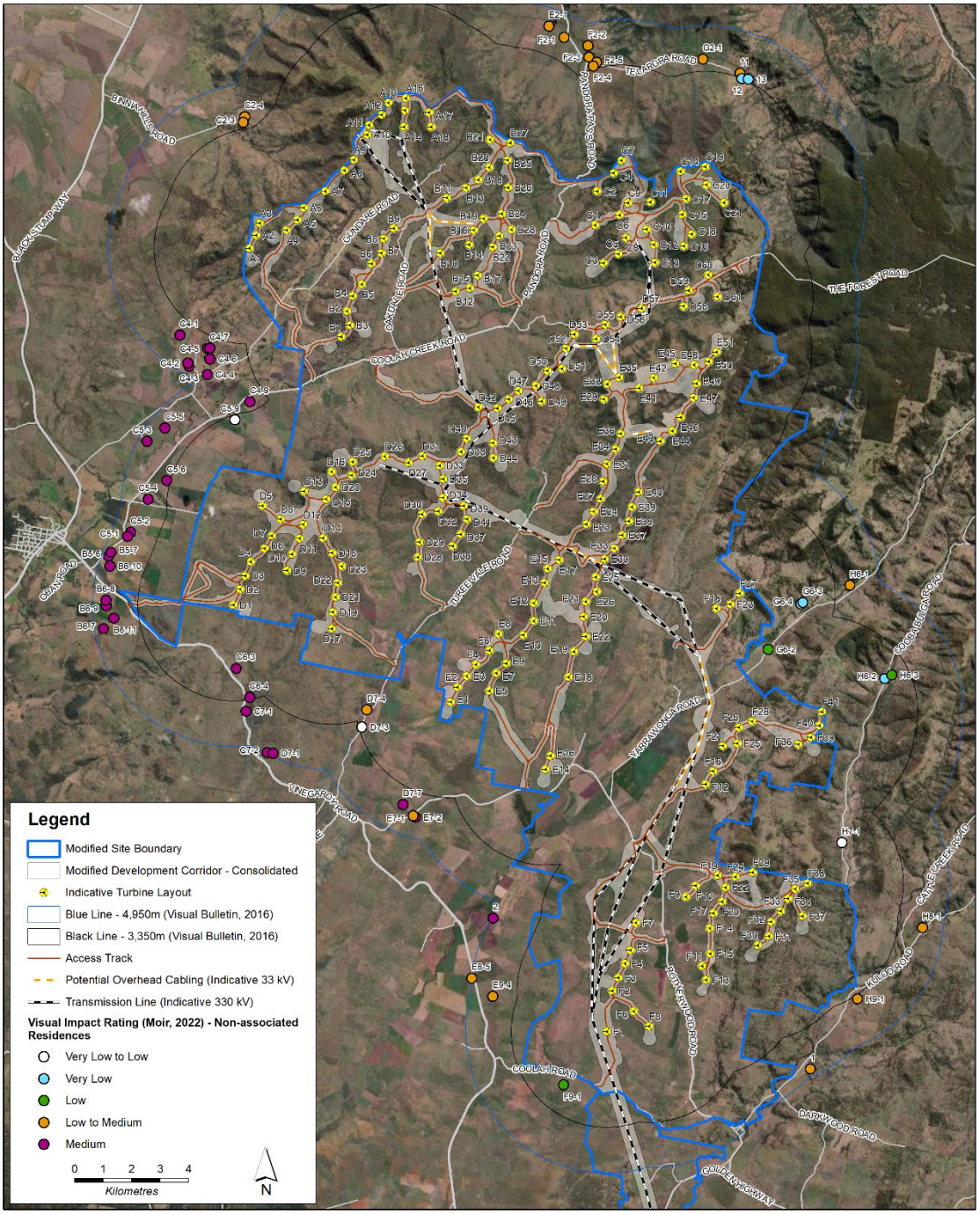
The Proposed Modification is not considered to result in a magnitude of visual change that would significantly increase visual effects (and former visual impact ratings) associated with the Approved

Project.

For the most part, the existing conditions of the Development Consent are considered to remain appropriate to manage the potential visual impacts of the Modified Project. In particular existing Conditions 2 and 3 of Schedule 3 (Visual Impact Mitigation) appropriately control the visual appearance of turbines and ancillary infrastructure, to minimise potential off-site visual impact.

However, the VIA prepared for the Modified Project recommends that the Development Consent is updated to align with the increase in the 'blue line' of visual magnitude. Accordingly, it is recommended that Condition 1 of Schedule 3 (Visual Impact Mitigation) is updated to increase the distance out to which visual impact mitigation measures are available to Non-associated residences from 4 km to 4,950 m (increase of 950 m) from the nearest proposed turbine.

Figure 26: Visual impact ratings at Non-associated residences



7.4 Shadow Flicker and Blade Glint

7.4.1 Approach

A Shadow Flicker Assessment was prepared by WSP Pty Ltd to assess the change in potential theoretical shadow flicker impacts from the Approved Project to the Modified Project (see Appendix G.2). The Shadow Flicker Assessment includes an assessment of blade glint.

The Shadow Flicker Assessment has been prepared in accordance with the relevant guidelines outlined in Table 31 and the relevant Conditions of the Development Consent outlined in Table 32.

Table 31: Relevant Shadow Flicker Guidelines

Relevant Guidelines	Description
Draft National Wind Farm Development Guidelines **(EPHC, 2010)**	Recommends a limit of 30 hours per year on the theoretical shadow flicker duration, and 10 hours per years on the actual shadow flicker duration.
NSW Wind Energy Visual Assessment Bulletin **(DPE, 2016b)**	Recommends a shadow flicker limit of 30 hours per year at residences in the vicinity of a wind farm.

Table 32: Relevant Shadow Flicker Conditions of Consent

Relevant Conditions	Description
Condition 4 of Schedule 3 (Shadow Flicker)	Requires that shadow flicker from operational wind turbines does not exceed 30 hours per year at any non-associated residence.
Condition 2(b) of Schedule 3 (Visual Appearance)	Requires turbines to be painted off white/grey and finished with surface treatment that minimises the potential for glare and reflection, and that the visual appearance of all ancillary infrastructure blends in as far as possible with the surrounding landscape to minimise off-site visual impact.

The Shadow Flicker Assessment considers the change in potential shadow flicker impacts as a result of the reduction of 47 wind turbines, increase in the maximum blade tip height to 250 m AGL, and revised turbine layout and associated ground elevations.

The Original EIS included an assessment of potential shadow flicker impacts associated with a 288 turbine layout. The potential shadow flicker impacts associated with the approved 267 turbine layout were not assessed. To enable a comparison of potential shadow flicker impacts between the Approved Project and the Modified Project the Shadow Flicker Assessment prepared by WSP Pty Ltd re-modelled the indicative wind turbine layout and turbine dimensions proposed by the Approved Project. The Shadow Flicker Assessment then modelled the indicative wind turbine layout and turbine dimensions proposed by the Modified Project, against which a comparative assessment of the potential impacts was undertaken.

The Shadow Flicker Assessment assessed a conservative 'worst case' shadow flicker impact scenario by adopting a range of conservative assumptions for the Modified Project including a maximum blade tip height of 250 m AGL, nominal rotor diameter of 200 m, and maximum blade chord width of 5.5 m. Calculation of the theoretical shadow flicker durations does not consider any potential reduction due to cloud cover, turbine rotor orientation, low wind speed, vegetation, or other shielding effects around each residence. Therefore, the values presented in the Shadow Flicker Assessment are likely to be conservative and exceed the actual impacts of the Project.

7.4.2 Assessment

Original EIS/RTS

The shadow flicker assessment included in the Original RTS found that no Non-associated or Associated residences would experience shadow flicker above the accepted limit of 30 hours per year.

In its Assessment Report, DPE accepted the *Draft National Wind Farm Development Guidelines* recommendation of a 30 hour limit and required that the Project meet this via Condition 4 of Schedule 3 of the Development Consent.

Furthermore, DPE agreed blade glint could be managed through appropriate wind turbine finishes and imposed Condition 4(b) of Schedule 3 of the Development Consent.

Proposed Modifications

The Shadow Flicker Assessment prepared by WSP Pty Ltd for the Modified Project, found that seven residences are predicted to experience some theoretical shadow flicker, four of which are predicted to experience durations that exceed the annual 30 hour limit. However, all four of these residences are Associated residences. The location of these residences is shown in Appendix C.2.

The expected changes in shadow flicker from the Approved Project to the Modified Project are summarised in Table 33.

Table 33: Summary of Shadow Flicker Assessment Results

Predicted theoretical shadow flicker within 50 m of residence	Approved Project	Modified Project	Extent of Change
0-30 hours per year	No residences	3 residences (D4-7, D4-8, and E5-1) – all are Associated Residences	Increase in 3 residences – all are Associated Residences
Above Development Consent limit of 30 hours/year	No residences	4 residences (D4-4, E4-2, E4-3, and E4-1) – all are Associated Residences	Increase in 4 residences – all are Associated Residences

Overall, **the Shadow Flicker Assessment found the Modified Project will have no increased shadow flicker impacts at any Non-associated Residences**.

It is noted that the predicted theoretical shadow flicker durations exceed the 30 hours per year limit at four Associated residences. The Shadow Flicker Assessment adopted nominal turbine dimensions to model a worst-case impact scenario. Once a wind turbine model is selected, a subsequent shadow flicker assessment will be undertaken to determine the final predicted shadow flicker durations at these residences. Where warranted mitigation measures aimed at reducing shadow flicker impacts will be implemented, and may include consideration of the following:

- the installation of screening structures or planting of trees to block shadows
- the use of turbine control strategies to shut down turbines during periods when shadow flicker is likely to occur
- through micro siting of turbines

The Shadow Flicker Assessment confirmed that blade glint is not typically an issue for modern wind turbines, provided blades are coated with a non-reflective finish. This would be the case for wind turbines used for both the Approved Project and Modified Project.

Accordingly, the Modified Project will not impact the ability to comply with Condition 2(b) (Visual Appearance)

and Condition 4 (Shadow Flicker) of Schedule 3 of the Development Consent that relates to shadow flicker and blade glint:

- In accordance with Condition 2(b) of Schedule 2, the Applicant will ensure all turbines are painted off white/grey, and finished with surface treatment that minimises the potential for glare and reflection to occur.
- In accordance with Condition 4 of Schedule 3, the Applicant must ensure the final layout after micro-siting does not result in shadow flicker from operational wind turbines exceeding 30 hours per year at any Non-associated residence. Shadow flicker at residences D4-4, E4-2, E4-3, and E4-1 may exceed this limit, however all these residences are Associated.

7.5 Noise

7.5.1 Approach

A Predictive Noise Impact Assessment (PNIA) (contained in Appendix G.3) was prepared by Sonus Pty Ltd to assess the change in potential construction and operational noise from the Approved Project to the Modified Project.

The Wind Energy Guidelines (DPE, 2016a) states:

"… the rotation of wind turbines generates both aerodynamic and mechanical noise. When assessing the potential annoyance from a noise source, both the level and character of the noise need to be taken into consideration."

Additionally, the PNIA has been prepared in accordance with the applicable guidelines and relevant Conditions of the Development Consent outlined in Table 34 and Table 35 respectively.

Table 34: Relevant Noise Guidelines

Relevant noise guidelines	Description
Wind Turbine Noise	
***South Australian Environment Protection Authority's Wind Farms – Environmental Noise Guidelines* (SA EPA, 2009) (SA EPA Guidelines)**	Wind turbine noise predictions were assessed in accordance with the SA EPA Guidelines which have been adopted in NSW being: - 35 dB(A) or 5 dB(A) above the background noise level for Non-associated residences (whichever is greater); and - indoor limit of 30 dB(A) and outdoor limit of ~45 dB(A) with windows open for Associated residences.
***Environmental Noise Guidelines for the European Region* (World Health Organisation, 2018) (WHO Guidelines)**	The WHO Guidelines identify that operational turbine noise at a day-evening-night sound pressure level of 45 dB L_{den} or less is unlikely to cause sleep disturbance.
Substation Noise (inc. ancillary facilities)	
***NSW Noise Policy for Industry* (EPA, 2017) (the NPI)**	The NPI policy sets out the following project noise trigger levels that are relevant to operational noise from substations and ancillary facilities: - Amenity Noise Level: day=50 dB(A) L_{Aeq} / evening=45 dB(A) L_{Aeq} / night=40 dB(A) L_{Aeq} - Project Intrusiveness Noise Level: day=40 dB(A) L_{Aeq} / evening=35 dB(A) L_{Aeq} / night=35 dB(A) L_{Aeq} If it is predicted that the operation of substations is likely to cause the project noise trigger level to be exceeded at existing noise-sensitive receivers, management measures need to be considered to seek to reduce the predicted noise level.
Construction Noise	

Relevant noise guidelines	Description
***NSW Interim Construction Noise Guideline* (DECC, 2009) (ICN Guideline)**	Provides an emphasis on implementing "feasible" and "reasonable" noise reduction measures.
NSW Road Noise Policy (DECCW, 2011)	Establishes a daytime assessment criterion of 55 dB(A)$L_{Aeq\ (1\ hour)}$ where existing residences may be affected by additional traffic on existing local roads generated by land use developments. A night-time assessment criterion of 50 dB(A)$L_{Aeq\ (1\ hour)}$ is also established. Where construction traffic noise exceeds the assessment criteria all reasonable and feasible mitigation measures should be considered.

Table 35: Relevant Noise Conditions

Relevant conditions of the Development Consent	Description
Operational Noise	
Condition 10 of Schedule 3 **(Operational Noise Criteria – Wind Turbines)**	Requires the Applicant to ensure noise generated by the operation of the wind turbines does not exceed the relevant criteria specified in Table 4 at any Non-associated residence.
Condition 11 of Schedule 3 **(Operational Noise Criteria – Ancillary Infrastructure)**	Requires the Applicant to ensure noise generated by the operation of ancillary infrastructure does not exceed 35 dB(A)$_{LAeq(15\ minute)}$ at any Non-associated residence.
Conditions 12 and 13 of Schedule 3 **(Operational Noise Monitoring)**	Requires the Applicant to undertake operational noise monitoring.
Construction Noise	
Conditions 6 and 7 of Schedule 3 (Construction and Decommissioning Noise)	Requires the Applicant to minimise construction and decommissioning noise, including associated traffic noise in accordance with the ICN Guideline and specifies specific hours for construction and decommissioning activities.
Condition 5 of Schedule 3 (Additional Mitigation Upon Request)	Requires noise mitigation measures to be made available to four Non-associated residences (D7-3, D7-4, E7-1, and E9-3) that are reasonable and feasible and directed towards reducing construction traffic noise impacts.

The PNIA considers the change in potential noise impacts as a result of the removal of 47 wind turbines, increase to the wind turbine envelope, revised turbine layout including newly proposed turbines in the northwest and northeast of the Project site, and modifications to ancillary infrastructure including the location and number of collector substations and concrete batch plants.

Given potential noise related impacts for the Approved Project (i.e. 267 turbine layout) were not assessed, the PNIA compares the Modified Project to the RTS Project.

Wind turbine noise predictions have been based on an indicative wind turbine model being the GE 158 5.5 MW wind turbine with a tip height of 250 m AGL. The modelled wind turbine used has one of the highest noise emissions of those currently on the market and has been used to provide a conservative 'worst case' turbine noise impact scenario.

Updated background noise monitoring was undertaken over a six week period in October – November 2020 at five representative residence locations (Residences C2-3, C4-9, D7-4, H7-1, G6-3) to provide an up-to-

date baseline understanding of existing pre-construction noise conditions. The five background noise monitoring locations were at Non-associated residences and were chosen by Sonus Pty Ltd as the most appropriate representative locations.

7.5.2 Assessment

Original EIS/RTS

The Noise Impact Assessment (and Addendum) prepared by SLR Pty Ltd in 2014 (and 2017) in support of the Original EIS/RTS assessed the potential noise impacts associated with operation of turbines and substations, construction noise associated with the operation of anticipated machinery and equipment during construction, and construction traffic noise (the SLR Report).

The SLR Report found that noise generated from the wind turbines could comply with the specified operational noise criteria whilst noise generated from ancillary infrastructure, including substations, would not impact on the amenity of nearby residences. Similarly, corona and aeolian noise were not considered an issue for separation distances greater than 240 m from the transmission lines.

The SLR Report found that with the implementation of reasonable and feasible mitigation measures that anticipated construction noise and construction traffic noise would comply with the requirements of the Interim Construction Guidelines (ICN Guidelines).

Accordingly, DPE recommended the Applicant comply with the relevant noise criteria and authorised Conditions 5 – 13 of Schedule 3 of the Development Consent.

Proposed Modifications

Operational Wind Turbine Noise

In accordance with the SA EPA Guidelines and NSW Noise Bulletin, the results of the updated background noise monitoring campaign completed in late 2020 have resulted in increases to the applicable wind turbine noise limits at several Non-associated residences to above the standard 35 dB(A) noise limit (i.e. background noise + 5 dB(A)).

The Predictive Noise Impact Assessment (PNIA) prepared by Sonus Pty Ltd for the Modified Project found that the noise levels generated from the operation of the indicative wind turbines is predicted to be below the relevant noise limits at all Non-associated residences. Maximum predicted noise levels plateau at wind speeds of 9 m/s. Figure 27 below illustrate the predicted noise levels at surrounding residences at 9 m/s wind speed.

The highest predicted noise level at any Non-associated residence for wind turbine noise is 34 dB(A) (Residences C5-10, D7-6, G6-2), which is below the applicable noise limit.

Compared to the Approved Project, the Modified Project is expected to result in an increase in predicted noise levels at 12 Non-associated residences, which are listed in the Table 36. The degree of increase at these Non-associated residences ranges between 0.1 dB(A) and 1.7 dB(A), which is below the typically audible range of around 2-3 dB(A). All predicted turbine noise levels remain below the applicable noise limits specified in the SA EPA Guidelines and NSW Noise Bulletin.

Accordingly, **wind turbine noise associated with the Modified Project is predicted to achieve the applicable noise criteria at all nearby residences and comply with the requirements of the Development Consent.** [31]

[31] As detailed in Section 4.9 of this Modification Assessment Report it is anticipated that DPE will amend the Development Consent to remove the specific wind turbine noise limits at each relevant receiver listed in Table 4 of Condition 10 and replace it with the noise criteria set out in the SA EPA Guidelines (i.e. 35 dB(A) or background noise + 5 dB(A), whichever is greater), consistent with recent wind farm approvals that have been granted.

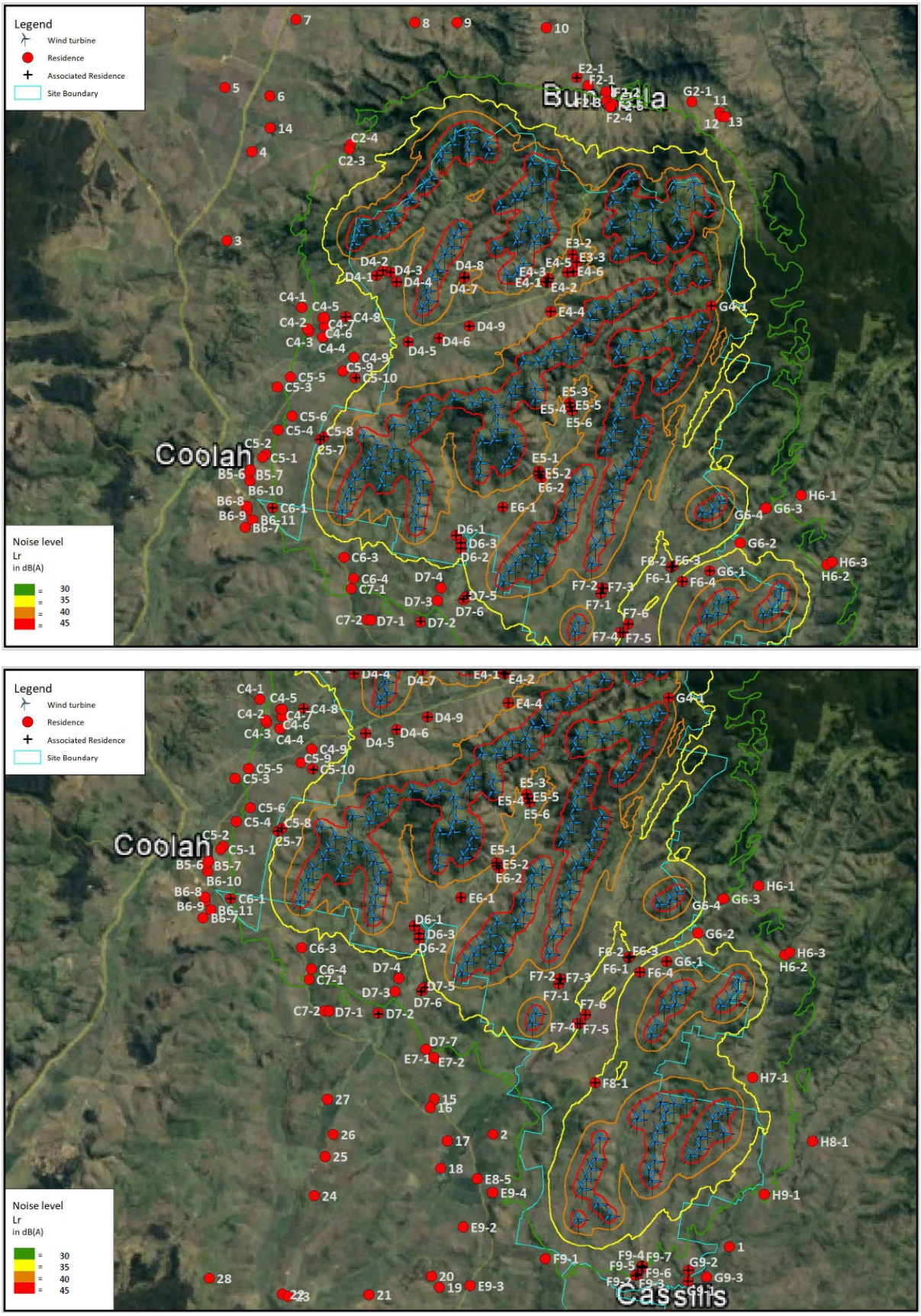
As the predicted turbine noise levels are below the applicable limits, the PNIA concludes that there is currently no need for noise mitigation measures or a curtailment strategy which would involve operating the turbines in a reduced power mode.

As the Project progresses towards construction and the final turbine model is selected, an updated pre-construction noise assessment will be prepared to confirm that the final turbine layout can comply with all applicable noise limits. Prior to commissioning turbines, a noise management plan (NMP) will be prepared that will set out the post-construction noise monitoring requirements to confirm that the operational project complies with all applicable noise limits. The need for a curtailment strategy will be evaluated as part of that pre-construction noise assessment.

Table 36: Predicted increase in turbine noise levels at Non-associated residences

Non-associated Dwelling ID	Predicted Turbine Noise Levels dB(A)		Increase in Predicted Turbine Noise Levels dB(A)
	Approved Project (SLR 2014,2017)	Modified Project (Sonus 2021)	
C2-4	29.6	29.7	0.1
D7-7	29.1	30.3	1.2
E7-1	28.2	29.1	0.9
E7-2	28.4	28.8	0.4
E9-4	27.9	28.7	0.8
F2-1	29.3	29.4	0.1
F2-2	29	29.7	0.7
F2-3	29.7	30.3	0.6
F2-4	30.1	30.6	0.5
F2-5	29.9	30.3	0.4
G2-1	26.9	28.6	1.7
H8-1	26.1	27.4	1.3

Figure 27: Predicted operational turbine noise level contours



Substation Noise

Up to seven collector substations (depending on which transmission line option is adopted) are proposed to be located at 10 potential locations within the Wind Farm Site, and one connection substation at Ulan.

