

Forest Wind

Landscape and Visual Impact Assessment

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VIENTO ENVIRONMENTAL LIMITED

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Landscape and Visual Impact Assessment

EXECUTIVE SUMMARY

1. This report presents the findings of a LVIA that has been undertaken to identify the likely effects of the Forest Wind Project on the landscape character and visual amenity of the locality.
2. The project has been sited within plantation forestry and has been designed so as to minimise visibility of the wind farm wherever possible.
3. This LVIA has described and illustrated that, in general terms, the visibility of the proposed wind farm would be extremely limited. This has been indicated but perhaps underplayed by the viewpoints, which have been located at some of the most open, well used and publicly accessible locations within the study area. The viewpoints illustrate some of the views seen on typical journeys through this study area, but they generally illustrate the most open views of the proposal from these journeys.
4. It is also important to recognise that the turbines may often be less visible than the viewpoint photomontages illustrate due to the turbine positions in relation to the prevailing wind direction as well as the varying visibility available across the area due to varying weather conditions throughout the year. The visibility data tends to indicate that in general terms, the more distant the receptor is from the wind farm, the less of it would be visible, on average.
5. There would be no significant effects on the vast majority of residents, tourists, recreational users, motorists, or rail users within the study area. Due to the carefully considered location and design of the proposed wind farm, the proposed turbines would be at least partially screened in many views, limiting the potential effects on both visual receptors and on landscape character.
6. By siting the proposal wholly within plantation forestry, the impacts on landscape character and landscape fabric have been limited; the plantation continually works on a rotation felling basis where the wind turbines will utilise existing plantation tracks and will result in no loss of distinctive landscape features. Furthermore, as the proximate viewpoints indicate, the forestry itself provides a natural visual buffer in many views.
7. As the ZVIs indicate, from the vast majority of the study area the proposed development would be entirely screened from view by the considerable and dense vegetation and undulating land form. Limited and scattered potential visibility of the turbines would be available from a few locations within the site and also some locations at greater distances from the site, although this visibility would predominantly be limited to under 25% percent of the wind farm
8. Furthermore, whilst a number of national parks, recreation areas and the Fraser Island World Heritage Site are all located within the study area, the LVIA has provided information to confirm that the proposed wind farm would not fundamentally alter the reasons for which any of these assets were designated.

INTRODUCTION

9. Forest Wind Holdings Pty Ltd proposes to develop a wind farm, named Forest Wind (the Project) in Queensland. Forest Wind Holdings is preparing a development application to install up to 226 wind turbine generators and supporting infrastructure. As part of the development application, a landscape and visual impact assessment (LVIA) has been prepared by Viento Environmental Ltd.
10. This report presents the findings of a LVIA that has been undertaken to identify the likely effects of the proposed Project on the landscape character and visual amenity of the locality.
11. The assessment has concentrated on a study area determined by applying a 30km radial buffer to the turbines, which is considered sufficient to identify all likely significant effects on landscape and visual amenity (see **Figure PO9-1**). Cumulative effects have also been considered, although no operational, permitted or proposed wind farms were found located within the 30km radius study area for the site.

12. The assessment is illustrated by the following figures, viewpoints and appendices of supporting information. All references are listed at the end of this report.

Figure PO9-1 LVIA study area

Figure PO9-2 Landform

Figure PO9-3 Vegetation heights

Figure PO9-4 Landscape character types

Figure PO9-5 Protected areas and visual receptors

Figure PO9-6 ZVI of vertical subtended angle

Figure PO9-7 ZVI of vertical subtended angle with protected areas and receptors

Figure PO9-8 ZVI of percentage of wind farm visible

Figure PO9-9 ZVI of hubs visible

Figure PO9-10 ZVI of tips visible

Figure PO9-11 Photomontages

Viewpoint 1

Viewpoint 2

Viewpoint 3

Viewpoint 4

Viewpoint 5

Viewpoint 6

Viewpoint 7

Viewpoint 8

Viewpoint 9

Viewpoint 10

Viewpoint 11

Viewpoint 12

Viewpoint 13

Appendix A Landscape Character Assessment

Appendix B Detailed Viewpoint Analysis

Appendix C Zone of Visual Influence Assessment

CONSULTANT CAPABILITY

Viento Environmental Limited is an environmental consultancy specialising in landscape and visual impact assessment and landscape design, with a focus on wind farm developments. With over 20 years' experience in the planning sector, we have a detailed understanding of environmental impact assessment and the necessary requirements of planning applications at both EIA and sub EIA level.

Fran Iribar, the principle and assessor of this LVIA, is recognised internationally for her specialist skills in relation to wind turbines in landscape and visual impact assessments, cumulative impact assessments, landscape characterisation, landscape design, cultural heritage assessments and provision of expert witness services. Fran has undertaken landscape and visual impact assessments and associated services on some 63 wind power projects in the UK, Ireland and Australia, including onshore and offshore sites, as well as solar and battery storage projects, as listed below:

| | | |
|-----------------------------------------|-----------------------------------------------|-------------------------------------------------|
| Bagmoor Wind Cluster | Upper Holton Wind Farm | Bransholme Battery Storage Facility |
| Benington Wind Energy Project | Walkway Wind Farm | Carlam Hill Farm Solar Farm |
| Bicker Fen Wind Farm | West Hinkley Wind Farm | Cefn Caer Solar Farm |
| Blaen Bowi Wind Farm | White Hill Wind Farm | Cefn y Maes Solar |
| Boundary Lane Wind Farm | Winscales Moor Wind Farm | Cheshire solar farm |
| Boyndie Wind Farm | Rhyl Flats Offshore Wind Farm | Clashnagoneen Solar Farm |
| Bryn Blaen Wind Farm | Ballycooleen Solar Farm | Deerpark Solar Farm |
| Checkley Wood Wind Turbine | Arkwright Community Wind Turbine | Drumroe East Solar Farm |
| Cottam Wind Farm | Ashby Farm FiT turbine | Ingham Solar Farm |
| Deeping St Nicholas Wind Farm | Elms Farm FiT turbine | Lockleaze Battery Storage Facility |
| Denshaw Wind Farm | Fron Isaf wind turbine | Rayleigh Battery Storage Facility |
| Ferndale/Power Factory Wind Farm | Hargreaves Farm single turbine | Solar Farm - South Wales |
| Forestmoor Wind Farm | Kenwick Lodge single FiT turbine | Solar Farm - east coast |
| Foxton Lane Wind Farm | Ladygate single FiT turbine | Suite of solar farms in Southern Ireland. |
| Glassmoor Wind Farm | Maple Plantation FiT turbine | Templerainey East Solar Farm |
| Grange Wind Farm | Norton Canes FiT turbine | Cae Mor Farm Free Range Egg Production Unit |
| Green Rigg Wind Farm | Oernant Wind Turbine | Crossparks Anaerobic Digester |
| Hendy Wind Farm | Pencau Lands Wind Turbine | Edgeworthy Anaerobic Digester |
| Highfield Wind Farm | Penhill Wind Turbine | Free range egg laying units - Shropshire |
| Hore Down & Old Racecourse Windclusters | Penllwyn single turbine | Hartnoll Anaerobic Digester |
| Laughton Wind Farm | Potash Farm FiT turbine | LVIA for poultry unit in Wales. |
| Llethercynon Wind Farm | Ryehill and Bullymore's Lodge single turbines | Landscape Characterisation |
| Mynydd Llanelian Wind Farm | Single wind turbine in Powys | Lower Leighton Farm extension - Planning Appeal |
| Palmers Hollow Wind Farm | Single wind turbine on Anglesey | Mid Wales Pylon Connection |
| Red Tile Wind Farm | Single wind turbine on Llyn Peninsula | Planting Design for TFM Superstore |
| Rhoscrowther Wind Farm | Station Farm FiT turbine | Willand Anaerobic Digester |
| Scout Moor Wind Farm | Strellas Lane wind turbine in Lancashire | Forest Wind |
| Stud Farm Solar Farm | Syrrior FiT turbines | |
| Suite of turbine sites in Wales | Warren Farm FiT turbine | |
| Thornholme Wind Farm | Wyggeston FiT turbine | |
| Treading Wind Farm | | |
| Two single turbines in Mid Wales | | |

METHOD OF ASSESSMENT

Assessment Approach

13. The assessment has examined the effects of the proposed wind farm in the context of the existing landscape and visual baseline which currently contains no operational, permitted or proposed wind farms.
14. As a result this assessment considers the existing baseline landscape without wind turbines and assesses the impact of introducing the proposed wind farm to this baseline.
15. The assessment is produced in accordance with the State code 23: Wind Farm development - Planning Guidelines (Queensland Government, 2018), State Development Assessment Provisions (Department of State Development, Manufacturing, Infrastructure and Planning, July 2019), the Draft National Wind Farm Development Guidelines (Commonwealth Government, 2010) and Queensland Government Implementation Guideline No 8 - Identifying and Protecting Scenic Amenity Values (2007), and the methodology used in this study broadly conforms to the UK Guidelines for Landscape and Visual Impact Assessment, Third edition (GLVIA3, LI/IEMA 2013) in the absence of detailed Australian guidelines.

Good Practice Guidance and Data

16. As mentioned above, the assessment process has been based on the current published good practice guidelines for landscape and visual assessment (LI/IEMA, 2013). The assessment has drawn on information provided within the Local Government Planning Schemes that cover the study area (see list of references) and the landscape character assessments which cover the study area (see list of references), as well as the State code 23: Wind Farm development – Planning Guidelines (Queensland Government, 2018).

Assessment Process

17. The assessment has involved information review, fieldwork observations and photography, and computer-based data processing and analysis, and has been undertaken in several stages, as presented in the following sections of this report:

- Predicted effects and mitigation – a review of the visual characteristics of the proposed development to identify the aspects with the potential to give rise to landscape and visual effects and a description of the measures that have been incorporated into the design to mitigate these effects.
- Landscape and visual context – a review of the existing landscape and visual baseline of the study area, to identify landscape character, landscape designations and visual receptors in the study area.
- Visual analysis – visibility analysis using computer-generated zones of theoretical visibility (ZTVs)/ zones of visual influence (ZVIs) to identify the locations in the study area from where the Forest Wind proposal could in theory be visible (based on topography and vegetation within the study area), and a viewpoint analysis to predict the changes to views as a result of the proposed development from a selection of viewpoints that represent the main visual receptors in the study area.
- Landscape assessment – an assessment of the potential effects of the proposed development on landscape fabric, landscape character and landscape designations in the landscape study area.
- Visual assessment – an assessment of the potential effects of the proposed development on the visual amenity of receptors in the visual study area.
- Conclusions – a summary of the findings of the landscape and visual assessments.

Prediction Methodologies

18. The prediction methodologies for the viewpoint analysis, landscape assessment and visual assessment are provided at the beginning of these sections.

PREDICTED EFFECTS AND DESIGN MITIGATION

Characteristics of Commercial Onshore Wind Farms

19. When commencing an LVIA, it is essential to consider the national context (see Planning Report) and the characteristics and locational requirements of the type of development being proposed, in order to understand and put into context the potential effects that may arise and the potential mitigation measures that can be incorporated to minimise these effects such that the predicted residual landscape and visual effects would be acceptable when weighed in the planning balance.

20. All commercial onshore wind farms are major renewable energy developments with particular locational requirements and characteristics. These include:

- A suitable wind resource and an area of undeveloped land – these tend to be found in sparsely settled, rural locations.

- A range of technical, environmental and planning constraints – such as access, aviation, grid connection and capacity, habitats and species, cultural heritage, land use and availability, designations and telecommunications. These also influence location and suitability of a site and the size and arrangement of turbines, so wind energy schemes cannot be designed specifically around landscape and visual considerations.
 - Standardised turbine design – this limits the opportunity to modify the appearance of wind turbines to suit local conditions. However, the highly evolved design of modern turbines has resulted in a structure that many people consider simple and elegant, and which has a clear rationale between form, function and location.
 - Wind turbine colour and finish – this is usually a shade of white, with a low reflectivity finish/treatment. If lit by bright sunlight the turbine colour can appear white but if in shadow, the shade of white can make wind turbines less noticeable against the sky and the landscape.
 - Large scale, height and verticality – arising from the scale and shape of the wind turbines.
 - Movement - arising from the rotation of the rotors. This movement is part of the rationale between form, function and location but can draw attention to the wind turbines and make partially obscured wind turbines more noticeable than if the rotors were static.
 - Ancillary development – including access tracks, crane hardstandings, substation and/or control building, underground electrical and communication cables, battery storage facilities, temporary site compounds and, in some cases, meteorological masts and an overhead grid connection.
 - A very open form - arising from the necessity to space the wind turbines to minimise array losses, which gives wind energy schemes a high degree of visual “transparency”.
 - Small footprint – compared to the total site area, so disturbance to vegetation is minimal and current land uses usually continue on the site.
 - Reversibility – time limited design life and decommissioning resulting in the removal of the turbine towers and a reversal of the changes to landscape character and visual amenity.
 - Localised and global landscape effects – all wind farms are likely to result in localised changes in landscape character but with potential benefits to the local and wider landscape as a result of contributing towards tackling the causes and effects of climate change.
21. As a result, it would be impossible to site an onshore wind farm in the Australian landscape without some significant effects on landscape character and/or visual amenity. Therefore, the purpose of the site selection, design and assessment process is to mitigate (prevent/avoid, reduce, remedy or offset/compensate for) any likely adverse significant effects such that the residual effects are considered acceptable when weighed in the planning balance.

Potential Effects

22. A detailed description of the proposed development and information on the installation of the various components of this wind farm are provided within the Planning Report. Chapter 3 outlines the characteristics of the site, including environmental aspects within what is Australia’s largest exotic pine plantation.
23. It is the visual appearance of the proposed development and associated activities and any proposed changes to the existing vegetation that are the main aspects of the development with the potential to affect landscape character and visual amenity and these are summarised below for each of the three distinct phases of the development – the construction, operational and decommissioning phases.

Construction Phase

24. The construction phase would be approximately 24 - 36 months (including time to reinstate working areas). It may be undertaken in several stages, with some stages lasting only a few months within different sections

of the site. The activities and temporary features with the potential to affect landscape character and visual amenity would include:

- Existing forestry trucking and operational tracks are to be utilised as access and maintenance tracks for the proposed wind farm. Some upgrades may be required and ongoing maintenance will be required through construction.
- A main site entrance is proposed off Neerdie Road (as shown in **Figure 2 in the Planning Report**) where the site office (incorporating office buildings, first aid and training rooms, welfare facilities, equipment store and vehicle parking) would be located, along with the primary construction compound (incorporating temporary offices, parking, induction rooms and welfare facilities etc). Three to four further secondary and tertiary site entrances would also be incorporated into the scheme, although these would be determined prior to site commencement in order to minimise travel to relevant sections of the site.
- Secondary and tertiary site compounds would also be created, with the secondary construction compounds proposed at the northern and southern ends of the site, and the tertiary compounds as temporary structures supporting the construction of each string of wind turbines. All of these compounds are to be situated within the existing exotic pine plantation.
- Two temporary quarries may be established within the Wind Turbine Area within the exotic pine plantation providing materials for track upgrade and materials for concrete production. A crushing plant and concrete batching plants may also be established for the construction phase.
- Crane hardstandings adjacent to each turbine. Dimensions will vary depending on access to turbine location, terrain, vegetation and crane configuration (approximately 10,000m² or as required, which may be 100m x 100m, or other shape as required).
- Excavation and construction of the turbine foundations (approximately 30m dia x 2.5m deep). Size of foundation may vary depending on turbine model and ground conditions etc.
- Erection of the turbine towers and installation of nacelles, hubs, blades and control cabinets.
- Installation of battery storage, transformer and switching substations as required per detailed design within the exotic pine plantation area (approximately 250m x 250m x 5m).
- Excavation of the cable trenches (approximately 0.75m wide) located adjacent to or under the existing forestry tracks where possible.
- Construction of medium voltage (33-66kV) and high voltage (132-275kV) overhead transmission lines.
- Minor upgrade of waterway crossings such as minor bridges and culverts within the exotic pine plantation.
- The presence of the cranes on site, heavy goods and oversize vehicle deliveries to site, to the construction compounds and movement of vehicles (including trucks) on-site.
- Progressive site reinstatement and restoration as each part of the project is completed and temporary areas are no longer required and the re-grading of track margins (where required) and of disturbed areas using site-derived materials.

Operational Phase

25. The main elements that would be visible over the operational life of the proposed wind farm would be:

- Up to 226 wind turbines - horizontal axis, up-wind, wind turbine generator, with a tapered tubular tower, a nacelle, hub and three blades. This wind turbine would have a maximum tip height of 265m, comprising of a hub-height and rotor diameter to be determined in the detailed design process; the rotor would rotate clockwise (when viewed from upwind) with rotational speeds up to approximately 12rpm (rotations per minute). The nacelle and rotor blades shall be a shade of white, with a low reflectivity finish/treatment, without supplier branding or other promotional material. [It should be noted that the number (226) and height of the turbines (265m to tip) was used for this assessment on the instruction of Forest Wind Holdings Pty Limited. It is also noted that the Project Description for Forest Wind includes a layout of up to 226 turbines at up to 295m in height. However, it is extremely unlikely that all 226 wind turbines would be 295m in height. If all turbines were 295m in height the

number of turbines installed would be less than 226 in number. Therefore, for the purposes of this assessment a worst case scenario of 226 turbines at 265m to tip has been assessed.]

- Transformers – these would be in the nacelles or base of the wind turbine towers, or in separate housings adjacent to each wind turbine.
- Maintenance tracks – existing forestry trucking and operational tracks, with some tracks upgraded and minor deviations of new track would be required to some specific turbine locations.
- Meteorological masts (met masts) – up to six masts in total across the site up to turbine hub height.
- Battery storage, transformer and switching substations (each approximately 250m x 250m x 5m), as required per detailed design within the exotic pine plantation area.
- Medium voltage (33-66kV) and high voltage (132-275kV) overhead transmission lines.
- Construction and operations compounds.
- Visits to the site for maintenance purposes, involving a commercial van type on a daily basis.

26. Maintenance personnel would make routine visits to the wind farm by car/van on a daily basis, from the operations compounds. Routine maintenance work would be carried out regularly and, in exceptional circumstances, a crane and/or truck may be used where large turbine components need to be repaired.

Decommissioning Phase

27. The decommissioning phase would be undertaken after the operational phase and is expected to last up to 24 months. All above ground structures and equipment (wind turbines, switchgear buildings, met masts) would be removed. Wind turbine structures would be removed to a depth to allow ongoing forestry operations. All ground disturbed by the works would be graded over with site derived soil. Visible elements of the decommissioning phase would include the presence of cranes, heavy goods vehicle deliveries collecting materials and components from the site and the movement of vehicles on-site.

Design Mitigation

28. A number of mitigation measures have been incorporated into the design and construction of this wind farm to limit the effects of the development as described in Chapter 4 of the Planning Report. Those that would mitigate potential effects on landscape character and visual amenity have been taken into account in the assessment of effects and include:

- Site location – the development would be sited in a relatively sparsely settled area such that appropriate separation distances of 1500m from sensitive land uses, as set out within the State code 23: Wind farm development, are doubled to 3000m.. The development would be located outside of any landscape designations.
- Forestry context – the exotic pine plantation environment has been a key factor in selecting the site, with the thicket of pine trees aiding in mitigating impacts on sensitive land uses and other receptors in the area.
- Design evolution – potential landscape and visual effects have been a key factor in the evolution of the site design. For instance, the arrangement and distance of the wind farm in views from surrounding settlements were examined for various layouts, in order to minimise, and remove where possible, the potential visibility of the development as far as possible from key views.
- Existing forestry access tracks – would be utilised to minimise the need for new on-site tracks.
- Main site entrance access – situated on the southwestern boundary of the site to minimise the distance to the main State-controlled road network for ease of access during construction and decommissioning phases.
- Crane hardstandings – would be retained but covered in gravel and may naturally re-vegetate so they would not be a noticeable feature from local surrounding areas.
- Wind turbine layout – the layout is confined within the main forested area so as to maximise the containment of near views of the turbines by the forestry blocks. The turbines are laid out in sinuous lines following existing features such as forestry tracks, so that when visible in near views the turbines are viewed as linked to existing landscape patterns.

- Wind turbine size – the wind turbines selected would be in scale with the local landform and landscape scale.
- Wind turbine colour – the towers, nacelle and blades would be finished in a low reflectivity finish/treatment with a shade of white colour which would minimise the contrast and, therefore, visibility of the wind turbines when seen against the sky, particularly on overcast days.
- Power cables – would be placed, as far as is practicable, along the routes of existing tracks and firebreaks within the forestry. This would limit ground disturbance and also vegetation loss and utilise the tall nature of the pine trees to reduce visibility of the overhead lines.
- Construction and operations compounds – their location within the pine plantation would limit views of the buildings.
- Battery storage, transformer and switching substations will all be located with the pine plantation, limiting views to this infrastructure.
- Decommissioning – would leave most below ground structures in place which would minimise ground disturbance and effects on vegetation but may remove all above ground structures and revegetate the site.

Potential Residual Effects

29. The mitigation measures incorporated into the design and construction of the development have limited the residual effects of the three phases of the development on landscape and visual amenity as follows:

- Construction phase – the visual effects of the various aspects would be temporary, intermittent and short-term with each aspect lasting only part of the overall construction programme. Visual disturbance would be minimised by good site management and the relatively short duration of each aspect of the works. Ground disturbance would be minimised by the use of existing tracks where feasible, by locating the trenches for underground cables alongside tracks and by the progressive and full reinstatement over all temporarily disturbed and excavated areas. Given the forested nature of the site and the overall size of the site, many aspects of the construction phase would largely be screened from view by existing forestry.
- Operational phase – the visual effects would be minimised by the limited number of above ground elements present during the operational life of the development.
- Decommissioning phase – the visual effects of the various aspects would be temporary and minimised by the short duration of the works, leaving most below ground structures in place, limiting ground disturbance and restoring the ground disturbed by the works.

30. The residual effects of the construction, operational and decommissioning phases of the development on the landscape fabric and the landscape character of the site are considered in more detail within the Assessment of Effects on Landscape section of this report.

31. With regards to the wider landscape and visual amenity of the study area, as a result of the design and mitigation measures incorporated into the development, the only elements with the potential for significant residual effects over the life of the development are the wind turbines, and these are considered in more detail later within this report.

LANDSCAPE AND VISUAL CONTEXT

Landscape Fabric

32. The proposed wind farm and associated development would be located within the Tuan, Toolara and Neerdie State Forests, which are currently utilised for commercial pine plantation forestry, with small remnants of white mahogany / scribbly gum open forest. Some of the open forests contain heath understoreys containing banksia, hakea and xanthorrhoea. Narrow remnant patches of melaleuca woodlands also containing white mahogany and scribbly gums occur along the waterways.

Landscape Character

33. The proposed site is located within the Undulating Forested Lowlands Landscape Character Type (LCT). *“This landscape type covers a substantial portion of the Region’s northern, eastern and western landscapes and is largely defined by the densely forested lowlands of both native forest and managed pine plantations”* (Aecom 2011, p.26)
34. Within 30km of the proposed wind farm extent there are eight LCTs subdivided into various Landscape Character Areas (LCAs), identified within the Fraser Coast Landscape Strategy (Aecom 2011) covering the northern half of the study area. These LCTs have been extrapolated for the purposes of this assessment to cover the entire study area as Gympie Regional Council does not have a Landscape Character Strategy. The LCTs are shown on **Figure PO9-4**. As part of the landscape character assessment, all relevant landscape character assessments have been studied and used to fully understand the influences on landscape character in this area. Some of the information used has been provided within **Appendix A**, for reference.
35. The LCAs subdivide the LCTs into more detailed areas, but for the purposes of this assessment, the higher level LCTs are considered the most useful landscape unit descriptors. Both the LCTs and LCAs have been studied although landscape character is broadly discussed via reference to the LCTs. The proposed wind farm would be located within one of the most extensive LCTs within the study area (Undulating Forested Lowlands). The key characteristics of the eight LCTs are set out below (extracts from Fraser Coast Landscape Character Strategy). An assessment of the effects of the proposed wind farm on landscape character is provided in the Landscape Assessment below.

Table 1: C - Undulating Forested Lowlands LCT

(C1 – Tuan Undulating Forested Lowlands LCA)

(C2 – Glenbar Undulating Forested Lowlands LCA)

(C4 – Burrum Undulating Forested Lowlands LCA)

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| Key characteristics | <ul style="list-style-type: none"> • Sedimentary detrital geology formed by conglomerates of the Maryborough Formation and Burrum Coal Measures, comprising sandstones, siltstones and mudstones with shale and conglomerates. • Mixture of soils types; including sodosols in central parts of the Region; and kandosols and podosols in northern and eastern parts of the Region. • Undulating low lying landform, generally between 20-100m AHD. • Located at the foothills of the more elevated and dramatic scenery associated with the <i>Forested Peaks and Hills</i> in central and western parts of the Region e.g. surrounding Mount Woocoo. • Incised by several creek valleys, including tributaries of the Mary and Burrum Rivers (in central and northern parts of the Region), Tinana Creek (in southern parts of the Region), and small coastal creeklines which eventually discharge into the Great Sandy Strait in eastern parts of the Region, e.g. Poona Creek. • Predominantly a forested landscape; comprising both native forest and managed hardwood (pine) plantations e.g. Tuan State Forest. This is the major defining characteristic of this landscape type. • Contains several protected areas, covering a large proportion of this landscape type including Vernon Conservation Park, Beelbi Creek Conservation Park, Wongi Forest Reserve, Tinana Creek Conservation Park and several state forests (Vernon, Wongi, Tuan, St Mary, Glenbar, Thinoomba, Boompa, Bauple, Ferguson and Gungaloon). • Key native forest communities include Eucalyptus and Corymbia open forest, Melaleuca woodland, Lacustrine wetlands and some hoop pine vine forest (e.g. at Lenthalls Dam). • Patches of Swamp Banksia (<i>Banksia robur</i>), Red Silky Oak (<i>Grevillea banksii</i>), Grass Trees (<i>Xanthorrhoea johnsonii</i>) and She Oak (<i>Casuarina glauca</i>) are a distinctive feature, particularly in Wongi State Forest. |
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| | <ul style="list-style-type: none"> • Mostly managed / protected by State Forest or National Park designations. • The Wongi waterholes and Lenthalls Dam are a key points of interest in this landscape. • Generally a sparsely settled landscape with limited access. • Key routes through the landscape include the Bruce Highway, Maryborough-Tuan Forest Road and Maryborough-Biggenden Road. • Key settlements include Brooweena, Aramara, and Burrum, Howard, Torbanlea and Aldershot (historic mining towns). • The densely forested and sparsely settled character evokes a strong sense of remoteness and tranquillity. • Timber fire towers provide local landmarks and orientation. |
| Landscape designations | None. |
| Landscape value | District/ Regional and local |
| Susceptibility to wind farm development | <i>Moderate/ slight</i> (to a wind farm development in this LCT) – as the clarity of the key characteristics are clearly expressed, their robustness to change is strong, views make a limited contribution to the character of the LCT, and the changes to landscape character that could be brought about by a development of this type and scale in the location proposed would have some compatibility with these factors. |
| Sensitivity to the proposed development | <i>Medium/ low</i> – a landscape with mainly District/ Regional and local value that could have a moderate/ slight susceptibility to the type, scale and location of development proposed. |

Table 2: A – Forested Peaks and Hills LCT

(A1 – Mount Bauple, A2 – Grassy Mountain, A3 – Mount Neerdie, A4 – Mount Urah and A7 – Mount Woocoo Forested Peaks and Hills LCAs)

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| Key characteristics | <ul style="list-style-type: none"> • Associated with the most elevated topography in the Region; from approximately 100m to above 700m AHD at Mount Walsh. • Varied geology consisting of volcanic granite associated with Mount Bauple, Grassy Mountain, Mount Neerdie, Mount Urah, Mount Walsh and Mount Bererum; and silicacious sedimentary rocks/sandstones associated with Mount Joseph, Mount Woocoo, Mount Benarige, Fairlies Knob and Mount Doongul. • Soils dominated by rudosols (western parts) and sodosols (eastern parts). • Although the underlying geology, soils and vegetative character associated with each peak or hill varies discreetly; the extensive forest cover, distinctive elevated landform and their related role as key visual and scenic markers in the Region, provide the key unifying elements of this landscape type. • Remnant vine forest often associated with volcanic geology (e.g. at Mount Walsh, Grassy Mountain, Mount Bauple, Mount Urah); defining species include Hoop pine (<i>Araucaria cunninghamii</i>), Bunya Pine (<i>Araucaria bidwillii</i>), Queensland Kauri Pine (<i>Agathis Robusta</i>), Lemon Myrtle (<i>Backhousia myrtifolia</i>), Tuckeroo (<i>Cupaniopsis</i> spp.), Crows Ash (<i>Flindersia australis</i>), Queensland Brush Box (<i>Lophostemon confertus</i>) and sometimes Alexandra Palm (<i>Archontophoenix cunninghamiana</i>) in gullies. • Corymbia and Eucalyptus open forest is generally associated with sedimentary rock/sandstone hills and foot slopes. |
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| | <ul style="list-style-type: none"> Sparsely settled landscapes with very limited recreational access; evoking a strong sense of remoteness and tranquillity. Mostly managed / protected by State Forest or National Park designations. |
| Landscape designations | None. |
| Landscape value | District/ Regional and Local value. |
| Susceptibility to wind farm development | <i>Moderate</i> (to a wind farm development in adjacent LCTs) – as the clarity of the key characteristics are clearly expressed, their robustness to change is moderately strong, views out of the LCT contribute limitedly to landscape character, and the changes to landscape character that could be brought about by a development of this type and scale in an adjacent LCT would have a moderate compatibility with these factors. |
| Sensitivity to the proposed development | <i>Medium</i> – a landscape with mainly Regional/District and local value that could have a moderate susceptibility to the type, scale and location of development proposed. |

Table 3: D – Undulating Farmland Mosaic

(D1 – Pine Mountain, D2 - Graham’s Creek, and D3 – Hervey Bay Hinterland Undulating Farmland Mosaic LCAs)

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| Key characteristics | <ul style="list-style-type: none"> Comprises mixed but predominantly metamorphic geology including the Tiaro Coal Measures, Alluvium, Maryborough Formation and Ferruginous duricrust; with volcanic geology associated with the Graham’s Creek Formation. Predominantly sodosol soils; however the Hervey Bay hinterland area coincides with kandosols. Gently rolling lowland topography. Contain several watercourses descending from nearby peaks and hills; most notably the Mary River, which meanders through the landscape in an approximately northerly direction between Munna Creek and Myrtle Creek. Land use is predominantly cattle grazed pastures and cane fields (particularly along the Mary River), evoking a strong rural character. Gently rolling pastures provide visual contrast to forested hills and peaks beyond e.g. Mount Bauple. Small blocks or strands of remnant forest are a common feature, including Denison, Gundiah and parts of Glenbar State Forests, creating visual contrast. Settlement pattern defined by small rural townships (including Bauple, Tiaro and Mungar) and isolated rural homesteads. This landscape is commonly experienced through the Bruce Highway; a key north-south route providing primary access to and through the Fraser Coast Region. Mount Bauple provides a distinctive backdrop to both Tiaro and Bauple. Mature Hoop Pine street tree planting along Bauple Drive amongst rolling cane fields provides a memorable approach to Bauple. |
| Landscape designations | None. |

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| Landscape value | District/ Regional and Local value. |
| Susceptibility to wind farm development | <i>Moderate/ slight</i> (to a wind farm development in adjacent LCTs) – as the clarity of the key characteristics are clearly expressed, their robustness to change is strong, views out of the area to the east are incidental to landscape character of the LCT, and the changes to landscape character that could be brought about by a development of this type and scale in an adjacent LCT would have a good compatibility with these factors. |
| Sensitivity to the proposed development | <i>Medium/ low</i> – a landscape with mainly Regional/ District and local value that could have a moderate/ slight susceptibility to the type, scale and location of development proposed. |

Table 4: E – Alluvial Pastures and Cane Fields LCT**(E1 –Maryborough Alluvial Pastures and Cane Fields LCA)**

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| Key characteristics | <ul style="list-style-type: none"> Varied geology; consisting of alluvium and ferruginous duricrust in core lower lying area associated with cane fields and the Elliott formation in more undulating periphery areas near Tinana Creek. Soils dominated by Kandosols, comprising alluvial sands or loams associated with the Mary River and its tributaries. The elevation of the landscape ranges between 1m-40m AHD, resulting in a mostly flat, low lying terrain. Rich, fertile arable farmland and pastures. Strong geometric landscape patterning defined by medium to large scale intensive arable farmland, mostly sugar cane, evoking a strong rural character. Occasional areas of cattle grazed pastures (e.g. north of Poona National Park) and blocks of remnant vegetation (e.g. Granville Conservation Park). Cane fields provide a unique and defining setting to Maryborough; including memorable views from the town centre to surrounding cane fields e.g. views from Brolga Theatre to cane fields at Granville. Rich townscape of Maryborough, comprising valued mature trees and an exemplary collection of 19th and early 20th century Queenslander style houses. Settlement pattern surrounding Maryborough consists of rural residential properties, hobby farms, and small/medium scale farming properties with farm houses. Classic Queenslander style houses protruding above cane fields and/or nestled amongst remnant hoop pines are a memorable feature in this landscape. Due to the low-lying nature of the landscape and tall sugar cane, views are generally limited to within the landscape, with occasional skyline views to surrounding mountains to the west e.g. Mount Bauple. |
| Landscape designations | None. |
| Landscape value | District/ Regional and Local value. |
| Susceptibility to wind farm development | <i>Slight</i> (to a wind development in adjacent LCTs) – as the robustness of the key characteristics to change is strong, views out of the LCT are very limited and mainly to the SW (so that views out are incidental to landscape character), and the changes to landscape character that could be brought about by a development of this type and scale in an adjacent LCT would have a good compatibility with these factors. |

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| Sensitivity to the proposed development | <i>Medium/ low</i> – a landscape with mainly Regional/ District and local value that could have a slight susceptibility to the type, scale and location of development proposed. |
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Table 5: F – Estuaries and Coastal Foreshores with Wallum LCT

(F1 –Tinnanbar to Maaroom, F2 – Maaroom to River Heads, F3 – River Heads to Burrum Estuaries and Coastal Foreshores with Wallum LCAs)

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| Key characteristics | <ul style="list-style-type: none"> Quaternary Coastal Dune geology with areas of estuarine and delta deposits, with coal measures and ferruginous duricrust further away from coastal areas. Mixed soils; generally poor podosols with some kandosols around Hervey Bay, and sodosols around Toogoom. Largely flat, low-lying landscape, generally between 1-10m AHD and strongly influenced by proximity to the coast, which is the key defining feature. The eastern boundary of this landscape type is not abrupt; rather its character blends and slowly transitions into the <i>Ocean Passage</i> landscape type, sharing similar shoreline vegetation communities. Contains a diversity of coastal habitats including mud flats, salt marshes, mangrove lined coastal creeks/rivers and estuaries, and extensive areas of lowland banksia wallum, melaleuca woodlands and swamps (often acidic soils); evoking a strong sense of naturalness. Coastal salt marshes occur in upper tidal zone of estuaries and mangrove systems between wet and dry land, comprising communities of salt-tolerant vegetation (e.g. grasses, herbs, reeds, sedges and shrubs such as <i>Banksia</i> spp, <i>Callitris columellaris</i>, <i>Acacia</i> spp). Contains several protected areas including Burrum Coast National Park, northern parts of Vernon State Forest, O'Regan Creek Conservation Park, Poona National Park, Granville Conservation Park, eastern parts of Tuan State Forest and the shoreline features of Great Sandy Conservation Park. Contain tracts of rural land, including cane fields and cattle-grazed pastures, that provide a setting and/or breaks in the urban fabric e.g. between Hervey Bay and Dundowran. String of coastal settlements including Tinnanbar, Poona, Maaroom, River Heads, Hervey Bay, Dundowran, Toogoom and Burrum Heads. The villages adjoining the Great Sandy Strait retain a sense of remoteness and many of these settlements retain a character that denotes their origins as 'fishing villages'. Vegetation along the foreshore often provides a buffer zone, protecting coastal properties from the effects of foreshore erosion, strong winds and storm surges. Strong sense of place provided by locally endemic vegetation (e.g. banksia forest and melaleuca swamp) and coastal views, particularly views over the Great Sandy Strait to Fraser Island. Notable expansion of low density, homogenous residential development at River Heads, Toogoom, Hervey Bay, Dundowran and Burrum Heads. |
| Landscape designations | None. |
| Landscape value | District/ Regional and Local value. |
| Susceptibility to wind farm development | <i>Susceptible</i> (to a wind farm development in adjacent LCTs) – as the clarity of the key characteristics are strongly expressed, views are an important characteristic of the LCT, and the changes to landscape character that could be brought about by a development of this type and scale in an adjacent LCT would have a poor compatibility with these factors. |