For the purposes of predicting conservative worst-case noise levels associated with the proposed substations, the PNIA assumed the following:

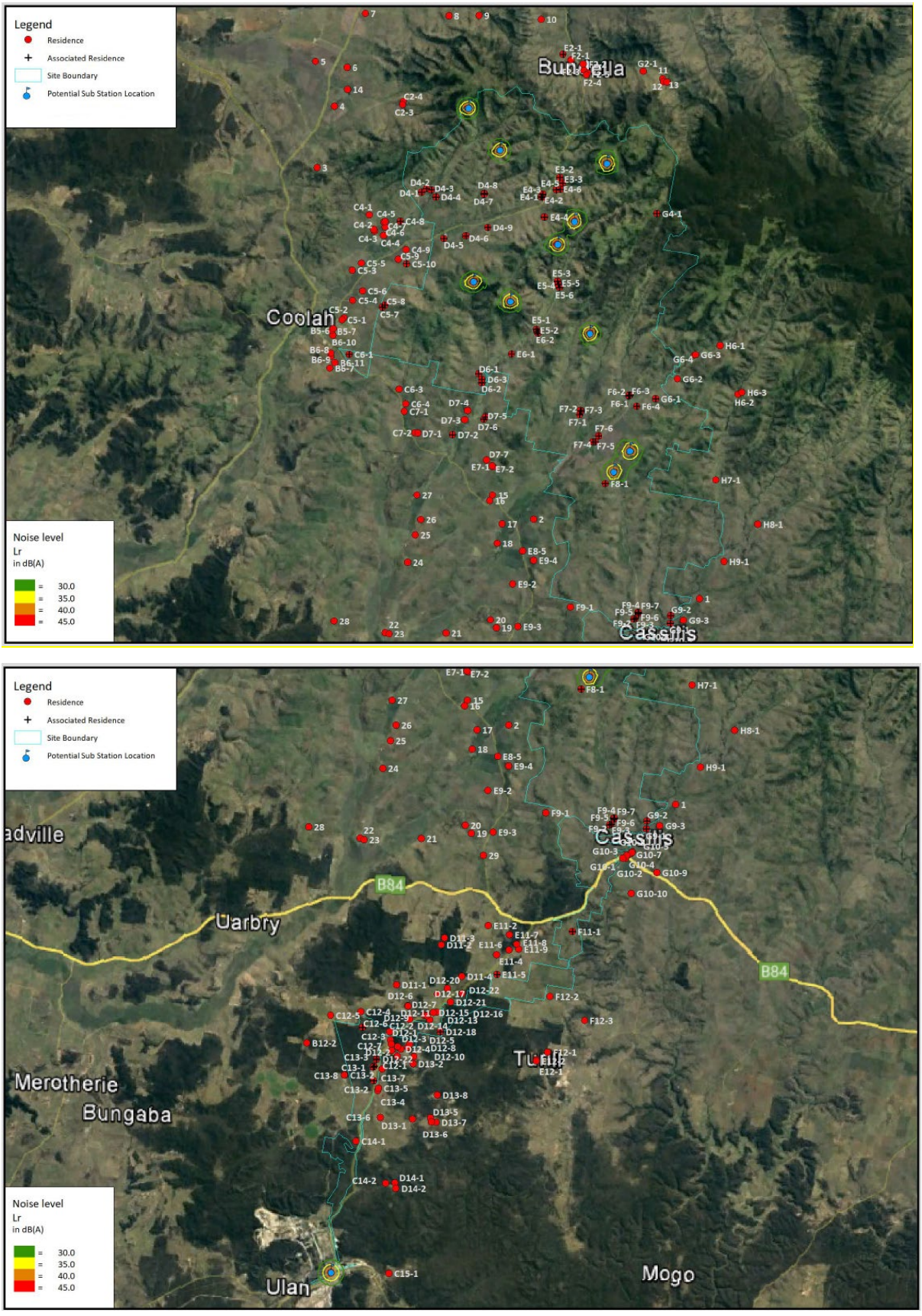
- All 10 potential collector substation locations are constructed (only up to seven substation locations are required).
- Each substation would contain a 400 MVA capacity transformer with an associated sound power level of 102 dB(A). Again, this approach represents a conservative worst-case scenario.
- The presence of noise characteristics that have the potential to be annoying, such as tonality, modulation or dominant low-frequency content. As such a 5 dB(A) correction factor was applied which effectively reduces the applicable noise limit for the collector substations to 30 dB(A) at Non-associated residences, in accordance with the NSW Noise Policy for Industry (NPI).

The highest predicted noise level associated with the operation of all indicative substation locations at a Non-associated residence is 20 dB(A), with the predicted noise levels at most other Non-associated residences being less than 15 dB(A). Figure 28 illustrates the predicted substation noise levels at surrounding residences.

The PNIA concludes that mitigation measures are not required for noise associated with the operation of the substations.

Accordingly, **operation of the proposed substations will therefore easily achieve the conservatively reduced noise limit of 30 dB(A) at Non-associated residences and comply with the requirements of the Development Consent and the NPI.**

Figure 28: Predicted operational noise level contours for substations (all indicative locations)



Construction Noise

The PNIA provides a comparative assessment of on-site construction noise and construction traffic noise associated with the Modified Project and Approved Project.

The PNIA identifies that the infrastructure layout and construction traffic volumes estimated for the Modified Project do not differ greatly from the Approved Project, and therefore the findings of the SLR Report prepared for the Original EIS/RTS related to construction noise, vibration, blasting and construction traffic noise remain valid and should be relied upon for the Modified Project.

For ease of reference the key findings of the SLR Report in relation to construction noise and construction traffic noise are summarised as follows:

- The ICN Guideline sets out recommended mitigation measures that should be implemented for 'noise affected' and 'highly noise affected' residences.
- The noisiest works typically occur during the turbine foundation civil works construction scenario and is largely associated with the operation of rock breaker machinery, which would be operated intermittently across the site.

Daytime Construction Works

- A total of 82 residences were deemed 'noise affected' under the ICN Guidelines as the predicted noise levels at those residences exceed the daytime Noise Management Level of 40 dB(A) under different construction scenarios.
- Due to the anticipated short period of localised works turbine foundation civil works were considered acceptable under the ICN Guideline.
- Predicted noise levels for daytime construction works do not exceed 75 dB(A) and therefore no residences would be considered as being 'highly noise affected'.

Evening/night-time construction works

- On occasion, night-time construction works may be required to complete activities that cannot be stopped midway through or must be undertaken under favourable wind/weather conditions, for example turbine erection works.
- To account for potential night-time works, the SLR Report assumed that turbine erection works may occur at night on occasion and modelled noise levels associated with the use of large cranes operated at full load.
- Assuming a conservative night-time Noise Management Level of 35 dB(A), 45 residences may be deemed 'noise affected' during night-time construction activities as the predicted noise levels at those residences exceed 35 dB(A).
- Predicted noise levels for night-time turbine erections works do not exceed 75 dB(A) and therefore no residences would be considered as being 'highly noise affected'.

Blasting and ground vibration

- Blasting is typically undertaken at turbine foundation locations.
- All blasting activities at the site are likely to meet all human comfort limits and building damage assessment criteria and comply with the ANZEC Guidelines.

Construction traffic noise along public roads

The SLR Report predicted noise levels associated with movement of construction traffic along public roads, assuming approximately 300 vehicle trips per day during the construction period. The SLR Report concludes that the 'worst case' maximum construction traffic scenario would comply with the NSW Road Noise Policy (NSW RNP) requirements, due to the typically large setback of dwellings from relevant public roads and that night-time deliveries are unlikely to cause sleep disturbance based on predicted maximum

noise levels. The key findings of the SLR Report in relation to construction traffic noise are as follows:

- Maximum noise levels at a residence approximately 50 metres from the road as a result of a heavy vehicle pass-by would be in the range 45-55 dB(A). Assuming a 10 dB(A) transmission loss through an open window this would result in 35 to 45 dB(A) inside the residence.
- Construction traffic noise levels at nearby residences during daytime periods are anticipated to meet the NSW RNP daytime noise targets of 55 dB(A) $L_{Aeq(1\ hour)}$ for a Local road and 60 dB(A) $L_{Aeq(1\ hour)}$ for a Regional road at all nearby residences that are setback at distance of 50 m.
- All but four residences located near public roads proposed to be used for construction of the Project are set back in excess of 50 m from the public road and therefore will meet the NSW RNP daytime targets.
- The four identified residences located within 50 m of a public road (listed in Table 37 below) are unlikely to be significantly impacted by road traffic noise as:
    - Predicted noise levels are based on conservative worst-case estimates of daily vehicle movements along the public roads, and traffic volumes are likely to be less in practice.
    - The predicted noise levels at the closest residence (D7-3, set back 24 m from the public road) would only be approximately 3 dB(A) higher than that at the 50 m setback distance.
- Night-time deliveries are likely to be required throughout the construction phase. Road traffic noise levels at nearby residences during night-time periods are anticipated to meet the NSW RNP night-time target of 50 dB(A) $L_{Aeq(1\ hour)}$. for Local roads and 55 dB(A) $L_{Aeq(1\ hour)}$ for Regional roads.

Table 37: Nearby residences within 50 m of a relevant public road

Non-associated Residence ID	Nearby public road	Distance from public road centreline
C4-4*	Gundare Road (Local road)	40 m
D7-3	Turee Vale Road (Local road)	24 m
E7-1	Rotherwood Road (Local road)	38 m
E9-3	Vinegaroy Road (Regional road)	30 m

**Note 1: Dwelling C4-4 is located along Gundare Road external to the Modified Site Boundary - this section of Gundare Road is not proposed to be used by the Modified Project.*

Additional potential concrete batch plant locations

The Modified Project identifies 19 potential locations for temporary concrete batch plants, and proposes up to 10 concrete batch plants in operation at any given time during the construction period (9 within the Wind Farm Site and one within the External Transmission Line Site). As the proposed number and location of potential temporary concrete batch plants differs from the Approved Project the PNIA includes updated predicted noise levels associated with concrete batch activities and compares them against the Noise Management Levels set out in the ICN Guideline. Noise contours for the operation of all temporary concrete batch plants are shown in Figure 29 below.

The key findings of the PNIA in relation to the operation of temporary concrete batch plants are summarised as follows:

- The predicted noise levels associated with all potential concrete batch plants proposed within the Wind Farm Site are expected to be less than 35 dB(A) at all Non-associated residences, and therefore comply with the ICN Guideline.
- The predicted noise levels associated with the concrete batch plant proposed within the External Transmission Line Site off Cliffdale Road, Turill exceed 35 dB(A) at 6 x Non-associated residences . All these residences are located in the area near Cliffdale Road, Turill (see Table 38). These residences would be considered to be “Noise Affected” under the ICN Guideline, for operations of the concrete batch plants which may *occur outside recommended standard hours.* Where residences are noise affected,

justification must be provided for the works to proceed and all "feasible and reasonable" noise control strategies must be implemented to minimise noise. Although a residence may be noise affected, it does not preclude concrete batching from occurring but rather requires further consultation with the community, justification and approval to be sought and consideration of noise reduction measures which can be undertaken.

- The predicted noise levels are conservative worst-case estimates which assume all 19 indicative temporary concrete batch plant locations are in operation concurrently. Up to 9 concrete batch plants within the Wind Farm Site could be in operation concurrently, resulting in lower noise levels at nearby residences than what has been predicted.

Table 38: Predicted noise levels greater than 35 dB(A) at Non-associated residences (all 19 x indicative temporary concrete batch plant locations)

Residence ID	Predicted Noise Level dB(A)
C12-2	48
C12-3	43
C12-4	41
D12-1	41
D12-22	38
D12-3	37

Potential Alternate Transmission Line Connection (CWO REZ Transmission Line)

As discussed in Section 2.3, in the event the alternate transmission line alignment proposed by EnergyCo is adopted, the External Transmission Line (or part thereof) would no longer be required and the associated potential noise impact impacts associated with the concrete batch plant proposed near Cliffdale Road, Turill would no longer apply.

Mitigation Strategies

Where residences are classed as 'noise affected' in accordance with the ICN Guidelines, the Applicant is required to apply all feasible and reasonable work practices, and to inform residents of the proposed construction work. Similarly, the Applicant is required to apply all feasible and reasonable measures to reduce noise levels to meet the road traffic noise targets set out in the NSW RNP.

The SLR Report recommends that a construction noise management plan is prepared to ensure that all reasonable steps are taken to reduce construction noise and that appropriate community engagement occurs. Noise mitigation strategies to be considered for inclusion in the construction noise management plan may involve the following:

- Scheduling construction work (particularly where audible at Non-associated residences), including heavy vehicle movements to between 7am and 6pm Monday to Friday, and between 8am and 1pm on Saturdays (per the requirements of Condition 8, Schedule 3) where possible
- Locating fixed noise sources as far as reasonably practicable from residences
- Installing acoustic screens around fixed noise sources
- Enclosing generators and compressors
- Implementing alternative processes (where feasible and reasonable), and
- Ensuring effective site, equipment and vehicle management

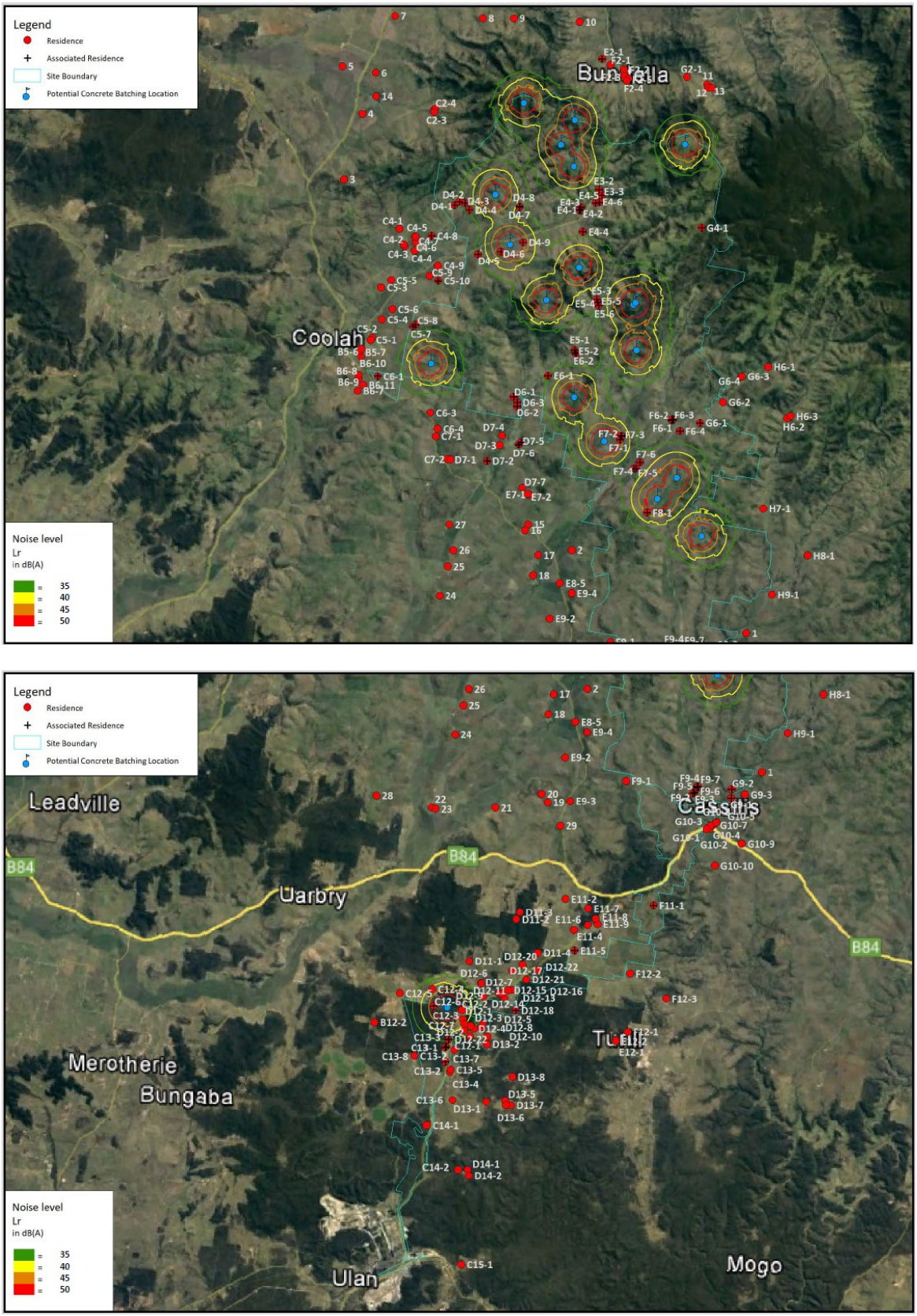
The noise mitigation measures required by the conditions of the Development Consent are considered to

remain appropriate to manage construction noise impacts associated with the Modified Project.

Summary

The Modified Project will not impact the ability to comply with Conditions 5 - 13 of Schedule 3 of the Development Consent that relate to construction noise including noise associated with construction traffic along relevant public roads.

Figure 29: Predicted noise level contours for operation of all concrete batch plants



7.6 Biodiversity (Vegetation)

7.6.1 Approach

A Biodiversity Development Assessment Report (BDAR) has been prepared by Umwelt (Australia) Pty Ltd (Umwelt) to assess the change in potential biodiversity impacts from the Approved Project to the Modified Project (see Appendix G.4).

The Wind Energy Guidelines (DPE, 2016a) state:

> "*…including the extent to which impacts of the wind energy project on biodiversity values has been avoided, minimised or offset to an acceptable level, in accordance with the NSW Biodiversity Offsets for Major Projects having regard to the advice of the NSW Office of Environment & Heritage for terrestrial biodiversity or the Department of Primary Industries (Fisheries) for aquatic biodiversity.'*

As the Modified Project is expected to result in a change in the potential impacts to biodiversity values compared to the Approved Project a BDAR is considered to be required. Accordingly, the BDAR has been prepared primarily in accordance with the Biodiversity Assessment Method 2020 (BAM) under the *Biodiversity Conservation Act 2016* (BC Act) and the following guidelines:

- *Surveying threatened plants and their habitats, NSW survey guide for the Biodiversity Assessment Method* (DPIE, 2020d)
- *Draft Survey Guidelines for Australia's Threatened Orchids* (DoEE, 2013)
- *Guidance to assist a decision-maker to determine a serious and irreversible impact* (DPIE, 2019b).
- *Draft Koala Habitat Protection Guideline and Koala Habitat Protection SEPP* (DPIE, 2020a).

In addition, the BDAR has had regard to the relevant conditions of the Development Consent as outlined in Table 39.

The Applicant has consulted closely with BCS, DPE and DCCEEW to confirm survey approaches and the application of the BAM methodology, and to seek approval to use the BAM in order to calculate the biodiversity credit liability.

Table 39: Relevant Biodiversity Conditions

Conditions	Description
Condition 18, Schedule 3 **(Restrictions on Clearing and Habitat)**	Requires the Applicant to clear no more than: - 200.85 hectares (ha) of White-Box-Yellow Box-Blakely's Red Gum Woodland EEC, including native pasture - 10.37 ha of the EPBC Act listed White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland Ecological Community Requires the Applicant minimise the impacts on hollow-bearing trees, threatened bird and bat populations, and native vegetation and key habitat
Condition 19, Schedule 3 **Biodiversity Offsets**	Requires the Applicant to update the baseline mapping of the vegetation and key habitat within the disturbance areas and calculate biodiversity offset credit liabilities in accordance with the *Framework for Biodiversity Assessment* under the *NSW Biodiversity Offset Policy for Major projects.* The Approved Project was required to calculate the biodiversity offset credit liabilities in accordance with the Framework for Biodiversity Assessment (FBA) under the NSW Biodiversity Offset Policy for Major Projects. In August 2017, the Biodiversity Assessment Methodology (BAM) was established under section 6.7 of the BC Act which repealed the *Threatened Species Conservation Act 1995* (TSC

Conditions	Description
	ACT). Through its establishment, the BAM replaced the FBA. While FBA still remains an assessment option for projects under existing transitional arrangements, the BAM is the current assessment method for NSW. The Applicant has confirmed with BCS and DPE that the Modified Project is to be assessed under the BAM.
Condition 20, Schedule 3 **Biodiversity Offsets**	Requires the Applicant to retire the required biodiversity credits within two years of commencement of construction in accordance with the *NSW Biodiversity Offsets Policy for Major Projects*.
Condition 21, Schedule 3 **Biodiversity Management Plan**	Requires the Applicant to prepare a Biodiversity Management Plan (BMP) that will outline mitigation measures to monitor and manage potential impacts to biodiversity, including the control of weeds and pests.

The BDAR considers the change in potential impacts on biodiversity values as a result of the Modified Project Indicative Development Footprints (Wind Farm and External Transmission Line) and the addition of the Indicative Development Footprint – Public Road Upgrades (discussed in Section 4.9.1) [32].

Biodiversity surveys and vegetation mapping that supported the BDAR was undertaken to:

- Update the baseline mapping of the vegetation and key habitats within the indicative ground disturbance areas in accordance with the requirements of Condition 19 of Schedule 3 of the Development Consent, and
- Map vegetation within areas of the Modified Development Corridor and Indicative Development Footprint – Public Road Upgrades that were previously not considered.

In accordance with Condition 19 of Schedule 3, the vegetation mapping will be finalised following finalisation the Project layout (i.e. through micro-siting and realignment of infrastructure) and the associated ground disturbance.

In accordance with the BAM, vegetation was mapped within a 500 m buffer of the Indicative Development Footprints (Wind Farm, External Transmission Line, and Public Road Upgrades). The buffer was determined based on the outer extent of the Indicative Development Footprints, including the full extent of the Modified Development Corridor. This has allowed greater flexibility for micro-siting the wind turbines and ancillary infrastructure subject to specific limits.

In addition to general ecosystem surveys, targeted surveys were undertaken for both threated flora and fauna species.

7.6.2 Assessment

Original EIS/RTS

The following ecological assessments were undertaken to assess potential impacts to vegetation and habitat in support of the Original EIS/RTS:

[32] The BDAR prepared for the Modified Project separates out the impact areas for the Indicative Development Footprint – Wind Farm, Indicative Development Footprint – External Transmission Line, and Indicative Development Footprint – Public Road Upgrades to enable a like-for-like comparison of potential impacts against the Approved Project which did not consider those impacts associated with anticipated public road upgrades.

- *Biodiversity Assessment, Wind Farm Study Area* (NGH Environmental, 2013);
- *Biodiversity Assessment, Transmission Line Study Area* (NGH Environmental, 2013);
- *Biodiversity Assessment Addendum, Wind Farm and Transmission Line Project* (NGH Environmental, 2017a);
- *Biodiversity Offset Strategy* (NGH Environmental, 2017b); and
- Raptor and Bird Utilisation Surveys, Brett Lane & Associates, September 2017.

Based on these assessment findings and concerns raised by OEH, the following changes were made to the infrastructure layout to minimise biodiversity impacts:

- removing 21 turbines from the Original EIS project layout;
- revising the location of 12 turbines;
- reducing the number of proposed collection substations from 6 to 4;
- streamlining the alignment of the transmission line route to minimise impacts to woodland areas and the Durridgere SCA; and
- avoiding impacts to the Bobadeen East Vegetation Offset Area.