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| Sensitivity to the proposed development | <i>High/ medium</i> – a landscape with mainly Regional/District and local value that could be susceptible to the type, scale and location of development proposed. |
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Table 6: G – Broad River Valley LCT**(G1 –Lower Mary Broad River Valley LCA****(G2 – Lower Burrum Broad River Valley LCA)**

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| Key characteristics | <ul style="list-style-type: none"> • Broad meandering U-shaped river corridors defined by the Mary and Burrum Rivers; which empty into Great Sandy Strait near Burrum Heads and River Heads, respectively. The mouth of the Susan River is also falls in this landscape type where it joins the Mary River, including a wide tract of mangrove vegetation. • Generally steep valley sides, stabilised by remnant vegetation, which straighten out to level alluvial plains; affording land to be cultivated very close to the river, often resulting in a narrow riparian zone. • River valleys fringed by mangrove vegetation in intertidal areas; particularly at the river mouths. • Mary River meanders in wide bends through the rich, fertile arable farmland and pastures associated with the <i>Alluvial Pastures and Cane Fields</i>, to the east and south of Maryborough. • Burrum River meanders in a northerly direction through the <i>Undulating Forested Lowlands</i> between Torbanlea and Howard, before discharging into the Great Sandy Strait at Burrum Heads. • Trees along river corridor contribute to a strong sense of visual continuity and provide a ‘natural edge’ to adjacent farmed landscapes. • Generally comprise a strong sense of tranquillity with a high level of naturalness, forming an important feature in the scenic amenity of the wider landscape. • The Mary River provides a defining feature and historic setting to the city of Maryborough; where an inland port (for immigration and exporting wool, cotton, timber, sugar and gold) and wharfs established in the late nineteenth century; later evolving as a key historic tourism and recreational precinct. |
| Landscape designations | None. |
| Landscape value | District/ Regional and Local value. |
| Susceptibility to wind farm development | <i>Slight</i> (to a wind farm development in nearby/adjacent LCTs) – as the robustness of the key characteristics to change is strong, views out of the LCT are very limited (so that views out are incidental to landscape character), and the changes to landscape character that could be brought about by a development of this type and scale in an adjacent LCT would have a good compatibility with these factors. |
| Sensitivity to the proposed development | <i>Medium/ low</i> – a landscape with mainly Regional/ District and local value that could have a slight susceptibility to the type, scale and location of development proposed. |

Table 7: H – Coastal Dunes and Beaches LCT**(H1 –Fraser Island Coastal Sands and Beaches LCA)**

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|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Key characteristics | <ul style="list-style-type: none"> • A landscape of long beaches, dramatic coloured-sand cliffs, natural sandblows, rocky headlands, freshwater lakes and streams, and distinctive communities of native forest, saltmarsh and wallum. |
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| | <ul style="list-style-type: none"> • Comprises ancient sand dunes derived from granites, sandstones and metamorphic rocks in river catchments to the south and from the seafloor. • Landform varies from sea-level to 240m AHD. • Notable features are the sandblows (created whenever the local vegetation disappears due to human or natural causes) and the freshwater lakes, generally formed in low elevation dune depressions that intersect the Island's regional water table. • Fraser Island National Park was inscribed on the World Heritage List in 1992; the boundary of the Park is 500m below high water mark to include important areas of beaches, wetlands and mangroves, and part of the extensive seagrass beds in the Great Sandy Strait. • Diverse communities of vegetation; including closed forest (including rain forest and tall eucalypt forest dominated by Satinay and Brushwood), Blackbutt forest, Scribbly Gum and wallum banksia communities, communities of wet sites often dominated by <i>Melaleuca</i> species, <i>Callitris</i> forest and woodlands, mangroves and saltmarsh; evoking a strong sense of naturalness. • Rainforest is characterised by upper strata species such as Piccabeen Palm (<i>Archontophoenix cunninghamiana</i>), Hoop Pine (<i>Araucaria cunninghamii</i>), Kauri Pine (<i>Agathis robusta</i>) and Lemon Scented Myrtle (<i>Backhousia myrtifolia</i>). • Tall eucalypt forests, dominated by stands of Blackbutt (<i>Eucalyptus pilularis</i>), occur mainly on the high dunes adjoining the rain forests. • Low sclerophyll forest, behind the foredunes stretching back to the taller eucalypt forest, is dominated by Scribbly Gum (<i>Eucalyptus signata</i>). • Several towns, settlements and resorts, as well as camping areas, forestry camps, roads, jetties, and airstrips lie within Fraser Island e.g. Eurong, Happy Valley, Orchid Beach. • 'Day-trippers' to the island are generally limited to southern parts of the Island (i.e. south of Indian Head and in close proximity to Kingfisher bay), due to limited access to and from the island (i.e. ferry to Kingfisher Bay, Wanggoolba Creek and Hook Point). • Relics of the Island past uses for timber logging and milling (particular Satinay and Kauri trees), which took place between approximately 1863 and 1991, is evident near Central Station (originally a forestry township) in the now-redundant railway tracks and roads. • A major landmark of Fraser Island is the shipwreck of the S.S. <i>Maheno</i>, a Scottish luxury liner which was being towed in 1935 from Melbourne to Japan for scrap metal when it was caught in a strong cyclone, drifted ashore and was beached on Fraser Island; later serving as target bombing practice for the RAAF during World War II. • Described by Matthew Flinders in 1797 as a "low woody island" |
| Landscape designations | None. |
| Landscape value | District/ Regional and Local value. |
| Susceptibility to wind farm development | <i>Susceptible</i> (to a wind farm development in adjacent/ nearby LCTs) – as the clarity of the key characteristics are strongly expressed, views are a key characteristic of the LCT, and the changes to landscape character that could be brought about by a development of this type and scale in an adjacent LCT would have a poor compatibility with these factors. |
| Sensitivity to the proposed development | <i>High/ medium</i> – a landscape with mainly Regional/ District and local value with features and special qualities of national value, that could be susceptible to the type, scale and location of development proposed. |

Table 8: I – Ocean Passage LCT**(I1 –Great Sandy Strait Ocean Passage LCA)**

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| Key characteristics | <ul style="list-style-type: none"> • This landscape has been largely defined by the boundaries (at high tide, approx 1m AHD) of the mainland (Landscape Type F) and Fraser Island (Landscape Type H) an offshore barrier island located close enough to the mainland to sufficiently block the flow of a substantial river system (Mary River); forming a double ended estuary and ocean passage (one of the few passage landscapes in Australia). • This boundary of this landscape type is not abrupt; rather its character blends and slowly transitions into the <i>Estuaries and Coastal Foreshores with Wallum</i> landscape type, sharing similar shoreline vegetation communities. • Consists of a sand estuary passage with a diversity of marine and coastal habitats. • Key habitats include seagrass beds, mangrove-lined shores, sandy and muddy intertidal flats, saltmarshes, freshwater swamps, protected beaches and a maze of tidal creeks and islands. • Large horizontal tide movements because of the relatively flat shoreline. • Low water is one kilometre offshore in some areas. • Recognised by the Convention on Wetlands of International Importance and was declared a Ramsar site in 1999; managed by the <i>Great Sandy Region Management Plan</i> (a statutory management plan and zoning plan). • The marine areas, tidal wetlands and adjacent beaches support and harbour a diversity of marine life, including humpback whales, dugong, dolphins, turtles and migratory wading birds. • “Go slow” marine vessel zones identified to protect turtles and dugongs from boat strike, especially in critical feeding and resting areas. • Its extent, diversity of marine habitats, isolation and relative freedom from disturbance evokes a strong sense of naturalness and tranquillity. • Long uninterrupted sweeps of ocean beach and tidal flats, generally with an unbuilt foreshore skyline are memorable features. |
| Landscape designations | None. |
| Landscape value | District/ Regional and Local value. |
| Susceptibility to wind farm development | <i>Susceptible</i> (to a wind farm development in adjacent/ nearby LCTs) – as the clarity of the key characteristics are strongly expressed, views are a key characteristic of the LCT, and the changes to landscape character that could be brought about by a development of this type and scale in an adjacent LCT would have a poor compatibility with these factors. |
| Sensitivity to the proposed development | <i>High/ medium</i> – a landscape with mainly Regional/ District and local value with features and special qualities of national value, that could be susceptible to the type, scale and location of development proposed. |

Landscape and Recreational Designations

Landscape Designations

36. There are no landscape designations within the study area.

Other Designations/ Protected Areas

NATURE CONSERVATION ACT PROTECTED AREAS

37. Protected areas for conservation of natural and cultural values and those areas managed for production of forest resources including timber within the study area are shown in **Figure PO9-5** and include;
38. **National Parks;** The nearest national park is Poona National Park, which is directly adjacent to the northern site boundary. Great Sandy Marine Park is located approximately 4km east of the nearest proposed turbine, with Great Sandy National Park and Pipeclay approximately 7km and 14km southeast of the nearest proposed turbine respectively. Mount Bauple (scientific) and Glenbar and Miva National Parks are approximately 18km, 38km and 33km west respectively. Gympie, Goomborian and Woondum National Parks are approximately 10km, 13km and 27km south respectively, from the nearest proposed turbine. These National Parks are discussed in more detail later within the assessment.
39. **Conservation Parks;** Conservation Parks in the study area and closest distances to turbines (approximately) include; Tinana Creek (3km), Great Sandy Conservation Park (10km), Baddow Island Conservation Park (12km), Police Paddock Conservation Park (12km), King Conservation Park (33km) and Vernon Conservation Park (28km).
40. **State Forests;** which are timber reserves subject to forestry activities under the Forestry Act 1959, in the study area include; Tuan, Toolara and Neerdie State Forests in which the wind farm is located, plus Wongi, Fraser Island, Thinoomba, Gungaloon, Ferguson, Denison, St Mary, Young, Tiaro, Glenbar, Glendiah, Bauple, Curra, Booyar, Fisherman's Pocket, King and Woondum.
41. **Recreation areas;** Several recreation areas are also located within the national parks, such as Fraser Island Recreation Area, Cooloola Recreation Area and Inskip Peninsula Recreation Area.
42. Under the Nature Conservation Act 1992 (*Queensland Government, 1992*), preserving the natural condition of parks is the key principle of park management. The purpose of the Nature Conservation Act 1992 is nature conservation, while allowing for the following:
- the involvement of Indigenous people in the management of protected areas in which they have an interest under Aboriginal tradition or Island custom;
 - the use and enjoyment of protected areas by the community; and
 - the social, cultural and commercial use of protected areas in a way consistent with the natural, cultural and other values of the areas.
43. The Recreation Areas Management Act 2006 also provides protection to national parks broadly as follows:
- Through establishment, maintenance and use of recreation areas,
 - Providing, coordinating, integrating and improving recreational planning, recreational facilities and recreational management for recreation areas, having regard to:
 - The conservation, cultural, educational, production and recreational values of the areas, and
 - The interests of area land-holders.
 - This is broadly achieved by carefully managing the use of and access to recreation areas.

WORLD HERITAGE SITE

44. Fraser Island is also a World Heritage Site (WHS) as well as part of Great Sandy National Park, and is located approximately 12km east of the nearest proposed turbine at its closest point. At 122km long, it is the longest sand island in the world and only a small part of Fraser Island is located within the 30km radius study area.
45. Overarching protection of the world heritage values is provided by the legislation protecting national parks (Conservation Area Act and Recreation Areas Management Act) as well as the Marine Parks Act 2004 and the Sustainable Planning Act 2009. In addition, Australia's World Heritage Properties are also protected by the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).
46. Fraser Island was designated a WHS as it fulfilled the following three selection criteria. (information from Department of National Parks, Sport and Racing website):
- Superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance.
The island includes over 250km of sandy beaches with long uninterrupted sweeps of ocean beach, more than 40km of strikingly coloured sand cliffs, as well as spectacular dune blowouts, tall rainforests on sand, dune lakes and a mosaic of landscapes.
 - Outstanding examples which represent major stages of earth's history, including the record of life, significant ongoing geological processes in the development of landforms, or significant geomorphic or physiographic features.
Fraser Island has still evolving, complex coastal dune formations and an array of dunes and dune lakes, exceptional in number, diversity and age. These features provide evidence of dynamic and developmental stages in soil development, plant succession and retrogression.
 - Outstanding examples representing significant ongoing ecological and biological processes in the evolution and development of terrestrial, fresh water, coastal and marine ecosystems and communities of plants and animals.
This includes rainforest growing on tall sand dunes, species of flora and fauna adapted to nutrient poor acidic sands of the island, acid frogs and the diversity of plant and animal species.
47. The potential effects on this designation are discussed in more detail later within the assessment.

FRASER COAST STRATEGIC VIEWS, SCENIC CORRIDORS ETC

48. Fraser Coast Regional Council has identified 14 Strategic Views within the Fraser Coast Planning Scheme (FCRC, 2014). These are identified on Strategic Framework Map 4 of the Planning Scheme, with 7 of the 14 Strategic Views located within the Forest Wind study area as set out below:
- Coastal Landscape View – 1 – View of Great Sandy Strait and Fraser Island from coastal fishing villages (eg River Heads, Maaroom, Boonooroo, Poona and Tinnanbar),
 - Rural Landscape Views – 4 – Gateway View from Bruce Highway near Glenwood.
5 – Views of Mount Bauple from Bruce Highway.
6 – Rural production vistas from Bruce Highway near Glenorchy.
 - Forested Hinterland Views – 12 – Views of coastal lowlands from the edge of the hinterland range at Mount Benargie lookout.
 - Townscape and Built Heritage Views – 14 – View across the Mary River towards Maryborough City Centre from Granville Bridge.
49. The Planning Scheme seeks to ensure that development does not adversely impact upon the landscape character elements identified conceptually on Strategic Framework Map 4, which includes these Strategic Views as well as Scenic Corridors and Routes and other significant landscape areas and features.

50. Scenic Corridors and Routes within the study area include the Bruce Highway, Bauple Drive and Route 57 (Saltwater Creek Road and Maryborough Hervey Bay Road).
51. The Planning Scheme identifies significant landscape areas and features within the study area as:
- (i) Fraser Island and the Great Sandy Strait;
 - (ii) Coastal foreshore areas and streams;
 - (iii) Rural peaks and ridgelines, particularly those visible from the main transport routes and strategic viewpoints;
 - (iv) Mary River and its tributaries including riparian areas;
 - (v) Undeveloped parts of the Ghost Hill ridgeline;
 - (vi) Other features, attributes and values of landscape character and scenic amenity that contribute to regional image, including:-
 - a. Significant Views, Viewpoints and Scenic Corridors;
 - b. Areas of visually significant vegetation; and
 - c. Agricultural land class A and B and other rural lands.
52. The potential effects of the proposal on these features are discussed in more detail later within the assessment.

Visual Receptors

53. The visual receptor locations within the study area are illustrated on **Figures PO9-1 and PO9-5** and include:
- Settlements – the towns of Maryborough, Gympie and Hervey Bay, and a number of smaller settlements including the coastal settlements of Cooloola Cove, Tin Can Bay, Tinnanbar, Poona, Tuan, Boonooroo, Maaroom and River Heads, as well as a number of inland settlements including Wallu, Kia Ora, Neerdie, Gunalda, Glenwood, Gundiah, Bauple, Tiaro, Magnolia and Owanyilla.
 - Individual residential properties – scattered houses and farmsteads.
 - Visitor attractions – leisure facilities (such as golf courses, camp sites and picnic sites), Macadamia House in Bauple, Bauple Museum, Portside Heritage Precinct in Maryborough, Fraser Coast Wildlife Sanctuary in Maryborough, Susan River Homestead Adventure Resort, Brennan and Geraghty's Store Museum in Maryborough, Wongi Waterholes, Gympie Gold Mining and Historical Museum, Gympie Woodworks Museum, the Mary Valley Heritage Railway, Fraser Coast Cultural Centre in Hervey Bay, plus a few forest reserves and recreation areas.
 - Built tourist lookouts (and distances to closest turbine) - include Rainbow Beach Road (10km), Rainbow Beach (23km), Brooyar State Forest's Point Pure Lookout and Eagles Nest Lookout (35km) and Markwell's Lookout Fraser Island (28km).
 - Long distance recreational routes – The Fraser Island Great Walk which starts at Happy Valley and ends at Dilli Village covers approximately 90km with an additional recent extension south down to Hook Point, Cooloola Great Walk – a 102km route linking Noosa to Rainbow Beach, the Bicentennial National Trail a section of which runs west of Maryborough and Gympie, Cooloola Wilderness Trail – a 48km route and a number of local circular walks and cycle routes.
 - Public highways and roads – including the A1 Bruce Highway, Maryborough Cooloola Road, Route 15 Tin Can Bay Road, Rainbow Beach Road, Kin Kin Road, Route 49 Wide Bay Highway, Boonooroo Road, Bauple Woolooga Road, Mungar Road, Route 86 Maryborough Biggenden Road, Route 57 Maryborough Hervey Bay Road and a number of smaller routes.
 - Passenger rail route – between Gympie and Maryborough as part of the main route between Cairns and Brisbane.

VISUAL ANALYSIS

Theoretical Visibility Analysis

54. The Forest Wind Zones of Theoretical Visibility (ZTVs)/ Zones of Visual Influence (ZVIs) have been generated by CleanSight Pty Ltd using a computer-based intervisibility package, Digital Elevation Model (DEM) data with vertical and horizontal accuracy of 1m and a model of the proposed Forest Wind turbine layout, with all data and outputs resampled to a 25m resolution. Full details of the process and methodology are contained within **Appendix C**.
55. The ZVIs consider the elevation of the turbine bases, turbine tower and blade lengths, the elevation of the receptor on land and any vegetation communities and their respective heights around the receptor and between the receptor and the turbines, as well as curvature of the earth. The ZVI's key inputs are:
 - Landform data (DEM data) as shown in **Figure PO9-2**, and
 - Detailed vegetation height data as shown in **Figure PO9-3**, which identify not only the species mixes but also the vegetation heights.
56. The ZVIs do not take into account built form, other than road ways, but simply the main vegetation blocks within the landscape. However, because these ZVIs do not take into account the screening effects of minor topographic features or built structures, they may, therefore, over-emphasise the extent of visibility, providing a worst case scenario. In reality, these surface features may well fragment and reduce the extent of most of these zones of theoretical visibility, and may also reduce the amount of the wind farm visible from any given location.
57. The exotic pine plantation area's vegetation height varies from nil to 30m over the felling cycle and therefore will change over the wind farm's life. Given the forestry blocks heights will continue to vary, a height of 15m has been applied to the Toolara, Tuan and Neerdie State Forests.
58. The four metrics considered in the ZVI outputs are vertical subtended angles, fraction of wind farm visible and number of hubs and tips visible.
59. The vertical subtended angle is the only metric that considers distance from the turbines, making it the most relevant for the Project when considering factors affecting the magnitude of impact. The other three metrics can provide indicators of whether part of a turbine may be visible, but have a more limited usefulness in considering the magnitude of impact from turbines as distance increases.
60. **Figures PO9-6 and PO9-7** illustrate the vertical subtended angle of the wind farm, which is a sum of the angle from the receptor location to the tip of each turbine and also takes the existing vegetation within the study area into account. Importantly these ZVIs aid in illustrating the decrease in the scale of the wind farm with increased distance from the development. Both illustrate extremely fragmented and limited potential visibility of the wind farm within the study area.
61. **Figure PO9-8** illustrates the potential visibility of the proposed wind farm, using the fraction of the wind farm visible. Limited and scattered potential visibility of the turbines would be available from a few locations within the site and also some locations at greater distances from the site.
62. **Figure PO9-9 and Figure PO9-10** are the hub and tip height ZVIs, respectively. These figures illustrate the number of tips and hubs which would potentially be visible from various parts of the study area. Both illustrate extremely fragmented and limited potential visibility of the wind farm within the study area.
63. As the ZVIs indicate, from the vast majority of the study area the proposed development would be entirely screened from view by the considerable and dense vegetation and undulating land form. Limited and scattered potential visibility of the turbines would be available from a few locations within the site and also some locations at greater distances from the site. However, as the legend illustrates, in the majority of locations where potential visibility of the proposal is anticipated, this visibility would predominantly be limited to under 25% percent of the wind farm.

Viewpoint Analysis

Viewpoint Locations

64. The viewpoints were selected to represent the more open views of the proposed wind farm from a range of distances, directions and viewpoint receptor locations, focusing on the well-used locations within the study area. The viewpoints are listed in **Table 9** below and the locations of these viewpoints are shown on **Figures PO9-1 to 10**. A detailed description of the viewpoint panoramas and the potential changes that would occur to each through the introduction of the proposed development are contained below.
65. The findings of the viewpoint analysis are summarised below in **Table 11**. The findings in **Table 11** take into account the screening effects of intervening topography, existing vegetation and built form and assume excellent visibility conditions with the full turbine rotor sweeps facing towards the viewpoint. Those landscape and visual effects that would potentially be significant in accordance with the methodology set out below are highlighted in grey in **Tables 11** below.
66. It is important to note that the wireframe and photomontage images have been produced with the full turbine rotor sweep facing towards the viewpoint so as to illustrate the worst case view of the wind farm. Typical visibility of the wind farm is expected to be different from a number of viewpoints and this has been illustrated by the prevailing wind photomontages. The wind does not come from just one direction, but changes direction regularly. Detailed data has been gathered on wind flow and wind direction in the area, which has been compiled into a 'wind rose' diagram indicated on some of the viewpoint images. The wind rose shows in a proportional format the directions in which the wind travels locally, with the predominant direction being from the southeast. When wind turbines are in operation the rotor faces directly into the oncoming wind. Whilst the main photomontages are intended to illustrate the worst case visibility of the proposed wind farm, the prevailing wind photomontages are intended to illustrate the typical visibility of the wind farm showing the turbine rotors as they will be facing when the wind is coming from a south-easterly direction. .
67. Also included on the photomontages is a pie chart showing local visibility data. The viewpoint photographs were captured during clear, bright and dry weather so as to illustrate the potential wind farm visibility during good weather conditions. However, weather is variable and plays a direct role in our ability to see across the landscape over distances. The pie charts associated with each viewpoint use visibility data that has been obtained for the wind farm site area from Monitoring Atmospheric Composition and Climate (MACC) European Climate Model from the European Centre for Medium-Range Weather Forecasts (ECWMF) covering the period from 2015 to 2018 with a temporal resolution of 3hrs. The data has been analysed by Cleansight Pty Ltd for each viewpoint and the pie charts each show the proportion of time in an annual period when the visibility of the wind farm falls within the following categories:
- **Night:** Annual average darkness hours based on civil twilight data from Geoscience Australia (<http://www.ga.gov.au/geodesy/astro/sunrise.jsp>),
 - **Visible:** the whole wind farm is potentially visible, topographical and vegetative screening notwithstanding, meaning all wind turbines are within the visibility distance range from the viewpoint,
 - **Partially Visible:** only part of the wind farm is visible, meaning the visibility is less than the distance between the furthest wind turbine and the viewpoint but one or more of the turbines are within the visibility distance range,
 - **Not Visible:** meaning the visibility is less than the distance between the viewpoint and the nearest wind turbine.
68. This data has then been extrapolated to form a pie chart for each viewpoint. However, it is important to reiterate that in some cases, despite the information on the pie chart, the proposed wind farm would be entirely screened from a viewpoint by topography and/or vegetation.

Prediction Methodology

69. The detailed viewpoint analysis contained within **Appendix B** has identified the visual receptor sensitivity and landscape sensitivity at each viewpoint location and combined these with the predicted magnitude of change in the view in order to determine the overall impact and whether or not this would be a significant change in the view for each visual receptor type and landscape character unit at each location.
70. However, the term 'significant' has been used to refer to effects which are material to the determination of the application.
71. In accordance with GLVIA3, the sensitivity of each visual receptor group at each location is a function of the susceptibility of visual receptors to change at that location and the value attached to these views.
72. All visual receptors are people and are assumed to be equally sensitive to change. However, the location and activities of visual receptors influence the way in which they currently experience the landscape and views, the extent to which views of the surrounding landscape may contribute to their existing visual amenity, the value they place on these views and their susceptibility to changes in these views. Accordingly, at any one location there may be different levels of sensitivity for the different receptor groups, the sensitivity may vary depending on the direction of the view, and any one receptor group may be accorded different levels of sensitivity at different locations.
73. Receptor susceptibility levels of very susceptible, susceptible, moderate susceptibility, slight susceptibility and negligible susceptibility are used taking into account the following factors:
 - Receptor location, occupation or activity,
 - Movement of receptor and duration and frequency of view experienced,
 - Focus of attention and interest.
74. The judgement of value is based on a five point scale – National value, Regional/District value, Community value, private value, unvalued. The value attached to a location or to a particular view at a location can influence the purpose and expectation of receptors at the location and the judgement of value takes into account:
 - Recognised value – for example by the presence of landscape designations or designated heritage assets,
 - Indicators of value – to individuals, communities and society generally, such as the popularity of a location.
75. Accordingly, visual receptor sensitivity is determined in terms of the sensitivity of each location for each receptor type (rather than the sensitivity of the receptors *per se*), using a five point relative scale – high, high/medium, medium, medium/low and low.
76. In accordance with GLVIA3, the sensitivity of each landscape unit is judged on the basis of its value and its susceptibility to change arising from the specific type, scale and location of development proposed.
77. The susceptibility to change of a landscape unit is based on a five point scale (very susceptible, susceptible, moderate susceptibility, slight susceptibility and negligible susceptibility)and depends on:
 - The key characteristics of the landscape, and the clarity and robustness of these characteristics,
 - Nature of views (visual enclosure/openness of views and extent to which views contribute to landscape character),
 - Landscape planning policies and strategies for the landscape unit,
 - The nature of the changes to landscape character and views that could be brought about by the type, scale and location of the proposed development and the compatibility of these with the above factors.

78. The same five point value scale is used for landscape units as for visual receptors. Judgements on landscape value are based on those given in published landscape character assessments (where given) and/or checked in the field from fieldwork observations.
79. Accordingly, the assessment of landscape sensitivity for each landscape unit is derived from the judgement of value and combined with the judgement of susceptibility to give a level of landscape sensitivity as part of a five point scale – high, high/medium, medium, medium/low or low sensitivity.
80. The magnitude of the change in the views and in landscape character from the thirteen viewpoints has been assessed using a five point scale – very substantial, substantial, moderate, slight and negligible and also the intermediate categories of very substantial/substantial, substantial/moderate, moderate/slight and slight/negligible. This magnitude of change scale is a relative scale and is not an absolute scale. It is based on the assessor’s interpretation of largely quantifiable parameters, including:
- Distance and direction of the viewpoint from the development.
 - Extent of the development visible from the viewpoint.
 - Field of view occupied by the development (horizontal and vertical angles of view) and proportion of view (as a percentage of the panorama).
 - Context of the view and degree of contrast with the existing landscape and built elements (background, form, composition, pattern, scale and mass, line, movement, colour, texture, etc).
 - Scale of change with respect to the loss or addition of features in the view. For the addition of built form, this includes the relative scale of the development and whether the development would be overwhelming, overbearing, dominant, prominent, visible, noticeable, discernible or barely discernible.
 - Duration and nature of the effect, eg direct/ indirect, secondary, cumulative, temporary/ permanent, short term/ long term, intermittent/ continuous, reversible/ irreversible, etc (as related to the nature of the development).
81. The sensitivity and magnitude of change have then been combined as per the matrix in **Table 10** below. Overall effects of major/moderate and above are considered significant and are shaded dark grey in **Table 10** below. Overall effects of moderate+ may be significant if experienced over a sustained length of a route or over most of a zone, area or location, and overall effects of moderate may contribute to significance if combined with greater changes at the same general location, whereas moderate/minor+ or lower changes are unlikely to result in significant changes to views or landscape character.

Table 10 – Assessment of Overall Impact and Significance

| LOCATION SENSITIVITY | MAGNITUDE OF CHANGE | | | | | | | | |
|----------------------|---------------------|------------|-----------|-----------|-----------|-------------|-----------|-------------|-----------|
| | V sub | V sub/ sub | Sub | Sub/ mod | Mod | Mod/ slight | Slight | Slight/ neg | Neg |
| High | Major++ | Major+ | Major | Maj/ mod+ | Maj/ mod | Mod+ | Mod | Mod/ min+ | Mod/ min |
| High/ medium | Major+ | Major | Maj/ mod+ | Maj/ mod | Mod+ | Mod | Mod/ min+ | Mod/ min | Minor+ |
| Medium | Major | Maj/ mod+ | Maj/ mod | Mod+ | Mod | Mod/ min+ | Mod/ min | Minor+ | Minor |
| Medium/ low | Maj/ mod+ | Maj/ mod | Mod+ | Mod | Mod/ min+ | Mod/ min | Minor+ | Minor | Min/ neg+ |
| Low | Maj/ mod | Mod+ | Mod | Mod/ min+ | Mod/ min | Minor+ | Minor | Minor/ neg+ | Min/ neg |

82. Significant effects on landscape character may be beneficial or adverse:

- Significant beneficial effects on landscape character - are likely to occur where the proposed development would materially enhance the quality (condition) of the landscape, would complement the existing character and/or where particularly valued characteristics, previously lost or degraded, would be reinstated.
- Significant adverse effects on landscape character - are likely to occur where the proposed development would become a key characteristics of the landscape, would contrast with the existing character, and/or where existing key characteristics would be permanently (or long-term temporarily) lost or changed and cannot be adequately mitigated.

83. The polarisation of public opinion on renewable energy developments is such that significant effects on views can be considered beneficial by some observers and adverse by others. Accordingly, in order to consider a worst case scenario, it is recommended that the predicted effects on views are considered to be adverse.

Viewpoint Analysis

84. The findings of the viewpoint analysis are provided in **Appendix B**. This analysis was undertaken in the field in January 2017 using computer-generated wireframe views of the proposed development. It is illustrated by the images in **Viewpoints 1 to 13**, which were photographed in January 2017, showing the existing and predicted views in the direction of the proposed development from each of these locations. In these figures, photographs illustrate the existing views from each viewpoint (as at January 2017) and photomontages illustrate the predicted views including the proposed development. These viewpoint illustrations when printed should be on A1 sized paper and guidance is contained on each viewpoint as to the appropriate viewing distances or principal distance in order for the scale of the elements in the images to approximately match those in the field when viewed from these viewpoint locations.

Table 11: Viewpoint Locations

| Vp No | Location | Easting | Northing | Elevation (approx) | Distance (km) | Bearing (approx) to site | Local Planning Authority | Landscape Character Type | Landscape Designations | Recreational and Transport Routes | Visual receptors |
|-------|--------------------------------------------|---------|----------|--------------------|---------------|--------------------------|-------------------------------|-----------------------------------------------------|------------------------|-----------------------------------|----------------------------------------|
| 1 | Tin Can Bay Road near Wallu | 0490435 | 7129050 | 79m AOD | 3.8 | W | Gympie Regional Council | LCT C: Undulating Forested Lowlands | None | State controlled road | Motorists |
| 2 | Eckert Road, Boonooroo | 0488680 | 7160569 | 7m AOD | 4.6 | W | Fraser Coast Regional Council | LCT F: Estuaries and Coastal Foreshores with Wallum | None | Local road | Residents, Motorists |
| 3 | Poona Boat Ramp | 0491335 | 7155015 | 3m AOD | 6.6 | W | Fraser Coast Regional Council | LCT F: Estuaries and Coastal Foreshores with Wallum | None | None/ public car park | Recreational users/ walkers, Fishermen |
| 4 | Anderleigh Road, Neerdie | 0471750 | 7122410 | 107m AOD | 11.6 | NE | Gympie Regional Council | LCT D: Undulating Farmland Mosaic | None | Local road | Motorists |
| 5 | Norway Street, Maryborough | 0470949 | 7173731 | 8m AOD | 11.8 | SE | Fraser Coast Regional Council | LCT E: Alluvial Pastures and Cane Fields | None | Local road | Residents, Motorists |
| 6 | Cooloola Cove Shops, Queen Elizabeth Drive | 0498683 | 7127655 | 13m AOD | 12.0 | NW | Gympie Regional Council | LCT F: Estuaries and Coastal Foreshores with Wallum | None | Local road | Residents, Shoppers, Motorists |
| 7 | Bruce Highway by Eight Mile Road | 0463832 | 7164835 | 42m AOD | 12.5 | SE | Fraser Coast Regional Council | LCT E: Alluvial Pastures and Cane Fields | None | State controlled road | Motorists |
| 8 | Bruce Highway near Mount Bauple | 0459741 | 7145569 | 94m AOD | 14.5 | E | Fraser Coast Regional Council | LCT D: Undulating Farmland Mosaic | None | State controlled road | Motorists |

| Vp No | Location | Easting | Northing | Elevation (approx) | Distance (km) | Bearing (approx) to site | Local Planning Authority | Landscape Character Type | Landscape Designations | Recreational and Transport Routes | Visual receptors |
|-------|------------------------------------------|---------|----------|--------------------|---------------|--------------------------|-------------------------------|-----------------------------------------------------|------------------------|-----------------------------------|----------------------------------------------------|
| 9 | Tin Can Bay – Snapper Creek Boat Harbour | 0501374 | 7135216 | 1m AOD | 15.5 | W | Gympie Regional Council | LCT F: Estuaries and Coastal Foreshores with Wallum | None | None/ public car park | Tourists, Recreational users, Fishermen, Motorists |
| 10 | Arborten Road, Glenwood | 0460685 | 7131950 | 87m AOD | 15.8 | NE | Fraser Coast Regional Council | LCT A: Forested Peaks and Hills | None | Local road | Residents, Motorists |
| 11 | 75 Mile Beach, Fraser Island | 0507481 | 7146937 | 0m AOD | 21.3 | W | Fraser Coast Regional Council | LCT H: Coastal Dunes and Beaches | None | None | Tourists, Recreational users, Motorists |
| 12 | River Heads Shopping Village | 0491662 | 7188226 | 23m AOD | 23.2 | SW | Fraser Coast Regional Council | LCT F: Estuaries and Coastal Foreshores with Wallum | None | Local road | Tourists, Shoppers, Residents |
| 13 | Carlo Sand Blow | 0509681 | 7133795 | 105m AOD | 23.4 | NW | Gympie Regional Council | LCT H: Coastal Dunes and Beaches | None | Long Distance Route | Tourists, Walkers/ recreational users |