Following these revisions (but inclusive of 282 turbines), the Approved Project was determined to have a total ground disturbance of 744.94 ha, of which 343.45 ha was exotic vegetation. DPE noted in its Assessment Report that:

- 401.49 ha of native vegetation to be cleared as part of the Approved Project is largely fragmented and degraded. This includes up to 200.85 ha of endangered ecological community (EEC) listed under the TSC Act, the majority of which is comprised of derived native grassland with sparsely distributed trees, that has been subject to past clearing and grazing.
- 10.37 ha of the 200.85 ha of EEC listed under the TSC Act is Box Gum Woodland Ecological Community listed under the EPBC Act.

DPE's assessment found that despite the proposed ground disturbance, the Project would not result in any significant impacts on threatened species or EECs. Accordingly, DPE determined that with implementation of Conditions 18-21 of Schedule 3 of the Development Consent, the residual biodiversity impacts would be suitably minimised, managed and/or offset.

Proposed Modifications

The combined Indicative Development Footprints (Wind Farm, External Transmission Line, and Public Road Upgrades) is estimated to result in 1,790.0 ha of ground disturbance, of which 190.7 ha is attributable to the anticipated public road upgrades (these were not included in the Original EIS/RTS). Of this, a total of 139.5 ha of ground disturbance impacts upon existing roads/tracks and waterways or Category 1 exempt land.

Impacts to Plant Community Types and Species Habitat

The Biodiversity Development Assessment Report (BDAR) prepared by Umwelt Pty Ltd found that the Modified Project will impact 1,650.5 ha of native vegetation across a total of 11 Plant Community Types (PCTs) and seven species habitat. This equates to an additional 1,249.1 ha of native vegetation removal than was estimated for the Approved Project (see Table 40 below).

Table 40: Comparison between Approved Project and Modified Project

PCT/Species	Approved Project – Total Area of Impact (ha)[1]	Modified Project - Total Area within Indicative Development Footprints	Order of Change between Approved Project and Modified Project
Ecosystem			
PCT 84 – River Oak - Rough-barked Apple – red gum - box riparian tall woodland (wetland) of the Brigalow Belt South Bioregion and Nandewar Bioregion	6.47	8.1	**+1.63**
PCT 281 – Rough-Barked Apple - red gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion	18.94	13.4	**-5.54**
PCT 395 – Derived speargrass - wallaby grass - wire grass mixed forb grassland mainly in the Coonabarabran - Pilliga - Coolah region	77.26	197.3	**+120.04**
PCT 467 – Blue-leaved Ironbark - Black Cypress Pine shrubby sandstone open forest in the southern Brigalow Belt South Bioregion (including Goonoo)	3.30	-	**-**
PCT 477 – Inland Scribbly Gum - Red Stringybark – Black Cypress Pine - Red Ironbark open forest on sandstone hills in the southern Brigalow Belt South Bioregion and northern NSW South Western Slopes Bioregion	31.51	-	**-**
PCT 479 – Narrow-leaved Ironbark- Black Cypress Pine - stringybark +/- Grey Gum +/- Narrow-leaved Wattle shrubby open forest on sandstone hills in the southern Brigalow Belt South Bioregion and Sydney Basin Bioregion	42.65	20.0	**-22.65**
PCT 480 – Black Cypress Pine - ironbark +/- Narrow-leaved Wattle low open forest mainly on Narrabeen Sandstone in the Upper Hunter region of the Sydney Basin Bioregion	10.32	-	**-**
PCT 481 – Rough-barked Apple - Blakely's Red Gum - Narrow-leaved Stringybark +/- Grey Gum sandstone riparian grass fern open forest on in the southern Brigalow Belt South Bioregion and Upper Hunter region	30.04	12.7	**-17.34**
PCT 483 – Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley	101.10	668.6	**+567.5**
PCT 488 – Silvertop Stringybark - Yellow Box +/- Nortons Box grassy woodland on basalt hills mainly on northern aspects of the Liverpool Range, Brigalow Belt South Bioregion	70.16	627.8	**+557.64**
PCT 490 – Silvertop Stringybark - Forest Ribbon Gum very tall moist open forest on basalt plateau on the Liverpool Range, Brigalow Belt South Bioregion	3.12	11.0	**+7.88**
PCT 495 – Brittle Gum - Silvertop Stringybark grassy open forest of the Liverpool Range, Brigalow Belt South Bioregion	1.51	7.3	**+5.79**
PCT 278 – Blakely's Red Gum – Grey Box – White Box – Riparian Woodland	3.55	-	**-**
PCT 478 – Sandstone Forest – Red Ironbark dominant	1.20	-	**-**
PCT 588 – White Box – Cypress Pine Shrubby Open Forest	0.36	-	**-**
PCT 1661 - Narrow-leaved Ironbark - Black Pine – Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin	n/a	53.2	**+53.2**
PCT 1675 - Scribbly Gum - Narrow-leaved Ironbark - Bossiaea rhombifolia heathy open forest on sandstone ranges of the Sydney Basin	n/a	31.0	**+31.0**
Sub-total (ha)	**401.49**	**1,650.40**	**+1,248.91**
Species			
Ausfeld's wattle	-	10.5	**+10.5**
silky swainson-pea	1.0	19.4	**+18.4**

PCT/Species	Approved Project – Total Area of Impact (ha)[1]	Modified Project - Total Area within Indicative Development Footprints	Order of Change between Approved Project and Modified Project
glossy black-cockatoo	19.0	1.0	**-18.0**
large-eared pied bat	19.0	284.5	**+265.5**
square-tailed kite	-	1.4	**+1.4**
squirrel glider	19.0	243.3	**+224.3**
eastern cave bat	19.0	286.6	**+267.6**
black-chinned honeyeater	19.0	-	**-**
powerful owl	19.0	-	**-**
corben's long-eared bat	19.0	-	**-**
grey-crowned babbler	19.0	-	**-**
diamond firetail	19.0	-	**-**
masked owl	19.0	-	**-**
eastern bentwing bat	19.0	-	**-**

A detailed summary of the direct impacts to the 11 PCTs and seven species-credit species by the Modified Project broken down by Indicative Development Footprints - Wind Farm, External Transmission Line, and Public Road Upgrades is provided below in Table 41 and Table 42.

Table 41: Direct impacts to PCTs and associated offset obligation

Veg. Zone	Plant Community Type (PCT)	Area within Indicative Development Footprints (ha)				Total Credits Required
	Condition Class	Wind Farm	External Transmission Line	Public Road Upgrades	Total Combined Indicative Development Footprints	
1	PCT 84 – River Oak - Rough-barked Apple – red gum - box riparian tall woodland (wetland) of the Brigalow Belt South Bioregion and Nandewar Bioregion - *Moderate/Good*	6.5	-	1.6	**8.1**	**94**
2	PCT 281 – Rough-Barked Apple - red gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion -*Moderate/Good*	0.7	12.0	0.7	**13.4**	**514**
3	PCT 395 – Derived speargrass - wallaby grass - wire grass mixed forb grassland mainly in the Coonabarabran - Pilliga - Coolah region - *Moderate/Good*	149.2	41.9	6.3	**197.4**	**3,807**
4	PCT 479 – Narrow-leaved Ironbark-Black Cypress Pine - stringybark +/- Grey Gum +/- Narrow-leaved Wattle shrubby open forest on sandstone hills in the southern Brigalow Belt South Bioregion and Sydney Basin Bioregion - *Moderate/Good*	-	19.2	0.7	**19.9**	**462**
5	PCT 481 – Rough-barked Apple - Blakely's Red Gum - Narrow-leaved	-	12.7	-	**12.7**	**274**

Veg. Zone	Plant Community Type (PCT)	Area within Indicative Development Footprints (ha)				Total Credits Required
	Condition Class	Wind Farm	External Transmission Line	Public Road Upgrades	Total Combined Indicative Development Footprints	
	Stringybark +/- Grey Gum sandstone riparian grass fern open forest in the southern Brigalow Belt South Bioregion and Upper Hunter region - *Moderate/Good*					
6	PCT 483 – Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley - *Moderate/Good*	23.3	5.4	-	**28.7**	**1,332**
7	PCT 483 – Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley - *Low*	191.3	39.2	10.9	**241.4**	**8,273**
8	PCT 483 – Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley - *Exotic*	322.8	2.3	73.4	**398.5**	**5,716**
9	PCT 488 – Silvertop Stringybark - Yellow Box +/- Nortons Box grassy woodland on basalt hills mainly on northern aspects of the Liverpool Range, Brigalow Belt South Bioregion - *Moderate/Good*	95.9	-	-	**95.9**	**3,241**
10	PCT 488 – Silvertop Stringybark - Yellow Box +/- Nortons Box grassy woodland on basalt hills mainly on northern aspects of the Liverpool Range, Brigalow Belt South Bioregion - *Moderate/Good-Shrubby*	0.5	-	-	**0.5**	**10**
11	PCT 488 – Silvertop Stringybark - Yellow Box +/- Nortons Box grassy woodland on basalt hills mainly on northern aspects of the Liverpool Range, Brigalow Belt South Bioregion - *Low*	152.2	-	4.9	**157.1**	**3,967**
12	PCT 488 – Silvertop Stringybark - Yellow Box +/- Nortons Box grassy woodland on basalt hills mainly on northern aspects of the Liverpool Range, Brigalow Belt South Bioregion - *Exotic*	364.4	-	10.0	**374.4**	**0**
13	PCT 490 – Silvertop Stringybark - Forest Ribbon Gum very tall moist open forest on basalt plateau on the Liverpool Range, Brigalow Belt South Bioregion -*Moderate/Good*	11.0	-	-	**11.0**	**317**
14	PCT 495 – Brittle Gum - Silvertop Stringybark grassy open forest of the Liverpool Range, Brigalow Belt South Bioregion -*Moderate/Good*	7.3	-	-	**7.3**	**147**
15	PCT 1661 – Narrow-leaved Ironbark - Black Pine - Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin - *Moderate/Good*	-	52.9	0.3	**53.2**	**1,290**

Veg. Zone	Plant Community Type (PCT)	Area within Indicative Development Footprints (ha)				Total Credits Required
	Condition Class	Wind Farm	External Transmission Line	Public Road Upgrades	Total Combined Indicative Development Footprints	
16	PCT 1675 – Scribbly Gum - Narrow-leaved Ironbark - Bossiaea rhombifolia heathy open forest on sandstone ranges of the Sydney Basin - *Moderate/Good*	-	30.6	0.4	**31.0**	**657**
-	Nil (incl. roads, tracks and waterbodies)	14.1	4.1	79.2	**97.4**	**N/A**
-	Category 1 – Exempt Land	28.2	11.6	2.3	**42.1**	**N/A**
Total		**1,367.4**	**231.79**	**190.7**	**1,790.0**	**30,101**

Table 42: Direct impacts to species habitat and associated offset obligation

Species	Area within Indicative Development Footprints (ha)				Total Credits Required
	Wind Farm (ha)	External Transmission Line (ha)	Public Road Upgrades (ha)	Total Combined Indicative Development Footprints (ha)	
Ausfeld's wattle	-	10.5	-	**10.5**	**311**
Silky swainson-pea	-	19.4	-	**19.4**	**432**
Glossy black-cockatoo	-	0.8	0.2	**1**	**13**
Large-eared pied-bat	265.6	12.6	6.3	**284.5**	**6,862**
Square-tailed kite	-	1.4	-	**1.4**	**29**
Squirrel glider	167.0	74.1	2.2	**243.3**	**5,848**
Eastern cave bat	267.7	12.6	6.3	**286.6**	**6,910**
Total	**n/a**	**n/a**	**n/a**	**n/a**	**20,405**

Avoidance Measures

Although the Indicative Development Footprints proposed by the Modified Project have increased in size and the extent of native vegetation and habitat removal has increased compared with the Approved Project, numerous measures have been implemented to avoid impacts to significant biodiversity values. A summary of these efforts is outlined in Table 43.

Table 43: Summary of Avoidance Measures

Measure	Outcome
Reduction in the number of wind turbines	- The original Approved Project (SSD 6696) allowed for the construction and operation of up to 267 wind turbines. - The original biodiversity assessment stated the Project considered an application to construct and operate up to 417 wind turbines (NGH Environmental 2013a). - The Modified Project includes an application to construct and operate up to 220 wind turbines, a further reduction of 47 wind turbines from the Approved Project.

Measure	Outcome
Turbine spacing	- Spacing between the indicative turbine locations has been maximised to accommodate larger turbines, which in-turn gives birds and bats greater opportunity to move through the landscape between the wind turbines. In general, the majority of the indicative turbine locations are between approximately 500-600 metres apart. Final locations will be determined once a turbine is selected and in response to a range of other factors including wind resources, topography and ground conditions, and environmental constraints.
Avoidance of substantially altering the proposed transmission line	- The Applicant recognises the intactness and quality of vegetation, threatened species records and potential habitat, and landscape connectivity the approved transmission line interacts with. - The Applicant actively avoided substantial alterations to the proposed transmission line south of Golden Highway to the switching station at Ulan. - The External Transmission Line alignment proposed by the Modified Project almost remains unchanged from Approved Project south of the Golden Highway, with the exception of one minor change near Cliffdale Road (off Ulan Road), and the inclusion of a number of small access tracks.
Avoidance of Box Gum CEEC	- Overall impacts on Box Gum Woodland CEECs have increased as part of the Modified Project. This is not considered to be an outcome of the Modified Project expanding into new areas of the CEECs, rather, it is an outcome of: o The Modified Project undertaking a significant amount of design work that was informed by recent construction experience and detailed 3D terrain modelling to ensure the Project is constructable and associated impacts were accurately estimated and assessed. o The Modified Project identifying the necessary Public Road Upgrades required to facilitate the construction of the Project, which the Approved Project did not identify, survey or assess. o A new detailed analysis of current data collected from extensive BAM Vegetation Integrity Plots, current condition thresholds and assessment criteria which re-mapped areas not previously identified as the CEEC. - The Applicant consulted with and sought feedback from Umwelt following completion of extensive field surveys to understand the Box Gum Woodland CEEC constraints for the Project. Through this effort, the Modified Project has avoided better quality and larger patches of BC Act and EPBC Act listed Box Gum Woodland CEECs. - Particular locations where the project design has avoided impacts to better quality patches of the CEECs are provided below: o The public road reserves in the Project locality support large areas of BC Act and EPBC Act listed Box Gum Woodland CEECs, for the most part substantial impacts to these stands of vegetation have been avoided. o Extensive patches of BC Act and EPBC Act listed Box Gum Woodland CEECs occur in private properties between Rotherwood Road and Coolah Road. While the Modified Project does interact with this vegetation, the Applicant has avoided impacts to the better quality and larger patches of the BC Act and EPBC Act listed Box Gum Woodland CEECs.
Avoidance of threatened species records	- The Applicant has avoided three records of *Acacia ausfeldii* that were recorded as part of the Approved Project. It is noted however that known records of the species occur within and directly adjacent to the transmission line easement near the entry to Ulan Mine. Mitigation measures have been specifically designed to avoid and minimise impacts to these records. - The Applicant has avoided direct impact of three records of *Swainsona sericea* that were recorded as part of the Approved Project. It is noted that the continuous patches of vegetation where the species was recorded were used to identify a species polygon. Detailed targeted surveys as part of proposed pre-clearance surveys will ensure that *Swainsona sericea* are not impacted, where practicable.

Measure	Outcome
Avoidance of threatened species habitat and connectivity	- The Applicant consulted with and sought feedback from Umwelt regarding the potential to propose wind turbines in the far northeastern portion of the Project site, near Coolah Tops National Park. - Following this consultation and feedback, the Applicant reduced the proposed number of turbines in this area from 15 to 8. - Furthermore, the Applicant engaged Umwelt to undertake extensive habitat assessment and detailed targeted surveys for threatened species of forest owls and microbats, to determine whether or not breeding habitat was likely and/or present. - Following completion of these additional surveys, the Applicant altered the proposed location of several wind turbines to increase their distance from Coolah Tops National Park as well as other large patches of woodland and forests outside of the National Park. This recommendation and design change was a direct measure to avoid impacting habitat connectivity and proximity to high conservation value areas.

Key Changes in Design/Layout and Impacts to Box Gum Woodland CEEC

The Modified Project results in an increase in the extent of ground disturbance and associated native vegetation/habitat clearance, including to the Box Gum Woodland Critically Endangered Ecological Community (CEEC) listed under the BC Act (NSW Box Gum Woodland) and EPBC Act(Commonwealth Box Gum Woodland).

The key layout changes proposed by the Modified Project and the associated avoidance or impacts to Box Gum Woodland CEEC are listed below in Table 44 and shown below in Figure 30. Further detail of the proposed changes is shown on the maps contained in Appendix E.

The Modified Project is estimated to result in the following impacts to NSW and Commonwealth Box Gum Woodland:

- removal of approximately 427.0 ha of NSW Box Gum Woodland. This equates to approximately 2.2 x times the impact threshold of 200.85 ha specified in Condition 18(a) of the Development Consent.
- removal of approximately 42.1 ha of Commonwealth Box Gum Woodland which is 31.7 ha greater than the impact threshold of 10.37 ha specified in Condition 1 of the existing EPBC Approval (EPBC 2014/7136) and Condition 18(b) of the Development Consent.

This increase is not considered to be a result of the Modified Project impacting new areas or better patches of the CEEC. Instead, Umwelt Pty Ltd consider that the primary driver for this increase is the outcome of the detailed analysis of extensive BAM Vegetation Integrity Plots undertaken for the Modified Project against the Listing Advice for the CEEC.

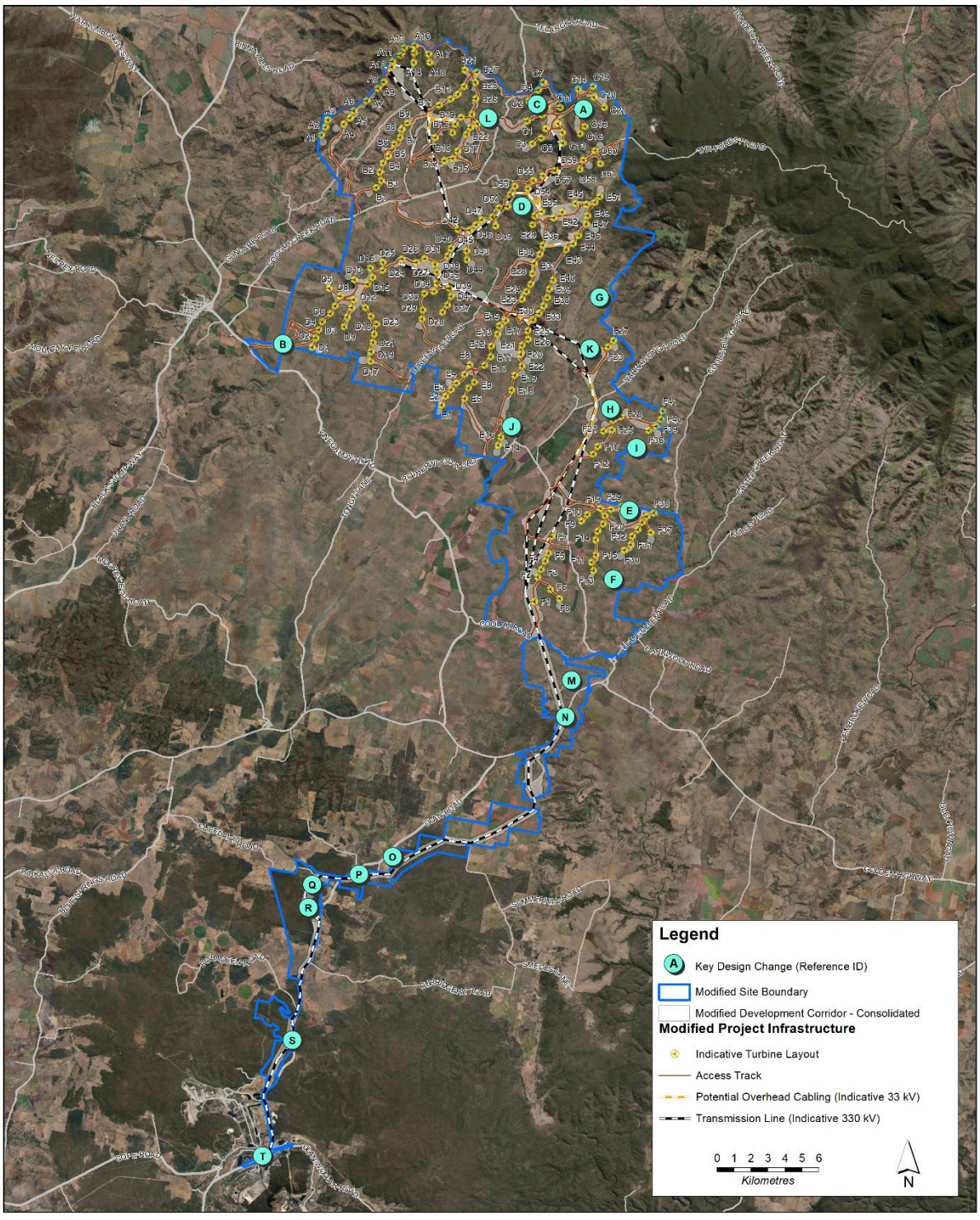
Table 44: Changes in infrastructure layout and impacts to Box Gum Woodland CEEC

Reference ID (see Figure 30)	Design Change/Avoidance/Minimisation Measure	Outcome/Impacts
N/A	Multiple avoidance/minimisation measures implemented, as described in the Original EIS/RTS	Development Consent granted for up to 267 turbines.
N/A	Reduction of 47 turbines to accommodate larger turbines.	Increased ground disturbance based on extensive 3D terrain modelling and more realistic design assumptions based on recent construction experience.

Reference ID (see Figure 30)	Design Change/Avoidance/Minimisation Measure	Outcome/Impacts
A	Eight turbines relocated in the C Cluster in the north east portion of the Project site following extensive biodiversity and heritage surveys (the North East Turbine Cluster), as well as a potential permanent met masts and construction compound/concrete batch plant.	The 8 x relocated turbines result in an additional ~29.5 ha of ground disturbance, and no additional impacts to Box Gum Woodland CEEC. **See detailed map on Sheet 3 of Appendix E.**
B	Removal of Approved Site Access Point #9 (located off Vinegaroy Road) and associated access track to Approved Project Turbine C6-5, and replacement with alternate Site Access Point #113/114 off Vinegaroy Road and associated access track to turbines in the D Cluster. This has resulted in the removal of land parcels, and the addition of new land parcels within the Modified Site Boundary	Increase of ~11.7 ha of ground disturbance and ~9 ha of additional impact to Box Gum Woodland CEEC. **See detailed map on Sheet 7 of Appendix E.**
C	Removal of section of 33 kV overhead cabling in C Cluster east of Pandora Pass Road	Avoids impact to ~6.5 ha of Box Gum Woodland CEEC. **See detailed map on Sheet 2 of Appendix E.**
D	Removal of section of 33 kV overhead cabling in D Cluster south of State Forest Road	Avoids impact to ~1.5 ha of Box Gum Woodland CEEC. **See detailed map on Sheet 5 of Appendix E.**
E	Removal of 33 kV overhead cabling in F Cluster east of Rotherwood Road	Avoids impact to ~15.6 ha of Box Gum Woodland CEEC. **See detailed map on Sheet 12 of Appendix E.**
F	Removal of access track off Rotherwood Road to F Cluster	Avoids impact to ~9 ha of Box Gum Woodland CEEC. **See detailed map on Sheet 14 of Appendix E.**
G	Removal of approved turbine G5-4 (near Bounty Creek Road north of the F Cluster) and associated access track and overhead 33 kV overhead cabling from Bounty Creek Road	Avoids impact to ~4.5 ha of Box Gum Woodland CEEC. **See detailed map on Sheet 10 of Appendix E.**
H	Removal of section of 33 kV overhead cabling in F Cluster east of Yarrawonga Road	Avoids impact to ~6.3 ha of Box Gum Woodland CEEC. **See detailed maps on Sheets 10 and 12 of Appendix E.**
I	Removal of section of access track in F Cluster east of Yarrawonga Road	Avoids impact to ~1.0 ha of Box Gum Woodland CEEC. **See detailed map on Sheet 12 of Appendix E.**
J	Removal of section of access track off Norfolk Road to E Cluster and upgrades to Norfolk Road.	Avoids ground disturbance and vegetation/habitat impacts associated with ~1.3 km of wind farm access track and ~500 m of public road upgrades. **See detailed map on Sheet 11 of Appendix E.**
K	Removal of section of 33 kV overhead cabling in	Avoids ground disturbance and vegetation/habitat impacts associated with ~1.2 km of 33 kV overhead

Reference ID (see Figure 30)	Design Change/Avoidance/Minimisation Measure	Outcome/Impacts
	the F Cluster east of Bounty Creek Road	cabling. **See detailed map on Sheet 10 of Appendix E.**
L	Removal of section of 33 kV overhead cabling between the B Cluster and C Cluster west of Pandora Pass Road	Avoids ground disturbance and vegetation/habitat impacts associated with ~1.1 km of 33 kV overhead cabling. **See detailed map on Sheet 2 of Appendix E.**
M	Inclusion of new access track off Golden Highway to construct and maintain the 330 kV External Transmission Line	Increase of 2.62 ha of impact to Box Gum Woodland CEEC **See detailed map on Sheet 15 of Appendix E.**
N	Inclusion of new access track off Golden Highway to construct and maintain the 330 kV External Transmission Line	Increase of 1.32 ha of impact to Box Gum Woodland CEEC **See detailed map on Sheet 15 of Appendix E.**
O	Inclusion of new access track off Ulan Road to construct and maintain the 330 kV External Transmission Line	Increase of 0.49 ha of impact to Box Gum Woodland CEEC **See detailed map on Sheet 16 of Appendix E.**
P	Inclusion of new access track off Ulan Road to construct and maintain the 330 kV External Transmission Line	No impact to Box Gum Woodland CEEC **See detailed map on Sheet 16 of Appendix E.**
Q	Shift section of External Transmission Line west to minimise potential visual impact and minimise impact to Durridgere State Conservation Area further south, and inclusion of potential concrete batch plant/construction compound/laydown area	Negligible change in ground disturbance and native vegetation/habitat impacts. **See detailed map on Sheet 16 of Appendix E.**
R	Potential to shift section of External Transmission Line east to avoid impacts to Durridgere State Conservation Area in this location	Avoid impacts to Durridgere State Conservation Area in this location. **See detailed map on Sheet 16 of Appendix E.**
S	Shift External Transmission Line east to avoid impacts to the land parcel (Lot 751 / DP 1270886) within which Hands on Rock cultural heritage site is located	Minimise impacts to the land upon which Hands on Rock is located. **See detailed map on Sheet 17 of Appendix E.**
T	Inclusion of potential upgrade works to existing Transgrid towers and associated access tracks, as requested by Transgrid	Increase in ground disturbance. No additional impacts to native vegetation/habitat. **See detailed map on Sheet 17 of Appendix E.**

Figure 30: Changes to layout and impacts to Box Gum Woodland CEEC



Serious and Irreversible Impact (SAII) Assessment

One threatened ecological community (NSW Box Gum Woodland CEEC) and two threatened species (large-eared pied-bat and eastern cave bat) are identified by DPE as entities at-risk of Serious and Irreversible Impact (SAII). An assessment of the potential for SAII to the three at-risk entities was undertaken in accordance with the principles set out in clause 6.7 of the Biodiversity Conservation Regulations 2017. In accordance with Section 3.2 of the Biodiversity Assessment Method Operational Manual – Stage 2 ultimately

the consenting authority is responsible for deciding whether an impact is serious and irreversible and whether there are any additional and appropriate measures that will minimise that impacts when approving a State Significant Development (SSD) (or modification to an SSD) which is likely to have serious and irreversible impacts.

The key conclusions of the SAII assessment are as follows:

- **NSW Box Gum Woodland CEEC:** The current total geographic extent of the Box Gum Woodland CEEC in NSW as 250,729 hectares but the community is also known to occur in Queensland and Victoria. However, the community has suffered a very large reduction in geographic distribution" and there is evidence that clearing is ongoing with approximately 93% of the pre-1750 area having been cleared. The Modified Project is estimated to impact on 427.0 ha of the NSW Box Gum Woodland CEEC out of a total of 3,081.19 ha of Box Gum Woodland CEEC identified as being present within the Modified Development Corridor. Of the 427.0 ha to be impacted, only 42.1 ha (10%) is in moderate to good condition woodland, with the remaining 409.7 ha (90%) being in derived native grasslands and low condition (90%). Despite the increase in potential impacts to the NSW Box Gum Woodland CEEC proposed by the Modified Project, the significance of the proposed impact is not considered to have substantially increased.
- **Large-eared pied bat:** The Modified Project Indicative Development Footprint would clear about 18% of the area of habitat recorded within the Modified Development Corridor (being habitat within 2 km of suitable rocky habitat), but will not impact directly on shelter and breeding sites. There is a risk that individuals may be impacted by turbine strike and/or barotrauma.
- **Eastern cave bat:** The Modified Project will clear about 18% of the area of potential habitat recorded within the Modified Development Corridor (being habitat within 2 km of potential roosting habitat), but will not impact roosting habitat. There is a risk that individuals may be impacted by turbine strike and/or barotrauma.

The Applicant is committed to minimise potential impacts to relevant SAII entities through the detailed design process. This could involve optimising further the design of infrastructure to reduce the extent of ground disturbance by, for instance, designing steeper access track batters and/or reducing the number of adjacent underground cables where geotechnical conditions allow. The Applicant will work closely with DPE and other relevant stakeholders to understand whether additional evidence-based, reasonable and feasible mitigation measures would be required to further reduce potential impacts to relevant SAII entities.

Matters of National Environmental Significance

Consistent with the Approved Project (EPBC 2014/7136), the Modified Project will impact five Matters of National Environmental Significance (MNES), being Commonwealth Box Gum Woodland CEEC, regent honeyeater, swift parrot, large-eared pied-bat and koala. Impacts include:

- 42.1 ha of Commonwealth Box Gum Woodland CEEC within Vegetation Zone 2 (13.4 ha) and Vegetation Zone 6 (28.7 ha)
- 577.8 ha of potentially suitable habitat for the regent honeyeater (threatened species)
- 471.7 ha of potentially suitable habitat for the swift parrot (threatened species)
- 284.5 ha of potentially suitable habitat for the large-eared pied bat (threatened species), and
- 672.3 ha of potentially suitable habitat for the koala (threatened species).

None of the potentially impacted threatened species have been recorded in the Modified Development Corridor.

A referral under the EPBC Act is currently being finalised for the Modified Project and will be lodged in due course.

Management and Mitigation Measures

The Applicant has committed to the design and implementation of measures to mitigate the unavoidable impacts of the Project. These measures will be designed and described within the Biodiversity Management Plan (BMP) which will be prepared in accordance with the existing Development Consent, and Vegetation Clearance Plan which will be prepared in accordance with the EPBC approval.

These management plans will contain control measures to mitigate impacts on biodiversity features of the Indicative Development Footprints for the Wind Farm, External Transmission Line, and Public Road Upgrades.

Table 45 outlines how the Applicant has satisfied and/or will satisfy relevant conditions of the Development Consent and comply with the required mitigation measures.

Table 45: Management / Mitigation Requirements

Conditions of Consent	Assessment
Condition 18, Schedule 3 **Restrictions on Clearing Habitat**	Despite substantial efforts made by the Applicant to avoid/minimise impacts to White Box Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC listed under the BC Act and EPBC Act, increases to the clearance thresholds specified in the Development Consent are required. Where possible, hollow-bearing trees have been avoided. Pre-clearance surveys for key fauna habitat will be undertaken to limit removal of these habitats. Once a final wind turbine is selected, all reasonable efforts will be made to reduce the final Development Footprints through the detailed design process, to minimise impacts to these threatened ecological communities.
Condition 19, Schedule 3 **Biodiversity Offset**	As part of the BDAR, that Applicant has updated baseline mapping and calculated the biodiversity offset credit liabilities. Once a final wind turbine is selected, and final Development Footprints confirmed, the biodiversity offset credit liabilities will be confirmed.
Condition 20, Schedule 3 **Biodiversity Offset**	The Applicant is in the process of securing the required offsets. In accordance with the BC Act, the biodiversity credits identified in the BDAR are required to offset the impact of the Project. A Biodiversity Offset Strategy that appropriately compensates for the loss of biodiversity values is currently being prepared. Surveys of potential land-based biodiversity offsets are being progressed by the Applicant to identify potential credit yield from various sites. Currently, a number of potential sites have been identified and are being investigated for their suitability for the required biodiversity offsets. Through the detailed design process the Applicant will seek to further reduce the extent of ground disturbance and minimise impacts to biodiversity values. The Applicant may seek to stage the retirement of offsets in accordance with the staging requirements set out in Schedule 2, Condition 9 of the Development Consent. These details will be reflected in the biodiversity offset strategy.
Condition 21, Schedule 3 **Biodiversity Management Plan**	A comprehensive mitigation strategy to mitigate adverse biodiversity impacts of the Project will be designed and detailed within the Biodiversity Management Plan (BMP).

Biodiversity Offset Strategy

The Applicant is currently preparing a biodiversity offset strategy that appropriately compensates for the unavoidable loss of ecological values as a result of the Modified Project in accordance with the Biodiversity Offset Scheme (BOS). Following the application of avoidance and minimisation measures, the BDAR

concludes that a total of 11 PCTs and seven species-credit species require offsetting in accordance with the BAM. The required ecosystem and species-credit offset credits are summarised above in Table 41 and Table 42 respectively.

The biodiversity offset strategy will detail the approach to use a combination offset options available under the BC Act, Biodiversity Conservation Regulation 2017 (BC Regulation), and EPBC Act which may include:

- Land based offsets through the establishment of new Stewardship Sites (and subsequent retirement of credits). The Applicant would then retire the required number and class of credits determined in accordance with the BDAR in accordance with the conditions of the Development Consent and any new EPBC approval issued for the Modified Project following re-referral, and the required offset rules.
- Purchasing credits from existing Stewardship Sites through the open credit market and then retiring them; and
- Paying into to the Biodiversity Conservation Fund (BCF).

The Applicant will implement the biodiversity offset strategy to ensure the efficient and timely retirement of credits for the Project. The Applicant has engaged a BAM-accredited assessor and offset credit broker and is liaising closely with multiple real estate agents, to identify potential Stewardship Sites and refine the biodiversity offset strategy. The Applicant has begun investigating a number of potential Stewardship Sites to determine their suitability to provide ecosystem credits and/or species credits, and negotiations have commenced on multiple sites. The current investigations have included desktop-based assessments as well as preliminary field surveys. The Applicant is also actively monitoring the credit register for availability of relevant credits.

The Applicant has optimised the Modified Project infrastructure layout to avoid and minimise ecological impacts in the planning and design stages as far as practicable at this phase of the Project. The Applicant will make all reasonable efforts to further minimise impacts to biodiversity values as the Project progresses towards construction, as well through the micro-siting process during construction.

Condition 20 of the Development Consent requires that the Applicant retire the required biodiversity offsets within two years of commencement of construction; or stage thereof (as per Condition 9, Schedule 2 of the Development Consent), which provides a substantial incentive for the Applicant to further minimise impacts through the construction phase. This approach is consistent with the 'avoid-minimise-offset' hierarchy and the 'no net loss' of biodiversity objective set out in the Biodiversity Offset Scheme (BOS). The Applicant may seek to stage the retirement of offsets in accordance with the staging requirements set out in Schedule 2, Condition 9 of the Development Consent.

Potential Alternate Transmission Line Connection (CWO REZ Transmission Line)

In the event the proposed CWO REZ transmission line between Uarbry Energy Hub and the Project site becomes a viable option (discussed in Section 2.3), the External Transmission Line and Connection Infrastructure component would no longer be required, and the identified impacts to PCTs and species habitat within the External Transmission Line Site would no longer apply.

Conclusion

The Applicant will continue to identify opportunities to avoid and minimise impacts to native vegetation and habitat as the Project progresses through detailed design and into construction. Where impacts cannot be avoided, those impacts will be offset in accordance with the NSW Biodiversity Offset Scheme and the conditions of the Development Consent any new EPBC approval issued for the Modified Project following re-referral to achieve not-net-less in biodiversity values. Taken together, the identified impacts are considered to be acceptable and outweighed by the clear public benefits arising from the Modified Project.

The clearance thresholds specified in Condition 18 of the Development Consent will require updating to reflect the increased Indicative Development Footprints.

The Modified Project will not impact the ability to comply with Conditions 19 – 21 of Schedule 3 of the Development Consent.

7.7 Biodiversity (Birds and Bat)

7.7.1 Approach

A Bird and Bat Strike Risk Assessment was prepared by Umwelt Pty Ltd which forms part of the Biodiversity Development Assessment Report (BDAR) (contained in Appendix G.4) to assess the change in potential impacts to bird and bat species from the Approved Project to the Modified Project.

The Wind Energy Guidelines (DPE, 2016a) state:

> *"A key biodiversity issue for wind energy development is bird and bat strike and whether suitable measures are proposed to manage potential bird and bat strike fatalities resulting from either direct collision or through barotrauma…"*

For those species where the comparative risk assessment indicated an increased risk from the Modified Project, the impacts were considered against the BC Act, and where relevant, the EPBC Act. These, in addition to the relevant Conditions of Consent are outlined in Table 46 and Table 47 respectively.

Table 46: Relevant Bird and Bat Guidelines

Relevant Guidelines	Description
Section 7.3 of the BC Act	The purpose of the Section 7.3 test is to determine whether the proposed development or activity is likely to significantly affect threatened species or ecological communities, or their habitats. These tests summarised the outcome in a table format for comparative purposes to the Approved Project.
Matters of National Environmental Significance Guidelines (MNES Guidelines)	The purpose of these guidelines is to determine whether or not a referral to the Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW) for a decision by the Minister for the Environment on whether assessment and approval is required under the EPBC Act.

Table 47: Relevant Bird and Bat Conditions

Relevant Conditions	Description
Condition 22 of Schedule 3 **Bird and Bat Adaptive Management Plan**	Requires the Applicant to prepare a Bird and Bat Adaptive Management Plan (BBAMP) prior to commissioning any turbines.

7.7.2 Assessment

Original EIS/RTS

The following assessments were undertaken in support of the Original EIS and RTS to assess potential bird and bat strike during operation of the wind turbines:

- Biodiversity Assessment, Wind Farm Study Area, NGH Environmental, December 2013;
- Raptor and Bird Utilisation Surveys, Brett Lane & Associates, September 2017.

These assessments found that 13 bird and bat species were at risk of blade strike, of which:

- three were assessed as High risk (Regent Honeyeater, Square-tailed Kite, and Dusky Woodswallow);
- six were assessed as Moderate risk (Swift Parrot, Barking Owl, Powerful Owl, Large-eared Pied Bat, Yellow-bellied Sheathtail Bat, and Eastern Cave Bat); and
- four were assessed as Low risk (Spotted Harrier, Masked Owl, Eastern Bentwing Bat, and Corben's Long-eared Bat)

DPE concluded that the Project would not pose a significant or unacceptable level of risk to bird and bat species in the vicinity of the proposed wind turbines and prescribed the Applicant to prepare a Bird and Bat Adaptive Management Plan (BBAMP) as per the requirements of Condition 22, Schedule 3 of the Development Consent.

Proposed Modifications

A detailed prescribed impact assessment has been prepared by Umwelt Pty Ltd as part of the Biodiversity Development Assessment Report (BDAR) for the Modified Project (to consider the potential impacts associated with turbine strike and barotrauma on protected bird and bat species see Appendix G.4). The prescribed impact assessment has been prepared in accordance with Sections 6.1.5 and 8.3.5 of the Biodiversity Assessment Method (BAM), 2020.

The assessment considered 27 species, comprising 17 threatened species (12 bird and five bat species). A total of 18 species were assessed as being at-risk of blade strike/barotrauma based on them being recorded within the Project site, and the known susceptibility of the species to turbine strike and barotrauma in Australia.

The results of the risk assessment determined that six (6) species were considered to be at High risk, 10 species were considered to be at Moderate risk and the remaining two (2) species were considered at Minor risk of being impacted by turbine strike and barotrauma as a result of the Modified Project (see Table 48). The resultant risk rating for these species is primarily due to their relative abundance within the Project site, their predicted or observed flight behaviour and/or their known susceptibility to blade strike at wind farms in south-east Australia.

Table 48: Turbine Strike Risk Assessment Summary

Common Name	Latin Name	Likelihood	Consequence	Risk Rating
White-throated needletail	*Hirundapus caudacutus*	High	Moderate	High
Barking owl	*Ninox connivens*	High	Moderate	High
Large bent-winged bat	*Miniopterus orianae oceanensis*	High	Moderate	High
Powerful owl	*Ninox stenua*	High	Moderate	High
Regent honeyeater	*Anthochaera phrygia*	Moderate	High	High
Swift parrot	*Lathamus discolor*	Moderate	High	High
Large-eared pied bat	*Chalinolobus dwyeri*	Moderate	Moderate	Moderate
Yellow-bellied sheath-tail bat	*Saccolaimus flaviventris*	Moderate	Moderate	Moderate
Eastern cave bat	*Vespadelus troughtoni*	Moderate	Moderate	Moderate
Corben's long-eared bat	*Nyctophilus corbeni*	Moderate	Moderate	Moderate
Dusky woodswallow	*Artamus cyanopterus*	High	Low	Moderate
Wedge-tailed eagle	*Aquila audax*	High	Low	Moderate
Black-chinned honeyeater	*Melithreptus gularis*	Moderate	Moderate	Moderate
Painted honeyeater	*Grantiella picta*	Moderate	Moderate	Moderate
Superb parrot	*Polytelis swainsonii*	Moderate	Moderate	Moderate

Little Eagle	*Hieraaetus morphnoides*	Moderate	Moderate	Moderate
Brown falcon	*Falco berigora*	Moderate	Low	Minor
Square-tailed kite	*Lophoictinia isura*	Low	Moderate	Minor

The overall risk rating of High for powerful owl, barking owl and large bent-winged bat reflect the likelihood of those species occurring in the Project site, their population sizes and potential to fly within the rotor swept area (RSA).

The overall risk rating of High for swift parrot and regent honeyeater reflects the very small remaining population sizes, coupled with each species' migratory nature, the extent of habitat fragmentation in the local area and region and the species' critically endangered status.

The overall risk rating of High for white-throated needletail largely reflects the High likelihood of collision of birds in the Project site given their known susceptibility to blade strike at other wind farms in Australia.

The prescribed impact assessment notes that while the indicative rotor swept area proposed by the Modified Project has increased due to increased blade lengths, the overall impact of blade strike and barotrauma is considered to be consistent with the Approved Project, due in large part to the following:

- the Applicant has sought to modify the wind turbine layout to avoid areas of high quality habitat for particular bird and bat species
- the slight increase to the minimum blade tip height reduces the potential impact or risk of impact on smaller woodland bird species, and
- the Applicant has modified the wind turbine layout to accommodate larger turbines which has led to an increase in the distance between turbines. This in-turn provides greater distances for avian fauna species to travel within the Project site.

The results of this assessment will inform the Bird and Bat Adaptive Management Plan (BBAMP) which will be prepared in consultation with BCS and in accordance with Development Consent. The BBAMP will detail the mitigation measures to reduce the collision risk of identified species.

Summary

T**he Modified Project will not impact the ability to comply with Conditions 23 of Schedule 3 of the Development Consent that relates bird and bat strike management.**

7.8 Aboriginal Cultural Heritage

7.8.1 Approach

The Aboriginal Cultural Heritage Assessment (ACHA) (contained at Appendix G.5) was prepared by Umwelt Pty Ltd to assess the change in potential impacts to Aboriginal cultural heritage from the Approved Project to the Modified Project, in particular the modified Indicative Development Footprints (Wind Farm and External Transmission Line) and the addition of the Indicative Development Footprint – Public Road Upgrades (described in Section 4.9.1).

The Wind Energy Guidelines (DPE, 2016a) state:

"…Aboriginal heritage will continue to be dealt with through existing policies and practices…."

The ACHA was prepared in accordance with the guidelines and relevant Conditions of Consent as outlined in Table 49 and Table 50 respectively.

Table 49: Relevant Aboriginal and Cultural Heritage Guidelines

Relevant Guidelines	Description
***Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH, 2011)**	This guideline provides guidance on the process when investigating and assessing whether Aboriginal cultural heritage values and objects are present and the harm a proposed activity may cause to them.
***Code of Practice for the Archaeological Investigation of Aboriginal Objects in New South Wales* (OEH, 2010a)**	This code provides information about how to protect and conserve Aboriginal cultural heritage by specifying minimum standards for archaeological investigation
***Aboriginal cultural heritage consultation requirements for proponents 2010* (OEH, 2010b).**	Consultation with Aboriginal groups undertaken in accordance with this guideline.
National Parks and Wildlife Amendment (Aboriginal Objects and Places) Regulation 2010.	Aboriginal Heritage in NSW is primarily protected under this regulation. Consultation with Aboriginal groups was also undertaken in accordance with this regulation.

Table 50: Relevant Aboriginal and Cultural Heritage Conditions

Relevant Conditions	Description
Condition 23 of Schedule 3 (Protection of Heritage Items)	Requires the Applicant to ensure the development does not cause any direct or indirect impacts on the Aboriginal heritage items identified in Table 1 in Appendix 5, or located outside the approved development corridor, minimise any impacts on the Aboriginal heritage items identified in Table 2 in Appendix 5 and undertake salvage excavation adjacent to creek lines identified in Table 3 in Appendix 5 where impacts cannot be avoided.
Condition 24 of Schedule 3 (Heritage Management Plan)	Requires the Applicant to prepare a Heritage Management Plan that will outline suitable measures to manage the impacts of the development on Aboriginal and historic heritage within and adjoining the development disturbance areas

7.8.2 Assessment

Original EIS/RTS

An Aboriginal Cultural Heritage Assessment (and Update) was prepared by NSW Archaeology Pty Ltd in 2014 (and 2017) in support of the Original EIS and RTS. Substantial survey effort across the Approved Development Corridor and consultation with the local Aboriginal community was undertaken as part of the preparation of that assessment. The key findings of the assessment are summarised as follows:

- The assessment identified 17 Aboriginal heritage items within the Approved Development Corridor that could be directly impacted by the project, including 4 previously recorded Aboriginal heritage items and 13 previously unidentified Aboriginal heritage items.
- Of the 17 Aboriginal heritage items identified within the Approved Development Corridor, 12 of the stone artefact scatters were assessed as having low significance, 1 stone artefact scatter and 1 PAD were assessed as having low/moderate significance, 1 PAD was assessed as having moderate significance and the 2 rock shelters have the potential to contain archaeological deposits.
- The assessment also identified a number of landform units adjacent to creek lines within the Approved Development Corridor that were potentially used by Aboriginal people for hunting, gathering and camping, and as a result, are likely to have artefacts present.
- The assessment included recommendations to:
    - avoid impacts to the identified Aboriginal heritage rock shelters and PADs, and provide a buffer around them of at least 50 m.
    - micro-site power poles in the transmission line to minimise impacts to Aboriginal heritage items located in proximity to the transmission line route.
    - undertake a program of salvage excavation at the identified selection of landform units adjacent to creek lines if impacts to them cannot be avoided.