Table 12: Summary of Viewpoint Analysis – effects on landscape character and visual amenity

| Viewpoint Information | | | | Landscape Assessment | | | Visual Assessment | | |
|-----------------------|--------------------------------------------------|--------------------|-----------------------------------|-----------------------------------------------------------------------------|-------------------------------------|--------------------------------------|--------------------------------------------------|--------------------------|---------------------------------|
| No | Location | NGR | Distance/ direction to site | LCT (sensitivity) | Magnitude of change | Effects on Landscape Character | Receptors (sensitivity) | Magnitude of change | Effects on Visual Amenity |
| 1 | Tin Can Bay Road near Wallu | 0490435 7129050 | 3.8km/ W | LCT C: Undulating Forested Lowlands (Medium) | None | No effect | Motorists (medium) | None | No effect |
| 2 | Eckert Road, Boonaroo | 0488680 7160569 | 4.6km/ W | LCT F: Estuaries and Coastal Foreshores with Wallum (High/ medium) | Substantial adverse | Major/ moderate+ adverse | Residents (high) | Substantial | Major |
| | | | | | | | Motorists (medium) | | Major/ moderate |
| 3 | Poona Boat Ramp | 0491335 7155015 | 6.6km/ W | LCT F: Estuaries and Coastal Foreshores with Wallum (High/ medium) | Substantial/ moderate adverse | Major/ moderate adverse | Recreational users/ walkers (high/ medium) | Substantial/ moderate | Major/ moderate |
| | | | | | | | Fishermen (medium) | | Moderate+ |
| 4 | Anderleigh Road, Neerdie | 0471750 7122410 | 11.6km/ NE | LCT D: Undulating Farmland Mosaic (Medium/ low) | None | No effect | Motorists (medium) | None | No effect |
| 5 | Norway Street, Maryborough | 0470949 7173731 | 11.8km/ SE | LCT E: Alluvial Pastures and Cane Fields (Medium/ low) | Moderate/ slight adverse | Moderate/ minor adverse | Residents (high) | Moderate/ slight | Moderate+ |
| | | | | | | | Motorists (medium) | | Moderate/ minor+ |
| 6 | Cooloola Cove Shops, Queen Elizabeth Drive | 0498683 7127655 | 12.0km/ NW | LCT F: Estuaries and Coastal Foreshores with Wallum (High/ medium) | None | No effect | Residents (high) | None | No effect |
| | | | | | | | Shoppers (medium) | | No effect |
| | | | | | | | Motorists (medium) | | No effect |

| | | | | | | | | | |
|----|------------------------------------------|--------------------|------------|--------------------------------------------------------------------|--------------------------|--------------------------|-----------------------------------|------------------|------------------|
| 7 | Bruce Highway by Eight Mile Road | 0463832 7164835 | 12.5km/ SE | LCT E: Alluvial Pastures and Cane Fields (Medium/ low) | Moderate adverse | Moderate/ minor+ adverse | Motorists (medium/ low) | Moderate | Moderate/ minor+ |
| 8 | Bruce Highway near Mount Bauple | 0459741 7145569 | 14.5km/ E | LCT D: Undulating Farmland Mosaic (Medium/ low) | Moderate adverse | Moderate/ minor+ adverse | Motorists (medium/ low) | Moderate | Moderate/ minor+ |
| 9 | Tin Can Bay – Snapper Creek Boat Harbour | 0501374 7135216 | 15.5km/ W | LCT F: Estuaries and Coastal Foreshores with Wallum (High/ medium) | Moderate adverse | Moderate+ adverse | Tourists (high) | Moderate | Major/ moderate |
| | | | | | | | Recreational users (high/ medium) | | Moderate+ |
| | | | | | | | Fishermen (medium) | | Moderate |
| | | | | | | | Motorists (medium) | | Moderate |
| 10 | Arborten Road, Glenwood | 0460685 7131950 | 15.8km/ NE | LCT A: Forested Peaks and Hills (Medium) | None | No effect | Residents (high) | None | No effect |
| | | | | | | | Motorists (medium) | | No effect |
| 11 | 75 Mile Beach, Fraser Island | 0507481 7146937 | 21.3km/ W | LCT H: Coastal Dunes and Beaches (High/ medium) | Moderate/ slight adverse | Moderate adverse | Tourists (high) | Moderate/ slight | Moderate+ |
| | | | | | | | Recreational users (high/ medium) | | Moderate |
| | | | | | | | Motorists (medium) | | Moderate/ minor+ |

| | | | | | | | | | |
|----|------------------------------|--------------------|---------------|--------------------------------------------------------------------|----------------------------------|-------------------------------|-----------------------------------------------|-----------------------|---------------------|
| 12 | River Heads Shopping Village | 0491662 7188226 | 23.2km/ SW | LCT F: Estuaries and Coastal Foreshores with Wallum (High/ medium) | Slight/ negligible adverse | Moderate/ minor adverse | Tourists (high) | Slight/ negligible | Moderate/ minor+ |
| | | | | | | | Shoppers (medium) | | Minor+ |
| | | | | | | | Residents (high) | | Moderate/ minor+ |
| 13 | Carlo Sand Blow | 0509681 7133795 | 23.4km/ NW | LCT H: Coastal Dunes and Beaches (High/ medium) | Moderate/ slight adverse | Moderate adverse | Tourists (high) | Moderate/ slight | Moderate+ |
| | | | | | | | Walkers/ recreational users (high/ medium) | | Moderate |

Findings of Visual Analysis

85. Given the nature of the landform of the study area and the very good levels of vegetation within the landscape, in general terms the visibility of the proposed wind farm would be extremely limited. This has been indicated but perhaps underplayed by the viewpoints, several of which have been located at some of the most open publicly accessible locations within the study area. The viewpoints illustrate some of the views seen on typical journeys through this study area, but they generally illustrate the most open views of the proposal from these journeys. For instance, on a journey along the Bruce Highway from Maryborough to Gympie, Viewpoints 7 and 8 do not illustrate typical or regular views from the highway, but instead show two of the most open views available towards the wind farm from a route where the wind farm would predominantly be screened from view. Similarly, on a journey to camp on Fraser Island, Viewpoints 11 and 13 show the main locations along this coastal journey from which the wind farm would be visible, they do not indicate the vast sections of beach along Rainbow Beach and 75 Mile Beach where the proposed turbines would be entirely screened by intervening wallum and coastal dunes.
86. Therefore, it must be remembered that these viewpoints are not representative of typical views experienced during the overall recreational experience of receptors, nor the overall car journey of motorists; for linear receptors within the study area these viewpoints illustrate single snapshot views from individual transit or recreational points. Similarly, for stationary receptors such as residents, the viewpoints have been selected to illustrate some of the most open views, such as Viewpoint 2 in Boonooroo and Viewpoint 5 in Maryborough, but do not represent the views generally available from most properties in these settlements. It is crucial that the significant effects identified at some of these viewpoints are not taken out of context within the overall potential visibility of the wind farm in the study area.
87. It is also useful to note that the main photomontage viewpoints have been produced with the turbine rotor sweeps facing towards the viewpoint in line with best practice guidance and so as to illustrate the worst case visibility of the wind farm, rather than showing the rotor sweep in the position it would predominantly be facing based on the typical or prevailing wind direction. Therefore, a prevailing wind photomontage has also been provided as an additional photomontage from those viewpoints where the predominant wind direction may make the most difference to the typical visibility of the wind farm. In some cases, such as Viewpoint 2 at Boonooroo, Viewpoint 3 at Poona Boat Ramp, Viewpoint 9 at Tin Can Bay and Viewpoint 11 on Fraser Island, these photomontages indicate that the turbine rotor sweeps and blades would be expected to be seen at an angle or side on for a large proportion of the time that they are in operation, rather than facing the viewpoint. In many cases this could make the wind turbines less noticeable.
88. Another factor that would play a role in the potential visibility of the wind farm is weather conditions. As set out earlier, the viewpoint analysis has assumed excellent weather conditions, and the viewpoint images were captured during clear, bright and dry weather so as to illustrate the potential wind farm visibility during good weather conditions. However, weather is variable and plays a direct role in our ability to see across the landscape over distances. The pie charts associated with each viewpoint indicate that at times it is not possible to see as far as the wind farm, or at least as far as all of the wind farm, due to either the distance to the wind farm, inclement weather conditions, nightfall, or a combination of more than one of these factors.
89. A more detailed discussion of the likely effects on the visual amenity of receptors in settlements and residential properties, at visitor attractions, on recreational routes and on public highways is provided in the Visual Assessment below.

LANDSCAPE ASSESSMENT

90. This assessment draws on the review of the predicted effects of the development, the landscape fabric of the site, the key characteristics of the LCTs, the purposes/objectives of the landscape designations (where relevant), the visibility analysis, the viewpoint analysis and fieldwork observations, and discusses the significance of the predicted effects on:

- Landscape fabric of the site.
- Landscape character.
- Purposes of the landscape designations.

91. This report does not assess the impact on the landscape's cultural values that are held by the Butchulla and Kabi Kabi First Nations People, who are the native title holders and/ or claimants over the LVIA study area. The landscape's cultural values are being considered in a separate study process.

Effects on Landscape Fabric

Prediction Methodology

92. Landscape fabric is composed of the physical components of the landscape (eg landform, land cover and landscape elements and features). Developments can bring about both direct and indirect effects on landscape fabric. Direct effects occur where changes to the fabric of the landscape arise as the result of physical disturbance, for example, the loss of landscape elements such as shrubs, walls and trees. Indirect effects are consequential changes that are separated from the source of the change in a temporal or spatial manner, for example changes in vegetation downstream as the result of modifications to surface water patterns upstream in a catchment area.

93. This assessment of effects on landscape fabric considers the existing landscape fabric of the site and the predicted effects of the development, and makes a judgement as to whether there are likely to be any significant beneficial or adverse changes to landscape fabric based on the following two definitions:

- Significant beneficial effects on landscape fabric - could occur where important/mature/diverse/distinctive components, which had previously been lost or degraded as the result of agricultural operations or other development, would be added, reinstated or improved.
- Significant adverse effects on landscape fabric - could occur where existing important/mature/diverse/distinctive components would be permanently lost (or long term temporarily lost) and the effects cannot be adequately mitigated.

Construction Phase

94. There would be some limited adverse effects on landscape fabric during the construction phase as there would be a limited loss of forestry trees at each turbine location and at the meteorological masts, battery storage, substations, concrete batching plants and construction and operation compounds. These trees would be at varying stages of development depending on which stage of the felling cycle they were removed. However, there would be no loss of any other important, mature, diverse or distinctive landscape components.

95. As these trees form part of the standard forestry rotation there would not be any significant (adverse or beneficial) effects on landscape fabric as a result of the construction phase.

Operational Phase

96. There would be no effects on the landscape fabric of the site during the operational phase, as there would not be any further alterations to the landscape fabric of the site as a result of the operation of the proposed wind farm.

Decommissioning Phase

97. There would be minimal disturbance of landscape features during this phase as below ground structures (eg lower part of the turbine foundation and cables) would be left *in situ* and there would be reinstatement of all ground disturbed by the works. Therefore, there would be a negligible effect on landscape fabric during the decommissioning phase.

Effects on Landscape Character

Prediction Methodology

98. Landscape character is composed of physical, biological and social components, combined with aesthetic and perceptual factors. This assessment of effects on landscape character considers the existing landscape character of the site and study area by using the information collected during fieldwork and within the local landscape character assessments. It considers the predicted effects of the development, and assesses the area within which there is likely to be a significant change to landscape character, based on the following two definitions:

- Significant beneficial effects on landscape character - are likely to occur where the proposed development would materially enhance the quality (condition) of the landscape, would complement the existing character and/or where particularly valued characteristics, previously lost or degraded, would be reinstated.
- Significant adverse effects on landscape character - are likely to occur where the proposed development would become a key or one of the defining characteristics of the landscape, would contrast with the existing character, and/or where existing key characteristics would be permanently lost or changed.

99. The long-term addition of a renewable energy development into an area of landscape that is not currently characterised by built form or renewable energy development will usually have an appreciable effect on the character of at least a localised area within that landscape. For an area which is characterised by renewable energy development, the introduction of further similar development would have an incremental effect on landscape character.

100. Whether such effects would be significant depends on the sensitivity (susceptibility and value) of the landscape resource and the scale or magnitude of landscape effects, as indicated by fieldwork and the viewpoint analysis. Therefore, fieldwork observations are examined together with the findings of the viewpoint analysis so as to determine the degree and extent of likely significant effects of the proposed development on landscape character within the various landscape character units in the study area.

101. Landscape units are often relatively large geographical areas and the screening effects of topography and vegetation will vary across each unit, so that the predicted extent of significant effects on landscape character will almost always be intermittent. However, with increasing distance from the proposed site, the proposed development will have a decreasing effect on landscape character and there will come a point where there are few or no further significant landscape effects. This is defined as the extent of the significant effects on landscape character.

Effects on Character of the Site Landscape

102. There would be some short-term effects on the character of the site as a result of the construction phase. Overall, the construction phase would be short-term, with the various activities lasting for only small parts of the overall timescale. The presence of construction machinery and activities would be transient (temporary, short-term and reversible) and ground and vegetation disturbance would be limited. Therefore, the effects of the construction phase would not result in a significant beneficial or adverse effect on the landscape character of the site.

103. The main effects on the landscape character of the site would occur during the operational phase as a result of the presence of the wind turbines and associated infrastructure. All these parts of the proposed development would be located within the Undulating Forested Lowlands LCT.

104. The hardstandings and track upgrades would not affect any of the existing characteristics of this LCT and, once weathered, would appear similar to other farm hardstanding areas in this landscape. In many views these elements would be screened by existing forestry.

105. The proposed substations, battery storage and electrical reticulation would be located adjacent to the proposed wind farm and within the plantation forestry and would generally be screened from view. Therefore, these buildings would not detract from or enhance the existing landscape and so would have a negligible effect on the character of this LCT.
106. The proposed turbines would introduce built structures into an extensive forestry area which is currently used for timber production on a rotation system. The turbines would be tall structures and would have the characteristic of movement. As a result, the proposed turbines would become a key characteristic of the site landscape and, although no existing key characteristics would be lost or changed, they would contrast with the existing character such that the proposed wind turbines would result in a significant adverse change to the character of the site landscape.
107. The decommissioning phase would be short-term, ground disturbance would be very limited in extent and there would be the removal of the wind turbines and the reinstatement of the ground on completion of the works, which would return the site to its current character. Therefore, the decommissioning phase would result in a significant beneficial effect on the landscape character of the site relative to the operational phase but no change in character relative to the current landscape character of the site.
108. Therefore, there would be a significant adverse long-term but temporary change in the character of the site landscape for the duration of the operational phase but the site would be returned to its present character by the end of the decommissioning phase.
109. However, it would be impossible to site a wind turbine development of this scale in Australia without significantly affecting the character of at least the site and immediate surroundings. The key issue is how far this change in landscape character would extend and whether this change would be acceptable.
110. As noted in paragraph 31 above, the only aspect of the development that is likely to give rise to significant effects on landscape character (and visual amenity) during the operational phase is the proposed wind turbines. The effects of the presence of the wind turbines on the character of the wider landscape are considered below.

Effects on Character of Wider Landscape

111. The viewpoint analysis suggests that there could be significant adverse effects on the character of some landscapes within approximately 7.0km of the proposed development (as indicated by Viewpoints 2 and 3 – LCT F: Estuaries and Coastal Foreshores with Wallum). However, the potential effects of the proposal on some of the other LCTs within the vicinity of the site are also discussed below.

LCT C: Undulating Forested Lowlands

112. The key characteristics of this LCT are set out within **Table 1** above, and a more detailed description of this LCT is provided in the extract in **Appendix A**. The area is described within the character assessment as (extract) *'predominantly a forested landscape. This is a major defining characteristic of this landscape type'*. Key characteristics are also set out in **Table 1**. This is a landscape that derives its character primarily from its key characteristics where views make a limited contribution. The overall evaluation of the sensitivity of this LCT to the proposed development has been identified as **medium/low**.
113. Within the viewpoint analysis one of the viewpoints is located within the LCT itself – Viewpoint 1, Tin Can Bay Road near Wallu, where the proposed wind farm would be entirely screened from view. The LCT covers land across the site but also several other areas within the study area at a distance from the site. However, within the LCT covering land within the exotic pine plantation across the site, parts of the proposed development would be recurrently visible, resulting in a significant adverse effect on landscape character as discussed earlier. In more distant sections of this LCT, such as sections north of Maryborough and west of the Bruce Highway, views would characteristically be contained within the LCT itself where distant views of the proposed development at over 10km away are not expected to be available due to the intrinsic

enclosed character of the LCT. Therefore, for these more distant sections of this LCT, no significant effects on landscape character are expected.

LCT A: Forested Peaks and Hills

114. The key characteristics of this LCT are set out within **Table 2** above, and a more detailed description of this LCT is provided in the extract in **Appendix A**. The area is described within the character assessment as (extract) *'the extensive forest cover, distinctive elevated landform and their related roles as key visual and scenic markers in the Region, provide the key unifying elements of this landscape type'*. Key characteristics are also set out in **Table 2**. This is a landscape that derives its character primarily from its internal characteristics where views out of the LCT make a limited contribution. The overall evaluation of the sensitivity of this LCT to the proposed development has been identified as **medium**. At its closest point, the boundary of this LCT is approximately 10km west of the nearest proposed turbine, as is illustrated on **Figure PO9-4**.

115. One of the viewpoints within the viewpoint analysis is located within this LCT – Viewpoint 10, Arborten Road in Glenwood. The ZVI suggests extremely limited potential visibility of the proposal from sections of this LCT. As **Table 2** above notes, there is very limited recreational access within this LCT and the landscape is sparsely settled. Given the well forested character and hilly nature of the LCT, extremely limited views of the proposal are expected from this LCT, especially as this LCT is also generally surrounded by plantation forestry. Viewpoint 10 provides a typical example of the types of views available from several parts of this LCT and the very good levels of screening afforded by local vegetation. The character of the LCT is derived from its internal characteristics and from views towards the LCT, rather than from views out of the LCT, and Viewpoint 10 indicates that the proposed wind farm would be entirely screened from the viewpoint by this dense vegetation. Therefore, the proposed development would not impact upon these key characteristics. As a result, no significant effects on landscape character within this LCT are anticipated.

LCT D: Undulating Farmland Mosaic

116. The key characteristics of this LCT are set out within **Table 3** above, and a more detailed description of this LCT is provided in the extract in **Appendix A**. The area is described within the character assessment as (extract) *'gently rolling lowland topography, landuse is predominantly cattle grazed pastures and cane fields, this landscape is commonly experienced through the Bruce Highway'*. Key characteristics are also set out within **Table 3**. This is a landscape that derives its character predominantly from its internal characteristics where the limited views out of the area are focused towards LCT A – Forested Peaks and Hills. The overall evaluation of the sensitivity of this LCT to the proposed development has been identified as **medium/ low**. At its closest point, the boundary of this LCT is approximately 5km west of the nearest proposed turbine, as is illustrated on **Figure PO9-4**.

117. Viewpoints 4 and 8 are located within this LCT at a distance of approximately 11.6km and 14.5km from the nearest proposed turbine, respectively. Both viewpoints illustrate the effectiveness of the screening provided by forestry and also localised mature vegetation in containing views from the LCT, where no visibility of the wind farm is predicted from Viewpoint 4 and a moderate adverse magnitude of change is predicted from Viewpoint 8 which would result in a moderate/minor+ adverse effect on landscape character. This would not be significant at this viewpoint. Some sections of the landscape are located at slightly closer proximity to the proposed development (between 5km and 10km from the nearest proposed turbine), although this is still at a distance from the proposal. Land uses vary across the LCT between pasture, remnant forest and cane fields, limiting the majority of views out of the area (as the experience along the Bruce Highway suggests). Occasional views of the proposed development may be available, although as Viewpoint 4 indicates, these are regularly expected to be predominantly screened due to the well vegetated local landscape and also the rising topography of LCT A.

118. As discussed above, the character of the LCT is predominantly derived from its internal characteristics, where very intermittent and partial views of the wind farm would not significantly affect the key

characteristics of this LCT, as illustrated by Viewpoints 4 and 8. As a result, no significant effect on the landscape character of this LCT is expected.

LCT E: Alluvial Pastures and Cane Fields

119. The key characteristics of this LCT are set out within **Table 4** above, and a more detailed description of this LCT is provided in the extract in **Appendix A**. The area is described within the character assessment as (extract) *'strong geometric landscape patterning defined by medium to large scale intensive arable farmland. Due to the low-lying nature of the landscape and tall sugar cane, views are generally limited to within the landscape'*. Key characteristics are also set out within **Table 4**. This is a landscape that derives its character predominantly from its internal characteristics where the limited views out of the area are focused towards the west. The overall evaluation of the sensitivity of this LCT to the proposed development has been identified as **medium/ low**. At its closest point, the boundary of this LCT is approximately 4km west of the nearest proposed turbine, as is illustrated on **Figure PO9-4**.
120. Viewpoints 5 and 7 are located within this LCT at a distance of approximately 11.8km and 12.5km from the nearest proposed turbine, respectively. Both viewpoints suggest no significant adverse effects on landscape character at these distances, where partial visibility of the proposed development would be available. Fieldwork has found that the type of visibility of the wind farm illustrated within these two viewpoints would be typical of potential views of the proposed turbines out of this LCT. As views out of the LCT are not a key characteristic of this area, overall, these limited effects would not affect the LCT as a whole and no significant effects on the landscape character of the LCT are expected.

LCT F: Estuaries and Coastal Foreshores with Wallum

121. The key characteristics of this LCT are set out within **Table 5** above, and a more detailed description of this LCT is provided in the extract in **Appendix A**. The area is described within the character assessment as (extract) *'largely flat, low-lying landscape....strongly influenced by proximity to the coast, which is the key defining feature....strong sense of place provided by locally endemic vegetation and coastal views, particularly views over the Great Sandy Strait to Fraser Island'*. Key characteristics are also set out within **Table 5**. This is a landscape that derives its character partly from its internal characteristics but also from views out of the LCT. The overall evaluation of the sensitivity of this LCT to the proposed development has been identified as **high/medium**. At its closest point, the boundary of this LCT is approximately 0.1km east of the nearest proposed turbine, as is illustrated on **Figure PO9-4**.
122. Viewpoints 2, 3, 6, 9 and 12 are located within this LCT at distances ranging between 4.6km and 23.2km from the nearest proposed turbine. Viewpoints 2 and 3 indicate a significant adverse effect on landscape character, whereas Viewpoints 6 and 12 indicate no significant adverse effects and Viewpoint 9 indicates no significant effect on landscape character at this viewpoint, although if combined with greater changes in the same general area, a significant effect may occur. This suggests that for parts of the LCT closest to the site, and with views available towards the site, within approximately 7-8km of the proposed development, a significant adverse effect on landscape character may occur. However, considering this more closely, it is important to note that Viewpoints 2 and 3 are located on the coastline with open foreground views allowing visibility out towards the site. However, sections of the LCT more proximate to the site are located inland and covered in forestry and wallum where views out towards the site are generally unavailable. Furthermore, these coastal views are predominantly focussed out over Great Sandy Strait towards Fraser Island, as noted in the key characteristics in **Table 5** above and as also protected as Strategic Views by Fraser Coast Regional Council, with views inland (towards the site) as secondary to these main views. Therefore, whilst Viewpoints 2 and 3 illustrate a significant adverse effect on landscape character for views inland, views towards Fraser Island would remain unaffected by the proposed development. It is extremely important to note that the Strategic Views identified within the Fraser Coast Landscape Character Strategy (Aecom 2011) and within Strategic Framework Map 4 of the Regional Plan from Poona, Tinnanbar, Maaroom, Boonooroo etc are all Strategic Views towards Great Sandy Strait and Fraser Island and not inland. In addition, the types of views illustrated in the Forest Wind viewpoints (from coastal locations

within the LCT across open water towards inland views) are generally extremely limited within this LCT, with these 5 viewpoints illustrating the only main examples of these available views. Overall, the majority of this LCT would gain no visibility of the proposed development due to the screening effects of intervening vegetation, with only two locations identified within the LCT where a significant adverse effect on landscape character would occur within secondary views from the LCT. The vast majority of the LCT would experience no significant adverse effects on landscape character.

LCT G: Broad River Valley

123. The key characteristics of this LCT are set out within **Table 6** above, and a more detailed description of this LCT is provided in the extract in **Appendix A**. The area is described within the character assessment as (extract) *'broad meandering U shaped river corridors'*. Key characteristics are also set out within **Table 6**. This is a landscape that derives its character predominantly from its internal characteristics. The overall evaluation of the sensitivity of this LCT to the proposed development has been identified as **medium/ low**. At its closest point, the boundary of this LCT is approximately 0.5km south of the nearest proposed turbine, as is illustrated on **Figure PO9-4**, although the majority of parts of this LCT are located at greater distances of 3km or more from the proposal.

124. None of the viewpoints within the viewpoint analysis are located within this LCT and the ZVI suggests extremely limited potential visibility of the proposal from sections of this LCT. Given the well vegetated character of the LCT, and also the well vegetated nature of adjacent LCTs, extremely limited views of the proposal are expected from this LCT. The character of the LCT is derived from its internal characteristics, rather than from views out of the LCT. Therefore, the proposed development located at a distance of over 6.0km away should not impact upon these key characteristics. As a result, no significant effects on landscape character within this LCT are anticipated.

LCT H: Coastal Dunes and Beaches

125. The key characteristics of this LCT are set out within **Table 7** above, and a more detailed description of this LCT is provided in the extract in **Appendix A**. The area is described within the character assessment as (extract) *'a landscape of long beaches, dramatic coloured sand cliffs, natural sandblows, rocky headlands, freshwater lakes and streams and distinctive communities of native forest, saltmarsh and wallum'*. Key characteristics are also set out within **Table 7**. This is a landscape that derives its character partly from its internal characteristics but also from views out of the LCT. The overall evaluation of the sensitivity of this LCT to the proposed development has been identified as **high/medium**. At its closest point, the boundary of this LCT is approximately 10.5km east of the nearest proposed turbine, as is illustrated on **Figure PO9-4**.

126. Viewpoints 11 and 13 are located within this LCT at distances ranging between 21.3km and 23.4km from the nearest proposed turbine. Viewpoints 11 and 13 indicate no significant adverse effect on landscape character. In a similar way to LCT F, these viewpoints represent some of the main locations within the LCT where the proposed development would be visible. Fieldwork found that the proposal would be entirely screened by vegetation and dunes from the vast majority of Fraser Island and Rainbow Beach, with these viewpoints representing the key locations where the proposal would be visible. It is also important to note that each of these viewpoints affords open and panoramic views in several directions and that in each case, views towards Fraser Island would be in the opposite direction to the views towards the proposed development. Therefore, these viewpoints are not considered representative of typical views from this LCT. Bearing in mind all these factors, no significant adverse effects on landscape character area expected for this LCT as a result of the proposed development.

LCT I: Ocean Passage

127. The key characteristics of this LCT are set out within **Table 8** above, and a more detailed description of this LCT is provided in the extract in **Appendix A**. The area is described within the character assessment as (extract) *'forming a double ended estuary and ocean passage'*. Key characteristics are also set out within **Table 8**. This is a landscape that derives its character partly from its internal characteristics but also from

views out of the LCT. The overall evaluation of the sensitivity of this LCT to the proposed development has been identified as **high/medium**. At its closest point, the boundary of this LCT is approximately 4.0km east of the nearest proposed turbine, as is illustrated on **Figure PO9-4**.

128. None of the viewpoints are located within this LCT, although Viewpoints 2, 3, 9, 11 - 13 can all be considered to show reasonable representations of the types of views available from LCT I at a range of distances from the site. These viewpoints indicate that from some of the closest parts of this LCT to the proposed site a significant adverse effect on landscape character may occur as part of views inland to the west, but that from the majority of the LCT views would be open and wide ranging, offering numerous views towards Fraser Island where the proposed development would not be visible within the same views.

Effects on Landscape Designations

129. As set out within paragraph 36 above, there are no landscape designations within the study area. However, there are a number of other designations which are discussed in more detail below.

Other Designations

NATIONAL PARKS

130. The nearest national park to the site is Poona National Park, which is directly adjacent to the northern site boundary. Great Sandy Marine Park is located approximately 4km east of the nearest proposed turbine, with Great Sandy National Park and Pipeclay approximately 7km and 14km southeast of the nearest proposed turbine respectively. Mount Bauple (scientific) and Glenbar and Miva National Parks are approximately 18km, 38km and 33km west respectively. Gympie, Goomborian and Woondum National Parks are approximately 10km, 13km and 27km south respectively, from the nearest proposed turbine.

131. As set out earlier in this report at paragraphs 37 – 43, the Nature Conservation Act 1992 and the Recreation Areas Management Act 2006 provide protection to the national parks by managing and preserving the natural condition of the parks and access to the parks and recreation areas.

132. The purpose of the Nature Conservation Act 1992 is nature conservation, while allowing for:

- the involvement of Indigenous people in the management of protected areas in which they have an interest under Aboriginal tradition or Island custom;
- the use and enjoyment of protected areas by the community; and
- the social, cultural and commercial use of protected areas in a way consistent with the natural, cultural and other values of the areas.

133. The proposed wind farm would not be located within any national park and all of the uses of these national parks would remain uninterrupted throughout the operational life of the wind farm. The enjoyment, social, cultural and commercial uses of these protected areas are all uses and features within these national parks which would be unaffected by the proposed wind farm outside of the national parks and as such the proposal would have no effect on the purposes of these national parks.

WORLD HERITAGE SITE (WHS)

134. Fraser Island is a WHS as well as part of Great Sandy National Park. As such it is protected by a number of legislative tools including the Nature Conservation Act 1992 and the Recreation Areas Management Act 2006 (see above). Fraser Island was designated a WHS as it fulfilled the following three selection criteria. (information from Department of National Parks, Sport and Racing website):

- Superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance.

The island includes over 250km of sandy beaches with long uninterrupted sweeps of ocean beach, more than 40km of strikingly coloured sand cliffs, as well as spectacular dune blowouts, tall rainforests on sand, dune lakes and a mosaic of landscapes.

- Outstanding examples which represent major stages of earth's history, including the record of life, significant ongoing geological processes in the development of landforms, or significant geomorphic or physiographic features.

Fraser Island has still evolving, complex coastal dune formations and an array of dunes and dune lakes, exceptional in number, diversity and age. These features provide evidence of dynamic and developmental stages in soil development, plant succession and retrogression.

- Outstanding examples representing significant ongoing ecological and biological processes in the evolution and development of terrestrial, fresh water, coastal and marine ecosystems and communities of plants and animals.

This includes rainforest growing on tall sand dunes, species of flora and fauna adapted to nutrient poor acidic sands of the island, acid frogs and the diversity of plant and animal species.

135. The above selection criteria refer to features intrinsic within Fraser Island itself, which would remain unaffected by the proposed wind farm at a distance of over 12km away (at its closest point).

FRASER COAST STRATEGIC VIEWS, SCENIC CORRIDORS ETC

136. Fraser Coast Regional Council has identified 14 Strategic Views within the Fraser Coast Planning Scheme (FCRC, 2014). These are identified on Strategic Framework Map 4 of the Planning Scheme, with 6 of the 14 Strategic Views located within the Forest Wind study area as set out below:

- Coastal Landscape View – 1 – View of Great Sandy Strait and Fraser Island from coastal fishing villages (eg River Heads, Maaroom, Boonooroo, Poona and Tinnanbar),
- Rural Landscape Views – 4 – Gateway View from Bruce Highway near Glenwood.
 - 5 – Views of Mount Bauple from Bruce Highway.
 - 6 – Rural production vistas from Bruce Highway near Glenorchy.
- Forested Hinterland Views – 12 – Views of coastal lowlands from the edge of the hinterland range at Mount Benargie lookout.
- Townscape and Built Heritage Views – 14 – View across the Mary River towards Maryborough City Centre from Granville Bridge.

137. The Planning Scheme seeks to ensure that development does not adversely impact upon the landscape character elements identified conceptually on Strategic Framework Map 4, which includes these Strategic Views as well as Scenic Corridors and Routes and other significant landscape areas and features.

138. Scenic Corridors and Routes within the study area include the Bruce Highway, Bauple Drive and Route 57 (Saltwater Creek Road and Maryborough Hervey Bay Road).

139. The Planning Scheme identifies significant landscape areas and features within the study area as:

- (i) Fraser Island and the Great Sandy Strait;
- (ii) Coastal foreshore areas and streams;
- (iii) Rural peaks and ridgelines, particularly those visible from the main transport routes and strategic viewpoints;
- (iv) Mary River and its tributaries including riparian areas;
- (v) Undeveloped parts of the Ghost Hill ridgeline;
- (vi) Other features, attributes and values of landscape character and scenic amenity that contribute to regional image, including:-
 - a. Significant Views, Viewpoints and Scenic Corridors;

- b. Areas of visually significant vegetation; and
- c. Agricultural land class A and B and other rural lands.

140. It is worth discussing each of the above views in turn:

- Strategic View 1 – these views are specifically focussed out to the east towards Great Sandy Strait and Fraser Island, in the opposite direction to the wind farm and would remain unaffected by the proposal.
- Strategic View 4 – Viewpoint 10 within the LVIA is located close by, on the edge of Glenwood and from an elevated location illustrates that the proposed wind farm would be screened entirely by forestry and surrounding mature vegetation.
- Strategic View 5 – Viewpoint 8 within the LVIA is located in the vicinity and is focussed on the view in the opposite direction to Mount Bauple where the wind farm would be partially visible, without resulting in a significant effect on the visual amenity of motorists. It must be reiterated that this view is in the opposite direction to views of Mount Bauple and any views of the wind farm to the east would be partial, distant and short-lived when travelling.
- Strategic View 6 - Viewpoint 7 within the LVIA is located in the vicinity and is focussed on the view to the east, where the wind farm would be partially visible, without resulting in a significant effect on the visual amenity of motorists. Views to the west would remain unchanged as rural production vistas and any views of the wind farm would be partial, distant and short-lived.
- Strategic View 12 – The ZVIs suggest that the proposed wind farm would be screened from this area by dense and mature trees. However, limited views out may be available, especially from the lookout where the wind farm may be visible as a distant element (over 25km away) as part of wide and panoramic views. Large areas of the coast may be visible from the lookout, of which the wind farm would form a very small proportion.
- Strategic View 14 – The surrounding built form and vegetation close to Granville Bridge and within the surrounding settlement would entirely screen the proposed wind farm from view.
- Bruce Highway, Bauple Drive and Route 57 Scenic Corridors/ Routes – potential effects on motorists on these routes are discussed in detail within the Visual Assessment below.
- Fraser Island and the Great Sandy Strait significant landscape area – Viewpoint 11 within the LVIA is located on Fraser Island at a distance of over 21km from the wind farm and indicates that significant effects on landscape character would not occur in this location.
- Coastal foreshore areas and streams – several of the LVIA viewpoints are located in coastal foreshore locations and illustrate the effective screening provided by local intervening vegetation.
- Rural peaks and ridgelines, particularly those visible from the main transport routes and strategic viewpoints – several of the LVIA viewpoints illustrate that the proposed development would not interfere with key views to rural peaks and ridgelines (as set out above).
- Mary River and its tributaries including riparian areas – fieldwork found no locations in the vicinity of these main watercourses where the proposed wind farm would be clearly visible.
- Undeveloped parts of the Ghost Hill ridgeline – as the ZVIs indicate, the proposed wind farm is not expected to be visible from this ridgeline.
- Other features, attributes and values of landscape character and scenic amenity that contribute to regional image – it is considered that the wind farm integrates well within the local landscape, utilising the large scale character of the plantation forestry.

VISUAL ASSESSMENT

Prediction Methodology

141. Visual amenity arises from a visual receptor's experience of the visual world around them and the value they place on a particular view or views. It is possible for a development to result in a significant change in the view from a particular location without resulting in a significant effect on the visual amenity of any receptors if, for example, the location is not accessible to receptors or if the view is acknowledged as having limited value.
142. For the purposes of this assessment, the predicted changes in views have been examined and significant effects on visual amenity have been identified where the proposed wind farm would result in a significant effect on the primary view(s) at a location or along a route and the view(s) is/are valued and can be appreciated by receptors who are at that location for purposes that include the appreciation of the view(s).
143. Significant effects on visual amenity can be perceived as beneficial, adverse or neutral and this depends largely on the perceptions and opinions of the individual receptors and, to a certain extent, on the type of development proposed. The polarisation of public opinion on renewable energy is such that it is difficult to define significant changes in a view as having a definitely beneficial or definitely adverse effect on visual amenity for all members of the public who may experience that view.
144. Accordingly, the assessment identifies whether the predicted effects on visual amenity would be significant or not significant and, whilst it is expected that these significant effects would be considered to be adverse, it is important that the broad range of public opinions on such effects is also taken into account in the decision making process.
145. This assessment draws on the predicted effects of the development, the viewpoint analysis and fieldwork observations, and discusses the significance of the predicted effects on the visual amenity of receptors at a range of visual receptor locations within the study area. Within this study area these include settlements, individual residential properties, long distance recreational routes, visitor attractions, public highways and passenger rail routes.

Settlements

146. The viewpoint analysis has identified some significant changes in views as a result of the wind farm for residents on a section of Eckert Road in Boonooroo (4.6km from the proposal). It is also important to note that the viewpoint analysis found no views of the proposal from Cooloola Cove (Viewpoint 6) in the vicinity of the shopping area (the main area the ZVI identifies with potential views), that the views illustrated by Viewpoint 5 on the edge of Maryborough closest to the proposal would not result in significant changes to residential views and that the viewpoints illustrated from Poona and Tin Can Bay are not representative of the views available for nearby residents.
147. In general, the coastal settlements such as Poona, Maaroom, Tinnanbar, Tin Can Bay, Rainbow Beach, Tuan and Boonooroo are characterised by a core of residential properties located inland from the coastline and surrounded by adjacent built form and local areas of vegetation, either within garden areas or in the form of mature trees in informal tree belts. A few properties are located close to the coastline, but generally informal tree belts separate these properties from the coast, such as can be seen in Poona and Tinnanbar. Therefore, the open and panoramic views illustrated from Poona are generally only available from the beaches or boat ramps due to the filtering of views from these areas of vegetation. In reality, residential views from these settlements are predominantly enclosed with only very filtered views available out to the sea from a few properties adjacent to the coastline. As a result, fieldwork found no significant effects on the visual amenity of residents within Poona, Cooloola Cove, Maaroom, Tinnanbar, Rainbow Beach or Tin Can Bay would occur as a result of the proposed wind farm.
148. Viewpoint 2 is located on an open section of Eckert Road in Boonooroo and is representative of some views available from some southern facing parts of this settlement. In general, the nearby settlement of Tuan is

orientated towards views out to the east, with dense wallum immediately to the west, so that views of the proposed wind farm would be broadly screened. However, some parts of Boonooroo around Eckert Road and Oak Street are orientated towards the south where partial views of the proposed wind farm would be available, similar to the view illustrated by Viewpoint 2, at distances of approximately 4.6km away, where a significant effect on the visual amenity of these residents would occur.

149. Viewpoint 5 represents a view of the wind farm from the southeastern edge of Maryborough. Residential streets further west and north within the settlement have more enclosed views as the layering of built form occupies the foreground of views, rather than the agricultural fields illustrated within the viewpoint. Therefore, this view is representative of a handful of receptors on the southeastern edge of the settlement. Nevertheless, these residents would gain views of parts of the wind farm closest to the settlement (approximately 11.8km away), where no significant effect on their visual amenity would occur.

150. It is useful to note that no potential visibility of the wind farm is expected for residents within Hervey Bay to the north of the site, or Tiaro, Bauple, Bidwill, Owanyilla or Gympie to the west of the proposed site. The screening effects of the forestry itself, combined with the layered screening from intervening wallum is expected to entirely screen the proposed turbines from these westerly settlement areas.

151. It is also useful to bear in mind the population figures from the 2016 Census for local settlement areas:

| Name | Population (2016 Census) |
|--------------------------------------|--------------------------|
| Fraser Coast Regional Council | |
| Maaroom | 219 |
| Boonooroo | 322 |
| Poona | 481 |
| Tinnanbar | 123 |
| Bidwill | 129 |
| Glenwood | 1535 |
| Gympie Regional Council | |
| Wallu | 85 |
| Tin Can Bay | 2242 |
| Neerdie | 109 |
| Kia Ora | 205 |
| Cooloola Cove | 2633 |
| Bauple | 644 |
| Teddington | 237 |
| Anderleigh | 90 |

Table 13 – 2016 Census population figures

152. Overall, the ABS estimated residential population in 2016 within Fraser Coast Regional Council area was 102,953, and within Gympie Regional Council area was 50,292.

153. Additionally, as noted above, significant effects on visual amenity can be perceived as beneficial, adverse or neutral and this depends largely on the perceptions and opinions of the individual receptors and, to a certain extent, on the type of development proposed. Therefore, these predicted significant effects on visual amenity could be perceived as positive or negative by these residents depending on their personal opinion of wind turbines.

154. Finally it is also useful to consider the visibility data indicated on the pie chart on the viewpoint photomontages and also the prevailing wind direction photomontage for Viewpoint 2, which suggests that from Boonooroo it is expected that the wind turbines would predominantly be orientated so that the rotor sweeps would be side on to the viewpoint.

Individual Residential Properties

155. There are a number of residents on rural properties and individual properties within the study area who may gain views of the proposed wind farm. However, not all of these views from residential properties would result in a significant effect on the visual amenity of residents. In many cases, the residential properties will be surrounded or located in close proximity to other associated buildings such as farm buildings, sheds, garages and outbuildings. As the ZVI illustrates, given the nature of the landform in the local area, and also the very good levels of vegetation throughout the study area, many properties will also be located in a position where topography and/or vegetation would only allow very partial visibility of the proposed development, in a similar way to the potential visibility illustrated in Viewpoints 5 and 12. It is also often the case that residential properties have vegetation associated with them, along boundaries and within garden areas. All of these types of features will add foreground screening elements which may entirely or partially screen views of the proposed development. Where the proposal is partially screened, the magnitude of change in the view as a result of the development and the resulting significance of effects may be reduced. Therefore, the number of residents in individual properties significantly affected by the proposed development is expected to be extremely limited.

Visitor Attractions

156. There are a number of leisure facilities (such as golf courses, camp sites and picnic sites), Macadamia House in Bauple, Bauple Museum, Portside Heritage Precinct in Maryborough, Fraser Coast Wildlife Sanctuary in Maryborough, Susan River Homestead Adventure Resort, Brennan and Geraghty's Store Museum in Maryborough, Wongi Waterholes, Gympie Gold Mining and Historical Museum, Gympie Woodworks Museum, the Mary Valley Heritage Railway, Fraser Coast Cultural Centre in Hervey Bay, plus a few forest reserves and recreation areas within the study area. The majority of these attractions are based within settlement areas where no views of the proposed development would be available. The ZVI also indicates no potential visibility of the proposal from the Susan River Homestead Adventure Resort due to the screening afforded by nearby and intervening vegetation. In a similar way, the forest reserves and recreation areas are generally located within well vegetated areas with limited views out. However, a number of camp sites are located along coastal areas, such as around Inskip Point and along 75 Mile Beach and Rainbow Beach. Many of these camping areas are located on eastern facing beaches and dunes where views towards the wind farm to the west are entirely screened by foreground dunes and adjacent wallum. This is the case along several sections of Rainbow Beach and 75 Mile Beach and for some of the camping areas close to Inskip Point. However, one or two camping areas are west facing near to Inskip Point where campers (depending on their orientation) may gain views similar to those illustrated by Viewpoint 11, where a significant effect on their visual amenity may occur. However, it must be reiterated that this would affect an extremely limited number of camping areas within the study area and given the number of camping areas any impact could be mitigated by camping elsewhere in the vicinity.

157. In broad terms, the coast itself is a big visitor attraction within the study area. Fraser Island, Rainbow Beach and the Wide Bay area attract a large number of tourists but also local recreational users. Many of the beaches allow 4 wheel drive access and as a result large numbers of vehicles access many of the beaches within the study area not only to gain access to Fraser Island, but also to enjoy water sports and water based

activities along the coast. Fieldwork has indicated that the coastal dunes and low cliffs along the Wide Bay/Rainbow Beach area in combination with wallum on these landforms would screen the vast majority of views of the proposed development from the Rainbow Beach area. As a result, for those accessing the coast for leisure purposes and for those using the beach as a transport route to reach camp sites, the proposed development would be screened from view except for a limited few locations, such as the more elevated Carlo Sand Blow (Viewpoint 13). At a distance of 23.4km from the proposed development, this elevated scenic viewpoint allows an uncharacteristically panoramic view towards the proposal which is not available from the beach below. The focus of many visitors' views is in the opposite direction, out across Wide Bay and no significant effect on the visual amenity of visitors to this location is expected.

158. Built tourist lookouts include; Rainbow Beach Road, Rainbow Beach, Brooyar State Forest's Point Pure Lookout and Eagles Nest Lookout, and Markwell's Lookout Fraser Island. All of these viewpoints look east, with the ZVI showing no visibility to the wind farm and therefore no effect on visual amenity is anticipated.
159. Viewpoint 11 at 75 Mile Beach near Hook Point is one of the other main points along these coastal areas where the proposed development would be visible for recreational users. From the majority of approaches to this location along beach areas, the proposed turbines would once again be entirely screened from view by intervening dunes and wallum. Therefore, this viewpoint does not represent or characterise the general views or the experience of recreational visitors to Fraser Island and Rainbow Beach, it illustrates the views from the crossing point between Inskip and Hook Point, which has the most open vista towards the mainland available from this general area. Recreational users at Inskip Point would be expected to experience a moderate+ or moderate effect on their visual amenity, with those recreational users on 75 Mile Beach gaining a slightly more distant and more partial view of the proposal, resulting in a moderate effect overall. It is also important to note that at this crossing point there are wide views available across Wide Bay in the opposite direction and so a significant effect on the visual amenity of most recreational users is not expected, although for some tourists visiting this particular area specifically for the views rather than water sports etc, their visual amenity may be significantly affected, although could be mitigated by driving to the eastern side of Fraser Island where the wind farm would not be visible.

Long Distance Recreational Routes

160. There are a few long distance recreational routes within the study area which are all located at least 15km from the proposed development. The majority of these routes are located within well vegetated areas, such as the Fraser Island Great Walk which travels through areas of mature wallum, and Cooloola Great Walk which is located within similar vegetation. Open views out are very limited from these routes and at distances of over 15km from the proposed development, views of the proposal are expected to be available extremely infrequently. Where available, a moderate or lower magnitude of change would be expected (such as from Viewpoint 13 on the Cooloola Great Walk where a moderate/slight magnitude is predicted). Given the infrequent availability of views of the wind farm and the distance of each of these routes from the proposal, no significant effect on the visual amenity of these receptors would occur as a result of the wind farm.

Public Highways and Roads

161. Roads in the study area include the A1 Bruce Highway, Maryborough Cooloola Road, Route 15 Tin Can Bay Road, Rainbow Beach Road, Kin Kin Road, Route 49 Wide Bay Highway, Boonooroo Road, Bauple Woolooga Road, Mungar Road, Route 86 Maryborough Biggenden Road, Route 57 Maryborough Hervey Bay Road and a number of smaller routes.
162. The Maryborough Cooloola Road, Boonooroo Road and Tin Can Bay Road are the three closest main roads to the site, adjacent to the east, north and south site boundaries, respectively. Each route currently travels through extensive forestry with characteristically very contained views. The introduction of the proposed turbines into the forestry area would result in some visibility of some of these proposed turbines from these roads. However, due to the characteristically contained views, only a few of the turbines would be visible

at each time, although visibility of wind turbines would be recurrent and regular as part of any journey along these routes in the vicinity of the wind farm. The overall effect of this regular and recurrent visibility would be significant on the visual amenity of motorists on sections of these routes in the vicinity of the site. However, Viewpoint 1 illustrates that even in proximity to the wind farm, all of the proposed turbines can be entirely screened by surrounding forestry.

163. Further afield, the Bruce Highway runs west of the site at a consistent distance of over 10-15km away. Viewpoints 7 and 8 illustrate the most open views of the proposed turbines from this route, which would be seen to the side of the direction of travel along this busy and fast moving traffic route. Both the viewpoints indicate that no significant effect on the visual amenity of motorists would occur, with the majority of the route gaining no potential visibility of the proposed wind farm due to the screening effects of intervening vegetation.

164. Other routes within the study area are generally surrounded by wallum or areas of bush within farmland, and open views across the surrounding landscape are extremely rare, with routes to the east of the site characteristically enclosed, such as Rainbow Beach Road. Very occasional open vistas are available, such as from topographical high points, but these are of extremely short-lived duration and not characteristic of journeys along any of the roads within the study area as a whole. As a result, only very occasional, distant, partial and short-lived views of the proposed wind farm would be available from a few points on the road network (aside from those routes mentioned above) which would not result in any significant effects on the visual amenity of motorists.

Passenger rail routes

165. The main rail line between Cairns and Brisbane follows a route through the study area between Maryborough and Gympie, through the west of the study area, approximately 15km from the proposed development. This route travels through a similar landscape to the Bruce Highway and views would be similar to those experienced along the Bruce Highway, they would be seen to the side of the direction of travel and would be experienced at a high speed of travel. Visibility of the proposed development is expected to be very intermittent, partial and distant, where no significant effect on the visual amenity of rail passengers would occur.

SUMMARY OF EFFECTS

| Landscape Character | |
|-----------------------------------------------------|--------------------------------------------------------------------------------------------------|
| LCT A: Forested Peaks and Hills | No significant effect on landscape character |
| LCT C: Undulating Forested Lowlands | Some significant adverse effects on landscape character in areas local to the site |
| LCT D: Undulating Farmland Mosaic | No significant effect on landscape character |
| LCT E: Alluvial Pastures and Cane Fields | No significant effect on landscape character |
| LCT F: Estuaries and Coastal Foreshores with Wallum | Some significant adverse effects on landscape character within 7-8km of the proposed development |
| LCT G: Broad River Valley | No significant effect on landscape character |
| LCT H: Coastal Dunes and Beaches | No significant effect on landscape character |
| LCT I: Ocean Passage | Some significant adverse effects on landscape character in closest parts of the LCT to the site |

| Visual Amenity | |
|-----------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|
| Maryborough | No significant effect on visual amenity |
| Gympie | No significant effect on visual amenity |
| Cooloola Cove | No significant effect on visual amenity |
| Rainbow Beach | No significant effect on visual amenity |
| Tin Can Bay | No significant effect on visual amenity |
| Tinnanbar | No significant effect on visual amenity |
| Poona | No significant effect on visual amenity |
| Tuan | No significant effect on visual amenity |
| Boonooroo | Significant effects expected for limited number of residents around Eckert Road and Oak Street |
| Maaroom | No significant effect on visual amenity |
| Tiaro | No significant effect on visual amenity |
| Bauple | No significant effect on visual amenity |
| Glenwood | No significant effect on visual amenity |
| Gunalda | No significant effect on visual amenity |
| Neerdie | No significant effect on visual amenity |
| Kia Ora | No significant effect on visual amenity |
| River Heads | No significant effect on visual amenity |
| Macadamia House & Bauple Museum | No significant effect on visual amenity |
| Portside Heritage Precinct, Fraser Coast Wildlife Sanctuary, Brennan and Geraghty's Store Museum – all in Maryborough | No significant effect on visual amenity |
| Susan River Homestead Adventure Resort | No significant effect on visual amenity |
| Wongi Waterholes | No significant effect on visual amenity |
| Gympie Gold Mining and Historical Museum and Gympie Woodworks Museum, | No significant effect on visual amenity |
| Mary Valley Heritage Railway | No significant effect on visual amenity |
| Fraser Coast Cultural Centre in Hervey Bay | No significant effect on visual amenity |
| Fraser Island Great Walk | No significant effect on visual amenity |
| Cooloola Great Walk | No significant effect on visual amenity |

| | |
|------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 75 Mile Beach, Fraser Island | Receptors on the majority of 75 Mile Beach would gain no views of proposed development. Receptors on very southern tip of the beach would gain views of part of the wind farm where a significant effect on visual amenity would only occur for those receptors specifically at this location to appreciate the view. For those receptors undertaking water sports, using the location as a transport route etc, no significant effect on visual amenity would occur. |
| Inskip Point | Receptors at this location would gain views of the wind farm where a significant effect on visual amenity would only occur for those receptors specifically at this location to appreciate the view. For those receptors undertaking water sports, using the location as a transport route etc, no significant effect on visual amenity would occur. |
| Carlo Sand Blow | No significant effect on visual amenity |
| Maryborough Cooloola Road | Significant effect on visual amenity of motorists from some sections of route in vicinity of the site. |
| Boonooroo Road | Significant effect on visual amenity of motorists from some sections of route in vicinity of the site. |
| Tin Can Bay Road | Significant effect on visual amenity of motorists from some sections of route in vicinity of the site. |
| Bruce Highway | No significant effect on visual amenity |
| Other traffic routes | No significant effect on visual amenity |
| Rail routes | No significant effect on visual amenity |

CONCLUSIONS

166. This assessment has examined the likely effects of the proposed wind farm on the landscape and visual amenity of the site and surrounding area.

167. The significant effects of this proposed wind farm would be limited to:

- Some parts of the Undulating Forested Lowlands LCT (LCT C) within the vicinity of the site,
- A limited number of parts of the Estuaries and Coastal Foreshores with Wallum LCT (LCT F) within approximately 7-8km of the proposed development,
- Some parts of the Ocean Passages LCT (LCT I) closest to the proposed development,
- A limited number of residents around Eckert Road and Oak Street, Boonooroo and a very limited number of residents in individual residential properties,
- Motorists on limited sections of the Maryborough Cooloola Road, Boonooroo Road and Tin Can Bay Road.
- A limited number of receptors at the southern tip of 75 Mile Beach and Inskip Point who are visiting these locations specifically in order to appreciate the view, rather than for water sports, transport across Wide Bay etc.

168. This LVIA has described and illustrated that, in general terms, the visibility of the proposed wind farm would be extremely limited. This has been indicated but perhaps underplayed by the viewpoints, which have been located at some of the most open, well used and publicly accessible locations within the study area. The viewpoints illustrate some of the views seen on typical journeys through this study area, but they generally illustrate the most open views of the proposal from these journeys.
169. It is also important to recognise that the turbines may often be less visible than the viewpoint photomontages illustrate due to the turbine positions in relation to the prevailing wind direction as well as the varying visibility available across the area due to varying weather conditions throughout the year. The visibility data tends to indicate that in general terms, the more distant the receptor is from the wind farm, the less of it would be visible, on average.
170. There would be no significant effects on the vast majority of residents, tourists, recreational users, motorists, or rail users within the study area. Due to the carefully considered location and design of the proposed wind farm, the proposed turbines would be at least partially screened in many views, limiting the potential effects on both visual receptors and on landscape character.
171. By siting the proposal wholly within plantation forestry, the impacts on landscape character and landscape fabric have been limited; the plantation continually works on a rotation felling basis where the wind turbines will utilise existing plantation tracks and will result in no loss of distinctive landscape features. Furthermore, as the proximate viewpoints indicate, the forestry itself provides a natural visual buffer in many views.
172. As the ZVIs indicate, from the vast majority of the study area the proposed development would be entirely screened from view by the considerable and dense vegetation and undulating land form. Limited and scattered potential visibility of the turbines would be available from a few locations within the site and also some locations at greater distances from the site, although this visibility would predominantly be limited to under 25% percent of the wind farm
173. Furthermore, whilst a number of national parks, recreation areas and the Fraser Island World Heritage Site are all located within the study area, the LVIA has provided information to confirm that the proposed wind farm would not fundamentally alter the reasons for which any of these assets were designated.
174. Therefore, to summarise, it is considered that the significant effects on landscape and visual amenity as a result of the proposed wind farm would be extremely limited and contained in this location.

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Forest Wind LVIA

Appendix A – Fraser Coast Landscape Strategy Extracts

Landscape Character Strategy

Fraser Coast Regional Council Land Use Strategy Project



4.3.1 TYPE A: FORESTED PEAKS AND HILLS

4.3.1.1 Description of the landscape resource

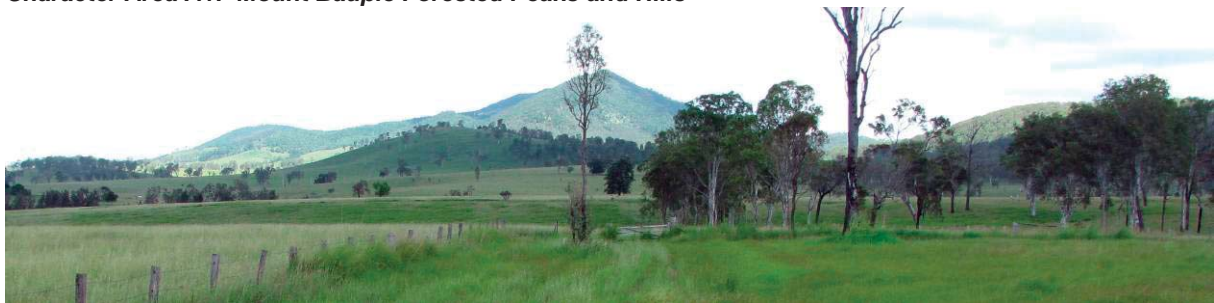
Location and boundaries

This landscape type is characterised by the forested volcanic and sedimentary peaks and hills associated with mountainous areas within central and western parts of the Region, including Mount Bauple, Grassy Mountain, Mount Neerdie, Mount Walsh, Mount Joseph, Mount Urah, Mount Benarige, Mount Woocoo, Mount Bererum, Fairlies Knob and Mount Doongul.

Key characteristics

- Associated with the most elevated topography in the Region; from approximately 100m to above 700m AHD at Mount Walsh
- Varied geology consisting of volcanic granite associated with Mount Bauple, Grassy Mountain, Mount Neerdie, Mount Urah, Mount Walsh and Mount Bererum; and silicacious sedimentary rocks/sandstones associated with Mount Joseph, Mount Woocoo, Mount Benarige, Fairlies Knob and Mount Doongul
- Soils dominated by rudosols (western parts) and sodosols (eastern parts)
- Although the underlying geology, soils and vegetative character associated with each peak or hill varies discreetly; the extensive forest cover, distinctive elevated landform and their related role as key visual and scenic markers in the Region, provide the key unifying elements of this landscape type
- Remnant vine forest often associated with volcanic geology (e.g. at Mount Walsh, Grassy Mountain, Mount Bauple, Mount Urah); defining species include Hoop pine (*Araucaria cunninghamii*), Bunya Pine (*Araucaria bidwillii*), Queensland Kauri Pine (*Agathis Robusta*), Lemon Myrtle (*Backhousia myrtifolia*), Tuckeroo (*Cupaniopsis* spp.), Crows Ash (*Flindersia australis*), Queensland Brush Box (*Lophostemon confertus*) and sometimes Alexandra Palm (*Archontophoenix cunninghamiana*) in gullies
- Corymbia and Eucalyptus open forest is generally associated with sedimentary rock/sandstone hills and foot slopes
- Sparsely settled landscapes with very limited recreational access; evoking a strong sense of remoteness and tranquillity
- Mostly managed / protected by State Forest or National Park designations

Character Area A1: Mount Bauple Forested Peaks and Hills



This character area is associated with the distinctive volcanic peak and surrounding hills associated with Mount Bauple. The majority of the area is protected as a National Park for its scientific value. The area (especially Mount Bauple itself) provides a memorable feature in the Region's southern landscapes, including gateway views into the Region from the Bruce Highway, described further in the View Management Framework (Strategic View No. 5), and provides a unique setting to the townships of Bauple and Tiaro.

Character Area A2: Grassy Mountain Forested Peaks and Hills



This area is located in the southern part of the Region on the volcanic rock associated with Grassy Mountain, south of Bauple. This area comprises remnant Hoop Pine vine forest; including a large patch to the west of the Bruce Highway. Grassy Mountain hosts a telecommunications tower.

Character Area A3: Mount Neerdie Forested Peaks and Hills



This area is located along the Region's southern boundary at Glenwood, a large rural residential community south of Bauple. Entering the Fraser Coast Region from the south along the Bruce Highway, the steep landform and vegetation associated with Mount Needie and Mount Kanighan (outside the Region boundary) helps to frame and elevate memorable gateway views across *Pine Mountain Undulating Farmland Mosaic* and beyond Grassy Mountain, to Mount Bauple, as described further in the View Management Framework (Strategic View No. 5)

Character Area A4: Mount Urah Forested Peaks and Hills



This area is located in the southern part of the Region on the volcanic rock associated with Mount Urah and is predominantly covered by native forest. The majority of the area is either protected as nature conservation (under Glenbar National Park) or managed under Glenbar State Forest. Key vegetation communities in this area include Hoop Pine vine forest (associated with Mount Urah and Glenbar National Park). Glenbar State Forest is located on sedimentary rocks/sandstones, and includes Lemon-scented Gum (*Corymbia citriodora*) and Narrow-leaved ironbark (*Eucalyptus crebra*) open forest.

Character Area A5: Mount Joseph Forested Peaks and Hills



This area is located in the south western pocket of the Region on the sedimentary rocks/sandstones associated with Mount Joseph and is predominantly covered by native open forest. The majority of the area is either protected as nature conservation (under Grongah National Park) or managed under Gigooman State Forest. Key vegetation communities in this area include Lemon-scented Gum (*Corymbia citriodora*) and Narrow-leaved ironbark (*Eucalyptus crebra*) open forest.

Character Area A6: Mount Walsh Forested Peaks and Hills



Located in the south western pocket of the Region, this character area is dominated by dense native forest. The majority of the area is protected as a National Park and contains diverse vegetation communities, including vine forest in sheltered pockets, scrubland and heath on rock pavements and open eucalypt forest and woodland. This landscape, especially the “bluff” area associated with Mount Walsh itself which consists of exposed granite outcrops and cliffs; provides prominent memorable landmark in the surrounding landscape (Woocoo and Biggenden areas), as described further in the View Management Framework (Strategic View No. 9)

Character Area A7: Mount Woocoo Forested Peaks and Hills



This area is located in the central western part of the Region on the sedimentary rocks/sandstones associated with Mount Woocoo, Mount Benarige and Mount Bererum. The majority of the area is managed under St Mary State Forest. Vegetation communities are dominated by Lemon-scented Gum (*Corymbia citriodora*), narrow and broad-leaved ironbark (*Eucalyptus crebra* and *fibrosa*) and Queensland Blue Gum (*Eucalyptus tereticornis*) open forest. The area is sparsely settled and has limited access.

Character Area A8: Fairlies Knob and Mount Doongul Forested Peaks and Hills



This area is located in the north western part of the Region on the sedimentary rocks/sandstones associated with Fairlies Knob, Mount Doongul and the surrounding forested foothills north of Brooweena and Aramara. The majority of the area is either protected as nature conservation (under Wongi National Park and Fairlies Knob National Park) or managed under Wongi State Forest. Key vegetation communities in this area include Hoop pine vine forest (associated with Fairlies Knob) and open forest of Lemon-scented Gum (*Corymbia citriodora*), Narrow-leaved ironbark (*Eucalyptus crebra*) and Queensland Blue Gum () associated with Mount Doongul. The area is sparsely settled.

4.3.1.2 Evaluation of the landscape resource

Key landscape and visual sensitivities

- Predominantly unbuilt and forested skyline which provides a scenic backdrop within the Region and landscapes beyond
- Forested landscape would be visually vulnerable to clearing patterns, particularly regular and geometric patterns of clearance that would be visible as intrusive scars over long distances.
- Undeveloped skyline vulnerable to intrusion by linear infrastructure such as telecommunications towers.
- Sensitive to buildings creeping up the slope, for example to capitalise on panoramic views and incursion of pasture extending from lower parts.

Key issues / forces for change

- Change of forest management within State Forests e.g. conversion of native forest to managed hardwood (pine) plantations
- Change in management and/or land use in areas not covered by National Park or State Forest designations (e.g. potential for private landowners to manage these forests for timber and other uses/values) resulting in a change in landscape character; although management plans must be submitted before undertaking such operations to ensure sustainable land management

Strategy to manage change

- Opportunity for FCRC to develop policy and guidance in the evolving Regional Strategy which emphasises the scenic value of the *Forested Peaks and Hills* landscape. To validate the safeguarding of this landscape from adverse change (i.e. clearing and/or built development, including transmission pylons and telecommunications towers), the ecological and potential recreational value (where appropriate), would need to be highlighted.

4.3.2 TYPE B: RURAL TRIBUTARY VALLEYS AND HILLS

4.3.2.1 Description of the landscape resource

Location and boundaries

This landscape type is defined by the tributary valleys and rolling pasture hills of the former Woocoo Shire, nestled between Mount Walsh, Mount Woocoo and Mount Urah.

Key characteristics

- Geology dominated by Gympie Group; consisting of mudstones, siltstones, sandstones and Gigoomgan limestone
- Soils consist of rudosols (western parts) and sodosols (eastern parts)

- Several narrow creeks meander fairly inconspicuously through the landscape, including Munna Creek, Eel Creek, Teebar Creek and Neran Creek
- Land use dominated by large rural properties (e.g. Marodian and Malarga) containing well maintained cattle grazed pastures (evidence of pasture improvement) with blocks of remnant native forest and tree lined creeks
- The mountain ranges associated with Mount Walsh, Mount Joseph, Mount Urah, Mount Bauple and Mount Woocoo provide a dramatic backdrop
- Sequences of lagoons in low-lying regions, for example near Munna Creek at Teebar
- Landscape comprises a strong rural character
- Fig trees growing from dead tree stumps are a characteristic feature
- The sparsely settled rural landscape with extensive rolling hills of grazing pastures amid a forested setting evoke a strong rural character and sense of remoteness
- Key routes include Bauple-Woolooga Road and Maryborough-Biggenden Road; both narrow (and partly unsealed) roads which provide access to properties and small townships in the area including Brooweena, Teebar, Aramara, Biggenden and Woolooga (both outside of the FCRC area)
- Memorable views to Mount Bauple from southern part of the area, including from Bauple-Woolooga Road.
- Memorable views to Mount Walsh from western parts of the area (from near Boompa and Lakeside); a prominent rocky bluff which overlooks the town of Biggenden

Character Area B1: Woocoo Tributary Valleys and Hills



This character area is unique to the landscape of rolling pasture hills and tributary valleys associated with the former Woocoo Shire. It is the only Character Area of this Landscape Type falling within the Region and, therefore, all of the type descriptions above apply.

4.3.2.2 Evaluation of the landscape resource

Key landscape and visual sensitivities

- Sparsely settled landscape with a strong rural character and sense of remoteness
- Would be vulnerable to intrusion by most uncharacteristic forms of built development, particularly bulky warehouse type farm buildings, residential subdivision.
- Major road upgrades would need to respond to the distinctive character (i.e. topography, drainage, remnant vegetation).

Key issues / forces for change

- No major issues / forces for change affecting the landscape character were noted during field work
- Longer term potential of eco-tourism and farm-stay type tourist operations in this landscape type.

Strategy to manage change

- The evolving Regional Strategy and associated land use management decisions need to recognise this high quality agricultural land and protect it from irreversible damage
- The evolving Regional Strategy needs recognise the significance of agriculture in sustainable land use planning (e.g. locally food production and supply chains), their role in the Region's rural economy, as well as the role of land, soil and vegetation management in carbon sequestration
- Opportunity for FCRC to develop policy and guidance in the evolving Regional Strategy which emphasises the scenic value of the *Rural Tributary Valleys and Hills* landscape; including the extensive rolling hills of grazing pastures with a dramatic backdrop of forested mountain ranges. To validate the safeguarding of this

landscape from adverse change (i.e. conversion of large-scale properties to small hobby farms, rural residential and/or other built development, including transmission pylons), the recreational value and potential tourism market (i.e. scenic drives), may need to be highlighted.

- Through policy, promote and encourage farmers to develop and implement a suitable Farm Management System⁵ or similar scheme that supports environmental stewardship and best land management practices, to ensure sustainable farming practices, and improve natural resource management and environmental outcomes.

4.3.3 TYPE C: UNDULATING FORESTED LOWLANDS

4.3.3.1 Description of the landscape resource

Location and boundaries

This landscape type covers a substantial portion of the Region's northern, eastern and western landscapes and is largely defined by the densely forested lowlands of both native forest and managed pine plantations. It includes several State Forests, including Wongi, Tuan, Tiaro and Bauple.

Key characteristics

- Sedimentary detrital geology formed by conglomerates of the Maryborough Formation and Burrum Coal Measures, comprising sandstones, siltstones and mudstones with shale and conglomerates
- Mixture of soils types; including sodosols in central parts of the Region; and kandosols and podosols in northern and eastern parts of the Region
- Undulating low lying landform, generally between 20-100m AHD
- Located at the foothills of the more elevated and dramatic scenery associated with the *Forested Peaks and Hills* in central and western parts of the Region e.g. surrounding Mount Woocoo
- Incised by several creek valleys, including tributaries of the Mary and Burrum Rivers (in central and northern parts of the Region), Tinana Creek (in southern parts of the Region), and small coastal creeklines which eventually discharge into the Great Sandy Strait in eastern parts of the Region, e.g. Poona Creek
- Predominantly a forested landscape; comprising both native forest and managed hardwood (pine) plantations e.g. Tuan State Forest. This is the major defining characteristic of this landscape type.
- Contains several protected areas, covering a large proportion of this landscape type including Vernon Conservation Park, Beelbi Creek Conservation Park, Wongi Forest Reserve, Tinana Creek Conservation Park and several state forests (Vernon, Wongi, Tuan, St Mary, Glenbar, Thinoomba, Boomba, Bauple, Ferguson and Gungahlin)
- Key native forest communities include Eucalyptus and Corymbia open forest, Melaleuca woodland, Lacustrine wetlands and some hoop pine vine forest (e.g. at Lenthalls Dam)
- Patches of Swamp Banksia (*Banksia robur*), Red Silky Oak (*Grevillea banksii*), Grass Trees (*Xanthorrhoea johnsonii*) and She Oak (*Casuarina glauca*) are a distinctive feature, particularly in Wongi State Forest
- Mostly managed / protected by State Forest or National Park designations
- The Wongi waterholes and Lenthalls Dam are a key points of interest in this landscape
- Generally a sparsely settled landscape with limited access
- Key routes through the landscape include the Bruce Highway, Maryborough-Tuan Forest Road and Maryborough-Biggenden Road
- Key settlements include Brooweena, Aramara, and Burrum, Howard, Torbanlea and Aldershot (historic mining towns)
- The densely forested and sparsely settled character evokes a strong sense of remoteness and tranquillity
- Timber fire towers provide local landmarks and orientation.

⁵ Previously funded through The Department of Agriculture, Fisheries and Forestry's *Pathways to Industry Environmental Management Systems Programme* (2004–07) under the Natural Heritage Trust to foster the adoption of profitable and sustainable farming practices, and improve natural resource management and environmental outcomes.

Character Area C1: Tuan Undulating Forested Lowlands



This character area is located in the eastern part of the Region, comprising Bauple State Forest, Tiaro Forest, Tuan State Forest and the northern part of Toolara State Forest. Tuan Forest covers a large part of the area and contains some of the most extensive exotic pine plantations in Queensland. The landscape also contains small coastal wallum remnants along creeks and estuaries, such as Poona Creek (pictured above right).

Character Area C2: Glenbar Undulating Forested Lowlands



This character area is located in the western part of the Region, at the foothills of Mount Woocoo, comprising undulating forested foothills surrounding Mount Woocoo, Mount Benarige and Mount Bereum. Glenbar and St Mary State Forests cover a large part of this area. The area also contains Woocoo National Park. Brooweena is a key historic town in this area (part of the former Woocoo Shire), which established in the late 19th Century on the Maryborough-Gayndah railway as a timber milling settlement, mainly drawing on hoop pine and managed hardwood plantations. The town contains a primary school, timber mill and a collection of historic buildings such as the Woocoo Shire Council Hall (pictures above). Aramara is also located in this landscape; a small linear rural residential settlement located along Maryborough-Biggenden Road, near the Maryborough-Gayndah timber railway bridge at North-Aramara Road.

Character Area C3: Boompa Undulating Forested Lowlands



This character area is located in the western part of the Region, east of Brooweena, comprising Boompa State Forest and the undulating foothills of Billygoat Mountain, and Fairlies Knob. There is a distinctive patch of remnant grass trees east of the Bauple-Woolooga Road/ Maryborough-Biggenden Road junction. Transmission line towers traverse this area in a 120m north-south cleared corridor.

Character Area C4: Burrum Undulating Forested Lowlands



This character area is located in the northern part of the Region, comprising Wongi State Forest, Wongi National Park and Wongi Forest Reserve. It comprises a range of vegetation communities, including Hoop Pine rainforest, open eucalypt forest, open woodland with a heath understorey, and exotic pine plantations. Lenthalls Dam, built in 1984, lies within this area (pictured above left), which provides drinking water for Hervey Bay. Located approximately 8km south west of Torbanlea on the Burrum River, the dam is nestled amongst dense Hoop Pine forest and is fairly remote (accessed via a gravel track through Wongi State Forest). However, the dam is well known as a picnic and fishing spot (officially stocked with fish), offering barbecue facilities, picnic shelter and tables, walking tracks and a small boat ramp. At the foot of the dam near Logbridge Creek, the Wongi waterholes are also a key point of interest in this area, fringed by paperbark trees (*Melaleuca* species), sedges and rushes (pictured above right).

Rural townships include Aldershot, and Burrum, Howard and Torbanlea (historic mining towns). Aldershot is a former industrial town north of Maryborough, focussed on the North Coast railway line and former smelting works (1893 -1906); which now comprises a rural residential character with no retail/commercial centre (served by Maryborough, approximately 9km south east of Aldershot). A large-scale open cut coal mine is proposed by north of Aldershot by Northern Energy Corporation (Colton Mine), which (if approved) is likely to change the character of this settlement, as well as its role and setting.

Burrum, Howard and Torbanlea are former coal mining communities focussed on the North Coast railway line. The Burrum River is a key landscape feature separating Howard from Burrum and Torbanlea. The commercial centre of each settlement is focussed along the Old Bruce Highway, consisting of classic 'Queenslander' style shops/services, public houses and a saw mill at Howard, surrounded by suburban and rural residential suburbs often containing high set timber houses, amidst a forested setting. Brooklyn House (c.1890) is a key landmark in Howard; a high set Victorian era Queenslander home constructed of mostly timber with corrugated iron roof, large verandas, elaborate timber detailing (on balustrades and gables), and an established garden, built by William Rankin who managed coal mines in the local area.

4.3.3.2 Evaluation of the landscape resource

Key landscape and visual sensitivities

- Predominantly an unsettled forested landscape which contains substantial tracts of remnant vegetation, evoking a strong sense of naturalness
- The character is vulnerable to intrusion by large scale built developments, unsympathetic forest clearing or upgrade of forest tracks (e.g. insensitive medalling of forest tracks)
- The Wongi Waterholes are a highly distinctive and sensitive feature

Key issues / forces for change

- Transportation and communication infrastructure which dissects the forest (although their location in this forested landscape may minimise their visual extent with careful routing and planning)
- Change of forest management within State Forests e.g. further conversion of native forest to managed hardwood (pine) plantations
- Change in management and/or land use in areas not covered by National Park or State Forest designations (e.g. potential for private landowners to manage these forests for timber and other uses/values) resulting in a change in landscape character; although management plans must be submitted before undertaking such operations to ensure sustainable land management

- Open cut coal mine proposed north of Aldershot by Northern Energy Corporation; intending to produce up to 500,000 tonnes per annum (Colton Mine). The production life is anticipated to be ten years (Northern Energy Company, 2011).