In its Assessment Report, DPE accepted the findings and recommendations of the Aboriginal Cultural Heritage Assessment prepared by NSW Archaeology Pty Ltd and authorised Conditions 23 and 24 of Schedule 3 of the Development Consent as summarised in Table **50** above. Appendix 5 of the Development Consent contains Aboriginal heritage items whereby impacts are to be avoided, minimised or items salvaged in accordance with Condition 23 of Schedule 3 of the Development Consent.

Proposed Modifications

The revised Aboriginal Cultural Heritage Assessment (ACHA) prepared for the Modified Project by Umwelt Pty Ltd involved field surveys of the area comprising the public road upgrades and those areas where the Modified Development Corridor extends outside the Approved Development Corridor (termed “Assessment Area”). All other areas within the Approved Development Corridor are addressed in the previous ACHA prepared by NSW Archaeology Pty Ltd in 2014/2017 in support of the Original EIS/RTS. The revised ACHA has been prepared in consultation with the Registered Aboriginal Parties (RAPs).

The key findings of the revised ACHA are summarised as follows:

- Additional areas of Low-moderate or Moderate archaeological potential (areas where it is considered likely that additional artefacts may be present below the ground surface) were identified (including some associated with surface artefacts).
- One area of cultural sensitivity was identified. Impacts to this area must be avoided.
- The findings of recommendations of the revised ACHA should supplement the existing conditions of the Development Consent related to Aboriginal cultural heritage.

The revised ACHA prepared by Umwelt Pty Ltd for the Modified Project found that the results of the surveys are broadly consistent to both the previous assessments undertaken across the Approved Development Corridor by NSW Archaeology Pty Ltd in support of the Original EIS/RTS and the archaeological patterning of the region.

As part of the revised ACHA three low density artefact scatters and one isolated artefact were recorded, with the density and characteristics of these sites similar to those recorded previously, with the exception of the slightly higher artefact density at LRWF AS3 on Curryall Creek. Similarly, the presence of three (3) new scarred trees is in accordance with the predictive model for the area. The finding that the majority of the Assessment Area has low archaeological potential, with the exception of key landforms associated with watercourses is also consistent with the findings of the NSW Archaeology Pty Ltd (2014, 2017) assessments.

The micro-siting of infrastructure allows for some flexibility in the management of Aboriginal cultural heritage. In relation to the sites identified during the assessment, the revised ACHA found the following:

- Impacts to scarred trees recorded as AHIMS #28-6-0022, LRWF ST1 and LRWF ST2 and to the identified modified tree (AHIMS site 36-3-0203) can be avoided.
- Impacts will likely be avoided to scarred trees recorded as AHIMS #28-6-0020 and LRWF ST2. However, these two sites are located within the Indicative Development Footprint – Public Road Upgrades which has been developed to meet the required standards agreed with the relevant councils. The Applicant will work with the relevant Council to endeavour to avoid impacts to these sites (including a buffer inclusive of the dripline for #28-6-0020 and a buffer comprising the dripline and the edge of the current road surface for LRWF ST2) but it is recognised that impacts may be required.
- Impacts to LRWF IA1 can be avoided.
- Impacts in the vicinity of LRWF CS1 have been subject to redesign to ensure that there are no impacts to the identified area, including the buffer, as agreed with Aboriginal parties.
- Impacts may be necessary to LRWF AS1-3, AHIMS 36-3-1137 and the identified areas of low-moderate or moderate archaeological potential. During final design and construction planning, all consideration will be given to minimising impacts to these sites and areas of potential however, for the purposes of this ACHA, it is assumed that partial or complete impact to these sites/areas may occur.

The newly recorded Aboriginal heritage values identified as part of the Modified Project and their level of significance, potential impacts, and applicable mitigation or management measure to minimise harm, are listed in Appendix C.4 (see also Appendix G.5). Appendix C.4 of this report includes an updated list of the existing Aboriginal heritage items specified in the Development Consent and the additional Aboriginal heritage items identified as part of the Modified Project. A high level map showing both existing heritage items listed in the Development Consent and newly recorded heritage items is provided in Figure 31 and Figure 32 below.

Figure 31: Heritage items and applicable mitigation and management measures (northern section)

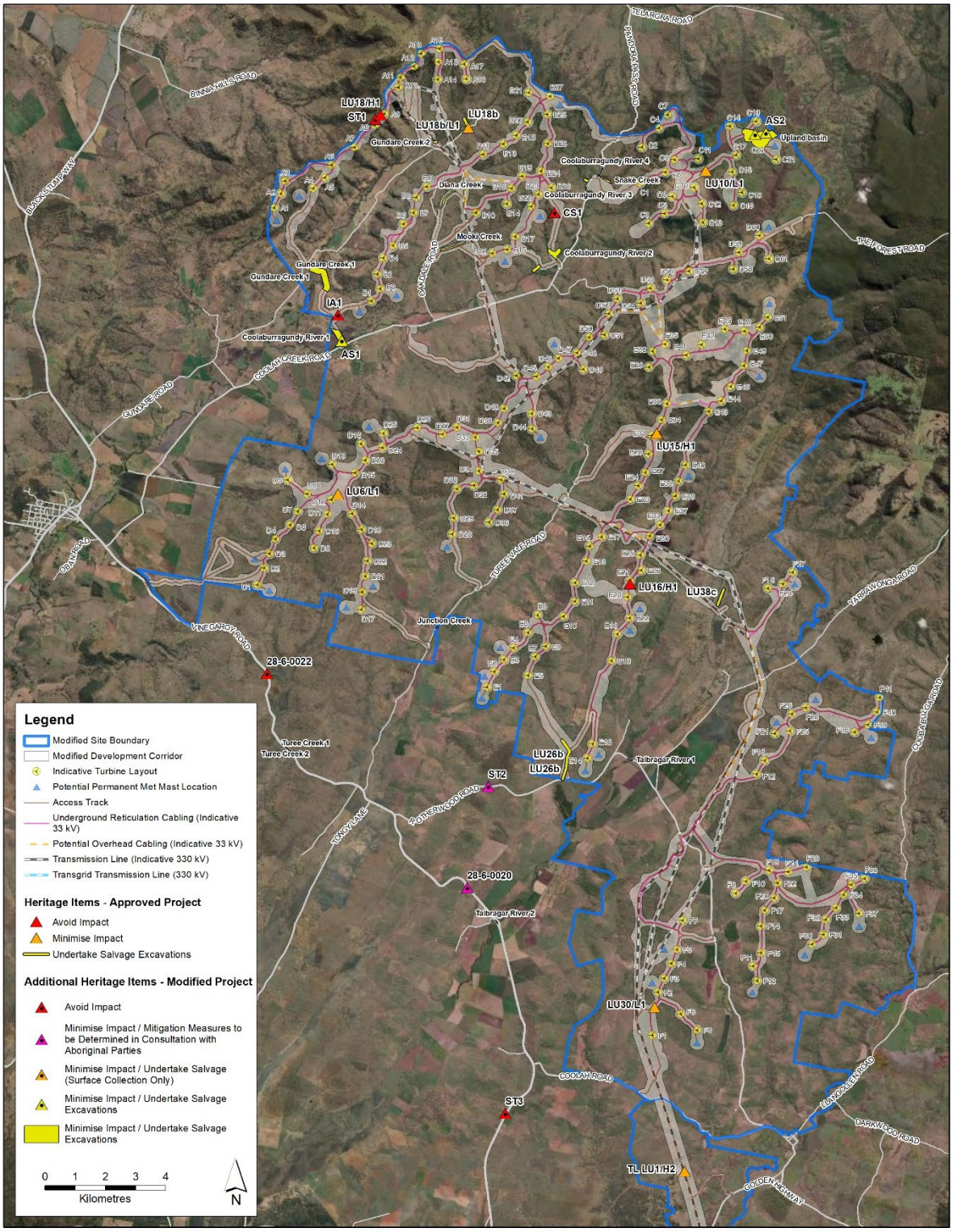
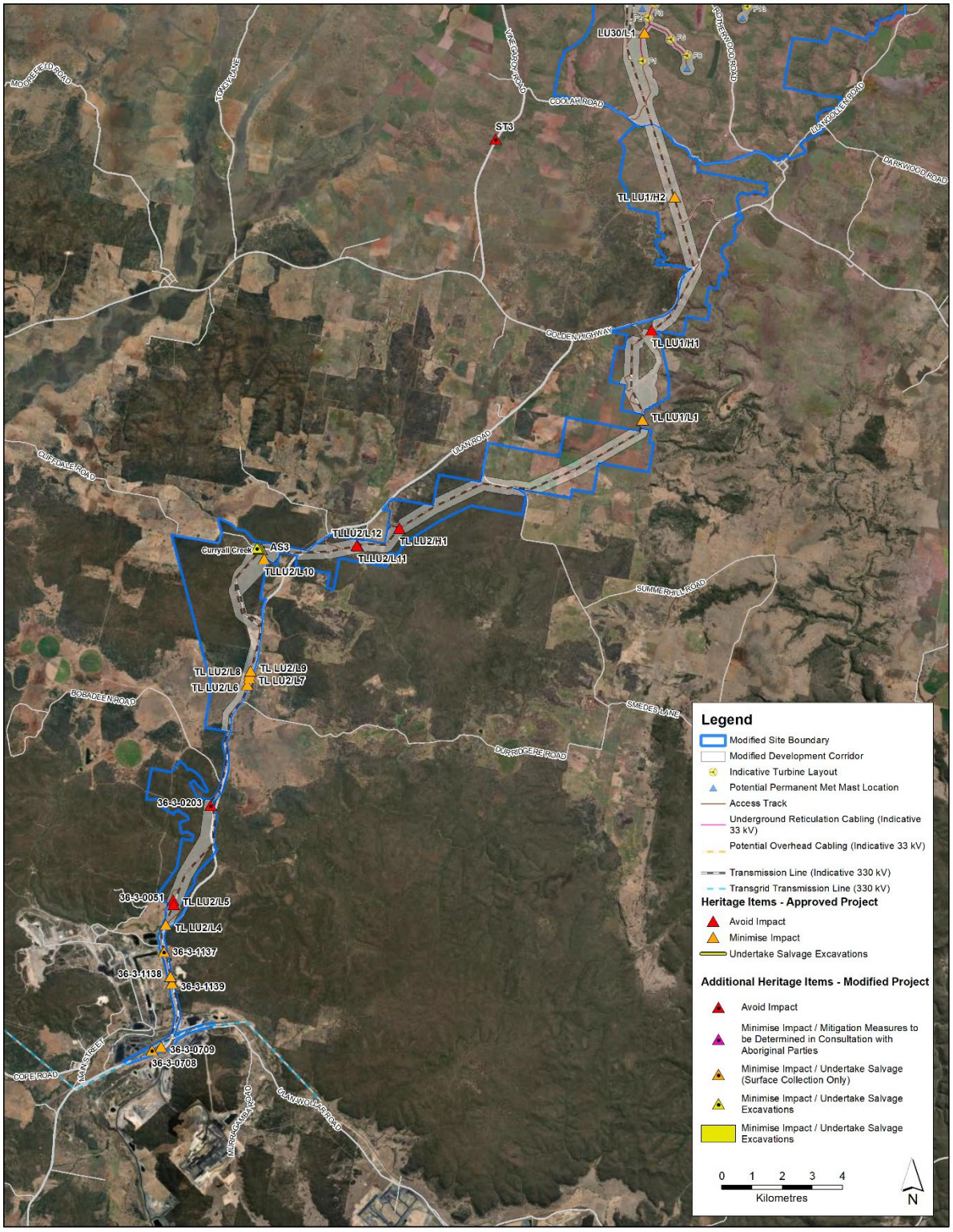


Figure 32: Heritage items and applicable mitigation and management measures (southern section)



Consultation with Registered Aboriginal Parties (RAPs) occurred as part of the ACHA that prepared by NSW Archaeology Pty Ltd in support of the Original EIS/RTS. Further consultation has been undertaken with RAPs as part of the revised ACHA prepared by Umwelt Pty Ltd for the Modified Project. A total of 22 RAPs registered their interest in the Modified Project.

The draft consultation version of the ACHA was provided to the RAPs for comment. No material issues were raised by the RAPs. Following conclusion of the consultation period with the RAPs, amendments have since been made to the Modified Development Corridor (Wind Farm and External Transmission Line) that was assessed in the version of the ACHA that was reviewed by the RAPs. Those changes to the Modified Development Corridor are limited to removal of land in the northwest portion of the Modified Site Boundary and addition of land along the External Transmission Line near Hands on Rock cultural heritage site (see Section 4.5.1 and Section 4.9.2). The ACHA has since been updated accordingly, and the Applicant has committed to undertake field surveys of the additional land that has now been included in the Modified Development Corridor (External Transmission Line) near the Hands on Rock cultural heritage site prior to determination of this Modification Application.

Mitigation measures

A Heritage Management Plan (AHMP) must be prepared in accordance with Condition 24 of Schedule 3 of the Development Consent. The HMP will outline suitable measures to manage the potential impacts of the development on Aboriginal heritage values.

The revised ACHA prepared for the Modified Project recommends that the HMP should be developed in consultation with the RAPs to address the relevant conditions of the Development Consent SSD and include measures to avoid and minimise impacts to newly identified Aboriginal archaeological sites and areas of archaeological potential identified in the revised ACHA. The HMP should also include a requirement to undertake additional inspections in specified areas where access was not available and/or where current vegetation conditions did not facilitate effective survey, protocols for unexpected finds, and monitoring and reporting requirements.

Potential Alternate Transmission Line Connection (CWO REZ Transmission Line)

As discussed in Section 2.3, in the event the alternate transmission line alignment proposed by EnergyCo is adopted, the External Transmission Line (or part thereof) would no longer be required and the associated potential heritage impacts would no longer apply.

Summary

Ultimately, the revised ACHA concludes that with the implementation of recommended mitigation measures, the Modified Project would result in a similar to level of harm compared to the Approved Project.

Accordingly, **the Modified Project will not impact the ability to comply with Conditions 23 and 24 of Schedule 3 of the Development Consent**.

To reflect the findings of the ACHA prepared for the Modified Project, **the Proposed Modifications include an updated schedule of Aboriginal heritage items (contained in Appendix C.4) that should replace the existing schedule in Appendix 5 of the Development Consent.**

7.9 Historic (Post-contact) Heritage

7.9.1 Approach

A Historic Heritage Assessment (HHA) was prepared by Umwelt Pty Ltd to assess the change in potential impacts on historic heritage values from the Approved Project to the Modified Project (see Appendix G.6). The HHA builds on the original historic heritage assessment prepared by NSW Archaeology Pty Ltd in 2014 (and updated in 2017) in support of the Original EIS/RTS. The updated HHA assesses those new areas that have been included within the Modified Development Corridor that had not been previously assessed by

NSW Archaeology Pty Ltd (termed the 'Assessment Area').

The HHA involved:

- Searches of heritage registers to identify known heritage items within the vicinity of the Modified Development Corridor
- Review of historic land use, and
- Field surveys to identify any potential historic items and/or archaeological deposits.

The HHA considers the change in potential impacts on historic heritage values as a result of the Modified Indicative Development Footprint (Wind Farm and External Transmission Line) and addition of the Indicative Development Footprint – Public Road Upgrades (discussed in Section 4.9.1).

The Wind Energy Guidelines states:

> *"…Historic heritage will continue to be dealt with through existing policies and practices..."*

The HHA was undertaken in accordance with the relevant conditions of the Development Consent that relate to historic heritage as outlined in Table 51 below, and the following:

- *NSW Heritage Manual 1996* (Heritage Office and Department of Urban Affairs & Planning, 1996)
- *The Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance 1999* (Australia ICOMOS, 2000) (the Burra Charter)
- *Assessing Significance for Historical Archaeological Sites and 'Relics'* (NSW Heritage Branch, Department of Planning, 2009)
- *The Historical Archaeology Code of Practice* (NSW Heritage Office, Department of Planning, 2006)

Table 51: Relevant Historic Heritage Conditions

Relevant Conditions	Description
Condition 23 of Schedule 3 (Protection of Heritage Items)	Requires the Applicant to ensure the development does not cause any direct or indirect impacts on the historic heritage items identified in Table 1 in Appendix 5, or located outside the Approved Development Corridor, minimise any impacts on the historic heritage items identified in Table 2 in Appendix 5 and undertake salvage excavation adjacent to creek lines identified in Table 3 in Appendix 5 where impacts cannot be avoided.
Condition 24 of Schedule 3 (Heritage Management Plan)	Requires the Applicant to prepare a Heritage Management Plan that will outline suitable measures to manage the impacts of the development on historic heritage within and adjoining the development disturbance areas.

7.9.2 Assessment

Original EIS/RTS

An Aboriginal Cultural Heritage Assessment (and Update) was prepared by NSW Archaeology Pty Ltd in 2014 (and 2017) in support of the Original EIS and RTS, which included an assessment of historic heritage values. Substantial survey effort across the Approved Development Corridor was undertaken as part of the preparation of that assessment. The key findings of the assessment are summarised as follows:

The assessment identified seven potential European heritage items located within the Approved Development Corridor, including a telegraph tree and European midden, an electricity pole, 2 mouldboard ploughs and 3 old fence posts.

The assessment included recommendations to:

- minimise impacts to the identified European heritage items.
- micro-site power poles in the transmission line to minimise impacts to European heritage items located in proximity to the transmission line route.

In its Assessment Report, DPE accepted the findings and recommendations of the historic heritage assessment contained within the Aboriginal Cultural Heritage Assessment prepared by NSW Archaeology Pty Ltd and authorised Conditions 23 and 24 of Schedule 3 of the Development Consent as summarised in Table 51.

Proposed Modifications

The key findings of the Historic Heritage Assessment (HHA) prepared by Umwelt Pty Ltd for the Modified Project, are summarised as follows:

- No Commonwealth or Nationally listed heritage items or places are located within the Assessment Area
- No State listed heritage items are located within the Assessment Area
- No items listed on any s170 Heritage and Conservation Registers (NSW State agency heritage registers) are located within the Assessment Area
- Two locally listed heritage items, being the 'Yarrawonga' and 'Dalkeith' estates are listed as items of local heritage significance in the Upper Hunter Shire LEP 2013 and are partially intersected by the Modified Development Corridor
- Four potential heritage items (PHIs) were identified.
- No direct impacts to listed or potential historic heritage items are expected.
- Indirect impacts are generally considered to be negligible or minor.

Compared with the Approved Project, **the HHA found the overall impact on historic heritage is considered to be similar compared with the Approved Project.**

No direct impacts to historic heritage values are expected. Nonetheless, the HHA recommends the following mitigation measures:

- An unexpected heritage finds protocol should be established and included in the environmental management plans to be prepared for the Project.
- All project team members and construction contractor inductions should include a heritage-specific induction to support the use of this protocol.
- In the unlikely event that unexpected historical archaeological material is discovered, all work in the area should cease and a suitably qualified archaeologist should be consulted to determine an appropriate course of action. Depending on the extent and significance of the archaeological remains encountered, Heritage NSW may require consultation prior to the re-commencement of works.
- The required mitigation measures for potential impacts on historic heritage will be detailed in a Heritage Management Plan (HMP) in accordance with the existing conditions of the Development Consent.

Accordingly, **the Modified Project will not impact the ability to comply with Conditions 23 and 24 of Schedule 3 of the Development Consent that relates to heritage management.**

7.10 Traffic and Transport

7.10.1 Approach

Three key traffic and transport assessments have been undertaken for the Modified Project, as follows:

- A Traffic Impact Assessment (TIA) (contained in Appendix G.7.1) was prepared by GTA Consultants (now Stantec) to assess the change in potential traffic and transport impacts from the Approved Project to the Modified Project.
- An Over-size/Over-mass (OSOM) Haulage Route Assessment (contained in Appendix G.7.2) was prepared by GTA Consultants (now Stantec) to verify the haulage route for the transport of large wind turbine components from the Port of Newcastle to the Project site.
- An Ecology Due Diligence Assessment (contained in Appendix G.7.3) and a Heritage Due Diligence Assessment (contained in Appendix G.7.4) were prepared by Umwelt Pty Ltd to assess potential biodiversity and heritage impacts at identified locations along the indicative Modified OSOM Haulage Route where upgrade works are anticipated.
- Preliminary Road Upgrade Investigation (PRUI) was prepared by iCubed Consulting Pty Ltd to develop the following:
    - optimised road upgrade standards in accordance with Austroads standards with the aim of minimising the extent of ground disturbance and associated impacts to cultural heritage, native vegetation and encroachment into adjacent private property.
    - Accurate estimates of ground disturbance associated with the construction of road upgrades, based on 3D terrain modelling of road upgrades standards agreed with the relevant councils.

The Wind Energy Guidelines (DPE, 2016a) state:

> *"…the consent authority will give consideration to the extent to which the local and classified road network can accommodate the type and volume of traffic generated by the wind energy project, including the adequacy of any proposed road upgrades and maintenance commitments, having regard to the advice of relevant road authorities."*

The TIA and OSOM Haulage Route Assessment considered the relevant conditions of the Development Consent which are summarised in Table 52 below.

Table 52: Development Consent conditions related to traffic and transport

Relevant Conditions	Description
Condition 25 of Schedule 3 (Additional Mitigation Upon Request)	Requires the Applicant to implement additional reasonable and feasible mitigation measures aimed at reducing impacts of construction traffic on agricultural activities, in consultation with owners of properties listed in Table 5 of Schedule 3.
Condition 26 of Schedule 3 (Designated Heavy and Over-Dimensional Vehicle Routes)	Requires the Applicant to ensure all Over-dimensional and Heavy vehicle access to and from the site is via the designated routes identified in the figures in Appendix 7.
Condition 27 of Schedule 3 (Designated Heavy and Over-Dimensional Vehicle Routes)	Requires that Access Point #9 off Vinegaroy Road is only used during construction and decommissioning of turbines and only when a Traffic Control Plan is in place. At the completion of construction and decommissioning, the access point is to be removed and gates to be replaced with fencing.
Condition 28 of Schedule 3 (Road Upgrades)	Requires the Applicant to implement the road upgrades identified in Appendix 6 in prior to their use by Heavy or Over-dimensional vehicles, to the satisfaction of the relevant roads authority. Requires the Applicant to upgrade or relocate cattle grids along the Designated Heavy and Over-Dimensional Vehicle Routes prior to their use by Heavy or Over-dimensional vehicles.
Condition 29 of Schedule 3	Requires the Applicant to prepare a dilapidation survey of the Designated Heavy and Over-Dimensional Vehicle Routes and to make good any development-related

Relevant Conditions	Description
(Road Maintenance)	damage.
Condition 30 of Schedule 3 (Unformed Crown Roads)	The Applicant must ensure any unformed Crown road reserves affected by the development are maintained for future use, unless otherwise agreed with the NSW Department of Industry – Crown Lands and Water.
Condition 31 of Schedule 3 (Traffic Management Plan)	Requires the Applicant to prepare a Traffic Management Plan to manage traffic related impacts of the Project.

7.10.2 Assessment

Original EIS/RTS

The traffic impact assessment prepared by Epuron Pty Ltd and Zem Energy Pty Ltd in support of the Original EIS/RTS provided an assessment of the potential traffic and transport impacts associated with the construction and operation of the Project.

The traffic impact assessment estimated that during construction approximately 344 construction vehicle movements per day would be generated on the primary access routes. The traffic impact assessment did not include an estimated traffic generation associated with the construction of public road upgrades.

The traffic impact assessment found the primary traffic impacts were temporary and associated with the construction phase of the Project. In particular, movement of Over-size/over-mass (OSOM) [33], and Heavy vehicles may impact on local traffic flows. However, with the implementation of mitigation and management measures, the likely traffic impacts were considered acceptable.