Strategy to manage change

- Opportunity for FCRC to develop policy and guidance in the evolving Regional Strategy which emphasises the scenic value of the *Undulating Forested Lowlands* landscape and prioritise the conservation of particular tracts of forest in order to conserve and enhance landscape character, biodiversity and ecological links (i.e. ability for cross-catchment fauna movement). This will also assist in raising the awareness of the Region's diverse and distinct landscapes, and ensure sensitive parts of the *Undulating Forested Lowlands* landscape (e.g. Wongi Waterholes) are managed into the future. To validate the safeguarding of important parts of this landscape from adverse change (i.e. clearing of native forest area), the ecological and potential recreational value (where appropriate), would need to be highlighted.
- In managed forest areas (e.g. pine hardwood plantations), sensitive natural features, particularly watercourses and drainage lines, should be identified and conserved through appropriate management strategies (e.g. green corridors, riparian buffer zone) in order to conserve and enhance landscape character, biodiversity and ecological links (i.e. ability for cross-catchment fauna movement).

4.3.4 TYPE D: UNDULATING FARMLAND MOSAIC

4.3.4.1 Description of the landscape resource

Location and boundaries

This landscape comprises the gently rolling pastures and cane fields which define the hinterland of both Hervey Bay (including the ridgeline and beyond) and Maryborough (along the Mary River, south west of Maryborough).

Key characteristics

- Comprises mixed but predominantly metamorphic geology including the Tiaro Coal Measures, Alluvium, Maryborough Formation and Ferruginous duricrust; with volcanic geology associated with the Graham's Creek Formation
- Predominantly sodosol soils; however the Hervey Bay hinterland area coincides with kandosols
- Gently rolling lowland topography
- Contain several watercourses descending from nearby peaks and hills; most notably the Mary River, which meanders through the landscape in an approximately northerly direction between Munna Creek and Myrtle Creek
- Land use is predominantly cattle grazed pastures and cane fields (particularly along the Mary River), evoking a strong rural character
- Gently rolling pastures provide visual contrast to forested hills and peaks beyond e.g. Mount Bauple
- Small blocks or strands of remnant forest are a common feature, including Denison, Gundiah and parts of Glenbar State Forests, creating visual contrast
- Settlement pattern defined by small rural townships (including Bauple, Tiaro and Mungar) and isolated rural homesteads
- This landscape is commonly experienced through the Bruce Highway; a key north-south route providing primary access to and through the Fraser Coast Region
- Mount Bauple provides a distinctive backdrop to both Tiaro and Bauple
- Mature Hoop Pine street tree planting along Bauple Drive amongst rolling cane fields provides a memorable approach to Bauple

Character Area D1: Pine Mountain Undulating Farmland Mosaic



This character area surrounds Mount Bauple and Grassy Mountain, comprising an undulating mosaic of rolling grazing pastures, forest (including Gundiah State Forest and part of Glenbar State Forest), and cane fields along the Mary River. The area provides an important rural setting and gateway to the Fraser Coast Region from the south, along the Bruce Highway and Bauple-Woolooga Road. The area also provides a distinctive rural setting to Tiaro and Bauple. The forested hills associated with Pine Mountain provide a unique feature in this area (currently under private ownership).

Character Area D2: Grahams Creek Undulating Farmland Mosaic



This character area is located west of Maryborough, comprising a well-contained landscape of rolling pastures hills and cane fields between Wongi State Forest, Thinoomba State Forest and the Mary River.

Character Area D3: Hervey Bay Hinterland Undulating Farmland Mosaic



This character area consists of the rural hinterland south of Hervey Bay. The northern boundary is defined by a prominent ridgeline between Booral, Hervey Bay, Dundowran and Jacobsons Hill (partly protected under the former Hervey Bay Local Plan), comprising an undulating mosaic of cane fields, grazing pastures and blocks of forest (predominantly in private ownership). There are key vantage points along the ridgeline, which provide memorable views to the north and south of coastal and rural landscapes, respectively (e.g. Scrub Hill) as explored further in the View Management Framework. This landscape provides a rural setting and approach to Hervey Bay; in particular the cane fields between the Hervey Bay ridgeline and Sunshine Acres, a rural residential community at the Maryborough-Hervey Bay Road/Booral Road junction.

4.3.4.2 Evaluation of the landscape resource

Key landscape and visual sensitivities

- Gently rolling lowland topography overlain by pastures and cane fields, evoking a strong rural character
- A sparsely settled landscape, excepting a small number of traditional rural townships and isolated property homesteads,
- The *Hervey Bay Hinterland Undulating Farmland Mosaic* (Area D3) provides a memorable rural setting and approach to Hervey Bay

- Visually sensitive ridgeline within *Hervey Bay Hinterland Undulating Farmland Mosaic* (Area D3) which generally comprises an unbuilt skyline and offers memorable views to the north and south of coastal and rural landscapes, respectively. The ridgeline also provides a scenic backdrop to coastal townships (e.g. Hervey Bay and River Heads) and a distinct visual separation between urban areas along the coastline and surrounding natural and rural hinterland areas and is vulnerable to any form of built development including residential development (that would be attracted to the proximity to Hervey Bay and the potential for panoramic views), and further linear infrastructure.

Key issues / forces for change

- New development and urban extensions encroaching the ridgeline and disrupting the scenic backdrop to coastal and rural townships (e.g. Hervey Bay, River Heads, Tiaro)
- Continued and piecemeal development on the urban edge, changing the rural setting and approach to coastal and rural settlements e.g. Tiaro, Hervey Bay and River Heads
- Conversion or loss of farmland to urban development (including rural residential) and small scale hobby farms, changing the pattern of settlement and strong rural character

Strategy to manage change

- The evolving Regional Strategy and associated land use management decisions need to recognise high quality agricultural land and protect it from irreversible damage (further detailed agricultural studies may be required to determine valuable rural land in this landscape type)
- The evolving Regional Strategy needs to recognise the significance of agriculture in sustainable land use planning (e.g. locally food production and supply chains), its role in the Region's rural economy, as well as the role of land, soil and vegetation management in carbon sequestration
- Opportunity for FCRC to develop policy and guidance in the evolving Regional Strategy which emphasises the scenic value of the *Undulating Farmland Mosaic* landscape, including the gently rolling pastures and cane fields, which provide a scenic backdrop and rural approach to coastal and rural townships. To validate the safeguarding of this landscape from adverse change (i.e. conversion of large-scale properties to small hobby farms, rural residential, urban residential and/or other urban development such as superstores), the recreational and ecological values, may need to be highlighted. Specific tools such as urban breaks and similar greenspace policies (e.g. green corridors, networks, and wedges) can make an important contribution to these landscape character objectives through maintaining the identity and setting of towns, and contributing to the quality of life in and around settlements.
- Through policy, promote and encourage farmers to develop and implement a suitable Farm Management System or similar scheme that supports environmental stewardship and best land management practices, to ensure sustainable farming practices, and improve natural resource management and environmental outcomes.

4.3.5 TYPE E: ALLUVIAL PASTURES AND CANE FIELDS

4.3.5.1 Description of the landscape resource

Location and boundaries

This landscape type is located on broad low lying slightly undulating alluvial plains surrounding Maryborough; primarily comprising cane fields and grazing pastures associated with the Mary River and its tributaries, most notably Tinana Creek.

Key characteristics

- Varied geology; consisting of alluvium and ferruginous duricrust in core lower lying area associated with cane fields and the Elliott formation in more undulating periphery areas near Tinana Creek
- Soils dominated by Kandosols, comprising alluvial sands or loams associated with the Mary River and its tributaries
- The elevation of the landscape ranges between 1m-40m AHD, resulting in a mostly flat, low lying terrain
- Rich, fertile arable farmland and pastures
- Strong geometric landscape patterning defined by medium to large scale intensive arable farmland, mostly sugar cane, evoking a strong rural character

- Occasional areas of cattle grazed pastures (e.g. north of Poona National Park) and blocks of remnant vegetation (e.g. Granville Conservation Park)
- Cane fields provide a unique and defining setting to Maryborough; including memorable views from the town centre to surrounding cane fields e.g. views from Brologa Theatre to cane fields at Granville
- Rich townscape of Maryborough, comprising valued mature trees and an exemplary collection of 19th and early 20th century Queenslander style houses
- Settlement pattern surrounding Maryborough consists of rural residential properties, hobby farms, and small-medium scale farming properties with farm houses
- Classic Queenslander style houses protruding above canefields and/or nestled amongst remnant hoop pines are a memorable feature in this landscape
- Due to the low-lying nature of the landscape and tall sugar cane, views are generally limited to within the landscape, with occasional skyline views to surrounding mountains to the west e.g. Mount Bauple

Character Area E1: Maryborough Alluvial Pastures and Cane Fields



This character area is defined by the low-lying, mostly flat alluvial pasture and sugar cane fields to the north, east and south of Maryborough along the Mary River and Tinana Creek. It is the only Character Area of this Landscape Type falling within the Region and, therefore, all of the type descriptions above apply.

4.3.5.2 Evaluation of the landscape resource

Key landscape and visual sensitivities

- The rich low-lying fertile arable farmland and pastures evoke a strong rural character that provide a memorable rural setting and approach to Maryborough and which are vulnerable to any modification that could affect the integrity of the heritage city in its landscape setting.
- Remnant vegetation (e.g. Granville Conservation Park and along watercourses)
- Rich townscape of Maryborough, comprising valued mature trees and profound collection of 19th and early 20th century Queenslander style houses with a scale and heritage value that could be vulnerable to unsympathetic architectural or urban design elements

Key issues / forces for change

- Residential development which does not respond to Maryborough's unique character (i.e. pattern/urban structure, built form, planting character) and which may erode the town's unique visible farmland setting (i.e. conversion or loss of cane fields to urban development)
- Loss of mature street trees as a result of new developments, road upgrades and services upgrades or through natural mortality
- Continued and piecemeal development on the urban edge, including new residential communities and 'big box' commercial changing the rural setting and approach to Maryborough
- Conversion or loss of farmland to urban development (including rural residential) and small scale hobby farms, changing the pattern of settlement and strong rural character

Strategy to manage change

- The evolving Regional Strategy and associated land use management decisions need to recognise high quality agricultural land and protect it from irreversible damage (further detailed agricultural studies may be required to determine valuable rural land in this landscape)

- The evolving Regional Strategy needs to recognise the significance of agriculture in sustainable land use planning (e.g. locally food production and supply chains), their role in the Region's rural economy, as well as the role of land, soil and vegetation management in carbon sequestration
- Opportunity for FCRC to develop policy and guidance in the evolving Regional Strategy which emphasises the scenic value of the *Alluvial Pastures and Cane Fields* landscape, including the rich low-lying fertile arable farmland and pastures, which provide a scenic backdrop and rural approach to Maryborough. The agricultural, recreational and ecological values may also need to be highlighted to assist in validating the safeguarding of important parts of this landscape from adverse change (i.e. conversion of large-scale properties to small hobby farms, rural residential, urban residential and/or other urban development such as superstores). Specific tools such as urban breaks and similar greenspace policies (e.g. green corridors, networks, and wedges) could also make an important contribution to these landscape character objectives through maintaining the identity and setting of towns, and contributing to the quality of life in and around settlements.
- Through policy, promote and encourage farmers to develop and implement a suitable Farm Management System or similar scheme that supports environmental stewardship and best land management practices, to ensure sustainable farming practices, and improve natural resource management and environmental outcomes.
- Mapping of important streetscape trees, supported by policy that presumes the retention of trees of certain species above a certain size (to be determined) and encouragement of succession planting on both public and private properties. This may include requirements for offset planting where tree loss is unavoidable.
- Preparation of preferred species lists which relate to different areas/precincts within Maryborough e.g. key riverside areas, character suburbs, new suburban areas. These lists may assist developers and Council officers in designing and planning landscape strategies which respond to the existing character and sense of place.

4.3.6 TYPE F: ESTUARIES AND COASTAL FORESHORES WITH WALLUM

4.3.6.1 Description of the landscape resource

Location and boundaries

This landscape type is characterised by a largely flat, low-lying linear landscape located alongside the coastline, which contains a mosaic of sensitive natural habitats (i.e. wallum, mud flats, salt marshes, mangroves, estuaries, coastal creeks/rivers) and coastal townships, most notably, Hervey Bay.

Key characteristics

- Quaternary Coastal Dune geology with areas of estuarine and delta deposits, with coal measures and ferruginous duricrust further away from coastal areas
- Mixed soils; generally poor podosols with some kandosols around Hervey Bay, and sodosols around Toogoom
- Largely flat, low-lying landscape, generally between 1-10m AHD and strongly influenced by proximity to the coast, which is the key defining feature
- The eastern boundary of this landscape type is not abrupt; rather it's character blends and slowly transitions into the *Ocean Passage* landscape type, sharing similar shoreline vegetation communities
- Contains a diversity of coastal habitats including mud flats, salt marshes, mangrove lined coastal creeks/rivers and estuaries, and extensive areas of lowland banksia wallum, melaleuca woodlands and swamps (often acidic soils); evoking a strong sense of naturalness
- Coastal salt marshes occur in upper tidal zone of estuaries and mangrove systems between wet and dry land, comprising communities of salt-tolerant vegetation (e.g. grasses, herbs, reeds, sedges and shrubs such as *Banksia* spp, *Callitris columellaris*, *Acacia* spp)
- Contains several protected areas including Burrum Coast National Park, northern parts of Vernon State Forest, O'Regan Creek Conservation Park, Poona National Park, Granville Conservation Park, eastern parts of Tuan State Forest and the shoreline features of Great Sandy Conservation Park
- Contain tracts of rural land, including cane fields and cattle-grazed pastures, that provide a setting and/or breaks in the urban fabric e.g. between Hervey Bay and Dundowran

- String of coastal settlements including Tinnanbar, Poona, Maaroom, River Heads, Hervey Bay, Dundowran, Toogoom and Burrum Heads. The villages adjoining the Great Sandy Strait retain a sense of remoteness and many of these settlements retain a character that denotes their origins as 'fishing villages'
- Vegetation along the foreshore often provides a buffer zone, protecting coastal properties from the effects of foreshore erosion, strong winds and storm surges
- Strong sense of place provided by locally endemic vegetation (e.g. banksia forest and melaleuca swamp) and coastal views, particularly views over the Great Sandy Strait to Fraser Island
- Notable expansion of low density, homogenous residential development at River Heads, Toogoom, Hervey Bay, Dundowran and Burrum Heads

Character Area F1: Tinnanbar to Maaroom estuaries and coastal foreshores with wallum



This character area follows the coastline between Tinnanbar and Maaroom and comprises extensive flat low-lying areas of wallum adjacent to Tuan State Forest. Access to the area is limited to the Maryborough-Tuan Forest Road, with minor roads linking to coastal townships of Tinnanbar, Poona and Maaroom. Limited access combined with little development/settlement contribute to a strong sense of remoteness and tranquillity in this area. There are memorable scenic views across the Great Sandy Strait towards Fraser Island from the foreshore of Tinnanbar, Poona and Maaroom.

Character Area F2: Maaroom to River Heads estuaries and coastal foreshores with wallum



This character area follows the coastline between Maaroom and River Heads. The landscape consists of extensive flat low-lying areas of wallum (including Poona National Park) and a distinctive pattern of mangroves, sand banks, and mud islands associated with the mouth of the Mary River, where it enters the Great Sandy Strait. Maaroom is a small fishing village on the waterfront with memorable views to Fraser Island and the surrounding wallum, saltmarsh, mudflat and mangrove habitats. River Heads is a primary departure point for vehicles to Fraser Island and has memorable easterly views of the Island and Great Sandy Strait and southerly views the Mary and Susan River estuaries. The vegetated ridgeline along River Heads Road and the extensive flat low-lying coastal habitats near the Mary River mouth (e.g. Kangaroo, Crab and Turkey Islands) are key natural features.

Character Area F3: River Heads to Burrum Heads estuaries and coastal foreshores with wallum



This character area follows the coastline between River Heads and Burrum Heads, at the foothills of the Hervey Bay to River Heads ridgeline. The area comprises extensive flat low-lying areas of wallum north-west of Hervey Bay, which provides a memorable break between the coastal townships of Hervey Bay, Dundowran, Toogoom and Burrum Heads. The headland at Point Vernon, with its folded sedimentary rock strata, interrupts views along long sweeping beaches and tidal flats. There is notable expansion of low density, homogenous residential development at River Heads, Toogoom, Hervey Bay, Dundowran and Burrum Heads. Marine areas and associated tidal wetlands of Hervey Bay, and adjacent beaches support and harbour a diversity of marine life, which are seasonally visible from the foreshore (e.g. humpback whales, dolphins). There are memorable scenic views across the Great Sandy Strait from the foreshore and surrounding more elevated areas of River Heads and Hervey Bay, as well as intermittent views through remnant coastal vegetation at Dundowran, Toogoom and Burrum Heads. Key areas of conservation include Vernon State Forest, O'Regan Conservation Park, Vernon Conservation Park, Duggan Conservation Park and the Arkarra Lagoons at Dundowran.

4.3.6.2 Evaluation of the landscape resource

Key landscape and visual sensitivities

- Diversity of coastal habitats including mud flats, salt marshes, mangrove lined coastal creeks/rivers and estuaries, and extensive areas of lowland banksia wallum, melaleuca woodlands and swamps (often acidic soils); evoking a strong sense of naturalness that would be vulnerable to intrusion by any man-made features
- Sensitive ridgeline extending between River Heads (along River Heads Road), Hervey Bay, Dundowran and beyond Toogoom (encompassing Vernon State Forest); which generally comprises an unbuilt skyline and provides visual separation between urban areas along the coastline and surrounding natural and rural hinterland areas
- Visually sensitive ridgeline within *River Heads to Burrum Heads estuaries and coastal foreshores with wallum* (Area F3) which generally comprises an unbuilt skyline and offers memorable views to the north and south of coastal and rural landscapes, respectively. The ridgeline also provides a scenic backdrop to coastal townships (particularly Hervey Bay and River Heads) and a distinct visual separation between urban areas along the coastline and surrounding natural and rural hinterland areas
- Notable tracts of green space, including significant blocks of remnant vegetation, which permeate Hervey Bay and may be vulnerable to change in management or loss (e.g. wide vegetated road reserves and large tracts of Melaleuca woodland along Doolong South Road at Wondunna, Hervey Bay)
- Generally well-vegetated shoreline, with development well set back from the foreshore and mostly below or in line with the tree line that would be vulnerable to vegetation loss or encroachment e.g. wide vegetated foreshore at Torquay esplanade

Key issues / forces for change

- Highly evident pressure for continued and piecemeal development on the urban edge (particularly at Hervey Bay, Dundowran, and on the outskirts of Toogoom and Burrum Heads); particularly low density residential developments which unless carefully designed, erode the character (townscape and landscape) and setting of towns and villages
- New residential developments whose urban structure (i.e. positioning of key pieces of the urban environment around which all future development will be organised e.g. diverse range of residential opportunities, provision of community facilities and services, street layout), built form and landscape treatments (e.g. fencing, boundary design, selection of tree species) have little response to the site character, development pattern and landscape context e.g. at Point Vernon, River Heads, Pialba-Burrum Heads Road and Toogoom
- Conversion and loss of open space and greenspace; particularly conversion of remnant vegetation and rural land to urban development, which may eventually merge settlements such as Hervey Bay and Dundowran (including a DA approved 50 hectare master planned community proposed along Pialba Burrum Heads Road; consisting of all types of accommodation including retirement villages, residential housing, gated communities, town houses and medium density units, plus ancillary facilities such as neighbourhood shopping, child care & indoor recreation).
- Loss of sensitive green space (including significant blocks of remnant vegetation) to urban development (including the growing industrial precinct near Hervey Bay Airport and residential expansion at Wondunna, Hervey Bay; and the associated infringement of remnant vegetation, including large tracts of Melaleuca woodland and Littoral Vine Forest)

- Continued growth of the tourism industry particularly in Hervey Bay with pressure for waterfront developments, such as hotels and restaurants, which seek vegetation clearance along the coastal strip in order to gain sea views. Such developments may also seek to impose standard international landscaping concepts (e.g. palms) in favour of more evolved design responses to local character.
- Increased use of beach access tracks due to the increasing urban population and visitor numbers which may result in dune erosion and instability, as well as the loss of distinctive native vegetation
- Drainage pipes/culverts on the beach have been noted as a threat to the coastline's scenic amenity/aesthetics
- Change of forest management within State Forests e.g. further conversion of native forest to managed hardwood (pine) plantations
- Change in management and/or land use in forested areas not covered by National Park or State Forest designations (e.g. potential for private landowners to manage these forests for timber and other uses/values) resulting in a change in landscape character; although management plans must be submitted before undertaking such operations to ensure sustainable land management

Strategy to manage change

- Future planning for development along the foreshore will need to address climate change; mitigation and adaptation measures should be pursued, including the ability of development to withstand the predicted long term impacts of climate change such as sea level rise and extreme weather events
- New development should promote consolidation and separation of urban areas, thus minimising adverse impact on this landscape and its diverse habitats and associated strong sense of place and naturalness
- Opportunity for FCRC to develop policy and guidance in the evolving Regional Strategy which emphasises the scenic value of the *Estuaries and coastal foreshores with wallum* landscape and prioritise the further conservation of particular tracts of vegetation in order to conserve and enhance landscape character (particular the sense of naturalness and sense of place), biodiversity and ecological links. This will also assist in raising the awareness of the Region's diverse and distinct landscapes, and ensure sensitive parts of the *Estuaries and coastal foreshores with wallum* landscape (e.g. network of creeks/streams, wetlands, estuaries, remnant areas of forest) are managed into the future. To validate the safeguarding of important parts of this landscape from adverse change (i.e. clearing of native forest area), the ecological and potential recreational value (where appropriate), would need to be highlighted. Specific tools such as urban breaks and similar greenspace policies (e.g. green corridors, networks, and wedges) can make an important contribution to these landscape character objectives through maintaining the identity and setting of towns, and contributing to the quality of life in and around settlements. The Hervey Bay ridgeline is an important feature in this respect and requires particular consideration in the planning process (this is discussed further in the section on urban breaks).
- Preparation of preferred species lists which relate to different areas/precincts within the Region e.g. key centres, foreshore areas, character suburbs, suburban areas. These lists may assist developers and Council officers in designing and planning landscape strategies which respond to the existing character and sense of place

4.3.7 TYPE G: BROAD RIVER VALLEY

Location and boundaries

This landscape type is defined by the broad lower river valleys and adjacent floodplain of the Burrum and Mary rivers. The sources of both rivers begin in elevated forested landscapes at Lenthalls Dam and Pine Mountain, respectively, and widen into broad U-shaped valleys upon reaching the Region's flat low-lying landscapes. The rivers meander in a northerly direction, before discharging into Great Sandy Strait, and are defining features of the Fraser Coast Region.

Key characteristics

- Broad meandering U-shaped river corridors defined by the Mary and Burrum Rivers; which empty into Great Sandy Strait near Burrum Heads and River Heads, respectively. The mouth of the Susan River is also falls in this landscape type where it joins the Mary River, including a wide tract of mangrove vegetation.
- Generally steep valley sides, stabilised by remnant vegetation, which straighten out to level alluvial plains; affording land to be cultivated very close to the river, often resulting in a narrow riparian zone
- River valleys fringed by mangrove vegetation in intertidal areas; particularly at the river mouths

- Mary River meanders in wide bends through the rich, fertile arable farmland and pastures associated with the *Alluvial Pastures and Cane Fields*, to the east and south of Maryborough
- Burrum River meanders in a northerly direction through the *Undulating Forested Lowlands* between Torbanlea and Howard, before discharging into the Great Sandy Strait at Burrum Heads
- Trees along river corridor contribute to a strong sense of visual continuity and provide a 'natural edge' to adjacent farmed landscapes
- Generally comprise a strong sense of tranquillity with a high level of naturalness, forming an important feature in the scenic amenity of the wider landscape
- The Mary River provides a defining feature and historic setting to the city of Maryborough; where an inland port (for immigration and exporting wool, cotton, timber, sugar and gold) and wharfs established in the late nineteenth century; later evolving as a key historic tourism and recreational precinct

Character Area G1: Lower Mary Broad River Valley



This character area follows the valley of the Mary River, between Munna Creek and the Great Sandy Strait. The river flows in a north-easterly direction through a mixed landscape of *Undulating Farmland Mosaic* west of Pine Mountain, and flat arable farmland and grazing pastures between Tiaro and Great Sandy Strait. Major tributaries of the Mary River include Tinana Creek, Munna Creek and the Susan River. Crossing points are limited to Bauple-Woolooga Road, Tiaro (Mungar Road Bridge) and Maryborough (Bruce Highway, Gympie Road and Tiger Street). Urban development and rural uses (e.g. cane fields and grazing pastures) occur in close proximity to the river corridor (including flood prone areas in Maryborough), however the riparian vegetation is generally intact, albeit very narrow in places (e.g. in and around Maryborough). There are a small number of parks adjoining the river e.g. Petrie Park in Tiaro and Queens Park and Pioneer Country Park in Maryborough. Residential properties have frequently been positioned on the valley edge where they obtain extensive views of the Mary. However, the combination of few fording points across the river and limited public access to and views of the river due to private properties and cane fields occurring right up to its edge, give it an elusive character that at times belies its importance as a focal feature for the region.

Character Area G2: Lower Burrum Broad River Valley



This character area follows the valley of the Burrum River, between Torbanlea and Howard, before emptying into the Great Sandy Strait at Burrum Heads. The river flows in a northerly direction through the *Undulating Forested Lowlands*. Crossing points are limited to the Old Bruce Highway and the Bruce Highway near Burrum. The riparian zone is generally intact, providing a natural character.

4.3.7.1 Evaluation of the landscape resource

Key landscape and visual sensitivities

- Sensitive riparian zone vegetation
- Built development along the Mary River generally currently doesn't impinge the riparian zone treeline which retains a verdant setting for the river which would be vulnerable to intrusion

- Natural, unbuilt character associated with the Burrum River valley

Key issues / forces for change

- Change in management and/or land use in waterway buffer zones (e.g. potential for private landowners to manage these riparian areas differently) resulting in a change in landscape character
- Positive forces arising from conservation prioritisation and responses to flood issues that may suggest creating more generous natural buffers to the river corridor
- Potential desire for greater public access to River for recreation (walking, boating etc.)

Strategy to manage change

- Opportunity for FCRC to develop policy and guidance in the evolving Regional Strategy which emphasises the scenic value of the *Broad River Valley* landscape and prioritise river buffer zone management in order to conserve and enhance landscape character (particularly the sense of naturalness), biodiversity and ecological links e.g. through rehabilitation projects (weed management, regeneration of native species and stabilisation works). This will also assist in raising the awareness of the Region's diverse and distinct landscapes, and ensure the *Broad River Valley* landscape is managed into the future. To validate the safeguarding of important parts of this landscape from adverse change (i.e. clearing of native forest area), the ecological and potential recreational value (where appropriate), would need to be highlighted.
- Through policy, promote and encourage farmers to develop and implement a suitable Farm Management System or similar scheme that supports environmental stewardship and best land management practices, to ensure sustainable farming practices, and improve natural resource management and environmental outcomes e.g. managed stock access to the buffer zone
- Opportunity to promote additional recreation and parklands adjacent to the river or in overlooking landscape types.

4.3.8 TYPE H: COASTAL DUNES AND BEACHES

4.3.8.1 Description of the landscape resource

Location and boundaries

This landscape type is defined by Fraser Island; a 122km long and 5-25km wide sand island, claimed to be the largest sand island in the world⁶. The most southern point of Fraser Island is Hook Point; 500m north of the mainland (Inskip Point; a primary access point to the Island). The most Northern point is Sandy Cape, a remote stretch of beach where the lighthouse is located.

Key characteristics

- A landscape of long beaches, dramatic coloured-sand cliffs, natural sandblows, rocky headlands, freshwater lakes and streams, and distinctive communities of native forest, saltmarsh and wallum
- Comprises ancient sand dunes derived from granites, sandstones and metamorphic rocks in river catchments to the south and from the seafloor
- Landform varies from sea-level to 240m AHD
- Notable features are the sandblows (created whenever the local vegetation disappears due to human or natural causes) and the freshwater lakes, generally formed in low elevation dune depressions that intersect the Island's regional water table
- Fraser Island National Park was inscribed on the World Heritage List in 1992; the boundary of the Park is 500m below high water mark to include important areas of beaches, wetlands and mangroves, and part of the extensive seagrass beds in the Great Sandy Strait
- Diverse communities of vegetation; including closed forest (including rain forest and tall eucalypt forest dominated by Satinay and Brushwood), Blackbutt forest, Scribbly Gum and wallum banksia communities, communities of wet sites often dominated by *Melaleuca* species, *Callitris* forest and woodlands, mangroves and saltmarsh; evoking a strong sense of naturalness

⁶ [Former] Department of the Arts, Sport, the Environment, Tourism and Territories (1997) *Nomination of Fraser Island and the Great Sandy Region by the Government of Australia for inclusion in the World Heritage List*. URL: <http://www.fraserisland.au.com/news/other/07.htm>, accessed 19/04/10.

- Rainforest is characterised by upper strata species such as Piccabeen Palm (*Archontophoenix cunninghamiana*), Hoop Pine (*Araucaria cunninghamii*), Kauri Pine (*Agathis robusta*) and Lemon Scented Myrtle (*Backhousia myrtifolia*)
- Tall eucalypt forests, dominated by stands of Blackbutt (*Eucalyptus pilularis*), occur mainly on the high dunes adjoining the rain forests
- Low sclerophyll forest, behind the foredunes stretching back to the taller eucalypt forest, is dominated by Scribbly Gum (*Eucalyptus signata*)
- Several towns, settlements and resorts, as well as camping areas, forestry camps, roads, jetties, and airstrips lie within Fraser Island e.g. Eurong, Happy Valley, Orchid Beach
- 'Day-trippers' to the island are generally limited to southern parts of the Island (i.e. south of Indian Head and in close proximity to Kingfisher bay), due to limited access to and from the island (i.e. ferry to Kingfisher Bay, Wanggoolba Creek and Hook Point)
- Relics of the Island past uses for timber logging and milling (particular Satinay and Kauri trees), which took place between approximately 1863 and 1991, is evident near Central Station (originally a forestry township) in the now-redundant railway tracks and roads
- A major landmark of Fraser Island is the shipwreck of the *S.S. Maheno*, a Scottish luxury liner which was being towed in 1935 from Melbourne to Japan for scrap metal when it was caught in a strong cyclone, drifted ashore and was beached on Fraser Island; later serving as target bombing practice for the RAAF during World War II.
- Described by Matthew Flinders in 1797 as a "low woody island"

Character Area H1: Fraser Island coastal sands and beaches



This character area is defined by Fraser Island. It is the only Character Area of this Landscape Type falling within the Region and, therefore, all of the type descriptions above apply.

4.3.8.2 Evaluation of the landscape resource

Key landscape and visual sensitivities

- Unique geomorphology and diverse collection of habitats, evoking a strong sense of naturalness and tranquillity
- Limited settlement and access, evoking a strong sense of remoteness

Key issues / forces for change

- Ensuring sustainable settlement patterns, access and recreational use of the island and its resources
- Already the subject to a great number of ecology and biodiversity studies and afforded significant protection due to its status as a World Heritage Area and National Park that should serve as a positive force for change for land management that benefits biodiversity and associated landscape objectives

Strategy to manage change

- As a World Heritage Area and National Park, Fraser Island is protected and managed under the *Great Sandy Region Management Plan 1994-2010* and the proposed *State Coastal Management Plan*, which promote sustainable management of its natural and cultural resources and provide policy on sustainable settlement pattern and design. These will be the main authorities for managing change and no additional protection is considered to be required through the Fraser Coast Regional Council Land Use Strategy.

4.3.9 TYPE I: OCEAN PASSAGE

4.3.9.1 Description of the landscape resource

Location and boundaries

This landscape is defined by a narrow shallow protected waterway separating Fraser Island from the mainland. The north entrance of the strait into Hervey Bay is 10.5 km wide; its southern end at Inskip Point is only a kilometre across. Fraser Island provides shelter to the strait's large system of bays and channels, which are relatively deep (15-25 metres).

Key characteristics

- This landscape has been largely defined by the boundaries (at high tide, approx 1m AHD) of the mainland (Landscape Type F) and Fraser Island (Landscape Type H) an offshore barrier island located close enough to the mainland to sufficiently block the flow of a substantial river system (Mary River); forming a double-ended estuary and ocean passage (one of the few passage landscapes in Australia)
- This boundary of this landscape type is not abrupt; rather it's character blends and slowly transitions into the *Estuaries and Coastal Foreshores with Wallum* landscape type, sharing similar shoreline vegetation communities
- Consists of a sand estuary passage with a diversity of marine and coastal habitats
- Key habitats include seagrass beds, mangrove-lined shores, sandy and muddy intertidal flats, saltmarshes, freshwater swamps, protected beaches and a maze of tidal creeks and islands
- Large horizontal tide movements because of the relatively flat shoreline
- Low water is one kilometre offshore in some areas
- Recognised by the Convention on Wetlands of International Importance and was declared a Ramsar site in 1999; managed by the *Great Sandy Region Management Plan* (a statutory management plan and zoning plan)
- The marine areas, tidal wetlands and adjacent beaches support and harbour a diversity of marine life, including humpback whales, dugong, dolphins, turtles and migratory wading birds
- "Go slow" marine vessel zones identified to protect turtles and dugongs from boat strike, especially in critical feeding and resting areas
- Its extent, diversity of marine habitats, isolation and relative freedom from disturbance evokes a strong sense of naturalness and tranquillity
- Long uninterrupted sweeps of ocean beach and tidal flats, generally with an unbuilt foreshore skyline are memorable features

Character Area I1: Great Sandy Strait ocean passage



This character area is defined by Great Sandy Strait. It is the only Character Area of this Landscape Type falling within the Region and, therefore, all of the type descriptions above apply.

4.3.9.2 Evaluation of the landscape resource

Key landscape and visual sensitivities

- The strong sense of naturalness and tranquillity
- Long uninterrupted sweeps of ocean beach and tidal flats, generally with an unbuilt foreshore skyline

Key issues / forces for change

- A steady increase in population and residential development in adjacent coastal areas places extra pressure on the natural and cultural resources and the unique scenic and recreation values of Great Sandy Strait

Strategy to manage change

- As a World Heritage Area, The Great Sandy Strait is protected and managed under the *Great Sandy Region Management Plan 1994-2010* and the proposed *State Coastal Management Plan*, which promote sustainable management of its natural and cultural resources and provide policy on sustainable settlement pattern and design. It is not considered that additional protection is required for this zone through the Fraser Coast Land Use Strategy project.