DPE identified traffic and transport as one of the key issues associated with the Project. However, DPE agreed that with suitable road upgrades, regular road maintenance, and the implementation of a detailed Traffic Management Plan (TMP), the Project would result in acceptable impacts on the capacity, efficiency, and safety of the road network.

Accordingly, DPE authorised Conditions 25-31 of Schedule 3 of the Development Consent to be actioned in consultation with the RMS and the Councils, [34] as summarised in Table 52.

Proposed Modification

Traffic generation

The Traffic Impact Assessment (TIA) prepared by GTA Consultants (now Stantec) assessed the anticipated change in potential impacts between the Modified Project and Approved Project, based on a consideration of the following:

- Details of expected traffic volumes
- Traffic impacts on the road network function
- Capacity of the existing road network to accommodate the type and volume of traffic
- Mitigation measures to manage potential impacts

[33] An over-mass / over-dimensional vehicle is a heavy vehicle that is carrying, or specially designed to carry large, indivisible items. An indivisible item is one that cannot be divided or cannot be carried on a vehicle without contravening a mass requirement or dimension requirement.

[34] Here, the term 'Councils' refers to Warrumbungle Shire Council, Upper Hunter Shire Council, and Mid-western Regional Council.

- Detail of access roads within the site and how they connect to the existing public road network, and
- Consideration of Council traffic/road policies.

Consistent with the Approved Project, the Modified Project will generate a large amount of additional traffic, particularly during the construction phase of the Project. Operational traffic is expected to be low, limited to operational staff carrying out scheduled and un-scheduled activities.

Construction traffic generated by the Project involves the delivery of plant, equipment and materials including the movement of standard Light vehicles up to Heavy and OSOM vehicles which have the potential to impact the Local and Regional traffic network.

Movements of large vehicles, in particular Heavy and OSOM vehicles, have the potential to impact the safe and efficient operation of the public road network due to their over-sized loads and generally slower travelling speeds. Table 53 and Table 54 provide a comparison between the RTS Project, re-baselined Approved Project, and Modified Project in terms of the total predicted Heavy vehicle and OSOM vehicle traffic volumes during the construction period. [35]

The Modified Project is anticipated to generate a 137% increase in predicted total Heavy vehicle one-way trips over the construction period compared to the estimates referenced by DPE in its Assessment Report. The construction traffic assumptions used in the RTS traffic impact assessment to estimate construction traffic are significantly different to those used to estimate construction traffic volumes for the re-baselined Approved Project, and Modified Project, which are based on recent wind farm construction experience and are therefore considered to be more accurate. In addition, the estimated Heavy vehicle traffic volumes associated with the anticipated public road upgrades are included in the estimates prepared for the re-baselined Approved Project and Modified Project, however were not included in the Original EIS/RTS.

Table 53: Heavy Vehicle Construction Traffic Generation

Traffic generated	RTS Project	Approved Project (re-baselined)	Modified Project
Total traffic (One-way)	39,791 [36]	99,233 [37]	94,291
Change from RTS (%)	-	149% (Increase)	137% (Increase)
Change from the Approved Project (%)	-	-	**12% (reduction)**

The Modified Project is anticipated to generate a 42% reduction in predicted total OSOM vehicle one-way trips over the construction period compared to the estimates referenced by DPE in its Assessment Report (see Table 54 below).

[35] Daily heavy vehicle construction traffic assumes an 18-month construction period with 22 working days per month. It is assumed that the total construction traffic is distributed uniformly over the entire construction phase. It has also been assumed that excess spoil does not require to be transported from the site, as it will be reused on site.

[36] This value has been taken from DPE's Assessment Report prepared in March 2018 that assessed the Original EIS/RTS and ultimately recommended that the Development Consent SSD 6696 be granted for the Project. This value does not include the Heavy vehicle movements associated with the anticipated road upgrades as this was not considered in the Original EIS/RTS.

[37] This value uses the same assumptions as used to estimate one-way vehicle movements for the Modified Project, and assumes the inclusion of anticipated road upgrades, which alone contribute approximately 386 Heavy vehicle movements per week over an approximately 31 week period.

Table 54: OSOM Vehicle Construction Traffic Generation

Traffic generated	RTS Project	Approved Project (re-baselined)	Modified Project
Total traffic (One-way)	4,982 [38]	3,474 [39]	2,902
Change from RTS (%)	-	30% (reduction)	42% (reduction)
Change from the Approved Project (%)	-	-	**12% (reduction)**

As a result of the proposed reduction in the number of wind turbines from 267 to 220 (17% reduction), **the Modified Project is estimated to result in a 12% decrease in Heavy vehicle traffic and a 12% reduction in OSOM vehicle traffic generated during the construction phase.**

The Modified Project is anticipated to result in slightly lower daily one-way trips during the peak construction period (estimated to occur when access track construction, turbine foundation preparation, transmission line construction and turbine erection works are underway concurrently) when combining Light, Heavy and OSOM trips. As shown in Table 55 below the Modified Project is expected to result in a 5% reduction in daily one-way trips during the peak construction period compared to the RTS Project and a 12% reduction compared to the re-baselined Approved Project.

Table 55: Peak daily one-way traffic (combined Light, Heavy and OSOM vehicles)

Traffic generated	RTS Project	Approved Project (re-baselined)	Modified Project
Total traffic (One-way)	344	319	304
Change from RTS (%)	-	7% (reduction)	12% (reduction)
Change from the Approved Project (%)	-	-	**5% (reduction)**

Measures to mitigate potential impacts to local traffic during the construction period will be outlined in a Traffic Management Plan in accordance with Condition 31, of Schedule 3 of the Development Consent. The TMP will be prepared in consultation with the relevant Councils and TfNSW to ensure that applicable safety standards are achieved and disruption to local traffic is minimised.

Site Access Points

As summarised in Section 3.1.3, the Approved Project proposed a number of access points off public roads to both the Wind Farm Site and External Transmission Line alignment, including:

- Wind Farm Site – 41 site access points, including:
    - 23 site access points specifically defined within the Original EIS/RTS for the purpose of accessing the Wind Farm Site.
    - 18 site access points within the Wind Farm Site where internal access tracks (wind farm or internal transmission line) cross public roads.
- External Transmission Line – 20 site access points, including:
    - 5 site access points specifically defined within the Original EIS/RTS for the purpose of accessing the

[38] This value has been taken from DPE's Assessment Report prepared in March 2018 that assessed the Original EIS/RTS.

[39] This value uses the same assumptions as used to estimate one-way vehicle movements for the Modified Project.

External Transmission Line.

- 15 site access points along the External Transmission Line where the transmission line (and associated access track) crosses public roads.

The Proposed Modifications seek approval for:

- Wind Farm Site – Up to 47 site access points (50 indicative locations identified)
- External Transmission Line – Up to 43 site access points

A detailed comparison between the number of site access points along each relevant public road is presented in Table 56 below and shown in Appendix C.6.

Sight Line Assessment

The TIA prepared by GTA Consultants (now Stantec) includes a detailed safe intersection sight distance assessment (also referred to as a sight line assessment) for the newly proposed and micro-sited access points in accordance with Section 3.2.1 and 3.2.2 of the *Austroads Guide to Road Design Part 4A* (2017) to provide guidance on the suitability of the proposed site access arrangements. All the approved site access points have previously been assessed and determined to be appropriate in the Traffic and Transport Report prepared by Epuron Pty Ltd in support of the Original EIS/RTS.

The sight line assessment prepared by GTA Consultants (now Stantec) adopted the following assumptions to inform the approach sight distance (ASD) and safe intersection sight distance (SISD) assessment:

- Design speed: 80 km/h
- Coefficient of deceleration: 0.36
- Reaction time (RT): 2.5 seconds
- Longitudinal grade (a): 0%
- Set back: 5 metres

Based on those assumptions, the ASD and SISD values are 126 metres and 192 metres, respectively. The sight line assessment concludes that there are no sight line issues at any of the proposed new or micro-sited access points, noting the majority of the proposed site access points are located in largely open areas with no obstructions.

As discussed in Section 4.10 and summarised in the sub-section below amendments to the Development Consent will be required to reflect the revised site access points proposed by the Modified Project.

Table 56: Site Access Points – Modified Project compared to Approved Project

Road/Intersection	Approved Project			Modified Project	Assessment		
	Specified Access Points (specified in Original EIS/RTS) [40]	Implied Access Points (where access track crossed public road) [41]	Total Site Access Points (A + B) [42]	Site Access Points	Change (D – C)	Site Access Points that utilise existing farm access	Site Access Points required for transmission line crossings of public roads
Column	A	B	C	D	E	F	G
Wind Farm							
Pandora Pass Road	1	2	3	3	No change	3	-
Pandora Road	1	-	1	1	No change	1	-
State Forest Road	8	1	9	19	+10	5	1
Coolah Creek Road	1	2	3	4	+1	1	2
Gundare Road	-	3	3	3 (see Note 1)	No change	-	2
Oakdale Road	1	-	1	1	No change	1	-
Turee Vale Road	4	1	5	5	No change	2	1
Norfolk Road	1	-	1	-	-1	-	-
Warung Road	-	7	7	4	-3	1	2
Bounty Creek Road	1	-	1	-	-1	-	-
Yarrawonga Road	-	1	1	1	No change	1	1

[40] The site access points listed in this column are those that were identified in the Original EIS/RTS.

[41] The Original EIS/RTS did not include all site access points that would have been required to access wind farm access tracks or to account for all of the transmission line crossings of public roads. The total number of site access points listed in this column account for those additional site access points that were not identified in the Original EIS/RTS but reflect the infrastructure layout proposed by the Approved Project.

42 This values in this column are the total number of site access points that were proposed in the Original EIS/RTS plus the additional site access points required to reflect the Approved Project wind farm access tracks and transmission line crossings of public roads.

Road/Intersection	Approved Project			Modified Project	Assessment		
	Specified Access Points (specified in Original EIS/RTS) [40]	Implied Access Points (where access track crossed public road) [41]	Total Site Access Points (A + B) [42]	Site Access Points	Change (D – C)	Site Access Points that utilise existing farm access	Site Access Points required for transmission line crossings of public roads
Column	**A**	**B**	**C**	**D**	**E**	**F**	**G**
Rotherwood Road	4	1	5	6	+1	6	2
Vinegaroy Road	1	-	1	1 (see Note 2)	No change	1	-
Total	**23**	**18**	**41**	**47**	**+6** (15%)	**22** (47%)	**11**
External Transmission Line							
Coolah Road	1	2	3	3	No change	-	2
Summerhill Road	1	1	2	2	No change	-	2
Golden Highway	-	2	2	5 (see Note 3)	+3	4	2
Phelps Lane	-	2	2	2	No change	-	2
Cliffdale Road	1	1	2	5 (see Note 3)	+3	-	2
Unnamed Crown Road	1	-	1	1	No change	-	1
Bobadeen Road	-	2	2	2	No change	-	2
Ulan Road	1	5	6	21 (see Note 3)	+15	14	7
Ulan-Wollar Road	-	-	-	2	+2	-	-
Total	**5**	**15**	**20**	**43**	**+23** (115%)	**18** (42%)	**20**

Note 1: *Additional site access points are identified by the Modified Project along this public road to account for alternate optional overhead line alignments and crossings of this public road, to ensure they have been assessed for safe intersection sight distances. As a result not all of these identified site access points will ultimately be required.*

Note 2: *The proposed site access point (ID# 113 and 114) off Vinegaroy Road provides access along a single wind farm access track to Cluster D and therefore has been counted as a single site access point. To account for the wide turning radius required by OSOM vehicles entering the Wind Farm Site potentially from the east or the west off Vinegaroy Road this proposed site access point has been assessed for safe intersection sight distances as two site access points (separated by approximately 200 m).*

Note 3: *Site access points have been identified along this public road to provide access to potential overhead line pole/towers a short distance from the public road reserve. This would potentially avoid the need for a continuous access track within the transmission line easement and in-turn minimise the extent of ground disturbance and potential impacts to biodiversity and heritage values.*

Public Road Upgrades

The main traffic and transport impacts of the Modified Project will be during the construction phase and on the public roads within and around the Project site. These impacts include potential damage to road pavement surfaces and impacts on local traffic, particularly by OSOM and Heavy vehicle traffic movements during the construction period.

The Preliminary Road Upgrade Investigation (PRUI) prepared by iCubed Consulting Pty Ltd identifies the extent of road upgrades that are anticipated to be required to facilitate transportation of OSOM and Heavy vehicles. The PRUI developed a series of optimised road upgrade standards in accordance with Austroads guidelines that have been discussed extensively with Warrumbungle, Upper Hunter and Mid-western councils. The agreed road upgrade standards are discussed in further detail in Section 4.7, noting also that a mechanism has been agreed with Councils that allows for a reduction in the road upgrade cross-sections in highly constrained locations to minimise impacts to native vegetation, cultural heritage and encroachment into adjacent private properties.

As discussed in Section 4.10 and summarised in the sub-section below amendments to the Development Consent will be required to reflect the revised layout and public roads usage proposed by the Modified Project and to incorporate the road upgrade standards as agreed with Councils.

Staged delivery of public road upgrades/Works in Parallel

The TIA prepared by GTA Consultants (now Stantec) for the Modified Project includes an assessment of the potential traffic impacts associated with the indicative staging scenario presented in Section 4.8.2 (see Appendix G.7.1). The key conclusions of that assessment are as follows:

- The public road upgrade works are expected to generate around 75 Heavy vehicles per day (or around seven Heavy vehicles per hour) over the 18-month period in addition to the wind farm construction traffic generation.
- This additional traffic is considered minor, also noting that indicative seven Heavy vehicles per hour associated with the public road upgrades would be dispersed across various roads after leaving Vinegaroy Road.
- To address potential road safety implications of construction works for the wind farm commencing prior to all road upgrade works being completed, a road safety review should be undertaken. This would involve identifying basic short-term safety upgrades to existing roads (e.g. passing bays, localised shoulder widening, advisory signage, and sight line improvements at tight bends) to address high risk issues, with full upgrades to be completed prior to these roads being used by OSOM vehicles transporting the turbine blade components.
- A Driver Code of Conduct should be prepared and adhered to by drivers associated with the road upgrade works and the wind farm construction works.
- A consultation strategy should be established by the Applicant throughout the staged delivery of public road upgrades to allow the community to report any localised road dilapidation caused by the project, with work crews able to mobilise and attend to any reports of issues as soon as practicable.

Indicative OSOM Haulage Route

The EIS assessed an indicative Over-size/over-mass (OSOM) Haulage Route between the Port of Newcastle to the Project site via the Pacific Highway (through Maitland), New England Highway, Golden Highway, Vinegaroy Road, Coolah Road, Rotherwood Road, Turee Vale Road, and Coolah Creek Road.

The Applicant engaged GTA Consultants (now Stantec) to prepare an OSOM Haulage Route Assessment that modelled the travel and turning movements of haulage vehicles transporting an indicative 90-metre long turbine blade and 35-metre-long and 5-metre-wide diameter base tower section along the indicative OSOM Haulage Route (see Appendix G.7.2). All relevant horizontal and vertical constraints are identified in the

swept path diagrams included in the OSOM Haulage Route Assessment.

The OSOM Haulage Route Assessment identified significant constraints and conflicts through Newcastle, Maitland, Greta, Mount Thorley and Denman. To avoid these constraints and enable larger turbine components to be transported safely and efficiently to the Project Site several changes have been considered to the indicative OSOM Haulage Route proposed by the Original EIS/RTS (described in Section 4.6.3).

A key constraint is the low-height clearance bridge at Denman that requires taller loads (generally above 5.2 m in height) to travel along Local roads within the Muswellbrook local government area (LGA) to bypass Denman Bridge. This is likely to affect most if not all OSOM vehicle movements. As such the indicative OSOM Haulage Route includes two optional routes along Local roads to bypass Denman Bridge, as follows:

- **Option 1:** Right-turn from Golden Highway at Denman onto Denman Road, and follow Bengalla Road and Wybong Road, re-joining the Golden Highway at Sandy Hollow. This option requires substantial upgrades to infrastructure at the Golden Highway/Denman Road intersection.
- **Option 2:** Right-turn from Golden Highway at Coolmore onto Edderton Road, right-turn onto Denman Road, Denman, and follow Bengalla Road and Wybong Road, re-joining the Golden Highway at Sandy Hollow. This option is likely to require localised road upgrades including substantial drainage and levelling works at the Saddlers Creek crossing.

As discussed in Section 6.0, throughout consultation Muswellbrook Shire Council (MSC) acknowledged the need to use these Local roads to bypass Denman Bridge. However, MSC officers have recently advised however that MSC does not support their use until EnergyCo, TfNSW and DPE find a more strategic solution that is acceptable to MSC. The Applicant will continue to consult closely with all relevant agencies to determine the final OSOM Haulage Route.

The OSOM Route Assessment concludes that, with appropriate mitigation measures in place, the indicative Modified OSOM Haulage Route is a viable and reasonable route from a transport perspective. In particular, the indicative Modified OSOM Haulage Route is likely to require some localised upgrade works at particular intersections (including relocation of signage and poles and construction of hardstands), minor vegetation removal, and some encroachment into land adjacent to the road reserve at particular locations identified along the route.

The Applicant has secured agreement with most of the relevant landholders along the indicative Modified OSOM Haulage Route. Negotiations with all remaining relevant landholders are at an advanced stage and agreements are expected to be in place shortly. Further consultation with key stakeholders, including relevant councils along the route and TfNSW, will be required as the project progresses towards construction.

To assess potential ecology and heritage impacts at each identified impact area along the modified indicative OSOM Haulage Route two separate due diligence assessments have been prepared by Umwelt Pty Ltd (see Appendix G.7.3 and Appendix G.7.4). The findings of the ecology and heritage due diligence assessments are summarised as follows:

- **Ecology:** Potential habitat for threatened flora and fauna species at the identified impact areas is limited, as works are to be conducted within highly disturbed roadside verges. One critically endangered ecological community has been assumed present, and habitat is likely present for four threatened microbat species. No significant impacts are likely.
- **Aboriginal Cultural Heritage:** the majority of the identified impact areas are at least 500 m from the nearest registered Aboriginal archaeological site, or, in case of works within the Project site, the nearest area of archaeological potential. The exception to this is Area 4 (Hunter Expressway Crossover), which contains a recorded site (AHIMS 38-4-0822 - Wallis Creek RTA 6), and is listed as a valid site containing stone artefacts. However, this site was partially salvaged during the program of works for the Hunter Expressway. Based on the description of salvage in the report the site is no longer extant with the identified impact area. On this basis, there are no extant recorded Aboriginal archaeological sites within

the identified impact areas along the modified indicative OSOM Haulage Route.

- **Historic (post-contact) Heritage:** the majority of the works at identified impact areas are unlikely to result in direct or indirect impacts to historical heritage. Further assessment (in the form of a Heritage Impact Statement) is required for the proposed works at the intersection of the Golden Highway and Denman Rd (in relation to the locally listed Merton Cemetery) and at Edderton Road at the Saddlers Creek crossing (in relation to the locally listed Edderton Homestead).

During the detailed design phase a final OSOM Haulage Route will be determined. All potential ecology and heritage impacts will be assessed and appropriate mitigation measures will be implemented to avoid/minimise impacts.

Potential Alternate Transmission Line Connection (CWO REZ Transmission Line)

In the event the proposed CWO REZ transmission line between Uarbry Energy Hub and the Project site becomes a viable option (discussed in Section 2.3), the External Transmission Line component would no longer be required, resulting in the following savings:

- Reduction in the volume of Light and Heavy vehicle traffic required to construct the External Transmission Line
- Reduction in the length of roads anticipated to require upgrading and associated reduction in construction traffic
- Reduction of 43 potential site access points off nearby public roads along the External Transmission Line

Conclusion

Generally, **the Modified Project will not impact the ability to comply with Conditions 25-31 of Schedule 3 of the Development Consent that relate to traffic and transport.**

Notwithstanding this, the following amendments to the Development Consent will be required to reflect the revised layout proposed by the Modified Project:

<u>Designated Heavy and Over-dimensional Vehicle Routes</u>

- **Condition 26 of Schedule 3:** requires amendment to allow for the use of the eastern portion of Gundare Road that is located within the Modified Site Boundary. This portion of Gundare Road will be accessed from within the Modified Site Boundary via a newly proposed access track off Coolah Creek Road and will be used solely for the construction and ongoing maintenance of the transmission line located at the eastern end of Gundare Road. The western portion of Gundare Road external to the Modified Site Boundary and Cooks Drive are not proposed to be used.
- **Condition 27 of Schedule 3:** requires deletion from the Development Consent as Site Access Point #9 off Vinegaroy Road is no longer proposed by the Modified Project.
- **Appendix 7:** requires updating to reflect the identified site access points and public roads proposed to be used by the Modified Project.

<u>Road Upgrades</u>

- **Appendix 6:** requires amendment to reflect the public roads and intersections that are proposed to be used by the Modified Project, and clarification of the agreed road upgrade standards.
- **Condition 28(a) of Schedule 3:** requires amendment to allow for potential staging of public road upgrades.

<u>Traffic Management Plan</u>

- **Condition 31 of Schedule 3:** requires amendment to remove reference to Site Access Point #9 off

Vinegaroy Road as it is no longer proposed by the Modified Project.

7.11 Electromagnetic Interference

7.11.1 Approach

An Electromagnetic Interference Assessment (EMIA) has been prepared by WSP Pty Ltd to assess the change in potential electromagnetic interference (EMI) impacts from the Approved Project to the Modified Project (see Appendix G.8).

The Wind Energy Guidelines (DPE, 2016a) state:

> *"…the consent authority will give consideration to the risk of electromagnetic interference with telecommunication services in the area, and the adequacy of the measures proposed to ensure the level of service is maintained."*

The methodology adopted for the EMIA has been undertaken in accordance with the relevant guidelines listed in Table 57 and Conditions of the Development Consent outlined in Table 58.

Table 57: Relevant EMI Guidelines

Relevant Guidelines	Description
***Draft National Wind Farm Development Guidelines* (EPHC, 2010)**	The guidelines provide best practise guidance about the issues associated with EMI impacts, and details methods for assessing the potential of such impacts. They also advise on which stakeholders should be consulted and the information they may require.

Table 58: Relevant EMI Condition

Relevant Condition	Description
Condition 36 of Schedule 3 (Radiocommunications)	Requires the Applicant to 'make good' any disruption to radiocommunication services as soon as possible following the disruption.

The EMIA considers the change in potential EMI impacts as a result of the removal of 47 wind turbines, revised wind turbine layout, and increase to the indicative wind turbine envelope.

As the potential EMI impacts associated with the 267 turbine layout proposed by the Approved Project were not assessed as part of the Original EIS/RTS, the EMIA prepared by WSP Pty Ltd modelled the indicative wind turbine locations and increased wind turbine envelope against the re-baselined Approved Project to assess the potential changes in impacts between the Approved Project and the Modified Project.

7.11.2 Assessment

Original EIS/RTS

The telecommunications impact assessment prepared by Epuron Pty Ltd in support of the Original RTS found that no adverse impacts to EMI were anticipated from the RTS Project, including impacts on existing telecommunications and aviation navigation services. Several mitigation strategies were proposed to curtail any potential unforeseen impacts.

Accordingly, DPE authorised Condition 36 of Schedule 3 that requires the Applicant to mitigate any unforeseen disruption to services during operation of the Project.

Proposed Modifications

The EMIA prepared by WSP Pty Ltd in support of the Modified Project involved extensive consultation with all point-to-point, point-to-multipoint, broadcast services, and emergency services licensees within 10 kms of the Project registered on the Australian Communications and Media Authority (ACMA) database to seek their feedback on potential impacts associated with the Modified Project turbine layout. This consultation process commenced in June 2020.