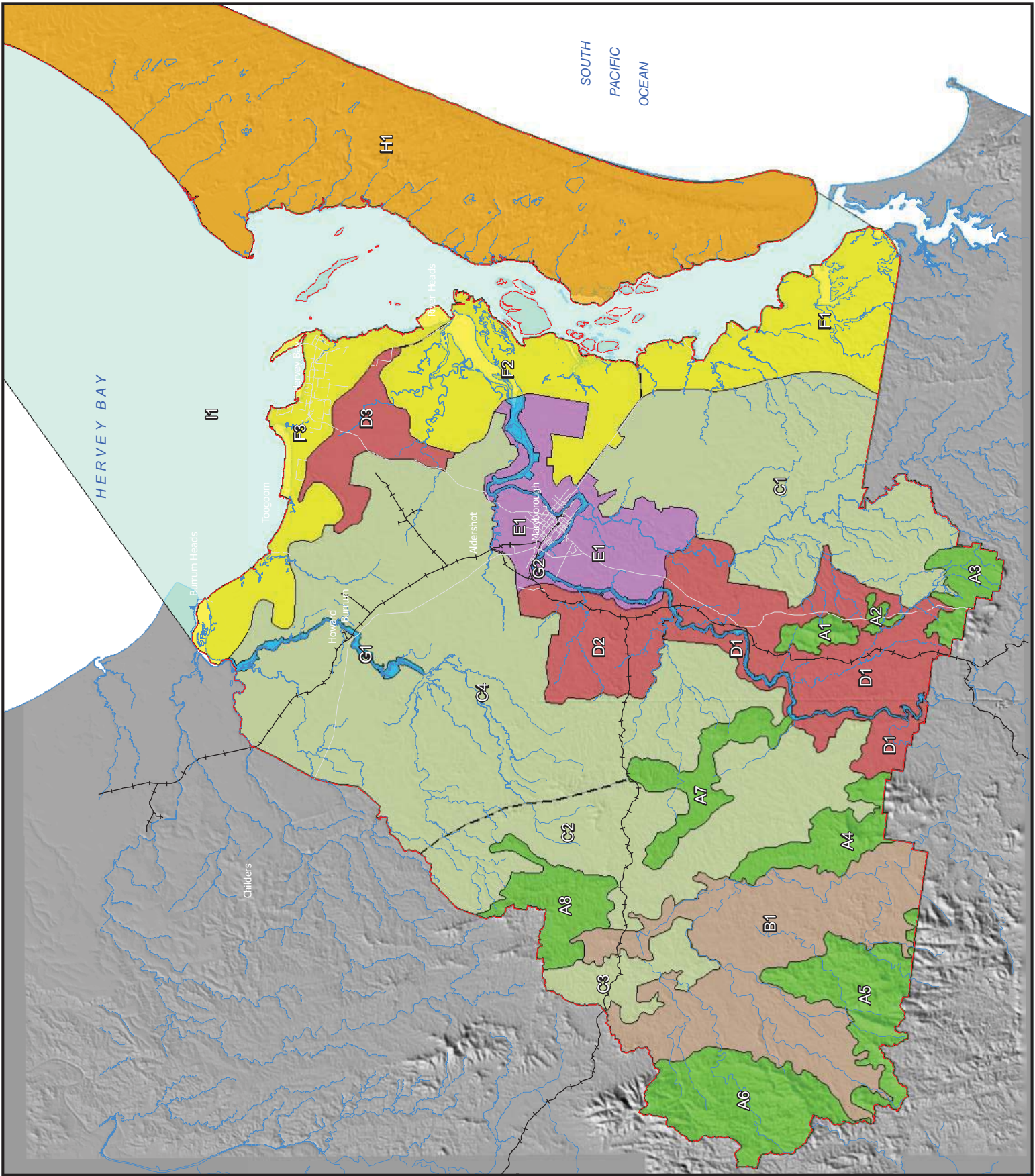
DATUM GDA 1994, PROJECTION MGA ZONE 56
 0 5 10 20
 Kilometres
 1:400,000 (when printed at A3)

- LEGEND**
- ▬ Fraser Coast Region Boundary
 - Landscape Types**
 - A - FORESTED PEAKS AND HILLS
 - B - RURAL TRIBUTARY VALLEYS AND HILLS
 - C - UNDLIATING FORESTED LOWLANDS
 - D - UNDLIATING PASTURES AND CANE FIELDS
 - E - ALLUVIAL PASTURES AND CANE FIELDS
 - F - ESTUARIES AND COASTAL FORESHORES WITH WALLUM
 - G - BROAD RIVER VALLEY
 - H - COASTAL DUNES AND BEACHES
 - I - OCEAN PASSAGE

**FIGURE 4
 LANDSCAPE CHARACTER TYPES
 AND AREAS**

Fraser Coast Regional Council
 Land Use Strategy

Figure
F4



Forest Wind LVIA

Appendix B – Viewpoint Analysis

Table B1: Viewpoint Locations

| Vp No | Location | Easting | Northing | Elevation (approx) | Distance (km) | Bearing (approx) to site | Local Planning Authority | Landscape Character Type | Landscape Designations | Recreational and Transport Routes | Visual receptors |
|-------|--------------------------------------------|---------|----------|--------------------|---------------|--------------------------|-------------------------------|-----------------------------------------------------|------------------------|-----------------------------------|----------------------------------------|
| 1 | Tin Can Bay Road near Wallu | 0490435 | 7129050 | 79m AOD | 3.8 | W | Gympie Regional Council | LCT C: Undulating Forested Lowlands | None | State Controlled road | Motorists |
| 2 | Eckert Road, Boonooroo | 0488680 | 7160569 | 7m AOD | 4.6 | W | Fraser Coast Regional Council | LCT F: Estuaries and Coastal Foreshores with Wallum | None | Local road | Residents, Motorists |
| 3 | Poona Boat Ramp | 0491335 | 7155015 | 3m AOD | 6.6 | W | Fraser Coast Regional Council | LCT F: Estuaries and Coastal Foreshores with Wallum | None | None/ public car park | Recreational users/ walkers, Fishermen |
| 4 | Anderleigh Road, Neerdie | 0471750 | 7122410 | 107m AOD | 11.6 | NE | Gympie Regional Council | LCT D: Undulating Farmland Mosaic | None | Local road | Motorists |
| 5 | Norway Street, Maryborough | 0470949 | 7173731 | 8m AOD | 11.8 | SE | Fraser Coast Regional Council | LCT E: Alluvial Pastures and Cane Fields | None | Local road | Residents, Motorists |
| 6 | Cooloola Cove Shops, Queen Elizabeth Drive | 0498683 | 7127655 | 13m AOD | 12.0 | NW | Gympie Regional Council | LCT F: Estuaries and Coastal Foreshores with Wallum | None | Local road | Residents, Shoppers, Motorists |
| 7 | Bruce Highway by Eight Mile Road | 0463832 | 7164835 | 42m AOD | 12.5 | SE | Fraser Coast Regional Council | LCT E: Alluvial Pastures and Cane Fields | None | State Controlled road | Motorists |
| 8 | Bruce Highway near Mount Bauple | 0459741 | 7145569 | 94m AOD | 14.5 | E | Fraser Coast Regional Council | LCT D: Undulating Farmland Mosaic | None | State Controlled road | Motorists |

| Vp No | Location | Easting | Northing | Elevation (approx) | Distance (km) | Bearing (approx) to site | Local Planning Authority | Landscape Character Type | Landscape Designations | Recreational and Transport Routes | Visual receptors |
|-------|------------------------------------------|---------|----------|--------------------|---------------|--------------------------|-------------------------------|-----------------------------------------------------|------------------------|-----------------------------------|----------------------------------------------------|
| 9 | Tin Can Bay – Snapper Creek Boat Harbour | 0501374 | 7135216 | 1m AOD | 15.5 | W | Gympie Regional Council | LCT F: Estuaries and Coastal Foreshores with Wallum | None | None/ public car park | Tourists, Recreational users, Fishermen, Motorists |
| 10 | Arborten Road, Glenwood | 0460685 | 7131950 | 87m AOD | 15.8 | NE | Fraser Coast Regional Council | LCT A: Forested Peaks and Hills | None | Local road | Residents, Motorists |
| 11 | 75 Mile Beach, Fraser Island | 0507481 | 7146937 | 0m AOD | 21.3 | W | Fraser Coast Regional Council | LCT H: Coastal Dunes and Beaches | None | None | Tourists, Recreational users, Motorists |
| 12 | River Heads Shopping Village | 0491662 | 7188226 | 23m AOD | 23.2 | SW | Fraser Coast Regional Council | LCT F: Estuaries and Coastal Foreshores with Wallum | None | Local road | Tourists, Shoppers, Residents |
| 13 | Carlo Sand Blow | 0509681 | 7133795 | 105m AOD | 23.4 | NW | Gympie Regional Council | LCT H: Coastal Dunes and Beaches | None | Long Distance Route | Tourists, Walkers/ recreational users |

Prediction Methodology

1. The following viewpoint analysis has identified the visual receptor sensitivity and landscape sensitivity at each viewpoint location and combined these with the predicted magnitude of change in the view in order to determine the overall impact and whether or not this would be a significant change in the view for each visual receptor type and landscape character unit at each location.
2. In accordance with GLVIA3, the sensitivity of each visual receptor group at each location is a function of the susceptibility of visual receptors to change at that location and the value attached to these views.
3. All visual receptors are people and are assumed to be equally sensitive to change. However, the location and activities of visual receptors influence the way in which they currently experience the landscape and views, the extent to which views of the surrounding landscape may contribute to their existing visual amenity, the value they place on these views and their susceptibility to changes in these views. Accordingly, at any one location there may be different levels of sensitivity for the different receptor groups, the sensitivity may vary depending on the direction of the view, and any one receptor group may be accorded different levels of sensitivity at different locations.
4. Receptor susceptibility levels of very susceptible, susceptible, moderate susceptibility, slight susceptibility and negligible susceptibility are used taking into account the following factors:
 - Receptor location, occupation or activity,
 - Movement of receptor and duration and frequency of view experienced,
 - Focus of attention and interest.
5. The judgement of value is based on a five point scale – National value, County/Borough/District value, Community value, private value, unvalued. The value attached to a location or to a particular view at a location can influence the purpose and expectation of receptors at the location and the judgement of value takes into account:
 - Recognised value – for example by the presence of planning designations or designated heritage assets,
 - Indicators of value – to individuals, communities and society generally, such as the popularity of a location.
6. Accordingly, visual receptor sensitivity is determined in terms of the sensitivity of each location for each receptor type (rather than the sensitivity of the receptors *per se*), using a five point relative scale – high, high/medium, medium, medium/low and low.
7. In accordance with GLVIA3, the sensitivity of each landscape unit is judged on the basis of its value and its susceptibility to change arising from the specific type, scale and location of development proposed.
8. The susceptibility to change of a landscape unit is based on a five point scale (very susceptible, susceptible, moderate susceptibility, slight susceptibility and negligible susceptibility) and depends on:
 - The key characteristics of the landscape, and the clarity and robustness of these characteristics,
 - Nature of views (visual enclosure/openness of views and extent to which views contribute to landscape character),
 - Landscape planning policies and strategies for the landscape unit,
 - The nature of the changes to landscape character and views that could be brought about by the type, scale and location of the proposed development and the compatibility of these with the above factors.
9. The same five point value scale is used for landscape units as for visual receptors. Judgements on landscape value are based on those given in published landscape character assessments (where given) and/or checked in the field from fieldwork observations.

10. Accordingly, the assessment of landscape sensitivity for each landscape unit is derived from the judgement of value and combined with the judgement of susceptibility to give a level of landscape sensitivity as part of a five point scale – high, high/medium, medium, medium/low or low sensitivity.
11. The magnitude of the change in the views and in landscape character from the thirteen viewpoints has been assessed using a five point scale – very substantial, substantial, moderate, slight and negligible and also the intermediate categories of very substantial/substantial, substantial/moderate, moderate/slight and slight/negligible. This magnitude of change scale is a relative scale and is not an absolute scale. It is based on the assessor’s interpretation of largely quantifiable parameters, including:
- Distance and direction of the viewpoint from the development.
 - Extent of the development visible from the viewpoint.
 - Field of view occupied by the development (horizontal and vertical angles of view) and proportion of view (as a percentage of the panorama).
 - Context of the view and degree of contrast with the existing landscape and built elements (background, form, composition, pattern, scale and mass, line, movement, colour, texture, etc).
 - Scale of change with respect to the loss or addition of features in the view. For the addition of built form, this includes the relative scale of the development and whether the development would be overwhelming, overbearing, dominant, prominent, visible, noticeable, discernible or barely discernible.
 - Duration and nature of the effect, eg direct/ indirect, secondary, cumulative, temporary/ permanent, short term/ long term, intermittent/ continuous, reversible/ irreversible, etc (as related to the nature of the development).
12. The sensitivity and magnitude of change have then been combined as per the matrix in **Table B2** below. Overall effects of major/moderate and above are considered significant and are shaded dark grey in **Table B2** below. Overall effects of moderate+ may be significant if experienced over a sustained length of a route or over most of a zone, area or location, and overall effects of moderate may contribute to significance if combined with greater changes at the same general location, whereas moderate/minor+ or lower changes are unlikely to result in significant changes to views or landscape character.

Table B2 – Assessment of Overall Impact and Significance

| LOCATION SENSITIVITY | MAGNITUDE OF CHANGE | | | | | | | | |
|----------------------|---------------------|------------|-----------|-----------|-----------|-------------|-----------|-------------|-----------|
| | V sub | V sub/ sub | Sub | Sub/ mod | Mod | Mod/ slight | Slight | Slight/ neg | Neg |
| High | Major++ | Major+ | Major | Maj/ mod+ | Maj/ mod | Mod+ | Mod | Mod/ min+ | Mod/ min |
| High/ medium | Major+ | Major | Maj/ mod+ | Maj/ mod | Mod+ | Mod | Mod/ min+ | Mod/ min | Minor+ |
| Medium | Major | Maj/ mod+ | Maj/ mod | Mod+ | Mod | Mod/ min+ | Mod/ min | Minor+ | Minor |
| Medium/ low | Maj/ mod+ | Maj/ mod | Mod+ | Mod | Mod/ min+ | Mod/ min | Minor+ | Minor | Min/ neg+ |
| Low | Maj/ mod | Mod+ | Mod | Mod/ min+ | Mod/ min | Minor+ | Minor | Minor/ neg+ | Min/ neg |

13. Significant effects on landscape character may be beneficial or adverse:

- Significant beneficial effects on landscape character - are likely to occur where the proposed development would materially enhance the quality (condition) of the landscape, would

complement the existing character and/or where particularly valued characteristics, previously lost or degraded, would be reinstated.

- Significant adverse effects on landscape character - are likely to occur where the proposed development would become a key characteristics of the landscape, would contrast with the existing character, and/or where existing key characteristics would be permanently (or long-term temporarily) lost or changed and cannot be adequately mitigated.
14. The polarisation of public opinion on renewable energy developments is such that significant effects on views can be considered beneficial by some observers and adverse by others. Accordingly, in order to consider a worst case scenario, it is recommended that the predicted effects on views are considered to be adverse.

Viewpoint Analysis

15. The findings of the viewpoint analysis are provided in **Table B3** below. This analysis was undertaken in the field in January 2017 using computer-generated wireframe views of the proposed development. It is illustrated by the images in **Figure PO9-13 Viewpoints 1 to 13** which were photographed in January 2017, showing the existing and predicted views in the direction of the proposed development from each of these locations. In these figures, photographs illustrate the existing views from each viewpoint (as at January 2017) and photomontages and/or computer-generated wireframes illustrate the predicted views including the proposed development. These viewpoint illustrations should be printed at A1 (length) size and guidance is contained on each viewpoint as to the appropriate viewing distances or principal distance in order for the scale of the elements in the images to approximately match those in the field when viewed from these viewpoint locations.
16. It is important to note that the wireframe and photomontage images have been produced with the full turbine rotor sweep facing towards the viewpoint so as to illustrate the worst case view of the wind farm. However, the wind does not come from just one direction, but changes direction regularly, although in this area on average it comes predominantly from a southeasterly direction. Detailed data has been gathered on wind flow and wind direction in the area, which has been compiled into a 'wind rose' diagram indicated on some of the viewpoint images. The wind rose shows in a proportional format the directions in which the wind travels locally, with the predominant direction being from the southeast. This tell us that at many times of the day/month/year the turbine rotor sweeps will be facing a certain direction in order to capture this wind. This is known as the prevailing wind direction and the full rotor sweep would be facing towards the oncoming wind at these times, so facing towards the southeast, as shown on the wind rose diagram on the prevailing wind photomontages. Therefore, whilst the main photomontages are intended to illustrate the worst case visibility of the proposed wind farm, the prevailing wind photomontages are intended to illustrate the typical visibility of the wind farm when the wind is coming from a southeasterly direction. Nevertheless, the impact assessment has been carried out on the worst case visibility of the wind farm, although please bear in mind that the typical visibility of the wind farm is expected to be different from a number of viewpoints and this has been illustrated by the prevailing wind photomontages.
17. Also included on the photomontages is a pie chart showing local visibility data. The viewpoint photographs were captured during clear, bright and dry weather so as to illustrate the potential wind farm visibility during good weather conditions. However, weather is variable and plays a direct role in our ability to see across the landscape over distances. The pie charts associated with each viewpoint use visibility data that has been obtained for the wind farm site area from MACC (Monitoring Atmospheric Composition and Climate) European Climate Model covering the period from 2015 to 2018 with a temporal resolution of 3hrs. The data has been analysed by Cleansight Pty Ltd for each viewpoint and the pie charts each show the proportion of time in an annual period when due to visibility:
- **Night:** Annual average darkness hours based on civil twilight data from Geoscience Australia (<http://www.ga.gov.au/bin/geodesy/run/sunrisenset>),

- **Visible:** the whole wind farm is potentially visible, topography and vegetative screening notwithstanding, meaning all wind turbines are within the visibility distance range from the viewpoint,
 - **Partially Visible:** only part of the wind farm is visible, meaning the visibility is less than the distance between the furthest wind turbine and the viewpoint but one or more of the turbines are within the visibility distance range,
 - **Not Visible:** meaning the visibility is less than the distance between the viewpoint and the nearest wind turbine.
18. This data has then been extrapolated to form a pie chart for each viewpoint. However, it is important to reiterate that in some cases, despite the information on the pie chart, the proposed wind farm would be entirely screened from a viewpoint by topography and/or vegetation.
19. As a further point of reiteration, the viewpoint analysis set out below has assumed excellent weather conditions, and has been undertaken on the assumption of the wind turbine rotor sweeps facing towards the viewpoints.

Table B3: Viewpoint Analysis – Effects of the Forest Wind application

| Vp 1: Tin Can Bay Road near Wallu | | | | | |
|-----------------------------------------------------|------------------------------------------------|---------------------------|------------------------------|-----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Distance to Forest Wind | NGR | Elevation (approx) | Landscape designation | Recreational area or route | Existing View |
| 3.8km | 0490435 7129050 | 79m AOD | None | State Controlled road | Located adjacent to the junction of Tin Can Bay Road and Maryborough Cooloola Road, close to the settlement of Wallu. The viewpoint looks northwest across nearby forestry within Tuan State Forest. |
| Wind Farms/turbines Visible | | | | | |
| Wind Developments | Distance (km) | Direction from Vp | Turbines visible | Proposed development array angle | Observations |
| Forest Wind | 3.8 | NW-SW | None | -- | The Forest Wind turbines would be entirely screened from view by the mature and dense forestry in the intervening landscape. |
| Assessment of Effects on Landscape Character | | | | | |
| LCT | Value Susceptibility | Sensitivity | Magnitude | Individual effects | Assessment |
| LCT F: Estuaries and Coastal Foreshores with Wallum | District/ Regional/ Local Susceptible | High/ medium | None | No effect | A landscape of regional/district and local value that could be susceptible with a high/medium sensitivity to the type, scale and location of development proposed. The Forest Wind turbines would be entirely screened from view by intervening features. This indicates no effect on landscape character at this viewpoint. |
| Assessment of Effects on Views | | | | | |
| Receptor | Value Susceptibility | Sensitivity | Magnitude | Individual effects | Assessment |

| | | | | | |
|------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|--------|------|-----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Motorists | Community Moderate susceptibility | Medium | None | No effect | A public road with community value, along which receptors would be moving steadily to swiftly, could use the route frequently, with views generally contained by surrounding forestry, and so would be moderately susceptible and with a medium sensitivity to changes in the view. The Forest Wind turbines would be entirely screened from view by intervening features. This indicates no effect on visual amenity at this viewpoint. |
| Additional Information | | | | | |
| Visibility data: (proportion of time) Night – 46.21% Visible – 21.07% Partially visible – 32.72% Not visible – 0% | | | | | |

| Vp 2: Eckert Road, Boonooroo | | | | | |
|-----------------------------------------------------|-----------------------------|---------------------------|------------------------------|-----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Distance to Forest Wind | NGR | Elevation (approx) | Landscape designation | Recreational area or route | Existing View |
| 4.6km | 0488680 7160569 | 7mAOD | None | Local road | Located on one of the main routes into and through Boonooroo, looking southwest through housing and development on Eckert Road. Boonooroo Bowls Club is adjacent to the viewpoint. |
| Wind Farms/turbines Visible | | | | | |
| Wind Developments | Distance (km) | Direction from Vp | Turbines visible | Array angle (Approx) | Observations |
| Forest Wind | 4.6 | NW-SW | Up to 65 (various) | 70° visible | The visible Forest Wind turbines would be seen as a mixture of almost complete structures, rotor sweeps and upper blades, with the majority of turbines entirely screened by existing built form and vegetation. |
| Assessment of Effects on Landscape Character | | | | | |
| LCT | Value Susceptibility | Sensitivity | Magnitude | Individual effects | Assessment |

| LCT F: Estuaries and Coastal Foreshores with Wallum | District/Regional/Local Susceptible | High/medium | Substantial adverse | Major/moderate+ adverse | A landscape of regional/district and local value that could be susceptible with a high/medium sensitivity to the type, scale and location of development proposed. Parts of the proposed development would become a key characteristic, would compete with the existing landscape characteristics and would be a prominent additional feature for the duration of the operational life, resulting in a substantial adverse magnitude of change and a major/moderate+ adverse effect on landscape character at this location. This indicates that these predicted effects would be significant on landscape character at this location. |
|-----------------------------------------------------|--------------------------------------|-------------|---------------------|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Assessment of Effects on Views | | | | | |
| Receptor | Value Susceptibility | Sensitivity | Magnitude | Individual effects | Assessment |
| Residents | Private view Very susceptible | High | Substantial | Major | A private residential view, which receptors may gain from parts of their property, depending on orientation, including views from windows and garden areas. Views in other directions would also be available. High sensitivity to changes in the view. Some of the Forest Wind turbines would be visible to the southwest backgrounded by sky in the middle distance landscape where rotor movement would be discernible. Those turbines visible in the middle distance would be a mixture of almost complete turbines, rotor sweeps and some upper blades, resulting in a substantial magnitude of change and a major effect on the visual amenity of residents. This indicates that these predicted effects would be significant for these residential receptors. This is discussed in more detail later within the main assessment. |
| Motorists | Community Moderate susceptibility | Medium | Substantial | Major/moderate | A public road with community value, along which receptors would be moving slowly to steadily, could use the route frequently, with views generally contained by surrounding built form and vegetation, and so would be moderately susceptible and with a medium sensitivity to changes in the view. Some parts of the proposed development would be seen in the middle distance and to the side of the direction of travel along the road as a mixture of complete turbines, rotor sweeps and some upper blades, backgrounded by sky, resulting in a substantial magnitude of change and a major/moderate effect on the visual amenity of motorists and their passengers. This indicates that these predicted effects would be significant for these receptors. This is discussed in more detail later within the main assessment. |
| Additional Information | | | | | |

Visibility data: (proportion of time)

Night – 46.21% Visible – 25.63% Partially visible – 28.16% Not visible – 0%

Prevailing wind direction – from this viewpoint the prevailing wind photomontage illustrates the typical visibility of the wind farm when the wind is coming from a southeasterly direction.

| Vp 3: Poona Boat Ramp | | | | | |
|-----------------------------------------------------|-----------------------------|---------------------------|------------------------------|-----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Distance to Forest Wind | NGR | Elevation (approx) | Landscape designation | Recreational area or route | Existing View |
| 6.6km | 0491335 7155015 | 3mAOD | None | Public car park | Located on a boat ramp within a public car park and close to local walking routes and picnic facilities. The view looks southwest as part of wide and panoramic views across Great Sandy Strait and also towards Fraser Island to the southeast and east. |
| Wind Farms/turbines Visible | | | | | |
| Wind Developments | Distance (km) | Direction from Vp | Turbines visible | Array angle (approx.) | Observations |
| Forest Wind | 6.6 | W | Up to 35 (various) | 50° visible | The Forest Wind turbines would mainly be screened from view by intervening vegetation and built form. However, three almost complete turbines, the hubs of seven turbines and the tips of up to a further 25 blades are expected to be visible from this location above intervening vegetation to the southwest. |
| Assessment of Effects on Landscape Character | | | | | |
| LCT | Value Susceptibility | Sensitivity | Magnitude | Individual effects | Assessment |

| LCT F: Estuaries and Coastal Foreshores with Wallum | District/ Regional/ Local Susceptible | High/ medium | Substantial/ moderate adverse | Major/ moderate adverse | A landscape of regional/district and local value that could be susceptible with a high/medium sensitivity to the type, scale and location of development proposed. Parts of the proposed development would become a key characteristic of the landscape, would contrast with the existing landscape context, and would be prominent/ clearly visible features for the duration of the operational life of the development, resulting in a substantial/ moderate adverse magnitude of change and a major/ moderate adverse effect on landscape character at this location. This indicates a significant effect on landscape character at this viewpoint. |
|-----------------------------------------------------|---------------------------------------|--------------------|-------------------------------|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Assessment of Effects on Views | | | | | |
| Receptor | Value Susceptibility | Sensitivity | Magnitude | Individual effects | Assessment |
| Recreational users/ walkers | Community Susceptible | High/ medium | Substantial/ moderate | Major/ moderate | A public area with community value, around and along which receptors would be moving slowly, could use the area frequently, with views in most directions, but generally panoramic to the east and south, and so would be susceptible and with a high/medium sensitivity to changes in the view. The proposed development would be visible only in part, seen in the middle distance as a mixture of a few complete turbines, but mainly as hubs and tips, all seen back grounded by sky with blade movement visible. The majority of the wind farm would be entirely screened by intervening vegetation and built form, with the visible parts of the development occupying a limited proportion of the overall panoramic view, and not the main sections of the panorama, resulting in a substantial/moderate magnitude of change and a major/moderate effect on the visual amenity of recreational users of the area, including local walkers. This indicates that these predicted effects would be significant for these receptors. This is discussed in more detail later within the main assessment. |

| | | | | | |
|-----------|-----------------------------------------|--------|--------------------------|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Fishermen | Community Moderate susceptibility | Medium | Substantial/ moderate | Moderate+ | A public area with community value, around which receptors would be moving slowly, could use the area frequently, with views in most directions, but generally panoramic to the east and south. Main receptor focus would not be on the view, and so would be moderately susceptible and with a medium sensitivity to changes in the view. The proposed development would be visible only in part, seen in the middle distance as a mixture of some complete turbines, but mainly hubs and tips, all seen back grounded by sky with blade movement visible. The majority of the wind farm would be entirely screened by intervening vegetation and built form, with the visible parts of the development occupying a limited proportion of the overall panoramic view, resulting in a substantial/moderate magnitude of change and a moderate+ effect on the visual amenity of fishermen. This indicates that these predicted effects may be significant if experienced over a greater local area. This is discussed in more detail later within the main assessment. |
|-----------|-----------------------------------------|--------|--------------------------|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Additional Information

Visibility data: (proportion of time)
Night – 46.21% Visible – 31.28% Partially visible – 22.43% Not visible – 0.08%
Prevailing wind direction – from this viewpoint the prevailing wind photomontage illustrates the typical visibility of the wind farm when the wind is coming from a southeasterly direction.

Vp 4: Anderleigh Road, Neerdie

| Distance to Forest Wind | NGR | Elevation (approx) | Landscape designation | Recreational area or route | Existing View |
|-------------------------|--------------------|--------------------|-----------------------|----------------------------|-----------------------------------------------------------------------------------------------------------------------|
| 11.6km | 0471750 7122410 | 107mAOD | None | Local road | Located on a local route into and through Neerdie, looking north through roadside trees and middle distance forestry. |

Wind Farms/turbines Visible

| Wind Developments | Distance (km) | Direction from Vp | Turbines visible | Array angle (approx.) | Observations |
|-------------------|---------------|-------------------|------------------|-----------------------|--------------|
|-------------------|---------------|-------------------|------------------|-----------------------|--------------|

| Forest Wind | 11.6 | NW-NE | None | ---- | The seven visible Forest Wind turbines would be seen as a mixture of blade tips and hubs and upper blades, with the vast majority of the turbines entirely screened by existing built form and vegetation. |
|--------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|----------------|-----------|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Assessment of Effects on Landscape Character | | | | | |
| LCT | Value Susceptibility | Sensitivity | Magnitude | Individual effects | Assessment |
| LCT D: Undulating Farmland Mosaic | Regional/ District and Local Moderate/ slight susceptibility | Medium/ low | None | No effect | A landscape of regional/district and local value that could be moderately/ slightly susceptible with a medium/low sensitivity to the type, scale and location of development proposed. The Forest Wind turbines would be entirely screened from view by intervening features. This indicates no effect on landscape character at this viewpoint. |
| Assessment of Effects on Views | | | | | |
| Receptor | Value Susceptibility | Sensitivity | Magnitude | Individual effects | Assessment |
| Motorists | Community Moderate susceptibility | Medium | None | No effect | A public road with community value, along which receptors would be moving steadily, could use the route frequently, with views generally contained by surrounding vegetation, and so would be moderately susceptible and with a medium sensitivity to changes in the view. The Forest Wind turbines would be entirely screened from view by intervening features. This indicates no effect on visual amenity at this viewpoint |
| Additional Information | | | | | |
| Visibility data: (proportion of time) Night – 46.21% Visible – 15.64% Partially visible – 36.4% Not visible – 1.74% | | | | | |

| Vp 5: Norway Street, Maryborough | | | | | |
|-----------------------------------------------------|--------------------------------------------------------------------|---------------------------|--------------------------------|-----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Distance to Forest Wind | NGR | Elevation (approx) | Landscape designation | Recreational area or route | Existing View |
| 11.8km | 0470949 7173731 | 8mAOD | None | Local road | Located on a local road on the southeastern edge of Maryborough, looking in a southeasterly direction across surrounding farmland. |
| Wind Farms/turbines Visible | | | | | |
| Wind Developments | Distance (km) | Direction from Vp | Turbines visible | Array angle (approx.) | Observations |
| Forest Wind | 11.8 | SE | 8-10 (upper blades & tips) | 20° | Limited parts of the proposed development would be visible above intervening mature vegetation as upper blades and blade tips. |
| Assessment of Effects on Landscape Character | | | | | |
| LCT | Value Susceptibility | Sensitivity | Magnitude | Individual effects | Assessment |
| LCT E: Alluvial Pastures and Cane Fields | Regional/ District and Local Slight susceptibility | Medium/ low | Moderate/ slight adverse | Moderate/ minor adverse | A landscape of regional/district and local value that could have slight susceptibility with a medium/low sensitivity to the type, scale and location of development proposed. Parts of the proposed development would become a characteristic of the landscape, would contrast with the existing landscape context, and would be a noticeable/ discernible feature for the duration of the operational life of the development, resulting in a moderate/slight adverse magnitude of change and a moderate/ minor adverse effect on landscape character at this location. This indicates no significant effect on landscape character at this viewpoint. |
| Assessment of Effects on Views | | | | | |
| Receptor | Value Susceptibility | Sensitivity | Magnitude | Individual effects | Assessment |

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|---------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|--------|---------------------|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Residents | Private view Very susceptible | High | Moderate/ slight | Moderate+ | A private residential view, which receptors may gain from parts of their property, depending on orientation, including views from windows and garden areas. Views in other directions would also be available. High sensitivity to changes in the view. Parts of up to ten of the Forest Wind turbines would be partially visible above intervening vegetation as a mixture of blades and blade tips backgrounded by sky in the middle distance landscape where rotor movement would be discernible. The turbines would occupy a small proportion of the overall view, resulting in a moderate/slight magnitude of change and a moderate+ effect on the visual amenity of residents. This indicates that these predicted effects may be significant if experienced over a greater local area. This is discussed in more detail later within the main assessment. |
| Motorists | Community Moderate susceptibility | Medium | Moderate/ slight | Moderate/ minor+ | A public road with community value, along which receptors would be moving slowly to steadily, could use the route frequently, with views generally open, and so would be moderately susceptible and with a medium sensitivity to changes in the view. Up to ten turbines of the proposed development would be seen in the middle distance and to the side of the direction of travel along the road as a mixture of upper blades and blade tips, backgrounded by sky, resulting in a moderate/ slight magnitude of change and a moderate/ minor+ effect on the visual amenity of motorists and their passengers. This indicates no significant effect on receptors at this viewpoint. |
| Additional Information | | | | | |
| Visibility data: (proportion of time) Night – 46.21% Visible – 13.08% Partially visible – 38.92% Not visible – 1.78% | | | | | |

| Vp 6: Cooloola Cove Shops, Queen Elizabeth Drive | | | | | |
|---------------------------------------------------------|--------------------|---------------------------|------------------------------|-----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Distance to Forest Wind | NGR | Elevation (approx) | Landscape designation | Recreational area or route | Existing View |
| 12.0km | 0498683 7127655 | 13mAOD | None | Local road | Located on Queen Elizabeth Drive looking across the car park towards the northwest. This view represents typical views not only for nearby shoppers but also for local residents. |

| Wind Farms/turbines Visible | | | | | |
|-----------------------------------------------------|---------------------------------------|--------------------------|-------------------------|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Wind Developments | Distance (km) | Direction from Vp | Turbines visible | Array angle | Observations |
| Forest Wind | 12.0 | NW | None | -- | The Forest Wind turbines would be entirely screened from view by the mature and dense vegetation in the intervening landscape. |
| Assessment of Effects on Landscape Character | | | | | |
| LCT | Value Susceptibility | Sensitivity | Magnitude | Individual effects | Assessment |
| LCT F: Estuaries and Coastal Foreshores with Wallum | District/ Regional/ Local Susceptible | High/ medium | None | No effect | A landscape of regional/district and local value that could be susceptible with a high/medium sensitivity to the type, scale and location of development proposed. The Forest Wind turbines would be entirely screened from view by intervening features. This indicates no effect on landscape character at this viewpoint. |
| Assessment of Effects on Views | | | | | |
| Receptor | Value Susceptibility | Sensitivity | Magnitude | Individual effects | Assessment |
| Residents | Private view Very susceptible | High | None | No effect | A private residential view, which receptors may gain from parts of their property, depending on orientation, including views from windows and garden areas. Views in other directions would also be available. High sensitivity to changes in the view. The Forest Wind turbines would be entirely screened from view by intervening features. This indicates no effect on visual amenity at this viewpoint. |
| Shoppers | Community Moderate susceptibility | Medium | None | No effect | A public area with community value, around which receptors would be moving slowly, could use the area frequently, and are likely to spend much of their time indoors for the purposes of shopping (without a view), and so would be moderately susceptible and with a medium sensitivity to changes in the view. The Forest Wind turbines would be entirely screened from view by intervening features. This indicates no effect on visual amenity at this viewpoint. |

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| Motorists | Community Moderate susceptibility | Medium | None | No effect | A public road with community value, along which receptors would be moving swiftly, could use the route frequently, with views generally open, and so would be moderately susceptible and with a medium sensitivity to changes in the view. The Forest Wind turbines would be entirely screened from view by intervening features. This indicates no effect on visual amenity at this viewpoint. |
| Additional Information | | | | | |
| Visibility data: (proportion of time) Night – 46.21% Visible – 17.56% Partially visible – 34.34% Not visible – 1.89% | | | | | |

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|-----------------------------------------------------|-----------------------------|---------------------------|------------------------------|-----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Vp 7: Bruce Highway by Eight Mile Road | | | | | |
| Distance to Forest Wind | NGR | Elevation (approx) | Landscape designation | Recreational area or route | Existing View |
| 12.5km | 0463832 7164835 | 42mAOD | None | State Controlled road | View looking southeast across surrounding farmland from a main traffic route. At the time that the photograph was taken, the cane crop was low enough to allow distant views. However, once the cane crop is more mature, these views are obscured. |
| Wind Farms/turbines Visible | | | | | |
| Wind Developments | Distance (km) | Direction from Vp | Turbines visible | Array angle | Observations |
| Forest Wind | 12.5 | E | Up to 85 (various) | 54° visible | The Forest Wind turbines would be visible to varying degrees due to the screening effects of intervening forestry. Sections of the wind farm to the southeast of the viewpoint would be entirely screened by nearby trees and built form. The majority of the visible turbines would be seen as upper blades and hubs with only some turbine rotor sweeps visible above forestry as part of this wide and open view. |
| Assessment of Effects on Landscape Character | | | | | |
| LCT | Value Susceptibility | Sensitivity | Magnitude | Additional effects | Assessment |

| LCT E: Alluvial Pastures and Cane Fields | Regional/ District and Local Slight susceptibility | Medium/ low | Moderate | Moderate/ minor+ adverse | A landscape of regional/district and local value that could have slight susceptibility with a medium/low sensitivity to the type, scale and location of development proposed. Parts of the proposed development would become a characteristic of the landscape, would contrast with the existing landscape context, and would be a visible feature for the duration of the operational life of the development, resulting in a moderate adverse magnitude of change and a moderate/ minor+ adverse effect on landscape character at this location. This indicates no significant effect on landscape character at this viewpoint. |
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| Assessment of Effects on Views | | | | | |
| Receptor | Value Susceptibility | Sensitivity | Magnitude | Additional effects | Assessment |
| Motorists | Community Moderate susceptibility | Medium/ low | Moderate | Moderate/ minor+ | A public road with community value, along which receptors would be moving swiftly, could use the route frequently, with views generally open, and so would be moderately susceptible and with a medium/ low sensitivity to changes in the view. Parts of the proposed development would be seen in the distance and to the side of the direction of travel along the road as a mixture of rotor sweeps, hubs and upper blades, backgrounded by sky, resulting in a moderate magnitude of change and a moderate/ minor+ effect on the visual amenity of motorists and their passengers. This indicates no significant effect on receptors at this viewpoint. |
| Additional Information | | | | | |
| <p>Visibility data: (proportion of time) Night – 46.21% Visible – 17.24% Partially visible – 34.28% Not visible – 2.27%</p> | | | | | |

| Vp 8: Bruce Highway near Mount Bauple | | | | | |
|-----------------------------------------------------|------------------------------------------------------------------------------|---------------------------|------------------------------|-----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Distance to Forest Wind | NGR | Elevation (approx) | Landscape designation | Recreational area or route | Existing View |
| 14.5km | 0459741 7145569 | 94mAOD | None | State Controlled road | View looking east across surrounding farmland from a main traffic route. This is a panoramic and relatively open view. |
| Wind Farms/turbines Visible | | | | | |
| Wind Developments | Distance (km) | Direction from Vp | Turbines visible | Array angle | Observations |
| Forest Wind | 14.5 | E | Up to 80 (various) | 84° visible (intermittently) | Several of the Forest Wind turbines would be partially visible in the distance above intervening vegetation to the east. The turbines would be discernible mainly as some rotor sweeps, hubs, upper blades and blade tips. |
| Assessment of Effects on Landscape Character | | | | | |
| LCT | Value Susceptibility | Sensitivity | Magnitude | Individual effects | Assessment |
| LCT D: Undulating Farmland Mosaic | Regional/ District and Local Moderate/ slight susceptibility | Medium/ low | Moderate adverse | Moderate/ minor+ adverse | A landscape of regional/district and local value that could be moderately/ slightly susceptible with a medium/low sensitivity to the type, scale and location of development proposed. The proposed development would become a characteristic of the landscape, would contrast with the existing landscape context and the turbines would be seen as visible additional features for the duration of the operational life, resulting in a moderate adverse magnitude of change and a moderate/minor+ adverse effect on landscape character at this location. This indicates no significant effect on landscape character at this viewpoint. |
| Assessment of Effects on Views | | | | | |
| Receptor | Value Susceptibility | Sensitivity | Magnitude | Individual effects | Assessment |

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| Motorists | Community Moderate susceptibility | Medium/ low | Moderate | Moderate/ minor+ | A public road with community value, along which receptors would be moving swiftly, could use the route frequently, with views in most directions, and so would be moderately susceptible and with a medium sensitivity to changes in the view. Parts of the proposed development would be seen in the distance and to the side of the direction of travel along the road mainly as a mixture of hubs, upper blades and tips, backgrounded by sky, resulting in a moderate magnitude of change and a moderate/minor+ effect on the visual amenity of motorists and their passengers. This indicates no significant effect on receptors at this viewpoint. |
| Additional Information | | | | | |
| Visibility data: (proportion of time) Night – 46.21% Visible – 28.58% Partially visible – 21.45% Not visible – 3.75% <i>Prevailing wind direction</i> – from this viewpoint the prevailing wind photomontage illustrates the typical visibility of the wind farm when the wind is coming from a southeasterly direction. | | | | | |

| Vp 9: Tin Can Bay – Snapper Creek Boat Harbour | | | | | |
|-------------------------------------------------------|----------------------|---------------------------|------------------------------|-----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| Distance to Forest Wind | NGR | Elevation (approx) | Landscape designation | Recreational area or route | Existing View |
| 15.5km | 0501374 7135216 | 1mAOD | None | Public car park | Located within the public car park by the boat ramp, looking west and northwest across the Tin Can Inlet. This is an open and wide view. |
| Wind Farms/turbines Visible | | | | | |
| Wind Developments | Distance (km) | Direction from Vp | Turbines visible | Array angle (approx.) | Observations |

| Forest Wind | 15.5 | NW | Up to 35 (various) | 40° visible | Some of the Forest Wind turbines would be visible to varying degrees due to the screening effects of intervening mature vegetation. However, large parts of the wind farm to the northwest of the viewpoint would be entirely screened by nearby trees. The majority of the visible turbines would be seen as complete turbines, rotor sweeps or hubs and upper blades above forestry as part of this wide and open view. |
|-----------------------------------------------------|---------------------------------------|--------------|--------------------|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Assessment of Effects on Landscape Character | | | | | |
| LCT | Value Susceptibility | Sensitivity | Magnitude | Individual effects | Assessment |
| LCT F: Estuaries and Coastal Foreshores with Wallum | District/ Regional/ Local Susceptible | High/ medium | Moderate adverse | Moderate+ adverse | A landscape of regional/district and local value that could be susceptible with a high/medium sensitivity to the type, scale and location of development proposed. Parts of the proposed development would become a characteristic of the landscape, would contrast with the existing landscape context and would be seen as a visible additional feature for the duration of the operational life of the development, resulting in a moderate adverse magnitude of change and a moderate+ adverse effect on landscape character at this location. This indicates no significant effect on landscape character at this viewpoint, although if combined with greater changes in the same general area, a significant effect may occur. This is discussed in more detail later within the assessment. |
| Assessment of Effects on Views | | | | | |
| Receptor | Value Susceptibility | Sensitivity | Magnitude | Individual effects | Assessment |

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| Recreational users | Community Susceptible | High/medium | Moderate | Moderate+ | <p>A public area with community value, around and along which receptors would be moving slowly, could use the area frequently, with views in most directions, but generally open and panoramic to the north and west, and so would be susceptible and with a high/medium sensitivity to changes in the view. The proposed development would be visible in part, seen in the distance as a mixture of complete turbines, rotor sweeps and blade tips, all seen above vegetation, backgrounded mainly by sky with blade movement discernible. The majority of the wind farm would be entirely screened by intervening vegetation, with the visible parts of the development occupying a limited proportion of the overall view, and usually seen in the context of foreground vertical elements such as boat masts, resulting in a moderate magnitude of change and a moderate+ effect on the visual amenity of recreational users of the area. This indicates no significant effect on receptors at this viewpoint, although if combined with greater changes in the same general area, a significant effect may occur. This is discussed in more detail later within the assessment.</p> |
| Tourists | Community Very susceptible | High | Moderate | Major/moderate | <p>A public area with community value, around which receptors would be moving slowly, could use the area frequently, with views in most directions, but generally open and panoramic to the north and west. One of the main receptor focuses would be on the view, and so would be very susceptible and with a high sensitivity to changes in the view. The proposed development would be visible in part, seen in the distance as a mixture of complete turbines, rotor sweeps and blade tips, seen above vegetation and backgrounded mainly by sky with blade movement discernible. The majority of the wind farm would be entirely screened by intervening vegetation, with the visible parts of the development occupying a limited proportion of the overall view, and usually seen in the context of foreground vertical elements such as boat masts, resulting in a moderate magnitude of change and a major/moderate effect on the visual amenity of tourists to the area. This indicates that these predicted effects would be significant. This is discussed in more detail later within the main assessment.</p> |

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| Fishermen | Community Moderate susceptibility | Medium | Moderate | Moderate | A public area with community value, around which receptors would be moving slowly, could use the area frequently, with views in most directions, but generally panoramic to the north and west. Main receptor focus would not be on the view, and so would be moderately susceptible and with a medium sensitivity to changes in the view. The proposed development would be visible in part, seen in the distance as a mixture of complete turbines, rotor sweeps and blade tips, seen above vegetation and backgrounded mainly by sky with blade movement discernible. The majority of the wind farm would be entirely screened by intervening vegetation, with the visible parts of the development occupying a limited proportion of the overall view, and usually seen in the context of foreground vertical elements such as boat masts, resulting in a moderate magnitude of change and a moderate effect on the visual amenity of fishermen. This indicates no significant effect on receptors at this viewpoint, although if combined with greater changes in the same general area, a significant effect may occur. This is discussed in more detail later within the assessment. |
| Motorists | Community Moderate susceptibility | Medium | Moderate | Moderate | A public car park with community value, around which receptors would be moving slowly, could use the area frequently, with views generally open, and so would be moderately susceptible and with a medium sensitivity to changes in the view. The proposed development would be visible in part, seen in the distance as a mixture of complete turbines, rotor sweeps and blade tips, seen above vegetation and backgrounded mainly by sky with blade movement discernible. The majority of the wind farm would be entirely screened by intervening vegetation, with the visible parts of the development occupying a limited proportion of the overall view, and usually seen in the context of foreground vertical elements such as boat masts, resulting in a moderate magnitude of change and a moderate effect on the visual amenity of motorists and their passengers. This indicates no significant effect on receptors at this viewpoint, although if combined with greater changes in the same general area, a significant effect may occur. This is discussed in more detail later within the assessment. |
| Additional Information | | | | | |
| <p>Visibility data: (proportion of time) Night – 46.21% Visible – 22.47% Partially visible – 26.74% Not visible – 4.58% <i>Prevailing wind direction</i> – from this viewpoint the prevailing wind photomontage illustrates the typical visibility of the wind farm when the wind is coming from a southeasterly direction.</p> | | | | | |

| Vp 10: Arborten Road, Glenwood | | | | | |
|-----------------------------------------------------|----------------------------------------------------------------|---------------------------|------------------------------|-----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Distance to Forest Wind | NGR | Elevation (approx) | Landscape designation | Recreational area or route | Existing View |
| 15.8km | 0460685 7131950 | 87mAOD | None | Local road | Located on one of the main local routes into Glenwood and situated at one of the highest and most open points within Glenwood, looking east across the surrounding landscape. |
| Wind Farms/turbines Visible | | | | | |
| Wind Developments | Distance (km) | Direction from Vp | Turbines visible | Proposed development array angle | Observations |
| Forest Wind | 15.8 | NW-SW | None | -- | The Forest Wind turbines would be entirely screened from view by the mature and dense vegetation in the intervening landscape. |
| Assessment of Effects on Landscape Character | | | | | |
| LCT | Value Susceptibility | Sensitivity | Magnitude | Individual effects | Assessment |
| LCT A: Forested Peaks and Hills | District/ Regional/ Local Moderate susceptibility | Medium | None | No effect | A landscape of regional/district and local value that could be susceptible with a high/medium sensitivity to the type, scale and location of development proposed. The Forest Wind turbines would be entirely screened from view by intervening features. This indicates no effect on landscape character at this viewpoint. |
| Assessment of Effects on Views | | | | | |
| Receptor | Value Susceptibility | Sensitivity | Magnitude | Individual effects | Assessment |

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| Residents | Private view Very susceptible | High | None | No effect | A private residential view, which receptors may gain from parts of their property, depending on orientation and elevation, including views from windows and garden areas. Views in other directions would also be available. High sensitivity to changes in the view. The Forest Wind turbines would be entirely screened from view by intervening features. This indicates no effect on visual amenity at this viewpoint. |
| Motorists | Community Moderate susceptibility | Medium | None | No effect | A public road with community value, along which receptors would be moving slowly to steadily, could use the route frequently, with views generally contained by surrounding vegetation, and so would be moderately susceptible and with a medium sensitivity to changes in the view. The Forest Wind turbines would be entirely screened from view by intervening features. This indicates no effect on visual amenity at this viewpoint. |
| Additional Information | | | | | |
| Visibility data: (proportion of time) Night – 46.21% Visible – 19.88% Partially visible – 29.02% Not visible – 4.88% | | | | | |

| Vp 11: 75 Mile Beach, Fraser Island | | | | | |
|--------------------------------------------|----------------------|---------------------------|------------------------------|-----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Distance to Forest Wind | NGR | Elevation (approx) | Landscape designation | Recreational area or route | Existing View |
| 21.3km | 0507481 7146937 | 0mAOD | None | Informal transport route | Located on an area of beach headland near Semaphore Creek and Hook Point which gives access to a ferry link to Inskip Point. The area is accessible by 4 wheel drive vehicles and on foot although there is no road access. This location is one of the main access points off Fraser Island and has panoramic views across Wide Bay and east across the sea. |
| Wind Farms/turbines Visible | | | | | |
| Wind Developments | Distance (km) | Direction from Vp | Turbines visible | Array angle (approx.) | Observations |

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|-------------|------|----|--------------------|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Forest Wind | 21.3 | SW | Up to 95 (various) | 40° visible | The Forest Wind proposal would be partially visible from this location. Several of the turbines would be entirely screened by the landform and wallum on Fraser Island itself, with parts of several other turbines also screened by intervening vegetation in the view. However, several of the Forest Wind turbines would be visible in the distance as a mixture of complete structures, rotor sweeps, hubs or blade tips within the southwestern section of this wide and panoramic view. |
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Assessment of Effects on Landscape Character

| LCT | Value Susceptibility | Sensitivity | Magnitude | Individual effects | Assessment |
|----------------------------------|------------------------------------------------|-----------------|--------------------------------|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| LCT H: Coastal Dunes and Beaches | Regional/ District and Local Susceptible | High/ medium | Moderate/ slight adverse | Moderate adverse | A landscape of regional/district and local value that could be susceptible with a high/medium sensitivity to the type, scale and location of development proposed. The proposed development would become a characteristic of the landscape and would contrast with the existing landscape context and would be seen as a noticeable additional feature for the duration of the operational life of the development, resulting in a moderate/ slight adverse magnitude of change and a moderate adverse effect on landscape character at this location. This indicates no significant effect on landscape character at this viewpoint, although if combined with greater changes in the same general area, a significant effect may occur. This is discussed in more detail later within the assessment. |

Assessment of Effects on Views

| Receptor | Value Susceptibility | Sensitivity | Magnitude | Individual effects | Assessment |
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|-------------------------------|-----------------------------------------|-----------------|---------------------|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Tourists | Community Very susceptible | High | Moderate/ slight | Moderate+ | A public area with community value, around which receptors would be moving slowly, could use the area frequently, with views in most directions, but generally open and panoramic. One of the main receptor focuses would be on the view, and so would be very susceptible and with a high sensitivity to changes in the view. The proposed development would be partially visible, seen in the distance as a mixture of complete turbines, rotor sweeps, hubs and blade tips seen above vegetation and backgrounded by sky with blade movement discernible, occupying a limited proportion of the overall view, resulting in a moderate/ slight magnitude of change and a moderate+ effect on the visual amenity of tourists to the area. This indicates that these predicted effects may be significant if experienced over a greater local area. This is discussed in more detail later within the main assessment. |
| Recreational users | Community Susceptible | High/ medium | Moderate/ slight | Moderate | A public area with community value, around and along which receptors would be moving slowly, could use the area frequently, with views in most directions, but generally open and panoramic, and so would be susceptible and with a high/medium sensitivity to changes in the view. The proposed development would be partially visible, seen in the distance as a mixture of complete turbines, rotor sweeps, hubs and blade tips seen above vegetation and backgrounded by sky with blade movement discernible, occupying a limited proportion of the overall view, resulting in a moderate/ slight magnitude of change and a moderate effect on the visual amenity of recreational users of the area. This indicates no significant effect on receptors at this viewpoint, although if combined with greater changes in the same general area, a significant effect may occur. This is discussed in more detail later within the assessment. |
| Motorists | Community Moderate susceptibility | Medium | Moderate/ slight | Moderate/ minor+ | A beach with community value, along which receptors would be moving steadily, could use the area frequently, with views generally open, and so would be moderately susceptible and with a medium sensitivity to changes in the view. The proposed development would be partially visible, seen in the distance as a mixture of complete turbines, rotor sweeps, hubs and blade tips seen above vegetation and backgrounded by sky with blade movement discernible, occupying a limited proportion of the overall view, resulting in a moderate/ slight magnitude of change and a moderate/ minor+ effect on the visual amenity of motorists and their passengers. This indicates no significant effect on receptors at this viewpoint. |
| Additional Information | | | | | |

Visibility data: (proportion of time)

Night – 46.21% Visible – 24.74% Partially visible – 17.73% Not visible – 11.31%

Prevailing wind direction – from this viewpoint the prevailing wind photomontage illustrates the typical visibility of the wind farm when the wind is coming from a southeasterly direction.

| Vp 12: River Heads Shopping Village | | | | | |
|-----------------------------------------------------|-----------------------------|---------------------------|------------------------------|-----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Distance to Forest Wind | NGR | Elevation (approx) | Landscape designation | Recreational area or route | Existing View |
| 23.2km | 0491662 7188226 | 23mAOD | None | Local road | Located on a veranda at the rear of River Heads Shopping Village looking southwest across the Mary River and Great Sandy Strait. |
| Wind Farms/turbines Visible | | | | | |
| Wind Developments | Distance (km) | Direction from Vp | Turbines visible | Array angle (approx.) | Observations |
| Forest Wind | 23.2 | SW | Up to 15 (various) | 7° visible intermittently | The Forest Wind proposal would be only very partially visible from this location, with views filtered through some foreground mature trees. The majority of the turbines would be entirely screened by these trees, with parts of several other turbines also screened by intervening vegetation in the view. However, a few of the Forest Wind turbines would be visible in the distance as upper blades. |
| Assessment of Effects on Landscape Character | | | | | |
| LCT | Value Susceptibility | Sensitivity | Magnitude | Individual effects | Assessment |

| LCT F: Estuaries and Coastal Foreshores with Wallum | District/Regional/Local Susceptible | High/medium | Slight/negligible adverse | Moderate/minor adverse | A landscape of regional/district and local value that could be susceptible with a high/medium sensitivity to the type, scale and location of development proposed. The proposed development would become a characteristic of the landscape and would contrast with the existing landscape context and would be seen as a discernible additional feature for the duration of the operational life of the development, resulting in a slight/negligible adverse magnitude of change and a moderate/minor adverse effect on landscape character at this location. This indicates no significant effect on landscape character at this viewpoint. |
|-----------------------------------------------------|-------------------------------------|-------------|---------------------------|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Assessment of Effects on Views | | | | | |
| Receptor | Value Susceptibility | Sensitivity | Magnitude | Individual effects | Assessment |
| Tourists | Community Very susceptible | High | Slight/negligible | Moderate/minor+ | A public area with community value, around which receptors would be moving slowly, could use the area frequently, with views in several directions, but generally panoramic to the south and west. One of the main receptor focuses would be on the view, and so would be very susceptible and with a high sensitivity to changes in the view. The proposed development would be very partially visible, filtered by foreground trees and seen in the distance as upper blades above vegetation and backgrounded mainly by sky with blade movement discernible in clear weather, occupying a limited proportion of the overall view, resulting in a slight/negligible magnitude of change and a moderate/minor+ effect on the visual amenity of tourists to the location. This indicates no significant effect on receptors at this viewpoint. |
| Shoppers | Community Moderate susceptibility | Medium | Slight/negligible | Minor+ | A public area with community value, around which receptors would be moving slowly, could use the area frequently, and are likely to spend much of their time indoors for the purposes of shopping (without a view), and so would be moderately susceptible and with a medium sensitivity to changes in the view. The proposed development would be very partially visible, filtered by foreground trees and seen in the distance as upper blades above vegetation and backgrounded mainly by sky with blade movement discernible in clear weather, occupying a limited proportion of the overall view, resulting in a slight/negligible magnitude of change and a minor+ effect on the visual amenity of shoppers. This indicates no significant effect on receptors at this viewpoint. |

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| Residents | Private view Very susceptible | High | Slight/ negligible | Moderate/ minor+ | Representative of views from some nearby residential properties, which receptors may gain from parts of their property, depending on orientation, including views from windows and garden areas. Views in other directions would also be available. High sensitivity to changes in the view. The proposed development would be very partially visible, filtered by foreground trees and seen in the distance as upper blades above vegetation and backgrounded mainly by sky with blade movement discernible in clear weather, occupying a limited proportion of the overall view, resulting in a slight/negligible magnitude of change and a moderate/minor+ effect on the visual amenity of residents. This indicates no significant effect on receptors at this viewpoint. |
| Additional Information | | | | | |
| Visibility data: (proportion of time) Night – 46.21% Visible – 6.67% Partially visible – 33.24% Not visible – 13.86% | | | | | |

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|-----------------------------------------------------|----------------------|---------------------------|------------------------------|-----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Vp 13: Carlo Sand Blow | | | | | |
| Distance to Forest Wind | NGR | Elevation (approx) | Landscape designation | Recreational area or route | Existing View |
| 23.4km | 0509681 7133795 | 105mAOD | None | Long Distance Footpath | Located on Cooloola Great Walk looking west as part of open and panoramic views from this tourist location. Attractive and panoramic coastal views across Rainbow Beach to Double Island Point are also available to the east from this location. |
| Wind Farms/turbines Visible | | | | | |
| Wind Developments | Distance (km) | Direction from Vp | Turbines visible | Array angle (approx.) | Observations |
| Forest Wind | 23.4 | NW | Up to 226 (various) | 70° | The Forest Wind proposal would be visible in the distance from this location. Several of the turbine bases would be partially screened by intervening forestry, with a mixture of complete structures, rotor sweeps, hubs and upper blades visible in the distance to the northwest as part of this wide and panoramic view. |
| Assessment of Effects on Landscape Character | | | | | |

| LCT | Value Susceptibility | Sensitivity | Magnitude | Individual effects | Assessment |
|---------------------------------------|------------------------------------------------|-----------------|--------------------------------|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| LCT H: Coastal Dunes and Beaches | Regional/ District and Local Susceptible | High/ medium | Moderate/ slight adverse | Moderate adverse | A landscape of regional/district and local value that could be susceptible with a high/medium sensitivity to the type, scale and location of development proposed. The proposed development would become a characteristic of the landscape and would contrast with the existing landscape context and would be seen as a visible additional feature for the duration of the operational life of the development, resulting in a moderate/slight adverse magnitude of change and a moderate adverse effect on landscape character at this location. This indicates no significant effect on landscape character at this viewpoint, although if combined with greater changes in the same general area, a significant effect may occur. This is discussed in more detail later within the assessment. |
| Assessment of Effects on Views | | | | | |
| Receptor | Value Susceptibility | Sensitivity | Magnitude | Individual effects | Assessment |
| Tourists | Community Very susceptible | High | Moderate/ slight | Moderate+ | A public area with community value, around which receptors would be moving slowly, could use the area frequently, with views in most directions, but generally open and panoramic. One of the main receptor focuses would be on the view, and so would be very susceptible and with a high sensitivity to changes in the view. The proposed development would be visible in the distance as a mixture of complete turbines, rotor sweeps, and hubs seen above vegetation and backgrounded mainly by sky with blade movement discernible in clear weather, occupying a limited proportion of the overall view, and with the main view focussed out to the coast to the east, resulting in a moderate/ slight magnitude of change and a moderate+ effect on the visual amenity of tourists to the area. This indicates that these predicted effects may be significant if experienced over a greater local area. This is discussed in more detail later within the main assessment. |

| | | | | | |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|-------------|-----------------|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Recreational users/ walkers | Community Susceptible | High/medium | Moderate/slight | Moderate | <p>A public area and long distance route with community value, around and along which receptors would be moving slowly, could use the area frequently, with views in most directions, but generally open and panoramic, and so would be susceptible and with a high/medium sensitivity to changes in the view. The proposed development would be visible in the distance as a mixture of complete turbines, rotor sweeps, and hubs seen above vegetation and backgrounded mainly by sky with blade movement discernible in clear weather, occupying a limited proportion of the overall view, and with the main view focussed out to the coast to the east, resulting in a moderate/ slight magnitude of change and a moderate effect on the visual amenity of recreational users of the area. This indicates no significant effect on receptors at this viewpoint, although if combined with greater changes in the same general area, a significant effect may occur. This is discussed in more detail later within the assessment.</p> |
| Additional Information | | | | | |
| <p>Visibility data: (proportion of time) Night – 46.21% Visible – 17.12% Partially visible – 22.47% Not visible – 14.21% <i>Prevailing wind direction</i> – from this viewpoint the prevailing wind photomontage illustrates the typical visibility of the wind farm when the wind is coming from a southeasterly direction.</p> | | | | | |

Forest Wind LVIA

Appendix C – Zone of Visual Influence Assessment

ZONE OF VISUAL IMPACT ASSESSMENT



Forest Wind



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| Revision | Date | Description | Author | Approved |
|------------|-------------|------------------------|--------|----------|
| R-003-0.01 | 13 Oct 17 | PRELODGE MENT DRAFT v1 | JP | JP |
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| | | | | |

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1. Introduction

Forest Wind (the “Project”) is a wind farm under development, located in the Wide Bay region of Queensland. CleanSight Pty Ltd (“CleanSight”), as the development service provider of the Project, is undertaking detailed site design processes and preparing to submit a development application to the State of Queensland.

Factors affecting the site design include an array of social, technical, environmental, legal, regulatory, commercial and financial considerations. A particular social and environment aspect considered in detail is the landscape and visual impact that the Project may have in the surrounding area. Therefore, CleanSight has engaged Viento Ltd (“Viento”) to undertake a landscape and visual impact assessment (“LVIA”) in order to feed in into the site design process and ultimately provide a LVIA for the purposes of a development application.

The visibility of Forest Wind is firstly determined by whether a location in the area is accessible, and then by whether the visual receptors are capable of seeing through obstructions caused by terrain, vegetation and the built environment. In order to assess these variables to inform the site design process and Viento’s LVIA, CleanSight has calculated a Zone of Visual Influence (ZVI).

The ZVI considers the turbine bases elevation, turbine tower and blade lengths, accessibility of receptors, the elevation of the receptor and any vegetation communities and their respective heights around the receptor and between the receptor and the turbines, as well as curvature of the earth. The output of the ZVI considers four metrics to consider the visibility and magnitude of impact for receptors.

This paper outlines the data used, the assumptions relating to the data, the calculation methodology applied in determining the Project’s ZVI and finally presents the calculated outputs as a colour coded graphical tool.

2. Data used

The core data sets required to determine a ZVI include terrain elevation, vegetation height and built up environment heights. This section describes the data sets used and the assumptions applied.

2.1 Terrain elevation

Highly accurate Digital Elevation Model (DEM) data, with one (1) meter vertical accuracy, has been used to determine the terrain elevation within the boundaries of the Fraser Coast and Gympie Regional Council’s area. This data set was obtained from the State of Queensland’s Light, Detection And Ranging (LiDAR) DEM data set, using:

- 2010 Fraser Coast Project LiDAR DEMs¹
- 2010 Gympie Project LiDAR DEMS

¹ Based on or contains data provided by the State of Queensland (Department of Natural Resources and Mines) [2016]. In consideration of the State permitting use off this data you acknowledge and agree that the State gives no warranty in relation to the data (including accuracy, reliability, completeness, currency or suitability) and accepts no liability (including without limitation liability in negligence) for any loss, damage or costs (including consequential damage) relating to any use of the data. Data must not be used for direct marketing or be used in breach of the privacy laws.

These two data sets had a vertical and horizontal accuracy of 1m, with the horizontal resolution resampled to 10m.

For areas further afield, outside of Fraser Coast and Gympie Regional Councils, Queensland Government's [QSpatial's catalogue 5m vertical resolution](#) data was used with resampling to 25m horizontal resolution across all terrain data.

Digital elevation data applied to the ZVI calculation can be seen in:

- Figure PO9-2 Landform

2.2 Vegetation heights

Based on available data and its practical application, for vegetation mapping purposes, there are five broad vegetation categories and associated mapping products and assumptions used;

- i. pine plantation
- ii. remnant vegetation
- iii. non-remnant vegetation,
- iv. built environment, including
 - a. built up areas
 - b. roads and streets

Pine plantation

Wide Bay hosts Australia's largest exotic pine plantation, in which the Project is located. In this area, vegetation heights will continuously vary as the forestry industry cycles the trees; commencing with a patchwork of pre-planting 0m height, and growing up to around 30m trees at 30 years' age at the time of harvest. All views incorporating the pine plantation will change over the Project's life. Whilst a field of trees may be harvested, the field next door may not, and then this will be the inverse at some point in the 30 years. Therefore, it is broadly assumed 15m tree heights be applied throughout the extent of the forestry area, which represents the average height of a 30m high pine tree over its life.

In terms of forestry tracks, the views will vary over time as trees are harvested, planted, thinned out and mature throughout the trees lifecycle. Given the uncertainty and complexity associated with assessing these variations, plus that enclosing nature of a pine forest, it has been considered not practical to apply nil vegetation height for forestry tracks. Instead, the 15m pine plantation heights outlined above have been applied over the forestry tracks.

Remnant vegetation

Remnant vegetation is accurately mapped across Queensland, in terms of location but also regional ecosystems which include vegetation communities. These regional ecosystems were correlated with technical descriptions providing height data to represent expected obstruction of views to the turbines.

Datasets

This representative height data has been applied in calculating the ZVI based on the following data sets and assumptions.

Queensland Government's QSpatial's catalogue provided the following vegetation mapping data:

- [Vegetation management regional ecosystem and remnant map – version 8](#) (5 Dec 2016)

This data set has fields to identify the detailed description of the full range in structure and floristic composition of regional ecosystems (e.g. 12.3.5) and their component vegetation communities (e.g. 12.3.5a). The descriptions are compiled using site survey data from the Queensland Herbarium's CORVEG database. With the following description quoted from the metadata from the above link:

“Distribution maps, representative images (if available) and the pre-clearing and remnant area (hectares) of each vegetation community derived from the regional ecosystem mapping (spatial) data are included. The technical descriptions should be used in conjunction with the fields from the regional ecosystem description database (REDD) for a full description of the regional ecosystem. Quantitative site data from relatively undisturbed sites are extracted from CORVEG and summarized to provide information specific to each vegetation community.

Technical descriptions include the attributes: tree canopy height and cover and native plant species composition of the predominant layer, which are used to assess the remnant status of vegetation under the Vegetation Management Act 1999. However, as technical descriptions reflect the full range in structure and floristic composition across the climatic, natural disturbance and geographic range of the regional ecosystem, local reference sites should be used where possible (Neldner et al. 2005 section 3.3.3)”

The [Regional Ecosystem Technical Descriptions](#) outlines a number of strata that may be applied to each description, including

- Emergent (E)
- Canopy (T1)
- Sub-canopy and Low tree layers (T3)
- Shrub (S1)
- Sub-shrub layers (S2)
- Ground (G)

The definitions for each stratum was found at Queensland Government publications; [Glossary for technical descriptions](#) as outlined below:

- **Emergent (E):** In the modified Specht (1970) system, the Queensland Herbarium describes the vegetation by the predominant stratum, which is the stratum that is assessed as contributing the most above-ground biomass. The tallest stratum is regarded as the emergent layer if it does not form the most above-ground biomass, regardless of its canopy cover.
- **Canopy tree layer (T1):** The predominant layer (for example, T1 layer) with the highest biomass.
- **Sub-canopy tree layer (T2):** The sub-canopy layer (for example, T2 layer).
- **Shrub (S1) and Sub-shrub) and Ground (G):** heights not considered relevant for the purposes of screening views.

For each applicable stratum the [Regional Ecosystem Technical Descriptions](#) provides:

- **Heights** - average canopy height in metres, range in metres and number of sites values are based on.
- **Cover** - Average percentage canopy cover of the layer, range and number of sites values are based on.
- Average stem density (stems per hectare), range and number of sites values are based on.

The regional ecosystem [framework](#) (numbering) is set out below:

| Bioregion . | Landzone . | Vegetation |
|----------------------|--------------------------|---------------|
| Eg. | | |
| Southeast Qld (12) . | Estuarine wetlands (1) . | mangroves (1) |
| 12.1 .4 | | |

Assumptions

To determine the height for each of the regional ecosystems in the remnant mapping, from a landscape perspective it would be reasonable to use the emergent (E) heights as these typically will represent the tops of the trees that a receptor would be looking into. More conservatively, the high end of the range of canopy tree layer (T1) would be a reasonable assumption for blocking views. However, in light of the fact that the mapped area may have a range of vegetation types and there will be variances in density and accuracy of mapping, to be conservative, typically the applied vegetation height is the average of the canopy tree layer (T1).

However, an exception was regional ecosystems with an average canopy (T1) height of 2m, which is marginally above eye height, such as *banksia aemula low woodland on alluvial plains usually near coast*. Given it is possible to see through a 2m canopy, a height of 1.5m was applied to allow the ZVI to see above these ecosystem types.

Appendix 2 Vegetation height applied to each regional ecosystem outlines the majority regional ecosystem for each identified area and the applied height. In cases where the heights were not available in the technical description, an alternative regional ecosystem number with a similar description was applied as shown in the far right hand column in this appendix.

Non-remnant vegetation

The Queensland Government's QSpatial's catalogue Landsat Foliage Projective Cover (2014) ("FPC") mapping data shows all vegetation types, including the pine plantation areas and remnant vegetation. Given the more sophisticated approach and accuracy in considering the pine plantation and remnant vegetation areas as outlined above, these areas have been omitted from the FPC data. For the remainder of the areas within the FPC data that are identified as trees (with pixel value of more than or equal to 130), it has been found that these areas are non-remnant trees.

Non-remnant trees are frequently eucalyptus trees in the order of 10-25m height. However, acknowledging the non-remnant areas may have relatively sparse trees of varying height, it was elected to be conservative and apply a single 10m vegetation height to all non-remnant trees identified in the FPC mapping layer.

For more information on source data, refer to Appendix 1 Background to vegetation data.

Built environment

Roads and streets

Roads and frequently their verges are un-vegetated and therefore can allow for views down the road, but also side on out between trees and buildings, albeit at some level of speed. Therefore, the following array of varying corridors has been compiled with a 0m vegetation height for the purposes of generating the ZVI, based on the Queensland Government’s QSpatial [Baseline roads and tracks Queensland dataset](#).

Table 1 Road type and easement width allowed for

| Type | Description | Corridor width (including road) | Resolution |
|--------|--------------------------------------------------------------------------|---------------------------------|------------|
| Type 2 | Highway | 80m | 20m |
| Type 3 | Secondary roads | 20m | 10m |
| Type 4 | Local connection roads | 20m | 10m |
| Type 5 | Street local roads (excluding Great Sandy National Park) | 10m | 10m |
| Type 5 | Street local roads (for Great Sandy National Park being dirt 4WD routes) | 6m | 5m |

Urban areas

Urban communities are typically enclosed, with difficulty seeing over a neighbour’s house or fences. Albeit, some houses are designed with an aspect with distant views and therefore no height constraint on visibility in urban communities, or any residents, has been imposed.

Whilst some communities may be shown to see turbines, in reality on the ground, it may or may not be possible when considering fences, signs, trees, traffic, the extent of buildings and any other built environment aspects which can impede long distance views from a built up area.

Vegetation height data applied to the ZVI calculation can be seen in:

- Figure PO9-3 Vegetation heights

3. Tools and assumptions

AWS Truepower has developed an industry standard wind power project design and optimisation tool called OpenWind. CleanSight has extensive experience in using such packages and has applied this tool with the available suitable data, using OpenWind v01.08.00.2886b, to calculate and represent the ZVIs.

There are numerous means of assessing a wind farms visual impact, with visibility factors to be considered including which part of the turbine is visible, the distance from receptor to the turbines (closest and furthest) and the angle that the receptor is looking at the turbines. There are four metrics that can be modelled:

- a) Vertical subtended angle;
- b) Fraction of wind farm visible;
- c) Number of hubs visible; and
- d) Number of tips visible.

The vertical subtended angle is the on only metric that considers distance from the turbines, making it the most relevant for the Project when considering factors affecting the magnitude of impact. The other three metrics can provide indicators of whether part of a turbine may be visible, but have a more limited usefulness in determining the magnitude of impact from turbines as distance increases.

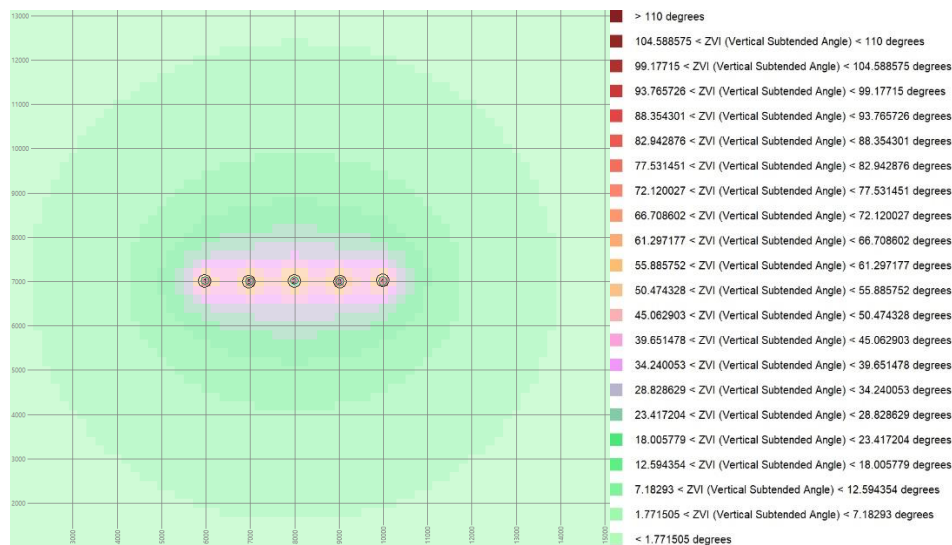
The fraction of wind farm's visibility is the next most relevant metric. It considers any part of a turbine that will be shielded by terrain, vegetation, built environment or curvature of the earth from the receptor.

The number of hubs and tips visible is a basic guide to whether part of a turbine may be visible, but does not consider the distance from the receptor. With the greatest distance in the study from receptor to turbine being over 70km, a turbine may be calculated as theoretically being visible, but with most components only 4m diameter, at 70km the visibility will be questionable in practice and likely indistinguishable. The number of hubs and tips may be used as a reference, but not reliably as a means of assessing the magnitude of impact on a Project of this scale over such large distances.

Vertical subtended angle

The vertical subtended angle is the angle from the receptor to the tip of the turbine. This angle is summed for all vertical subtended angles visible to the receptor in these ZVIs. This metric is a numerical representation of some of the factors comprising the magnitude of change. If for example, there are five turbines in open flat terrain, as shown below, with distance away from the turbines, the vertical subtended angle reduces, representing reduction in the magnitude of change. The reduction is not symmetrical and is shown to be greater in the north south directions, than east west, which reflects the distance from the closest to most distant turbine and the associated reduction of vertical subtended angle and associated impact.