The key findings of the EMIA are summarised as follows:

- Four (4) operating point-to-point links are in the vicinity of the Modified Project. None will be impacted by the Modified Project.
- Two (2) communications towers were identified and located within 2 km of the nearest turbine (500 m separation distance). The registered licensees confirmed that the Modified Project will not have detrimental effect on their operations and services.
- Existing mobile reception was assessed as being either marginal or non-existent within or surrounding the Project site. The Modified Project is unlikely to result in significant disturbance to existing mobile reception.
- Existing TV coverage was assessed as being marginal. It is currently not known whether the Modified Project will impact on TV reception within or nearby the LRWF site. Mitigation measures are available to

rectify potential impacts.

- The Bureau of Meteorology has identified potential impacts associated with both the Approved Project and the Modified Project to the signal quality of the Namoi (Blackjack Mountain) weather radar located approximately 80 kms to the north of the Project site, southwest of Gunnedah. Mitigation measures are available to rectify potential impacts.
- One (1) Land Mobile licensee is registered to a nearby private landholder used for internal communications across geographically separated land parcels under their ownership. The Modified Project may impact this communication link and further consultation with the licensee is required. Mitigation measures are available to rectify potential impacts.
- One (1) point-to-point communication link registered in 2020 to the NSW Telecommunications Authority (NSW Telco) was proposed to cross the wind farm site. This link was proposed by NSW Telco after the approval for the Project was granted in March 2018 and would be potentially affected by three turbines proposed by the Approved Project and the Modified Project layouts.

The potential impacts to the Bureau of Meteorology's Namoi (Blackjack Mountain) weather radar, to a nearby landholder's land mobile service, and NSW Telco's proposed link across the Project site are discussed further below.

Bureau of Meteorology - Namoi (Blackjack Mountain) weather radar

In its consultation response dated 9 June 2021 the Bureau of Meteorology advised that the signal quality of the S-band weather radar located at Namoi approximately 80 kms northeast of the Project site is likely to be impacted, mostly due to the high elevation (up to 1,100 m AHD) and the proposed turbine heights. The potential impacts were identified by internal modelling undertaken by the Bureau of Meteorology. The Bureau of Meteorology confirmed that it did not have any record of prior consultation as part of the Original EIS/RTS.

Since receiving its consultation response the Applicant has been in detailed discussions with the Bureau of Meteorology to gain a better understanding of the extent of potential impacts to the Namoi radar and to work collaboratively on a viable solution that maintains the existing quality of weather-related information that is provided for the area. The Bureau of Meteorology is aware that the Project site is located within the Central West and Orana Renewable Energy Zone (CWO REZ) and the potential impacts that other wind farm projects proposed within the CWO REZ may have on its weather radar operations.

The Applicant has been working closely with the Bureau of Meteorology to find a mutually agreeable solution to avoid/minimise impacts to the signal quality of the weather radar, including progressing discussions to enter into a framework agreement that commits both parties to continue to work collaboratively on this matter. In a meeting held with the Applicant on 21 February 2022, the Bureau of Meteorology acknowledged that the potential impact from wind farms to weather radar signals was not specific to the Project but rather was an issue relevant to the broader Central West Orana REZ. Rather than working with individual wind farm proponents, the Bureau of Meteorology has expressed a preference to work closely with the NSW Government to implement a suitable solution for the broader REZ. Wherever requested however, the Applicant will continue to assist the Bureau of Meteorology to find a mutually agreeable solution.

Local Land Mobile Licence

Betrola Investments Pty Limited (Betrola) operates a Land Mobile radio licence (Land Mobile System - > 30MHz) for communicating between two properties. The Yarralee repeater (Site ID 10013037) is located approximately 5 km east of the Project site. During the consultation process, Betrola indicated that the Yarralee repeater is used by land mobile receivers, spanning across the Betrola site boundary.

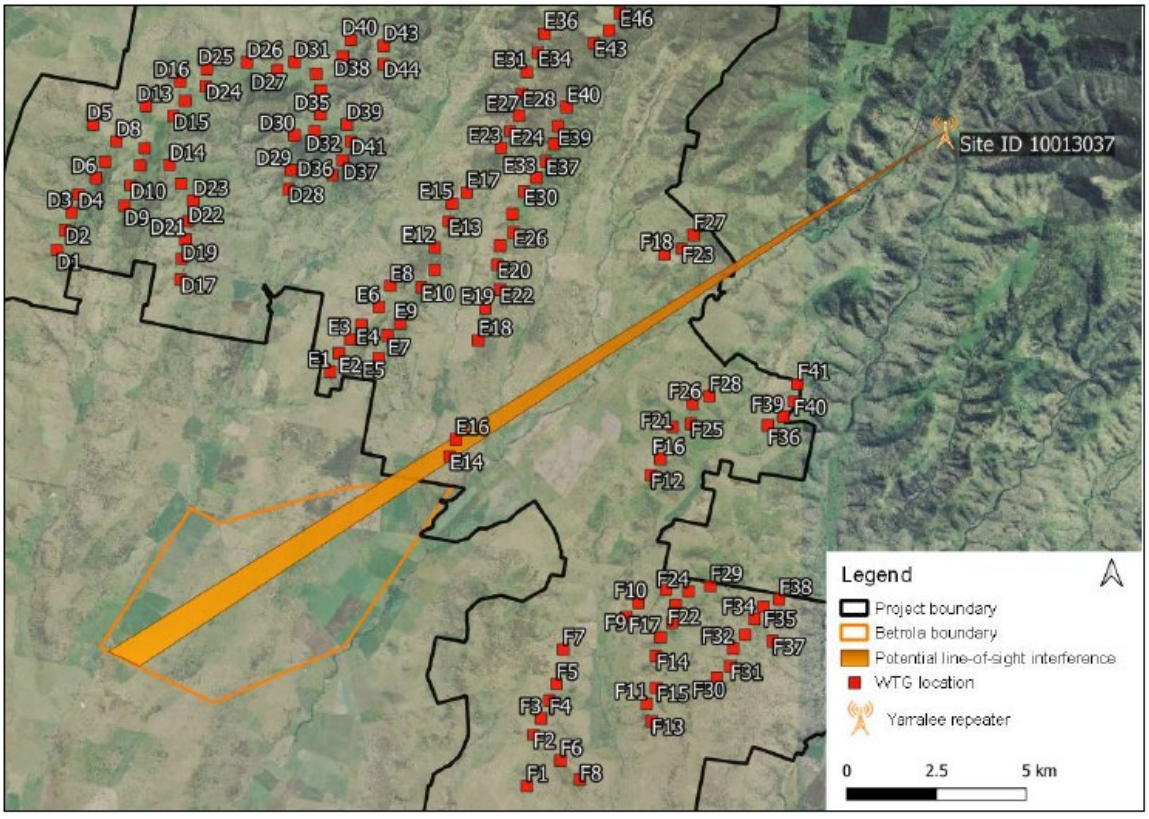
Depending on the location of the land mobile receiver within the Betrola boundaries, two turbines proposed by the Modified Project (E14 and E16) may obstruct the line of sight and hence, lead to a potential deterioration of the signal strength. It is noted that three turbines proposed by the Approved Project (E7-6,

E7-7, and E7-8) also may obstruct the line of sight (see Figure 33 below)

A potential mitigation strategy can be through a minor adjustment in the position of the receiver improving the line of sight between the tower and the receiver. As noted in the Draft National Wind Farm Development Guidelines, where effects cannot be easily quantified, and/or where effects are intended to be dealt with after construction, the potential EMI impact can be mitigated through baseline testing.

Since receiving its consultation response the Applicant has been in discussions with the licensee to understand more clearly the existing communications technology used and the potential impacts to the licensee's operations. The Applicant has made a commitment to undertake a pre-construction signal survey at the Betrola property prior to construction of the relevant turbines to gain a baseline understanding of the existing signal strength and quality at that time. Should it be discovered that mitigation is required, the Applicant has made a commitment to implement reasonable and feasible measures to ensure the existing signal quality is maintained. The licensee has confirmed that this approach is supported.

Figure 33: Potential impacts to nearby land mobile radio licence



NSW Telco – proposed point-to-point communication link

In their consultation response, the NSW Telco identified that they are in the process of designing a new point-to-point link that would cross the Project site. The proposed link was registered on the ACMA database in August 2020.

The EMI Assessment identified that the 2nd Fresnel zone of the proposed link would intersect with three (3) approved turbines (E5-21, E5-24, and F5-16) whose locations are proposed to be shifted slightly by the Modified Project and which are now referred to as turbines D40, D43, and E31, respectively.

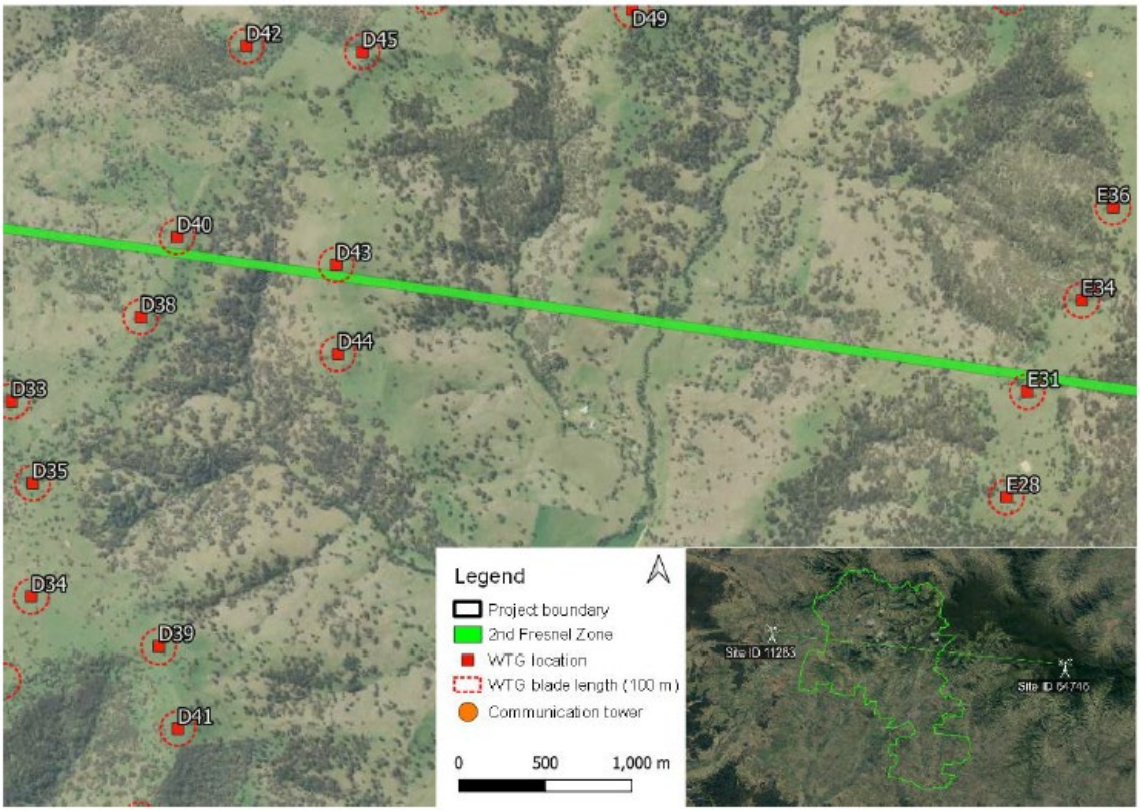
A consultation meeting with NSW Telco and the Applicant was arranged on 10 August 2020 to discuss the potential interference. Following this meeting, NSW Telco provided their written technical response on 7

September 2020, requesting that the relevant turbines (D40, D43, and E31) be moved to avoid interference to the link (see Figure 34). However, the NSW Telco also stated that if such movement is not possible, the link may be removed from their design.

The Applicant undertook a review of the turbine layout and it was deemed that three turbines proposed by the Approved Project (E5-21, E5-24, and F5-16) and the corresponding turbines proposed by the Modified Project (D40, D43, and E31) could not be moved due to complex topographical constraints.

The Applicant has been working closely with NSW Telco to find a mutually agreeable solution, including investigating alternate communications pathways around the Project site. The Applicant is committed to continue working with NSW Telco and other key stakeholders to find a mutually agreeable reasonable and feasible solution.

Figure 34: NSW Telco recently proposed telecommunications link



Summary of potential impacts and mitigation measures

Table 59 summarises the results of potential impacts to broadcast towers and transmission paths and assesses the extent of change in impacts from the Approved Project to the Modified Project.

Table 59: EMI assessment results

Licence or service type	Assessment findings for the Approved Project	Assessment findings for the Modified Project
Radiocommunication Towers	Turbines are located within 500 m of towers.	Unable to determine extent of change from approved 267 wind turbine configuration findings. Based on consultation, there is no expected interference with existing signals.
Fixed point-to-point links	Four links crossing the Project boundary operated by NSW Rural Fire Service and Electrostar. Wind turbines not within 2nd Fresnel Zone.	No change from Approved Project. Fifth proposed link registered to NSW Telco Authority intersects with three Approved Project and Modified Project turbines.
Fixed point-to-multipoint links	Not assessed.	No point-to-multipoint (P2PM) licences were observed to intersect the site boundary. According to the ACMA database, the closest P2MP is Site ID 201640 (Comms Site Mt Tamarang) located approximately 22 km from Project site. Due to the extended separation distance, it is unlikely the Project will have any adverse EMI impacts on the registered P2MP licences
Emergency Services	Not assessed.	Four licencees identified within 30 km of Project site. Consultation with licencees undertaken. No expected interference with existing signals.
Meteorological Radars	Not assessed.	Potential impact to the Bureau of Meteorology (BoM) Namoi radar. The Applicant is in discussions with BoM to mitigate any impact.
Mobile Phones	No expected interference with existing signals.	No change from Approved Project, based on consultation with two mobile phone providers. No expected interference with existing signals.
Wireless Internet	Due to the distance of residences from the wind farm it is very unlikely internet services would be subject to interference due to the wind farm's operation.	No change from Approved Project.
Satellite Television and Internet	Unless a particular subscriber's antenna reception direction and elevation is aligned with a turbine, no impacts on satellite provided TV reception are likely.	No change from Approved Project. Potential mitigation measures are outlined in Section 4 of EMI report.
Radio broadcasting	AM signals unlikely to be affected. FM signals may experience interference. Digital radio signals not available in vicinity of the Project.	No change from Approved Project.
Television broadcasting	Unlikely to be affected due to distance to residences.	Larger wind turbines may increase potential for interference. Consultation with applicable broadcasters undertaken and limited interference is expected. Potential mitigation measures (including baseline TV signal surveys) should be considered.

Table 60 outlines the mitigation measures available to minimise potential interference with existing communications technologies in use in the area, should they be required.

Table 60: Available mitigation measures

License or service type	Available Mitigation Measures
Mobile Phones and Wireless Internet	Moving a short distance to a new or higher location until the signal improves or using an external antenna to improve the signal.
Wireless Internet	Moving outdoor antennas for impacted residences, micro-siting wind turbines or installing a new NBN tower.
Radio broadcasting (FM Radio)	Installing high-quality antennas or amplifiers at affected residences, increasing the broadcast signal strength from the transmission tower, moving the tower away from the wind farm or installing a signal repeater on the opposite side of the Project site.
Television broadcasting	Realigning or relocating the resident's television antenna, tuning the antenna into an alternative source, installing a more directional or higher gain antenna, installing satellite television or installing a television relay station. Where requested by residents within 10 kms of the Project site, investigations will be undertaken (which may include pre-construction and post-construction reception surveys) to determine whether reported impacts are due to the wind farm and, where warranted, mitigation measures implemented.
Land Mobile Licence (Betrola Investments)	The Applicant has made a commitment to work closely with the Land Mobile licensee potentially affected by the Modified Project to ensure their existing communication signal strength and quality is not adversely affected by the Modified Project.
Weather radar (Bureau of Meteorology)	The Applicant will continue to work closely with the Bureau of Meteorology to find a mutually agreeable solution.
Proposed point-to-point communication link (NSW Telco)	The Applicant will continue to work closely with the NSW Telco to find a mutually agreeable solution.

The Modified Project will not impact the ability to comply with Condition 36 of Schedule 3 of the Development Consent that relates to radiocommunication. In accordance with Condition 33 of Schedule 2, the Applicant must implement mitigation measures within one month following any disruption as a result of the development.

Updates have been made to the Statement of Commitments (SoCs) to ensure appropriate mitigation measures are implemented to address identified impacts to weather radar, land mobile, and telecommunication signals (see Appendix D).

7.12 Aviation

7.12.1 Approach

An Aviation Impact Assessment (AIA) (contained in Appendix G.9) has been prepared by Aviation Projects Pty Ltd to assess the change in potential aeronautical impacts from the Approved Project to the Modified Project.

The Wind Energy Guidelines (DPE, 2016a) state:

> *"…wind energy projects need to consider potential safety hazards for aircraft through intrusion of the wind turbines into the airspace; and potential effects on navigation instruments."*

The AIA specifically responds to the following key legislation, approvals, and guidance material:

- The Aeronautical Information Package (dated 13 August 2020)
- The Aeronautical Charts (dated 8 October 2020)
- NASF Guideline D: Managing the Risk to aviation safety of wind turbine installations (wind farms)/Wind Monitoring Towers
- The requirements of relevant aviation authorities
- *Environmental Planning and Assessment Act 1979*
- Relevant Acts and Regulations applicable to developments near airports and air traffic routes

The AIA considered the relevant conditions of the Development Consent as outlined in Table 61.

Table 61: Relevant Aviation Conditions

Relevant Conditions	Description
Condition 32 of Schedule 3 (Mitigation of Aviation-Related Impacts)	Requires the Applicant to carry out the development in accordance with the *National Airports Safeguarding Framework Guideline D: Managing the Risk to Aviation Safety of Wind Turbine Installations (Wind Farms)/Wind Monitoring Towers*, or its latest version.
Conditions 33 and 34 of Schedule 3 (Notification of Aviation Authorities)	Requires the Applicant to provide the final co-ordinates, height and ground level of each turbine and met mast, and details of any proposed aviation hazard lighting to CASA, Air services Australia, and the RAAF.
Condition 35 of Schedule 3 (Aerial agricultural activities)	Requires the Applicant to make available reasonable and feasible mitigation measures aimed at reducing impacts to aerial agricultural activities caused by the erection and/or operation of wind turbines.
Condition 3(b)(c), Schedule 3 (Lighting)	Requires the Applicant to ensure aviation hazard lighting complies with CASA's requirements and hazard lighting design includes all reasonable and feasible measures to minimise visual impact.

The AIA considers the change in potential aeronautical impacts as a result of the removal of 47 wind turbines, revised wind turbine layout, increase in the maximum blade tip height, and increase to the indicative wind turbine envelope.

7.12.2 Assessment

Original EIS/RTS

An aeronautical impact assessment was prepared by Rehbein Airport Consulting in support of the Original RTS which determined that the Project would not result in impacts to registered or certified aerodromes, performance of any navigation aids or impact primary or secondary surveillance radars. The Project was not considered a hazard to aircraft safety based on its remoteness from aerodromes likely to be used for night operations navigated by visual flight rules. CASA agreed with the assessment that the Project was not considered a hazard to aircraft safety due to its remote location, and as such did not require obstacle lighting.

DPE agreed with the findings of the aviation impact assessment prepared by Rehbein Airport Consulting and authorised Condition 3(b)(c) of Schedule 3 and Conditions 32-35 of Schedule 3 to mitigate any potential impacts to aviation operations as a result of the Project.

Proposed Modifications

The revised Aviation Impact Assessment (AIA) prepared by Aviation Projects Pty Ltd in support of the Modified Project addresses the following:

- Considered all potential aviation activities including recreation, commercial, civil (including for agricultural purposes) and military operations, including departure and approach procedures for airfields.
- Assessed the impacts of wind turbines and permanent masts on flight procedures and aviation communications, navigation and surveillance (CNS) facilities, and radar operations.
- Undertook a safety risk assessment and considered the requirements for obstacle lights and markings on wind turbines and permanent met masts.
- Completed a comparative assessment of the potential aviation impacts associated with the Approved Project and the Modified Project.

The revised AIA was prepared in consultation with all relevant aviation operators and authorities, including with Airservices Australia, Department of Defence (DoD), Royal Flying Doctor Service, NSW Rural Fire Service, National Parks and Wildlife Service, and all relevant local councils. No objections were received, including from Airservices Australia and DoD. It is understood that the Civil Aviation Safety Authority (CASA) will not assess or comment on the wind farm until a wind turbine model has been selected and the layout is finalised.

The findings of the revised AIA are for the most part consistent with those of the Rehbein Airport Consulting report prepared in support of the Original RTS.

Table 62 below provides a comparison of the potential impacts associated with the Approved Project and the Modified Project.

Table 62: Aeronautical impacts of the Approved Project and Modified Project

Type of Impact	Approved Project	Modified Project
OLS and PANS-OPS surfaces of any registered or certified aerodrome	Will not infringe on any OLS and PANS-OPS surfaces of any registered or certified aerodrome	Will not infringe on any OLS and PANS-OPS surfaces of any registered or certified aerodrome
Aviation Obstacle Lighting and Marking	Aviation obstacle lighting on wind turbines not required. Met masts were not assessed.	Aviation obstacle lighting of turbines or met masts is not considered necessary as it is unlikely that they would create a safety hazard to aviation activity in the area at night.
Aircraft Landing Areas (ALAs) - unregulated/uncertified landing areas	Impact to flight circuit operations not assessed in detail. Wake turbulence impacts not assessed in detail.	No impact to flight circuit operations at any ALAs. Based on conservative worst-case estimates specified in the National Airport Safeguarding Framework Guideline D wake turbulence may be noticeable at five nearby ALAs. All relevant ALA operators are aware of the potential impacts.
Radar Navigation Aids: - **Cecil Park Primary Surveillance Radar (PSR) and Sydney PSR** - **Mt Sandon Secondary Surveillance Radar (SSR), Cecil Park, and Sydney SSR** - **Mt Boyce Route Surveillance Radar (RSR) and Round**	No expected impact.	No expected impact – outside of radar line of sight.

Type of Impact	Approved Project	Modified Project
Mountain RSR - **Williamtown Tactical Air Command military radar**		
Lowest Safe Altitude (LSALT) protection surfaces for published air routes	No expected impact.	Will infringe on a single 4-degree grid LSALT protection surface. Mitigation measures are required.

The revised AIA identified that the Modified Project would result in an impact to the grid Lowest Safe Altitude (LSALT) where the Project site is located due the proposed increase in the maximum blade tip height to 250 m AGL (increased from 165 m AGL). The grid LSALT will be impacted by the highest wind turbine C18, by approximately 6 m (18 ft). Note that this height impact is the same as the 5 m error budget incorporated into the turbine height elevations and final surveyed site data may result in an overall height that would be below, and therefore not impact, the grid LSALT.

In the event the overall height of turbines encroaches into the grid LSALT it will be necessary to increase the grid LSALT height from the current 5,400 ft to 5,500 ft. This measure is generally considered to be an acceptable mitigation strategy to address such encroachments by tall structures such as wind turbines, is unlikely to entail approval risks and will not adversely impact aviation safety.

Notwithstanding this, **the change in aviation related impacts from the Approved Project to the Modified Project is considered negligible**.

Obstacle lighting and tall structure notification

The revised AIA included a detailed aviation safety risk assessment that determined that obstacle lighting on the turbines or permanent met masts is not warranted. As part of the consideration of this Modification Application, DPE will refer the application to CASA for their advice on whether the Project is likely to cause a hazard without appropriate obstacle lighting. Obstacle marking such as red/white painted bands and marker balls are recommended for the permanent met masts, given their slender design which makes them less visible.