Example of vertical subtended angle



Percentage of wind farm visible

This metric represents the cumulative visible components, divided by the total potential visible wind farm. For example, if only the top half of 10 turbines in a 10 turbine wind farm was visible, then the output would be that 50% of the wind farm is visible. Alternatively, if five full turbines were visible, out of 10, then again, the output would be that 50% of the wind farm is visible.

Whilst this metric is useful, it should be kept in mind that the percentage visible does not consider the distance to the turbines. So, for example, if the output was that 20% of the wind farm was visible from a distance of 10km to the south, then in practice some of these turbines would be 10km away, however the remainder would be between 10km and 50km where the site is 40km long, as is the case with the Project. The turbines at 50km would rarely be clearly visible, and largely not visible at all, but still a contributor to the 20% visible output. For this reason, CleanSight relies on Viento's opinions in terms of impact significance when considering the full breadth of issues considered in the LVIA.

Model inputs

There are a number of input parameters to calculate the ZVI:

- Observer eye level; 1.75m height applied;
- ZVI resolution; 25m horizontal applied;
- Line of site checking distance; 25m applied;
- Maximum distance to consider visual impact; 30km from the closest turbine;
- Application of the curvature of the earth on simple spherical geoid applied; and
- Hub height of up to 200m and tip height of 295m.

4. Extent of assessment

The assessment is a land based ZVI to a distance of 30km from the closest turbine. Views from the air and the water are not considered, but may be in Viento's LVIA.

5. Certainty of results and limitations

The certainty of the results from the ZVI assessment is contingent on the accuracy of the third party data used, the calculations in the OpenWind software package and the assumptions made. A considerable number of spot checks of the vegetation and elevation data sets have been evaluated and are considered to be the most accurate inputs to undertake such an assessment.

To illustrate an example of the model's application, a demonstration area to the north of the site comprising cleared land with strips of non-remnant vegetation, surrounded by remnant vegetation and also local roads is shown in Figure 1 of this report.

Step 1: shows a satellite photo prior to considering the input data sets.

Step 2: shows some of the vegetation communities identified and the determined height. For the remnant vegetation the regional ecosystem technical data was applied, showing the area varying from 1.5m to 17.6m. The non-remnant vegetation had 10m height applied to all identified areas.

Step 3: shows the ZVI output by way of the percentage of the wind farm that would be visible from any point within the fields, or on the roads. It clearly shows that the ZVI model accurately identifies where vegetation will obstruct views to the wind farm, which could either be because the viewer is in the trees that are higher than their observation level, or standing behind trees that are limiting the views. As the distance from trees increases to the north, so too does the percentage of visibility of the wind farm.

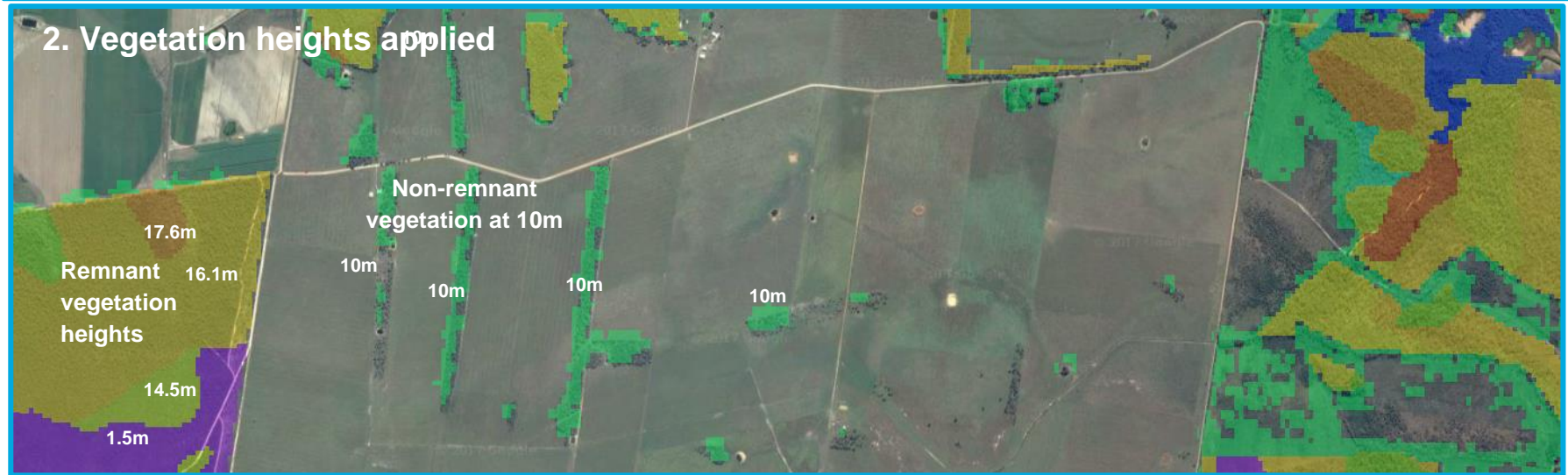
In the same way the vegetation will obscure open views, the terrain elevation data works in the same manner to identify when a view to the turbines will be obstructed.

Notwithstanding the successful example shown above, the viewer of the ZVI should be aware that the vegetation data height assumptions may either be too low (such as in the case of emergent (E) vegetation) or too high in other instances. It may be possible to see turbines through particular vegetation types, or if the vegetation is relatively sparse which may not have been accounted for completely due to the mapping resolution. On balance however, where the ZVI may under-represent visible turbines in some instances, there will be other locations that are over-represented due to the conservative nature of the assumptions outlined. Considering the porosity of the vegetation is outside the scope of this assessment.

1. Satellite image showing vegetation in and around a field



2. Vegetation heights applied



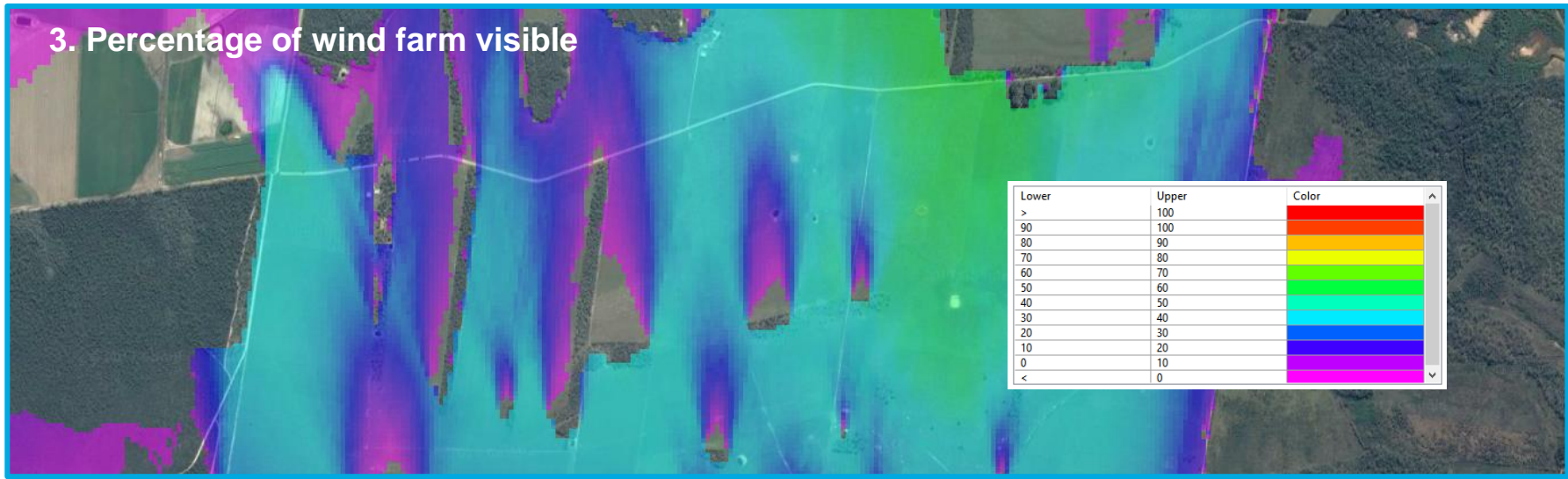


Figure 1 Demonstration of ZVI model

6. Outputs

To view the ZVI outputs please refer to

- Figure PO9-6 ZVI vertical subtended angle
- Figure PO9-7 Protected areas and receptors with ZVI vertical subtended angle
- Figure PO9-8 ZVI of fraction visible
- Figure PO9-9 ZVI of hubs visible
- Figure PO9-10 ZVI of tips visible

A discussion on these outputs has been undertaken by Viento in PO9 – A Landscape and visual amenity assessment report.

Appendix 1 Background to vegetation data

Landsat Foliage Projective Cover - Queensland 2014

Foliage Projective Cover (FPC) is the percentage of ground area occupied by the vertical projection of foliage. The Remote Sensing Centre FPC mapping is based on regression models applied to dry season (May to October) Landsat-5 TM, Landsat-7 ETM+ and Landsat-8 OLI imagery for the period 1988-2014. An annual woody spectral index image is created for each year using a multiple regression model trained from field data collected mostly over the period 1996-1999. A robust regression of the time series of the annual woody spectral index is then performed. The estimated foliage projective cover is the prediction at the date of the selected dry season image for 2014. Where this deviates significantly from the woody spectral index for that date, further tests are undertaken before this estimate is accepted. In some cases, the final estimate is the woody spectral index value rather than the robust regression prediction. The product is further masked to remove areas classified as non-woody (see Landsat Woody Vegetation Extent - Queensland 2014). Corrections have been applied to remove errors due to topographic effects, cloud, cloud shadow, water, cropping, and regrowth following clearing. Some errors may remain. The product was generated from WRS-2 path/row scenes obtained from the United States Geological Survey (USGS).

Vegetation management regional ecosystem and remnant map - version 8.0

This map provides supporting information for assessments under the Vegetation Management Act. The map incorporates elements of the regulated vegetation management map and the remnant regional ecosystem mapping and remnant cover mapping version 8.0. Regional ecosystem information for both remnant and high value regrowth vegetation has been included in this map. 2011 Remnant regional ecosystems mapping at a map scale of 1:100,000 and 1:50,000 in part, based on surveys of vegetation communities and related landform, soils and geology is based on the Landsat imagery for 2011 (Dataset for Queensland incomplete). Version 8.0 regional ecosystem descriptions, as originally described in Sattler & Williams (ed.) (1999) are available for download on the Queensland Government website. (Search on: Regional Ecosystem Description Database). The survey and mapping of regional ecosystems of Queensland provides information for regional groups, non-government organisations, government departments, local government and industry, for planning and management purposes. NOTE: This data is for the purposes of assessments under the Vegetation Management Act 1999 only. Consult the relevant Queensland Herbarium datasets for other purposes.

Appendix 2 Vegetation height applied to each regional ecosystem

| Majority Regional ecosystem | Vegetation height (m) | | |
|-----------------------------|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| | Applied | Description | Reference where height not published |
| 12.1.1 | 11 | Casuarina glauca woodland on margins of marine clay plains | |
| 12.1.2 | 0 | Saltpan vegetation including grassland, herbland and sedgeland on marine clay plains | |
| 12.1.3 | 4 | Mangrove shrubland to low closed forest on marine clay plains and estuaries | |
| 12.11.1 | 20 | Simple notophyll vine forest often with abundant Archontophoenix cunninghamiana (gully vine forest) on metamorphics +/- interbedded volcanics | 12.3.1 |
| 12.11.10 | 20 | Notophyll vine forest +/- Araucaria cunninghamii on metamorphics +/- interbedded volcanics | 12.3.1 |
| 12.11.11 | 20 | Araucarian microphyll vine forest on metamorphics +/- interbedded volcanics; usually southern half of bioregion | 12.3.1 |
| 12.11.12 | 20 | Araucarian complex microphyll vine forest on metamorphics +/- interbedded volcanics; usually northern half of bioregion | 12.3.1 |
| 12.11.13 | 20 | Semi-evergreen vine thicket on metamorphics +/- interbedded volcanics; usually northern half of bioregion | |
| 12.11.14 | 23.2 | Eucalyptus crebra, E. tereticornis, Corymbia intermedia woodland on metamorphics +/- interbedded volcanics | |
| 12.11.15 | 23.2 | Eucalyptus crebra, E. tereticornis, Corymbia intermedia woodland on metamorphics +/- interbedded volcanics | 12.11.14 |
| 12.11.16 | 21 | Eucalyptus tereticornis, Corymbia intermedia open woodland with Xanthorrhoea johnsonii understorey on serpentinite | 12.11.9 |
| 12.11.16x1 | 21 | Eucalyptus tereticornis, Corymbia intermedia open woodland with Xanthorrhoea johnsonii understorey on serpentinite | 12.11.9 |
| 12.11.17 | 24 | Eucalyptus acmenoides or E. portuensis open forest on metamorphics +/- interbedded volcanics | 12.9-10.21 |
| 12.11.18 | 22 | Eucalyptus moluccana woodland on metamorphics +/- interbedded volcanics | |
| 12.11.19 | 26.8 | Eucalyptus fibrosa subsp. fibrosa woodland on metamorphics +/- interbedded volcanics | |
| 12.11.2 | 30 | Eucalyptus saligna or E. grandis, E. microcorys, Lophostemon confertus tall open-forest on metamorphics +/- interbedded volcanics | |
| 12.11.22 | 21.8 | Angophora leiocarpa, Eucalyptus crebra woodland on metamorphics +/- interbedded volcanics | 12.9.10.18 |

| | | | |
|-----------|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| 12.11.3 | 25.2 | Eucalyptus siderophloia, E. propinqua +/- E. microcorys, Lophostemon confertus, Corymbia intermedia, E. acmenoides open-forest on metamorphics +/- interbedded volcanics | |
| 12.11.3a | 22.8 | Lophostemon confertus woodland +/- Eucalyptus microcorys, E. carnea, E. propinqua, E. major, E. siderophloia on metamorphics +/- interbedded volcanics | |
| 12.11.3b | 22.8 | Angophora leiocarpa, Eucalyptus crebra woodland on metamorphics +/- interbedded volcanics | 12.11.3a |
| 12.11.5e | 20.8 | Corymbia citriodora subsp. variegata woodland +/- Eucalyptus siderophloia or crebra, E. carnea, E. propinqua on metamorphics +/- interbedded volcanics | |
| 12.11.5j | 20.6 | Eucalyptus racemosa subsp. racemosa and/or E. seeana and Corymbia intermedia woodland on metamorphics +/- interbedded volcanics | |
| 12.11.6 | 20.8 | Corymbia citriodora subsp. variegata, Eucalyptus crebra woodland on metamorphics +/- interbedded volcanics | 12.11.5e |
| 12.11.7 | 21 | Eucalyptus crebra woodland on metamorphics +/- interbedded volcanics | 12.11.9 |
| 12.11.8 | 16.1 | Eucalyptus melanophloia, E. crebra woodland on metamorphics +/- interbedded volcanics | 12.8.17 |
| 12.11.9 | 21 | Eucalyptus tereticornis subsp. tereticornis or E. tereticornis subsp. basaltica open forest on metamorphics +/- interbedded volcanics. Usually higher altitudes | |
| 12.11.9x1 | 21 | Eucalyptus tereticornis subsp. tereticornis or E. tereticornis subsp. basaltica open forest on metamorphics +/- interbedded volcanics. Usually higher altitudes | |
| 12.12.1 | 21.5 | Simple notophyll vine forest usually with abundant Archontophoenix cunninghamiana (gully vine forest) on Mesozoic to Proterozoic igneous rocks | 12.3.1 |
| 12.12.10 | 3 | Shrubland of rocky peaks on Mesozoic to Proterozoic igneous rocks | |
| 12.12.11 | 17.7 | Eucalyptus portuensis or E. acmenoides, Corymbia trachyphloia subsp. trachyphloia woodland on Mesozoic to Proterozoic igneous rocks | |
| 12.12.12 | 22.2 | Eucalyptus tereticornis, Corymbia intermedia, E. crebra +/- Lophostemon suaveolens woodland on Mesozoic to Proterozoic igneous rocks | |
| 12.12.13 | 21.5 | Araucarian Complex microphyll to notophyll vine forest on Mesozoic to Proterozoic igneous rocks | 12.3.1 |
| 12.12.14 | 16.3 | Eucalyptus racemosa subsp. racemosa, Lophostemon confertus, Eucalyptus acmenoides openforest usually on rocky near coastal areas on Mesozoic to Proterozoic igneous rocks | |
| 12.12.15 | 21.8 | Corymbia intermedia +/- Eucalyptus propinqua, E. siderophloia, E. microcorys, Lophostemon confertus open-forest on Mesozoic to Proterozoic igneous rocks | |
| 12.12.15a | 21.8 | Corymbia intermedia +/- Eucalyptus propinqua, E. siderophloia, E. microcorys, Lophostemon confertus open-forest on Mesozoic to Proterozoic igneous rocks | |
| 12.12.15b | 21.8 | Corymbia intermedia +/- Eucalyptus propinqua, E. siderophloia, E. microcorys, Lophostemon confertus open-forest on Mesozoic to Proterozoic igneous rocks | |

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| 12.12.16 | 21.5 | Notophyll vine forest on Mesozoic to Proterozoic igneous rocks | 12.3.1 |
| 12.12.17 | 21.5 | Semi-evergreen vine thicket on Mesozoic to Proterozoic igneous rocks; usually in southern half of bioregion | 12.3.1 |
| 12.12.18 | 21.5 | Semi-evergreen vine thicket on Mesozoic to Proterozoic igneous rocks; north of bioregion | |
| 12.12.19 | 0 | Vegetation complex of rocky headlands on Mesozoic to Proterozoic igneous rocks | (grassland) |
| 12.12.19x2 | 0 | Vegetation complex of rocky headlands on Mesozoic to Proterozoic igneous rocks | |
| 12.12.19x3 | 0 | Vegetation complex of rocky headlands on Mesozoic to Proterozoic igneous rocks | |
| 12.12.2 | 26.8 | Eucalyptus pilularis tall open forest on Mesozoic to Proterozoic igneous rocks especially granite | 12.11.23 |
| 12.12.22 | 17.7 | Eucalyptus decolor, E. portuensis or E. acmenoides open forest on Mesozoic to Proterozoic igneous rocks | 12.12.11 |
| 12.12.23 | 21 | Eucalyptus tereticornis subsp. tereticornis or E. tereticornis subsp. basaltica +/- E. eugenioides woodland on crests, upper slopes and elevated valleys and plains on Mesozoic to Proterozoic igneous rocks | 12.11.9 |
| 12.12.24 | 21.8 | Angophora leiocarpa, Eucalyptus crebra woodland on Mesozoic to Proterozoic igneous rocks | 12.9-10.18 |
| 12.12.25 | 22.5 | Eucalyptus fibrosa subsp. fibrosa woodland to open forest on Mesozoic to Proterozoic igneous rocks | 12.9-10.19 |
| 12.12.26 | 10 | Acacia harpophylla open forest on Mesozoic to Proterozoic igneous rocks | |
| 12.12.28 | 25 | Eucalyptus moluccana woodland on Mesozoic to Proterozoic igneous rocks | |
| 12.12.3 | 25 | Eucalyptus moluccana open-forest on Mesozoic to Proterozoic igneous rocks | |
| 12.12.4 | 18.3 | Eucalyptus acmenoides +/- Syncarpia glomulifera woodland on Mesozoic to Proterozoic igneous rocks, especially granite | |
| 12.12.5 | 21.7 | Corymbia citriodora subsp. variegata, Eucalyptus crebra open-forest on Mesozoic to Proterozoic igneous rocks | |
| 12.12.7 | 23.2 | Eucalyptus crebra woodland on Mesozoic to Proterozoic igneous rocks | 12.11.14 |
| 12.12.8 | 17.5 | Eucalyptus melanophloia woodland on Mesozoic to Proterozoic igneous rocks | 12.9-10.7 |
| 12.12.9 | 8 | Eucalyptus dura woodland usually on rocky peaks on Mesozoic to Proterozoic igneous rocks | |
| 12.2.1 | 11.7 | Notophyll vine forest on parabolic high dunes | 12.2.2 |
| 12.2.11 | 17.6 | Corymbia tessellaris +/- Eucalyptus tereticornis, C. intermedia and Livistona decora woodland on beach ridges in northern half of bioregion | |
| 12.2.12 | 1.6 | Closed-heath on seasonally waterlogged sand plains | |
| 12.2.13 | 0 | Open or dry heath on dunes and beaches | |
| 12.2.14 | 1.5 | Foredune complex | |
| 12.2.15 | 1.8 | Gahnia sieberiana, Empodisma minus, Gleichenia spp. closed-sedgeland in coastal swamps | |
| 12.2.15a | 1.8 | Gahnia sieberiana, Empodisma minus, Gleichenia spp. closed sedgeland in coastal swamps | 12.2.15 |
| 12.2.15f | 1.8 | Gahnia sieberiana, Empodisma minus, Gleichenia spp. closed sedgeland in coastal swamps | 12.2.15 |

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| 12.2.16 | 0 | Sand blows largely devoid of vegetation | |
| 12.2.2 | 11.7 | Microphyll/notophyll vine forest on beach ridges | |
| 12.2.3 | 4 | Araucarian vine forest on parabolic high dunes | |
| 12.2.4 | 4 | <i>Syncarpia hillii</i> , <i>Lophostemon confertus</i> tall open to closed forest on parabolic high dunes | |
| 12.2.5 | 15.8 | <i>Corymbia intermedia</i> +/- <i>Lophostemon confertus</i> +/- <i>Banksia</i> spp. +/- <i>Callitris columellaris</i> openforest on beach ridges usually in southern half of bioregion | |
| 12.2.6 | 13.5 | <i>Eucalyptus racemosa</i> open-forest on dunes and sand plains. Usually deeply leached soils | |
| 12.2.7 | 15.5 | <i>Melaleuca quinquenervia</i> or rarely <i>M. dealbata</i> open-forest on sand plains | |
| 12.2.8 | 17.3 | <i>Eucalyptus pilularis</i> open-forest on parabolic high dunes | |
| 12.2.9 | 6.2 | <i>Banksia aemula</i> low open-woodland on dunes and sand plains. Usually deeply leached soils | |
| 12.3.1 | 15.5 | Gallery rainforest (notophyll vine forest) on alluvial plains | |
| 12.3.10 | 8 | <i>Eucalyptus populnea</i> woodland on alluvial plains | |
| 12.3.11 | 17.6 | <i>Eucalyptus tereticornis</i> +/- <i>Eucalyptus siderophloia</i> , <i>Corymbia intermedia</i> open forest on alluvial plains usually near coast | 12.2.11 |
| 12.3.11a | 17.6 | <i>Eucalyptus tereticornis</i> +/- <i>Eucalyptus siderophloia</i> , <i>Corymbia intermedia</i> open forest on alluvial plains usually near coast | 12.2.11 |
| 12.3.12 | 13.7 | <i>Eucalyptus latisinensis</i> or <i>E. exserta</i> , <i>Melaleuca viridiflora</i> var. <i>viridiflora</i> woodland on alluvial plains | |
| 12.3.13 | 1.5 | Closed-heathland on seasonally waterlogged alluvial plains usually near coast | |
| 12.3.14 | 1.5 | <i>Banksia aemula</i> low woodland on alluvial plains usually near coast | |
| 12.3.14a | 1.5 | <i>Banksia aemula</i> low woodland on alluvial plains usually near coast | |
| 12.3.2 | 30 | <i>Eucalyptus grandis</i> tall open forest on alluvial plains | 12.11.2 |
| 12.3.3 | 23.8 | <i>Eucalyptus tereticornis</i> woodland on Quaternary alluvium | |
| 12.3.3d | 24.2 | <i>Eucalyptus moluccana</i> woodland on Quaternary alluvium | |
| 12.3.4 | 9.3 | <i>Melaleuca quinquenervia</i> , <i>Eucalyptus robusta</i> woodland on coastal alluvium | 12.3.4a |
| 12.3.5 | 15.6 | <i>Melaleuca quinquenervia</i> open-forest on coastal alluvium | |
| 12.3.5a | 18.3 | <i>Melaleuca quinquenervia</i> , <i>Casuarina glauca</i> +/- <i>Eucalyptus tereticornis</i> open-forest on lowest river terraces | |
| 12.3.6 | 15.3 | <i>Melaleuca quinquenervia</i> , <i>Eucalyptus tereticornis</i> , <i>Lophostemon suaveolens</i> open-forest on coastal alluvial plains | |
| 12.3.7 | 19.4 | <i>Eucalyptus tereticornis</i> , <i>Casuarina cunninghamiana</i> subsp. <i>cunninghamiana</i> +/- <i>Melaleuca</i> spp. fringing woodland | |
| 12.3.7a | 19.4 | <i>Eucalyptus tereticornis</i> , <i>Casuarina cunninghamiana</i> subsp. <i>cunninghamiana</i> +/- <i>Melaleuca</i> spp. fringing woodland | 12.3.7 |

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| 12.3.7b | 19.4 | Eucalyptus tereticornis, Casuarina cunninghamiana subsp. cunninghamiana +/- Melaleuca spp. fringing woodland | 12.3.7 |
| 12.3.7c | 19.4 | Eucalyptus tereticornis, Casuarina cunninghamiana subsp. cunninghamiana +/- Melaleuca spp. fringing woodland | 12.3.7 |
| 12.3.7d | 19.4 | Eucalyptus tereticornis, Casuarina cunninghamiana subsp. cunninghamiana +/- Melaleuca spp. fringing woodland | 12.3.7 |
| 12.3.8 | 0 | Swamps with Cyperus spp., Schoenoplectus spp. and Eleocharis spp | |
| 12.5.1 | 24.3 | Open forest complex with Corymbia citriodora subsp. variegata on subcoastal remnant Tertiary surfaces. Usually deep red soils | 12.5.7 |
| 12.5.10 | 14.5 | Banksia aemula low open-woodland on complex of remnant Tertiary surface and Tertiary sedimentary rocks | |
| 12.5.11 | 19.3 | Syncarpia glomulifera woodland on complex of remnant Tertiary surface and Tertiary sedimentary rocks | |
| 12.5.12 | 13.5 | Eucalyptus racemosa subsp. racemosa, E. latisinensis +/- Corymbia gummifera, C. intermedia, E. bancroftii woodland with heathy understorey on remnant Tertiary surfaces | 12.2.6 |
| 12.5.13a | 21.5 | Microphyll to notophyll vine forest +/- Araucaria cunninghamii on remnant Tertiary surfaces | 12.3.1 |
| 12.5.13b | 21.5 | Microphyll to notophyll vine forest +/- Araucaria cunninghamii on remnant Tertiary surfaces | 12.3.1 |
| 12.5.13c | 21.5 | Microphyll to notophyll vine forest +/- Araucaria cunninghamii on remnant Tertiary surfaces | 12.3.1 |
| 12.5.1a | 24.3 | Open forest complex with Corymbia citriodora subsp. variegata on subcoastal remnant Tertiary surfaces. Usually deep red soils | 12.5.7 |
| 12.5.1b | 24.3 | Open forest complex with Corymbia citriodora subsp. variegata on subcoastal remnant Tertiary surfaces. Usually deep red soils | 12.5.7 |
| 12.5.1e | 24.3 | Open forest complex with Corymbia citriodora subsp. variegata on subcoastal remnant Tertiary surfaces. Usually deep red soils | 12.5.7 |
| 12.5.2 | 19.3 | Corymbia intermedia, Eucalyptus tereticornis open-forest on remnant Tertiary surfaces, usually near coast. Usually deep red soils | |
| 12.5.2a | 15.8 | Corymbia intermedia, Eucalyptus tereticornis open forest on remnant Tertiary surfaces, usually near coast. Usually deep red soils | 12.2.5 |
| 12.5.2b | 15.8 | Corymbia intermedia, Eucalyptus tereticornis open forest on remnant Tertiary surfaces, usually near coast. Usually deep red soils | 12.2.5 |
| 12.5.3 | 23.7 | Eucalyptus racemosa woodland on remnant Tertiary surfaces | |
| 12.5.4 | 16.1 | Eucalyptus spp., Corymbia spp., Melaleuca spp. woodland on complex of remnant Tertiary surfaces and Cainozoic and Mesozoic sediments | |

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| 12.5.4a | 16.1 | Eucalyptus spp., Corymbia spp., Melaleuca spp. woodland on complex of remnant Tertiary surfaces and Cainozoic and Mesozoic sediments | |
| 12.5.5 | 22.8 | Eucalyptus portuensis, Corymbia intermedia open-forest on remnant Tertiary surfaces. Usually deep red soils | |
| 12.5.6a | 22.8 | Eucalyptus siderophloia, E. propinqua, E. microcorys and/or E. pilularis open forest on remnant Tertiary surfaces. Usually deep red soils | 12.3.11 |
| 12.5.6c | 22.8 | Eucalyptus siderophloia, E. propinqua, E. microcorys and/or E. pilularis open forest on remnant Tertiary surfaces. Usually deep red soils | |
| 12.5.7 | 24.3 | Corymbia citriodora subsp. variegata +/- Eucalyptus portuensis, E. fibrosa subsp. fibrosa openforest on remnant Tertiary surfaces. Usually deep red soils | 12.5.7a |
| 12.5.7a | 24.3 | Corymbia citriodora subsp. variegata +/- Eucalyptus portuensis, E. fibrosa subsp. fibrosa openforest on remnant Tertiary surfaces. Usually deep red soils | |
| 12.5.8 | 20 | Eucalyptus hallii open woodland on complex of remnant Tertiary surface and Tertiary sedimentary rocks | |
| 12.5.9 | 1.5 | Sedgeland to heathland in low lying areas on complex of remnant Tertiary surface and Tertiary sedimentary rocks | 12.3.13 |
| 12.5.9a | 1.5 | Sedgeland to heathland in low lying areas on complex of remnant Tertiary surface and Tertiary sedimentary rocks | 12.3.13 |
| 12.7.1 | 22.5 | Eucalyptus fibrosa subsp. fibrosa and/or Corymbia trachyphloia subsp. trachyphloia woodland on jump-ups | 12.9-10.19 |
| 12.8.13 | 20 | Araucarian complex microphyll vine forest on Cainozoic igneous rocks | |
| 12.8.14 | 23.1 | Eucalyptus eugenioides +/- E. biturbinata, E. melliodora woodland on Cainozoic igneous rocks | |
| 12.8.16 | 16.3 | Eucalyptus crebra +/- E. melliodora, E. tereticornis woodland on Cainozoic igneous rocks | |
| 12.8.17 | 16.1 | Eucalyptus melanophloia +/- E. crebra, E. tereticornis, Corymbia tessellaris woodland on Cainozoic igneous rocks | |
| 12.8.19 | 0 | Heath and rock pavement with scattered shrubs or open woodland on Cainozoic igneous hills and mountains | |
| 12.8.1a | 30.3 | Eucalyptus campanulata tall open-forest on Cainozoic igneous rock | |
| 12.8.20 | 1.5 | Shrubby woodland with Eucalyptus racemosa subsp. racemosa or E. dura on Cainozoic igneous rocks | |
| 12.8.21 | 3 | Semi-evergreen vine thicket with Brachychiton rupestris on Cainozoic igneous rocks. Usually southern half of bioregion | |
| 12.8.22 | 3 | Semi-evergreen vine thicket with Brachychiton australis on Cainozoic igneous rocks. Usually northern half of bioregion | |
| 12.8.23 | 10 | Acacia harpophylla open forest on Cainozoic igneous rocks | |
| 12.8.24 | 24.3 | Corymbia citriodora subsp. variegata open forest on Cainozoic igneous rocks especially trachyte | 12.5.7 |

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| 12.8.25 | 24 | Open forest with <i>Eucalyptus acmenoides</i> or <i>E. helidonica</i> on Cainozoic igneous rocks especially trachyte | 12.9-10.21 |
| 12.8.3 | 15 | Complex notophyll vine forest on Cainozoic igneous rocks. Altitude <600m | |
| 12.8.8 | 25 | <i>Eucalyptus siderophloia</i> , <i>E. microcorys</i> , <i>Corymbia intermedia</i> +/- <i>E. propinqua</i> , <i>E. carnea</i> openforest on Cainozoic igneous rocks | |
| 12.8.8a | 25 | <i>Eucalyptus siderophloia</i> , <i>E. microcorys</i> , <i>Corymbia intermedia</i> +/- <i>E. propinqua</i> , <i>E. carnea</i> openforest on Cainozoic igneous rocks | |
| 12.8.9 | 15.8 | <i>Lophostemon confertus</i> open forest on Cainozoic igneous rocks | 12.2.5 |
| 12.9-10.1 | 30 | Tall open forest often with <i>Eucalyptus resinifera</i> , <i>E. grandis</i> , <i>E. robusta</i> , <i>Corymbia intermedia</i> on sedimentary rocks. Coastal | 12.11.2 |
| 12.9-10.14 | 31.4 | <i>Eucalyptus pilularis</i> tall open-forest on sedimentary rocks | 12.9-10.14 |
| 12.9-10.14a | 31.4 | <i>Eucalyptus pilularis</i> tall open-forest on sedimentary rocks | |
| 12.9-10.15 | 15 | Semi-evergreen vine thicket with <i>Brachychiton rupestris</i> on sedimentary rocks | |
| 12.9-10.16 | 21.5 | Araucarian microphyll to notophyll vine forest on Cainozoic and Mesozoic sediments | 12.3.1 |
| 12.9-10.17 | 17.7 | <i>Eucalyptus acmenoides</i> , <i>E. major</i> , <i>E. siderophloia</i> +/- <i>Corymbia citriodora</i> subsp. <i>variegata</i> woodland on sedimentary rocks | 12.12.11 |
| 12.9-10.17a | 26 | <i>Corymbia citriodora</i> subsp. <i>variegata</i> +/- <i>Eucalyptus acmenoides</i> , <i>Angophora leiocarpa</i> , <i>E. siderophloia</i> woodland on Cainozoic and Mesozoic sediments | 12.9-10.17a |
| 12.9-10.17b | 26 | <i>Corymbia citriodora</i> subsp. <i>variegata</i> +/- <i>Eucalyptus acmenoides</i> , <i>Angophora leiocarpa</i> , <i>E. siderophloia</i> woodland on Cainozoic and Mesozoic sediments | |
| 12.9-10.17d | 26.7 | <i>Lophostemon confertus</i> , <i>Corymbia intermedia</i> +/- <i>Eucalyptus siderophloia</i> , <i>E. propinqua</i> openforest on sedimentary rocks | |
| 12.9-10.18 | 21.8 | <i>Angophora leiocarpa</i> , <i>Eucalyptus crebra</i> woodland on sedimentary rocks | 12.9-10.18 |
| 12.9-10.18b | 21.8 | <i>Angophora leiocarpa</i> , <i>Eucalyptus crebra</i> woodland on sedimentary rocks | |
| 12.9-10.19 | 22.5 | <i>Eucalyptus fibrosa</i> subsp. <i>fibrosa</i> woodland on sedimentary rocks | |
| 12.9-10.1x1 | 30 | Tall open forest often with <i>Eucalyptus resinifera</i> , <i>E. grandis</i> , <i>E. robusta</i> , <i>Corymbia intermedia</i> on sedimentary rocks. Coastal | 12.11.2 |
| 12.9-10.2 | 21.2 | <i>Corymbia citriodora</i> subsp. <i>variegata</i> +/- <i>Eucalyptus crebra</i> open-forest on sedimentary rock | |
| 12.9-10.21 | 24 | <i>Eucalyptus acmenoides</i> or <i>E. portuensis</i> woodland usually with <i>Corymbia trachyphloia</i> on Cainozoic to Proterozoic sediments | |
| 12.9-10.22 | 1.5 | Closed sedgeland/shrubland on sedimentary rocks. Generally coastal | 12.3.3 |
| 12.9-10.3 | 22.2 | <i>Eucalyptus moluccana</i> woodland on sedimentary rocks | |
| 12.9-10.4 | 23.2 | <i>Eucalyptus racemosa</i> subsp. <i>racemosa</i> woodland on sedimentary rocks | |

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| 12.9-10.7 | 17.5 | Eucalyptus crebra +/- E. tereticornis, Corymbia tessellaris, Angophora spp., E. melanophloia woodland on sedimentary rocks | |
| 12.9-10.7a | 23.5 | Eucalyptus siderophloia, Corymbia intermedia +/- E. tereticornis and Lophostemon suaveolens open-forest on sedimentary rocks | |
| 12.9-10.9 | 1.5 | Shrubland/low woodland on sandstone lithosols | 12.3.3 |
| canal | 0 | canal | |
| estuary | 0 | estuary | |
| hoop | 0 | hoop | |
| non-rem | 0 | non-rem | |
| ocean | 0 | ocean | |
| plant | 0 | plant | |
| sand | 0 | sand | |
| small_i | 0 | small_i | |
| water | 0 | water | |