Furthermore, as the Modified Project wind turbine tip heights will exceed 110 m AGL, formal notification to CASA and DoD is required as part of the tall structures notification process in accordance with:

- CASA Advisory Circular AC 139-08(0) “Reporting of Tall Structures” to enable inclusion of the wind farm location and height of wind turbines in relevant aeronautical information publications; and
- CASA Form 406 – “Operational Assessment of Existing and Proposed Structures”.

In accordance with Conditions 33 and 34 of Schedule 3, the relevant aviation authorities will be provided details of the wind farm once a wind turbine model has been selected and the layout finalised.

Nearby aerial agricultural activities and uncertified aircraft landing areas (ALAs)

The revised AIA included a detailed assessment of potential impacts to uncertified airstrips (also known as aircraft landing areas (ALAs)) within and adjacent to the Project site, from either the physical presence of the turbines or potential wake turbulence caused by the rotation of the blades, or physical presence of the proposed overhead transmission line.

The wake turbulence analysis undertaken in the revised AIA is consistent with the National Airport Safeguarding Framework NASF (NASF) Guideline D - Managing the Risk to Aviation Safety of Wind Turbine Installations (Wind Farms)/Wind Monitoring Towers guidelines, which conservatively estimates that the effects of wake turbulence could be felt up to 16 x rotor diameter from a turbine location. For the Modified Project this equates to a distance of up to 3,200 m from the proposed wind turbines, assuming a 200 m rotor

diameter).

The key conclusions of the revised AIA related to ALAs are summarised in Table 63 below.

Table 63: Potential impacts to uncertified aircraft landing areas (ALAs)

ALA ID	Landholder Status	Potential Impact – Turbines (Physical Presence)	Potential Impact – Turbines (Wake Turbulence)	Potential Impact – Overhead Transmission Line (Physical Presence)
ALA 1 Located south of Turbine A1	Associated	Unlikely to be impacted	Operations are conducted to the east only (landing to the west, take-off to the east), and may be affected by wake turbulence when the wind is blowing from the north clockwise around to the south.	No impact
ALA 2 Located west-north-west of Turbine D5	Non-associated	Unlikely to be impacted	When a south easterly wind is blowing, departures to the south-east may be affected by wake turbulence.	No impact
ALA 3 Located north of Turbine C14	Non-associated	Unlikely to be impacted	When a southerly wind is blowing, operations to the south (i.e. standard left hand circuit on the westerly runway direction) may be affected by wake turbulence.	No impact
ALA 4 Located south-south-west of Turbine E1	Non-associated	Unlikely to be impacted	When a northerly wind is blowing, departures to the north-west may be affected by wake turbulence.	No impact
ALA 9 Located west of Turbine D55	Associated	Potentially impacted – further consultation with ALA owner required	To avoid any adverse impact from downstream wake turbulence caused by the turbines, aircraft operators should plan to operate when the turbines closest to ALA 9 and within close proximity to the arrival and departure paths are not rotating, with due consideration of wind direction and the downstream projection of wake turbulence.	Transmission line may prevent an early turn to the right on take-off to the east, noting that the wind turbines to the north-east of the ALA 9 prevent manoeuvring to the north of runway centreline until above a standard circuit height. Operations to the west will be relatively unconstrained by the transmission line.
OZDAK ALA	Associated	Unlikely to be	When a northerly wind is blowing, operations to	The transmission line route goes through a 3

ALA ID	Landholder Status	Potential Impact – Turbines (Physical Presence)	Potential Impact – Turbines (Wake Turbulence)	Potential Impact – Overhead Transmission Line (Physical Presence)
Located southeast of Turbine F8		impacted	the north (i.e. standard left hand circuit on the easterly runway direction) may be affected by wake turbulence. In this case, operations should be limited to south of the ALA in stronger wind conditions.	nm radius of OZDAK ALA. In the currently proposed location of the transmission line the approach and take-off surfaces and aerodrome flight circuits of OZDAK ALA will not be impacted. However, if the transmission line route is relocated to the east, by more than approximately 1 km, closer to the OZDAK ALA runway, then further consultation with the landowner of this ALA will be required to assess any potential impact on operations, and a need for providing obstacle marking.

Summary

Overall, the potential impacts associated with Modified Project are generally consistent with those identified for the Approved Project. With the implementation of mitigation measures as set out in the revised AIA, all identified potential impacts can be appropriately managed.

Accordingly, **the Modified Project will not impact the ability to comply with Condition 5(b)(C) and Conditions 31 and 32 of Schedule 3 of the Development Consent that relate to aviation.**

8.0 Statement of Commitments

Statement of Commitments (SoCs) are the range of environmental mitigation, management and monitoring measures and other commitments that will be implemented during construction, operations, and decommissioning phases of the Project.

The Original RTS report prepared in May 2017 contains 22 SoCs. This report presents the reviewed and updated SoCs to better align them with the Development Consent and to accurately reflect the extent of potential impacts associated with the Modified Project.

These measures will be incorporated and addressed in the Environmental Management Strategy (EMS) and associated management plans.

The reviewed and updated SoCs, including an assessment of the Modified Project against the SoCs prepared for the Approved Project is contained at Appendix D.

9.0 Other legislation

9.1 State Legislation and Policies

This section provides an overview of the key additional state legislation and policies of relevance to the Proposed Modification which have not been considered elsewhere in this report.

Environmental Planning and Assessment Act 1974

The objects of the EP&A Act are:

> *(a) to promote the social and economic welfare of the community and a better environment by the proper management, development and conservation of the State's natural and other resources,*
>
> *(b) to facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment,*
>
> *(c) to promote the orderly and economic use and development of land,*
>
> *(d) to promote the delivery and maintenance of affordable housing,*
>
> *(e) to protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities and their habitats,*
>
> *(f) to promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage),*
>
> *(g) to promote good design and amenity of the built environment,*
>
> *(h) to promote the proper construction and maintenance of buildings, including the protection of the health and safety of their occupants,*
>
> *(i) to promote the sharing of the responsibility for environmental planning and assessment between the different levels of government in the State,*
>
> *(j) to provide increased opportunity for community participation in environmental planning and assessment*

The Modified Project is consistent with the objectives of the EP&A Act. It adheres to ecologically sustainable development principles through the integration of relevant economic, environmental and social considerations. It will also make a positive contribution to the protection of the environment, including by materially assisting in the clean energy transition and greenhouse gas reductions, and delivering material benefits to the social and economic welfare of the local and regional community.

As outlined in Section 3.4.1 the Development Consent may be modified in accordance with section 4.55(2) of the EP&A Act so as to authorise the Proposed Modification.

Protection of the Environment Operations Act 1997

At the time that the Development Consent was granted, no environment protection licence was required for the Project because it was not a scheduled activity required to be licensed under the *Protection of the Environment Operations Act 1997* (NSW) (POEO Act).

However, the POEO Act now provides that an environment protection licence is required for electricity works (wind farms) the subject of a development consent for SSD. Accordingly, an EPL is now required for the Project.

Section 4.42 of the EP&A Act confirms that an environment protection licence cannot be refused if it is necessary for carrying out State significant development authorised by a development consent and is to be substantially consistent with the consent.

Biodiversity Conservation Act 2016

The original biodiversity assessment (NGH Environmental 2014; NGH Environmental 2017a) was undertaken under the now repealed Section 5A of the EP&A Act to consider impact to species, population and ecological communities listed under the *Threatened Species Conservation Act 1995* (NSW) (TSC Act). The TSC Act has since been repealed and replaced by the *Biodiversity Conservation Act 2016* (BC Act).

The BC Act requires that a modification application under the EP&A Act be accompanied by a biodiversity development assessment report (BDAR) unless the Environment Agency Head is satisfied that modification will not increase the impact of the Project on biodiversity values.

A BDAR has been prepared by Umwelt (Australia) Pty Limited (Umwelt) to assess the potential biodiversity impacts of the Modified Project, in accordance with the Biodiversity Assessment Method (BAM) 2020 (contained at Appendix G.4).

The BDAR includes an assessment of the Modified Project against the serious and irreversible impact criteria contained in clause 6.7(2) of the *Biodiversity Conservation Regulation 2017* (NSW). Section 17.6(3) of the BC Act provides that:

> *If the Minister for Planning is of the opinion that proposed State significant development or State significant infrastructure that is the subject of an application to which this Division applies is likely to have serious and irreversible impacts on biodiversity values, the Minister--*
>
> *(a) is required to take those impacts into consideration, and*
>
> *(b) is required to determine whether there are any additional and appropriate measures that will minimise those impacts if consent or approval is to be granted.*

National Parks and Wildlife Act 1974

The object of the *National Parks and Wildlife Act 1974* (NSW) (NPW Act) is to consolidate and amend the law relating to the establishment, preservation and management of national parks, historic sites, certain other area, and the protection of certain fauna, native plants and Aboriginal objects.

Section 4.41 of the EP&A Act operates so that an Aboriginal heritage impact permit is not required for impacts authorised by SSD development consents.

Heritage Act 1977

The Heritage Act 1977 (NSW) protects the cultural and natural history of NSW with emphasis on historic (European) heritage items, including listed places, buildings, works, relics, moveable objects or precincts with significance to the State or a local area. The impacts of the Modified Project on (European) heritage items have been assessed and measures are proposed to mitigate impacts.

Water Management Act 2000

The *Water Management Act 2000* (NSW) (WM Act) regulates the use and interference with surface and groundwater where a water sharing plan has been implemented.

The Project crosses multiple Water Sharing Plan areas that set out the rules for protecting the environment, groundwater, and surface water extractions, managing licence holders' water accounts, and water trading in the region, including the following:

- Liverpool Range Basalt
- Upper Macquarie River and Alluvial Aquifer (encompassing Talbragar Alluvial)
- Gunnedah Oxley Basin
- Coastal Oxley Basin

- Sydney Basin

All required water access licences under the WMA will be obtained as required following confirmation of the final selected water sources for the Project.

Section 4.41 of the EP&A Act operates to remove the requirement for other water related approvals for approved SSD projects.

Local Government Act 1993

This outlines processes for local government and sets out the powers of local councils. Approval is required under section 68 of the *Local Government Act 1993 (NSW)* to install an onsite sewerage system.

Roads Act 1993

The *Roads Act 1993* provides for the regulation of activities relating to public roads. The Approved Project required upgrade works to various public local roads and intersections to facilitate access for OSOM and Heavy vehicles to internal wind farm access tracks. Under Section 138 of the *Roads Act 1993*, it is necessary to obtain consent from the appropriate roads authority for proposed upgrade works on public roads.

The Development Consent identifies the public roads that may require upgrading subject to further detailed assessment and design. At the time the Development Consent was granted, further design work on the public road upgrades had not commenced and no assessment was made of the extent of associated potential impacts required to accommodate the road upgrades, for instance, vegetation clearing, impacts to heritage values or encroachment into adjacent private properties.

The Proposed Modification includes some changes to the proposed road upgrades to accommodate longer wind turbine blades and includes assessments of the potential vegetation removal, heritage impacts, and encroachment into adjacent private properties that are anticipated to be required to accommodate the proposed road upgrades.

Relevant approvals under Section 138 of the *Roads Act 1993* will be obtained once a turbine supplier has been determined and the detailed design phase is underway. Section 4.42 of the EP&A Act operates so that consent under Section 138 of the Roads Act cannot be refused and must be granted on terms substantially consistent with the Development Consent.

Crown Lands Management Act 2016

Approval under the *Crown Lands Act 1989* (NSW) for access across Crown land parcels, waterways and roads was provided for the Approved Project. The *Crown Lands Act 1989* (NSW) has been repealed by the *Crown Land Management Act* 2016 (NSW).

The Applicant has consulted with the Crown Lands division within DPE, to discuss options for securing tenure required for construction and operation over Crown land parcels within the Project site.

A survey of all infrastructure will be carried out prior to construction to accurately confirm there are no turbines and associated blades encroaching on Crown Waterways, Parcels and Roads.

A licence will be sought by the Applicant for proposed encroachment into Crown land and upgrade of existing Crown paper roads.

State Environmental Planning Policy (Biodiversity and Conservation) 2021

Since the Original EIS, two new SEPPs for Koalas were made, being:

1. *State Environmental Planning Policy (Koala Habitat Protection) 2020; and*
2. *State Environmental Planning Policy (Koala Habitat Protection) 2021*,

which were then repealed and consolidated into Chapter 3 and Chapter 4 of the new State Environmental Planning Policy (Biodiversity and Conservation) 2021.

Chapter 3 Koala habitat protection 2020 of the State Environmental Planning Policy (Biodiversity and Conservation) 2021 applies to land zoned RU1 Primary Production, RU2 Rural Landscape or RU3 Forestry.

Chapter 4 Koala protection 2021 of the State Environmental Planning Policy (Biodiversity and Conservation) 2021 applies to other areas required for the Project.

Each of Chapter 3 and Chapter 4 only impose specific requirements which apply where a local council is the consent authority, which is not the case for this modification. Accordingly, only the aims of these Chapters are relevant to the Proposed Modification.

The BDAR that has been prepared for the Modified Project (contained in Appendix G.4) concludes that the Modified Project is not expected to result in an adverse impact on a potentially occurring population of the koala due to the very low potential density of the species (as evidenced by the lack of records since 2012), the retention of substantial areas of potential habitat within the Modified Development Corridor and the mitigation strategies that will be employed as part of the Modified Project. Particular mitigation measures that will facilitate reducing impacts of the Modified Project on potential koala habitat are the pre-clearance and tree-felling procedures and identification of clearance boundaries to avoid inadvertent impacts. Furthermore, opportunities to further reduce impacts will be explored during detailed design. All impacts will be managed through the various management plans that will be required as part of the development consent.

9.2 Environment Protection and Biodiversity Conservation Act 1999 (Cth)

A referral under the *Environmental Protection and Biodiversity Act 1999* (EPBC Act) was made for the Project (EPBC 2014/7136). The Project was determined to be a Controlled Action. The Project was granted approval under the EPBC Act, subject to conditions, on 29 June 2018 (EPBC Approval).

Discussions with the Department of Climate Change, Energy, the Environment and Water (DCCEEW) are in progress and a re-referral will be lodged with DCCEEW in due course to ensure that the EPBC approval considers the same Project (Action) as the NSW approval including assessment of the potential impacts on Matters of National Environmental Significance (MNES).

10.0 Conclusion

The Proposed Modifications are required to enable the Project to utilise recent improvements in wind energy technology that allow significantly more renewable energy production to be achieved with fewer, larger wind turbines and to reflect the outcomes of the ongoing design optimisation and assessment carried out as the Project progresses towards construction.

The key justifications for the Proposed Modifications and the associated benefits can be summarised as follows:

- The Proposed Modification will materially increase the indicative renewable energy generation capacity of the Project while reducing the total number of turbines required.
- the Proposed Modification will materially assist in preventing forecast energy shortfalls and managing rising energy costs to benefit energy consumers as coal fired power stations are retired in coming years.
- The Proposed Modification will materially increase the estimated greenhouse gas benefits of the Project. The CO2 emissions savings from the Modified Project will increase from approximately 2.1 million tonnes of CO2 emissions savings per year to 2.9 million tonnes CO2 emissions savings per year. In doing so, the Project will make a positive contribution to the achievement of the 35% reduction in CO2 emissions by 2030 which is generally regarded as being critical to contain climate change impacts. The Modified Project will also materially assist NSW and Australia in meeting their greenhouse gas reduction targets of net-zero by 2050.
- The Project layout changes and updated design assumptions incorporated in the Proposed Modification have been informed by experiences in recent wind farm construction and the extensive use of 3D terrain modelling which has resulted in more accurate estimates of the extent of ground disturbance required to construct the Project and enabled a more detailed assessment of associated environmental impacts.
- The Modified Project will provide full time employment for approximately 800 staff during construction and approximately 47 full-time jobs during its operational life, providing increased employment opportunities.
- The Modified Project will result in a direct injection of approximately $6-7 million per annum to the local community through direct payments to landholders, Voluntary Planning Agreement (VPA) contributions, and other benefit sharing programs, providing better diversification of income and a drought-proof and post-retirement income for farmers.
- The Modified Project is also expected to provide a material boost to the local, regional and state-wide economies, particularly through flow-on economic activity during the construction phase.

Since acquiring the Project in 2019, the Applicant has consulted extensively with key stakeholders, including the local community, and will continue to do so as the Project progresses through to construction and into the operational phase.

The Applicant has a proven track-record of undertaking meaningful community engagement that is open, inclusive, responsive and accountable. The Applicant has engaged extensively with landowners and neighbours, community members, Councils, State and Commonwealth governments to seek feedback on the Proposed Modifications. Engagement has occurred via a variety of methods, including Project newsletter updates, updates to the Project webpage, attendance at periodic CCC meetings, attendance at drop-in information sessions held in October 2021, providing timely responses to enquiries made through the general 1800 number (1800 WE TILT) and email address (liverpoolrangewindfarm@titlrenewables.com). Regular meetings have been held with State and Commonwealth government departments and local councils.

Detailed assessments of the key environmental impacts associated with the Proposed Modification have been undertaken by a range of suitably qualified technical specialists. The assessments focus on the

potential change in impacts compared with the Approved Project. The assessments also take into consideration the relevant environmental issues identified in the Original EIS and RTS.

The assessments prepared confirm that the Proposed Modifications will result in some increased impacts but that most of these impacts may continue to be appropriately managed by the existing and proposed mitigation measures under the Development Consent conditions (see Appendix B) and the Statement of Commitments (see Appendix D).

The Applicant is strongly committed to ensuring that these measures are implemented in accordance with best practice as informed by the most up to date and detailed information available for the Project. This will ensure the best possible outcome for the Liverpool Range Wind Farm project and the local and broader community.

While the Proposed Modifications include several changes to the indicative turbine parameters and infrastructure layout, the Modified Project is considered to be substantially the same development as was approved in 2018 and is consistent with the objectives of the EP&A Act. Considering the benefits of the Modified Project, the findings of environmental assessment and the implementation of the existing and additional mitigation strategies the Proposed Modifications are not expected to result in significant impact to the environment, and therefore warrant approval.

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Key Terms and Definitions

Applicant	Liverpool Range Wind Farm Pty Ltd
Approved Development Corridor	This refers to the area of land that was approved under Development Consent SSD 6696 on 27 March 2018 and includes the wind farm and transmission line infrastructure layout in their entirety as well areas of adjoining land to allow for micro-siting of infrastructure. It does not include anticipated public road upgrades
Approved Project	The Project as approved under Development Consent SSD 6696 on 27 March 2018, as generally described in Section 3.1
Approved Site Boundary	The area containing all relevant land parcels that comprise the Wind Farm and External Transmission Line components of the Project, as approved under Development Consent SSD 6696 on 27 March 2018
Balance of Easement	The area within the proposed transmission line easement but outside of proposed access tracks, string pads, and pole/tower locations, where vegetation in excess of 4 metres in height at full maturity is proposed to be removed, in accordance with Transgrid's easement guidelines titled *Living and Working with Electricity Transmission Lines*
Conditions of Consent	Conditions of the Development Consent SSD 6696 which authorise and regulate the Project
Development Consent	Development Consent SSD 6696 granted under Section 4.38 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) on 27 March 2018
Development Layout	The indicative location of proposed infrastructure including wind turbine generators (WTGs) and associated infrastructure (e.g. turbine locations, access track alignments, substations, transmission lines, construction compounds and laydown areas etc.)
EPBC Approval	Approval granted (EPBC 2014/7136) for the Project under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
External Transmission Line Site	A short-hand heuristic term that refers to the portion of land within the Modified Site Boundary generally located south of Rotherwood Road, Cassilis, where the external transmission line infrastructure including connection substation (switchyard), upgrade works to Transgrid infrastructure at Ulan and associated works are located. The portion of land within the Modified Site Boundary generally north of Rotherwood Road, Cassilis is referred to as the Wind Farm Site
Environmental Impacts Statement (EIS)	As defined in Development Consent SSD 6696, this includes the Environmental Impacts Statement titled *Liverpool Range Wind Farm Environmental Assessment*, prepared by Epuron Pty Ltd and dated July 2014, as modified by the *Liverpool Range Wind Farm Response to Submissions*
Indicative Development Footprint – Wind Farm	The estimated ground disturbance and vegetation removal required for construction of the Wind Farm, including turbine hardstands, internal access tracks and other temporary and permanent ancillary infrastructure, collector substations and ancillary equipment, and internal transmission line.

Indicative Development Footprint – External Transmission Line	The estimated ground disturbance and vegetation removal required for construction of the External Transmission Line (i.e. the portion generally located within the External Transmission Line Site) including access tracks within the transmission line easement and access tracks to the transmission line easement from nearby public roads, pole/tower locations, and string pads
Indicative Development Footprint – Public Road Upgrades	The estimated ground disturbance and vegetation removal required for construction of the public road upgrades anticipated to be required as part of the Project, based on road upgrade standards agreed with the relevant councils.
Indicative Over-size/over-mass (OSOM) Haulage Route (Original and Modified)	The indicative route from the Port of Newcastle to the Project site for Over-sized Over-mass (OSOM) vehicles to transport large wind farm components, such as blades, nacelles, hubs, generators, transformers, and tower sections. The indicative Modified OSOM Haulage Route is described in Section 4.6.3
Modification Application	This application to modify Development Consent SSD 6696 that was granted on 27 March 2018
Modified Development Corridors (Wind Farm and External Transmission Line)	Two buffer areas that contain the proposed Indicative Development Footprint (Wind Farm) and Indicative Development Footprint (External Transmission Line) in their entirety as well areas of adjoining land to allow for micro-siting of infrastructure as described in Section 4.0 of this report. The Modified Development Corridors do not include the proposed Indicative Development Footprint – Public Roads as public road alignments are generally fixed and therefore possess limited opportunities for micro-siting.
Modified Project	Alternate term synonymous with the Proposed Modifications as described in Section 4.0 of this report
Modified Site Boundary	The area containing all relevant land parcels that comprise the Wind Farm and External Transmission Line components proposed by the Modified Project, as described in Section 4.9.3 and shown in Appendix C.2 and Appendix E.
Original EIS	Original Environmental Impact Assessment (Environmental Assessment) prepared for the Liverpool Range Wind Farm project by Epuron Pty Ltd, dated July 2014
Original RTS	Original Response to Submissions prepared for the Liverpool Range Wind Farm project by Epuron Pty Ltd, dated May 2017
Over-dimensional and Heavy Vehicle Access Route (Approved and Modified)	The Local and Regional roads within the Warrumbungle, Upper Hunter and Mid-western local government areas (LGAs) proposed to be used by Over-dimensional and Heavy vehicles for the construction and operation of the Project. The Approved Over-dimensional and Heavy Vehicle Access Route is shown in Appendix 7 of the Development Consent. The Modified Over-dimensional and Heavy Vehicle Access Route is described in Section 4.6.2 and shown in Appendix C.6
Pre-construction minor works	As defined in Development Consent SSD 6696, this includes the following activities: - building/road dilapidation surveys; - investigative drilling, excavation or salvage; - minor clearing or translocation of native vegetation; - establishing temporary site office;

	- installation of environmental impact mitigation measures, fencing, enabling - works; and - minor access roads and minor adjustments to services/utilities, etc.
Project	Broad reference to the Liverpool Range Wind Farm project
Project site	Broad reference to land associated with Liverpool Range Wind Farm project.
Proposed Modifications	The proposed changes to the Approved Project as described in Section 4.0 of this report
Wind Farm Site	A short-hand heuristic term that refers to the portion of land within the Modified Site Boundary generally located north of Rotherwood Road, Cassilis, where wind farm infrastructure including the internal portion of the transmission line is located. The portion of land generally south of Rotherwood Road is referred to as the External Transmission Line Site